Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles

Response to Comments

United States
Environmental Protection
Agency

Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles

Response to Comments

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

EPA United States Environmental Protection Agency

EPA-420-R-24-005
March 2024

Introduction

EPA's Proposed Rule, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," was signed by Administrator Michael Regan on April 11, 2023. A pre-publication version of the proposal was made available on EPA's website on April 12, 2023, after Administrator Regan's announcement of the program but prior to publication of the proposal in the Federal Register on May 5, 2023 (88 FR 29184 et seq.). The proposal indicated that the rule would be open for public comment until July 5, 2023. The Docket ID No. for the rule is EPA-HQ-OAR-2022-0829.

This Response to Comments (RTC) document is a compilation of public comments submitted to the public docket for this rule as well as EPA responses to those comments. Some aspects of our responses appear in the preamble to the final rule or other documents in this rule's docket and are incorporated by reference in this document.

This RTC document is organized by category of comment topic. The original documents submitted by commenters, including any attachments, footnotes, tables, and figures are included in the docket.

More than 252,400 written comments on the proposal were submitted to the public docket. The vast majority of these, nearly 248,000 comments, were submitted in the form of 46 mass comment campaigns. Some of these are identical letters submitted by many individuals, while others consist of a petition with many signatures. The vast majority of comments submitted in the form of mass comment campaigns express general support for the proposed rule or urge EPA to adopt even more stringent standards to reduce air emissions from light- and medium-duty vehicles, although some other mass comment campaign commenters urged EPA not to adopt the proposal. More information about the mass comment campaigns can be found in Appendix B to this RTC document. Mass comment campaigns that provided comments on specific aspects of the proposal are reproduced verbatim in this RTC document.

There were about 4,600 other, individual comments on the proposal submitted to the public docket by individuals, organizations, companies, or government entities. Many of these comments express support for the proposal or urge EPA to adopt more stringent standards, although some express concern with or opposition to its adoption.

Of these comments, approximately 240 comments provide specific views on elements of the proposal, information and feedback about particular data or assumptions used in EPA's analysis supporting the proposal, or other aspects of the proposal. A list of these comments can be found at the beginning of this RTC document. They are reproduced verbatim, in excerpts, in the following sections, organized by issue topic. Each section includes a summary of the comments received on that topic and EPA's response. Note that an individual comment or part of an individual comment submitted by a particular commenter may be reproduced in more than one section of this document if it contains observations on more than one aspect of an issue. It is worth noting that if a comment has been reproduced in more than one section it may be addressed in only one of those sections. Conversely, an individual comment that touches on several issues may not be duplicated verbatim across this document if the same issues were raised by other commenters. In other words, the responses contained in this document reply to the comments raised in the public process and are not solely to the specific commenters' verbatim comments that precede the responses in the document. Finally, if several commenters submit an identical comment, only one comment is included verbatim in the document; the others are noted on the list of comments for the included comment.

An additional 4,300 individual comments on the proposal express general support for or opposition to the proposal and/or contain opinions or statements about issues but without detailed data, information, or comment relating to specific provisions of the proposal or EPA's supporting analysis. These comments are not reproduced verbatim in this document because they do not raise issues with reasonable specificity. However, we note that we have provided a detailed rationale for the final rule in the preamble and that, to the extent the same issues were raised by other commenters with reasonable specificity, they are addressed in our responses in this document. These comments are listed in Appendix A along with a brief description of their overall nature.

EPA held a public hearing on the proposal, and the transcript of that hearing is included in the docket (EPA-HQ-OAR-2022-0829-5115). During the 3-day public hearing (May 9-11, 2023), 217 individuals testified. Appendix C contains a list of the testifiers and a brief description of the overall nature of the testimony. If public testimony provides information that is specific in nature and was not subsequently included in written comments submitted by the testifier or the testifier's organization, that statement is included verbatim in this RTC document. Additional comments received after the comment period closed and through December 15, 2023, were considered to the extent practicable. See Section 29 for these comments and EPA responses.

The responses presented in this RTC document are intended to augment the rationale and responses to comments that appear in the preamble to the final rule and to address comments not discussed in the preamble to the final rule. To the extent there is any confusion or apparent inconsistency between this RTC document and the preamble, the preamble itself remains the definitive statement of the rationale for the final rule. This document, together with the preamble to the final rule and the information contained in the Regulatory Impact Analysis, and related technical support documents, should be considered collectively as EPA's response to all of the significant comments submitted on the proposal.

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List of commenters' excerpts included verbatim in this document

Index	Document Number		Other Signatures
1	EPA-HQ-OAR-2022-0829-0490	Anonymous public comment	
2	EPA-HQ-OAR-2022-0829-0562	Anonymous public comment	
3	EPA-HQ-OAR-2022-0829-0565	Anonymous public comment	
4	EPA-HQ-OAR-2022-0829-0627	Anonymous public comment	
5	EPA-HQ-OAR-2022-0829-0573	25x'25 Alliance, et al.	
6	EPA-HQ-OAR-2022-0829-0517	A. Longo (forename not provided)	
7	EPA-HQ-OAR-2022-0829-0509	Ad Hoc Tier 4 Light-Duty Small Manufacturer Group	
8	EPA-HQ-OAR-2022-0829-0736	Ad Hoc Tier 4 Light-Duty Small OEM Group	
9	EPA-HQ-OAR-2022-0829-0695	Advanced Energy United	
10	EPA-HQ-OAR-2022-0829-5115, Day 1	Alex Stavis	
11	EPA-HQ-OAR-2022-0829-0701	Alliance for Automotive Innovation	
12	EPA-HQ-OAR-2022-0829-0534	Alliance for Consumers (AFC)	
13	EPA-HQ-OAR-2022-0829-0631	Alliance for Vehicle Efficiency (AVE)	
14	EPA-HQ-OAR-2022-0829-0666	American Chemistry Council Product Approval Protocol Task Group (PAPTG)	
15	EPA-HQ-OAR-2022-0829-0663	American Chemistry Council, Fuel Additives Task Group (FATG)	
16	EPA-HQ-OAR-2022-0829-0613	American Coalition for Ethanol (ACE)	
17	EPA-HQ-OAR-2022-0829-0642	American Council for an Energy-Efficient Economy (ACEEE)	

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18	EPA-HQ-OAR-2022-0829-0571	American Enterprise Institute	
19	EPA-HQ-OAR-2022-0829-0683	American Free Enterprise Chamber of Commerce (AmFree) et al.	The AmFree Center for Legal Action, the Energy Equipment and Infrastructure Alliance, Golden Grain Energy, LLC, and Lincolnway Energy, LLC
20	EPA-HQ-OAR-2022-0829-0699	American Freedom and America First Policy Institute (AFPI)	
21	EPA-HQ-OAR-2022-0829-0733	American Fuel & Petrochemical Manufacturers	
22	EPA-HQ-OAR-2022-0829-0696	American Highway Users Alliance	
23	EPA-HQ-OAR-2022-0829-0652	American Honda Motor Co., Inc.	
24	EPA-HQ-OAR-2022-0829-0745	American Lung Association (ALA)	Allergy & Asthma Network, Alliance of Nurses for Healthy Environments, American College of Physicians, American Medical Association, American Public Health Association, American Thoracic Society, Asthma and Allergy Foundation of America, Children's Environmental Health Network, Climate Psychiatry Alliance, Health Care Without Harm, Medical Society Consortium on Climate and Health, National Association of Pediatric Nurse Practitioners, and Physicians for Social Responsibility
25	EPA-HQ-OAR-2022-0829-0641	American Petroleum Institute (API)	
26	EPA-HQ-OAR-2022-0829-5115, Day 3	Andrea Strzelec	
27	EPA-HQ-OAR-2022-0829-0741	Arconic Corporation (ARCO)	
28	EPA-HQ-OAR-2022-0829-0533	Arizona Department of Environmental Quality (ADEQ)	

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29	EPA-HQ-OAR-2022-0829-0537	Arizona State Legislature	
30	EPA-HQ-OAR-2022-0829-0566	Aston Martin Lagonda (AML)	
31	EPA-HQ-OAR-2022-0829-0746	Attorney General's Office, State of California et al.	States of California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Maine, Maryland, Minnesota, New Jersey, New Mexico, New York, North Carolina, Oregon, Rhode Island, Vermont, Washington, and Wisconsin; the Commonwealths of Massachusetts and Pennsylvania; the District of Columbia; the City and County of Denver; and the Cities of Chicago, Los Angeles, New York, and Oakland
32	EPA-HQ-OAR-2022-0829-0654	Betsy Cooper and Aaron Barkhouse	
33	EPA-HQ-OAR-2022-0829-5115, Day 2	Billy Brooks	
34	EPA-HQ-OAR-2022-0829-0667	BlueGreen Alliance (BGA)	
35	EPA-HQ-OAR-2022-0829-0677	BMW of North America, LLC (BMW NA)	
36	EPA-HQ-OAR-2022-0829-0640	BorgWarner Inc.	
37	EPA-HQ-OAR-2022-0829-5115, Day 3	Brian Kalina	
38	EPA-HQ-OAR-2022-0829-5115, Day 2	Brian Russo	
39	EPA-HQ-OAR-2022-0829-0780	California Air Resources Board (CARB) (Part 1 of 5)	
40	EPA-HQ-OAR-2022-0829-0618	CALSTART	
41	EPA-HQ-OAR-2022-0829-0658	Center for American Progress (CAP)	
42	EPA-HQ-OAR-2022-0829-0671	Center for Biological Diversity et al.	

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43	EPA-HQ-OAR-2022-0829-0600	Ceres BICEP (Business for Innovative Climate and Energy Policy) Network	
44	EPA-HQ-OAR-2022-0829-0511	Ceres Corporate Electric Vehicle Alliance (CEVA)	
45	EPA-HQ-OAR-2022-0829-0738	Charles Forsberg	
46	EPA-HQ-OAR-2022-0829-0747	Charles Gordon	
47	EPA-HQ-OAR-2022-0829-3644	Chemours Company FC, LLC	
48	EPA-HQ-OAR-2022-0829-0553	Chevron	
49	EPA-HQ-OAR-2022-0829-0626	Clean Fuels Alliance America	
50	EPA-HQ-OAR-2022-0829-0630	Clean Fuels Development Coalition (CDFC)	
51	EPA-HQ-OAR-2022-0829-0712	Clean Fuels Development Coalition et al.	The Corn Producers Association of Texas, ICM Inc., the Illinois Corn Growers Association, the Indiana Corn Marketing Council, the Iowa Corn Growers Association, the Kansas Corn Growers Association, the Kentucky Corn Growers Association, the Michigan Corn Growers Association, the Missouri Corn Growers Association, the Nebraska Corn Growers Association, the South Dakota Corn Growers Association, and the Wisconsin Corn Growers Association
52	EPA-HQ-OAR-2022-0829-0608	Coalition for Safe Autonomous Vehicles and Electrification (SAVE)	
53	EPA-HQ-OAR-2022-0829-0694	Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment	

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54	EPA-HQ-OAR-2022-0829-0611	Competitive Enterprise Institute	
55	EPA-HQ-OAR-2022-0829-0788	Consumer Energy Alliance (CEA)	
56	EPA-HQ-OAR-2022-0829-0728	Consumer Reports (CR)	Consumer Reports petition with 18,817 signatures included as Attachment 1 to the main comment
57	EPA-HQ-OAR-2022-0829-0665	Countymark	
58	EPA-HQ-OAR-2022-0829-0645	Cummins Inc.	
59	EPA-HQ-OAR-2022-0829-0538	Dana Incorporated	
60	EPA-HQ-OAR-2022-0829-0526	Daniel Hellebuyck	
61	EPA-HQ-OAR-2022-0829-0519	Darius (no surname provided)	
62	EPA-HQ-OAR-2022-0829-0513	David B Manley III	
63	EPA-HQ-OAR-2022-0829-0548	David Hallberg	
64	EPA-HQ-OAR-2022-0829-0518	David Pedersen	
65	EPA-HQ-OAR-2022-0829-0527	Delek US Holdings, Inc.	
66	EPA-HQ-OAR-2022-0829-0651	DENSO Corporation	
67	EPA-HQ-OAR-2022-0829-0550	District of Columbia Department of Energy and Environment (DOEE)	
68	EPA-HQ-OAR-2022-0829-0546	Donn Viviani	
69	EPA-HQ-OAR-2022-0829-0697	Donn Viviani	
70	EPA-HQ-OAR-2022-0829-5115, Day 2	Donna Jackson	
71	EPA-HQ-OAR-2022-0829-0500	Doug Peterson	
72	EPA-HQ-OAR-2022-0829-5089	Dylan Ondek	
73	EPA-HQ-OAR-2022-0829-0734	East Kansas Agri-Energy (EKAE)	

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74	EPA-HQ-OAR-2022-0829-0708	Edison Electric Institute (EEI)	
75	EPA-HQ-OAR-2022-0829-0737	Elders Climate Action	
76	EPA-HQ-OAR-2022-0829-0589	Electric Drive Transportation Association (EDTA)	
77	EPA-HQ-OAR-2022-0829-0588	Electrification Coalition (EC)	
78	EPA-HQ-OAR-2022-0829-0568	Elizabeth Boynton	
79	EPA-HQ-OAR-2022-0829-0561	Energy Innovation	
80	EPA-HQ-OAR-2022-0829-0616	Energy Marketers of America (EMA)	
81	EPA-HQ-OAR-2022-0829-0610	Energy Strategy Coalition	
82	EPA-HQ-OAR-2022-0829-0786	Environmental Defense Fund (EDF) (1of 2)	
83	EPA-HQ-OAR-2022-0829-0759	Environmental. and Public Health Organizations	Center for Biological Diversity, Conservation Law Foundation, Environmental Law & Policy Center, Natural Resources Defense Council, Public Citizen, Sierra Club, the Union of Concerned Scientists
84	EPA-HQ-OAR-2022-0829-0632	Exxon Mobil Corporation	
85	EPA-HQ-OAR-2022-0829-0710	Fermata Energy	
86	EPA-HQ-OAR-2022-0829-0572	Ferrari N.V. and Ferrari North America, Inc.	
87	EPA-HQ-OAR-2022-0829-0605	Ford Motor Company	
88	EPA-HQ-OAR-2022-0829-0432	Fred Reitman	
89	EPA-HQ-OAR-2022-0829-0711	Fuel Freedom Foundation	
90	EPA-HQ-OAR-2022-0829-0455	Gabrielle Lawrence	
91	EPA-HQ-OAR-2022-0829-0700	General Motors, LLC (GM)	
92	EPA-HQ-OAR-2022-0829-0426	George White	

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93	EPA-HQ-OAR-2022-0829-1136	Glenn Passavant	
94	EPA-HQ-OAR-2022-0829-0621	Governing for Impact and Evergreen Action (GFI)	
95	EPA-HQ-OAR-2022-0829-0457	Green Diesel Engineering LLC	
96	EPA-HQ-OAR-2022-0829-0789	GreenLatinos et al.	Alliance of Nurses for Healthy Environments, CALSTART, C40 Cities, Center for Biological Diversity, Chispa LCV, Clean Air Coalition Laredo, Clean Energy Works, Coltura, Conservation Law Foundation, Dream.org, Earthjustice, Electric Vehicle Association, Endangered Species Coalition, EVHybridNoire, EV Charging for All Coalition (EVCAC), Evergreen Action, GRID Alternatives, itselectric, La MaraÃ±a, Mothers Out Front Silicon Valley, New Mexico Voices for Children, Plug In America, Project Green Home, Prosperity Works, Respiratory Health Association, Responsible Alpha, Sierra Club, Southern Alliance for Clean Energy, Southwest Energy Efficiency Project, The Asthma and Allergy Foundation of America, The Reno + Sparks Chamber of Commerce, Together for Brothers (T4B), Warehouse Workers for Justice, and Zero Emission Transportation Association (ZETA).
97	EPA-HQ-OAR-2022-0829-0685	Greg Dotson	
98	EPA-HQ-OAR-2022-0829-0560	GROWMARK, Inc.	
99	EPA-HQ-OAR-2022-0829-0580	Growth Energy	
100	EPA-HQ-OAR-2022-0829-0579	HF Sinclair Corporation	

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101	EPA-HQ-OAR-2022-0829-0554	Hyundai America Technical Center, Inc. (HATCI)	
102	EPA-HQ-OAR-2022-0829-0599	Hyundai Motor America	
103	EPA-HQ-OAR-2022-0829-0756	Illinois Corn Growers Association	
104	EPA-HQ-OAR-2022-0829-0532	Illinois Farm Bureau (IFB)	
105	EPA-HQ-OAR-2022-0829-0545	Ingevity Corporation	
106	EPA-HQ-OAR-2022-0829-0673	Institute for Energy Research (IER)	
107	EPA-HQ-OAR-2022-0829-0601	Institute for Policy Integrity at New York University School of Law	
108	EPA-HQ-OAR-2022-0829-0743	Institute for Policy Integrity at NYU School of Law et al.	Comment Signees: Clean Air Task Force, Environmental Defense Fund, Montana Environmental Information Center, Natural Resources Defense Council and Sierra Club
109	EPA-HQ-OAR-2022-0829-0530	Interfaith Power & Light	
110	EPA-HQ-OAR-2022-0829-0569	International Council on Clean Transportation (ICCT)	
111	EPA-HQ-OAR-2022-0829-0614	International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)	
112	EPA-HQ-OAR-2022-0829-0681	Jack Spencer	
113	EPA-HQ-OAR-2022-0829-0744	Jaguar Land Rover NA, LLC (JLR)	
114	EPA-HQ-OAR-2022-0829-0514	Jeremy Michalek and Matthew Bruchon	
115	EPA-HQ-OAR-2022-0829-0705	Jeremy Michalek et al.	Connor Forsythe, Kenneth Gillingham, Johnathan Vicente and Kate Whitefoot, Researchers,

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			Carnegie Mellon University and Yale University
116	EPA-HQ-OAR-2022-0829-0706	Jeremy Michalek et al.	Anthony Cheng, Valerie Karplus, and Kate Whitefoot, Researchers at Carnegie Mellon University
117	EPA-HQ-OAR-2022-0829-0497	Jim Hays	
118	EPA-HQ-OAR-2022-0829-0709	Job Creators Network Foundation (JCNF)	
119	EPA-HQ-OAR-2022-0829-0585	John Graham	
120	EPA-HQ-OAR-2022-0829-1648	John Noble	
121	EPA-HQ-OAR-2022-0829-5115, Day 2	Jonathan Walker	
122	EPA-HQ-OAR-2022-0829-0635	Joshua Linn	
123	EPA-HQ-OAR-2022-0829-0617	KALA Engineering Consultants	
124	EPA-HQ-OAR-2022-0829-1049	Kari Ostlie	
125	EPA-HQ-OAR-2022-0829-0703	Kate Whitefoot	
126	EPA-HQ-OAR-2022-0829-0649	Kentucky Office of the Attorney General et al.	
127	EPA-HQ-OAR-2022-0829-0440	Kevin Murphy	
128	EPA-HQ-OAR-2022-0829-0555	Kia Corporation	
129	EPA-HQ-OAR-2022-0829-0547	Landmark Legal Foundation	
130	EPA-HQ-OAR-2022-0829-0739	Letter Campaign, Ethanol Producers (7)	Letter submitted by seven commenters; it is reproduced only once: Commonwealth Agri-Energy LLC (EPA-HQ-OAR-2022-0829-0739). The other commenters are: Highwater Ethanol, LLC (EPA-HQ-OAR-2022-0829-0552), Heartland Corn Products (EPA-HQ-OAR-2022-0829-0622), Absolute Energy, LLC (EPA-HQ-OAR-2022-0829-0716), Trenton Agri Products LLC

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			(EPA-HQ-OAR-2022-0829-0755), Western New York Energy LLC (EPA-HQ-OAR-2022-0829-0753), Southwest Iowa Renewable Energy LLC (EPA-HQ-OAR-2022-0829-0582)]
131	EPA-HQ-OAR-2022-0829-0489	Lillian Davey	
132	EPA-HQ-OAR-2022-0829-5115, Day 1	Lisa Allee	
133	EPA-HQ-OAR-2022-0829-0664	Lucid Group, Inc.	
134	EPA-HQ-OAR-2022-0829-0593	Marathon Petroleum Corporation (MPC)	
135	EPA-HQ-OAR-2022-0829-0522	Marie Gluesenkamp Perez, and Mary Sattler Peltola, Members of Congress, Congress of the United States	
136	EPA-HQ-OAR-2022-0829-0689	Mario Loyola	
137	EPA-HQ-OAR-2022-0829-0698	Maryland Department of the Environment (MDE)	
138	EPA-HQ-OAR-2022-0829-0692	Mass Comment Campaign sponsored by Arizona Interfaith Power & Light. (web) (216 signatures)	
139	EPA-HQ-OAR-2022-0829-0722	Mass Comment Campaign sponsored by Center for Biological Diversity. (web) (12,460 signatures)	
140	EPA-HQ-OAR-2022-0829-0757	Mass Comment Campaign sponsored by Michigan Corn Growers Association (MCGA). (email) (30 signatures)	
141	EPA-HQ-OAR-2022-0829-0718	Mass Comment Campaign sponsored by Missouri Corn Growers Association (MCGA). (web) (168 signatures)	
142	EPA-HQ-OAR-2022-0829-0724	Mass Comment Campaign sponsored by Specialty	

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		Equipment Market Association (SEMA). (web) (1,488 signatures)	
143	EPA-HQ-OAR-2022-0829-1700	Mass Comment Campaign sponsoring organization unknown (web) (679 signatures)	
144	EPA-HQ-OAR-2022-0829-1701	Mass Comment Campaign sponsoring organization unknown (118 signatures)	
145	EPA-HQ-OAR-2022-0829-1702	Mass Comment Campaign sponsoring organization unknown (5,465 signatures)	
146	EPA-HQ-OAR-2022-0829-1704	Mass Comment Campaign sponsoring organization unknown (44,335 signatures)	
147	EPA-HQ-OAR-2022-0829-1707	Mass Comment Campaign sponsoring organization unknown (2,088 signatures)	
148	EPA-HQ-OAR-2022-0829-1709	Mass Comment Campaign sponsoring organization unknown (76 signatures)	
149	EPA-HQ-OAR-2022-0829-1710	Mass Comment Campaign sponsoring organization unknown (1,851 signatures)	
150	EPA-HQ-OAR-2022-0829-1714	Mass Comment Campaign sponsoring organization unknown (20 signatures)	
151	EPA-HQ-OAR-2022-0829-1716	Mass Comment Campaign sponsoring organization unknown (2,309 signatures)	
152	EPA-HQ-OAR-2022-0829-1717	Mass Comment Campaign sponsoring organization unknown (513 signatures)	
153	EPA-HQ-OAR-2022-0829-1721	Mass Comment Campaign sponsoring organization unknown (email) (5,313 signatures)	

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154	EPA-HQ-OAR-2022-0829-1514	Matthew DiPaulo, BP Lubricants USA, Inc.	
155	EPA-HQ-OAR-2022-0829-0732	Mayor Becky Daggett, City of Flagstaff, Arizona et al.	Aisha Chughtai, Council Member, Ward 10 Minneapolis, MN, Amy Falcone, Council Member Kirkland, WA, Andrew Johnson, Council Member Minneapolis, MN, Andy LaBarre, Member of the Washtenaw County Board of Commissioners, Ann Arbor, MI, Angela Conley, County Commissioner Minneapolis, MN, Anthony (Tony) Palomba, Councilor at-Large, City Council, Watertown, MA, Brendan Johnson, Oakland County Commissioner Rochester Hills, MI, Charlie Cavell ,Oakland County Commissioner Pontiac, MI, Deputy Mayor Jay Arnold Kirkland, WA, Dimple Ajmera, Council Member, At-large Charlotte, NC, Dow Constantine, King County Executive Seattle, WA, Dr. Ajay V. Raman, Oakland County Commissioner, District 14 Novi, MI, Elliott Payne, Council Member Minneapolis, MN, Erica Briggs, Council Member Ann Arbor, MI, Jarrett Stoltzfus, Councilmember, Ward 2, Mount Rainier, MD, Jason Chavez, City Council Member, Ward 9 Minneapolis, MN, Jeffrey Joneal Lunde, Hennepin County Commissioner Brooklyn Park, MN, John Hayes, Chair, Sustainability, Energy, and Resiliency Committee, Salem, MA, John Odell, Chief, Department of Sustainability & Resilience, Worcester, MA, Katherine Golub, City Councilor Greenfield, MA, Kelli Curtis,

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			Council Member Kirkland, WA, Kelly Rae Kirkpatrick, Council Member Rochester, MN, Kristen Nelson, Oakland County Commissioner Waterford, MI, Marion Greene, Hennepin County Commissioner Minneapolis, MN, Martha Simon, School Committee Member Burlington, MA, Mayor Angela Birney Redmond, WA, Mayor Becky Daggett Flagstaff, AZ, Mayor Cassie Franklin Everett , WA, Mayor Chance Cutrano Fairfax, CA, Mayor Christopher Taylor Ann Arbor, MI, Mayor Devin T. Murphy Pinole, CA, Mayor Indya Kincannon, Knoxville, TN, Mayor Jacob Frey Minneapolis, MN, Mayor John J. Bauters Emeryville, CA, Mayor Justin Wilson, Alexandria, VA, Mayor Kim Norton Rochester, MN, Mayor Louise From University Heights, IA, Mayor Mason Thompson Bothell, WA, Mayor Matt Mahan San Jose, CA, Mayor Melvin Carter Saint Paul, MN, Mayor Mike Nelson Edmonds, WA, Mayor Penny Sweet Kirkland, WA, Mayor Pro Tem Braxton Winston Charlotte, NC, Mayor Pro Tem Travis Radina Councilmember, Ward 3, Ann Arbor, MI, Mayor Viola Lyles Charlotte, NC, Michael Bettencourt, Select Board Member Winchester, MA, Mitra Jun Jalali, Council Member Saint Paul, MN, Robin Wonsley, Council Member, Ward 2 Minneapolis, MN, Ryan N. Mello, Chair, Pierce County Council Tacoma, WA, Samantha Perlman, City Councilor

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			Marlborough, MA, Teresa Mosqueda, Council Member Seattle, WA, Trista Matas Castillo, Chair, Ramsey County Board of Commissioners, St. Paul, MN
156	EPA-HQ-OAR-2022-0829-0595	Mazda North American Operations	
157	EPA-HQ-OAR-2022-0829-0748	Mclaren Automotive, McLaren Group	
158	EPA-HQ-OAR-2022-0829-0615	MCS Referral & Resources (MCSRR)	
159	EPA-HQ-OAR-2022-0829-0564	MECA Clean Mobility	
160	EPA-HQ-OAR-2022-0829-0644	MEMA, The Vehicle Suppliers Associated	
161	EPA-HQ-OAR-2022-0829-0623	Mercedes-Benz AG	
162	EPA-HQ-OAR-2022-0829-0503	Metropolitan Washington Air Quality Committee (MWAQC) et al.	
163	EPA-HQ-OAR-2022-0829-0672	Minnesota Biofuels Association	
164	EPA-HQ-OAR-2022-0829-0612	Minnesota Corn Growers Association (MCGA)	
165	EPA-HQ-OAR-2022-0829-0557	Minnesota Pollution Control Agency (MPCA)	
166	EPA-HQ-OAR-2022-0829-0578	Missouri Corn Growers Association (MCGA)	
167	EPA-HQ-OAR-2022-0829-0590	Missouri Farm Bureau (MOFB)	
168	EPA-HQ-OAR-2022-0829-0682	Mitsubishi Motors North America, Inc. (MMNA)	
169	EPA-HQ-OAR-2022-0829-0559	National Association of Clean Air Agencies (NACAA)	
170	EPA-HQ-OAR-2022-0829-0628	National Association of Convenience Stores (NACS) et al.	
171	EPA-HQ-OAR-2022-0829-0648	National Association of Convenience Stores (NACS) et al.	
172	EPA-HQ-OAR-2022-0829-0633	National Association of Manufacturers (NAM)	

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173	EPA-HQ-OAR-2022-0829-5092	National Association of Mutual Insurance Companies (NAMIC)	
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175	EPA-HQ-OAR-2022-0829-0643	National Corn Growers Association (NCGA)	
176	EPA-HQ-OAR-2022-0829-0581	National Farmers Union (NFU)	
177	EPA-HQ-OAR-2022-0829-0607	National Parks Conservation Association (NPCA)	
178	EPA-HQ-OAR-2022-0829-0634	National Propane Gas Association (NPGA)	
179	EPA-HQ-OAR-2022-0829-0575	National Rural Electric Cooperative Association (NRECA)	
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182	EPA-HQ-OAR-2022-0829-0583	Nebraska Corn Board (NCB) and Nebraska Corn Growers Association	
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184	EPA-HQ-OAR-2022-0829-0594	Nissan North America, Inc.	
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186	EPA-HQ-OAR-2022-0829-0586	North Dakota Farmers Union (NDFU)	
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192	EPA-HQ-OAR-2022-0829-0542	Our Children's Trust (OCT)	
193	EPA-HQ-OAR-2022-0829-0680	Pacific Legal Foundation (PLF)	
194	EPA-HQ-OAR-2022-0829-0551	Paul Bonifas and Tim Considine	
195	EPA-HQ-OAR-2022-0829-0577	Pearson Fuels	
196	EPA-HQ-OAR-2022-0829-0713	Plains All American Pipeline, L.P.	
197	EPA-HQ-OAR-2022-0829-0625	Plug In America	
198	EPA-HQ-OAR-2022-0829-0609	POET, LLC	
199	EPA-HQ-OAR-2022-0829-0637	Porsche Cars North America (PCNA)	
200	EPA-HQ-OAR-2022-0829-0556	Pueblo of Santa Ana	
201	EPA-HQ-OAR-2022-0829-0570	Reginald Modlin and B. Reid Detchon	
202	EPA-HQ-OAR-2022-0829-0602	Renewable Fuels Association (RFA)	
203	EPA-HQ-OAR-2022-0829-0653	Rivian Automotive, LLC	
204	EPA-HQ-OAR-2022-0829-0793	Roy Littlefield IV, Tire Industry Association	
205	EPA-HQ-OAR-2022-0829-0629	RV Industry Association (RVIA)	
206	EPA-HQ-OAR-2022-0829-5088	Sandra Thomas	
207	EPA-HQ-OAR-2022-0829-0687	Satya Consultores	
208	EPA-HQ-OAR-2022-0829-0515	Scott Wilson	Identical comment: Electric Vehicle Association of Greater Washington DC (EPA-HQ-OAR-2022-0829-0521)
209	EPA-HQ-OAR-2022-0829-5083	Senator Shelley Moore Capito et al., United States Senate	Shelley Moore Capito, Ranking Member, Environment and Public Works Committee, and Pete

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			Ricketts, Ranking Member, Clean Air, Climate, and Nuclear Safety Subcommittee, Roger F. Wicker, Lindsey O. Graham, John Barrasso, Dan Sullivan, Chuck Grassley, James Lankford, Deb Fischer, Thom Tillis, Kevin Cramer, Cynthia Lummis, James E. Risch, Bill Cassidy, John Hoeven, John Boozman, M. Michael Rounds, Mike Crapo, Michael S. Lee, Cindy Hyde-Smith, Ted Budd, Ted Cruz, Steve Daines, John Cornyn, John Kennedy, Tim Scott, and Markwayne Mullin, Senators
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212	EPA-HQ-OAR-2022-0829-0591	Southern Environmental Law Center (SELC)	
213	EPA-HQ-OAR-2022-0829-0596	Specialty Equipment Market Association (SEMA)	
214	EPA-HQ-OAR-2022-0829-0678	Stellantis	
215	EPA-HQ-OAR-2022-0829-0647	Steven Bradbury, The Heritage Foundation	
216	EPA-HQ-OAR-2022-0829-0646	Strong Plug-in Hybrid Electric Vehicle (PHEV)	
217	EPA-HQ-OAR-2022-0829-0567	T. Becker Power Systems	
218	EPA-HQ-OAR-2022-0829-0452	TCW Inc.	Identical comments: Transfer Flow, Inc. (EPA-HQ-OAR-2022-0829-0442 and -0496), Ben Banks (EPA-HQ-OAR-2022-0829-0502) and Ernest Quinn (EPA-HQ-OAR-2022-0829-0499)
219	EPA-HQ-OAR-2022-0829-0792	Tesla, Inc.	
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223	EPA-HQ-OAR-2022-0829-0657	The Mobility House et al.	
224	EPA-HQ-OAR-2022-0829-0620	Toyota Motor North America, Inc.	
225	EPA-HQ-OAR-2022-0829-0453	Transport Evolved LLC (Transportation Consultancy)	
226	EPA-HQ-OAR-2022-0829-0655	Travis Fisher	
227	EPA-HQ-OAR-2022-0829-0604	U.S. Chamber of Commerce	
228	EPA-HQ-OAR-2022-0829-0540	U.S. Conference of Catholic Bishops (USCCB)	
229	EPA-HQ-OAR-2022-0829-0525	U.S. Departments of Transportation of Idaho, Montana, North Dakota, South Dakota and Wyoming	
230	EPA-HQ-OAR-2022-0829-0587	United Steelworkers (USW)	
231	EPA-HQ-OAR-2022-0829-0707	Valero Energy Corporation	
232	EPA-HQ-OAR-2022-0829-0669	Volkswagen Group of America, Inc.	
233	EPA-HQ-OAR-2022-0829-0624	Volvo Car Corporation (VCC)	
234	EPA-HQ-OAR-2022-0829-0679	Western Energy Alliance	
235	EPA-HQ-OAR-2022-0829-0636	Winnebago Industries (Winnebago Industries)	
236	EPA-HQ-OAR-2022-0829-0494	Wisconsin Automobile and Truck Dealers Association	
237	EPA-HQ-OAR-2022-0829-0507	Wisconsin Department of Natural Resources	
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239	EPA-HQ-OAR-2022-0829-0638	Zero Emission Transportation Association (ZETA)	
240	EPA-HQ-OAR-2022-0829-0523	South Dakota Department of Agriculture and Natural Resources (DANR)	
241	EPA-HQ-OAR-2022-0829-0541	Washington State Department of Ecology	
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1 - General comments in support of or opposing the rulemaking

1.1 - General support for the program as proposed or more stringent standards

Comments by Organizations

Organization: Advanced Energy United

Transportation is the largest source of domestic emissions. In 2021, 28% of emissions came from the transportation sector, 21% of which came from passenger vehicles.1 We have a unique opportunity to not only decarbonize this sector, but improve public health, create good paying jobs, and produce technologically advanced vehicles for consumers and businesses in the process. The EPA's promulgation of the new emissions reductions rule on light-duty vehicles provides a pathway to meet emissions reductions targets and expand the adoption of zero-emissions vehicles on our roads. [EPA-HQ-OAR-2022-0829-0695, p. 1]

1 EPA. (28 April, 2023). Sources of Greenhouse Gas Emissions. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

IV. Conclusion

By providing a predictable business and regulatory environment, EPA's proposed vehicle rules can help not only decarbonize US transportation, but also bolster a critical segment of the American economy: automakers. [EPA-HQ-OAR-2022-0829-0695, pp. 5-6]

EVs present a critical lifeline for the U.S. automotive industry, as total car sales have declined since 2017. As industry analysts have noted, "[EVs] are the only growth area in the automotive market."12 The EPA's rule can simultaneously sustain this growth and accelerate EV adoption, revitalizing automakers and creating good paying, high-skilled jobs in the process. As such, EPA's proposed rules complement key parts of the Inflation Reduction Act (IRA) - namely the 30D and 45W tax credits that incentivize the purchase of electric vehicles, and the host of industry incentives, such as the manufacturing tax credit (45X) that support the buildout of a domestic EV industry. [EPA-HQ-OAR-2022-0829-0695, p. 6]

12 Carreon, A. (5 May, 2023). The EV Battery Supply Chain Explained. Rocky Mountain Institute. https://rmi.org/the-ev-battery-supply-chain-explained/

Organization: American Council for an Energy-Efficient Economy (ACEEE)

The U.S. needs the strongest vehicle standards

The United States will need to greatly reduce light-duty vehicle (LDV) greenhouse gas emissions if it is to have any chance of meeting the Biden Administration's economy-wide emissions reduction goal of 50% by 2030 and stave off the worst impacts of climate change. Transportation is now the largest source of greenhouse gas emissions in the United States and the light-duty sector makes up 58% of those emissions.1 Reducing carbon emissions is critical to tackling climate change but increasing LDV efficiency will also have significant benefits to air quality and will reduce driver fueling costs. Vehicles are a significant contributor to local air pollution and the associated health impacts, leading to increased rates of asthma, increased risk of heart attacks, strokes, and lung cancer.2 These impacts are particularly bad in low-income communities and communities of color, which bear a disproportionate air pollution burden.3 Greater efficiency can also provide significant cost savings for drivers when they refuel their vehicles. Low-income households are especially burdened by fueling costs, paying three times more than their higher-income counterparts on gasoline, as a percent of their total income.4 [EPA-HQ-OAR-2022-0829-0642, pp. 1-2]

1 https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

2 https://www.consumerreports.org/emissions/how-your-car-can-make-the-air-cleaner/

3 https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities

4 https://www.aceee.org/white-paper/2021/05/understanding-transportation-energy-burdens

EPA should adopt Alternative 1

EPA's GHG vehicle standards have historically been instrumental in advancing emissions reduction technology beyond what the market would otherwise deliver. Given the activity already taking place in the light-duty vehicle market as a result of IRA and IIJA investments and automaker commitments to fully electrifying their lineups, we urge EPA to adopt Alternative 1, at a minimum, to deliver the strongest emissions reduction and advance emissions reduction technologies in the market. [EPA-HQ-OAR-2022-0829-0642, pp. 2-3]

Organization: American Lung Association (ALA) et al.

On behalf of the undersigned health and medical organizations, we write to call on the United States Environmental Protection Agency's (EPA) to adopt the strongest possible standards to curb emissions from new passenger vehicles and spur the transition to zero-emission technologies. Health and medical organizations have long advocated for strong emissions standards as a crucial intervention to protect regional air quality, address disparities in pollution burdens and reduce the health impacts of the climate crisis. [EPA-HQ-OAR-2022-0829-0745, p. 1]

We urge EPA to act in 2023 to finalize the most stringent possible standards for new vehicles to reduce and eliminate emissions that harm Americans' health. [EPA-HQ-OAR-2022-0829-0745, p. 1]

Health Benefits of Zero-Emission Technologies

EPA's proposals note the significant clean air benefits of the proposed rule and illustrate the increased benefits of the stronger Alternative 1. The American Lung Association's recent "Driving to Clean Air" report highlighted that approaching a 100 percent zero-emission sales scenario by 2035, along with a non-combustion electricity generation grid, could result in major health benefits. The report found that the cumulative health benefits could reach $978 billion by 2050, including nearly 90,000 premature deaths avoided, over 2 million asthma attacks avoided and more than 10 million lost workdays avoided due to cleaner air.4 EPA's analysis shows that a potential compliance pathway for the proposal could result in nearly 70 percent of new vehicle sales being battery electric vehicles by 2032. We call on EPA to continue the trajectory of a stronger Alternative 1 to include more stringent GHG standards through 2035. [EPA-HQ-OAR-2022-0829-0745, p. 3]

4 American Lung Association. “Driving to Clean Air.” June 2023. https://www.lung.org/clean-air/electric-vehicle-report/driving-to-clean-air.

Organization: Arizona Department of Environmental Quality (ADEQ)

One of Arizona's largest emission categories is mobile sources (on-road and off-road). In 2022 alone, emissions from highway vehicles in Arizona were over 450,000 tons.1 While Arizona has many control measures in place to reduce emissions from mobile sources – such as our reformulated gasoline program. These control measures are simply not enough to significantly reduce emissions from transportation. Therefore, ADEQ supports EPA's goal to further reduce criteria pollutants and greenhouse gas emissions from the transportation sector. The proposed rule would improve the nation's overall air quality by reducing emissions through the proposed control technology. [EPA-HQ-OAR-2022-0829-0533, p. 1]

1 https://www.epa.gov/system/files/other-files/2023-04/state_tier1_caps_05Apr2023_Ktons.xlsx (Last accessed Jun. 1, 2023).

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Reducing emissions from motor vehicles is urgently needed to combat climate change and reduce exposure to harmful air pollution, especially in the nation’s most vulnerable communities. The California Air Resources Board (CARB) commends the U.S. Environmental Protection Agency (U.S. EPA) for proposing to adopt multi-pollutant emissions standards for the 2027 and later model years (MY) for light- and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0780, p. 7]

The emission standards of both the proposal and a more stringent alternative are achievable, technically feasible, and cost-effective and will significantly reduce emissions from light- and medium-duty vehicles across the country. U.S. EPA’s analysis demonstrates that both its proposal and the more stringent alternative would result in significant net benefits to society—benefits like improvements in public health, reduced climate impacts, and cost savings to consumers. Adopting the most stringent emission standards feasible is a critical step that U.S. EPA must take to fulfill its mandate to achieve National Ambient Air Quality Standards (NAAQS) and protect the environment, climate, and public health from motor vehicle pollution. [EPA-HQ-OAR-2022-0829-0780, p. 7]

Organization: California Attorney General's Office, et al.

EPA has long recognized that GHG and criteria pollutant emissions from new motor vehicles and new motor vehicle engines endanger public health and welfare, and, under Section 202(a) of the Clean Air Act, this recognition triggers a mandatory duty to reduce such emissions. The technologies necessary to reduce GHGs and criteria pollutants from new motor vehicles already exist and are widely in use in the market today. The costs of these technologies are reasonable and declining, and the application of these technologies generally results in consumers saving money over the life of a new vehicle. Moreover, the societal benefits of more stringent standards significantly exceed the costs of those standards. EPA thus has every reason to adopt stronger emissions standards to satisfy its statutory mandate to reduce emissions of harmful air pollution. [EPA-HQ-OAR-2022-0829-0746, p. 1]

In the Proposal, EPA set forth four alternative sets of GHG standards: the proposed standards, a more stringent alternative (Alternative 1), a less stringent alternative (Alternative 2), and an alternative similar in stringency to the proposed standards on a different timeline (Alternative 3). [EPA-HQ-OAR-2022-0829-0746, pp. 1-2]

We believe that the record before the agency supports the adoption of standards more stringent than the proposed standards and accordingly set forth potential improvements to EPA's models and compliance program below. As EPA recognizes in the Proposal, the necessary emission control technologies have already been developed and brought to market, and automakers have been planning for substantially more stringent standards in large portions of the global market. In addition, the crediting flexibilities already built into the program (which EPA has not reopened)—including the ability to trade, carry-forward, and carry-back credits—place automakers in even better positions to craft strategies to comply with more stringent standards. [EPA-HQ-OAR-2022-0829-0746, pp. 1-2]

As discussed below, the need for more stringent standards is critical, and the industry's ability to meet stronger standards and to cost-effectively reduce dangerous pollution is clear. We urge EPA to adopt standards more stringent than the proposed standards. [EPA-HQ-OAR-2022-0829-0746, pp. 1-2]

Organization: CALSTART

CALSTART strongly supports EPA's proposed multi-pollutant emission standards for light- and medium-duty vehicles for model years 2027-2032 standards. The multi-pollutant emissions standard represents a critical and seminal point to mitigate the worse impacts from the climate crisis and requires a clear and strong signal of the nation's needed direction and pace. [EPA-HQ-OAR-2022-0829-0618, p. 1]

We appreciate this opportunity to provide comments to help shape an effective and productive multi-pollutant emission standard and welcome the on-going potential to engage and explain our recommendations in more detail and assist EPA staff as the rule is finalized. [EPA-HQ-OAR-2022-0829-0618, p. 1]

The multi-pollutant emissions standard represents a critical and seminal point to mitigate the worse impacts from the climate crisis and requires a clear and strong signal of the nation's needed direction and pace. CALSTART desires to serve as an on-going resource to EPA staff in finalizing the most effective light-duty vehicle standard. For more than 30 years, CALSTART has been at the forefront of working with industry, fleets, and the public sector to understand, develop, and accelerate advanced transportation technology needed to address clean air, energy, and economic goals. [EPA-HQ-OAR-2022-0829-0618, p. 2]

We have developed significant knowledge of the status of zero-emission technologies and closely track technology readiness levels, vehicle product availability, and infrastructure deployment status. This experience arises from decades of managing technology demonstration field projects, administering and shaping two of the world's largest commercial vehicle and infrastructure incentive programs, and preparing effective commercialization strategies and implementation roadmaps in our work supporting California and other global governments through Drive to Zero. Utilizing this experience, CALSTART is urging EPA to finalize a regulation that meets our climate obligations while driving U.S. technology leadership and competitiveness forward. [EPA-HQ-OAR-2022-0829-0618, p. 2]

2. Adopt the strongest possible option, providing stringency which is at least as strong as Alternative 1. [EPA-HQ-OAR-2022-0829-0618, p. 2]

At a high level, strong standards maintain the recent positive momentum in the light duty sector and provide a regulatory framework that complements the historic incentives of the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) and is consistent with the current market. We applaud EPA staff for its ambitious and highly necessary Phase 2 stringency and encourage EPA to adopt a Phase 3 at least as stringent as Alternative 1. Below, we describe our justification for Recommendation 1 (closing the footprint loophole) and then discuss the drivers, barriers, and possible solutions to Recommendations 2-4 (adopting standards at least as stringent as Alternative 1, and extending the standards through 2035, and sending clear market signals). [EPA-HQ-OAR-2022-0829-0618, p. 2]

1. Ecosystem-Supportive Activities

This regulation represents a historic step in transitioning the automotive industry toward 100% sales of ZEVs. The proposed rule works in concert with IIJA, IRA, ACC II, LCFS, and other critical clean transportation programs that will reduce tailpipe emissions and increase the number and quality of light-duty ZEVs and plug-in hybrid electric vehicles (PHEVs) on the road. With game changing federal incentives now in place and stringent California regulations leading the way, the EPA now has the opportunity to match these incentives and guide the nation towards accelerated light-duty vehicle decarbonization with a Phase 3 standard at least as stringent as Alternative 1. Transitioning light-duty vehicles to electric power will dramatically improve air quality as well as substantially reduce greenhouse gas emissions due to the progressively cleaner energy generation portfolio of the nation’s electrical grid. [EPA-HQ-OAR-2022-0829-0618, p. 3]

Organization: Center for American Progress (CAP)

CAP urges EPA to adopt the strongest possible standard by the end of the year, finalizing the proposed Alternative 1, with modifications, which are discussed below. Alternative 1 should form the baseline for EPA’s final rule as it makes significant achievable improvements to the proposed rule that are critical for protecting public health and the climate. Alternative 1 features emissions targets on average 10 g/mi lower than the proposed rule. This results in a $20 billion increase in net benefits for calendar year 2055 over the proposed rule.8 In EPA’s DRIA, Alternative 1 is expected to result in 69 percent BEV penetration by 2032. This rate of BEV penetration is possible and indeed likely given the current policy landscape of incentives for manufacturing and purchasing batteries and electric vehicles. [EPA-HQ-OAR-2022-0829-0658, p. 2]

8 U.S. Environmental Protection Agency, “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis,” April 2023, available online: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Organization: Ceres BICEP (Business for Innovative Climate and Energy Policy) Network

BICEP members recognize that stronger LDV emissions standards and associated fuel cost savings have clear economic benefits: they mitigate the economic risks of volatile fuel prices, spur U.S. job creation,9 and reduce transportation costs.10 ICCT found that the net consumer benefits of BEVs outweigh their costs as soon as 2024 for passenger vehicles,11 and between 2023-2025 for commercial vans and pickups with a 200 mile range,12 even when IRA incentives are not taken into account. Electric vehicle sales are increasing rapidly,13 and auto manufacturers Ford and General Motors have committed to 100% light- duty electric vehicle (EV) sales in leading markets by 2035.14 While manufacturer commitments and consumer demand demonstrate the growing momentum toward electric cars, it is critical that EPA provide a strong market signal to support those commitments by adopting stringent standards. Further, strong standards will ensure billions of dollars in savings from fuel, health, and climate costs.15 [EPA-HQ-OAR-2022-0829-0600, p. 2]

9https://www.researchgate.net/publication/344241066_Economic_and_Jobs_Impacts_of_Enhanced_Fuel_Efficiency_Standards_for_Light_Duty_Vehicle s_in_the_USA.

10 https://advocacy.consumerreports.org/press_release/new-consumer-reports-analysis-shows-rising-gas-prices-ramp-up-savings-for-ev- owners/.

11 https://theicct.org/publication/ev-cost-benefits-2035-oct22/.

12 https://theicct.org/wp-content/uploads/2022/01/cost-ev-vans-pickups-us-2040-jan22.pdf.

13 https://subscriber.politicopro.com/newsletter/2023/06/supercharged-ev-sales-00103721.

14 https://theicct.org/wp-content/uploads/2023/05/The-Global-Automaker-Rating-2022_final.pdf.

15 https://theicct.org/publication/ev-cost-benefits-2035-oct22/.

Thus, on behalf of the companies in the BICEP network, I urge EPA to adopt light-duty vehicle (LDV) GHG emissions standards at least as strong as Alternative 1 through 2030, and stronger thereafter. I also urge EPA to adopt LDV criteria pollutant standards and medium-duty vehicle (MDV) multi-pollutant emissions standards at least as strong as those currently proposed to mitigate climate risk, strengthen U.S. economy, and address public health and equity concerns. [EPA-HQ-OAR-2022-0829-0600, p. 3]

Organization: Ceres Corporate Electric Vehicle Alliance (CEVA)

The Alliance applauds the Environmental Protection Agency (EPA) for its commitment to adopting multi-pollutant emissions standards for Model Years (MY) 2027 and later light- and medium- duty vehicles and greenhouse gas (GHG) emissions standards for heavy-duty vehicles, and urges EPA to align these standards with U.S. climate and public health goals.1 Specifically, the Alliance supports: [EPA-HQ-OAR-2022-0829-0511, p. 1]

1 https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf

-Light-duty vehicle GHG emissions standards aligned with Alternative 1, the strongest standard proposed in this rulemaking, which will result in a 59% reduction in average fleetwide carbon dioxide emissions by MY2032 from a MY2026 baseline. The Alliance also encourages EPA to move forward with its proposed criteria pollutant emissions standards for light-duty vehicles, reducing fleetwide average MY2032 criteria pollutant emissions 60% from MY2025 levels.2 [EPA-HQ-OAR-2022-0829-0511, p. 1]

2 https://www.epa.gov/system/files/documents/2023-04/lmdv-multi-pollutant-emissions-my-2027-nprm-2023-04.pdf (p.42)

-Medium-duty vehicle (Class 2b and 3) multi-pollutant emissions standards aligned with its current proposal, which will ensure a 44% reduction in average fleetwide GHG emissions by MY2032 from a MY2026 baseline, and a 66 76% reduction in criteria pollutant emissions by MY2032 from a MY2025 baseline.3 [EPA-HQ-OAR-2022-0829-0511, p. 1]

3 Ibid. (p.42)

- Heavy-duty vehicle phase 3 GHG emissions standards that are at least as strong as those proposed, but ideally are stronger to ensure at least 50% zero-emissions vehicle (ZEV) sales across all market segments by 2032. California's Advanced Clean Trucks (ACT) rule,4 manufacturer commitments,5 and the Inflation Reduction Act (IRA) funding are all consistent with such a goal.6 [EPA-HQ-OAR-2022-0829-0511, p. 1]

4 https://ww2.arb.ca.gov/sites/default/files/2023-06/ACT-1963.pdf (p.5)

5 https://theicct.org/wp-content/uploads/2023/04/hdv-phase3-ghg-standards-benefits-apr23.pdf

6 https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23-2.pdf

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

We appreciate the Administration's efforts to re-establish the United States as a leader on clean air and climate, and to regain ground on clean transportation. The President's agenda, including the goal to ensure half of all new vehicles sold in 2030 are zero emission and investments from the Bipartisan Infrastructure Law and Inflation Reduction Act, are already having transformational effects and can help support a successful transition to light- and medium-duty zero emission vehicles. We now urge the Administration to take the next step and codify this action by adopting the strongest national air pollution and GHG standards possible for light- and medium-duty vehicles. We appreciate the Administration's leadership, and are looking forward to collaborating to reach our ambitious collective goals with respect to reducing emissions from the light- and medium-duty vehicle sector. [EPA-HQ-OAR-2022-0829-0694, p. 3]

Colorado has demonstrated a strong commitment to accelerating adoption of light- and medium-duty zero emission vehicles, including hosting a robust stakeholder process to update and publish our most recent state electric vehicle plan [Embedded Hyperlink: https://energyoffice.colorado.gov/transportation/ev-education-resources/2023-colorado-ev-plan], and implementing three new transportation electrification enterprises funded by fees on retail deliveries and transportation network company rides that are forecast to invest over $700M in transportation electrification over the next decade. Some of the key advancements in the state's light- and medium-duty electrification efforts include: [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

- Adoption of the Advanced Clean Cars, Advanced Clean Trucks, and Low NOx Omnibus rules at our Air Quality Control Commission (AQCC), and a commitment to complete a rulemaking in 2023 to adopt the Advanced Clean Cars II rule through 2032 in our most recent state EV Plan. [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

- Implementation of the state's National Electric Vehicle Infrastructure (NEVI) plan [Embedded Hyperlink: https://www.codot.gov/programs/innovativemobility/electrification/nevi-plan to construct DC fast-charging sites along federally designated EV corridors. [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

- Developing the Vehicle Exchange Colorado [Embedded Hyperlink: https://energyoffice.colorado.gov/vehicle-exchange-colorado] program to incentivize low- and moderate-income Coloradans to retire and replace high-emitting vehicles with electric vehicles (EVs). [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

- Recently passed legislation that includes an extension and expansion of the state's tax credit for light, medium- and heavy-duty zero emission vehicles (HB23-1272 [Embedded Hyperlink: https://leg.colorado.gov/bills/hb23-1272]). [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

- Transportation Electrification Plans (TEPs) from the state's investor-owned utilities, including Xcel Energy's 2024-2026 TEP, which proposes over $400 million in investment in programs to reduce barriers to adoption of EVs, and Black Hills Energy's 2024-2026 TEP, which proposes more than $2.6 million for programming to support transportation electrification. [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

- EV CO [Embedded Hyperlink: https://evco.colorado.gov/], a public awareness campaign designed to promote the convenience and financial and environmental benefits of driving electric, and answer common questions about incentives and charging. [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

-Recently passed legislation (HB23-1233 [Embedded Hyperlink: https://leg.colorado.gov/bills/hb23-1233]) and state minimum building energy codes [Embedded Hyperlink: https://energyoffice.colorado.gov/climate-energy/energy-policy/building-energy-codes/energy-code-board] that require a minimum level of EV readiness in new construction for multi-family housing and other building types. [EPA-HQ-OAR-2022-0829-0694, pp. 1-2]

Organization: Consumer Reports (CR)

The proposed EPA rule would increase the supply of cleaner, cost-saving transportation options, such as EVs and hybrids, available to consumers. This proposal, particularly the more stringent Alternative 1, would support the transition to a cleaner transportation sector, providing cost savings, as well as other benefits that go beyond the pocketbook. This proposal would save consumers money on fuel and vehicle maintenance. It would also reduce emissions, thus contributing to reduced spending on healthcare costs tied to air pollution, and disaster recovery tied to GHG emissions. [EPA-HQ-OAR-2022-0829-0728, p. 6]

These savings are particularly important for overburdened communities who overwhelmingly bear the brunt of the negative impacts of air pollution. Not only do these communities face a disproportionate exposure to vehicle tailpipe emissions,4 but lower income households also spend a greater percentage of their income on transportation costs than their wealthier counterparts, making them more sensitive to fluctuation and uncertainty in fuel prices.5 Thus, policies such as the proposed rule, which reduce pollutant exposure and increase accessibility to clean, reliable modes of transportation, are needed. [EPA-HQ-OAR-2022-0829-0728, p. 6]

4 Disparities in the Impact of Air Pollution, American Lung Association, April 2020, https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities.

5 High Cost of Transportation in the United States, Institute for Transportation and Development Policy, May 2019, https://www.itdp.org/2019/05/23/high-cost-transportation-united-states.

1.3. Consumer Petitions in Support of Proposed Rule

Consumer Reports collected 18,817 signatures from consumers in support of strengthening EPA's current proposal for greenhouse gas standards.6 [EPA-HQ-OAR-2022-0829-0728, Attachment 1, p. 6]

6 Petition: More Clean Vehicles = Better Climate Future, Consumer Reports, 2023, https://action.consumerreports.org/nb-20230425-epa-cleancars-petition.

Petition Text:

"We're urging the EPA and NHTSA to adopt the strongest possible rules to reduce climate- and health-damaging vehicle emissions and greatly reduce fuel consumption, while helping consumers save an estimated $12,000 over the lifetime of a new vehicle. The rules will rapidly accelerate the number of cleaner vehicles like EVs and hybrids in production over the next decade; save lives due to a dramatic decrease in tailpipe pollution; and put us on the route towards a zero emissions future. These rules are a win-win for the climate, consumers' wallets, and our health." [EPA-HQ-OAR-2022-0829-0728, p. 6]

Organization: Dana Incorporated

Dana supports the underlying goals of the proposed Multi-Pollutant Emissions Standards and appreciates EPA's receptiveness in receiving stakeholder input. [EPA-HQ-OAR-2022-0829-0538, p. 2]

Organization: Doug Peterson

I appreciate the opportunity to comment on the EPA's proposed standards for 2027-2032 light and medium duty tailpipe emissions. The regulatory effort to accelerate the transition away from internal combustion vehicles is commendable, given the grave threat of climate change. The historic stringency increases are clearly feasible, and they reflect an appropriate, urgent response to the escalating crisis. There is growing optimism that the electrification of the transportation sector will succeed, and the agency's bold proposal is consistent with similar efforts enacted by other proactive nations. [EPA-HQ-OAR-2022-0829-0500, pp. 1-2]

Organization: Electrification Coalition (EC)

We urge this Administration to adopt the Alternative 1 Scenario, as we support the strongest policies that will accelerate our path to transportation electrification. [EPA-HQ-OAR-2022-0829-0588, p. 1]

In addition to our national security challenges, the U.S. also faces the rapidly growing threat of climate change. The latest National Climate Assessment4, which Congress mandated in 1990 under the Global Change Research Act, shows that the U.S. has been observing the impacts of climate change for decades and that more frequent and extreme weather and climate-related events are creating new and increasing risks across U.S. communities – which we have recently seen with wildfires that have ravaged the country, more powerful hurricanes causing loss of lives and immense destruction, more intense tornadoes destroying communities, and extreme weather events in areas that we should not expect to see these weather events in. [EPA-HQ-OAR-2022-0829-0588, p. 2]

To overcome these national security concerns from climate change, the U.S. must reduce carbon emissions. The EPA notes that the transportation sector is the largest source of greenhouse gas emissions, representing 27% of total greenhouse gas emissions.5 [EPA-HQ-OAR-2022-0829-0588, p. 2]

Organization: Energy Innovation

Energy Innovation appreciates the opportunity to submit these comments to the U.S. Environmental Protection Agency (EPA) regarding its Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (proposed rule). Energy Innovation is a nonpartisan energy and climate policy firm. We provide independent analysis and science-based research to policymakers and other decision-makers seeking to understand which policies are most effective to ensure a climate-safe future for all. Our team has expertise in modeling climate policy, including policies that support a cleaner power grid and electrify transportation, buildings, and industry. Our recommendations are data-driven and informed, in part, by our peer-reviewed Energy Policy Simulator (EPS) model. [EPA-HQ-OAR-2022-0829-0561, p. 1]

We appreciate the EPA's extensive work to develop these proposed emissions standards for criteria pollutants and greenhouse gases for light-duty and medium-duty vehicles (LDVs and MDVs, respectively) for model years 2027 (MY 2027) and later. We commend the EPA's diligent analysis in its development of the proposed rule, which reflects the impact of new federal and state policies and advances in clean vehicle technologies. The EPA has set forth a proposed rule that aligns with its statutory directive in Section 202(a)(1) of the CAA to enhance the stringency of LDV and MDV vehicle tailpipe standards needed to reduce emissions that endanger public health and welfare: "'the Administrator shall by regulation prescribe (and from time to time revise)…standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles … which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'"1 We concur with the EPA's analysis that the proposed rule and Alternative 1 are aligned with its statutory directive—the proposed more stringent standards offer technologically feasible and cost-effective options to reduce harmful GHG and other air polluting emissions over the timeframe the standards would be in place. [EPA-HQ-OAR-2022-0829-0561, p. 1]

1 U.S. EPA, "Proposed Rules: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (EPA–HQ–OAR–2022–0829; FRL 8953–03– OAR)," Federal Register 88, no. 87 (May 5, 2023), https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf, 29231-2.

CONCLUSION

We commend the EPA for undertaking such a thorough investigation into the myriad factors underpinning the proposed tailpipe rules. The stringency of the final rules will have an outsized impact on climate and public health, and the EPA is the agency with statutory authority under the CAA to adopt the most stringent standards feasible to mitigate harmful vehicle emissions. The combination of new federal policies, ongoing state leadership, increased private sector engagement, and the imperative to address climate change this decade are converging at the right moment to support the adoption of strong rules for the LDV and MDV sectors. We look forward to continued engagement with the EPA through this important process, and we invite its full consideration of our comments in its final decision-making. [EPA-HQ-OAR-2022-0829-0561, p. 27]

Organization: Environmental Defense Fund (EDF) (1of 2)

Environmental Defense Fund (EDF) respectfully submits the following comments in support of Environmental Protection Agency's (EPA) Proposed Rule, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29184 (May 5, 2023) ("Proposal" or "Proposed Standards"). These comments highlight the importance and urgency of finalizing health protective standards for new light- and medium-duty vehicles by the end of the year that ensure deep reductions in greenhouse gas (GHG) and criteria pollution by leveraging a range of zero emitting technologies and internal combustion engine vehicle (ICEV) improvements that automakers have available, including battery electric vehicles (BEVs), plug- in hybrid electric vehicles (PHEVs), hybrid vehicles, fuel cell vehicles, and internal combustion engine and vehicle technologies. Near-term emissions reductions are vital to mitigating the effects of climate change and to protecting public health, especially the health of low-income communities and communities of color, which are disproportionately impacted by transportation air pollution. [EPA-HQ-OAR-2022-0829-0786, pp. 1-2]

EPA's proposal is a vital step forward toward addressing the largest source of greenhouse gas emissions and a significant source of health-harming particulate matter (PM) and smog-forming nitrogen oxide (NOx) pollution in the United States. EDF urges EPA to finalize protective light- and medium-duty standards, consistent with and building from the proposals the agency has put forward, that account for the progress already underway thanks to manufacturer and fleet investments and commitments, federal investments, and state policies like the Advanced Clean Cars II (ACC II) rule. EDF supports EPA's finalization of the most protective multipollutant standards possible that deliver pollution reductions at least at the level of the proposal and that result in about two-thirds of new light-duty vehicles and 40% of new medium-duty vehicles sold in 2032 are zero-emitting, putting us on the path to zero emissions from new vehicles in 2035. We encourage EPA to secure even greater pollution reductions by providing for a voluntary (but once chosen, enforceable) alternative leadership pathway that, for manufacturers choosing the pathway, would ensure ACC II levels of ZEV deployment nationwide. We also recommend that the agency consider strengthening the standards in the 2031-32 timeframe, which is especially vital if EPA finalizes standards that are less protective than the proposal in the early years of the program. Doing so could potentially increase cumulative benefits relative to the proposal (and, at minimum, must offset any loss in cumulative benefits). [EPA-HQ-OAR-2022-0829-0786, pp. 1-2]

The historic investments in the Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL) have rapidly accelerated an American electric vehicle manufacturing renaissance, dramatically advanced purchase price parity for passenger ZEVs, and accelerated already declining costs for vehicles at the same time. Leveraging these trends, most manufacturers have made commitments consistent with and even greater than the levels of ZEV deployment EPA projects in this rule and leading states have continued to adopt California's ACCI and ACC II rules. These factors strongly support EPA's proposed standards and, as outlined below, our comments provide additional analysis and information to support standards that deliver even greater pollution reductions. [EPA-HQ-OAR-2022-0829-0786, p. 2]

Organization: Gabrielle Lawrence

I and all the children that I see say thank you to the EPA and President Biden for supporting new and stronger regulations on USA cars. trucks , buses. Hopefully, these regulations will significantly eliminate the poisons in our air and help those who are deeply impacted to be healthy – of body and mind. [EPA-HQ-OAR-2022-0829-0455, p. 2]

Organization: General Motors, LLC (GM)

In August 2021, GM was proud to participate in the Administration's event for Executive Order 14037 with a goal of 50% EV share by 2030,9 with an associated goal of a 60% GHG reduction from model year 2020 to 2030.10 At that time, we shared our aspiration of achieving 40-50% of annual U.S. sales volumes of all EVs by 2030, with the high end of the 40-50% range enabled by supportive policies.11 [EPA-HQ-OAR-2022-0829-0700, p. 3]

9 See Executive Order 14037, Aug 5, 2021 (86 FR 43583). https://www.federalregister.gov/documents/2021/08/10/2021- 17121/strengthening-american-leadership-in-clean-cars-and-trucks

10 "Fact Sheet: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks," Aug 5, 2021, https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive- american-leadership-forward-on-clean-cars-and-trucks/

11 "Ford, GM and Stellantis Joint Statement on Electric Vehicle Annual Sales" (August 2021). https://news.gm.com/newsroom.detail.html/Pages/news/us/en/2021/aug/0805-electric.html

-In September 2022, GM committed to 50% EVs by 2030, the high end of our previously-stated EV aspiration, as well as a 60% reduction in new light-duty vehicle GHG emissions from 2021 to 2030, in coordination with Environmental Defense Fund.12 This indicated our support for a regulation that underpins the Biden Administration's Executive Order 14037, based on passage of the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0700, p. 3]

12 "GM and EDF Announce Recommended Principles on EPA Emissions Standards for Model Year 2027 and Beyond" (September, 2022). https://pressroom.gm.com/gmbx/us/en/pressroom/home.detail.html/Pages/news/us/en/2022/sep/0920-gm.html

Organization: Governing for Impact and Evergreen Action (GFI)

Evergreen Action and Governing for Impact ("GFI") submit this comment on the Environmental Protection Agency's ("EPA") notice of proposed rulemaking, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles" ("the Proposed Rule").1 Evergreen Action is a climate policy organization focused on advancing ambitious, actionable policies to confront the climate crisis and support good jobs to build a thriving, just and inclusive clean energy economy.2 GFI is a regulatory policy organization dedicated to ensuring that the federal government operates more effectively for everyday working Americans.3 We appreciate the opportunity to comment and we write in support of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0621, p. 1]

1 88 Fed. Reg. 29184 (2023).

2 Evergreen Action, https://www.evergreenaction.com/mission.

3 Governing for Impact, www.governingforimpact.org.

Organization: GreenLatinos et al.

For Multi-Pollutant L/MDV standards, we urge the U.S. EPA to finalize the strongest possible standards by the end of 2023. In the proposed rulemaking, Alternative 1 is a good start, but we need to increase the pace after 2030 to stay on route to achieve a zero emissions transportation future. We urge the EPA to continue to create standards that make gas cars cleaner and more efficient. [EPA-HQ-OAR-2022-0829-0789, p. 1]

Organization: Greg Dotson

In seeking to spur the development and deployment of electric vehicles in its recently proposed rule, the U.S. EPA is not acting in isolation or conflict with Congress. Instead, Congress has insisted on the development of electric vehicles since 1976 and has provided many billions of dollars for EV research, development, demonstration, and deployment. With recent enactment of the IIJA and the IRA, Congress has clearly demonstrated its support for the widespread adoption of electric vehicles in the years to come. Given the substantial public resources devoted to developing mature electric vehicle technology and bringing those electric vehicles to market, it would be absurd for EPA to finalize emissions standards for light- and medium-duty vehicles that do not fully realize the opportunity and benefits of zero emission vehicles. [EPA-HQ-OAR-2022-0829-0685, p. 20]

One needs only to assess the growing importance of EVs to the automotive industry prior to EPA's proposal or the agency's most recent final rule strengthening standards through model year 2026 [1] to see the momentum in this transition. Prior to EPA's issuance of its proposed rule in August 2021 – [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

1 U.S. Environmental Protection Agency, Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, Final Rule, 86 Fed. Reg. 74434 (Dec. 30, 2021).

• The Ford Motor Company had announced that all of the vehicles it sells in Europe would be electric vehicles by 2030.2 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• Jaguar announced it would go electric in 2025.3 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• Volvo announced that it would sell only electric cars by 2030.4 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• Volkswagen announced its plan to increase its sales of electric vehicles by 2030, such that 70 percent of the vehicles it sells in Europe and 50 percent of the vehicles it sells in the U.S. and China would be electric.5 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• Honda announced plans for 40 percent of its sales to be zero-emission vehicles by 2030, 80 percent by 2035 and 100 percent globally by 2040.6 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• Mini announced its transition to electric vehicles.7 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• General Motors had announced its intent to produce only electric vehicles by 2035.8 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• The leading trade association for the auto sector had declared that it was committed to "net zero carbon transportation" and believed that the nation that leads development and adoption of electrification and other innovative technologies will "shape supply chains, define global standards, and potentially, reshape the international marketplace."9 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

• The Alliance for Automotive Innovation, United Autoworkers, and the Motor & Equipment Manufacturers Association had further stated in a joint letter that business and labor were "committed to working toward a netzero carbon transportation future that includes a shift to electric-drive vehicles."10 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

2 Ford, Press Release, Ford Europe Goes All-In On EVs On Road To Sustainable Profitability; Cologne Site Begins $1 Billion Transformation (Feb. 17, 2021) https://media.ford.com/content/fordmedia/feu/en/news/2021/02/17/ford-europe-goes-all-in-onevs-on-road-to- sustainable-profitabil.html.

3 Jaguar Website, Reimagine, https://www.jaguarlandrover.com/reimagine.

4 Volvo Press Release, Volvo Cars to be fully electric by 2030 (Mar. 2, 2021) https://www.media.volvocars.com/global/en-gb/media/pressreleases/277409/volvo-cars-to-befully-electric-by-2030.

5 Volkswagen Press Release, Volkswagen is accelerating transformation into software-driven mobility provider (Mar. 5, 2021) https://www.volkswagen-newsroom.com/en/pressreleases/volkswagen-is-accelerating- transformation-into-software-driven-mobility-provider-6878.

6 Aaron Gold, MotorTrend, Honda Plans to Dump Internal-Combustion Engines by 2040 (Apr.23, 2021) https://www.motortrend.com/news/honda-electric-vehicles-2040/.

7 Viknesh Vijayenthiran, Motor Authority, Mini to go Electric, Launch Last Car with Internal-Combustion Engine in 2025 (Mar. 17, 2021) https://www.motorauthority.com/news/1124463_mini-to-go-electric-launch-last- car-with-internal-combustion-engine-in-2025.

8 General Motors, Press Release, General Motors, the Largest U.S. Automaker, Plans to be Carbon Neutral by 2040 (Jan. 28, 2021) ,https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2021/jan/0128-carbon.html.

9 Alliance for Automotive Innovation, Auto Innovation Agenda (Dec. 2020) https://www.autosinnovate.org/about/advocacy/AutosInnovationAgenda12152020.pdf; Testimony of John Bozzella, Alliance for Automotive Innovation (Feb. 2021)

10 Letter to President Joe Biden from John Bozzella, Alliance for Automotive Innovation, Rory Gamble, United Autoworkers International Union, and Bill Long, Motor & Equipment Manufacturers Association (Mar. 29, 2021).

At the same time that automakers were making these announcements, national and subnational jurisdictions around the world were announcing policies to eliminate sales of emitting vehicles. For example, the United Kingdom had announced in November 2020 that it would ban fossil fuel powered vehicles by 2030.11 Dozens of other jurisdictions had also announced commitments to electrification.12 [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

11 Henry Edwardes-Evans, SPG PLatts, UK government brings forward ban on new ICE cars 10 years to 2030 (Nov. 18, 2020) https://www.spglobal.com/platts/en/market-insights/latestnews/electric-power/111820-uk- government-brings-forward-ban-on-new-ice-cars-10-years-to-2030.

12 Hongyang Cui, Dale Hall, and Nic Lutsey, International Council on Clean Transportation, Update on the global transition to electric vehicles through 2019 (July 2020) https://theicct.org/sites/default/files/publications/update-global-EV-stats-sept2020-EN.pdf.

All of these developments, again, predated EPA's even proposing its rule regarding Model Year 2023-2026 standards. [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

These developments were not attributable to any one government policy, technological breakthrough, or private sector action. Instead, momentum for these developments swelled in national parliaments, corporate boardrooms, research laboratories, and automakers' showrooms. [EPA-HQ-OAR-2022-0829-0685, pp. 2-3]

Organization: Interfaith Power & Light

As faith leaders from diverse religious and spiritual traditions, we speak with one voice in support of bold and just climate solutions. Climate change is a moral issue that is most harmful to those least responsible for creating the problem. People of faith and conscience recognize the need for bold, new transportation solutions, and clean cars and light trucks are an integral step towards addressing the climate crisis. Today we write to ask you to move swiftly to enact robust light-duty vehicle multi-pollutant emissions standards. As a nation, we have a moral imperative to enact the most stringent light-duty vehicle standards in order to address our historically unsafe pollutant emissions and to protect our public health and Shared Home. [EPA-HQ-OAR-2022-0829-0530, p. 1]

It is of the utmost importance that standards require tighter limits on internal combustion engine vehicles in order to continually make these vehicles cleaner as manufacturers transition to zero-emission cars. [EPA-HQ-OAR-2022-0829-0530, p. 2]

Now is the time to maximize the impact of our national clean car standards—the most effective policy that the federal government has to reduce dangerous air pollution, lower greenhouse gas emissions, and save consumers money at the pump. As policymakers, you have a critical and sacred role in helping to achieve these goals. As faith leaders, we urge you to establish strong light-duty vehicle multi-pollutant emissions standards that put our nation on a trajectory to a zero-emissions transportation future, and we ask you to redouble efforts to announce the draft rule before the end of 2023. For more than a decade, people of faith and conscience have advocated for strong safeguards on greenhouse gas pollution from transportation. Since then, the climate crisis has only accelerated, taking an enormous toll on human life, our communities, and our world. We have a moral responsibility to act right now as a nation to do all we can to address climate change for our communities, future generations, and our Sacred Earth. [EPA-HQ-OAR-2022-0829-0530, p. 2]

Organization: International Council on Clean Transportation (ICCT)

ICCT strongly supports EPA's proposed multi-pollutant emission standards for light- and medium-duty vehicles for model years 2027-2032. The proposed standards are critical to achieving the pace and scale of needed transportation emission reductions in the United States, where there is a clear and urgent need to rapidly transition to cleaner vehicles. Continued and strengthened standards are necessary to protect public health and deliver on national environmental obligations. We support the proposed standards that would dramatically reduce climate and air pollution from new passenger and medium-duty vehicles and deliver trillions of dollars in net benefits. [EPA-HQ-OAR-2022-0829-0569, p. 3]

ICCT strongly supports the proposed multi-pollutant emission standards for light- and medium- duty vehicles for model years 2027-2032 and recommends its finalization as quickly as possible. Doing so will provide a clear long-term signal that automakers, suppliers, charging companies, and utilities need to make needed investments with confidence. [EPA-HQ-OAR-2022-0829-0569, p. 5]

Organization: Lillian Davey

I believe this form of legislation is in the best interests of the people. Regulation on pollutants and greenhouse gases is vital in ensuring public health and safety as well as limiting environmental damage. The Environmental Protection Agency enforces the vehicle and engine provisions of Title II of the Clean Air Act and regulations at 40 C. F. R. Parts 85, 86, 88 through 94, 600, and 1033 through 1068., to which this legislation is directly related. The Clean Air Act, as well as the EPA are responsible for ensuring that motor vehicles are not emitting a certain amount of pollutants that can be responsible for the damage of human health, as well as environmental health. The Clean Air Act has been used several times to attack the EPA and demand for more stringent guidelines. One major case being Massachusetts v. EPA (2007), which changed the entire framework for the Clean Air Act and how it has been applied and monitored since. This legislation is a direct stem from that case. [EPA-HQ-OAR-2022-0829-0489, p. 1]

Greenhouse gases as well as other emitters are the most detrimental to the environment, and the list only keeps growing as more scientific evidence continues to arise. [EPA-HQ-OAR-2022-0829-0489, p. 1]

Organization: Lucid Group, Inc.

Response to the Proposed Rulemaking

Lucid Applauds EPA's Forward Thinking in Setting Cleaner, More Stringent Emissions Standards

Lucid strongly supports EPA's proposed rule on Multi-Pollutant Emissions Standards for Model Years (MYs) 2027 and Later in Light-Duty and Medium-Duty Vehicles. We applaud the agency for proposing stringent standards that would reduce tailpipe pollutants and accelerate EV adoption, ultimately addressing global warming and other air pollutants. [EPA-HQ-OAR-2022-0829-0664, p. 2]

Cleaner tailpipe standards for criteria pollutants and greenhouse gases are critical to protect public health and welfare and to combat the climate crisis. As demonstrated in its 2021 revision to the GHG standards for MYs 2023-20261, EPA has made significant strides under its authority to both set and revise standards based on updates to climate-related findings. Even with this progress, our national and international decarbonization goals require aggressive policies and standards to ramp up the shift to EVs sooner. [EPA-HQ-OAR-2022-0829-0664, p. 2]

1 86 FR 74434, December 30, 2021, "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards."

Under section 202 of the Clean Air Act, EPA has clear authority to regulate sources of air pollutants from all mobile sources, including carbon dioxide (CO2), non- methane organic gases (NMOG) plus oxides of nitrogen (NOx) or NMOG+NOx, particulate matter (PM), carbon monoxide (CO), and formaldehyde (HCHO) from vehicle tailpipes. Lucid applauds EPA's continued efforts under this authority to improve the nation's air quality. [EPA-HQ-OAR-2022-0829-0664, p. 2]

Organization: Maryland Department of the Environment (MDE)

The Maryland Department of the Environment (MDE) is writing to express our support for the above proposed rule to establish Multi-Pollutant Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles. MDE agrees that this comprehensive federal program would achieve significant greenhouse gas (GHG) and criteria pollutant emissions reductions, improve air quality, and result in substantial public health benefits while helping us meet our climate and air quality goals. MDE urges the Environmental Protection Agency (EPA) to adopt the proposed criteria pollutant standards. MDE also urges EPA to adopt the most stringent, technologically feasible Alternative 1 GHG emissions standards. Alternative 1 is the closest to being in alignment with the California Advanced Clean Cars II (ACC II) regulations, which Maryland is in the process of adopting. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland has made a lot of progress over the past few decades towards clean air. The improvements have been so substantial that the EPA has proposed to determine that the Washington, District of Columbia-Maryland-Virginia nonattainment area has clean data for the 2015 8-hour ozone national ambient air quality standard (2015 ozone NAAQS). A Clean Data Determination (CDD) is the first step in being redesignated from nonattainment to attainment. The Baltimore nonattainment area will also be eligible for a CDD in the near future if the area continues to stay at or below the ozone standard. Nitrogen oxides (NOx) are a precursor pollutant of ground-level ozone and are also precursors to secondary small particulate matter (PM2.5). Exposures to these two pollutants are associated with premature death, increased hospitalizations, and emergency visits due to exacerbation of chronic heart and lung diseases and other serious health impacts. Some areas of the state experience higher rates of illnesses such as asthma than average, and these illnesses are aggravated by these pollutants. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

While significant progress has been made statewide, continuing to reduce NOx emissions, especially those from the transportation sector, is critical to our efforts to attain and maintain the ozone NAAQS. Regional modeling shows that a significant portion of the ozone-forming pollutants are transported into Maryland from upwind states. EPA estimates that strengthening these standards will reduce NOx and PM2.5 emissions nationally by 41% and 35% in 2055, respectively, which combined with state reductions can provide cleaner air for Marylanders. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland is working hard to reduce in-state emissions from the transportation sector. Efforts include the Maryland Clean Cars Act that instructed MDE to adopt the California Advanced Clean Car (ACC I) regulations that require manufacturers of passenger cars and light-duty trucks to sell increasing percentages of zero-emission vehicles (ZEVs). The regulations also include low-emission vehicle (LEV) standards to reduce criteria pollutants and GHG emissions from new gasoline powered vehicles. As noted above, Maryland is in the process of adopting California's ACC II regulations. The ACC II regulations require auto manufacturers to sell an increasing percentage of ZEVs over time, with a phase in of a 100 percent sales target by 2035. ACC II also established increasingly more stringent exhaust and evaporative emissions standards for criteria pollutants from these vehicles. Maryland's recently enacted Clean Trucks Act of 2023 requires MDE to adopt California's Advanced Clean Trucks (ACT) regulations that require manufacturers of medium- and heavy-duty vehicles to sell increasing percentages of ZEVs by 2035. Maryland is also a signatory to both the 2013 Multi-State Zero-Emission Vehicle Memorandum of Understanding and the 2020 Multi-State Medium- and Heavy-Duty ZEV Memorandum of Understanding under which the signatory states are working collaboratively to accelerate ZEV adoption, coordinate ZEV policy, develop the ZEV market, and build out infrastructure. The recently enacted Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) will provide significant funding to advance electrification and charging infrastructure that will enable the widespread electrification of this vehicle market. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Adopting the most stringent, technically technical feasible Alternative 1 GHG emissions standards at the federal level will provide considerable support for Maryland's efforts to meet our GHG reduction goals. Transportation accounts for almost half of all GHG emissions generated in the State. The Climate Solutions Now Act of 2022 (CSNA) established a statewide goal of a 60 percent reduction in GHG emissions from 2006 levels by 2031. The CSNA requires more stringent GHG emission reductions economy wide and requires state agencies execute plans, programs, and policies in order to achieve these goals. Enacting the most stringent GHG emissions standards that are technologically feasible will complement the many strategies being implemented under the CSNA. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland has implemented emissions reduction measures across all sectors, including on-road transportation to reduce the state's GHG and NOx emissions. Federal programs such as these standards are needed to provide significant additional reductions of these pollutants as they also provide benefits across the economy. The EPA's leadership in strong regulatory GHG limits from motor vehicles could also help reduce ozone and PM2.5 precursors, providing further reductions to help meet our climate and air quality goals. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

For these reasons, MDE supports the EPA's proposal to adopt the proposed criteria pollutant standards and the most stringent, technologically feasible Alternative 1 GHG emissions standards for model year 2027 and later light-duty and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

Critical pollution reductions

In 2020, the transportation sector contributed 27 percent of total GHG emissions in the United States—more than any other single sector. Transport also contributes over 55 percent of our nation's total nitrogen oxide (NOx) emissions. NOx and particulate matter pollution pose serious health risks, leading to devastating human health impacts including asthma, other respiratory issues, and even premature death. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Fast-tracking robust car and truck standards is critical for the United States to meet its GHG targets over the coming decade, meet Clean Air Act requirements and provide long-overdue protections for environmental justice communities. We believe that such standards would be consistent with the U.S. nationally determined contribution to the Paris Agreement, under which the United States committed to cut economy-wide GHG emissions by 50 to 52 percent in 2030, compared to 2005 levels. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Outcomes

The final standards should:

- Ensure the LDV and HDV standards support greater zero-emission vehicle adoption by considering market growth expected from IRA and IIJA investments (which will surpass existing commitments outlined in Executive Order 14037);

- Put the nation on a trajectory to ensure 100 percent of all LDVs and HDVs sold in 2035 are zero-emission vehicles including pathway milestones assuring continuous progress; and

- Reflect recently adopted state LDV and HDV emissions standards, consistent with state authority under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0732, p. 2]

By implementing these recommendations, we believe that the resultant standards will not only meet the Clean Air Act's statutory command to protect public health, but will also help lower fuel costs for consumers, create good, green jobs, and reduce burden on frontline communities. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Organization: Mercedes-Benz AG

Mercedes-Benz supports the Administration's electrification goals.

The EPA has undertaken a monumental task with this NPRM, setting ambitious and challenging greenhouse gas and criteria emissions standards into the next decade. Mercedes-Benz proudly supports EPA's goal to advance vehicle electrification and protect the environment and public health. [EPA-HQ-OAR-2022-0829-0623, p. 1]

Organization: Metropolitan Washington Air Quality Committee (MWAQC) et al.

On behalf of the Metropolitan Washington Air Quality Committee (MWAQC), the Metropolitan Washington Council of Governments' (COG) Climate, Energy and Environment Policy Committee (CEEPC), and the National Capital Region Transportation Planning Board (TPB), we are writing to express our support for the proposed rule to establish Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. [EPA-HQ-OAR-2022-0829-0503, p. 1]

The EPA's current proposal to establish multi-pollutant emissions standards for model years 2027 and later light-duty and medium-duty vehicles would provide the critical leadership needed for our region to work towards meeting adopted environmental goals and standards. We agree that this comprehensive federal program would achieve significant greenhouse gas emissions reductions and would result in substantial public health and welfare benefits. As noted in the Metropolitan Washington 2030 Climate and Energy Action Plan, underserved communities have been disproportionately affected by ambient air pollution and climate-change-related health impacts. Therefore, more stringent greenhouse gas emissions standards and subsequent emissions reductions have the potential to help the most vulnerable populations. [EPA-HQ-OAR-2022-0829-0503, p. 1]

Organization: National Association of Clean Air Agencies (NACAA)

NACAA strongly supports EPA's proposal of these multipollutant emission standards – for LDVs and Class 2b and Class 3 MDVs (and we specifically support moving MDVs from the heavy-duty vehicle program to a LDV-program-like structure and the expansion of the definition of medium-duty "passenger" vehicles) – and the agency's use of its authority under CAA section 202(a) to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicles engines, which. . .cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." NACAA concurs with EPA that, consistent with the requirements of CAA section 202(b), the proposed standards "permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance." [EPA-HQ-OAR-2022-0829-0559, p. 6]

The proposal is based on the same regulatory framework that EPA has used for past vehicle rulemakings, and NACAA agrees with EPA that, "[t]he levels of stringency proposed in this rule for both light- and medium-duty vehicles continue the trend over the past fifty years for criteria pollutants, and over the past decade for GHGs, of EPA establishing numerically lower emissions standards based on continued advancements in emissions control technology that make it possible to achieve important emissions reductions at a reasonable cost."26 [EPA-HQ-OAR-2022-0829-0559, p. 6]

26 Supra note 1, at 29,196

Organization: National Tribal Air Association (NTAA)

As described and documented in the analysis of this proposed rule, when fully implemented, the U.S. will accomplish reductions in greenhouse gas emissions from motor vehicles, the largest source of these pollutants. Although the proposed rule and anticipated reduction in emissions of greenhouse gases (specifically carbon dioxide) are characterized as "ambitious" and “significant”5, Alternative 1 to the proposed standards will increase the cost of new vehicles as projected for Alternative 1 requirements. These costs for vehicle purchasers will be mitigated by increased savings in vehicle operating costs. [EPA-HQ-OAR-2022-0829-0504, p. 2]

5 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for cars and trucks to Accelerate Transition to a Clean – Transportation Future, USEPA News Release, April 12, 2023

The ravages of climate change continue to be of utmost concern to the NTAA. Alternative 1 to the proposed rule calls for more aggressive carbon monoxide emissions standards. We recommend its adoption. [EPA-HQ-OAR-2022-0829-0504, p. 2]

Conclusions

The NTAA appreciates this opportunity to comment on the proposed rule regarding “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles.” We agree with the EPA’s stated urgency to improve our air quality and to mitigate climate change5. The proposed vehicle emissions standards and related provisions can be important elements in addressing these critical needs. We support the proposed rule including Alternative 1 to the proposed greenhouse gas emissions standards. The anticipated shift to electric vehicle fleets must, however, be coincident with greatly enhanced electric infrastructure in many Tribal communities. [EPA-HQ-OAR-2022-0829-0504, p. 3]

5 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for cars and trucks to Accelerate Transition to a Clean – Transportation Future, USEPA News Release, April 12, 2023

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

NESCAUM and the OTC strongly support EPA’s proposal to establish new and more stringent criteria pollutant and greenhouse gas (GHG) emissions standards for model years (MYs) 2027 and later light-duty vehicles (LDVs) and Class 2b and 3 medium-duty vehicles (MDVs). Such standards have the potential to substantially reduce emissions of GHGs, NOx, fine particulate matter (PM2.5), VOCs, and air toxics, and help states across the country to achieve attainment with National Ambient Air Quality Standards (NAAQS) and state and federal climate goals. NESCAUM and the OTC urge EPA to adopt the proposed criteria pollutant standards and the most stringent GHG emissions standards that are technologically feasible. [EPA-HQ-OAR-2022-0829-0584, pp. 1-2]

II. State Policies and Federal Funding have Primed the Market for Rapid Electrification.

Recognizing the urgent need for action, most of the NESCAUM and OTC states have established ambitious economy wide or transportation sector specific GHG emission reduction targets for 2050 and interim targets that require aggressive emissions reductions by as soon as 2030. Transportation electrification is also critical to attaining the NAAQS in large metropolitan areas like the CSA. For decades, these states have worked individually and collaboratively to develop and implement a wide range of strategies to accelerate ZEV deployment, priming the market for increasingly stringent federal emissions standards. [EPA-HQ-OAR-2022-0829-0584, pp. 3-4]

A. Section 177 State LDV and MDV Emissions Standards

Under the CAA, California is the only state permitted to establish emissions standards for new motor vehicles. However, CAA Section 177 authorizes other states to adopt California's emissions standards, which are generally more stringent than comparable federal requirements. States first began to utilize this tool over 30 years ago to address smog and more than 15 years ago to curb GHG emissions. Since 1990, California and a growing number of "Section 177 states," including most of the NESCAUM and OTC states, have adopted regulations designed to increase production of on-road ZEVs. Adoption of these standards by Section 177 states enables economies of scale and sends clear market signals to industry and investors. These states also serve as a proving ground for advanced technologies and provide the foundation for strong federal standards like those proposed in the NPRM. [EPA-HQ-OAR-2022-0829-0584, pp. 3-4]

Organization: Oregon Department of Environmental Quality (DEQ)

The Oregon Legislature in 2007 found that "Global warming poses a serious threat to the economic well- being, public health, natural resources and environment of Oregon." It is important that the standards set by EPA continue to reduce greenhouse gases and other air pollutants from new vehicles through at least 2032. In Oregon, motor vehicles are the largest contributor of greenhouse gas emissions and the adoption of stringent vehicle standards is a foundational strategy to decarbonize Oregon's transportation sector. As a Section 177 state, Oregon has adopted regulations, namely California's Advanced Clean Cars program to increase production of ZEVs and reduce criteria air pollutant emissions from gasoline powered vehicles. The adoption of this program is one of many significant actions taken toward Oregon's goal of reducing greenhouse gas emissions 75 percent below 1990 levels by 2050. Additionally, the Advanced Clean Cars ZEV sales requirements provide the regulatory certainty needed to drive public and private investment in deployment of ZEVs and charging infrastructure. These requirements have propelled Oregon into one of the top five states selling light-duty ZEVs. Federally mandated requirements ensure the entire nation would move towards a cleaner transportation future. [EPA-HQ-OAR-2022-0829-0751]

These rules also provide numerous other environmental, economic and health benefits. Given that mobile sources contribute over half of the anthropogenic NOx emissions in the U.S.,1 it is essential to establish standards that lower the emissions from these sources. The proposed rules would reduce more than 400,000 tons of harmful NOx, PM2.5, and hazardous air pollutant emissions through 2055, significantly improving public health across America. EPA also estimates that these standards will result in approximately a 95% reduction in particulate matter (PM) emissions. These reductions are significant and ensures that Oregon, who has several ozone and PM maintenance areas, to continue to attain and maintain the existing PM and ozone standards as well as any revised, more stringent standards EPA may set in the future. [EPA-HQ-OAR-2022-0829-0751]

1 U.S. Environmental Protection Agency, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Govinfo, https://www.govinfo.gov/content/pkg/FR-2023-05-0S/pdf/2023- 07974.pdf

In the proposed rules, EPA is also requesting comment whether these new standards should be extended to MY 2035. DEQ recommends EPA extend and increase the GHG standards through MY 2035, to better align with those states that have already adopted California's Advanced Clean Cars Rule. [EPA-HQ-OAR-2022-0829-0751]

The proposed standards would meaningfully reduce emissions from the largest source of mobile emissions and provide substantial public health and climate benefits, helping Oregon achieve its greenhouse gas reduction goals. It also accelerates our efforts to decarbonize the transportation sector. In particular, for those states that lack the authority to address GHG emissions from on-road vehicles, EPA's action to update these standards is needed to ensure other states can meet their climate objectives. [EPA-HQ-OAR-2022-0829-0751]

Organization: Plug In America

We applaud the Environmental Protection Agency (EPA) for proposing the most stringent auto emissions standards in U.S. history. To meet the Paris Climate Agreement, 67% of vehicles sold in 2030 need to be electric vehicles (EVs).1 In addition to the significant climate and health benefits these standards will provide, we expect to see an increase in energy security, improved resilience of the electric power system, and a decrease in transportation fuel price volatility for American families. These emissions standards and the corresponding increase in electric vehicles have the potential to create a more just, equitable transportation system. [EPA-HQ-OAR-2022-0829-0625, p. 1]

1 https://theicct.org/us-ghg-standard-paris-agreement-dec22/.

EVs make ambitious GHG emissions standards achievable. There are parties who argue that these standards force a shift to electric transportation before the technology and infrastructure are ready. With 10 million EVs sold globally in 2022 and operating daily on roads worldwide, the EV future is here. [EPA-HQ-OAR-2022-0829-0625, p. 1]

In closing, we commend the EPA and the Biden - Harris administration for developing an elegant policy solution to address the climate change impacts of transportation through both regulation and incentives. Regulations drive manufacturers to innovate, incentives build the market, and infrastructure investments build consumer confidence. Together, these elements will drive change toward cleaner transportation and economic development. [EPA-HQ-OAR-2022-0829-0625, p. 3]

Organization: POET, LLC

POET thanks the Environmental Protection Agency (“EPA”) for the opportunity to submit this comment on the proposed rule, “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles” (the “Proposed Rule”). POET generally supports standards, like those in the Proposed Rule, that will significantly curb greenhouse gas (“GHG”) emissions from cars and light- and medium-duty trucks covered by the Proposed Rule. However, EPA must broaden the range of technologies the Proposed Rule relies upon to include renewable fuels, such as bioethanol, in setting standards for reducing GHG and other emissions. Renewable fuels will be critical to decarbonizing and reducing other air pollutant emissions from these vehicles. POET urges EPA to credit renewable fuels, including their significant lifecycle carbon emissions reductions, and adopt POET’s other recommendations in these comments. [EPA-HQ-OAR-2022-0829-0609, p. 1]

Organization: Pueblo of Santa Ana

The Pueblo of Santa Ana ("The Pueblo") is located along the Rio Jemez and Rio Grande in southeastern Sandoval County, New Mexico, about 15 miles north of Albuquerque and 45 miles south of Santa Fe. Santa Ana land encompasses 141,191 acres including original land grants, trust lands, and land purchased by the Tribe. The Pueblo is located in a major transportation corridor. One major interstate highway (I-25) bisects the Pueblo, and another state highway (NM-550) runs along the southern boundary, close to residential areas on the Pueblo. There are high traffic volumes and ongoing road construction in this area, producing heightened levels of emissions that have a significant impact on the Pueblo's air quality. [EPA-HQ-OAR-2022-0829-0556]

From the latest Level 2 emissions inventory the Pueblo has conducted, the percentage of criteria pollutants contributed by the Pueblo when totaling all sources on-Pueblo and within 50 miles of the Pueblo's boundaries stayed well below 3%. Because of this, the area emissions, including those from vehicles, that impact Santa Ana are contributed minimally by the Pueblo. This proposed regulation, along with EPA's other efforts to reduce ozone-causing pollutants, PM2s, and multiple hazardous air pollutants would benefit Santa Ana which is subject to these emissions coming from off the Pueblo. [EPA-HQ-OAR-2022-0829-0556]

The acute and continuous impacts of climate change on the Pueblo of Santa Ana are well documented. Unfortunately, new consequences of this global crisis continue to be revealed. As described and documented in the analysis of this proposed rule, when fully implemented, the U.S. will accomplish reductions in greenhouse gas emissions from motor vehicles, the largest source of these pollutants. Although the proposed rule and anticipated reduction in emissions of greenhouse gases (specifically carbon dioxide) are characterized as “significant” and “stringent”5, Alternative 1 to the proposed standards will achieve more substantial reductions. We are mindful of the expected additional costs of new vehicles as projected for Alternative 1 requirements. These costs for vehicle purchasers will be mitigated by increased savings in vehicle operating costs. We recommend Alternative 1. [EPA-HQ-OAR-2022-0829-0556]

5 No footnote provided.

The Pueblo of Santa Ana supports the proposed emissions standards for new light-duty and medium-duty vehicles for non-methane organic gases plus nitrogen oxides (NMOG+ NOx). When fully implemented, this will be an important step in reducing the impacts from the largest source of these ozone-precursor pollutants. Concurrently, reduced emissions of NMOG+ NOx will reduce ambient air concentrations of particulate matter, and PM2.s more specifically. Reducing these tailpipe emissions will further reduce the release of multiple toxic air pollutants including benzene - a known human carcinogen. [EPA-HQ-OAR-2022-0829-0556]

In conclusion, the Pueblo of Santa Ana supports this important set of proposed regulations regarding air pollution emissions from new light-duty and medium-duty vehicles. This support is contingent upon EPA and other federal agencies' assurances that infrastructure is in place to support the transition to an electric vehicle fleet nationwide. [EPA-HQ-OAR-2022-0829-0556]

As our light-duty and medium-duty vehicle populations become more electrified, battery durability and warranty will be increasingly important. The Pueblo of Santa Ana supports the proposed requirements regarding battery performance. [EPA-HQ-OAR-2022-0829-0556]

The anticipated transition from gasoline-powered vehicles to partial or total electric power trains will require greatly enhanced systems and convenient vehicle charging units. We are aware that programs are emerging to build this infrastructure. Such initiatives by the EPA, the Department of Energy (DOE), and others must be operational and reliable for the proposed emissions standards to be achievable and acceptable. [EPA-HQ-OAR-2022-0829-0556]

Organization: Rivian Automotive, LLC

EPA Proposed Strong Standards but More Stringent Requirements are Feasible

Rivian's mission to Keep the World Adventurous Forever is made manifest in its commitment to the environment and addressing climate change. We strongly support a program of ambitious GHG regulation in the transportation sector as core to our values and vision for the world. Given transportation's role as the country's number one source of GHG emissions at a time when the urgency of the climate crisis has never been clearer, a program such as this proposal is also vitally necessary. Rivian strongly supported EPA's revision in 2021 of the U.S. emissions standards for passenger cars and light trucks through MY26. But we stressed in our comments at the time that additional action would be necessary to meet the country's broader climate protection goals. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

EPA's current proposal fundamentally meets the moment. Collectively, automakers' have officially announced EV investments totaling hundreds of billions of dollars to support EV production goals that, if achieved, would result in 43 million annual EV sales globally by 2030.2 In the U.S. market specifically, independent analyses find that business as usual—including the impact of government incentives—now points toward an EV sales share in 2032 of 56-67 percent.3 Similarly, the agency's own sensitivity analysis finds that the central "No Action" scenario results in 54 percent BEV sales in MY32, while a "faster BEV acceptance" case results in 66 percent BEV sales on the same timeframe.4 Therefore, EPA's proposal reflects the industry's new paradigm and ensures that the investments and commitments of the private sector are matched by the regulatory framework in which they operate. With these rules in place, the L/MDV sector will be well on its way to a full transition to electrification no later than MY35. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

2 BloombergNEF, Zero-Emission Vehicles Factbook: A BloombergNEF Special Report Prepared for COP27 (November 2022), available at www.assets.bbhub.io/professional/sites/24/2022-COP27-ZEV-Transition_Factbook.pdf.

3 Peter Slowik et al., The International Council on Clean Transportation, and Robbie Orvis and Sara Baldwin, Energy Innovation Policy & Technology LLC, Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States (January 2023), available at https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23-2.pdf.

4 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 87 (May 5, 2023) (revising 40 C.F.R. Parts 85, 86, 600, 1036, 1037, and 1066), Table 129, 29,340.

The headline target—82 g/mi on a fleet-average basis in MY32—shows the agency's ambition to remain among the global leaders in emissions regulation. The BEV sales share projected to result from the target generally keeps pace, at least through MY30, with the broader ZEV sales requirements of Advanced Clean Cars II ("ACCII") and Canada's newly proposed amendments to its own GHG standards.5 The climate and public health benefits of this are clear but setting strong standards also positions the U.S. to compete for the automotive jobs of the future and hedges against potential component cost increases. For example, EPA's sensitivity analysis shows that a high battery cost scenario paired with no regulatory action results in industry achieving just 159 g/mi and roughly 29 percent BEV sales in MY32.6 While industry's investments and product plans today undoubtedly favor electrification, the pace of the transition must align with the world's midcentury decarbonization imperative. Leaving carbon reduction solely to the market, even in one now firmly oriented toward an EV future, risks stalled progress in the face of potential economic headwinds and uncertainty. A strong regulatory driver like EPA's proposal will ensure that industry moves forward at the pace and scale necessary to avoid the worst impacts of climate change. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

5 EPA did not include PHEVs in its initial analysis of the proposal's impact on technology penetrations. Nevertheless, we find the comparison with ACCII and Canada's proposal illustrative.

6 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 87 (May 5, 2023) (revising 40 C.F.R. Parts 85, 86, 600, 1036, 1037, and 1066), Table 129, 29,337.

See original attachment for: Figure 1. BEV sales rates projected under EPA's proposal largely keep pace with the ZEV sales requirements of ACCII and Canada (proposed), at least through MY30. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

Organization: Scott Wilson

By now, you will have read in public comments that this proposed regulation will transform the way people have lived, worked, and played for over 100 years" (Alliance for Automotive Innovation) and "If finalized as proposed, the proposals would have a very significant impact on all segments of the fuels and vehicle industries and the entire U.S. economy" (American Petroleum Institute). While these statements are hyperbolic, the rule will indeed lead to significant changes to our vehicle fleet, spread over many years. That's the whole point. We've just begun taking the first few steps needed to eventually bring the Gasoline Age to an end. We have a long way to travel on this road. But, it's clear that the best way to achieve the emission targets, which even the Texas Public Policy Foundation acknowledges are under EPA's authority, is to take the combustion out of vehicles. [EPA-HQ-OAR-2022-0829-0515, p. 1]

The automaker's position (Alliance for Automotive Innovation) is that the proposed rule is overly-ambitious and that it requires "stepped-up efforts at the state and local level when it comes to building codes, permitting, and approval from public utility commissions". That is true, and is an ongoing effort, however, we cannot wait until the entire EV ecosystem is in place before ramping up vehicle production. Vehicles and their supporting social and physical infrastructure must develop together, hand-in-hand, just like the fuel, repair, and dealer systems did for gasoline vehicles. We would do well to learn from societies that are successfully transitioning to EVs, like Norway, and the EU more broadly. [EPA-HQ-OAR-2022-0829-0515, p. 1]

Assuming the rule is adopted, opponents will turn to the legal system and rely on an alleged bedrock (but actually recently invented) legal concept called the "major questions doctrine". "Major" is in the eye of the beholder. Whether or not a particular trade group is impacted is not a major question, even if it is offset by an economic bonanza for another trade group. Climate change is a major question. Particulate air pollution affecting human health is a major question.

Economic cost due to climate impacts is a major question. As far as major questions, this rule will be a major win for Americans. [EPA-HQ-OAR-2022-0829-0515, p. 1]

In summary, while change can be challenging, it can also contain opportunity. Wise implementation can manage the former and harvest the latter. [EPA-HQ-OAR-2022-0829-0515, p. 1]

Organization: Sierra Club et al.

On behalf of the 32 undersigned advocacy groups, we thank the Environmental Protection Agency for its leadership in reducing harmful vehicle pollution. We urge the agency to protect public health and address the climate crisis by finalizing the strongest possible emissions standard for light and medium-duty vehicles before the end of 2023. [EPA-HQ-OAR-2022-0829-0668, p. 1]

The final emissions standard should put us on the path to ensuring that all new vehicles sold in 2035 are zero-emission vehicles (ZEVs). This transition is critical to reducing not only GHG emissions, but smog-forming pollution and particulate matter as well. Passenger vehicles produce more than one million tons of nitrogen oxide (NOx) emissions and 33,400 tons of particulate matter (PM) pollution every year.1 These emissions disproportionately harm people in low-income communities and communities of color. [EPA-HQ-OAR-2022-0829-0668, p. 1]

1 Zeroing in on Healthy Air, American Lung Association, https://www.lung.org/getmedia/13248145-06f0-4e35-b79b-6dfacfd29a71/zeroing-in-on-healthy-air-report-2022.

Organization: Southern Environmental Law Center (SELC)

Light- and medium-duty vehicles are a major source of greenhouse gases (GHGs) and other harmful pollutants that have serious environmental, public health, and economic impacts. These adverse impacts are particularly significant in the South. While the proposed standards are an important step towards cleaning up tailpipe emissions from light- and medium-duty vehicles, more should be done to accelerate the transition to zero-emission vehicle (ZEV) technology. We therefore support the adoption of standards at least as stringent as the Alternative 1 standards and urge EPA to consider adopting even stronger standards that would achieve 100 percent ZEV sales in the transportation sector by 2035. These strengthened standards should be adopted as soon as possible and take effect no later than model year 2027. In addition, as part of its effort to strengthen the standards, we support EPA’s proposals to close compliance loopholes, accurately account for tailpipe emissions, and implement stronger certification, durability, and warranty provisions. [EPA-HQ-OAR-2022-0829-0591, p. 1]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV) Coalition

We believe this rule when finalized as proposed will send a strong signal to car and truck manufacturers to produce strong PHEVs. We really appreciate the technology neutral approach that you have produced. [EPA-HQ-OAR-2022-0829-0646, p. 10]

Organization: Tesla, Inc.

Foundationally, the primary dynamics that have driven progress in the development of EPA's program in the past and its fundamental architecture remain and, if anything, have become even clearer and more imperative, including: the ongoing need to achieve significant additional emissions reductions from the motor vehicle sector, including for conventional pollutants and greenhouse gases; the increasingly capable role of advanced vehicle technologies, led by zero-emissions BEVs, in providing those reductions; the benefits to the automotive industry of achieving a uniform national program integrating California-led and Federal authorities and operating seamlessly across EPA, the Department of Transportation (DOT), and state authorities; and the importance of regulatory stability to the industry -- and of standards of sufficiently long duration -- to foster the significant investment needed to cement this transformation to advanced technology vehicles. The continuation and amplification of these trends provide a sound legal basis for an even more stringent set of standards than EPA's current proposal. [EPA-HQ-OAR-2022-0829-0792, p. 2]

6 See, 40 C.F.R. §1037.150(f) (Electric vehicles. Tailpipe emissions of regulated pollutants from electric vehicles . . . are deemed to be zero.).

as the carbon intensity of domestic electricity generation continues to decline, BEV emission performance becomes better and better over time.43 In short, consistent with Clean Air Act Section 202(a), BEVs represent a completely designed system to fully prevent and control air pollution.44 [EPA-HQ-OAR-2022-0829-0792, p. 7]

43 See e.g., IPCC, AR 6, Working Group III, Climate Change 2022: Mitigation of Climate Change (April 4, 2022) at 98 available at h ttps://www.ipcc.ch/report/ar6/wg3/.

44 42 U.S.C. §7521(a).

147 Id., at 29232.

Organization: Transport Evolved LLC (Transportation Consultancy)

On behalf of Transport Evolved (Transportation Consultancy), I am writing to express broad support for the updated calculations for the proposed "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles". [EPA-HQ-OAR-2022-0829-0453, p. 1]

It is vitally important, as we see the substantial health and climate impacts from pollution resulting from automakers who knew their product was harmful, that they are no longer artificially relieved of the burden of reducing pollution.1,2 The average age of the US fleet is approximately 12 years, and urgently reducing fleet emissions must be a priority if we are to reduce the impacts on the climate and on the health of the population.3 [EPA-HQ-OAR-2022-0829-0453, p. 1]

1 https://www.pnas.org/doi/abs/10.1073/pnas.1819989116.

2 https://policycommons.net/artifacts/2391360/the-price-of-fossil-fuels-full-report/3412789/.

3 https://www.statista.com/statistics/738667/us-vehicles-projected-age/.

Organization: The Mobility House et al.

We, the undersigned businesses and organizations support the Biden Administration's new EV emissions standards as proposed. As leaders in transportation electrification, vehicle-grid integration, and power control systems (PCS) implementation, the signatories are uniquely positioned to recognize not only the significance of the Environmental Protection Agency's (EPA's) new proposals, but also the context in which they are made. We urge the EPA and other implementing agencies to prioritize strategies to enable use of PCS to facilitate coherent and efficient secondary and primary upgrade planning. [EPA-HQ-OAR-2022-0829-0657, p. 1]

Under the Biden Administration, the United States has embraced new technologies and begun the process of scaling both the manufacture and sale of electric vehicles. We are excited to participate in the successful integration of millions of new light, medium, and heavy-duty vehicles, and stand ready to work with you to allow the electric vehicle revolution to continue and succeed. [EPA-HQ-OAR-2022-0829-0657, p. 2]

Organization: Volkswagen Group of America, Inc.

Ambitious and Stringent Standards Proposed

EPA's NPRM proposes historically ambitious and stringent targets towards carbon neutrality for the light-duty and medium-duty transportation sector. Significantly noted by AFAI, the automotive industry is committing resources and investments of $1.2 trillion by 2030, while Volkswagen estimates our worldwide digitalization and electrification investment around $130 billion1 between 2023 and 2027. The ambition must be met equally by commitment of segments outside the automotive Industry. [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

1 120 Billion Euro; Exchange rate: 1.09 USD to 1 EUR

To that end, Volkswagen supports continuous reductions in vehicle fleet average GHG emissions and criteria pollutants. Volkswagen is committed to work with U.S. agencies, utilities, charging infrastructure providers, raw material suppliers and additional stakeholders in partnership with AFAI on reasonable and achievable pathways for all manufacturers for 2027 and beyond. Sustained, complementary and supportive policy is paramount in forming a cross-sector foundation required to scale up growth and infrastructure. To achieve the shared vision of zero emission mobility, solutions must be instituted in these sectors to allow Volkswagen to provide customers with a "People's Car" of superior utility and affordability. [EPA-HQ-OAR-2022-0829-0669, p. 2]

Organization: Volvo Car Corporation (VCC)

Electrification

VCC shares the Biden administration goals to advance sustainability and electrification. VCC wants to be a leader in the transition to zero tailpipe emission mobility and our plan is to be a fully electric car company by 2030. Our goal is to be climate neutral by 2040, in line with the Paris Agreement. Therefore, VCC supports the Administration's goals of an electric vehicle future and lower emissions year over year. [EPA-HQ-OAR-2022-0829-0624, p. 2]

Organization: Washington State Department of Ecology

The Washington State Department of Ecology is pleased to submit comments on EPA's Notice of Proposed Rulemaking for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Docket ID No. EPA-HQ-OAR-2022-0829. Ecology is encouraged by EPA's proposal to significantly increase the deployment of electric vehicles throughout the nation using increasingly stringent motor vehicle emissions standards through 2032. We urge EPA at minimum to adopt the proposed standards. We encourage the agency to consider increasing the stringency beyond the proposed level, which we believe is economically and technically feasible and would maximize greenhouse gas and criteria pollutant reductions. Adoption of any standard less stringent than existing requirements will not serve the purpose of the Clean Air Act. [EPA-HQ-OAR-2022-0829-0541]

The transportation sector represents the most significant source of greenhouse gas emissions nationally, and accounts for around 40% of greenhouse gas emissions in Washington State. Like many of our peer states, Washington has set necessarily ambitious decarbonization requirements that cannot be achieved without aggressive and innovative transportation policies. [EPA-HQ-OAR-2022-0829-0541]

Washington is one of the 18 states that have adopted California's Advanced Clean Cars II regulation, which requires automakers to sell an increasing percentage of zero-emission vehicles each year through 2035, when 100% of new light-duty vehicle sales will need to be zero-emission. It is clear from the automaker response to this regulation that the zero-emission vehicle trend is here to stay. Automakers and battery manufacturing companies are spending tens of billions of dollars to build and retrofit factories across the country and around the world to produce zero-emission vehicles. Congress and the White House have also recognized the importance of converting the nation's motor vehicle fleet to zero-emission technology, with billions of dollars being invested in battery manufacturing, electric vehicle purchase rebates, and charging infrastructure development through the Infrastructure Investment and Jobs Act and the Inflation Reduction Act. [EPA-HQ-OAR-2022-0829-0541]

Since the passage of the Inflation Reduction Act in August 2022, over $49 billion of new private investment has been announced in North America for battery-related minerals mining, minerals processing, battery manufacturing, and zero-emission vehicle manufacturing, according to the EV Supply Chain Dashboard.1 These investments are projected to create over 37,000 new jobs, most of them in the U.S. [EPA-HQ-OAR-2022-0829-0541]

1 Data from EV Supply Chain Dashboard at https://www.charged-the-book.com/na-ev-supply-chain-map, accessed Mav 19 2023

With automakers now ramping up their offerings of mass-market zero-emission vehicles, electric vehicle sales have recently reached a market share of 10% nationwide, a five-fold increase in just the past couple of years. Zero-emission vehicle options are available in every segment of the light-and medium-duty market, and more models are being offered every year. According to the Automaker Dashboard at Atlas EV Hub, there are currently 127 models of zero-emission vehicles from 33 manufacturers either currently available or projected to be by the end of this year.2 Yet demand for new electric vehicles still outstrips available supply. A recent Sierra Club study revealed that two-thirds of auto dealerships nationwide did not have a single electric vehicle for sale on their lot, mostly due to supply chain, inventory issues, and automaker allocations.3 There simply aren't enough electric vehicles being produced to meet demand. However, by the time the proposed Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles take effect, most of the new investments in minerals mining, minerals processing, battery manufacturing, and electric vehicle manufacturing will result in dramatically increased supply chain capacity. [EPA-HQ-OAR-2022-0829-0541]

2 Data from Atlas EV Hub Automaker Dashboard at https://www.atlasevhub.com/materials/automakers-dashboard/, accessed May 19. 2023

3 Sierra Club, A Nationwide Study of the Electric Vehicle Shopping Experience, May 2023.

There is no longer any reason to delay the rapid acceleration of the zero-emission vehicle transition, and we encourage EPA to increase the stringency of emission standards to help promote this transition and help automakers meet market demand. The climate crisis demands the most aggressive policies to decarbonize our nation's transportation system as quickly as possible. [EPA-HQ-OAR-2022-0829-0541]

In summary, Ecology urges EPA to at a minimum adopt the emissions standards proposed in this rulemaking and to consider increasing the stringency beyond the proposed level. These rigorous standards will put the nation on the right path for achieving the ambitious greenhouse gas reduction targets that we committed to in the Paris Agreement, create Joos in the clean transportation sector and ensure that all Americans benefit from reduced transportation emissions in their neighborhoods. [EPA-HQ-OAR-2022-0829-0541]

Organization: Western States Air Resources Council (WESTAR)

WESTAR applauds EPA for its past efforts to reduce emissions from the transportation sector, and this proposed rule is another step in the right direction toward further reducing criteria pollutant and GHG emissions from this sector. Given that mobile sources are the primary contributor to GHG emissions and contribute over half of the anthropogenic NOx emissions in the U.S.,1 setting standards that lower the emissions from these sources is paramount. EPA projects that CO2 would be reduced by 26 percent relative to the no-action scenario.2 By 2055, EPA also projects a 35-40 percent reduction in PM2.5, NOx, and SOx, and over 40% reduction in VOC emissions.3 WESTAR members support regulations that reduce emissions. [EPA-HQ-OAR-2022-0829-0676]

1 U.S. Environmental Protection Agency, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Govinfo, https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023- 07974.pdf (accessed June 8, 2023).

2 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis (“DRIA”), EPA-420-D-23-003, Section VI and Chapter 9 (April 2023), https://www.epa.gov/system/files/documents/2023-04/420d23003.pdf.

3 See DRIA Section VII and Chapter 9

EPA’s action not only yields advantages at the national level but also provides significant benefits to states, local air agencies, and Tribes in the West who face challenges in meeting criteria pollutant standards in part due to significant emissions from federally regulated mobile sources. In terms of ozone formation, many areas in the West are NOx-limited and therefore focus emissions reduction efforts on NOx reductions, as they are most effective in reducing ozone concentrations. The proposed emissions standards for light-duty and medium-duty vehicles will reduce emissions in these areas and assist these agencies in achieving their ozone attainment planning goals. [EPA-HQ-OAR-2022-0829-0676]

In addition, EPA's approach to addressing multiple pollutants simultaneously simplifies the regulatory landscape and supports the paradigm shift from single to multi-pollutant policies, a shift many western states, local air agencies, and Tribes appreciate. Beyond regulatory simplification, the holistic approach to emissions standards outlined in the proposed rule acknowledges the interconnectedness of different pollutants and their cumulative impacts. This approach will help to improve overall air quality and protect the health and well-being of communities in the West. [EPA-HQ-OAR-2022-0829-0676]

Organization: World Resources Institute (WRI)

We applaud the Biden administration for acting swiftly and using the full force of Clean Air Act authorities to propose new, more stringent vehicle emissions standards to reduce criteria pollutants and greenhouse gas (GHG) emissions from passenger (and other) vehicles to address climate pollution and public health impacts. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Transportation accounted for the largest portion (29%) of total U.S. greenhouse gas emissions in 2021, and light duty vehicles [Link: https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions] (including passenger cars and light-duty trucks) represent the largest category with 58% of the transportation sector's GHG emissions. Furthermore, studies (such as the recent 'Zeroing in on Healthy Air' [Link: https://www.lung.org/getmedia/13248145-06f0-4e35-b79b-6dfacfd29a71/zeroing-in-on-healthy-air-report-2022.pdf] from the American Lung Association) show that regulations and policies designed to reduce GHG emissions, such as through accelerating electric transportation, will have the added benefit of reducing other forms of pollution - including air toxics and particulate matter - that impact public health and disproportionately impact overburdened communities. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

EPA Summary and Response

Summary

The above comments are some of the many general statements of support for EPA's proposed program to reduce GHG and criteria emissions from light- and medium-duty vehicles included in the detailed comments reproduced verbatim in this RTC document and the additional comments described in Appendix A. Many of the commenters note the need for these standards to address air pollution and climate change, reduce the impacts of emissions on human health, and/or for environmental justice. While there is support for the standards as proposed, some of the commenters urge EPA to adopt Alternative 1, or even more stringent standards or the California standards, and/or encourage EPA to finalize these standards as soon as possible. Some commenters also provide general statements about battery performance the availability of electric infrastructure, and the need to make the standards technology neutral so alternative fuels may be used.

Response

EPA acknowledges the comments received expressing general support for EPA's rulemaking. Some of these commenters provided detailed comments about specific aspects of the proposed program; those comments are reproduced verbatim in other parts of this RTC document. Regarding the general comments above relating to issues such as battery performance, warranties, electric infrastructure, and other issues, please see the respective sections of the RTC and preamble that address those aspects of the program in detail.

1.2 - General opposition to the proposed standards

Comments by Organizations

Organization: A. Longo

Considering the potential economic consequences, the lack of direct evidence supporting improved health conditions, and the complex nature of the relationship between regulatory measures and health outcomes, I urge the Environmental Protection Agency to reassess the proposed restrictions on transportation. It is crucial to strike a balance that achieves environmental goals while minimizing the financial burden on consumers and businesses. Additionally, I encourage the EPA to conduct further research and analysis, incorporating inputs from independent experts, to gather robust scientific evidence directly linking these regulations to substantial and quantifiable improvements in public health outcomes. [EPA-HQ-OAR-2022-0829-0517, p. 2]

Organization: Ad Hoc Tier 4 Light-Duty Small Manufacturer Group

EPA should reconsider its proposed provisions and finalize Small OEM rules that are consistent with the principles of an incremental phase-in with periods of stability, that are reflective of both the function and limited emissions contribution of Small OEM products, and that do not force Small OEMs to be overly-reliant on purchasing credits from other manufacturers. [EPA-HQ-OAR-2022-0829-0509, p. 3]

Organization: Alliance for Automotive Innovation

VII. Consideration of Standards Beyond 2032

EPA requests comment on potential light- and medium-duty greenhouse gas and criteria pollutant standards beyond MY 2032.322 [EPA-HQ-OAR-2022-0829-0701, p. 214]

322 NPRM at 29239

The standards that EPA is proposing through MY 2032 are already subject to massive uncertainties. The automotive industry is currently undergoing the single most transformative period in its history. We are essentially rebuilding and redesigning an entire industrial sector of the economy. EPA is already making projections and assumptions about this transformation that must come to fruition in a perfect, or almost perfect, manner to meet the proposed standards. [EPA-HQ-OAR-2022-0829-0701, p. 214]

Predicting the state of the EV market and its supporting conditions beyond MY 2032 is even more uncertain. If everything goes as hoped for by EPA, there may be an opportunity to continue further reductions in transportation emissions beyond MY 2032. However, now is much too soon to set specific standards. Incentives like those of the IRA are scheduled to sunset by 2032. Even this one factor alone may lead to a fattening of EV market share growth. Other enabling conditions may also falter or flourish. [EPA-HQ-OAR-2022-0829-0701, p. 214]

Auto manufacturers and suppliers are already transitioning to EVs, and this transformation will continue without the need to further extend specific regulatory standards at this time. We believe that EPA's Proposed Rule already stretches beyond the limits of what is practicable and feasible to accomplish between now and 2032. Attempting to propose standards beyond 2032 could further jeopardize the fragile drive to electrification with all the variables and stakeholders involved. EPA should not introduce even greater uncertainty by attempting to set standards beyond 2032 at this time. [EPA-HQ-OAR-2022-0829-0701, p. 214]

Organization: Alliance for Consumers (AFC)

Alliance for Consumers, by way of its Executive Director, O.H. Skinner, files this comment to highlight the ways in which the proposed rule fails to serve the interests of everyday consumers and how EPA's proposal is procedurally and substantively deficient and should not be finalized. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

The current EPA proposal is best understood as yet another attempt to weaponize the agency rulemaking process, and the power of the federal government, to wipe away things that everyday consumers overwhelmingly like, use, and rely upon for life's essential needs. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

EPA is proposing to replace a majority of the cars on the market today with EVs that are currently unpopular with everyday consumers in most parts of the country and do not work within the household budgets of those who need cars to help their families thrive. And that is before considering how EPA's proposed rule is premised on speculative, wholesale changes to other parts of the economy and our national infrastructure outside the purview of EPA (e.g., the energy grid). [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

Make no mistake, this is a proposal to forcibly remove from the market a majority of the cars that everyday consumers currently buy and use. The EPA Fact Sheet for the proposal focuses throughout on electric vehicle technology as the critical aspect of the proposed rule, from how it was conceived, through how it would be complied with. See, e.g., EPA Fact Sheet, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Apr. 2023, at 1 (highlighting EV technologies and support for a "rapid shift away from" "internal combustion engine (ICE) technologies"); id. at 2 (focusing on "vehicle electrification technologies" as central to proposed standards); id. at 6 (emphasizing electric vehicle costs and benefits throughout cost-benefit analysis section).1[EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

1 Fact Sheet available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017626.pdf.

Indeed, the path to compliance that EPA chose to highlight features nearly 70% of the passenger car market shifting to battery electric vehicles (and 40% or so of medium duty vans and pickup trucks). See EPA Fact Sheet, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Apr. 2023, at 5. This despite only about 1% of the current cars on the road being electric vehicles. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

The current EPA proposal is an unlawful EV mandate masquerading as a tailpipe regulation. That is the only conclusion that a disinterested observer or everyday consumer could reach, given how the proposal was promulgated, the limits that have been proposed, and the commentary surrounding its release. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

While an extreme EV mandate might be popular in progressive enclaves, and with federal employees who live in Washington, D.C., a rapid shift to electric vehicles along the lines proposed by EPA here will make lives worse for everyday consumers while costing them more for the privilege of having their lives inconvenienced. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

Early indications from places like California back up this conclusion and provide warning signs that were not properly addressed by EPA in the proposed rule. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

For the reasons set forth below, and those contained in other comments filed to date, EPA should not finalize the proposal; rather, it should address the deficiencies identified herein. [EPA-HQ-OAR-2022-0829-0534, p. 2]

EPA's proposal—entitled Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles—is procedurally and substantively deficient and should not be finalized. [EPA-HQ-OAR-2022-0829-0534, p. 3]

EPA should not finalize the proposal; rather, it should address the deficiencies identified herein and instead promulgate a proposal that properly considers the issues here and sets standards that better serve everyday consumers. [EPA-HQ-OAR-2022-0829-0534, p. 5]

Organization: American Coalition for Ethanol (ACE)

From the perspective of tailpipe-focused emissions, EPA's proposal represents the most ambitious standards ever for light-duty vehicles, effectively requiring 60% of all vehicle sales to be battery electric vehicles (BEVs) only by 2030, ramping up to BEVs representing 67% of all vehicle sales just two years later (2032). The Agency is seeking comment on alternative compliance scenarios; Alternative 1 would require BEVs to represent 69% of all vehicle sales by 2032 and Alternative 2, the "least stringent," would require BEVs to make up 64% of all vehicle sales by 2032. [EPA-HQ-OAR-2022-0829-0613, p. 1]

While ACE members share EPA's goal to significantly reduce lifecycle greenhouse gas (GHG) emissions from U.S. passenger vehicles, we know there is a better way than arbitrarily regulating a solution which merely focuses on the tailpipe and is practically unachievable. Therefore, ACE does not support the proposal nor either alternative. [EPA-HQ-OAR-2022-0829-0613, p. 1]

To be clear, ACE members recognize BEVs can play a meaningful role in decarbonizing the transportation sector. We also support technology-neutral policies which enable electric vehicles to compete on a level playing field with other low carbon technology solutions such as ethanol.

We oppose policies which tilt the scale in favor of BEVs and ignore the lifecycle GHG emissions associated with them. [EPA-HQ-OAR-2022-0829-0613, p. 1]

Our comments will 1) discuss the practical, technical and legal problems associated with arbitrarily regulating BEVs as the only solution to reduce GHGs from the transportation sector, and 2) how EPA can fix its proposal to develop a practical and achievable technology-neutral final rule which achieves the goals we share to meaningfully reduce carbon pollution from transportation emissions. [EPA-HQ-OAR-2022-0829-0613, p. 1]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

We are deeply concerned about the federal government's ongoing push to mandate the electrification of the American vehicle fleet. Through an ever-expanding list of agency action's, the Biden Administration is unilaterally attempting to mandate electrification rather than to improve efficiency and re- duce emissions through realistic, technology-neutral standards is both bad policy and, in many instances, contrary to law. This proposal exemplifies both problems. [EPA-HQ-OAR-2022-0829-0683, p. 2]

Through this proposed rule, EPA seeks to transform production of light- and medium-duty motor vehicles (from passenger cars and SUVs, to large pickups and vans) by forcing manufacturers to replace a substantial portion of their conventional-vehicle fleets with electric alternatives—in less than a decade. The agency does so by setting emissions standards for model years 2027- 2032 that EPA knows internal-combustion-engine vehicles could never satisfy. EPA itself projects that compliance would compel supplanting roughly 67 percent of light-duty vehicles and 46 percent of medium-duty vehicles with battery models. Combined with its parallel proposed rule for heavy-duty vehicles, EPA's proposed light- and medium-duty rule would radically reshape the American automotive industry. [EPA-HQ-OAR-2022-0829-0683, pp. 2-3]

EPA should not press forward with finalizing an unlawful, irrational rule that cannot succeed and is unlikely to survive judicial scrutiny. The transformation EPA seeks to work on all sectors of the automotive industry at once— including through this rule and the proposed Heavy-Duty rule—is infeasible, unworkable, and almost certain to fail, particularly given EPA's arbitrary and unrealistic timeline for compliance. Rather than pursue these rules, the agency should engage meaningfully with all affected stakeholders to develop sound, workable measures to address vehicle emissions that are technology-neutral and can also help to reduce life-cycle greenhouse-gas ("GHG") emissions in the currently existing vehicle fleet, which the proposed regulation ignores. [EPA-HQ-OAR-2022-0829-0683, pp. 5-6]

Organization: American Freedom and America First Policy Institute (AFPI)

Electric Vehicle Mandate

On May 5, 2023, the EPA proposed regulations that would significantly increase fuel economy and vehicle emission standards. As the EPA knows, it is physically impossible for conventional gasoline-powered vehicles to meet these proposed requirements. The rule would effectively force automakers to shift production to electric vehicles, which do not use fossil fuels or directly emit pollutants (although the power plants from which electric vehicles draw electricity typically do).1 The Biden Administration expects this rule to require EVs to make up 67% of new vehicles sold by 2032 (Environmental Protection Agency, 2023) (Link:

https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and). This is a substantial increase from the Biden Administration's prior target of 50% of EV sales by 2030 (Executive Order 14037, 2021) (Link: https://www.federalregister.gov/documents/2021/08/10/2021-17121/strengthening-american-leadership-in-clean-cars-and-trucks). [EPA-HQ-OAR-2022-0829-0699, p. 2]

1 Obtaining the minerals necessary to produce a single (EV) battery requires mining about 250 tons of rock—an energy-intensive process (Mills, 2022, p. 21) (Link: https://media4.manhattan-institute.org/sites/default/files/the-energy-transition-delusion_a-reality-reset.pdf). As a result, between 8 and 20 tons of carbon dioxide are emitted during the production of each EV. If battery production becomes even more energy intensive as mining shifts to lower-grade ores, EVs could emit more carbon dioxide over their full lifespan than do conventional vehicles (Mills, 2022, p. 21).

EVs currently make up only 5.6% of U.S. vehicle sales. One company—Tesla—accounts for almost two-thirds of those sales (Mihalascu, 2023) (Link: https://insideevs.com/news/653395/evs-made-up-5point6-percent-of-overall-us-car-market-in-2022-driven-by-tesla/). If this rule is finalized as proposed (and withstands legal challenges) it would force automobile manufacturers to replace conventional vehicle production with EVs en masse—irrespective of what cars Americans want to buy. [EPA-HQ-OAR-2022-0829-0699, p. 2]

Organization: Arizona State Legislature

EPA's proposed rule for light-duty and medium-duty vehicles will cost jobs, increase the price of goods, hurt families, threaten our electric grid's reliability, and endanger our national security. We are both elected representatives of the people of Arizona, and citizens of Arizona who purchase and operate vehicles and participate in the Arizona economy on the same footing as other Arizonans. In both capacities, we have grave concerns about this reckless proposed rule. EPA should reject the proposed rule for at least the ten reasons set forth in this comment. [EPA-HQ-OAR-2022-0829-0537, p. 2]

EPA should reject the proposed rule to avoid these and many other terrible consequences. The people of Arizona and America deserve better. [EPA-HQ-OAR-2022-0829-0537, p. 3]

Conclusion

EPA's proposed rule will hurt Arizona families and workers by forcing them to buy vehicles they cannot afford, increasing the cost of goods they need, costing them jobs, decreasing the reliability of the electricity they depend on, and weakening our national security by making us dependent on China. EPA's green dream will be a nightmare for Arizona. EPA should reject the proposed rule and begin acting in the best interests of Arizonans and Americans. [EPA-HQ-OAR-2022-0829-0537, p. 32]

Organization: BMW of North America, LLC (BMW NA)

Under the circumstances and the high uncertainties outlined herein we join the Alliance of Automotive Innovators in their comments and expressed concerns about the Proposed Rule's GHG targets. It is not evident to BMW NA that the Agency has aptly considered the significance of these external factors, most of which are not under the control of the auto industry to resolve. [EPA-HQ-OAR-2022-0829-0677, p. 2]

Organization: Charles Gordon

INTRODUCTION and SUMMARY

I recommend that EPA withdraw this rulemaking. The earlier rules and the subsidies of the Inflation Reduction Act will lead to a greater reduction of CO2 with less controversy. In addition, the proposal is attempting to force faster adoption of electric cars than the infrastructure can support. Natural gas power plants cannot be replaced by solar and wind fast enough and more importantly transmissions line cannot be built quickly enough because of local opposition. [EPA-HQ-OAR-2022-0829-0747, p. 3]

The EPA has been reducing airborne particulates from gas engines since 1968. Currently the levels produced by gas engines are so low that they are in the same range as dirt particles, tire particles, cooking fumes and clothes rubbing together. [EPA-HQ-OAR-2022-0829-0747, p. 3]

The proposed rules are highly controversial. One half of citizens and politicians bitterly oppose them. They are likely to be repealed or worse. The auto companies and industry will not be supportive like they are of the earlier rules and IRA. [EPA-HQ-OAR-2022-0829-0747, p. 3]

Even if the rules are implemented, the effects on global warming will be inconsequential, perhaps a 0.01 deg. C reduction in global warming from the earlier rules and subsidies. This is not enough to justify continued inconvenience to citizens and controversy. [EPA-HQ-OAR-2022-0829-0747, p. 3]

The prior regulations and the IRA subsidies will substantially reduce CO2 and particulates and improve health with much less controversy. The Auto companies and industry support them and have based their tens of billions of dollars investment on them. Citizens, industry and even some Republicans love subsidies and the US is good at doling them out. In addition, private citizens are more likely to go along with a rule that leaves them a choice. The value of freedom of choice should be taken into account by EPA. [EPA-HQ-OAR-2022-0829-0747, p. 3]

To make the point again, the earlier rule and IRA subsidies will lead to lower CO2 levels and greater health benefits than the theoretical benefits of the proposed rule. [EPA-HQ-OAR-2022-0829-0747, p. 3]

Organization: Clean Fuels Development Coalition et al.

Commentors submit this letter to urge EPA to withdraw its unlawful and unreasonable proposal, and to try a different approach. [EPA-HQ-OAR-2022-0829-0712, p. 3]

B. The non-binding company commitments and projections EPA cites do not prove feasibility.

The non-binding company commitments and projections EPA cites do not prove feasibility. See 88 Fed. Reg. 29,190-93 ("While manufacturer announcements such as these are not binding, and often are conditioned as forward-looking and subject to uncertainty, they indicate that manufacturers are confident in the suitability of PEV technology as an effective and attractive option that can serve the functional needs of a large portion of light-duty vehicle buyers."). The auto manufacturers' statements are not binding, and these companies could change their mind at any time. Many of these statements were made in response to the in direct response to the Biden

Administrations urging.16 Further, many of these statements were made with the expectation that EPA would continue to provide various compliance flexibilities—like multipliers—that reduce the real-world stringency of the standards. As noted, the proposed rule would cut these avoidance strategies. [EPA-HQ-OAR-2022-0829-0712, p. 27]

16 Compare FACT SHEET: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks, White House Briefing Room (Aug. 5, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president- biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/ ("[T]he Presi dent will sign an Executive Order that sets an ambitious new target to make half of all new vehicles sold in 2030 zero-emissions vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles…. That is why today, American automakers Ford, GM, and Stellantis and the United Auto Workers (UAW), will stand with President Biden at the White House with aligned ambition.") with Fred Lambert, Ford, GM, and Stellantis announce joint 40-50% EV sale goal in 2030, Electrek (Aug. 5, 2021), https://electrek.co/2021/08/05/ford-gm-stellantis-joint-40-50-ev-sale-goal-2030/. ("To- day, Ford, GM and Stellantis announce their shared aspiration to achieve sales of 40-50% of annual U.S. volumes of electric vehicles (battery electric, fuel cell and plug-in hybrid vehicles) by 2030 in order to move the nation closer to a zero-emissions future.").

As John Bozzella, president and CEO of Alliance for Automotive Innovation has explained, "Requiring 60+ percent of U.S. vehicles sales to be pure battery electric vehicles (BEVs) by 2030 leapfrogged the administration's own 2021 executive order that called for 50 percent electric vehicles –including plug-in hybrid and fuel cell EVs – by 2030." John Bozzella, EPA's EV Rules are Out of Whack: Five Ways to Fix Them, Alliance for Automotive Innovation (June 28, 2023), https://www.autosinnovate.org/posts/blog/epas-rules-are-out-of-whack-five-ways-to-fix-them. "[T]he administration's 50 percent target [by 2030] was always a stretch goal. It was ambitious and challenging by any measure." Mike Hartrick, Testimony from the Alliance for Automotive Innovation, Before the U.S. Environmental Protection Agency EPA Multi Pollutant Proposed Rule, EPA-HQ-OAR-2022-0829, https://www.autosinno- vate.org/posts/agency-comments/05-09%20EPA%20Multi-Pollutant%20NPRM.pdf. "The 60+ percent BEVs by 2030 plan, on the other hand, is a house of cards…. It rolls up rosy forecasts (like EV batteries will eventually cost automakers nothing) and other hopeful assumptions." John Bozzella, supra. [EPA-HQ-OAR-2022-0829-0712, pp. 27-28]

The 50 percent goal "was also predicated on several conditions, most significantly: supportive public policies including the bipartisan Infrastructure Investment and Jobs Act with funding for national public charging (installation not started yet); the manufacturing incentives and consumer purchase incentives in the Inflation Reduction Act to support EV purchases and affordability (becoming more, not less constrained); and the supply of critical minerals (projected to be woefully short of demand and largely controlled by China)." Mike Hartrick, supra. "If implemented, EPA's proposal will require 60 percent battery electric vehicles by 2030 (a 20 percent increase over the President's goal, which also included PHEVs), and two out of every three vehicles sold to be BEVs just two years later. These levels are substantially higher than what the auto industry indicated was achievable even after application of the supportive policies." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 27-28]

Organization: Letter Campaign, Ethanol Producers (7)

[The following letter was submitted by seven commenters; it is reproduced only once: Commonwealth Agri-Energy LLC (EPA-HQ-OAR-2022-0829-0739). The other commenters are: Highwater Ethanol, LLC (EPA-HQ-OAR-2022-0829-0552), Heartland Corn Products (EPA-

HQ-OAR-2022-0829-0622), Absolute Energy, LLC (EPA-HQ-OAR-2022-0829-0716), Trenton Agri Products LLC (EPA-HQ-OAR-2022-0829-0755), Western New York Energy LLC (EPA-HQ-OAR-2022-0829-0753), Southwest Iowa Renewable Energy LLC (EPA-HQ-OAR-2022-0829-0582)]

Commonwealth Agri-Energy, LLC appreciates the Biden administration's goals of increasing vehicle efficiency and reducing carbon emissions. That's why two years ago, we committed to achieving a net-zero carbon footprint for our ethanol plant by 2050 or sooner.1 [EPA-HQ-OAR-2022-0829-0739, p. 1]

1 Letter from RFA Member Companies to President Joe Biden. July 27, 2021. See more at https://ethanolrfa.org/pledge.

However, we firmly oppose regulatory approaches that arbitrarily favor certain technologies over others, which regrettably seems to be the case with this proposed rule. EPA's proposal would effectively force automakers to produce more battery electric vehicles and discourage them from pursuing other technologies that could achieve the same, or even better, environmental performance at a lower cost to American consumers. [EPA-HQ-OAR-2022-0829-0739, p. 1]

Organization: Competitive Enterprise Institute

The proposed rule is the latest phase of a longstanding unlawful agenda of market-rigging interventions. It should be withdrawn. [EPA-HQ-OAR-2022-0829-0611, p. 19]

Organization: Consumer Energy Alliance (CEA)

We appreciate the Agency's commitment to reducing greenhouse gas emissions from the transportation sector. However, we are concerned about the ramifications of the proposed Multi Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Rule. [EPA-HQ-OAR-2022-0829-0788, p. 1]

Should this rule be adopted in its current form - lacking both technological feasibility and economic practicality - the result will be limiting consumer options and thwarting environmental progress through depressing innovation. [EPA-HQ-OAR-2022-0829-0788, p. 2]

While there are clearly many reasons to pursue EVs as a mobility option, there are many realworld economic, social, and practical considerations the U.S. ERA should fully review before adopting overly restrictive transportation policies. Consumer impacts — especially the impacts imposed on those with low- and fixed-incomes — need to be front and center in these discussions. [EPA-HQ-OAR-2022-0829-0788, p. 2]

Organization: Daniel Hellebuyck

I am writing to voice my opposition to this draconian rule proposal.

I have been associated with the American auto industry for 30 plus years. In these years, some regulations were for the benefit of society, consumers, and the industry. However, many of these regulations worked toward the detriment of the industry, consumers, and/or society. This proposal is certainly one of them. [EPA-HQ-OAR-2022-0829-0526, p. 1]

This proposal as written needs a serious overhaul. The political posturing and virtue signaling of proposals such as these often are not based in reality. This proposal does little to balance the needs of reducing carbon emissions with jobs, a strong auto industry, and a strong American economy. [EPA-HQ-OAR-2022-0829-0526, p. 2]

Organization: Darius

I write in opposition to the U.S. Environmental Protection Agency's proposed multipollutant standards for light-and medium-duty vehicles (Docket ID No. EPA-HQ-OAR-2022-0829). I have serious concerns with all three of the options included in the draft rulemaking, as the EPA seeks to lower carbon emissions under timelines that effectively make electric vehicles the only option for automakers to meet the pollution limits from 2027 through 2032. [EPA-HQ-OAR-2022-0829-0519, p. 1]

The future of automotive technology matters to consumers, millions of automotive enthusiasts, and all the men and women who work in the industry. Accordingly, I ask that the EPA does not follow through on any of the three options outlined in this proposed rulemaking and instead pursues a rulemaking for light and medium-duty vehicles that embrace a technology-neutral approach that factors in the infrastructure that exists, the innovation we are all capable of, consumer preferences, and the lifecycle emissions of the technology that powers our vehicles. [EPA-HQ-OAR-2022-0829-0519, p. 1]

Organization: David Hallberg

The most disturbing thing about this NPRM is that, unless it is substantially revised, it will dramatically increase the most harmful mobile source emissions that are the predominant cause of a wide range of adverse health endpoints, from pre-term births and IQ loss to pulmonary disorders and cancers. [EPA-HQ-OAR-2022-0829-0548, p. 1]

Many of us were encouraged during your confirmation hearing when you pledged that you would be “driven by the science and rule of law”. However, your advisers—particularly Office of Transportation and Air Quality (OTAQ) experts, some of whom have been in their positions for more than 30 years—are giving you bad counsel, as this proposed rule falls far short of the mark on both counts. [EPA-HQ-OAR-2022-0829-0548, p. 1]

Organization: David Manley III

And, as you plan to penalize Americans, China is increasing its construction of coal-fired power plants to produce supplies for batteries for EVs and other components and, therefore, it’s carbon emissions. America has 225 coal-fired power plants and China has 1,118 (half of all the coal-fired plants in the world). [EPA-HQ-OAR-2022-0829-0513, p. 1]

There are many other ways than the proposed regulations to control pollution that may actually be effective if China, India, and Russia reduce their emissions, which they show no signs of doing. [EPA-HQ-OAR-2022-0829-0513, p. 1]

The bottom line is that the proposed rules will not significantly affect climate change, will penalize American consumers without significant benefit, and will significantly benefit our polluting competitor, Communist China. [EPA-HQ-OAR-2022-0829-0513, p. 1]

We oppose the proposed rule for the following reasons. [EPA-HQ-OAR-2022-0829-0513, p. 1]

You acknowledged that the proposed rule is such that carmakers will have to make up to 67% of new vehicles electric in order to comply with it while the result will be an additional 10-fold sales increase in electric vehicles (EVs) in a mere eight years. Yet completely eliminating all fossil fuels from the United States would result in less than 0.2 degrees Celsius in temperature mitigation by 2100 while benefiting our rival, communist China, that has no such regulations, continues to pollute negating our efforts, and either directly makes or controls the production of the lithium and rare-earth minerals required for EV batteries. [EPA-HQ-OAR-2022-0829-0513, p. 1]

Organization: Delek US Holdings, Inc.

VII. Conclusion

Given EPA's Proposed Rule is based on speculative and unsupported data, fails to analyze the potential impacts on domestic supply chains and foreign reliance, and overinflates the potential benefits while underinflating a majority of the costs, we urge EPA to abandon its proposal and reconsider the emissions standards necessary and feasible in accordance with its directive pursuant to the CAA and, at the very least, complete a comprehensive analysis of the effects of its Proposed Rule. [EPA-HQ-OAR-2022-0829-0527, p. 10]

Organization: East Kansas Agri-Energy (EKAE)

EKAE appreciates the Biden administration's goals of increasing vehicle efficiency and reducing carbon emissions. However, we firmly oppose regulatory approaches that arbitrarily favor certain technologies over others, which regrettably seems to be the case with this proposed rule. EPA's proposal would force automakers to produce more battery electric vehicles and discourage them from pursuing other technologies that could achieve the same, or even better, environmental performance at a lower cost to American consumers. [EPA-HQ-OAR-2022-0829-0734, p. 1]

Organization: Elizabeth Boynton

Also, the EPA is to be concerned about the environment as a whole, not just the air quality. As that is the case, EPA needs to realize that encouraging the manufacture, purchase and use of EVs is not actually that great for the environment. You're just cleaning the air from gas exhaust pollution by encouraging environmental destruction in the mining of rare earth minerals and creation of electricity to charge the EV batteries. [EPA-HQ-OAR-2022-0829-0568, p. 1]

Organization: Fred Reitman

I submit these comments on the EPA Proposed Rule, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles", Docket ID No. EPA-HQ-OAR-2022-0829. I oppose this proposed rule and am submitting these comments to explain the basis for my opposition. [EPA-HQ-OAR-2022-0829-0432, p. 1]

Electricity comes from fossil fuel combustion. Most of the electricity generated in the U.S. is from combustion of fossil fuels, which of course means that most of the electricity being used to charge EVs derives from fossil fuel combustion. Mandating that new cars manufactured and sold must be EVs will not change this. According to the US Energy Information Agency, in 2021, 60% of electricity generated in the US came from combustion of fossil fuels, primarily coal (22%) and natural gas (38%). Another 19% came from nuclear power. The remaining 20% electrical power is sourced from renewables, primarily from wind (9.2%), hydroelectric plants (6.3%), and solar (2.8%). [EPA-HQ-OAR-2022-0829-0432, p. 1]

Electricity explained - U.S. Energy Information Administration (EIA) [Link: https://www.eia.gov/energyexplained/electricity/] [EPA-HQ-OAR-2022-0829-0432, p. 1]

This is EPA Overreach. This regulation would have far-reaching ramifications on the economy and the American people. The EPA has no business imposing this on the American people via regulation. [EPA-HQ-OAR-2022-0829-0432, pp. 1-2]

For this reason it is Congress via elected representatives that should debate and possibly pass this initiative as a law. [EPA-HQ-OAR-2022-0829-0432, pp. 1-2]

This rule would have no impact on climate. Any reduction in CO2 emissions would be negligible as compared to emissions from the two largest CO2 emitters, China and India. China is rapidly building coal-fired power plants, currently at the rate of 2-3 every week, which also illustrates they do not share our concern about climate change due to CO2 emissions. [EPA-HQ-OAR-2022-0829-0432, p. 2]

I close with a statement on my opinion. I have thoroughly investigated the subject of anthropogenically- caused climate change during the past several years. Based on my investigation I do not believe that is occurring. Nor do I believe the intent of those advancing this proposal is to somehow mitigate climate change. Rather I believe this administration is beholden to the radical environmental left and the actual intent of this rule is to drag down our quality of life of the American people. [EPA-HQ-OAR-2022-0829-0432, p. 2]

Organization: George White

Regulating CO2 emissions has absolutely no foundation in legitimate science, where only science conforming to the scientific method can be considered legitimate. Furthermore, CO2 is not a pollutant, but is at the base of the food chain and that our very existence depends on there being sufficient atmospheric CO2. To justify this level of disruption based on a scientific conclusion, the science behind it must be bulletproof and what is passed of as the science demonizing CO2 emissions is demonstrably wrong in many ways. Einstein famously said "No amount of experimentation can prove me right; a single experiment can prove me wrong" where he articulated the concept of falsification which implies that the only thing in science that can be settled is that something is wrong. The absurdly large effect from CO2 emissions claimed by the IPCC and its self serving consensus can be unambiguously falsified in many ways and even violates basic physics like Conservation of Energy and the immutable Stefan-Boltzmann Law. It's also important to recognize that the rate of change seen in the climate system since the end of the Little Ice Age that corresponds roughly with the start of the Industrial Revolution and increasing CO2 emissions is well within the bounds of the natural variability observed in the ice cores,sediments and other data. If the climate wasn't changing, it would be broken and besides, a slight warming is far more beneficial to life than an ice age that no amount of CO2 will prevent from occurring again. [EPA-HQ-OAR-2022-0829-0426, p. 1]

We saw what happens when conclusions are based on rotten science with the draconian response to COVID that was more harmful than the disease itself that by now, many Americans have already had regardless of their vaccination status. We can not allow this kind of policy driven science to completely destroy the integrity of science and take our freedom away with it. Science is the only objective arbiter of truth we have and politics must not be allowed to subvert it. [EPA-HQ-OAR-2022-0829-0426, p. 1]

I've included several documents in support of my position and all of the references cited can be found on-line.

fail.pdf -> This is a top level summary of some of the issues with the IPCC's broken climate science [See original attachment A3 for summary of failures with IPCC's broken climate science] feedback.pdf -> This explains why feedback has no relevance to the climate system, yet without it, the IPCC's house of cards science collapses [See original attachment A5 for "Why Feedback is Fubar"] [EPA-HQ-OAR-2022-0829-0426, p. 1]

balance.pdf -> This explains how the radiant balance and consequential climate sensitivity emerges and what math and physics constrains it [See original attachment A4 for "The Radiant Balance and Sensitivity"] [EPA-HQ-OAR-2022-0829-0426, p. 1]

co2forcing.pptx -> A power point presentation about the ice core data. There are significant notes explaining each slide. [See original attachment A2 for CO2 Forcing: Fact or Fiction] [EPA-HQ-OAR-2022-0829-0426, p. 1]

comment_fod.xlxs -> Some of my comments as an official expert reviewer of the latest IPCC report [See original attachment A1 for "Working Group I contribution to the IPPP sixth assessment report"] [EPA-HQ-OAR-2022-0829-0426, p. 1]

I strongly suggest looking at this web site: http://climatechangereconsidered.org to see what some other scientists are saying. If you can't accept that climate science is the most controversial science of the modern age, I suggest you look at the articles and comments on http://wattsupwiththat.com [EPA-HQ-OAR-2022-0829-0426, p. 1]

Organization: Growth Energy

While Growth Energy supports efforts to reduce emissions in the transportation sector, it cannot support the Proposed Rule. The Proposed Rule presents an unnecessarily constraining, binary choice between a static future of fossil-fuel-only vehicles and an improbable future of precipitously ramped-up electric vehicle ("EV") production, sale, and use by 2032. But as EPA should already know, expanding the use of ethanol and other biofuels is a realistic and achievable third option that does not leave GHG emission reductions on the table. [EPA-HQ-OAR-2022-0829-0580, p. 3]

So, while EVs should be a part of the solution to decarbonizing the transportation sector, they are not the complete answer and need additional time to develop. It is neither cost-effective nor optimal to reduce emissions by shifting almost all new cars to EV technologies at the rate contemplated in the Proposed Rule when biofuels are a proven, effective solution. EPA should not ignore the significant role that biofuels can play in both the near- and long-term as part of a low-carbon transportation system. [EPA-HQ-OAR-2022-0829-0580, p. 6]

Organization: HF Sinclair Corporation

HF Sinclair Corporation ("HF Sinclair") submits these comments opposing the United States Environmental Protection Agency's ("EPA") proposed rule setting multi-pollutant emissions standards for model years 2027 and later light-duty ("LD") and medium-duty ("MD") vehicles, Docket EPA-HQ-OAR-2022-0829 (hereinafter, "Proposed Rule").1 Additionally, we support comments separately filed by the American Fuel and Petrochemical Manufacturers ("AFPM"), the trade association representing substantially all of the United States' refining capacity, of which we are a member [EPA-HQ-OAR-2022-0829-0579, p. 1]

1 88 Fed. Reg. 29,184 (May 5, 2023) [hereinafter "Proposed Rule"].

HF Sinclair urges EPA to abandon its misguided approach and instead ensure that any forthcoming regulation adopts a holistic approach, which is technology-neutral, recognizes consumer choice, and enables the U.S. transportation industry to continue its efforts to produce safe, affordable, reliable, and clean vehicles. [EPA-HQ-OAR-2022-0829-0579, p. 2]

IV. Conclusion

For the reasons set forth above, EPA should immediately abandon its misguided approach to force consumers into a product American consumers do not want. By eliminating consumer choice and forgoing a single technology solution to GHG emissions, EPA is putting U.S. jobs, industrial base, and economy at serious risk as highlighted above. Additionally, it is concerning that EPA would prioritize a policy that significantly benefits the Chinese industrial base which does not nearly have the environmental oversight as domestic manufacturing. It is also clear that EPA has not completed the appropriate environmental analysis on PEVs – there is clearly an environmental impact in the manufacturing these vehicles that EPA fails to account. Finally, the proposed rule does not account for Congressional intent, if EPA wishes to create such a significant change in the automobile market EPA should work with Congress. [EPA-HQ-OAR-2022-0829-0579, p. 18]

Organization: Illinois Farm Bureau (IFB)

For the reasons stated herein, IFB has significant concerns regarding several aspects of the proposed rule. In light of these concerns, IFB recommends USEPA reconsider the proposed rule and go back to the drawing board to draft a new and improved proposed rule. In fact, as of the date of this filing, over 2,000 individual IFB farmer members have also voiced their serious concern regarding the proposed rule in the above-referenced docket. [EPA-HQ-OAR-2022-0829-0532, p. 1]

Organization: John Noble

As a manager of over 270 vehicles for a public agency providing public safety services and as a consumer this ruling puts undue hardship on public agencies, small business and middle class Americans. The rule as proposed will drive prices up on conventional and zero emission vehicles. There are already numerous supply chain issues and the ruling will add unnecessary strain and make it extremely difficult for small public agencies and consumers to afford adequate fleet resources to serve our public safety needs. Current emission standards have increased maintenance costs and fuel consumption, this ruling will increase these costs even more. The aggressive timeline for implementation ignores the impact to average person and small public agency/business as well as increasing our reliance on off-shore manufacturing and supply chain. Extending the timeline for implementation by 10 or more years would allow natural market forces and the consumer to adjust and embrace the changes being promulgated. As the rules are currently written many people, and small agencies/businesses will suffer from lack of adequate resources to maintain levels of service required because they cannot afford new vehicles.

As I write this the sky is hazy from the smoke of wildfires hundreds if not thousands of miles from my home, causing me to ponder if vehicle emissions are the most effective target or our GHG reduction strategies - it is early in the fire season and already we have seen impacts across the nation. Prior to the last 10 years it was a rare occurrence to have widespread issues with smoke from fires and now it is common every summer. Unlike volcanoes, we can mitigate rather significantly the impacts from wildland fires. [EPA-HQ-OAR-2022-0829-1648]

Organization: Landmark Legal Foundation

Landmark Legal Foundation ("Landmark") advocates for the immediate revocation of this rule, Proposed Rule, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles ("Proposed Rule"). [EPA-HQ-OAR-2022-0829-0547, p. 1]

There are three major shortcomings Landmark has identified with the Proposed Rule:

1. The Proposed Rule uses a metric established by an entity with no constitutional or statutory authority. The Interagency-Working Group ("IWG") is not vested with any statutory authority to act as an executive agency. Therefore, the President did not have the authority to implement the IWG in the first place.

2. The IWG nonetheless acts as an agency and is therefore subject to the Administrative Procedures Act ("APA").

3. The APA requires agencies to follow a proscribed rulemaking process that provides opportunities for the public to comment on agency actions. The IWG bypassed this process when it established new metrics for the Social Costs of Greenhouse Gas ("SCGHG"). [EPA-HQ-OAR-2022-0829-0547, p. 1-2]

Organization: Matthew DiPaulo

I write in opposition to the U.S. Environmental Protection Agency's proposed multipollutant standards for light-and medium-duty vehicles (Docket ID No. EPA-HQ-OAR-2022-0829). I have serious concerns with all three of the options included in the draft rulemaking, as the EPA seeks to lower carbon emissions under timelines that effectively make electric vehicles the only option for automakers to meet the pollution limits from 2027 through 2032. [EPA-HQ-OAR-2022-0829-1514, p. 1]

The future of automotive technology matters to consumers, millions of automotive enthusiasts, and all the men and women who work in the industry. Accordingly, I ask that the

EPA does not follow through on any of the three options outlined in this proposed rulemaking and instead pursues a rulemaking for light and medium-duty vehicles that embrace a technology-neutral approach that factors in the infrastructure that exists, the innovation we are all capable of, consumer preferences, and the lifecycle emissions of the technology that powers our vehicles. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: Mazda North American Operations

Mazda North American Operations (Mazda) appreciates the opportunity to comment on the proposed rule "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light Duty and Medium-Duty Vehicles". Mazda is a smaller independent automaker not owned by a larger brand, and sells light duty vehicles globally with US operations headquartered in Irvine, CA. Mazda has been selling vehicles in the United States since 1970 and opened a new joint venture manufacturing facility with Toyota employing approximately 4000 persons in Huntsville, AL, in 2020. Despite being a smaller company, Mazda was able to achieve the highest fleet average fuel economy of all OEMs for five years in a row, according to EPA's Fuel Economy Trends Report. As a smaller OEM, we are particularly challenged by these proposals. Overall, we feel the rule is neither reasonable nor achievable for a variety of reasons that we will touch on below. [EPA-HQ-OAR-2022-0829-0595, p. 1]

Organization: Minnesota Corn Growers Association (MCGA)

As producers of the feedstock for low carbon ethanol, corn growers are a part of the solution to reduce emissions from transportation vehicles. Unfortunately, the proposal from EPA doesn’t enable low carbon fuel producers to be recognized in the draft multi-pollutant emission standards since the proposed regulation focuses on one solution to emissions reductions from the transportation sector: electric vehicles. Instead, we believe EPA should focus on outcomes and opening pathways for all low carbon fuels and technologies that enable more stringent vehicle emission standards, taking advantage of not only the low carbon benefits high ethanol blends, but also cuts in toxic emissions, greater fuel efficiency and consumer costs savings of increased renewable fuel blending. [EPA-HQ-OAR-2022-0829-0612, p. 1]

Higher octane fuel is an essential top for automakers to meet stringent standards. For automakers to use new technologies and enhanced engines to meet emission standards, they need updated fuel that enables new vehicles and fuels to work as a system to enhance carbon and other tailpipe emissions reductions. Higher ethanol blends used with advanced engines optimized for higher octane would provide a much-needed pathway for low-carbon, low-emission fuels. [EPA-HQ-OAR-2022-0829-0612, p. 1]

EPA failed to use the proposed rule to broaden the solutions that reduce transportation emissions by beginning a transition to low-carbon, high-octane fuels to advance goals with these and future standards. [EPA-HQ-OAR-2022-0829-0612, p. 1]

Organization: Missouri Corn Growers Association (MCGA)

As producers of feedstocks for low-carbon biofuels, MCGA strongly opposes the proposed emissions standards within this rulemaking. We estimate this rule may cost the U.S. corn industry nearly one-billion bushels annually in lost demand. This would deal a potentially devastating blow to corn farmers across the country. But the rule's negative impact will ripple beyond the corn industry. [EPA-HQ-OAR-2022-0829-0578, p. 1]

MCGA recognizes electric-powered vehicles play a growing role in tomorrow's transportation needs, yet strongly disagrees with EPA's approach. The aggressive timeline and, more importantly, EPA's false narrative that electric vehicles are the only way to reduce emissions is shortsighted in advancing emission reduction goals. [EPA-HQ-OAR-2022-0829-0578, p. 2]

Organization: Missouri Farm Bureau (MOFB)

We write today to express our opposition to the proposed rule. MOFB's member-adopted policy states:

"We oppose increased restrictions on vehicle emissions, including mandates on greenhouse gas emissions." [EPA-HQ-OAR-2022-0829-0590, p. 1]

As MOFB commented previously in response to EPA's proposed rule Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 (HD rule)1, this proposal affects the production of later-light duty and medium duty vehicle emissions by usurping the marketplace's role in developing the most efficient and lowest-cost technologies that can protect the environment, keep our nation's economy running at full speed and provide affordable transportation for working families. [EPA-HQ-OAR-2022-0829-0590, p. 1]

1 EPA-HQ-OAR-2022-0985-1584_attachment_1.pdf, June 16, 2023.

In conclusion, MOFB believes EPA's proposed rule is ill-conceived, and, as currently written, will not achieve its purported purpose. We call upon EPA to immediately withdraw the proposed rule and to work with transportation stakeholders, like MOFB, to better allow for emission reductions from a variety of vehicles and fuels technologies that will support the American economy, rather than those of foreign countries, and not force heavy-handed mandates on the vast majority of Americans who will be affected by this proposal. [EPA-HQ-OAR-2022-0829-0590, p. 3]

Organization: National Propane Gas Association (NPGA)

The Proposed Rule is flawed in how quickly it seeks to transform the light- and medium-duty vehicle market to a zero-emission vehicle market. The goal of 67% of the total vehicle market becoming battery electric vehicles (BEVs) in by 20323 is unrealistic given sales and available vehicles in the United States. Further, it ignores consumer preference and fuel choice. [EPA-HQ-OAR-2022-0829-0634, p. 1]

Organization: Nebraska Corn Board (NCB) and Nebraska Corn Growers Association

On behalf of the nearly 2,500 Nebraska Corn Growers Association (NeCGA) dues paying members and the over 21,000 corn farmers in Nebraska who contribute to the state's corn checkoff program through the Nebraska Corn Board (NCB), we appreciate the opportunity to comment on the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. [EPA-HQ-OAR-2022-0829-0583, p. 1]

Nebraska corn farmers and ethanol producers have worked diligently in reducing greenhouse gas emissions while supplying the fuels industry with a low carbon, high octane alternative. However, the EPA seemingly overlooks the contribution that biofuels, such as ethanol, can provide to reducing carbon emissions through tailpipes and internal combustion engines. [EPA-HQ-OAR-2022-0829-0583, p. 1]

In closing, we strongly urge the EPA to remove this proposal completely and investigate having a cost- effective, rural friendly approach involving biofuels. Additionally, we refer you to and support the technical comments submitted by the National Corn Growers Association. [EPA-HQ-OAR-2022-0829-0583, p. 2]

Organization: Nebraska Farm Bureau Federation (NEFB)

On behalf of the Nebraska Farm Bureau Federation (NEFB) and our more than 55,000 member families, I am writing to you today to express our concerns over the U.S. Environmental Protection Agency's (EPA) proposed Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles rule. Our concerns center on the proposal's clear attempt to push additional electric vehicles onto our nation's roads, while at the same time increasing regulations on liquid fuel vehicles. In our opinion, this proscriptive policy move is not in the interest of U.S. consumers, farmers, ranchers, or the economies of our state and nation as a whole. [EPA-HQ-OAR-2022-0829-0660, p. 1]

Organization: Nissan North America, Inc.

While Nissan understands and supports the Administration's efforts to push for progress in EV penetration, the current proposal goes well beyond the already aggressive goals set in President Biden's Clean Cars EO. The current proposal is not achievable for numerous reasons, including technology and resource limitations, limited availability of safe and responsibly-sourced critical minerals, supply chain and manufacturing constraints, insufficient charging and energy infrastructure, and significantly lagging consumer adoption, among other reasons. In order to allow for a safe, reliable, and equitable transition to EVs, the proposal must be modified to take these factors into consideration. [EPA-HQ-OAR-2022-0829-0594, pp. 9-10]

Organization: North American Subaru, Inc.

The EPA's 2023 NRPM sets a far more challenging path for the U.S. auto industry, going well above the Administration's 2021 ZEV target, aiming to achieve 67 percent BEV by 2032. In its comments to the agency, the Alliance for Automotive Innovation ("Auto Innovators"), of which Subaru is a member, the association provides a detailed analysis of the Proposed Rule and recommends areas of improvement. Subaru aligns itself with the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0576, p. 2]

The Proposed Rule requires transformative change in the U.S. auto industry. Automakers, including Subaru, are making significant investments toward electrification, but just as no automaker is alike, no electrification strategy is alike. A variety of factors including scale and business model can affect decision-making. Caution should be exercised toward a one-size-fits-all regulatory approach to electrification, particularly when applied to a dynamic U.S. automotive industry. [EPA-HQ-OAR-2022-0829-0576, p. 3]

Organization: North Dakota Farmers Union (NDFU)

EPA should not focus on one technology. While BEVs may be part of the solution, a balanced approach to emissions reductions using BEVs and other technologies is needed.11 It is important that EPA utilize lifecycle analysis to create a level playing field that encourages speedy adoption of flex-fuel vehicles, hybrid electric vehicles, plug-in hybrid electric vehicles and other technologies, to achieve the most rapid, affordable, robust, and practical GHG emissions reductions in a wide range of vehicle segments, while satisfying diverse customer needs and preferences. Furthermore, EPA should revise the proposed standards to a level which can be achieved using more realistic estimates for future penetration of vehicle technologies and that incorporates low carbon fuels. [EPA-HQ-OAR-2022-0829-0586, p. 5]

> 11 Pratt, G. (2021, August 23). (More) straight talk about Toyota's electric vehicle strategy. Medium. Retrieved from https://medium.com/toyotaresearch/more-straight-talk-about-toyotas-electric-vehicle-strategy- f0aba4be40.

Organization: Office of Wyoming Governor Mark Gordon

Wyoming has a vested interest in the proposed rule. Wyoming stands to feel significant negative impacts from this rule, including: consumer costs, supply chain effects, our nation's energy security, highway funding shifts, electric vehicle (EV) charging infrastructure realities, rural population accessibility, and state vehicle fleets. It is important that the EPA not mandate that the personal vehicle and transportation market move to EVs through a rushed and backdoor emissions approach. Programs such as the Federal Highway Administration's National Electric Vehicle Infrastructure (NEVI) program illustrates how difficult a compulsory shift to EVs is to implement in rural states such as Wyoming. [EPA-HQ-OAR-2022-0829-0675, p. 1]

Organization: Paul Bonifas and Tim Considine

The EPA's proposed EV Rule is a classic example of government intervention in markets; the government is trying to "push on a string" using heavy-handed top-down market control tactics. Governments do not have success when attempting to control markets, and the results of rules such as this one have been catastrophic and expensive. The EPA's Rule and corresponding RIA are riddled with contradictions, purposeful omissions, and government double-speak. [EPA-HQ-OAR-2022-0829-0551, p. 2]

Organization: POET, LLC

Summary

EPA's Proposed Rule on LDV emissions has significant shortcomings in achieving its stated goal of reducing GHG emissions. By treating only tailpipe emissions for compliance purposes, the Proposed Rule yields a narrow set of alternatives to reach compliance. In particular, the difference between zero tailpipe emission BEVs and all other ICE's is so great that only a narrow range of BEV penetration pathways can allow compliance. While the Proposed Rule's target is fixed, if the proposal's high projections of BEV deployments are not met, no combination of improved technology on ICEs in the model is sufficient to compensate for slower growth in BEVs. [EPA-HQ-OAR-2022-0829-0609, p. 50]

Organization: Roy Littlefield IV

I am writing to express my opposition to the proposed tailpipe emissions rule outlined in EPA-HQ-OAR-2022-0829. As proposed, I believe these regulations for light-duty vehicles go too far, reduce consumer choice, and fail to include safeguards to address serious infrastructure, resource, and funding shortfalls. [EPA-HQ-OAR-2022-0829-0793, p. 1]

In conclusion, I strongly urge the EPA to reconsider the proposed tailpipe emissions rules. It is crucial that the EPA engage in meaningful collaboration with Congress, automotive manufacturers, and other stakeholders to develop a comprehensive approach that accounts for the current limitations in charging infrastructure, safeguards consumer choice, promotes domestic energy security, and ensures the continued funding of our vital transportation infrastructure. [EPA-HQ-OAR-2022-0829-0793, p. 1]

Organization: Senator Shelley Moore Capito et al.

We request the Environmental Protection Agency (EPA) withdraw two recent proposals to regulate tailpipe greenhouse gas emissions from light-, medium-, and heavy-duty vehicles (Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles - Phase 3). These proposals effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction, and the Agency should immediately rescind both proposals. [EPA-HQ-OAR-2022-0829-5083, p. 1]

Since these proposals are legally flawed, divorced from reality with regard to the associated costs and domestic capacity to implement them, and would be devastating for American consumers and workers already burdened by sustained levels of historically high inflation, we respectfully ask the EPA to rescind these two proposals immediately. [EPA-HQ-OAR-2022-0829-5083, p. 5]

Organization: Specialty Equipment Market Association (SEMA)

Conclusion

While the automobile's roots are tied to the internal combustion engine, SEMA prides itself on maintaining a forward-looking vision that embraces innovative technology, including EVs and other zero-emissions vehicles. The specialty automotive aftermarket has led the way on alternative fuel innovations from replacing older engine technologies with newer, cleaner versions to converting older ICE vehicles to new electric, hydrogen, and other alternative-fuel vehicles. Sadly, the EPA's plans to reduce greenhouse gases and criteria pollutants do not factor this in. SEMA and its members have serious concerns with this proposal, which aggressively seeks to lower carbon emissions under timelines that effectively make electric vehicles the de facto choice for automakers to meet the requirements. [EPA-HQ-OAR-2022-0829-0596, p. 6]

Clean air and the reduction of greenhouse gases are goals everyone can acknowledge. That said, when governments arbitrarily pick technology winners and losers, the marketplace is deprived of choices and the public suffers. Instead of forcing this transition, the EPA should put in place incentives to support a diversified, zero-emissions approach that takes advantage of breakthrough technologies across the spectrum. [EPA-HQ-OAR-2022-0829-0596, p. 6]

Organization: Stellantis

These are ambitious targets that will require a comprehensive, multi-stakeholder strategy to build a robust market. Stellantis is committed to do its part to execute an unprecedented transformation of our products to support the U.S. electrification targets, and other stakeholders need to do their part to help drive consumer demand and remove barriers to electric vehicle (EV) market success. [EPA-HQ-OAR-2022-0829-0678, p. 2]

Stellantis is unwavering in its commitment to an all-electric portfolio and building an EV dominated market that can achieve the Biden administration's target of 40-50% by 2030. However, EPA's proposed greenhouse gas (GHG) requirements exceed what is feasible, and the proposed criteria emissions standards drive a distracting and costly focus on a shrinking internal combustion engine (ICE) fleet. [EPA-HQ-OAR-2022-0829-0678, p. 2]

The Proposed Rule exceeds the joint commitments of industry and the Biden administration, relying heavily on overly optimistic assumptions of EV market growth to meet GHG and criteria emissions standards. EPA is also proposing changes to the criteria emissions rules that go well beyond the recently completed CARB ACC II LEV IV standards that are both very challenging and deliver significant criteria emissions reductions from today. [EPA-HQ-OAR-2022-0829-0678, p. 2]

Organization: Steven G. Bradbury

Second, I will explain how the EPA has failed adequately to acknowledge and con- sider the true scope of the colossal costs and burdens these proposals, if finalized, would impose on American families, the U.S. economy, and our nation's security, and how, at the same time, the Agency has wildly overestimated the benefits it claims will result from these proposed rules. Because the key analyses and assumptions on which these proposals are based are so faulty and ill-considered, if the rules were finalized in the form proposed, they would be arbitrary and capricious in violation of the APA.7 [EPA-HQ-OAR-2022-0829-0647, pp. 2-3]

7 See id. § 706(2)(A) (providing that the reviewing court shall strike down a final rule found to be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law").

Conclusion

If and when the American people feel the true effects of these rules—when they lose the vehicle options they love at the local dealership and find themselves stuck driving older and less safe cars, when the bottom falls out of the job market in the U.S. auto industry, when drivers cannot find convenient charging stations for their electric vehicles—in sum, when American voters realize what the EPA's far-reaching regulatory enterprise has wrought for the nation, they will be angry. [EPA-HQ-OAR-2022-0829-0647, p. 24]

At issue are matters of life, liberty, and prosperity, and the considerations involved are fundamentally political in nature. That is exactly why, under our constitutional republic, it is for Congress, and Congress alone, to make the monumental decisions that EPA is purporting to take upon itself in these proposed rules. For these reasons, EPA should with- draw its proposed tailpipe rules and reconsider the wisdom of these proposals. [EPA-HQ-OAR-2022-0829-0647, p. 24]

Organization: T. Becker Power Systems

3- EPA has illegally refused to consider alternatives to the motor vehicle emission standards of this proposed rule. If implemented, those alternatives can meet the air quality goals of the proposed rule without the new motor vehicle emission standards found in the proposed rule. [EPA-HQ-OAR-2022-0829-0567, p. 1]

4- Most areas of the United States are already meeting EPA air quality standards. Only a few areas violate EPA “serious” or “severe” air quality standards. Those “serious” and “severe” areas are mostly located in California. Those areas can achieve EPA air quality standards by implementing emission reduction strategies that are specific to the area, and do not require increasingly stringent motor vehicle emission standards. [EPA-HQ-OAR-2022-0829-0567, p. 1]

6- 90%+ of the population of the USA live in areas that do not require increasingly stringent motor vehicle emission standards to meet EPA air quality standards. However, that 90% of the US population will be negatively impacted by this proposed regulation, with higher vehicle purchase costs, higher repair costs (battery replacement costs) and lower vehicle safety. [EPA-HQ-OAR-2022-0829-0567, p. 1]

7- Every issue in items 1-6 has been presented to both EPA and CARB in numerous documents submitted to EPA and CARB by myself and others over the years. [EPA-HQ-OAR-2022-0829-0567, p. 1]

Organization: TCW Inc.

The proposal for requiring "ZEV" purchases on a percentage basis is too early, not attainable and cost restrictive. Let alone, our studies have shown that our net carbon footprint would be worse with a Battery Electric Vehicle (BEV) fleet, compared to our modern diesel fleet today. [EPA-HQ-OAR-2022-0829-0452, p. 1]

"ZEV" is a misleading acronym. While electric vehicles may not have tailpipe emissions, approximately 60% of our electricity today is generated by fossil fuels. Cobalt, Lithium, etc., required to manufacture batteries for BEV's are primarily sourced overseas, with poor environmental standards, mined with equipment with no emission standards and/or with child and slave labor. [EPA-HQ-OAR-2022-0829-0452, p. 1]

While admirable in nature, the goal of converting a significant portion or our new commercial truck production over to BEV in a decade is not cost effective, is not achievable and will likely have a worse environmental impact than focusing on realistic alternatives, such as R99 and hydrogen power. Interestingly enough, American Transportation Research Institute (ATRI) data was used in the calculation of maintenance expense on Internal Combustion Engine (ICE) commercial motor vehicles, but no reference of the valuable studies above was made in the subject NPRM. We believe strongly that the EPA needs to not only focus on greenhouse gas emissions (GHG), but the true, net carbon footprint involved with ZET/BEV commercial motor vehicles. Focusing solely on GHG and neglecting the overall global carbon impact fails to truly make the best decisions for our environment. [EPA-HQ-OAR-2022-0829-0452, pp. 1-2]

Organization: Texas Public Policy Foundation (TPPF)

These proposed rules are ill-advised, statutorily impermissible, and likely unconstitutional. They are based on faulty science and an impermissible reading of the Clean Air Act ("CAA"). Together, they will likely devastate the American trucking industry and harm American automobile and truck buyers. [EPA-HQ-OAR-2022-0829-0510, pp. 1-2]

Organization: Travis Fisher

Considering the deficiencies in the Proposed Rule, EPA should decline to move forward with a final rule in this matter. If EPA chooses to move forward, it should first issue a new proposal that provides an analytically sound DRIA as the basis for reasoned decision-making by the EPA Administrator. [EPA-HQ-OAR-2022-0829-0655, p. 1]

Organization: U.S. Chamber of Commerce

For regulatory measures seeking to accelerate this transition to be successful, they must be technologically achievable, flexible, cost-effective and attentive to practical market and real-world considerations that affect consumer interest in and support for electric vehicles. They also must recognize the vital importance of a healthy auto sector to the national economy. According to the Alliance for Automotive Innovation, auto manufacturing, sales and service supports a total of 9.6 million American jobs and generates more than $1 trillion of economic activity each year. The Chamber has strong concerns that the proposed rule fails to meet these criteria by going too far, too fast, particularly in light of challenges associated with outside-the-vehicle factors that are critical to facilitating broad consumer support for EVs. [EPA-HQ-OAR-2022-0829-0604, p. 2]

Organization: United Steelworkers (USW)

Our union supports reasonable and well-researched regulations to ensure that our shared environment and communities are protected. However, EPA's proposed rule on emission standards for light- and medium-duty vehicles is far-reaching and recklessly hits the accelerator on the transition to Zero Emission Vehicles (ZEVs). [EPA-HQ-OAR-2022-0829-0587, p. 1]

Organization: Western Energy Alliance

Western Energy Alliance is struck by the magnitude of the proposed rule on tailpipe emissions standards and the breathtaking assumption of power as EPA seeks to transform a major portion of the transportation sector fundamentally with this rule along with its heavy-duty companion. Further, EPA is rushing forward even as a related rule on Corporate Average Fuel Economy (CAFE) from the National Highway Traffic Safety Administration (NHTSA), which has a substantially similar scope, has not yet been released. The public is being denied the opportunity to comment holistically on both rules in tandem to understand how the Biden Administration is attempting to so radically change the mobility choices of all Americans as well as the foundation for the delivery of goods and services throughout the entire economy in an unrealistically disruptive amount of time. [EPA-HQ-OAR-2022-0829-0679, p. 1]

Market Assessment: Likewise in I.A.ii EPA's justification follows the logic that because EV market penetration has increased and carmakers are increasing their investments and innovating, therefore EPA needs to regulate. EPA even makes the absurd statement that, “The proposed standards will also provide regulatory certainty to support the many private automaker announcements and investments in zero-emission vehicles that have been outlined in the preceding paragraphs.” (p. 29195) The absurd logic is that because the private sector is making advancements and investments, the government needs to support them with regulation. [EPA-HQ-OAR-2022-0829-0679, pp. 9-10]

Government’s role with regulation is to correct so-called market flaws, not promote markets. Insofar as there are opportunities for businesses to benefit from subsidies, federal loans, tax credits, and grants for EVs, such as those contained in BIL and IRA, carmakers that are so inclined can tap into those taxpayer resources. They do not need another agency to force them to use them. It’s simply the nature of an incentive. EPA should not go down the path of regulating for the supposed benefit of carmakers to help them increase their EV market share, as they already have government incentives to do so. Unlike government assistance and grants, EPA regulation is inherently contradictory to the task of promoting carmakers’ self interest. [EPA-HQ-OAR-2022-0829-0679, pp. 9-10]

Likewise, if EPA’s analysis is correct and, “The year-over-year growth in U.S. PEV sales suggests that an increasing share of new vehicle buyers are concluding that a PEV is the best vehicle to meet their needs” then why is the rule necessary? If the market is working, the rule is unnecessary by EPA’s own unwitting admission. [EPA-HQ-OAR-2022-0829-0679, p. 10]

We appreciate the opportunity to comment but strongly urge EPA to desist with this rule as exceeding its authority based on arbitrary and capricious legal and technical justification. At a minimum, we urge EPA to keep this comment period open until the close of the companion NHTSA CAFE rule. Thank you. [EPA-HQ-OAR-2022-0829-0679, p. 10]

Organization: Winnebago Industries (Winnebago Industries)

Winnebago Industries opposes the Proposed Rule in so far as it forces zero emission vehicle (ZEV) technologies upon Winnebago Industries’ motorhomes and recreational vehicles (RV) in an unreasonably short period of time, and because of the potentially serious negative impacts the Proposed Rule will have on Winnebago Industries’ critical recreational vehicle (RV) business. As provided below, Winnebago Industries requests that EPA include exemptions or other relief to prevent potential serious negative impacts to a critical area of our business. [EPA-HQ-OAR-2022-0829-0636, p. 1]

Organization: Wisconsin Automobile and Truck Dealers Association

To force this more expensive, inferior technology on Americans now is an act of blind political folly. While Americans may utilize electric powered vehicles at some point in the future, that point in time should be as a result of the technology meeting the demands of everyday life and not because it was shoved down the throats of Americans at their own peril. [EPA-HQ-OAR-2022-0829-0494, p. 2]

Bill Lear designed the popular cartridge of the eight-track tape. Ten years later the compact cassette arrived on the scene. The music industry went all in with the eight-track tape, only to create an aftermarket for radios and receivers that would accept a compact cassette. The EPA is forcing eight-track tape technology on the American public while not allowing research, development, and the free market to advance hydrogen fuel cell or other emerging technologies. [EPA-HQ-OAR-2022-0829-0494, p. 2]

When proposed rules disrupt commerce and the way Americans fundamentally travel, this is immense. When these rules also change how gigantic manufacturers produce products and limit availability across the nation, this is distressing. It is not the EPA's mission to pick transportation winners and losers. It is not the EPA's mission to reimagine transportation in United States. The EPA can facilitate change, but it should be a manageable transition, based on proven technology that functions and enhances a strong economy and quality of life. The Wisconsin Automobile and Truck Dealers Association implores you to reconsider Cost, Affordability, Network Build-out, Feasibility of Electrical Generation, Range, Climate, National Security, Impact on Americans, Impact on Climate for ROI, and more. [EPA-HQ-OAR-2022-0829-0494, p. 2]

This is well intentioned and ill-timed. [EPA-HQ-OAR-2022-0829-0494, p. 2]

EPA Summary and Response

Summary

The above comments are some of the many general statements in opposition to EPA's proposed program to reduce GHG and criteria emissions from light- and medium-duty vehicles included in the detailed comments reproduced verbatim in this RTC document and the additional comments described in Appendix A. Many of these commenters voiced concerns about the legal basis for the program, the impacts on the automotive manufacturing sectors, and on jobs and households. Other commenters express concerns about costs and supply chain impacts. Some commenters stated that EPA fails to include lifecycle emissions leading it to favor one technology solution. These commenters request EPA to consider allowing other technologies and low carbon fuel solutions. Some commenters also mention potential impacts on energy and national security, or question whether the energy grid can support these changes. Other commenters are skeptical that the program will reduce emissions or affect global climate change.

Response

EPA acknowledges these comments expressing general opposition to the proposed rule. Some of these commenters provided detailed comments about specific aspects of the proposed program; those comments are reproduced verbatim in other parts of this RTC document. Regarding the general comments above relating to issues such as legal authority, technology solutions, fuel-based solutions, energy and national security, and electric infrastructure, please see those sections of the RTC and preamble that address those aspects of the program in detail.

2 - Appropriateness/legal justification of standards under Clean Air Act

Comments by Organizations

Organization: 25x'25 Alliance, et al.

The undersigned parties offer the following comments on EPA's proposed rule, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." We write these comments because we believe that the proposed rules would establish an overly aggressive, high-risk program that would be counterproductive in achieving the agency's environmental and health objectives. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

In establishing or revising Clean Air Act Section 202(a) standards, EPA must consider issues of technological feasibility, cost of compliance, and lead time. Among other things, that means the agency must look closely at the impact of its proposed standards on net emissions of air pollutants and their associated public health effects, impacts on the automotive industry, impacts on the vehicle purchasers/consumers, energy security, and safety, and how the proposed approach would compare to other possible rulemakings. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

Organization: Alliance for Automotive Innovation

Additionally, regulations issued under section 202 of the Clean Air Act must not be arbitrary and capricious, a standard identical to the one imposed by the Administrative Procedure Act.16 This standard requires that EPA consider all "important aspect[s] of the problem" and engage in "reasoned decision making," and that it "consider[] the relevant factors and articulate[] a rational connection between the facts found and the choice made.'"17 [EPA-HQ-OAR-2022-0829-0701, pp. 24-25]

16 See 42 U.S.C. § 7607(d)(9)(A); see also Nat'l Petrochem. & Refiners Ass'n v. E.P.A., 287 F.3d 1130, 1135 (D.C. Cir. 2002).

17 Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43, 53 (1983); Nat'l Ass'n of Clean Air Agencies v. E.P.A., 489 F.3d 1221, 1229 (D.C. Cir. 2007).

2. Statutory Authority

Auto Innovators shares EPA's goal of addressing climate change by achieving a net-zero carbon transportation future, as part of an ambitious, comprehensive, and national strategy. The Proposed Rule, however, contemplates a rapid and transformative nationwide shift to electrification that may be well beyond what the industry or market can bear now or in the foreseeable future. Given the significant policy and economic consequences that would flow from this restructuring of the nation's vehicle market, and the breadth and unprecedented nature of EPA's proposed action, clear congressional authorization is required for the Proposed Rule. EPA lacks this clear authorization. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

The Proposed Rule seeks to use Clean Air Act section 202 rulemaking to force an extraordinary transformation of the nation's vehicle fleet away from ICE-based vehicles to BEVs, and it is not at all clear that the level of consumer demand and infrastructure that exists now and is expected in the future can support the expedited, aggressive timeline in the Proposed Rule. The Proposed Rule does not include an explicit electrification target, and EPA states that "a compliant fleet under the proposed standards will include a diverse range of technologies."152

But in practice, the stringency of the proposed standards is such that automakers will have no choice but to convert to BEV fleets on a massive scale. This is the result not only of the Proposed Rule's GHG emissions standards, but also its criteria pollutant standards and its tightening of credit programs and other flexibilities. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

152 NPRM at 29187.

In other words, the Proposed Rule is enormously consequential for the automobile industry, and for the economy and consumers as a whole. The Proposed Rule's provisions insert EPA into crucial policy tradeoffs and debates, such as concerns about the extraction and supply of critical minerals overseas, or the need to maintain a reliable, efficient electric grid.159 These considerations range far afield from the traditional ambit of section 202 rulemaking, delving into areas that are the subject of other regulatory schemes, or within the unique purview and authority of other agencies and other branches and levels of government. In short, the dramatic shift toward electrification required by the Proposed Rule implicates issues of tremendous political, economic, and social significance. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

159 See, e.g., NPRM at 29311-24.

Nor is such a transformative rule, with such wide-ranging implications, a typical feature of section 202 rulemaking. We acknowledge that some past EPA section 202 rules, most notably the MY 2023-2026 rule, have contemplated greater deployment of EVs as one of many options for complying with emissions standards. The Proposed Rule, however, is different not merely in degree but in kind, seeking to impose what is, at bottom, a mandate toward nationwide electrification. Such a proposal amounts to an unprecedented assertion of power on the part of EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

"[A]n enormous and transformative expansion in EPA's regulatory authority" such as this necessitates "clear congressional authorization," as Congress is expected to "speak clearly if it wishes to assign to an agency decision of vast 'economic and political significance.'"160 But section 202 does not confer such clear authority. Section 202 authorizes EPA to promulgate "standards applicable to the emission of any air pollutant" from vehicles; it does not empower EPA to force a historic shift in the makeup of the nation's entire vehicle fleet. In the absence of plain statutory authorization, such a decision, and the tradeoffs and consequences it entails, properly belongs to Congress. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

160 Utility Air Regulatory Group v. E.P.A., 573 U.S. 302, 324 (2014) (quoting FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 160 (2000)).

The Proposed Rule frequently cites to the IIJA, also known as the "Bipartisan Infrastructure Law,"161 and the Inflation Reduction Act.162 To the extent EPA purports to rely on either statute as providing a legal basis for the Proposed Rule,163 it should not do so. No provision of the IIJA or the IRA expands or modifies EPA's regulatory authority under section 202 or the Clean Air Act more broadly. Nor can these laws be considered to have implicitly altered EPA's authority. After all, "implied amendments require 'clear and manifest' evidence of congressional intent,"164 and "neither courts nor federal agencies can rewrite a statute's plain text to correspond to its supposed purposes."165 Those conditions are not satisfied here. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

161 Pub. L. 117-58, 135 Stat. 429 (2021).

162 Pub. L. 117-169, 136 Stat. 1818 (2022). See, e.g., NPRM at 29187-90, 29195-96, 29233, 29300, 29308, 29313, 29318, 29322-24, 29341 (referencing the IIJA and/or IRA).

163 See, e.g., NPRM at 29233 ("The recently enacted Inflation Reduction Act 'reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act'") (quoting floor statement by Rep. Pallone).

164 Sackett v. E.P.A., 598 U.S , 2023 WL 3632751, at *13 (U.S. May 25, 2023) (internal quotation omitted).

165 Landstar Exp. America, Inc. v. Fed. Maritime Comm'n, 569 F.3d 493, 498 (D.C. Cir. 2009).

We reaffirm that we are fundamentally supportive of EPA's goals of reducing GHG emissions and transitioning to a net-zero carbon transportation future. Section 202 standards have a place in this effort, as we have previously expressed. We remain concerned, however, that the extraordinary and unprecedented nature of the Proposed Rule places it outside the bounds of EPA's statutory authority. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

2. Statutory Authority

Auto Innovators shares EPA's goal of addressing climate change by achieving a net-zero carbon transportation future, as part of an ambitious, comprehensive, and national strategy. The Proposed Rule, however, contemplates a rapid and transformative nationwide shift to electrification that may be well beyond what the industry or market can bear now or in the foreseeable future. Given the significant policy and economic consequences that would flow from this restructuring of the nation's vehicle market, and the breadth and unprecedented nature of EPA's proposed action, clear congressional authorization is required for the Proposed Rule. EPA lacks this clear authorization. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

The Proposed Rule seeks to use Clean Air Act section 202 rulemaking to force an extraordinary transformation of the nation's vehicle fleet away from ICE-based vehicles to BEVs, and it is not at all clear that the level of consumer demand and infrastructure that exists now and is expected in the future can support the expedited, aggressive timeline in the Proposed Rule. The Proposed Rule does not include an explicit electrification target, and EPA states that "a compliant fleet under the proposed standards will include a diverse range of technologies."152 But in practice, the stringency of the proposed standards is such that automakers will have no choice but to convert to BEV fleets on a massive scale. This is the result not only of the Proposed Rule's GHG emissions standards, but also its criteria pollutant standards and its tightening of credit programs and other flexibilities. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

152 NPRM at 29187.

As EPA notes, BEVs accounted for 5.8% of the new U.S. light-duty passenger vehicle market in 2022.153 Moreover, EPA's MY 2023-2026 GHG emissions standards that were finalized at the end of 2021 projected only a 17% light-duty penetration rate for both BEVs and PHEVs by MY 2026.154 Despite this low rate of consumer acceptance, the Proposed Rule projects a light-duty BEV penetration rate of 67% by MY 2032, up from 36% in MY 2027.155 Importantly, in the absence of these and other strict regulatory programs (such as California's ZEV mandate), EPA projects a significantly lower MY 2032 BEV penetration rate of only 39%.156 It is unclear from EPA's analysis how the regulations alone justify a 28 percentage point increase in BEV market between having regulations versus not. This is particularly concerning given that EPA's no-action analysis presumably includes the same level of existing supportive mechanisms such as the IRA and IIJA, assumptions for infrastructure development, and other market-enabling features. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

153 Id. at 29189

154 See Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74485, Table 33 (Dec. 30, 2021).

155 NPRM at 29329, Table 80.

156 Id. at 29329, Table 81.

In other words, a staggering increase in the implementation and adoption of BEV technology underpins the Proposed Rule and is the central means by which the rule effectuates its contemplated emissions reductions. But this shift to electrification is not a simple matter of swapping one technology for another. The mass adoption of BEVs on the scale required for compliance with the Proposed Rule's standards requires a much broader transformation in the way vehicles are manufactured, purchased, fueled, serviced, and disposed of. Indeed, the Proposed Rule would reorder much of the U.S. automobile industry—which supports roughly 10.3 million American jobs and $558 billion in annual car sales, and about 6% of the U.S.'s Gross Domestic Product (GDP).157 Consumers must be willing to purchase BEVs at mass scale; the power sector must be able to generate and deliver adequate electricity158—which itself will contribute to emissions—while maintaining grid reliability and otherwise meeting consumer and industrial demand; adequate charging infrastructure must be available; batteries and other components must be manufactured at an increasing rate, critical minerals sourced, and supply chains developed. These needs must be met not only for light-duty vehicles, but also for medium-and heavy-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

157 See Economic Insights, Alliance for Automotive Innovation, https://www.autosinnovate.org/resources/insights.

158 In addition to increasing electricity capacity, utilities are also facing a transition in technology types and more renewable sources, as proposed under the "Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants" [88 FR 33240, May 23, 2023].

As expressed throughout this comment, we have serious concerns that the market will not be able to bear the requirements of the Proposed Rule and that those requirements will not be feasible given these considerations. Compliance will impose significant costs, and require extraordinary effort, on the part of regulated parties—costs which will be passed along to consumers. Setting such stringent standards has the potential to create a significant market disruption, with consequences not only for the automobile industry but for the entire U.S. economy. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

In other words, the Proposed Rule is enormously consequential for the automobile industry, and for the economy and consumers as a whole. The Proposed Rule's provisions insert EPA into crucial policy tradeoffs and debates, such as concerns about the extraction and supply of critical minerals overseas, or the need to maintain a reliable, efficient electric grid.159 These considerations range far afield from the traditional ambit of section 202 rulemaking, delving into areas that are the subject of other regulatory schemes, or within the unique purview and authority of other agencies and other branches and levels of government. In short, the dramatic shift toward electrification required by the Proposed Rule implicates issues of tremendous political, economic, and social significance. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

159 See, e.g., NPRM at 29311-24.

Nor is such a transformative rule, with such wide-ranging implications, a typical feature of section 202 rulemaking. We acknowledge that some past EPA section 202 rules, most notably the MY 2023-2026 rule, have contemplated greater deployment of EVs as one of many options for complying with emissions standards. The Proposed Rule, however, is different not merely in degree but in kind, seeking to impose what is, at bottom, a mandate toward nationwide electrification. Such a proposal amounts to an unprecedented assertion of power on the part of EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

"[A]n enormous and transformative expansion in EPA's regulatory authority" such as this necessitates "clear congressional authorization," as Congress is expected to "speak clearly if it wishes to assign to an agency decision of vast 'economic and political significance.'"160 But section 202 does not confer such clear authority. Section 202 authorizes EPA to promulgate "standards applicable to the emission of any air pollutant" from vehicles; it does not empower EPA to force a historic shift in the makeup of the nation's entire vehicle fleet. In the absence of plain statutory authorization, such a decision, and the tradeoffs and consequences it entails, properly belongs to Congress. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

160 Utility Air Regulatory Group v. E.P.A., 573 U.S. 302, 324 (2014) (quoting FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 160 (2000)).

The Proposed Rule frequently cites to the IIJA, also known as the "Bipartisan Infrastructure Law,"161 and the Inflation Reduction Act.162 To the extent EPA purports to rely on either statute as providing a legal basis for the Proposed Rule,163 it should not do so. No provision of the IIJA or the IRA expands or modifies EPA's regulatory authority under section 202 or the Clean Air Act more broadly. Nor can these laws be considered to have implicitly altered EPA's authority. After all, "implied amendments require 'clear and manifest' evidence of congressional intent,"164 and "neither courts nor federal agencies can rewrite a statute's plain text to correspond to its supposed purposes."165 Those conditions are not satisfied here. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

161 Pub. L. 117-58, 135 Stat. 429 (2021).

162 Pub. L. 117-169, 136 Stat. 1818 (2022). See, e.g., NPRM at 29187-90, 29195-96, 29233, 29300, 29308, 29313, 29318, 29322-24, 29341 (referencing the IIJA and/or IRA).

163 See, e.g., NPRM at 29233 ("The recently enacted Inflation Reduction Act 'reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act'") (quoting floor statement by Rep. Pallone).

164 Sackett v. E.P.A., 598 U.S , 2023 WL 3632751, at *13 (U.S. May 25, 2023) (internal quotation omitted).

165 Landstar Exp. America, Inc. v. Fed. Maritime Comm'n, 569 F.3d 493, 498 (D.C. Cir. 2009).

We reaffirm that we are fundamentally supportive of EPA's goals of reducing GHG emissions and transitioning to a net-zero carbon transportation future. Section 202 standards have a place in this effort, as we have previously expressed. We remain concerned, however, that the extraordinary and unprecedented nature of the Proposed Rule places it outside the bounds of EPA's statutory authority. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

7. Modeling of Plug-In Hybrid Electric Vehicles

In the Proposed Rule, EPA acknowledges that plug-in hybrid electric vehicles "can provide significant reductions in GHG emissions and that some vehicle manufacturers may choose to utilize this technology as part of their technology offering portfolio" and, in particular, that a "PHEV pickup architecture would provide several benefits."210 This is consistent with EPA's analysis in the MY 2023-2026 GHG emissions standards rulemaking, in which the Agency noted that "our updated analysis projects that about 17% of vehicles meeting the MY 2026 final standards will be BEVs or PHEVs," and projected that "BEVs and PHEVs can play a significant role in complying with the final standards."211 [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

210 NPRM at 29298; see also Drati Regulatory Impact Analysis at 2-75 (same).

211 Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74493-94 (Dec. 30, 2021) (emphasis added).

Despite recognizing the importance of PHEVs in meeting GHG emissions standards, EPA has not attempted to model any PHEVs as part of manufacturers' compliance pathways to meet the proposed standards or alternatives under consideration. Auto Innovators believes that this omission of technology that will indisputably be an important part of the transition to a net-zero carbon transportation future is a significant oversight that should be rectified in the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

A number of manufacturers are already building PHEVs or have announced plans to do so. S&P Global Mobility estimates a 5% U.S. market share for PHEVs in 2030.212 Auto Innovators' commitment to reaching 40-50% EV sales by 2030 was inclusive of PHEVs. Likewise, President Biden's Executive Order 14037 Specifically set "a goal that 50% of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles." (Emphasis added.)213 [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

212 S&P Global Mobility, U.S. light vehicle sales forecast by propulsion system design, January 2023.

213 E.O. 14037 of Aug 5, 2021.

EPA asks for comments on whether PHEVs should be modeled and what type of PHEV technology should be incorporated. Auto Innovators believes EPA should include PHEVs in their modeling and it would be appropriate to model both the typical strong PHEVs (accounting for stronger electrification needed to meet US06 high power cold starts), as well as the range-extending type that EPA is modelling at SwRI. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Moreover, assuming EPA includes PHEVs in the final rule, it should not use PHEV technology as a justification to further increase greenhouse gas stringency. Rather, EPA should treat PHEVs in the context that manufacturers consider them – as a component of EV technology, not as a means to further improve ICE vehicle emissions in addition to rapidly increasing BEV model availability and production. PHEVs offer unique utility, and because some consumers are not ready for a BEV, we do not believe the inclusion of PHEVs should increase the combined ZEV share that EPA has modeled as BEVs in the Proposed Rule. Rather, a PHEV is a preferred EV to a BEV for some vehicle buyers and should be considered as a substitute for a BEV. Additionally, the California ZEV mandate allows for PHEVs, meeting certain criteria, to meet requirements, and treats them as it treats BEVs. At a minimum, EPA could borrow CARB's assumptions regarding PHEV sales and characteristics and apply them for states that follow California's rules only. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

PHEVs are well suited to some applications, especially for more capable SUVs and pickup trucks. Specifically, EPA has modeled 60% BEV light-duty pickup trucks in the Proposed Rule, see Figure 34 below. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Figure 34: EPA Omega model output – Pickup BEV share percentage 214 [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

214 OMEGA output abs_share_frac_pickup_BEV divided by abs_share_frac_pickup significant effort to model battery capacity constraints, but it is only a model, which carries uncertainty.

In addition to consumer demand (for utility or as a bridge to full electrification), another reason that EPA should include PHEVs in their modeling is the potential for PHEVs to provide clean electric miles while reducing the amount of battery material needed. EPA has devoted. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Further, PHEVs can be very useful to sustain the transition to electrification in the case of unforeseen disruptions in the development of battery manufacturing capacity due to constraints in mineral availability, processing, or other supply chain challenges. Using MY 2023 EPA Fuel Economy Guide data, a 300-mile BEV requires a battery of approximately 109kW-hr on average. Accounting for energy efficiency differences, the same battery material could be used to make between four and six PHEVs with 50 miles of all-electric range. Fifty miles exceeds what most Americans drive on most days, enabling significant all-electric driving. Due to battery supply chain concerns, EPA should include PHEVs in their modeling as a substitute for some BEVs so that PHEVs comprise at least 20% of the combined BEV plus PHEV share consistent with California and other ZEV states. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Organization: Alliance for Consumers (AFC)

Consumers deserve better, especially given that EPA's proposal is arbitrary and capricious under the APA because it fails to consider all aspects of the problem. [EPA-HQ-OAR-2022-0829-0534, p. 2]

The Proposed Rule Is Pretextual And Therefore Cannot Be Finalized

The proposed rule is pretextual. It is transparently outcome driven: a poorly disguised attempt to mandate electric vehicles, a power that otherwise does not lie within the ambit of what EPA may do. It is therefore not the product of reasoned decision-making and cannot be finalized as proposed. [EPA-HQ-OAR-2022-0829-0534, pp. 3-4]

"[I]n order to permit meaningful judicial review, an agency must 'disclose the basis' of its action." Dep't of Commerce v. N.Y.], 139 S. Ct. 2551, 2573 (2019). Here, the administration's longstanding goal of forcing EV adoption has every appearance of being the driving force behind the strenuousness of the proposed standards, not the underlying statutory requirements or other more relevant considerations. The framing of this proposal in the press, as informed by briefing sheets and background briefings done by EPA and White House personnel, as well as the contents of the surrounding EPA documents all point to the proposal being an attempt to enforce an EV mandate through other means; it is clear that the goal here was requirements so strict that they could only be met by replacing nearly all gas-powered cars with EVs, with cross-references in the agency materials to other efforts by the administration to ensure EV penetration. See page 1, supra. In other words, the rationale for the proposal and its justification in the context of the tailpipe emissions program is “pretextual,” and thus the proposal itself in its current form is unlawful. Id. at 2573–76. [EPA-HQ-OAR-2022-0829-0534, pp. 3-4]

“Reasoned decisionmaking under the Administrative Procedure Act calls for an explanation for agency action. What was provided here was more of a distraction.” Dep’t of Commerce v. N.Y., 139 S. Ct. at 2576. [EPA-HQ-OAR-2022-0829-0534, pp. 3-4]

Failure To Adequately Consider All Aspects Of The Problem

An agency rule is arbitrary and capricious if “the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.” Motor Vehicle Mfrs. Ass’n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). [EPA-HQ-OAR-2022-0829-0534, p. 4]

Here, EPA has failed to adequately consider all aspects of the problem and adequately address crucial consideration that go to the validity of the proposal. This includes failure to properly consider the rising price of electric vehicles in the wake of the Inflation Reduction Act, the limits on credits and subsidies that have resulted from this surge in electric vehicle pricing, and the true cost of repairing electric vehicles over a relevant time horizon. [EPA-HQ-OAR-2022-0829-0534, p. 4]

Organization: American Coalition for Ethanol

Other legal questions have been raised given recent court rulings with respect to “major questions” doctrine. Some have suggested this proposal’s effect of forcing the production of BEVs to phase out internal combustion engines is similar to EPA’s Clean Power Plan to force changes in electric power generation, which was struck down by the Supreme Court in West Virginia v. EPA. And, just days ago, the Supreme Court used the ‘major questions doctrine” to nullify the Administration’s student loan forgiveness plan in Biden v. Nebraska. The Agency risks inviting litigation given the vast and political significance of this rule without clear congressional authorization to mandate BEVs. In the end, litigation surrounding this rule could forestall meaningful GHG reductions from liquid transportation fuels simply because EPA unnecessarily put its thumb on the scale for a preferred outcome that doesn’t survive legal scrutiny. [EPA-HQ-OAR-2022-0829-0613, pp. 3-4]

Even if the U.S. somehow reaches 50% BEV sales by 2030 (President Biden’s original executive order), the U.S. will consume over 1 trillion gallons of motor gasoline in the next decade. As stated earlier, ACE shares EPA’s goal to significantly decarbonize transportation related GHG emissions in the U.S. We strongly urge the Agency to rework its proposal to develop a more practical technology-neutral approach discussed below. [EPA-HQ-OAR-2022-0829-0613, pp. 3-4]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

This attempt to overhaul motor-vehicle manufacturing is unlawful, unworkable, and unjustified. EPA lacks legal authority to mandate this shift to- ward electric vehicles. Its proposed rule is doomed to fail in any event. Satisfying the proposed standards would require a massive, abrupt transformation of the light- and medium-duty vehicle sector that would be impossible in the compressed timeline given. EPA's analysis of costs, benefits, and alternative approaches is deeply flawed in multiple respects. Its misguided proposal should be abandoned. [EPA-HQ-OAR-2022-0829-0683, p. 3]

EPA's proposed light- and medium-duty rule is unlawful most centrally because the agency has no statutory authority to impose it. EPA must have con- gressional authorization for any action it undertakes. No such authority exists in the Clean Air Act (or anywhere else in the U.S. Code). And, under the major- questions doctrine, EPA's claim of power to regulate an enormous segment of the Nation's economy—especially on a matter of great political significance— must be unmistakably clear in the statute. But far from conferring sweeping authority on EPA to effectively mandate electrification, the Clean Air Act for- bids EPA's overreach. The Clean Air Act directs EPA to set emissions levels that individual motor vehicles must meet. EPA's proposed rule flouts that statutory directive. It dictates electrification of light- and medium-duty vehicles by setting emissions standards that manufacturers must meet on a fleetwide-average basis; and unlike previous rules, averaging is used as much more than a regulatory flexibility to allow for greater manufacturer choice and experimentation. Only by employing that fleetwide-averaging approach can EPA reverse-engineer its admitted aim of driving manufacturers to replace a significant portion of their conventional fleets with electric vehicles. If that sounds like the Clean Power Plan, that's because it's essentially the same kind of scheme. The Clean Air Act, however, does not authorize fleetwide averaging at all, let alone as a means to mandate electrification. [EPA-HQ-OAR-2022-0829-0683, p. 3]

EPA should not and cannot lawfully adopt the Light- and Medium-Duty rule it has proposed. EPA lacks statutory authority to remake the motor-vehicle industry, a massive segment of the Nation's economy and daily life, by forcing manufacturers to produce electric and other zero-emission vehicles. Even if EPA had such authority, the approach it has proposed in the Light- and Medium-Duty rule is arbitrary and irrational at every turn. The transformation it would mandate is not feasible, especially on the proposed truncated timeline. EPA's projections of resulting emissions reductions are unreliable, and its ap- proach to assessing compliance is illogically selective and sets the rule up for failure. EPA's cost-benefit analysis also suffers multiple fatal defects, and the proposed rule fails to address obvious, more workable alternatives. Finally, by relying on a California program that EPA has not yet approved—and that it might never approve, or might not approve in time to support EPA's forecasts for the period covered by its proposed Light- and Medium-Duty rule—EPA has both overstated the case for forcing a shift toward electric vehicles and improp- erly signaled that it has prejudged California's request for a waiver authorizing that program. EPA should not press forward with its unlawful and unrealistic Light- and Medium-Duty rule. It should instead engage meaningfully with stakeholders to develop permissible, viable solutions to GHG emissions. [EPA-HQ-OAR-2022-0829-0683, p. 8]

the proposed rule wades deep into issues of "political significance" that are "the subject of an earnest and profound debate across the country." West Virginia, 142 S. Ct at 2613–14 (citations omitted). Congress is currently considering vehicle electrification. See, e.g., Pub. L. No. 117-58, §§ 25006, 40435, 40436, 135 Stat. 429, 845–49, 1050 (2021) (requiring reports on "the cradle to grave environmental impact of electric vehicles" and supply-chain im- pacts). Proposals have been introduced, for example, to impose electric-vehicle mandates, but none thus far has made it out of committee. See, e.g., Zero-Emis- sion Vehicles Act of 2019, H.R. 2764, 116th Cong.; Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. That Congress has "considered and rejected” such proposals is a sign that EPA is “attempting to ‘work around’ the legislative process to resolve for itself a question of great political significance.” West Vir- ginia, 142 S. Ct. at 2620–21 (Gorsuch, J., concurring) (brackets and citations omitted). Just recently, 151 members of the U.S. House of Representatives, led by the Energy and Commerce Committee Chair, joined a letter urging EPA to rescind these proposed emissions standards—calling them an effort to “com- mandeer America’s transportation sector and force its complete vehicle electri- fication under the guise of mitigating climate change.” Letter from Rep. Cathy McMorris Rodgers et al. to Adm’r Michael S. Regan, at 1 (May 22, 2023). [EPA-HQ-OAR-2022-0829-0683, pp. 10-11]

The proposed rule also implicates other issues that are the subjects of vigorous public debate, such as grid reliability and national security. For example, as discussed below, most of the supply of critical components of batteries and motors for electric vehicles is controlled by foreign nations, and in particular by China. See 86 Fed. Reg. 49,602, 49,797 (Sept. 3, 2021) (noting that the United States “has very little capacity in mining and refining any of the key raw mate- rials” for electric vehicles); IEA, The Role of Critical Minerals in Clean Energy Transitions, at 11–12 (Mar. 2022) (“Role of Critical Minerals”). These broader im- plications of the proposed rule provide even more reason to doubt that Con- gress would obliquely confer on EPA sweeping authority over this area. [EPA-HQ-OAR-2022-0829-0683, pp. 10-11]

The Clean Air Act Does Not Permit Fleetwide Averaging

Nothing in the text of Section 202 authorizes a fleetwide-averaging approach. To the contrary, Section 202’s relevant provision authorizes emissions standards for “any class or classes of new motor vehicles or new motor vehicle engines” that EPA determines “cause, or contribute to, air pollution.” 42 U.S.C. § 7521(a)(1) (emphases added). Those standards must “be applicable to such vehicles and engines for their useful life.” Id. The text thus permits EPA to adopt a standard applicable to all of the vehicles (or engines) in a particular class. Whatever discretion EPA may exercise in defining a “class” of vehicles, the text requires standards for the vehicles in that class, not for the class as a collective. [EPA-HQ-OAR-2022-0829-0683, p. 14]

The absence of any affirmative authorization for fleetwide averaging should come as no surprise because, as EPA acknowledged four decades ago, “Con- gress did not specifically contemplate an averaging program when it enacted the Clean Air Act.” 48 Fed. Reg. 33,456, 33,458 (July 21, 1983). EPA’s entire averaging edifice is based on the purported fact that the Act “does not explicitly preclude standards” based on fleetwide averaging. 54 Fed. Reg. 22,652, 22,665 (May 25, 1989) (emphasis added). Under the major-questions doctrine, how- ever, the absence of a statutory prohibition on the approach the agency seeks authority to pursue is categorically insufficient: EPA needs “‘clear congres- sional authorization’ for the power it claims,” West Virginia, 142 S. Ct. at 2609 (citation omitted), not congressional silence on the subject. Even outside of ma- jor-questions cases, congressional silence is not an invitation to make things up. See Entergy Corp. v. Riverkeeper, Inc., 556 U.S. 208, 223 (2009) (“statutory silence, when viewed in context,” often is “best interpreted as limiting agency discre- tion”); Marx v. Gen. Revenue Corp., 568 U.S. 371, 381 (2013) (“[I]t is fair to sup- pose that Congress considered the unnamed possibility and meant to say no to it[.]” (citation omitted)); Univ. of Tex. Sw. Med. Ctr. v. Nassar, 570 U.S. 338, 353 (2013). [EPA-HQ-OAR-2022-0829-0683, p. 14]

EPA must “test . . . any new motor vehicle or new motor vehicle engine” to determine whether “such vehicle or engine” conforms with Sec- tion 202 emissions standards. 42 U.S.C. § 7525(a)(1). If the “vehicle or en- gine conforms to such regulations,” EPA must issue the manufacturer a “certificate of conformity.” Id. And a manufacturer may not sell a vehicle or engine not “covered by a certificate of conformity.” Id. § 7522(a)(1). These provisions are not compatible with fleetwide-averaging for at least two reasons: first, the use of singular terms “vehicle” and “engine”—along with “any” and “such”—indicates that testing individual vehicles is re- quired; and second, EPA cannot determine compliance with Section 202 standards before issuing a certificate of conformity—as the statute contem- plates—under a fleetwide-averaging approach. (Instead, conformity is de- termined at “the end of each model year,” when the manufacturer knows the quantity and model of “vehicles produced and delivered for sale.” 40 C.F.R. §§ 86.1818-12(c)(2), 86.1865-12(i)(1), (j)(3).) [EPA-HQ-OAR-2022-0829-0683, pp. 15-16]

Title II’s warranty provisions require a manufacturer to “war- rant to the ultimate purchaser and each subsequent purchaser” “at the time of sale” that each new vehicle complies with applicable Section 202 stand- ards. 42 U.S.C. § 7541(a)(1). Under an averaging approach, however, a manufacturer cannot determine compliance “at the time of sale,” because actual compliance with an average standard can be determined only at year’s end. Manufacturers may be able to make a rough predictive judgment ex ante, but they would be effectively warranting an unknown. [EPA-HQ-OAR-2022-0829-0683, p. 16]

Under 42 U.S.C. § 7524(a), any violation of applicable standards “shall constitute a separate offense with respect to each motor vehicle or motor vehicle engine,” with each offense subject to a civil penalty of up to $25,000. But under a fleetwide-averaging approach, “each motor vehicle or motor vehicle engine” cannot violate applicable emissions standards—only the fleet as a whole. [EPA-HQ-OAR-2022-0829-0683, p. 16]

EPA also finds no quarter for fleetwide averaging in the case law. The best it can muster is a single decision that found no “clear evidence that Congress meant to prohibit averaging.” Thomas, 805 F.2d at 425 (emphasis added); see 88 Fed. Reg. at 29,245 & n.417. But as explained above, under the major-questions doctrine, the absence of a “clear” prohibition is irrelevant: on the contrary, Congress must have specifically and clearly authorized the action. See West Vir- ginia, 142 S. Ct. at 2609. Moreover, the Thomas court recognized inconsisten- cies between averaging and other statutory provisions, including Title II’s “test- ing and certification provision, 42 U.S.C. § 7525,” discussed above. 805 F.2d at 425 n.24. The court reserved judgment on that issue only because “it was not raised by any party before the agency.” Id. EPA’s best (indeed, only cited) case thus provides no support for construing Section 202 to authorize averaging. [EPA-HQ-OAR-2022-0829-0683, p. 16]

EPA Cannot Use Fleetwide Averaging To Mandate Electrifica- tion

Even if Section 202 authorized fleetwide averaging in some circumstances, that approach cannot be used, as EPA proposes, to blend together the emissions levels of conventional, pollutant-emitting vehicles with vehicles that (according to EPA) emit zero pollutants. By its terms, Section 202(a)(1) authorizes EPA to promulgate “standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution.” 42 U.S.C. § 7521(a)(1) (em- phases added). The text’s focus on the “emission” of pollutants that “cause . . . air pollution” demonstrates that Congress intended to cover only vehicles that actually emit the relevant pollutant—and to authorize EPA to set standards for the quantity of pollutants those vehicles may acceptably emit. Nothing in the text authorizes EPA to dragoon light- and medium-duty vehicle manufacturers into producing a separate line of vehicles that do not themselves emit the regulated pollutant at all. [EPA-HQ-OAR-2022-0829-0683, p. 17]

EPA has elsewhere contended that the statute's reference to "classes" of vehicles or engines permits it to treat polluting and non-polluting vehicles on the same footing. See EPA Br. 76–78, Texas. v. EPA, No. 22-1031 (D.C. Cir. Feb. 24, 2023). But that term cannot rescue EPA's flawed interpretation. The relevant feature of a "class" of "motor vehicles" that "cause, or contribute to, air pollution" is that the vehicles in the class all emit the relevant pollutant. 42 U.S.C. § 7521(a)(1). A vehicle that emits zero pollutants is necessarily not part of that class. Given EPA's own assumption that electric vehicles do not emit pollutants, electric vehicles cannot be among the "class or classes of new motor vehicles or new motor vehicle engines" that EPA may consider in setting Sec- tion 202 standards and they therefore may not be factored into a fleetwide av- erage. If EPA were right, the relevant "category" EPA purports to be regulating would vanish at the point when EPA reaches the President's goal that 50 per- cent of the light- and medium-duty fleets be "zero-emissions vehicles." [EPA-HQ-OAR-2022-0829-0683, p. 17]

Beyond exceeding EPA's statutory authority, the proposed Light- and Me- dium-Duty rule also violates the Clean Air Act's mandate (echoing the Admin- istrative Procedure Act, 5 U.S.C. §§ 551 et seq., 701 et seq.) that agency action be the product of reasoned decisionmaking. 42 U.S.C. § 7607(d)(9)(A) (reviewing "court may reverse" EPA action "found to be . . . arbitrary, capri- cious, an abuse of discretion, or otherwise not in accordance with law"); cf. 5 U.S.C. § 706(2)(A). The proposed rule's feasibility, net emissions, compliance, and cost-benefit analyses all ignore the facts on the ground and are plagued with unrealistic assumptions and arbitrary modeling decisions. And the rule does not address potential alternatives to achieve EPA's stated goals. Even if EPA's interpretation of the Clean Air Act were otherwise permissible, its pro- posed rule is still arbitrary, capricious, and unlawful. [EPA-HQ-OAR-2022-0829-0683, pp. 17-18]

Section 202(a) requires EPA to consider whether compliance with the pro- posed emissions standards is feasible, giving appropriate consideration to the cost of compliance. 42 U.S.C. § 7521(a)(2) ("Any regulation prescribed . . . shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."). While the agency may take future advances into account, it may not promulgate rules on the basis of "crystal ball" prognostications. NRDC v. EPA, 655 F.2d 318, 328 (D.C. Cir. 1981) (internal quotation marks omitted). Instead, the agency must explain why its projections are "reason[able]" and defend "its methodology for arriving at numerical estimates." Id. Here, that includes answering theoretical objec- tions to widespread electrification, identifying the major steps necessary to achieve that objective, and offering plausible reasons for believing that each of those steps can be completed in the time available. Id. at 331–32. [EPA-HQ-OAR-2022-0829-0683, p. 18]

Courts deem rules arbitrary and capricious where a single source underlying large swathes of the rule is flawed in this manner. Cf. Tex. Oil & Gas Ass'n v. EPA, 161 F.3d 923, 935 (5th Cir. 1998) ("A regulation cannot stand if it is based on a flawed, inaccurate, or misapplied study.");

Desoto Gen. Hosp. v. Heckler, 766 F.2d 182, 186 (5th Cir. 1985) ("We find arbitrary and capricious the adop- tion of the Malpractice Rule based on 'a single study criticized extensively by its authors in its particular application.'" (quoting Walter O. Boswell Mem'l Hosp. v. Heckler, 749 F.2d 788, 803 (D.C. Cir. 1984)); Almay, Inc. v. Califano, 569 F.2d 674, 682 (D.C. Cir. 1977) (agency action arbitrary and capricious where it was promulgated "on the basis of [a] flawed survey"). EPA should withdraw the rule and permit more reviewers ample time to review OMEGA, make any changes necessary to incorporate those reviewers' comments, and then recon- sider whether the proposed emissions standards are appropriate. [EPA-HQ-OAR-2022-0829-0683, pp. 54-55]

In addition, the Interagency Working Group's estimates include global ben- efits from reducing GHG pollution. See 88 Fed. Reg. at 29,372.8 This led EPA to rely on factors not authorized by Congress, because the purpose of the Clean Air Act is to "enhance the quality of the Nation's air resources," not the world's air resources. 42 U.S.C. § 7401(b)(1) (emphasis added); see Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983) (hold- ing that agency action is arbitrary and capricious if "the agency has relied on factors which Congress has not intended it to consider"). At minimum, if EPA intends to consider global benefits, then it must also consider global costs to the rule—including its potential effects on global supply chains, upstream emis- sions in foreign countries, and the environmental effects on local communities of extracting critical minerals. The lithium-extraction process, for instance, has reportedly led to environmental harms in South American countries like Chile, Argentina, and Bolivia, none of which are accounted for in EPA's analysis.9 [EPA-HQ-OAR-2022-0829-0683, p. 64]

8 See also Interagency Working Grp. on Soc. Cost of Greenhouse Gases, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide, at 3 (Feb. 2021).

9 See James Blair et al., Exhausted: How We Can Stop Lithium Mining from Depleting Water Resources, Draining Wetlands, and Harming Communities in South America, at 4, Nat'l Res. Def. Council (Apr. 2022), https://tinyurl.com/524rsm86; Victoria Flexer et al., Lithium Recovery from Brines: A Vital Raw Material for Green Energies with a Potential Environmental Impact in Its Mining and Processing, 639 Sci. of Total Env't 1188 (2018), https://tinyurl.com/9fz6jwah.

EPA's Reliance On California's ACC II Program Is Improper

The Light- and Medium-Duty rule is also arbitrary and capricious because it repeatedly relies on California's Advanced Clean Cars II ("ACC II") program—which requires, but has not received, EPA's approval before it could become operational in California or elsewhere. [EPA-HQ-OAR-2022-0829-0683, p. 66]

Although the Clean Air Act generally preempts state motor-vehicle air-pollution standard, Section 209(b) of the Act authorizes EPA to waive that preemption for emissions standards adopted by California (which other States may then copy) if EPA makes certain findings. 42 U.S.C. § 7543(b). In 2022, California adopted its ACC II program, which generally would require all new cars and light trucks sold in California to be zero-emissions vehicles by 2035, and establishes increasingly stringent emissions criteria in the years leading up to 2035. In May 2023—after the proposed rule here was published—California submitted to EPA a request for a waiver for ACC II. [EPA-HQ-OAR-2022-0829-0683, p. 66]

EPA has not acted on California's waiver request. It has not even proposed action on the request for public comment. But in the Light- and Medium-Duty rule, EPA nevertheless relies on the ACC II program, for three main purposes: (1) as evidence of a purported trend toward vehicle electrification, see 88 Fed. Reg. at 29,188–89; (2) as a real-world driver of technological innovation and "increased consumer technology familiarity" with electric vehicles, id. at 29,254, 29,334; and (3) to show that the stringent standards imposed by the rule are "aligned with" existing state policies and thus reasonable, id. at 29,275, 29,284. This reliance is incurably improper. [EPA-HQ-OAR-2022-0829-0683, p. 66]

It is arbitrary and irrational for EPA to rely on ACC II and the effects of its implementation in California and beyond because that program is not, and may never be, operative anywhere. Although California has unilaterally "adopted" ACC II, and other States have indicated that they plan to implement the pro- gram if approved, no State—including California—can actually implement ACC II unless and until California receives a waiver from EPA under Section 209(b). California had not even requested EPA approval at the time EPA pub- lished the proposed rule. A grant of the requested waiver is far from a foregone conclusion: to do so, EPA must first conclude that California needs its own standards "to meet compelling and extraordinary conditions" specific to the State. 42 U.S.C. § 7543(b)(B). EPA must also conclude that ACC II is "fea- sib[le]," a rigorous standard that the program may not meet. Motor & Equip. Mfrs. Ass'n v. Nichols, 142 F.3d 449, 463 & n.13 (D.C. Cir. 1998) ("EPA . . . must deny a waiver for California if the state's regulations provide inadequate lead time to permit the development of the technology necessary to implement the new procedures, giving appropriate consideration to the cost of compliance within the time frame." (internal quotation marks omitted)). In- deed, twice in recent memory, EPA has rejected or withdrawn waivers sought by California. See 84 Fed. Reg. 51,310 (Sept. 27, 2019); 73 Fed. Reg. 12,156 (Mar. 6, 2008). Even if EPA ultimately grants the waiver for ACC II, it may not do so in time for that program to produce the effects for which EPA relies upon it. Whether as evidence of a current trend, a driver of consumer familiar- ity with and adoption of new technology, or as an indicator that EPA's pro- posed rule aligns with existing policies, EPA's reliance on that embryonic pro- gram is premature. [EPA-HQ-OAR-2022-0829-0683, pp. 66-68]

Yet by relying on ACC II, the Light- and Medium-Duty rule appears to ignore all these considerations and to presuppose that the waiver will be granted—and soon enough to provide support for adopting EPA's proposed Light- and Medium-Duty rule. In so doing, EPA has disregarded "an important aspect of the problem" without "reasonabl[e] expla[nation]." Am. Clinical Lab. Ass'n v. Becerra, 40 F.4th 616, 624 (D.C. Cir. 2022). Denial of the waiver would negate each of the three purposes for which EPA arbitrarily relies on ACC II. Deferral of action by EPA on the waiver could have the same result. It is also doubtful that an agency is permitted to justify one regulatory action with some other regulatory action that it has not yet taken and might never take. [EPA-HQ-OAR-2022-0829-0683, pp. 66-68]

EPA purports not to be "prejudging the outcome" of that "waiver process," 88 Fed. Reg. at 29,334, but it protests too much. The "effect of state adoption" of the ACC II model would not even be a relevant consideration—much less an "important" one," id.—in EPA's analysis of the proposed rule unless the ACC II program takes effect. EPA could not rationally treat ACC II as proba- tive of anything, when that program cannot take effect in any State without EPA's own signoff, unless EPA either has prejudged the waiver issue or at a minimum believes that approving the waiver is likely. For the same reason, EPA's effort to disclaim reliance on ACC II in its modeling, Id. at 29,296, is belied by its substantive reliance on the program in the proposed rule's actual reasoning, see, e.g., id. at 29,254, 29,275. 29,284, 29,334. [EPA-HQ-OAR-2022-0829-0683, pp. 66-68]

These indications of EPA's ostensible prejudgment of the ACC II waiver will likely have significant consequences for the validity of any eventual decision by EPA formally granting the requested waiver. See Cinderella Career & Finishing Schs., Inc. v. FTC, 425 F.2d 583, 591 (D.C. Cir. 1970) (holding that decisionmaker may be disqualified where "a disinterested observer may con- clude that the agency has in some measure adjudged the facts as well as the law of a particular case in advance of hearing it" (cleaned up)). For present pur- poses, EPA's choice to rely on a state-level program that is not and may never be operative, at least in the period relevant to the proposed rule, is irrational. See Appalachian Power Co. v. EPA, 249 F.3d 1032, 1053 (D.C. Cir. 2001) (per curiam) (noting that an agency's "model assumptions must have a rational re- lationship to the real world" (internal quotation marks omitted)). [EPA-HQ-OAR-2022-0829-0683, pp. 66-68]

EPA's reliance on the ACC II as a driver or reflection of circumstances out- side California is especially unjustified. There is no guarantee that any of the other States that EPA believes might implement ACC II (including Colorado, Maine, and New Jersey), see 88 Fed. Reg. at 29,334, will do so. At least one State that previously adopted ACC II has attempted (unsuccessfully) to repeal that adoption, backed by the newly elected governor. See Sarah Rankin, Va. Senate Democrats Kill Effort to Repeal Electric Car Rule, AP News (Jan. 17, 2023). A State's policy preferences tomorrow may not match its preferences today, especially in an area subject to vigorous debate and disagreement like climate policy. That's especially true here, given the many obstacles to rapid electric vehicle adoption discussed above. [EPA-HQ-OAR-2022-0829-0683, p. 68]

More fundamentally, EPA has no "special expertise" in state politics, Ass'n of Priv. Sectors Colls. & Univs. v. Duncan, 70 F. Supp. 3d 446, 452–53 (D.D.C. 2014), and its unreasoned speculation about States' future environmental poli- cies is arbitrary and capricious, cf. In re Aiken Cnty., 725 F.3d 255, 260 (D.C. Cir. 2013) (agencies "may not rely on political guesswork about future congres- sional appropriations"); New York v. DHS, 969 F.3d 42, 83 (2d Cir. 2020) (agen- cies may not rely on "unsupported speculation" that "run[s] counter to the re- alities" of the situation); N.M. Farm & Livestock Bureau v. U.S. Dep't of Interior, 952 F.3d 1216, 1227 (10th Cir. 2020) (reliance on "speculative" finding was arbitrary and capricious). EPA cannot justify its sweeping, profoundly mis- guided attempt to overhaul the motor-vehicle industry based on conjecture about hypothetical state-law developments. [EPA-HQ-OAR-2022-0829-0683, p. 68]

Organization: American Fuel & Petrochemical Manufacturers

There are several issues included in the Proposal with impacts that go well beyond EPA's expertise, and the Agency is not positioned to fully grapple with the consequences that such a rapid push for ZEVs will have across the nation. Beyond the obvious impacts to consumer automotive markets, the Proposed Rule will also eliminate American jobs in the refining sector that will not be offset by the "projected" job growth in the automotive sector.67 It will significantly strain the electric grid, requiring utilities to rapidly increase generation, transmission, and distribution capacity to a degree not fully contemplated by EPA. And it will have profound impacts on national security by forcing the American automotive industry and a large share of the domestic transportation market to depend on critical minerals from foreign suppliers—most notably, China—rather than a domestically-abundant and secure resource. The fact that mandating ZEVs forces EPA to wade into all these areas outside of vehicle tailpipe emissions—as EPA must, to appropriately quantify emissions reductions and other impacts of the Proposal—shows that mandating a wholesale switch to vehicles for which the bulk of emissions occur upstream, rather than at the tailpipe, was not contemplated or provided for by Congress. Because the Proposed Rule raises a major question, EPA can only proceed if Congress clearly authorized EPA to do so. But Congress did not. [EPA-HQ-OAR-2022-0829-0733, p. 19]

> 67 Proposed Rule at 29,393; DRIA at 4-59 (EPA admits that its proposal may affect employment for firms providing fuels: "Reduced consumption of petroleum represents cost savings for purchasers of fuel, as well as a potential loss in value of output for the petroleum refining industry, fuel distributors, and gasoline stations, which could result in reduced employment in these sectors.").

EPA proposed unachievable standards for light- and medium-duty ICEVs. This attempt to force an unprecedented transformation of the national transportation system to ZEVs goes far beyond the authority delegated to the Agency by Congress. The Proposal—which will likely require hundreds of billions of dollars, dictate what vehicles are permissible for automakers to sell, and has significant ramifications for the U.S. energy sector, national security, and consumers—clearly addresses questions of major economic and political significance that EPA is neither authorized nor equipped to address. [EPA-HQ-OAR-2022-0829-0733, p. 2]

EPA also misinterprets its authority to establish feasible efficiency improvements by proposing standards that cannot be achieved with ICEV technologies. First, EPA is not permitted to rely on averaging, banking, and trading mechanisms as a means to establish the relevant standards. Second, because ZEVs do not have tailpipe emissions, they do not directly "cause or contribute to" air pollution within the construct of a tailpipe emissions standard, and therefore any standard applicable to "any class or classes" of vehicles "which . . . cause, or contribute" to air pollution cannot include ZEVs. [EPA-HQ-OAR-2022-0829-0733, p. 2]

Even if EPA had Congressional authority to promulgate the proposed standards, the proposal is arbitrary and capricious due to the Agency's reliance on incomplete facts, overly optimistic or outright mistaken assumptions, and failure to use reason-based decision-making. The Agency significantly overestimates environmental benefits and feasibility, underestimates costs, and relies on little more than unsupported hope that consumer preferences will change to enable the Agency's intended policy. EPA's decision to not only ignore lifecycle emissions of ZEVs, but to explicitly propose removing the requirement for automakers to account for them, serves neither consumers nor the environment. EPA's reasoning, that its policy of not accounting for these emissions serves its goal of promoting the use of EVs, is the definition of arbitrary and capricious biased decision-making. Unfortunately, the Agency also ignored significant issues related to energy security and U.S. national security. [EPA-HQ-OAR-2022-0829-0733, p. 2]

II. Banning the Internal Combustion Engine is a "Major Question" that Congress did not Delegate to EPA.

The Proposed Rule goes beyond imposing regulations that represent appropriate and feasible technological improvements in the efficiency of ICEVs; rather, it requires the manufacturing of ZEVs and ultimately phasing out ICEVs. Though EPA contends the proposed standards do not mandate a specific technology (e.g., ZEVs), the proposed standards are a de facto ZEV mandate requiring auto manufacturers to shift production away from ICEV and to ZEVs.57 Consequently, the Proposed Rule obligates OEMs to increase the percentage of ZEVs they sell well more than market forces. EPA predicts that for MY 2032, the Proposed Rule will result in ZEV adoption rates between 62–78 percent across all body styles (sedans, crossovers/SUVs, and pickups).58 This is a tremendous jump from the 8.4 percent of LDV production that was plug-in electric in 2022.59 As a result, implementing this Proposal "requires massive changes from all sectors of the U.S. economy: from automotive suppliers to home builders to utilities, labor to mining to mineral processing."60 [EPA-HQ-OAR-2022-0829-0733, pp. 17-18]

57 Alliance for Automotive Innovation, Comments to the Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Proposed Rule, Docket No. EPA-HQ-OAR-2022-0829 (hereinafter AAI Comments) at iii.

58 Proposed Rule at 29,329; U.S. Environmental Protection Agency, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis" (April 2023) pg. 13-36, 13-37, available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf [hereinafter, "DRIA"].

59 Proposed Rule at 29,189 (identifying the percentage that was PEV, which included PHEVs and ZEVs).

60 AAI Comments at iv.

But the question of whether this shift is necessary and, if so, how to accomplish this shift, is a "major question" reserved for Congress, not EPA. [EPA-HQ-OAR-2022-0829-0733, pp. 17-18]

EPA's Proposed Rule here presents an analogous situation, albeit one with substantially greater costs. Mandating a rapid shift from ICEV to ZEV will reshape the American automotive market with profound collateral effects, making clear that EPA is encroaching upon an issue of "vast economic and political significance." As further discussed herein, the Proposal's direct compliance costs are enormous—even in the face of numerous errors and oversights in its analysis that materially understate these costs. EPA estimates that the cost of vehicle technology (not including the vehicle or battery tax credits) would be approximately $180 billion–$280 billion in addition to greater than $7 billion in electric vehicle supply equipment ("EVSE") costs through 2055. These figures do not include the transformation of the electric power sector and grid updates needed to meet the electricity demand created by the Proposed Rule, which is estimated to cost trillions of dollars.66 EPA acknowledges that auto manufacturers are spending over a trillion dollars by 2030, mainly for manufacturing facilities. By setting emissions standards requiring production of a different product, the Proposed Rule undoubtedly forces OEMs to meet production deadlines that would not exist but for EPA's new ZEV mandate. [EPA-HQ-OAR-2022-0829-0733, pp. 18-19]

66 Dan Shreve and Wade Schauer, Deep decarbonization requires deep pockets (June 2019), https://www.decarbonisation.think.woodmac.com/ (The U.S. needs to invest $4.5 trillion to fully transition the U.S. power grid to renewables during the next 10-20 years, annual investments exceeding the U.S. defense budget).

There are several issues included in the Proposal with impacts that go well beyond EPA's expertise, and the Agency is not positioned to fully grapple with the consequences that such a rapid push for ZEVs will have across the nation. Beyond the obvious impacts to consumer automotive markets, the Proposed Rule will also eliminate American jobs in the refining sector that will not be offset by the "projected" job growth in the automotive sector.67 It will significantly strain the electric grid, requiring utilities to rapidly increase generation, transmission, and distribution capacity to a degree not fully contemplated by EPA. And it will have profound impacts on national security by forcing the American automotive industry and a large share of the domestic transportation market to depend on critical minerals from foreign suppliers—most notably, China—rather than a domestically-abundant and secure resource. The fact that mandating ZEVs forces EPA to wade into all these areas outside of vehicle tailpipe emissions—as EPA must, to appropriately quantify emissions reductions and other impacts of the Proposal—shows that mandating a wholesale switch to vehicles for which the bulk of emissions occur upstream, rather than at the tailpipe, was not contemplated or provided for by Congress. Because the Proposed Rule raises a major question, EPA can only proceed if Congress clearly authorized EPA to do so. But Congress did not. [EPA-HQ-OAR-2022-0829-0733, p. 19]

67 Proposed Rule at 29,393; DRIA at 4-59 (EPA admits that its proposal may affect employment for firms providing fuels: "Reduced consumption of petroleum represents cost savings for purchasers of fuel, as well as a potential loss in value of output for the petroleum refining industry, fuel distributors, and gasoline stations, which could result in reduced employment in these sectors.").

Congress clarified that it, not EPA, must make the important policy decisions affecting if, when, and how the American automotive industry will transition from ICEVs to ZEVs. In the 116th Congress, for example, Congress introduced 44 bills seeking to reduce petroleum-based fuel consumption and GHG emissions from the transportation sector through customer rebates, vehicle and fuel producer incentives, local funding, development of standards, and research and development. Congress rejected bills that would have banned the sale of new light duty ICEVs by 204070 and it has consistently disapproved of EPA's efforts to hamstring the automotive sector with more stringent air pollution standards than are feasible.71 [EPA-HQ-OAR-2022-0829-0733, pp. 20-21]

70 See Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018); see also 116 Cong. Rec. 19238-40 (1970) (proposed amendment to Title II that would have banned ICEVs by 1978).

71 See, e.g., S. J. Res. 11, 118th Cong. (2023) (Although passed only by the Senate thus far, the joint resolution calls for disapproval of a similar rule submitted by the Administrator of the Environmental Protection Agency relating to "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 88 Fed. Reg. 4296 (Jan. 24, 2023)).

It should be no surprise then that in the wake of the Proposed Rule, members of Congress requested that the Agency rescind the proposals, asserting they "effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction."72 That Congress intended for it, not EPA, to direct these policy decisions is made all the more clear by the passage of the IRA and the BIL whereby Congress identified the policy levers it deemed appropriate. Congress could have, but did not, delegate the authority to (or otherwise direct) EPA to establish a fleet-wide credit trading regime to further drive ZEV development and rapid adoption. [EPA-HQ-OAR-2022-0829-0733, pp. 20-21]

72 Letter from Senator Shelley Capito, et al. to Administrator Michael S. Regan, EPA (May 25, 2023); see also Senate Resolution S.J. Res. 11, 118th Congress (Apr. 26, 2023) (Although related to heavy duty vehicles ("HDVs"), Congress has expressed its disapproval of EPA's overreach in this space. For example, in April of this year both houses of Congress passed a Congressional Review Act resolution to rescind EPA's December 2022 heavy duty NOx standards, sending a strong signal that Congress views EPA's efforts in this space as unnecessary, infeasible, and uniformed in light of economic and energy security concerns); House Resolution H2523 (May 23, 2023); see also Congressional Record, H2523 (May 23, 2023) at 1444, Statement from Mr. Walberg (R-MI) ("From tailpipe emissions regulations that will force people to buy expensive and less practical EVs to new rules on power plants that will threaten the

reliability of our electric grid. It seems like the EPA has not even thought about the economic and energy security of our constituents.”).

The Proposed Rule stands in direct contrast to other legislation, such as the Renewable Fuel Standard Program (“RFS”), whereby Congress mandated that “gasoline sold or introduced into commerce in the United States” must contain renewable fuels73 and, in 2022, must include billions of gallons of renewable fuel.74 In fact, EPA’s Proposal directly conflicts with the statutory framework that Congress provided in the RFS for lowering GHG emissions from the transportation sector. In the proposed rule, EPA cites only its authority under section 202(a) of the Clean Air Act and Executive Order 14037 as the basis for requirements that will extend from MY 2027 to 2032.75 Because Executive Orders have no force of law,76 EPA at bottom contends that a few general paragraphs of the Clean Air Act, enacted over 50 years ago, provides sufficient legislative authority and direction for the entirety of its proposed rule. But Congress demonstrated in the RFS that when it wants to transform the transportation sector, and specifically, when it desires to address GHGs associated with that sector, it does so with precision and within the context of a prescribed statutory framework. [EPA-HQ-OAR-2022-0829-0733, p. 21]

73 42 U.S.C. § 7545(o)(2)(A)(i).

74 Id., § 7545(o)(2)(B); 87 Fed. Reg. 39,600 (July 1, 2022).

75 88 Fed. Reg. at 29,186.

76 Rather, Executive Orders “simply serve as presidential directives to agency officials to consider certain policies when making rulemaking decisions.” State of California v. EPA, No. 21-1018 (D.C. Cir. 2023), Slip Op. at 17.

IV. The Proposed Rule is Arbitrary and Capricious

Even if EPA had Congressional authority to promulgate the Proposed Rule, which it does not, the Proposal is substantively deficient and based on illogical reasoning and incomplete analysis. Therefore, it constitutes arbitrary and capricious decision-making. [EPA-HQ-OAR-2022-0829-0733, p. 28]

A. Advanced Clean Cars II (“ACC II”) Cannot be a Basis for this Rulemaking

EPA points to California’s ACC II program and adoption by Section 177 states to support its projections of increased PEV penetration,122 but the ACC II has not received a waiver, and EPA did not even have the waiver application when the Proposed Rule was published.123 The CAA requires EPA to evaluate California’s waiver request to ensure that California did not arbitrarily determine that it needs “ZEV mandates” to address compelling and extraordinary circumstances. As Principal Deputy Administrator for the Office of Air and Radiation Joe Goffman testified on June 21, 2023, EPA just received the waiver request. Given that the EPA official responsible for overseeing the California waiver request publicly acknowledged that EPA has not determined whether it will grant a waiver for ACC II, the Agency cannot rely on ACC II as a basis for this Proposal. Moreover, because California concedes that ACC II will not meaningfully address the impacts of climate change in California and ACC II will slow fleet turnover and retard California’s progress toward meeting the NAAQS, California is NOT eligible for a waiver and ACC II is preempted. EPA’s reliance on ACC II as support for this rule is pre-decisional and another example of arbitrary and capricious decision-making. [EPA-HQ-OAR-2022-0829-0733, p. 28]

122 Proposed Rule at 29,118.

123 88 Fed. Reg. 29,189; See, e.g., Initial Br. For Private Petitioners, State of Ohio, et al. v. Envt'l Prot. Agency, et al., No. 22-1081 (D.C. Cir. Oct. 24, 2022).

D. EPA Cannot Adequately Substantiate the Need for Regulatory Action

EPA has not demonstrated a compelling need to accelerate emissions reductions within the time frame for which MY27–32 vehicles/engines are already being designed. EPA points primarily to the emissions associated with motor vehicles, presumably tailpipe emissions, but provides no information supporting the need for such an accelerated schedule beyond what is currently known. Rather, EPA makes conclusory assertions that the "need for regulatory action" is supported by the BIL and the IRA, which "together provide further support for a government-wide approach to reducing emissions by providing significant funding and support for air pollution and GHG reductions across the economy, including specifically, for the component technology and infrastructure for the manufacture, sales, and use of electric vehicles."193 EPA notes that under the current standards, ZEV demand is doubling each year, from 2.2 percent of U.S. light-duty vehicle production in MY 2020, to 4.4 percent in MY 2021 and projected to reach 8.4 percent in MY 2022.194 Congressional spending on EV charging or vehicle subsidies does not confer new authority on EPA to mandate EVs. For example, within the IRA, Congress merely appropriated additional funds "[i]n addition to amounts otherwise available" to the EPA for certain fiscal years to carry out various activities195 and Congress did not amend or refer to section 202 of the Clean Air Act or any of the provisions of that Act on which EPA bases its proposed rule.196 Thus, EPA's reliance on these enactments to justify and underwrite proposed standards' feasibility is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0733, p. 42]

193 Proposed Rule at 29,187.

194 Proposed Rule at 29,189.

195 See, e.g., sections 60106-60111 of the Inflation Reduction Act

196 In contrast, section 60107 references in the title to that section funding "for Section 211(o) of the Clean Air Act."

As discussed above, because EPA may only prescribe standards applicable to vehicles that "cause or contribute" to air pollution, its standards cannot account for ZEVs with no tailpipe emissions. However, if EPA is authorized to promulgate such standards, those standards must account for any upstream emissions from upstream electric generating units, the mining of battery materials, and the production of the vehicle.197 Without consideration of upstream and full life-cycle impacts (e.g., frequent battery replacements), EPA has failed to inform the public of the comparative costs of emission reductions, whether from ZEVs, ICEVs, energy efficiency, or other sectors. EPA's continued failure to address this "major aspect of the problem" is another example of EPA moving toward its predetermined outcome—the forced electrification of U.S. transportation.198 AFPM has continually put EPA on notice of the need to include a LCA to avoid an arbitrary comparison—the agency continues to ignore this issue of central relevance to EPA's benefit analysis. [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

197 Proposed Rule at 29,353–55.

198 See, e.g., Comments of the American Fuel & Petrochemical Manufacturers on EPA's Reconsideration of a Previous Withdrawal of a Waiver of Preemption 10 (July 6, 2021), https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0257-0139, Comments of the American Fuel

& Petrochemical Manufacturers on EPA's/NHTSA's Proposed The Safe Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks 68-73 (Aug. 24, 2018), https://www.regulations.gov/comment/EPA-HQ-OAR-2018-0283-5698; Comments of the American Fuel & Petrochemical Manufacturers on EPA's California State Motor Vehicle Pollution Control Standards; Advanced Clean Trucks; Zero Emission Airport Shuttle; Zero Emission Power Train Certification; Request for Waiver of Preemption 7-12 (Aug. 2, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0331-0088.

D. EPA Cannot Adequately Substantiate the Need for Regulatory Action

EPA has not demonstrated a compelling need to accelerate emissions reductions within the time frame for which MY27–32 vehicles/engines are already being designed. EPA points primarily to the emissions associated with motor vehicles, presumably tailpipe emissions, but provides no information supporting the need for such an accelerated schedule beyond what is currently known. Rather, EPA makes conclusory assertions that the "need for regulatory action" is supported by the BIL and the IRA, which "together provide further support for a government-wide approach to reducing emissions by providing significant funding and support for air pollution and GHG reductions across the economy, including specifically, for the component technology and infrastructure for the manufacture, sales, and use of electric vehicles."193 EPA notes that under the current standards, ZEV demand is doubling each year, from 2.2 percent of U.S. light- duty vehicle production in MY 2020, to 4.4 percent in MY 2021 and projected to reach 8.4 percent in MY 2022.194 Congressional spending on EV charging or vehicle subsidies does not confer new authority on EPA to mandate EVs. For example, within the IRA, Congress merely appropriated additional funds "[i]n addition to amounts otherwise available" to the EPA for certain fiscal years to carry out various activities195 and Congress did not amend or refer to section 202 of the Clean Air Act or any of the provisions of that Act on which EPA bases its proposed rule.196 Thus, EPA's reliance on these enactments to justify and underwrite proposed standards' feasibility is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0733, p. 42]

193 Proposed Rule at 29,187.

194 Proposed Rule at 29,189.

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196 In contrast, section 60107 references in the title to that section funding "for Section 211(o) of the Clean Air Act."

Organization: American Petroleum Institute

h. Legal Concerns.

The aggressive push to electrify the LDV and MDV fleet is the defining characteristic of the Proposed Rule from a legal standpoint. EPA explains that its "feasibility assessments in past rulemaking were predominantly based on ICE-based technologies that provided incremental tailpipe GHG reductions." 88 Fed. Reg. at 29238. Here, in contrast, EPA projects that the Proposed Rule at full implementation would result in the electrification of 67% of the LDV fleet – over 25% more than the 39% penetration rate that EPA projects in the no action base case. Id. at 29329. EPA similarly projects that 46% of the MDV fleet will be electrified, reflecting 98% electrification of all vans. Id. at 29331. These numbers make it clear that the Proposed Rule would establish a legal mandate effectively requiring that electric vehicles must comprise a significantly greater proportion of the LDV and MDV fleet than otherwise would be the case. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

While BEVs can and should be a choice available to manufacturers and vehicle purchasers, we disagree that EPA should impose a binding mandate for the production of BEVs and outline why such a mandate exceeds EPA's authority under the Clean Air Act (CAA). [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

i. EPA does not have authority to impose standards that are only achievable through the use of BEV technology because there is no clear statement in the Clean Air Act authorizing EPA to mandate a shift away from internal combustion engines.

The Proposed Rule marks a shift in EPA's approach to regulating emissions from LDVs and MDVs. EPA, consistent with the Clean Air Act, has traditionally established standards based on technology that can control the amount of emissions from LDVs and MDVs. EPA deviated from this approach in its 2021 GHG standards, setting standards based on a formula that the agency estimated would increase the market share for electric vehicles from 3.6% to 7% for model year 2023 and 17% for model year 2026. But even then, EPA contended that its "assessment, consistent with past EPA assessments, shows that the final standards can largely be met with increased sales of advanced gasoline vehicle technologies, and projects modest (17 percent) penetration rates of electrified vehicle technology" by 2026. 86 Fed. Reg. 74434, 74484 (Dec. 30, 2021). And EPA argued that it relied on advances in internal combustion engine ("ICE") powertrains to achieve the required GHG reductions and purported not to push for a shift from ICE powertrains to electrified vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

Here, EPA goes even further and seeks to totally transform the transportation sector. It proposes standards that would effectively require that BEVs must comprise two-thirds of the LDV fleet and nearly half of the MDV fleet at full implementation, which is a substantially greater proportion of the fleet any prediction of the market demand would support. Indeed, according to EPA, "[in] MY 2032 when the proposed standards reach the lowest level, it is possible that only BEVs and PHEVs are generating positive credits, and all ICE vehicles generate varying levels of deficits." 88 Fed. Reg. at 29342. In other words, EPA predicts that manufacturers will not be able to comply with the proposed rule without producing significant numbers of electric vehicles. EPA thus seeks to require a fundamental transformation of the LDV fleet from ICE powertrain technology to electric vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

Such a shift from ICE powertrains to electric powertrains would be truly transformative. BEVs require fundamentally different vehicle technologies than those used on conventionally fueled vehicles – e.g., electric motors instead of internal combustion engines, batteries to store power rather than on-board fuel tanks. Moreover, BEVs rely on a wholly different infrastructure (e.g., electric power generation and distribution, charging stations, battery manufacturing) – much of which does not yet exist or exists only in limited form. Additionally, switching to BEVs will fundamentally change the manner in which vehicles are used, for example requiring careful scheduling of vehicle operations to accommodate the long periods needed to adequately charge the vehicles. Lastly, a BEV mandate would produce widespread effects on the national economy, such as the reduced need for oil and gas production, gas processing, changes to petroleum refining, and distribution. Such changes are extraordinary and far more expansive than those caused by EPA's LDV and MDV GHG standards up to now. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

vii. The proposed emissions standards are unfounded because EPA fails to explain its rationale for selecting the proposed emissions control levels.

EPA provides an expansive explanation of the Proposed Rule in the 263-page Federal Register notice. But noticeably missing is any explanation of how EPA derived the numeric emissions standards that the Proposed Rule would establish. The "footprint-based standard curve coeffcients" for cars and light trucks are clearly presented in the proposal. 88 Fed. Reg. at 29236. While EPA describes these curves as "targets, rather than standards," the curves effectively represent the emissions standards because the enforceable obligation for each manufacturer is derived by summing the actual sales-weighted values derived through application of the curves. Id. at 29236 n. 405. Because of the ABT compliance provisions, a manufacturer can demonstrate compliance for its fleet even if each of its vehicles does not meet the emissions limit applicable to that vehicle according to the curves. But each manufacturer must meet an enforceable in-use emissions standard for each vehicle type based on the level of emissions to which the vehicle is certified. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

In presenting the curves, EPA discusses a wide variety of relevant factors --including the upper and lower cutpoints, the slope of the curve, incentives/disincentives for consumer choice of larger vehicles (and the resulting impact on overall GHG emissions reductions), the impact of BEVs, and the relationship between the car and truck curves (the later Including consideration of load and towing capacity). In addition, the preamble includes extensive discussion of the predicted costs of the Proposed Rule and technical feasibility. But nowhere does EPA explain how the numeric values of the curves (i.e., the actual GHG emissions rate that would be applied to each vehicle upon application of the curve) were derived and how those particular values are justified. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

It is bedrock administrative law that an "agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." Motor Vehicle Mfrs. Assn. of the United States, Inc. v. State Farm Mut. Automobile Ins. Co., 463 U.S. 29, 43 (1983). EPA's failure to do so here renders the Proposed Rule fatally arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

Additionally, the lack of explanation violates EPA's procedural obligation to develop a statement of basis and purpose that, among other things, explains "the factual data on which the proposed rule is based" and "the methodology used in … analyzing the data." CAA § 307(d)(3). Unless that failure is corrected, API and other interested parties do not have adequate notice of and opportunity to comment on one of the most fundamental aspects of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

Organization: Arizona State Legislature

1. The proposed rule violates the Major Questions Doctrine. EPA has not identified a clear congressional delegation of the authority to transform the automotive industry through rulemaking, and none exists. [EPA-HQ-OAR-2022-0829-0537, p. 2]

I. The proposed rule violates the Major Questions Doctrine

EPA touts this rule for passenger vehicles and its companion for heavy-duty vehicles as the “strongest-ever pollution standards for cars and trucks to accelerate transition to a clean-transportation future.”4 Numerous media reports recognize that the goal of the proposed rules is not to reduce emissions on existing vehicles, but to force a transition to new types of vehicles. Or, as the EPA administrator put it, “usher in a new generation” of clean cars.5 For example: [EPA-HQ-OAR-2022-0829-0537, pp. 3-4]

4 U.S. EPA, “Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future,” Apr. 12, 2023, available at https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars- and.

5 Camila Domonoske, The big reason why the U.S. is seeking the toughest-ever rules for vehicle emissions, NPR, Apr. 12, 2023, available at https://www.npr.org/2023/04/12/1169269936/electric-vehicles-emission-standards-tailpipes- fuel-economy.

- The proposed rules “could require as much as 67% of all new vehicles sold in the U.S. by 2032 to be all-electric, representing the country’s most aggressive climate regulations to date.”6 [EPA-HQ-OAR-2022-0829-0537, pp. 3-4]

6 Emma Newburger, Biden proposes toughest auto emissions rules yet to dramatically boost EV sales, CNBC, Apr. 12, 2023, available at https://www.cnbc.com/2023/04/12/epa-proposes-auto-pollution-limits-to-aggressively-boost- ev-sales-.html.

- “The Biden administration is proposing stiff new automobile pollution limits that would require up to two-thirds of new vehicles sold in the U.S. to be electric by 2032, a nearly tenfold increase over current electric vehicle sales.”7 [EPA-HQ-OAR-2022-0829-0537, pp. 3-4]

7 Matthew Daly and Tom Krisher, Stiff EPA emission limits to boost US electric vehicle sales, ASSOCIATED PRESS, Apr. 12, 2023, available at https://apnews.com/article/biden-electric-vehicles-epa-tailpipe-emissions-climate-406d74e18459bc135f089c681ba9e224.

- “The proposal for light- and medium-duty vehicles was accompanied by a proposal for heavy-duty fleets to electrify 25 percent of their trucks and half of all new buses to be electric by 2032.”8 [EPA-HQ-OAR-2022-0829-0537, pp. 3-4]

8 Aaron Cole, Proposed vehicle emissions standards would be America’s toughest yet, POPULAR SCIENCE, Apr. 12, 2023, available at https://www.popsci.com/technology/epa-electric-vehicle-emissions-targets/.

- “The overarching goal is not just cleaner cars, but the transformation of the auto industry: The EPA would essentially impose regulatory penalties on companies that do not move quickly enough toward electric cars.”9 [EPA-HQ-OAR-2022-0829-0537, pp. 3-4]

9 Domonoske, supra note 5.

The former head of EPA’s Office of Transportation and Air Quality recognized the significance of EPA’s proposed rules as “the single most important regulatory initiative by the Biden administration to combat climate change and to really reduce the worst outcomes of climate change.”10 [EPA-HQ-OAR-2022-0829-0537, pp. 3-4]

10 Matthew Daly and Tom Krisher, Stiff EPA emission limits to boost US electric vehicle sales, ASSOCIATED PRESS, Apr. 12, 2023, available at https://apnews.com/article/biden-electric-vehicles-epa-tailpipe-emissions-climate-

They are intended to radically transform America's entire automotive industry. [EPA-HQ-OAR-2022-0829-0537, pp. 3-4]

The West Virginia Court also focused on the technology-based approach to individual sources. "A technology-based standard, recall, is one that focuses on improving the emissions performance of individual sources." Id. at 2611. But "[r]ather than focus on improving the performance of individual sources, [EPA] would 'improve the overall power system by lowering the carbon intensity of power generation.' And it would do that by forcing a shift throughout the power grid from one type of energy source to another." Id. at 2611-12 (internal citation omitted) (emphasis original). With this position, "EPA can demand much greater reductions in emissions based on a very different kind of policy judgment: that it would be 'best' if coal made up a much smaller share of national electricity generation. And on this view of EPA's authority, it could go further, perhaps forcing coal plants to 'shift' away virtually all of their generation—i.e., to cease making power altogether." Id. at 2612. [EPA-HQ-OAR-2022-0829-0537, pp. 5-6]

EPA's proposed standards here require another massive shift away from current market operations. EPA projects that its proposed standards could be satisfied through a mix of nearly 70% battery electric vehicles for passenger cars, SUVs, and light-duty pickup trucks, and about 40% battery electric vehicles for medium duty vans and pickup trucks by model year 2032.12 But in 2021, less than 1% of the 250 million passenger cars, SUVs, and light-duty trucks in the United States were electric.13 [EPA-HQ-OAR-2022-0829-0537, pp. 5-6]

12 U.S. EPA Fact Sheet, supra note 11.

13 Feilding Cage, The long road to electric cars, REUTERS, Feb. 7, 2022, available at https://www.reuters.com/graphics/AUTOS-ELECTRIC/USA/mopanyqxwva/.

In West Virginia, "EPA decides, for instance, how much of a switch from coal to natural gas is practically feasible by 2020, 2025, and 2030 before the grid collapses, and how high energy prices can go as a result before they become unreasonably 'exorbitant.'" West Virginia, 142 S. Ct. at 2612. Here, EPA is deciding how much of a switch from internal combustion engine trucks to zero-emission vehicles or hydrogen-powered vehicles is practically feasible by model years 2027 to 2032. The West Virginia Court found it "highly unlikely that Congress would leave to agency discretion the decision of how much coal-based generation there should be over the coming decades." Id. at 2613. Instead, "[t]he basic and consequential tradeoffs involved in such a choice are ones that Congress would likely have intended for itself." Id. [EPA-HQ-OAR-2022-0829-0537, p. 6]

The magnitude of EPA's proposed rule implicates the Major Questions Doctrine. EPA is attempting to use emissions standards for vehicles to force a shift from gasoline-powered vehicles to electric-and hydrogen-powered vehicles. The shift will impact energy production by dropping demand for oil exploration and refineries and increasing demand for electricity generation and mining for rare earth minerals. The rule will cost billions of dollars. 88 Fed. Reg. 29,200. [EPA-HQ-OAR-2022-0829-0537, p. 6]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Under the Clean Air Act, California retains certain authority to regulate vehicle emissions, which has allowed California to function as a policy and technology incubator to address the State's air quality challenges. California's history of reducing pollution from motor vehicles has demonstrated that strong emission standards will spur innovation and technological advancements that reduce costs and improve public health. California's experience also demonstrates that cleaning the air and protecting the climate are good for the economy— while pursuing ambitious climate and air quality policies, California has grown to be the largest sub-national economy in the world. [EPA-HQ-OAR-2022-0829-0780, pp. 8-9]

In 2022, California adopted the Advanced Clean Cars (ACC) II program, which establishes a pathway towards 100 percent zero-emission new passenger car and light-duty truck sales by 2035 and incorporates a suite of assurance measures to help ensure that ZEVs are capable of fully replacing their conventional counterparts. 5 The ACC II regulations also established more stringent criteria air pollutant emission standards for vehicles with internal combustion engines (including PHEVs) to continue reducing harmful emissions from these vehicles. [EPA-HQ-OAR-2022-0829-0780, pp. 8-9]

> 5 The Advanced Clean Cars (ACC) II Regulations consist of the following new sections of the California Code of Regulations (Cal. Code Regs.), title 13: 1961.4, 1962.4, 1962.5, 1962.6, 1962.7, and 1962.8; and amendments to the following sections of tit. 13: 1900, 1961.2, 1961.3, 1962.2, 1962.3, 1965, 1968.2, 1969, 1976, 1978, 2037, 2038, 2112, 2139, 2140, 2147, 2317, and 2903; and incorporated test procedures. On May 22, 2023, California requested the Administrator of U.S. EPA grant a waiver for the ACC II Regulations under Clean Air Act Section 209(b), 42 U.S.C. § 7543(b).

California's standards, and their implementation in states that choose to adopt them under Section 177 of the Clean Air Act, lay a strong technical and policy foundation for U.S. EPA to adopt more stringent standards nationwide. While the requirements of ACC II and U.S. EPA's proposed standards differ somewhat, CARB expects that manufacturers will be able to use the same technologies to comply with both sets of regulations. [EPA-HQ-OAR-2022-0829-0780, pp. 8-9]

Organization: California Attorney General's Office, et al.

In 2009, EPA concluded that "greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare." 74 Fed. Reg. 66,496, 66,497 (Dec. 5, 2009); see Massachusetts v. EPA, 549 U.S. 497 (2011) (holding that GHGs are within the scope of air pollution covered by Section 202(a) of the Clean Air Act). And, in 2010, EPA promulgated its first set of GHG emission standards applicable to light-duty vehicles model years 2012 through 2016. 75 Fed. Reg. 25,324 (May 7, 2010). Since then, EPA has promulgated and amended GHG emission standards for light-duty vehicles multiple times, most recently tightening the standards for model years 2023 through 2026. 77 Fed. Reg. 62,624 (Oct. 15, 2012); 85 Fed. Reg. 24,174 (Apr. 30, 2020); 86 Fed. Reg. 74,434 (Dec. 30, 2021). [EPA-HQ-OAR-2022-0829-0746, pp. 17-18]

Throughout the more than fifty years that it has been translating technological progress into increasingly stringent standards for various pollutants, EPA's standards have generally anticipated a wider use of existing emission control technologies and application of new or emerging emission control technologies across vehicle classes. See, e.g., 44 Fed. Reg. 6,650, 6,552 (Feb. 1, 1979) (trap-oxidizers), 66 Fed. Reg. 5,002, 5,049-54 (Jan. 18, 2011) (NOx adsorbers), 75 Fed. Reg. at 25,454-55 (hybrid technologies); see 88 Fed. Reg. at 29,187-88. This long-standing practice is consistent with Congress's "expect[ation that EPA] press for the development and application of improved technology rather than be limited by that which exists today.” NRDC v. EPA, 655 F.2d 318, 328 (D.C. Cir. 1981); see 42 U.S.C. § 7521(a)(2). Accordingly, EPA has routinely analyzed a wide array of technologies—from aerodynamic and air conditioning technologies to hybrid and zero-emission-vehicle technologies—in its rulemakings to simulate manufacturers’ compliance with alternative stringency levels. [EPA-HQ-OAR-2022-0829-0746, pp. 17-18]

A. Section 202(A) Requires EPA to Reduce Threats to Public Health and Welfare from Harmful Air Pollution

Under Section 202(a)(1) of the Clean Air Act, EPA “shall by regulation prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles . . . , which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” 42 U.S.C. § 7521(a)(1). “By employing the verb ‘shall,’ Congress vested a non-discretionary duty in EPA,” Coalition for Responsible Regulation, Inc. v. EPA, 684 F.3d 102, 126 (D.C. Cir. 2012), rev’d in part on other grounds, Utility Air Regulatory Grp. v. EPA, 573 U.S. 302 (2014), the purpose of which is clear: reduce or eliminate the threats to public health and welfare of deleterious air pollutants. 42 U.S.C.§ 7521(a)(1); see also id. § 7401(b)(1) (declaring a goal of the Clean Air Act “to protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare and the productive capacity of its population”); Massachusetts, 549 U.S. at 532 (explaining that “EPA has been charged with protecting the public’s ‘health’ and ‘welfare’” in Section 202(a)). [EPA-HQ-OAR-2022-0829-0746, pp. 27-28]

D. EPA’s Proposal to Retire or Limit Credits Is Consistent with Section 202(a)’s Focus on Real-World Emission Reductions

Finally, the States and Cities support EPA’s Proposal to retire certain compliance flexibilities associated with the light- and medium-duty vehicle emissions program. In particular, EPA’s rationales for limiting air-conditioning efficiency credits, 88 Fed. Reg. at 29,246-48, and for phasing out off-cycle credits and the MDV multipliers, id. at 29,243-45, 29,249-52, are consistent with the agency’s responsibility to ensure the emissions program’s environmental integrity by tying credits and other flexibilities to real-world emission reductions as closely as possible. [EPA-HQ-OAR-2022-0829-0746, p. 37]

Organization: Clean Fuels Development Coalition et al.

I. EPA Lacks Statutory Authority to Electrify the Fleet.

Under the major questions doctrine, agencies may not construe a statute to “authoriz[e] [them] to exercise powers of ‘vast economic and political significance’” unless the statute does so in “clea[r]” terms. Alabama Ass’n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021) (quoting Utility Air Regul. Grp. v. EPA, 573 U.S. 302, 324 (2014)). Thus, an agency seeking to exercise significant powers must identify “something more than a merely plausible textual basis for the agency action.” West Virginia EPA, 142 S. Ct. 2587, 2609 (2022) (quoting Utility Air, 573 U.S. at 324). “The agency instead must point to ‘clear congressional authorization’ for the power it claims.” Id. Whether and how to transition the vehicle fleet away from internal combustion engines to electric motors and thousand-pound batteries is a major question of economic and political importance. EPA therefore needs clear statutory authority. Section 202(a) of the Clean Air Act, which authorizes the agency to issue “standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles," does not provide this clear authority, and that is the end of the matter. 42 U.S.C. § 7521(a). [EPA-HQ-OAR-2022-0829-0712, pp. 3-4]

Indeed, EPA's proposal is very similar to the Clean Power Plan. Just as in West Virginia v. EPA, the agency is claiming the power to shift the nation's energy policy by reverse-engineering its preferred balance of fuel sources through emission standards. In the Clean Power Plan, EPA attempted to force a shift from coal-fired plants to gas-, wind-, and solar-powered plants. Here, EPA attempts to force a shift from liquid-fuel vehicles to electric vehicles. [EPA-HQ-OAR-2022-0829-0712, pp. 3-4]

As this proposal shows, there's no stopping point to EPA's claim of authority. As in West Virginia, with this power EPA "could go further, perhaps forcing [automakers] … to cease making [conventional vehicles] altogether." 142 S. Ct. at 2612. Whether "[t]he future of the auto industry is electric"3 is—pace President Biden— very much an open question. But whether it is open or not, it is not a future that the Executive Branch can mandate by reimagining a decades-old statute. [EPA-HQ-OAR-2022-0829-0712, p. 4]

3 FACT SHEET: Biden-Harris Administration Ensuring Future is Made in America, White House Briefing Room (February 8, 2022), https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/08/fact-sheet-biden-harris-administration-ensuring-future-is-made-in-america/.

A. The proposal claims a power of vast economic and political significance.

In assessing the economic and political significance of a rule, courts look to both a rule's direct effects and the implications of the agency's underlying claim of authority. For example, in West Virginia, although EPA's Clean Power Plan only incrementally shifted power generation, the Court reasoned that EPA had asserted the "highly consequential power" to "announc[e] what the market share of coal, natural gas, wind, and solar must be, and then requir[e] plants to reduce operations or subsidize their competitors to get there." 142 S. Ct. at 2609 & 2613 n.4; see Alabama Ass'n of Realtors, 141 S. Ct. at 2489 (considering the "sheer scope of the [agency's] claimed authority" in addition to the rule's "economic impact"). [EPA-HQ-OAR-2022-0829-0712, pp. 4-5]

The proposal candidly indicates that that is exactly what EPA is doing here. See 88 Fed. Reg. 29,329 ("as the proposed standards become more stringent … the penetration of BEVs increases by almost 30 percentage points over this 6-year period, from 36 percent in MY 2027 up to 67 percent of overall vehicle production in MY 2032."). This regulatory transformation is exactly the sort of "highly consequential power" that the Supreme Court had in mind in West Virginia. [EPA-HQ-OAR-2022-0829-0712, pp. 4-5]

To begin with, the "economic impact" of the proposal raises it to a level of significance capable of triggering major question scrutiny. The proposal estimates $86 billion in costs over the first six years alone.4 This is comparable to the economic cost of the Clean Power Plan, which triggered the major-questions doctrine in West Virginia. See 142 S. Ct. at 2610; EPA, Regulatory Impact Analysis for the Clean Power Plan Final Rule 3-22 (projecting up to $3 billion in 2025 rising to $8.4 billion in costs in 2030). And, as will be discussed later in this comment, the proposal's listed costs grossly underestimate the rule's true costs. The proper metric is aggregate cost because the major-questions doctrine asks about the rule's significance to the "national economy." West Virginia, 142 S. Ct. at 2609 (2022); see also Biden v. Nebraska, 600 U.S. , , slip op. 21 (2023) (looking to projections of total costs to taxpayers). [EPA-HQ-OAR-2022-0829-0712, pp. 4-5]

4 This includes EPA's calculated vehicle technology costs, Table 160, id. at 29,364–65 , Electric Vehicle Supply Equipment (EVSE) costs, Table 165, id. at 29,367, and refueling costs, Table 166, id. at 29,367–68.

The proposal's political significance is equally vast. The target of EPA's proposal is "the subject of an earnest and profound debate across the country." West Virginia, 142 S. Ct at 2614. The Biden Administration and a small number of states favor an aggressive transition away from the internal combustion engine, while many other states are actively opposing it. See, e.g., State of Texas v. EPA, No. 22-1031 (D.C. Cir. 2022) (where sixteen states are challenging EPA's current light-duty standards). While Congress has provided certain taxpayer subsidies, grants, and loans to incentivize electric vehicles, it has never clearly authorized a transition away from the internal combustion engine by agency fiat. Indeed, proposals to impose electric vehicle mandates have never even made it out of committee. See, e.g., Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018,S. 3664, 115th Cong. (2018). Just last month, 151 members of the U.S. House of Representatives joined a letter urging EPA to withdraw its proposed emissions standards—calling them an attempt to "commandeer America's transportation sector and force its complete vehicle electrification under the guise of mitigating climate change." Letter from Rep. Cathy McMorris Rodgers et al. to Adm'r Michael S. Regan, at 1 (May 22, 2023), https://d1dth6e84htgma.cloudfront.net/DRAFT_05_22_23_ EPA_Tailpipe_Letter_af5a5b04a5.pdf?updated_at=2023-05-19T17:01:36.343Z. [EPA-HQ-OAR-2022-0829-0712, pp. 7-8]

That Congress has consistently rejected forced electrification is also evident from the way in which it would conflict with its broader legislative schemes it has enacted. For example, Congress has consistently sought to address greenhouse-gas emissions from the transportation sector by promoting corn ethanol and other renewable fuels, which can be amply supplied domestically. See e.g., Renewable Fuel Standard, 42 U.S.C. § 7545(o)(2)(A)(i); Inflation Reduction Act of 2022, Pub. L. No. 117-169, §§ 13202, 13404, 22003, 136 Stat. 1818, 1932–1935, 1966–1969, 2020 (2022). And it has granted EPA separate—and limited and procedurally cabined—authority to regulate fuels and fuel additives, further indicating that Section 202 is not a broad delegation of authority to phase out liquid-fueled internal combustion engines. See 42 U.S.C. § 7545. [EPA-HQ-OAR-2022-0829-0712, pp. 7-8]

The proposal is also a novel assertion of agency authority. The Supreme Court has explained that skepticism is warranted when an agency asserts an "unheralded power representing a transformative expansion in its regulatory authority." West Virginia, 142 S. Ct. at 2610 (cleaned up). Until this administration, EPA never claimed the authority to mandate even partial electrification. Now it claims the power to transform the entire fleet in just a few years' time. Cf. Nebraska, Slip Op. 22 (Imagine "asking the enacting Congress … 'Can the Secretary use his powers to abolish $430 billion in student loans, completely canceling loan balances for 20 million borrowers, as a pandemic winds down to its end?' We can't believe the answer would be yes."). It is irrelevant that setting mobile-source emissions standards falls within the agency's "wheelhouse"; the "sweeping and unprecedented impact" of these standards is not. Id. The "'basic and consequential tradeoffs' inherent in a mass [electrification] pro- gram 'are ones that Congress would likely have intended for itself.'" Id. at 24–25 (quoting West Virginia, 142 S. Ct. at 2613). [EPA-HQ-OAR-2022-0829-0712, p. 8]

B. EPA lacks clear authority to use fleetwide averaging.

Congress has expressly precluded EPA from using Section 202(a) to phase out internal-combustion vehicles. EPA achieves that result only by misconstruing the standard-setting tools at its disposal. The text and structure of Section 202, and of Title II more broadly, unambiguously require that emission standards under Section 202(a) apply to individual vehicles, not to manufacturers' fleets on average. EPA claims to find authority for fleetwide averaging in Section 202(a), which authorizes the agency to issue "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles ... which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(1). This says nothing about averaging across fleets. [EPA-HQ-OAR-2022-0829-0712, pp. 8-9]

EPA has already conceded as much. When the agency first adopted fleetwide averaging, it recognized that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act." 48 Fed. Reg. 33,456, 33,458 (July 21, 1983). And "[j]ust as the statute does not explicitly address EPA's authority to allow averaging, it does not address the Agency's authority to permit banking and trading." 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see also 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same). That is the end of the analysis. The statute does not "explicitly" allow averaging and so EPA lacks "clear congressional authorization" to enact the proposal. [EPA-HQ-OAR-2022-0829-0712, pp. 8-9]

This statutory silence means that even if the phasing out of the internal combustion engine were not a major question, EPA would have no power to use averaging. [EPA-HQ-OAR-2022-0829-0712, pp. 8-9]

When a statute "says nothing about" a potential regulatory power, it "would be improper to conclude that what Congress omitted from the statute is nevertheless within its scope." Univ. of Texas Sw. Med. Ctr. v. Nassar, 570 U.S. 338, 353 (2013); see also Entergy Corp. v. Riverkeeper, Inc., 556 U.S. 208, 223 (2009) ("statutory silence, when viewed in context," is in many situations "best interpreted as limiting agency discretion," not creating it). After all, "[a]n agency … 'literally has no power to act' … unless and until Congress authorizes it to do so by statute." FEC v. Cruz, 142 S. Ct. 1638, 1649 (2022). And agencies no less than courts have a "duty to respect not only what Congress wrote but, as importantly, what it didn't write." Va. Uranium, Inc. v. Warren, 139 S. Ct. 1894, 1900 (2019) (plurality op.). "And supplying the extra words 'on average' would have a significant substantive effect: 'roller coaster riders must be 48 inches tall' means something very different from 'roller coaster riders must be 48 inches tall on average.'" Initial Brief for Private Petitioners at 41, Texas v. EPA, No. 22-1031 (D.C. Cir., Nov. 3, 2022). [EPA-HQ-OAR-2022-0829-0712, pp. 9-10]

The inference against EPA's claim to be able to write into its authority a fleet- wide averaging power is especially strong because Congress knows full well how to create such a program—it did so not only in EPCA, but also in other provisions of Title II of the Clean Air Act. See 42 U.S.C. § 7545(k)(l)(B)(v)(II) (directing EPA to take certain actions if "the reduction of the average annual aggregate emissions of toxic air pollutants in a [designated district] fails to meet" certain standards). Simply put: "if Congress had wanted to adopt [an averaging] approach" for motor vehicle standards under Section 202(a), "it knew how to do so." SAS Inst., Inc. v. lancu, 138 S. Ct. 1348, 1351 (2018). That Congress didn't is dispositive. See Marx v. Gen. Revenue Corp., 568 U.S. 371, 381 (2013) ("[I]t is fair to suppose that Congress considered the unnamed possibility and meant to say no to it[.]"); Russello v. United States, 464 U.S. 16, 23 (1983); Rotkiske v. Klemm, 140 S. Ct. 355, 360–361 (2019) ("Atextual judicial supplementation is particularly inappropriate when, as here, Congress has shown that it knows how to adopt the omitted language or provision.").6 To quote Justice Frankfurter: "It is quite impossible…when Congress did specifically address itself to a problem…to find secreted in the interstices of legislation the very grant of power which Congress consciously withheld." Youngstown Sheet & Tube Co. v. Sawyer, 343 U.S. 579, 609 (1952) (Frankfurter, J., concurring) [EPA-HQ-OAR-2022-0829-0712, pp. 9-10]

6 At the very least, EPA should await the Supreme Court's decision in Loper Bright Enterprises v. Raimondo (22-451), which will consider "[w]hether the Court should overrule Chevron or at least clarify that statutory silence concerning controversial powers expressly but narrowly granted elsewhere in the statute does not constitute an ambiguity requiring deference to the agency."

Add to this that the "silence" argument is simply not correct. That fleet-wide averaging is forbidden can be seen in several parallel provisions of the Clean Air Act. For example, the plain text of the testing requirements that accompany the Section 202(b) standards require those standards apply to all vehicles individually. EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such system enables such vehicle or engine to conform to the standards required to be prescribed under [Section 202(b)]." 42 U.S.C. § 7525(a)(2). If the system complies with the testing, then EPA must issue a "'verification of compliance with emission standards for such system." Id. These provisions plainly require standards that apply to individual vehicles.7 The fundamental premise of this testing regime is that a vehicle can meet individually applied emission standards. Thus "the broader context of the statute as a whole," Robinson v. Shell Oil Co., 519 U.S. 337, 341 (1997), confirms that EPA is out over its skis here. [EPA-HQ-OAR-2022-0829-0712, p. 10]

7 See also, Initial Brief for Private Petitioners, Texas v. EPA, No. 22-1031 at 51–62 (D.C. Cir., Nov. 3, 2022) (detailing myriad ways in which statutory text, structure, and related provisions confirm that fleetwide averaging is not authorized).

C. Even if EPA could use fleetwide averaging, this cannot be used to force electrification.

Part of the reason EPA has traditionally been granted deference in its averaging schemes is because the agency has historically used averaging as an accommodation to regulated parties, allowing them additional flexibility that the statute does not in fact authorize. In prior rules, the use of fleet-wide averaging meant that a vehicle manufacturer could comply by making some vehicles that emitted more and others that emitted less. Thus, while some commentors have pointed out the illegality of this scheme, vehicle manufacturers have not opposed EPA's averaging approach because it provided them with the flexibility necessary to achieve in a more cost-effective way otherwise impractical standards. [EPA-HQ-OAR-2022-0829-0712, pp. 10-11]

Thus, when considering EPA's authority to use averaging, the D.C. Circuit has always noted that it was critical that the averaging serve as merely a flexibility. See NRDC v. Thomas, 805 F.2d 410, 425 (D.C. Cir. 1986) ("EPA's argument that averaging will allow manufacturers more flexibility in cost allocation while ensuring that a manufacturer's overall fleet still meets the emissions reduction standards makes sense.") (emphasis added); cf. White Stallion Energy Ctr., LLC v. EPA, 748 F.3d 1222, 1253 (D.C. Cir. 2014) (permitting averaging across multiple utility units under 42 U.S.C. § 7412(d) because averaging is a "'more flexible, and less costly alternative.'"). [EPA-HQ-OAR-2022-0829-0712, pp. 10-11]

But in this new proposal EPA is not offering an extrastatutory accommodation to a regulated party, but is instead taking an additional step away from the statutory text by using fleetwide averaging to mandate electrification. The proposal would set emissions standards in such a way that no fleet of internal combustion engine vehicles can meet the standards. This means that averaging no longer provides flexibility about which kinds of internal-combustion vehicles a manufacturer may sell, but instead amounts to a de facto mandate to incorporate electric vehicles to comply with its proposed standards. Much as in the Clean Power Plan, crediting is deployed as a tool for reverse engineering a share of preferred technologies by setting targets that cannot be achieved by disfavored technologies. Thus, even if the agency was properly entitled to deference in its previous averaging schemes, this deference evaporates when the scheme is used coercively, rather than permissively. [EPA-HQ-OAR-2022-0829-0712, pp. 10-11]

Of course, EPA freely admits that electric vehicles do produce upstream emissions, and that these upstream emissions matter. This is true and very important. And the proposal does consider upstream emissions when determining the rule's impact on total emissions. EPA's position is that this inconsistent approach to electric vehicles' upstream emissions is reasonable because it treats upstream emissions of all vehicles, electrified or not, the same way for compliance purposes. 88 Fed. Reg. 29,252 ("EPA proposes to include only emissions measured directly from the vehicle in the vehicle GHG program for MYs 2027 and later (or until EPA changes the regulations through future rulemaking) consistent with the treatment of all other vehicles. Electric vehicle operation would therefore continue to be counted as 0 g/mile, based on tailpipe emissions only.") [EPA-HQ-OAR-2022-0829-0712, pp. 11-12]

But this "consisten[cy]" is precisely what makes the rule unreasonable. Electric vehicles are not like "all other vehicles." EPA has previously recognized that "that for each EV that is sold, in reality the total emissions off-set relative to the typical gasoline or diesel powered vehicle is not zero, as there is a corresponding increase in up-stream CO2 emissions due to an increase in the requirements for electric utility generation." 74 Fed. Reg. 49,454, 49,533 (Sept. 28, 2009). EPA only chose the initial "zero grams/mile compliance value [a]s an incentive," Response to Comments, EPA-420-R-10-012a at 5-237 (Apr. 2010),), and explained that in future standards it "would at-tribute a pro rata share of national CO2 emissions from electricity generation to each mile driven under electric power minus a pro rata share of upstream emissions associated with from gasoline production," 88 Fed. Reg. 29,252. [EPA-HQ-OAR-2022-0829-0712, pp. 11-12]

D. EPA lacks the statutory authority to ignore upstream emissions for electric vehicles.

EPA has statutory authority to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(1). This presents an interpretive dilemma. On the one hand, if electric vehicles are not "vehicles" "which cause[ ] or contribute to" a given type of air pollution, then EPA may not set standards for them. Id. On the other, if electric vehicles are "vehicles" "which cause, or contribute to" a given type of air pollution, then EPA must set "standards applicable to the[ir] emissions." Id. [EPA-HQ-OAR-2022-0829-0712, p. 11]

The proposal tries to solve this problem by splitting the baby.8 EPA reasons that electric vehicles are vehicles that "cause or contribute to air pollution," but EPA just chooses to set their contribution to zero. This cannot be right. Cf. C.S. Lewis, That Hideous Strength 291 (Samizdat ed., 2015) ("Just imagine a man who was too dainty to eat with his fingers and yet wouldn't use forks!"). If electric vehicles truly emit no emissions, then they are not the sort of vehicle EPA can regulate. [EPA-HQ-OAR-2022-0829-0712, p. 11]

8 Of course, the point of the story about Solomon is that the baby wasn't split. See 1 Kings 3:16– 28 ("Give the living child to the first woman, and by no means put him to death; she is his mother.").

EPA never had authority to incentivize electric vehicles in this way. Section 202(a) requires the agency to "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles." Because it acknowledged that these emissions are "not zero," it is arbitrary to treat them as such. Indeed, as EPA previously acknowledged, treating upstream emissions of all vehicles, electrified or not, the same way puts a thumb on the scale against conventional vehicles in favor of electric vehicles. An agency's bare preference for one technology cannot satisfy the requirement that it "reasonably consider[] the relevant issues and reasonably explain[] the decision." FCC v. Prometheus Radio Project, 141 S. Ct. 1150, 1158 (2021). [EPA-HQ-OAR-2022-0829-0712, pp. 12-13]

At the very least, the agency is not permitted to change its position on the future inclusion of upstream emissions in compliance calculations without explanation. When an agency makes a decision, it must articulate a "satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'" Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). If the agency fails to "cogently explain why it has exercised its discretion in a given manner," its action will be held invalid. Id. at 48. In addition, the agency must "provide a more detailed justification than what would suffice for a new policy created on a blank slate . . . when, for example, its new policy rests upon factual findings that contradict those which underlay its prior policy." FCC v. Fox Television Stations, Inc., 556 U.S. 502, 515 (2009); see also Perez v. Mortg. Bankers Ass'n, 135 S. Ct. 1199, 1209 (2015). EPA previously thought that the zero grams-per-mile compliance value was only viable as a temporary incentive because "in reality" the total emissions were not zero. Failure to consider and adequately explain departure from this finding would render the entire rulemaking arbitrary and capricious. Fox Television Stations, 556 U.S. at 515. [EPA-HQ-OAR-2022-0829-0712, pp. 12-13]

E. Nothing in the Inflation Reduction Act grants EPA additional authority to mandate electrification.

The proposal also suggests that the Inflation Reduction Act ("IRA") provides some additional reinforcement to its claims of statutory authority for these sweeping changes. "The recently-enacted Inflation Reduction Act 'reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act,' and 'the IRA clearly and deliberately instructs EPA to use' this authority by 'combin[ing] economic incentives to reduce climate pollution with regulatory drivers to spur greater reductions under EPA's CAA authorities.'" 88 Fed. Reg. 29,233 (quoting 168 Cong. Rec. E868–02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone) and 168 Cong. Rec. E879–02, at 880 (daily ed. Aug. 26, 2022) (statement of Rep. Pallone)).

Not so. [EPA-HQ-OAR-2022-0829-0712, pp. 13-14]

The words in a statute must be read in their context to understand how they fit into an overall statutory scheme. Davis v. Michigan Dept. of Treasury, 489 U.S. 803, 809 (1989). In making this determination, consideration must be given to the overall type and purpose of the statute. Dolan v. U.S. Postal Service, 546 U.S. 481, 486 (2006). Here, the relevant context is that the IRA was passed through the reconciliation process under the Congressional Budget and Impoundment Control Act. That act established the congressional budget process giving Congress an expedited process by which it can pass by a majority vote legislation pertaining to revenue, spending, or the debt limit levels. This reconciliation process was intended to be used to reduce the deficit through some combination of spending reductions or revenue increases. Cong. Rsch. Serv., RL30862, The Budget Reconciliation Process: The Senate's “Byrd Rule” (updated Sept. 28, 2022), at 1, available at https://crsreports.con gress.gov/product/pdf/RL/RL30862. Legislation passed under this process does not alter other substantive obligations and it must be related to spending, revenue, or the federal debt limit. In other words, “If Congress wants to assign this authority to EPA or any other federal agency, it cannot do so by way of a budget reconciliation bill such as the IRA.” John Dixon, et al., No Inflation Act Boost For EPA Power Over Greenhouse Gases, Law360 (Sep. 19, 2022), https://www.law360.com/arti- cles/1531794/no-inflation-act-boost-for-epa-power-over-greenhouse-gases. [EPA-HQ-OAR-2022-0829-0712, pp. 13-14]

Indeed, nothing in the IRA grants any regulatory authority “under the Clean Air Act” at all. Instead, the IRA provides several section-specific definitions of green house gases, that apply only to that section for the purposes of grantmaking. For example, “Definition of Greenhouse Gas.—In this section, the term ‘greenhouse gas’ means the air pollutants carbon dioxide, hydrofluorocarbons, methane, nitrous oxide, perfluorocarbons, and sulfur hexafluoride.” 136 Stat. 2069. And none of these various definitional provisions address EPA’s authority under Section 202. See, e.g., 136 Stat. 2069 (applying the term to grants to address air pollution at schools under Section 103 and 105); id. (grants to states under Section 177); id. (grants for “education” and “outreach” about low-emissions electricity generation); id. at 2070 (grants for biofuels under Section 211); id. at 2072 (grants for corporate reporting); id. at 2077–78 (grants for labeling of construction materials); id. at 2083 (same for federal buildings). [EPA-HQ-OAR-2022-0829-0712, p. 14]

These provisions do nothing to change EPA’s ability to regulate greenhouse gas emissions and do not alleviate the many problems the proposal already has under the major questions doctrine. Rather, they highlight the problem: Congress just legislated in this area and failed to pass anything like the transformative program EPA now seeks to impose by its own ukase. [EPA-HQ-OAR-2022-0829-0712, p. 14]

As John Bozzella, president and CEO of Alliance for Automotive Innovation has explained, “Requiring 60+ percent of U.S. vehicles sales to be pure battery electric vehicles (BEVs) by 2030 leapfrogged the administration’s own 2021 executive order that called for 50 percent electric vehicles –including plug-in hybrid and fuel cell EVs – by 2030.” John Bozzella, EPA's EV Rules are Out of Whack: Five Ways to Fix Them, Alliance for Automotive Innovation (June 28, 2023), https://www.autosinnovate.org/posts/blog/epas-rules-are-out-of-whack-five-ways-to-fix-them. “[T]he administration’s 50 percent target [by 2030] was always a stretch goal. It was ambitious and challenging by any measure.” Mike Hartrick, Testimony from the Alliance for Automotive Innovation, Before the U.S. Environmental Protection Agency EPA Multi Pollutant Proposed Rule, EPA-HQ-OAR-2022-0829, https://www.autosinno-vate.org/posts/agency-comments/05-09%20EPA%20Multi-Pollutant%20NPRM.pdf. “The 60+ percent BEVs by 2030 plan, on the other hand, is a house of cards…. It rolls up rosy forecasts (like EV batteries will eventually cost automakers nothing) and other hopeful assumptions." John Bozzella, supra. [EPA-HQ-OAR-2022-0829-0712, pp. 27-28]

The 50 percent goal "was also predicated on several conditions, most significantly: supportive public policies including the bipartisan Infrastructure Investment and Jobs Act with funding for national public charging (installation not started yet); the manufacturing incentives and consumer purchase incentives in the Inflation Reduction Act to support EV purchases and affordability (becoming more, not less constrained); and the supply of critical minerals (projected to be woefully short of demand and largely controlled by China)." Mike Hartrick, supra. "If implemented, EPA's proposal will require 60 percent battery electric vehicles by 2030 (a 20 percent increase over the President's goal, which also included PHEVs), and two out of every three vehicles sold to be BEVs just two years later. These levels are substantially higher than what the auto industry indicated was achievable even after application of the supportive policies." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 27-28]

C. EPA cannot rely on California's Advanced Clean Cars program to justify feasibility.

EPA also points to the adoption of California's Advanced Clean Cars II program to justify the feasibility of the rule. The agency asserts that California's program makes the rule more feasible because it: provides as evidence of a trend toward vehicle electrification, 88 Fed. Reg. 29,188–89; serves as a driver of technological innovation and "increased consumer technology familiarity" with electric vehicles, id. at 29,254, 29,334; and that the impossible standards imposed by the proposal are "aligned with" existing state policies and thus reasonable, id. at 29,275, 29,284. This is improper. These standards have not yet received a waiver—California only applied for a waiver after the rule was proposed, and EPA has not yet determined whether a waiver is warranted—and the presence of a second regulation cannot make the first more feasible. See 88 Fed. Reg. 29,189. [EPA-HQ-OAR-2022-0829-0712, pp. 28-29]

To make matters worse, Advanced Clean Cars II is unlawful. Advanced Clean Cars I is already being challenged in court, as is its companion regulation for heavy- duty vehicles, Advanced Clean Trucks. See State of Ohio, et al. v. EPA, No. 22-1081 (D.C. Cir. 2022). According to EPA, California's standards are permitted under Section 209 of the Clean Air Act. Section 209(a) preempts states from setting emission standards for new cars and new engines. 42 U.S.C. § 7543(a). There are two exceptions. First, § 209(b) allows EPA to give California—and only California—a waiver allowing it to set emission standards more stringent than the federal standards. § 7543(b)(1). Second, the Act allows states, in some circumstances, to adopt emission standards "identical to the California standards." Id. § 7507(1). In other words, "the 49 other states" may depart from the federal standard if and only if they adopt "a standard identical to an existing California standard." Am. Auto. Mfrs. Ass'n v. Cahill, 152 F.3d 196, 201 (2d Cir. 1998). [EPA-HQ-OAR-2022-0829-0712, pp. 28-29]

As petitioners in those lawsuits make clear, California's standards violate the constitution's structural guarantee of equal sovereignty to all states, are forbidden by the plain text of the Clean Air Act, are preempted by EPCA, and fail to properly account for costs and technology limitations.17 EPA cannot rely on these illegal rules to justify its own rule. [EPA-HQ-OAR-2022-0829-0712, p. 29]

17 For the same reasons, the proposed rule would be contrary to law if finalized in anything resembling its current form.

At the very least, EPA is improperly commenting on an impending adjudication that it has not yet evaluated or even made available for public comment. While EPA purports not to be “prejudging the outcome” of that “waiver process,” 88 Fed. Reg. 29,334, it is difficult to see how EPA can expect ACC II to have any impact at all unless it has already concluded the waiver is a fait accompli. Such prejudgment would jeopardize the waiver process itself, threatening it vacatur, and thus undermining EPA’s reliance on that decision here. Cinderella Career & Finishing Schs., Inc. v. FTC, 425 F.2d 583, 591 (D.C. C970) (a decisionmaker is disqualified where “a disinterested observer may conclude that the agency has in some measure adjudged the facts as well as the law of a particular case in advance of hearing it” (cleaned up)); United Steelworkers of Am. v. Marshall, 647 F.2d 1189, 1209 (D.C. Cir. 1980) (courts vacate standards where a decisionmakers has “demonstrably made up [its] mind about important and specific factual questions and [is] impervious to contrary evidence.”). [EPA-HQ-OAR-2022-0829-0712, p. 29]

But EPA also has the authority to consider the impact of these fuels in its consideration of life-cycle emissions under the agency’s Section 202 powers. The agency has done so in the past, and acknowledging these benefits again would incentivize the use of more renewable fuels, and allow automakers to achieve greater emissions reductions, in a shorter time frame, and at a net savings to consumers. Agencies are required, as part of any reasoned decision making process, to consider all “‘significant and viable and obvious alternatives’” to their proposed action. Dist. Hosp. Partners, L.P. v. Burwell, 786 F.3d 46, 59 (D.C. Cir. 2015); see Spirit Airlines, Inc. v. DOT, 997 F.3d 1247, 1255 (D.C. Cir. 2021) (“‘[T]he failure of an agency to consider obvious alternatives has led uniformly to reversal.”’). Ignoring the benefits of renewable fuels— and of ethanol in particular—violates EPA’s duty to give “appropriate consideration to the cost of compliance” with the proposed regulations, 42 U.S.C. § 7521(a)(2), and would render the rule arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0712, pp. 38-39]

A. EPA has authority to consider the lifecycle emissions from different fuels in its standard setting.

Section 202(a)(3)(A)(ii) authorizes EPA to look beyond the basic engine to set its engine or vehicle emission standards. Specifically, it states that, “[i]n establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the [agency] may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors.” 42 U.S.C. § 7521(a)(3)(A)(ii) (emphasis added). To account for the “type of fuel used,” EPA would need to engage in lifecycle emissions analysis. EPA has often eschewed lifecycle analysis because of the nature of the pollutants it regulates, but it is the obvious best fit for greenhouse gas regulations. Section 202(a)(1) gives EPA’s authority to issue rules setting emissions standards for “air pollutants” that it finds may reasonably be anticipated to endanger public health or welfare. And while most air pollutants work on the local and regional level, which makes lifecycle analysis a poor fit, greenhouse gases’ harms are all at the global level. Except in truly extreme concentrations, CO2 emissions do not lead to adverse health effects if breathed in. [EPA-HQ-OAR-2022-0829-0712, pp. 39-40]

Clean Air Act Section 202(a)(4)(A) and (B) require that EPA consider whether its proposed standards “will cause or contribute to an unreasonable risk to public health, welfare or safety”, including whether the proposed standard “causes, increases, reduces, or eliminates emissions of any unregulated pollutants” and to assess “the availability of other devices, systems, or elements of design which may be used to conform to requirements prescribed under this subchapter without causing or contributing to such unreasonable risk." Neglecting lifecycle greenhouse gas emissions incentivizes compliance options that increase upstream carbon emissions at the expense of measured tailpipe emissions. This is exactly the sort of "other … element[ ] of design" that Congress imagined might "increase[ ] emissions." [EPA-HQ-OAR-2022-0829-0712, pp. 39-40]

Organization: Competitive Enterprise Institute

III. The Proposed Standards Trigger the Major Questions Doctrine

West Virginia v. EPA

The EPA's plan to drive gasoline-powered cars out of the marketplace is highly controversial and sure to be litigated. In fact, as the agency knows, plaintiffs in State of Texas v. Environmental Protection Agency, who include the Competitive Enterprise Institute (CEI) among other private petitioners, are suing to overturn the agency's milder electrification mandates for MY 2023-2026 motor vehicles.25 [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

25 Texas v. EPA, Docket Numbers: 22-1031, 22-1032, D.C. Cir., http://climatecasechart.com/case/texas-v-epa-2/.

Private petitioners' initial brief 26 and initial reply brief, 27 which have been submitted to the U.S. Court of Appeals for the D.C. Circuit, are pertinent to the current rulemaking. As the briefs explain, the EPA's proposal triggers the major-questions doctrine that was the basis of the Supreme Court's decision, in West Virginia v. EPA, 28 to vacate the Obama administration's Clean Power Plan (CPP). [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

26 Initial Brief for Private Petitioners, Texas v. EPA, November 3, 2022, http://climatecasechart.com/wp-content/uploads/sites/16/case-documents/2022/20221103_docket-22-1031_brief-2.pdf (hereafter "Petitioners' Initial Brief").

27 Initial Reply Brief for Private Petitioners, Texas v. EPA, April 18, 2023, https://cei.org/wp-content/uploads/2022/09/Filestamped-Texas-v.-EPA-Private-Pet-Reply-Br-1.pdf (hereafter "Petitioners' Reply Brief").

28 W. Virginia v. EPA, 142 S. Ct. 2587 (2022).

The major-questions doctrine is a jurisprudence of political accountability. Under Article I, Section 1, all legislative powers granted by the Constitution are vested in Congress. Accordingly, agencies have only such rulemaking power as Congress delegates to them. The major-questions doctrine focuses judicial (and public) attention on the big picture through a set of interrogatories. [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

- Does the agency's rulemaking affect a significant portion of the U.S. economy?
- Does it have significant political implications?
- Does it attempt to settle an issue Congress is still debating?
- Does it adopt a policy Congress has considered and rejected?
- Does it entail a "transformative expansion" of the agency's power? [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

If the answer to one or more of those queries is “yes” (it is “yes” to all five queries for both the CPP and the EPA’s proposal), a final interrogatory is considered: Does the agency’s purported statutory authority clearly authorize the rule? [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

If there is no “clear statement” of congressional authorization, the agency’s action is very likely unlawful. [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

The CPP was a plan to restructure a significant portion of the U.S. economy—the electric power sector. The CPP established CO2 performance standards for existing coal and natural gas combined cycle (NGCC) power plants that none could meet via affordable modifications made at and by the regulated facilities. A coal or NGCC power plant could comply only by averaging its emissions with those of lower- or non-emitting power plants elsewhere on the grid to which it cedes production and market share. For example, the owner of a coal power plant could buy power from an NGCC power plant, invest in renewables, or buy emission credits from lower- or non-emitting facilities in a carbon cap-and-trade program. [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

The EPA claimed that such “generation shifting” is the adequately demonstrated “best system of emission reduction” (BSER), and encouraged States to establish or join cap-and-trade programs as the most efficient way to implement generation shifting. The CPP was fundamentally a plan to herd States into the sorts of carbon cap-and-trade programs Congress had debated for years and declined to enact. No clear statement authorizing such a plan could be found in CAA Section 111(d), the CPP’s putative statutory basis. [EPA-HQ-OAR-2022-0829-0611, pp. 6-7]

More fundamentally, the CPP would make the EPA a de-facto industrial policy czar for electricity, coercing a national shift from fossil to renewable generation despite States’ traditional authority over electricity fuel mix within their borders. Congress was still debating how to tackle climate change, and much of the country did not support regulating or taxing fossil generation out of existence. A clear statement authorizing the EPA to take charge of the nation’s electric grid and resolve the climate policy debate was also nowhere to be found in CAA Section 111(d). [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

West Virginia should be the starting point for all subsequent EPA climate policy planning. Yet the words “major questions” and “West Virginia” occur nowhere in the proposal’s 225-page preamble. [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

West Virginia applies directly to the current rulemaking. Once again, the EPA seeks to regulate a “significant portion of the American economy.” Indeed, the EPA projects the vehicle technology investments required to meet the proposed MY 2027 and later standards will cost $280 billion by 2055, with annual costs rising from $6.8 billion in 2028 to $22 billion in 2035.29 Those expenditures are substantially larger than the CPP’s projected compliance costs (estimated at up to $3.0 billion in 2025 and up to $8.4 billion in 2030).30 [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

29 88 FR 29365.

30 EPA Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, Final Rule, 80 FR 64662, 64679, October 23, 2015, https://www.govinfo.gov/content/pkg/FR-2015-10-23/pdf/2015- 22842.pdf.

Like the CPP, the proposed standards would settle energy and climate policy issues Congress is still debating. The EPA would once again wield the powers of an industrial policy czar, "restructuring" the automotive sector with huge knock-on effects for the U.S. oil, gas, and biofuel industries,31 as well as for the electric power sector. 32 As private petitioners in Texas v. EPA put it: [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

31 Petitioners' Initial Brief, pp. 25-29.

32 "Assuming an immediate scenario of 100% EV usage and projecting electricity requirements, the U.S. electricity grid would need to generate 33%, or 1.4 trillion kWhs, more of electricity," according to the Energy Policy Research Foundation (EPRINC). The impacts of the EPA's mandates on utilities, reliability, and ratepayers could be severe, EPRINC cautions: "Historically, U.S. electricity generation has grown at an annualized rate of 0.4% over the last ten years. At this rate, it would require 79.8 years to accommodate a full EV transition of the U.S. fleet." The historic growth rate must increase rapidly to accommodate vehicle electrification on the EPA's schedule. Yet, at the same time, the EPA is proposing GHG standards for power plants projected to retire 42 gigawatts of coal generation capacity and 37 percent less generation from natural gas. See Max Pyziur, EPRINC Chart of the Week, #2023-2026 EV Electricity Requirements and EPA's Changing Rules, July 5, 2023, https://fxc6e4.p3cdn1.secureserver.net/wp-content/uploads/2023/07/EPRINC-Chart2023-26-EVElectricityRequirementsAndChallengingEPARules-Version1.pdf.

Just as in West Virginia, EPA is claiming the power to shift the Nation's energy policy by reverse-engineering its preferred balance of technologies through emission standards. In West Virginia, it attempted to force a shift from coal-fired plants to wind- and solar- powered plants; here, it attempts to force a shift from liquid-fuel vehicles to electric vehicles.33 [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

33 Petitioners' Reply Brief, p. 13.

The EPA is even using the same CPP regulatory tactic—setting standards the targeted vehicles cannot meet except by averaging their emissions with those of non-emitting vehicles, to which they must cede market share. [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

Congress has considered legislation to compel vehicle electrification. Such proposals have garnered far less support than cap-and-trade. For example, a bill introduced in the 116th Congress, H.R. 2764, the Zero-Emission Vehicles Act of 2019, would establish a national ZEV mandate requiring 50 percent of all new vehicles sold to be EVs by 2030. The House Energy and Commerce Committee took no action on the bill beyond referral to the appropriate subcommittee.34 [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

34 H.R. 2764, Zero-Emission Vehicles Act of 2019, https://www.congress.gov/bill/116th-congress/house-bill/2764/all-actions?overview=closed#tabs.

Most critically, private petitioners observe, "Congress nowhere provided clear authorization for EPA to effectively mandate electrification of the Nation's vehicles." Hence, they conclude, the MY 2023-2026 standards "cannot stand." 35 The same reasoning applies to the more aggressive standards the EPA now proposes. [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

35 Petitioners' Initial Brief, p. 17.

The EPA claims the 2021 rule raises no major questions requiring clear direction from Congress because it "broke no new legal ground." Rather, the rule merely "tighten[ed] existing emission standards under its longstanding and oft-invoked authority."36 Private petitioners rebut that claim: [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

36 EPA's Answering Brief, February 24, 2023, p. 48, http://climatecasechart.com/wp-content/uploads/sites/16/case- documents/2023/20230224_docket-22-1031_brief.pdf (hereafter "EPA's Answering Brief").

Before the [2021] rule, EPA set greenhouse gas vehicle emission standards for vehicles, and some automakers chose to comply in part by producing electric vehicles. Now, EPA has set standards that—by design— "[d]rive" electric-vehicle production and promote a market penetration rate double what it would be without the rule…. Petitioners do not argue that EPA can require some, but lower, electric-vehicle penetration; they challenge EPA's authority to set standards that, for the first time, require the substitution of electric vehicles for liquid-fuel vehicles—a difference in kind, not degree.37 [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

37 Petitioners' Reply Brief, pp. 13-14.

The EPA denies there is any such qualitative difference. Mandating electric vehicles is just another way to prescribe emission controls, whether "designed as complete systems" or "devices to prevent or control such pollution," the agency argues.38 But that is tantamount to saying that an EV is a pollution control device for gasoline-powered vehicles, which is nonsensical. [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

Petitioners explain:

38 EPA's Answering Brief, p. 40.

The component parts of an electric vehicle, such as their batteries, are not add-in devices that block the emission of pollution or minimize pollution that would otherwise occur. [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

They are integral to the basic functioning of the vehicle, which does not emit the relevant pollutant in the first place.39 [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

39 Petitioners' Reply Brief, pp. 28-29.

Although not mentioned by petitioners, the claim that EVs are pollution control devices for gasoline-powered vehicles bears a striking resemblance to the EPA's claim in 2012 that natural gas combined cycle (NGCC) power plants are the "best system of emission reduction" (BSER) for coal power plants. Based on that determination, the EPA proposed to establish CO_2 emission standards that no commercially-viable coal power plant could meet.40 [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

40 EPA, Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, Proposed Rule, 77 FR 22392, April 13, 2012, https://www.govinfo.gov/content/pkg/FR-2012-04- 13/pdf/2012-7820.pdf. For new coal power plants, the EPA proposed "a standard of 1,000 pounds of CO_2 per megawatt-hour (lb. CO_2/ MWh), based on the performance of widely used natural gas combined cycle (NGCC) technology." The emission rate of new efficient ("supercritical") coal power plants was much higher—1,800 lbs. CO_2/MWh (77 FR 22394). New coal plants could comply only by installing carbon capture and storage (CCS) technology. However, the levelized cost of a new coal power plant was already higher than that of a new NGCC unit (77 FR 22413). The standards seemed contrived to render new coal generation uneconomic.

The EPA had to drop that proposal because it effectively banned investment in new coal generation—a policy Congress had not approved and which would have been dead on arrival if proposed in legislation. Classifying EVs as pollution control devices for gasoline-powered cars is as contorted as classifying NGCC power plants as emission reduction systems for coal power plants. [EPA-HQ-OAR-2022-0829-0611, pp. 7-10]

The IRA Does Not Override West Virginia

One week after President Biden signed the IRA,41 Senate Environment and Public Works Chairman Tom Carper (D-Del.), Harvard Law professor Jody Freeman, and other unnamed "experts" told the New York Times that "Democrats designed" certain IRA provisions to undercut West Virginia. Supposedly, those provisions supply "clear" language authorizing "aggressive" GHG regulations, including California's ZEV mandates. 42 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

41 Public Law 117–169, August 16, 2022, https://www.congress.gov/117/plaws/publ169/PLAW-117publ169.pdf.

42 Lisa Friedman, "Democrats Designed the Climate Law to be a Game Changer. Here's How," New York Times, August 22, 2022, https://www.nytimes.com/2022/08/22/climate/epa-supreme-court-pollution.html,

To its credit, the proposal does not affirm that viewpoint, but perhaps because it says nothing about West Virginia. The proposal details the "clean vehicle" "incentives" in the BIL 43 and IRA, and touts those statutes as "pivotal milestones in the creation of a broad-based infrastructure instrumental to the expansion of clean transportation, including light-and medium-duty zero-emission vehicles."44 Careless readers may infer that the EPA is simply proposing to effectuate congressional intent. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

43 Public Law 117–58, November 15, 2021, https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf.

44 88 FR 29196.

For the record, the BIL and IRA do not enlarge the scope of the EPA's regulatory authorities under the Clean Air Act. The BIL mentions the Clean Air Act three times: [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-BIL Section 11115 establishes a "Congestion mitigation and air quality improvement program" (CMAQI) and stipulates that eligible projects must use "verified technologies" as "defined in section 216 of the Clean Air Act." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-BIL Section 11516 requires the Comptroller General to report on the CMAQI program's progress with "respect to attainment or maintenance of national ambient air quality standards under section 109 of the Clean Air Act." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-BIL Section 71101 amends the 2005 Energy Policy Act's Clean School Bus program to define a zero-emission school bus as one that has zero exhaust emissions of "any air pollutant that is listed pursuant to section 108(a) of the Clean Air Act (42 U.S.C. 7408(a)) (or any precursor to such an air pollutant.)" [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Clearly, the BIL does not amend the Clean Air Act.

Six IRA provisions expressly amend the Clean Air Act, lending a superficial plausibility to Carper's theory. However, all those provisions are fiscal in nature; none expands or otherwise modifies existing CAA regulatory authority: [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-IRA Section 60101 establishes a "Clean heavy-duty vehicles" program, authorizing up to $600 million in grants, rebates, and contracts for zero-emission heavy-duty vehicles, infrastructure, and workforce training. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-IRA Section 60102 authorizes grants to reduce air pollution at ports—up to $2.25 billion through 2027 for the purchase and installation of zero-emission port equipment. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-IRA Section 60103 establishes a "Greenhouse gas reduction fund," authorizing billions of dollars in support for States, municipalities, and tribal governments to "deploy or benefit from zero-emission technologies, including distributed technologies on residential rooftops, and to carry out other greenhouse gas emission reduction activities." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-IRA Section 60107 establishes a Low Emission Electricity Program, authorizing $17 million in grants and technical assistance to each of four groups—households, low-income communities, industries, and State and Tribal governments—for the purpose of reducing electricity-related emissions. The provision also authorizes $1 million for program monitoring, and $18 million for EPA efforts to ensure reductions are achieved. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-IRA Section 60113 establishes the "Methane emissions reduction program," authorizing up to $850 million in "grants, rebates, contracts, loans, and other activities of the Environmental Protection Agency for the purposes of providing financial and technical assistance to owners and operators of applicable facilities." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-IRA Section 60114 authorizes billions of dollars in "greenhouse gas air pollution planning grants" to state governments. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

-IRA Section 60201 authorizes billions of dollars in "environmental and climate justice block grants." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

In short, where the IRA amends the CAA, it authorizes subsidies, not mandates. The amending provisions create new carrots, but no new sticks.45 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

45 For example, the IRA Low Emission Electricity Program is a non-regulatory substitute for policies President Biden could not persuade Congress to enact: a national clean energy standard, mandating a nationwide transition to 100 percent zero-emission electricity, and a Clean Electricity Performance Program, imposing tax penalties on utilities that fail to decarbonize according to a national schedule. See Ashley J. Lawson, "Clean Energy Standards: Selective Issues for the 117th Congress," Congressional Research Service, November 2, 2021, https://crsreports.congress.gov/product/pdf/R/R46691, and Ben Adler, "Biden's emission pledge hanging by a thread after Manchin's climate budget cut," October 21, 2021, Yahoo News, https://news.yahoo.com/biden-emissions-pledge-hanging-by-a-thread-after-manchins-climate-change-budget-cut-090056653.html.

Sen. Carper, Prof. Freeman, and the other "experts" interviewed by the Times surely know that post-enactment elucidation of a statute's meaning carries little to no weight in ascertaining congressional intent. 46 As it happens, the actual legislative history Carper made on August 6, 2022 when debating the IRA on the Senate floor before passage, contradicts the post-hoc spin he later shared with the Times. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

46 And whatever interpretive force one attaches to legislative history, the Court normally gives little weight to statements, such as those of the individual legislators, made after the bill in question has become law." Barber v. Thomas, 560 U.S. 474, 486 (2010). "The Court has previously found the post-enactment elucidation of the meaning of a statute to be of little relevance in determining the intent of the legislature contemporaneous to the passage of the statute." Edwards v. Aguillard, 482 U.S. 578, 596 n.19 (1987). "This is a good example of why floor statements by individual legislators rank among the least illuminating forms of legislative history." N.L.R.B. v. SW Gen., Inc., 580 U.S. 288, 137 S. Ct. 929, 943 (2017).

Only once during the day-long Vote-A-Rama, in a two-minute exchange between Sens. Shelley Capito (R-W.Va.) and Carper, did senators debate the IRA's potential impact on West Virginia v. EPA. The exchange occurs on page 4178 of the Congressional Record.47 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

47 Congressional Record, Senate, August 6, 2022, p. 4178, https://www.congress.gov/117/crec/2022/08/06/168/133/CREC-2022-08-06-senate.pdf.

Sen. Capito offered an amendment to strike what was then IRA Sec. 60105(g), which would appropriate $45 million for the EPA "to carry out" CAA Section 111 and eight other sections "with respect to greenhouse gases." Here is the text:
(G) OTHER ACTIVITIES – In addition to amounts otherwise available, there is appropriated to the Administrator of the Environmental Protection Agency for fascial year 2022, out of any money in the Treasury not otherwise appropriated, $45,000,000, to remain available until September 30, 2031, to carry out, with respect to greenhouse gases, sections 111, 115, 163, 177, 202, 211, 213, 231, and 612 of the Clean Air Act (42 U.S.C. 7411, 7415, 7475, 7507, 7521, 7545, 7547, 7571, and 7671k). [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Capito warned that Sec. 60105(g) would create talking points for EPA lawyers and environmental groups "when they try and convince courts to uphold future overreaching climate regulations," such as the CPP. Sen. Carper countered that Section 60105(g) "would fund the EPA to use its existing narrow Clean Air Act authorities to address greenhouse gas emissions."48 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

48 Emphasis added.

In short, before passage, Sen. Carper effectively denied Sec. 60105(g) would reverse or undercut West Virginia. Rather, the IRA language would fund the EPA's use of "existing narrow" CAA authorities. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Although Capito's amendment lost on a 50-50 vote, Section 60105(g) was later deleted on a point of order. That means the final IRA does not even contain a section authorizing the EPA to use "existing narrow" regulatory authorities with respect to greenhouse gases. And, as noted above, all the CAA amendments in the IRA are fiscal policy provisions, which as such cannot create or expand any CAA regulatory authority. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Congress Prohibits NHTSA, the Only Agency Authorized to Establish Fleetwide-Average Standards, from Regulating Gasoline-Powered Vehicles Out of the Market. [EPA-HQ-OAR-2022-0829-0611, p. 18]

In 1992, Congress prohibited NHTSA from considering the fuel economy of EVs and other alternative vehicles when promulgating CAFE standards. The clear intent was to ensure that NHTSA does not set fleet-average standards that no gasoline-powered vehicle can meet. Petitioners explain: [EPA-HQ-OAR-2022-0829-0611, p. 18]

In the Energy Policy Act of 1992, Congress directed NHTSA to set fuel-economy standards based on averages, but prohibited NHTSA from setting fuel-economy standards that average in the fuel economy of electric vehicles. See Pub. L. No. 102-486 §§ 302,403, 106 Stat. 2776, 2870-2871, 2876 (later codified at 49 U.S.C. § 32902(h)). [EPA-HQ-OAR-2022-0829-0611, p. 18]

Petitioners spotlight the key point:

This prohibition bars NHTSA from doing exactly what EPA is doing here: misusing its regulatory authority to force a transition from conventional vehicles to electric vehicles by artificially tightening the “average” standard a fleet must meet. Of course, when Congress finalized the language of Section 202(a)(l) in 1977, it had no need to explicitly block EPA from considering electric vehicles, because it did not contemplate that EPA would set emission standards using averaging in the first place (or that EPA would be setting standards for greenhouse gases). The prohibition on NHTSA nevertheless underscores just how far EPA is reaching here: it is straining statutory language to seize a power that Congress expressly denied to a sister agency that actually has authority to promulgate fleetwide-average standards.71 [EPA-HQ-OAR-2022-0829-0611, p. 18]

71 Petitioners’ Initial Brief, pp. 61-62.

V. Conclusion

The EPA observes that the “levels of stringency in this proposal continue the trend of increased emissions reductions which have been adopted by prior EPA rules.”72 However, that does not rescue the proposal from legal peril. If petitioners’ argument is correct, the EPA’s MY 2023- 2026 standards are also de-facto EV mandates, which as such trigger the major questions doctrine. Moreover, the proposed standards, being fleetwide-average standards, are impermissible under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0611, p. 18]

72 88 FR 29188.

Organization: Elders Climate Action

B. Failure to Consider Relevant Factors is Arbitrary and Capricious and Inconsistent with Law.

EPA refers to the Administrator’s 2009 Endangerment Finding as the basis for promulgating standards for GHG emissions, but makes no reference to U.S. obligation to achieve its NDC under the U.N. Framework Climate Convention, or the declaration by the President to achieve a net zero economy by 2050. In fact, EPA makes passing reference to the IPCC report as a source of science that supports the need for GHG reductions from the transport sector, but identifies no environmental objective and no GHG emission reduction target as the motivating factor underlying the rulemaking goal of its rulemakings for either the multi-pollutant L/MD vehicle rule or the GHG rule. [EPA-HQ-OAR-2022-0829-0737, p. 6]

We contend that the proposed rule is arbitrary, capricious and inconsistent with law because – [EPA-HQ-OAR-2022-0829-0737, p. 6]

1. The failure to explain the environmental and/or air quality objective of the rule violates the obligation to describe the purpose of the rule under the APA. [EPA-HQ-OAR-2022-0829-0737, p. 6]

2. The failure to consider –[EPA-HQ-OAR-2022-0829-0737, p. 6]

a) the extent that GHG emissions from the transport sector contribute to the endangerment that the Administrator determined is the basis for conducting the rulemaking, [EPA-HQ-OAR-2022-0829-0737, p. 6]

b) the extent to which those emissions must be reduced to protect the public health and welfare from the risks identified in the endangerment finding; [EPA-HQ-OAR-2022-0829-0737, p. 6]

c) the extent that the proposed rule will achieve the reductions needed to protect public health and the general welfare from the dangerous effects of GHGs that underlie the endangerment finding; and [EPA-HQ-OAR-2022-0829-0737, p. 6]

d) the failure to consider and evaluate alternatives that could achieve the GHG emission reductions needed to protect the public health and welfare from adverse effects; [EPA-HQ-OAR-2022-0829-0737, p. 6]

is a failure to consider relevant factors required by the CAA. [EPA-HQ-OAR-2022-0829-0737, p. 6]

3. It is also arbitrary and capricious to –[EPA-HQ-OAR-2022-0829-0737, p. 6]

a) not identify the NOx and VOC reductions from the transport sector that are needed to attain the NAAQS in all nonattainment areas by the attainment deadline; [EPA-HQ-OAR-2022-0829-0737, p. 6]

b) not identify and consider alternative NOx and PM emission standards that would be needed to attain the ozone and PM2.5 NAAQS in all nonattainment areas by the attainment deadline; and [EPA-HQ-OAR-2022-0829-0737, p. 6]

c) not analyze the availability of vehicle control technologies capable of achieving zero NOx and PM emissions with respect to the economic and technological factors prescribed in the Act for the purpose of determining the feasibility of setting standards under CAA section 202 that would be adequate to achieve the statutory goal of attainment by the statutory deadlines, and thereby informing the Administrator so that he could properly exercise his statutory obligation to determine what standards are necessary and appropriate under the Act. [EPA-HQ-OAR-2022-0829-0737, p. 6]

B. Needed GHG Reductions Cannot Be Achieved Without Zero Emission Standard.

EPA does not investigate a ZEV sales mandate for the years 2027-2029 with respect to GHG emissions reductions, but the Rhodium Group estimates that light duty ZEV sales would need to reach 99% of total LDV sales by 2030 to achieve a zero emission fleet by 2045 (Fig. 2). Since L/MDVs have longer useful lives than LDVs, converting the L/MDV fleet to zero emission will require more aggressive regulatory approaches. Assuming the electric power sector achieves zero emissions by 2035 as President Biden has proposed, the L/MDV portion of the transport sector could achieve zero emissions by 2050 if a zero emission standard applies to all new L/MDVs by 2031. [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

In its Regulatory Impact Assessment for the SAFE 2 rule, at 2-15, EPA acknowledges that -- … long-term GHG reduction goals will require a far greater penetration of ZEVs than this proposal would require through MY2026. The need for substantial increases in fleet penetration of ZEVs over the long term is supported by the recommendations of the National Academy of Sciences, which states in its 2021 Light-duty Vehicle Technology Assessment: "The agencies should use all their delegated authority to drive the development and deployment of ZEVs, because they represent the long-term future of energy efficiency, petroleum reduction, and greenhouse gas emissions reduction in the light-duty fleet". [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

But EPA does not disclose what its “long-term GHG reduction goals” are for either LDVs or L/MDVs, how it intends to achieve them, or whether and how the current rulemaking contributes to achieving those goals. The reasonableness of the current proposal turns on whether EPA 1) is committed to achieving the GHG reductions identified by the IPCC as necessary to avoid the dire public health and environmental consequences of warming greater than 1.5°C, 2) recognizes that zero emissions from on-road vehicles are a necessary component of the President’s national policy of transforming the U.S. into a zero emission economy by 2050, and 3) can establish how the current proposal contributes to a strategy designed to achieve those objectives. [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

In the absence of any consideration of these factors and an explanation by the Agency of how it has addressed those factors in developing its proposed decision in this rulemaking, the current proposal fails to consider relevant factors, fails to provide a rational basis for the proposal, and is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

Action requested:

Elders Climate Action requests that EPA revise the standards for HDVs to set a zero emission standard for nitrogen oxides (NOx), PM2.5 and CO2 for the classes of L/MDVs or types of L/MDVs that operate in duty cycles for which zero emission power trains are currently in use or which EPA expects will be available by 2027. [EPA-HQ-OAR-2022-0829-0737, pp. 1-2]

ECA requests that EPA use its authority to set emission standards to –

1) respond meaningfully to the urgency of the climate crisis that threatens to destroy the future for our children and grandchildren by destroying or disrupting the natural systems upon which all life, including human civilization, relies to thrive and survive, to avoid turning the planet into an unsustainable Hell on Earth; [EPA-HQ-OAR-2022-0829-0737, pp. 1-2]

2) optimize the emission reductions needed from L/MD on-road vehicles to ensure attainment of the ozone and PM2.5 NAAQS within the deadlines established by the CAA rather than delaying attainment until 2045 for some areas, and not attaining at all in the New

York/Connecticut?New Jersey, Houston, South Coast and San Joaquin Valley nonattainment areas; and [EPA-HQ-OAR-2022-0829-0737, pp. 1-2]

3) to end the inequitable and unlawful disparate impact on BIPOC and low income frontline communities who are most exposed to emissions from L/MDVs in violation of Title VI of the Civil Rights Act and thereby suffer "disproportionately high and adverse human health or environmental effects on minority populations and low-income populations" in violation of EO 12,898. [EPA-HQ-OAR-2022-0829-0737, pp. 1-2]

A. EPA's Proposed Standards Fail to Meet the Global Climate, and National Air Quality and Public Health Emergencies.

EPA's proposed light and medium duty vehicle (L/MDV) rule will allow millions of polluting light and medium duty vehicles to be sold in the U.S. in 2027 and beyond without requiring any manufacturer to sell a single zero emission vehicle. The proposed standards fail to – [EPA-HQ-OAR-2022-0829-0737, p. 2]

1) implement the call from the Intergovernmental Panel on Climate Change for immediate action to transform the transportation sector to zero CO2 emissions as soon as possible to achieve a net zero economy by 2050, with half of that reduction by 2030 to avoid the worst impacts of the looming climate disaster; [EPA-HQ-OAR-2022-0829-0737, p. 2]

2) Implement the President's commitment in E.O. 14008 to transform the U.S. to a "net zero" economy by 2050; [EPA-HQ-OAR-2022-0829-0737, p. 2]

3) fulfill the U.S. "nationally declared contribution" (NDC) submitted at COP 26 to achieve a 50-52% reduction in CO2 by 2030; and [EPA-HQ-OAR-2022-0829-0737, p. 2]

4) achieve the reductions in ozone forming precursors (nitrogen oxides (NOx) and volatile organic compounds (VOCs)) needed to attain the ozone NAAQS in all ozone nonattainment areas by the deadline enacted in the CAA. [EPA-HQ-OAR-2022-0829-0737, p. 2]

1. CO2 Reductions Fall Far Short of the Reductions Needed to Stabilize the Climate.

The transportation sector is the leading source of climate pollution in the US, but between now and 2030 the proposal fails to make any significant progress toward ending CO2 emissions from transport to avoid the worst consequences of a warming climate. The IPCC reports make clear that the global mean temperature will rise much more than 1.5o C above the pre-industrial baseline if we fail to reduce CO2 emissions by half in 2030 on the path to "net zero" by 2050. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

Together, the proposed L/MD rule and HD rule will reduce on-road emissions in 2030 by less than 4% from 2021 levels. The L/MD rule claims to achieve only a 47% reduction by 2055. Both rules guarantee that the US will fail to meet its 50% CO2 reduction target by 2030 that was submitted as our NDC, and will make it impossible for the President to fulfill his promise to achieve a "net zero" economy by 2050. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

Reflecting the science reported by the IPCC, the U.S. NDC commits to reducing CO2 economy- wide 50-52% from 2005 levels by 2030. To meet the 2030 economy-wide 50% reduction target, and assuming that the electric power sector achieves the 80% reduction target in 2030 set by the President, U.S. transport emissions must be reduced about 800 million MT from

1800 million MT in 2021 to 1000 million MT by 2030. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

Nearly all of the CO2 reductions from the transportation sector must be achieved by replacing on-road internal combustion engine (ICE) vehicles with zero emission vehicles (ZEVs) because zero emission technologies are not yet commercially available for aviation or ocean-going vessels, and rail is too small a contributor to national CO2 to achieve meaningful reductions. EPA's CO2 emissions inventory shows that Heavy duty (on-road diesel) vehicles emitted 430 million MT (24%), and LD (on-road gasoline) vehicles about 1020 million MT (57%) of CO2 from the transport sector, for a total of 1450 million MT from on-road vehicles in 2021. To reduce on-road CO2 emissions by close to 800 million MT by 2030, more than half of HD vehicles (215 MMT) and 70% of LD vehicles (714 MMT) need to be replaced with ZEVs by 2030, and 80% of the electric power used to charge the vehicles must be zero emissions (215 + 714 = 929 x .8 = 743 MMT). [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

Estimates reported by EPA in the proposed HD show that the rule will reduce CO2 from trucks about 12 million MT by 2030, or by 2.9% from 2021 levels. EPA estimates that the proposed L/MD rule will induce (but not require) manufacturers to achieve 67% ZEV sales by 2032, with about 60% of new vehicle sales by 2030. But when increased fleet size is accounted for, new ZEVs will replace only about 5% of ICE vehicles by 2030, and reduce CO2 from LD and MD vehicles by 42 million MT (EPA NPR, Table 135), or 4% below 2021 levels. Alternative 1, the only more stringent option proposed for comment, would reduce CO2 49 million MT by 2030, or nearly 5% below 2021 emissions. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

Together, the HD rule and the LD/MD rules in 2030 would reduce CO2 from on-road vehicles by 54 MMT compared to no action, for a total reduction of (54/1450) 3.7% from 2021 emissions. Your proposal allows millions more new gasoline and diesel cars and medium duty trucks and buses to be added to the U.S. vehicle fleet between 2027 and 2032 that will remain on the road for twenty years locking-in billions of tons of additional CO2. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

The effect of these emissions will be to prevent the U.S. from honoring its obligation under the U.N. Climate Framework Convention to achieve the CO2 reductions promised in its NDC [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

In its 2022 heavy duty rule, EPA acknowledged that the proposed rule reduces CO2 emissions by only 221,000 metric tons (MT) (0.75%) compared to the current rule (from 29.088 million MT to 28.867 million MT in 2027), allowing new L/MDVs sold in 2027, 2028 and 2029 to emit an estimated 86.6 million MT annually after 2029, totaling 1.78 billion metric tons of CO2 over the 20 year useful life of those L/MDVs. CO2 from these vehicles would be equivalent to adding 21 new large coal-fired power plants. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

The proposed L/MD rules for the 2027-2032 MYs, will still allow more than 90% of the CO2 that would be emitted under the current GHG standards for those model years. Total CO2 emissions from future vehicles will double these emissions for each additional three to four model years that these standards continue to apply after 2032. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

CO2 from these model years will effectively prevent the US from achieving the IPCC's call for a 50% cut in CO2 by 2030, and make it impossible to achieve the zero emission economy promised by President Biden by 2050. These vehicles will remain on the road for at least 20 years, add to CO2 and prevent the U.S. from achieving the CO2 reductions identified by the Intergovernmental Panel on Climate Change (IPCC) as necessary to keep within the 1.5o C target to avoid a climate catastrophe. [EPA-HQ-OAR-2022-0829-0737, pp. 2-4]

A. To Stabilize the Climate as Quickly as Possible, EPA Must Set a Zero Emissions Standard for GHG Emissions from New L/MDVs, and Begin Phasing in the Standard With the 2027 Model Year. [EPA-HQ-OAR-2022-0829-0737, p. 11]

As discussed above in section II, the Clean Air Act requires EPA to set emission standards for L/MDVs that "reflect the greatest degree of emission reduction achievable…."[EPA-HQ-OAR-2022-0829-0737, p. 11]

Given the science informing the world that the climate cannot be stabilized short of achieving "net zero" GHG emissions, and the President's commitment to achieving a net zero economy by 2050, we ask the Administrator to make the determination that emissions of both GHGs and precursors to the criteria pollutants PM and ozone emitted from light duty vehicles must be reduced to zero to protect the public health and welfare from the many adverse effects of climate warming. [EPA-HQ-OAR-2022-0829-0737, p. 11]

The Act provides that "[a]ny such [standard] under this subchapter may provide for a phase-in of the standard."3 We ask the Administrator to begin phasing in a zero emission standard by establishing a sales mandate that requires each manufacturer to achieve ZEV sales during the 2027 MY that are comparable to CARB's ACT rule with the goal of achieving 100% L/MDV ZEV sales by 2035 in order to achieve zero emissions from on-road vehicles by 2050. [EPA-HQ-OAR-2022-0829-0737, p. 11]

3 Id.

B. Needed GHG Reductions Cannot Be Achieved Without Zero Emission Standard.

EPA does not investigate a ZEV sales mandate for the years 2027-2029 with respect to GHG emissions reductions, but the Rhodium Group estimates that light duty ZEV sales would need to reach 99% of total LDV sales by 2030 to achieve a zero emission fleet by 2045 (Fig. 2). Since L/MDVs have longer useful lives than LDVs, converting the L/MDV fleet to zero emission will require more aggressive regulatory approaches. Assuming the electric power sector achieves zero emissions by 2035 as President Biden has proposed, the L/MDV portion of the transport sector could achieve zero emissions by 2050 if a zero emission standard applies to all new L/MDVs by 2031. [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

In its Regulatory Impact Assessment for the SAFE 2 rule, at 2-15, EPA acknowledges that --

… long-term GHG reduction goals will require a far greater penetration of ZEVs than this proposal would require through MY2026. The need for substantial increases in fleet penetration of ZEVs over the long term is supported by the recommendations of the National Academy of Sciences, which states in its 2021 Light-duty Vehicle Technology Assessment: "The agencies should use all their delegated authority to drive the development and deployment of ZEVs, because they represent the long-term future of energy efficiency, petroleum reduction, and greenhouse gas emissions reduction in the light-duty fleet". [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

But EPA does not disclose what its “long-term GHG reduction goals” are for either LDVs or L/MDVs, how it intends to achieve them, or whether and how the current rulemaking contributes to achieving those goals. The reasonableness of the current proposal turns on whether EPA 1) is committed to achieving the GHG reductions identified by the IPCC as necessary to avoid the dire public health and environmental consequences of warming greater than 1.5°C, 2) recognizes that zero emissions from on-road vehicles are a necessary component of the President’s national policy of transforming the U.S. into a zero emission economy by 2050, and 3) can establish how the current proposal contributes to a strategy designed to achieve those objectives. [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

In the absence of any consideration of these factors and an explanation by the Agency of how it has addressed those factors in developing its proposed decision in this rulemaking, the current proposal fails to consider relevant factors, fails to provide a rational basis for the proposal, and is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0737, pp. 19-20]

Organization: Energy Innovation

The EPA’s statutory authority under Section 202(a)(1) of the CAA supports and enables the adoption of the most stringent standards feasible: “‘the Administrator shall by regulation prescribe (and from time to time revise)…standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles… which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.’”19 We concur with the EPA’s analysis that the proposed rule (and Alternative 1) are aligned with this statutory directive, offering technologically feasible and cost-effective options to reduce harmful emissions over the timeframe the standards would be in place. [EPA-HQ-OAR-2022-0829-0561, p. 8]

19 U.S. EPA, “Proposed Rules,” May 5, 2023, 29231-2 and 29186.

Organization: Environmental. and Public Health Organizations

In addition, Congress affirmed its commitment to achieving ambitious reductions in GHG and criteria pollutant emissions from motor vehicles in the Bipartisan Infrastructure Law (BIL)2 and the Inflation Reduction Act (IRA),3 which provide unprecedented financial support for ZEV technology and infrastructure. [EPA-HQ-OAR-2022-0829-0759, p. 8]

2 Infrastructure Investment and Jobs Act of 2021, Pub. L. No. 117–58, 135 Stat. 429 (2021), www.congress.gov/bill/117thcongress/house-bill/3684/text.

3 Inflation Reduction Act of 2022, Pub. L. No. 117–169, 136 Stat. 1818 (2022), www.congress.gov/bill/117th-congress/house-bill/5376/text.

II. EPA Must Establish Strong Emission Standards to Meet Its Obligations Under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0759, p. 9]

To carry out its statutory mandate, EPA must promulgate emission standards that protect public health and welfare by minimizing harmful air pollution. In passing the Clean Air Act, Congress found that “the growth in the amount and complexity of air pollution brought about by urbanization, industrial development, and the increasing use of motor vehicles, has resulted in mounting dangers to the public health and welfare."5 Congress thus declared that the express purpose of the Clean Air Act is to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare."6 As detailed throughout this comment letter, EPA must use this clear statutory authority to meet its mandate to protect public health and welfare by finalizing standards more stringent than it proposed. [EPA-HQ-OAR-2022-0829-0759, p. 9]

5 42 U.S.C. § 7401(a)(2).

6 Id. § 7401(b)(1). Congress affirmed this goal in the 1977 amendments to the Clean Air Act, which "emphasize[d] the preventive or precautionary nature of the act, i.e., to assure that regulatory action can effectively prevent harm before it occurs; [and] emphasize[d] the predominant value of protection of public health." Lead Industries Ass'n v. EPA, 647 F.2d 1130, 1152 (D.C. Cir. 1980) (quoting H.R. Rep. No. 95-294, 95th Cong., 1st Sess. 49 (1977)); see also 74 Fed. Reg. 66496, 66507 (Dec. 15, 2009).

A. Section 202 requires EPA to set standards that protect public health and welfare from the dangers of GHGs, criteria pollutants, and air toxics. [EPA-HQ-OAR-2022-0829-0759, p. 9]

Section 202(a)(1)7 of the Clean Air Act directs EPA to promulgate motor vehicle standards that "prevent or control" emissions of air pollutants that "cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."8 The criteria and toxic pollutants at issue in this Proposal9 have long been subject to regulation based on their harmful effects. And the Supreme Court held in Massachusetts v. EPA that Congress clearly provided EPA with "the statutory authority to regulate the emission of [greenhouse] gases from new motor vehicles" pursuant to Section 202(a)(1)–(2).10 In response to this decision, in 2009 EPA found that greenhouse gas emissions from motor vehicles "contribute to the total greenhouse gas air pollution, and thus to the climate change problem, which is reasonably anticipated to endanger public health and welfare."11[EPA-HQ-OAR-2022-0829-0759, p. 9]

7 EPA's specific statutory authority to set standards for emissions of criteria pollutants from medium-duty vehicles is addressed in Section VIII.B.

8 42 U.S.C. § 7521(a)(1).

9 The terms "Proposal" and "Proposed Standards" are used interchangeably to refer to this proposed rulemaking and the standards that EPA is proposing to establish.

10 549 U.S. 497, 532 (2007).

11 74 Fed. Reg. at 66499.

Given that the danger to public health and welfare from GHG emissions continues to intensify, and in light of the ongoing harm from criteria pollutant and air toxics emissions, EPA must use its authority under Section 202(a) to set strong emission standards. Section 202(a)(2) provides that standards promulgated pursuant to Section 202(a)(1) "shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology."17 As the D.C. Circuit has recognized, this language embodies Congress's intent that EPA "press for the development and application of improved technology rather than be limited by that which exists today."18 Here, adopting more stringent standards would not require EPA to press for the development of new technologies; zero-emission and combustion vehicle technologies have reached technological maturation and are on the market for light- and medium-duty vehicles. Because greater deployment of those technologies within the fleet is feasible and readily achievable, EPA must go further to address the dangers to public health and welfare wrought by GHG, criteria pollutant, and air toxics emissions from these vehicles—specifically, by finalizing Alternative 1 with a steeper increase in stringency after 2030.19 As detailed in Section III below, greenhouse gas emissions from light- and medium-duty vehicles contribute massively to the worsening climate crisis, while criteria pollutant and air toxics emissions from those vehicles continue to threaten public health. EPA should therefore choose a regulatory response that will better address the pollution responsible for the "endanger[ment]" that these vehicles pose to public health and welfare.20 [EPA-HQ-OAR-2022-0829-0759, pp. 10-11]

17 Id. § 7521(a)(2).

18 NRDC v. EPA, 655 F.2d 318, 328 (D.C. Cir. 1981) (quoting S. Rep. No. 91-1196 (1970)).

19 Granted, Section 202(a) provides discretion to EPA as to the exact manner of "prevent[ing] or control[ing]" emissions of dangerous air pollutants. And Section 202 places certain limitations on EPA in setting standards. EPA's standards pursuant to Section 202(a) must allow lead time for technical feasibility and must give "appropriate consideration to the cost of compliance." 42 U.S.C. § 7521(a)(2). Accounting for these requirements, EPA must promulgate standards that adequately address the danger to public health and welfare caused by the pollutant at issue.

20 See Massachusetts, 549 U.S. at 532; 74 Fed. Reg. at 66525–26.

Congress directed EPA, the expert agency with authority over air pollution from vehicles and engines, to develop a record and apply the Section 202(a) criteria to the facts to develop standards.21 In doing so, the Agency is "not obliged to provide detailed solutions to every engineering problem, but ha[s] only to identify the major steps for improvement and give plausible reasons for its belief that the industry will be able to solve those problems in the time remaining."22 Indeed, courts have consistently upheld EPA's vehicle and engine regulations over manufacturers' objections about technological readiness.23 And manufacturers have consistently risen to the challenge, complying with the very standards they previously claimed were impossible to meet.24). [EPA-HQ-OAR-2022-0829-0759, p. 11]

21 See Coal. for Responsible Regulation, 684 F.3d at 126.

22 Nat'l Petrochemical & Refiners Ass'n v. EPA, 287 F.3d 1130, 1136 (D.C. Cir. 2002) (cleaned up).

23 Id. at 1136–41 (upholding NOx and PM regulations predicated on future developments in pollution control technology); NRDC v. Thomas, 805 F.2d at 428–34 (upholding PM regulation over manufacturers' concerns about the feasibility of trap-oxidizer technology); NRDC v. EPA, 655 F.2d at 331–36 (same).

24 See, e.g., 87 Fed. Reg. 17414, 17536 (explaining that manufacturers deployed technologies that EPA had not predicted to meet the 2001 heavy-duty criteria pollutant standards, which they had unsuccessfully challenged in National Petrochemical & Refiners Association

B. The Clean Air Act authorizes EPA to rely on zero-emission technologies in standard-setting. [EPA-HQ-OAR-2022-0829-0759, p. 11]

We agree with EPA's assessment of its statutory authority to set vehicle emission standards that rely on the full spectrum of technologies to prevent and control tailpipe pollution, including both zero-emission and combustion vehicle technologies.25 As set forth in detail in the Proposal, the Clean Air Act authorizes EPA to consider zero-emission technologies when setting emission standards and to finalize standards at levels that will lead to greater deployment of ZEVs.26 Section 202(a) does not give preference to any particular emission control technology, propulsion system, or powertrain type.27 And far from enshrining the status quo or protecting the market share of polluting vehicles, Congress intended that EPA set standards that drive improvements in emission control technologies.28 Indeed, Congress was intensely interested in electrification and other emerging vehicle technologies as far back as the 1960s and 1970s, and it expected EPA to consider emission reductions that could be achieved through the use of alternative fuels and propulsion systems (including electrification) that control air pollution more effectively than combustion vehicle technologies.29 As “complete systems…to prevent” air pollution,30 ZEVs fall well within the scope of Section 202(a)(1).31 [EPA-HQ-OAR-2022-0829-0759, pp. 11-12]

25 See 88 Fed. Reg. at 29232-33.

26 See id. at 29231–33 (relying on statutory language, legislative materials, case law, and regulatory history).

27 See EPA Br. 7-10; Oge & Hannon Amicus Br. 17-18; Final Br. of State & Pub. Int. Respondent-Intervenors, Texas v. EPA, Case No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF No. 1996908, 6-8, 28-29 [hereinafter “State & Pub. Int. Br.”]; Br. of Sen. Thomas R. Carper & Rep. Frank Pallone, Jr. as Amici Curiae in Support of Respondents, Texas v. EPA, Case No. 22-1031 (D.C. Cir. Mar. 2, 2023), ECF No. 1988363, 12-16, 19-22 [hereinafter “Carper & Pallone Amicus Br.”].

28 See Int’l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 640 (D.C. Cir. 1973) (recognizing that Congress’s choices in the 1970 Clean Air Act Amendments may lead to “fewer models and a more limited choice of engine types”). As EPA explained in its brief in Texas v. EPA, Section 202(a), “by design, seeks innovation and change.” EPA’s Final Answering Br., Texas v. EPA, Case No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF No. 1996730, at 43-44 [hereinafter “EPA Br.”]. Indeed, over the decades, EPA’s emission standards have led to significant technological innovation and advancements in the auto industry. See id. at 7; Br. of Amici Curiae Margo Oge & John Hannon in Support of Respondents, Texas v. EPA, Case No. 22-1031 (D.C. Cir. Mar. 8, 2023), ECF No. 1989149, 7-8, 21-22, 26-27 [hereinafter “Oge & Hannon Amicus Br.”].

29 See 88 Fed. Reg. at 29232-33; EPA Br. at 7-10, 40-46; State & Pub. Int. Br. at 6-8, 28-29; Carper & Pallone Amicus Br. at 12-16, 19-22.

30 42 U.S.C. § 7521(a)(1).

31 Section 202(a)(4), which references an “emission control device, system, or element of design,” 42 U.S.C. § 7521(a)(4)(A) (emphasis added), provides further evidence that Congress envisioned that EPA may consider, and that manufacturers may use, a wide variety of emission control technologies and approaches. Electrification is a “system” and an “element of” motor vehicle “design.”

Accelerating the deployment of zero-emission technologies through this rulemaking would also build on EPA’s long and consistent practice of both considering and incentivizing these technologies in its Section 202(a) rulemakings.32 EPA began doing so more than two decades ago when it finalized the “Tier 2” criteria pollutant standards.33 That rule required manufacturers to certify all new light-duty vehicles into one of eight emissions profiles, or “bins.”34 A sales-weighted average of those bins determined the manufacturer’s compliance with the fleet-average NOx standard.35 Bin 1 was designated for ZEVs.36 EPA recognized that including ZEVs in the fleet average would “provide a strong incentive” for manufacturers to develop and introduce ultra-clean vehicle technologies, serving as “a stepping stone to the[ir] broader introduction.”37 (EPA’s prediction has proven correct, as ZEVs have grown to comprise ever-greater portions of the light-duty38 and heavy-duty fleets39 since that time.) Later, in a series of GHG emission rulemakings spanning three presidential administrations, the Agency continued to include ZEVs in fleet average standards for light- and heavy-duty vehicles, as shown in the table below. EPA took the same approach in 2014 for its Tier 3 criteria pollutant standards for light-duty vehicles.40 [EPA-HQ-OAR-2022-0829-0759, pp. 12-13]

32 Oge & Hannon Amicus Br. at 14-15, 24-25, 28-30.

33 65 Fed. Reg. 6698 (Feb. 10, 2000). Even before the Tier 2 standards, EPA included ZEVs in its 1997 National Low Emission Vehicle Program regulation. Those standards, however, were voluntary. 62 Fed. Reg. 31192, 31208, 31211-12, 31224 (June 6, 1997).

34 65 Fed. Reg. at 6734.

35 Id.

36 Id. at 6746.

37 Id.

38 EPA, The 2022 Automotive Trends Report, at 74, Table 4.1 (2022), https://www.epa.gov/system/files/documents/2022-12/420r22029.pdf (production share by powertrain, showing increasing shares of hybrids, plug-in hybrids, and battery electric vehicles).

39 88 Fed. Reg. 25926, 25939-43.

40 79 Fed. Reg. 23414, 23454, 23471 (Apr. 28, 2014).

SEE ORIGINAL COMMENT FOR Table II.B-1: Electrification, fleet-average standards, and averaging, banking, and trading in prior GHG rulemakings41[EPA-HQ-OAR-2022-0829-0759, p. 13]

41 Reproduced from EPA Br. at 16.

Finally, we agree with EPA that recent actions by Congress reinforce the Agency’s authority to set emission standards that rely on and accelerate the deployment of zero-emission vehicle technologies.42 As members of Congress have emphasized, the BIL and IRA provide “a clear signal of Congress’ intent to support vehicle electrification and robust EPA authority to accelerate it.”43 By increasing the market penetration of ZEVs44 and significantly lowering the cost of zero-emission technologies, the BIL and IRA assist EPA in setting standards that will achieve ambitious reductions in GHG, criteria pollutant, and air toxics emissions.45 EPA should use its clear authority under the Clean Air Act to do so here by finalizing standards more stringent than it has proposed. [EPA-HQ-OAR-2022-0829-0759, pp. 13-14]

42 See 88 Fed. Reg. at 29233.

43 Carper & Pallone Amicus Br. at 29; see generally id. At 29-35.

44 As EPA notes, pre-IRA projections predicted that PEVs would make up nearly 40% of U.S. market share by 2030. 88 Fed. Reg. at 29189. In contrast, post-IRA projections by the International Council on Clean Transportation (ICCT) estimate that battery-electric vehicles will increase to 56 to 67% of market share in the U.S. by 2032. Id. at 29189 n.40.

45 See Greg Dotson & Dustin J. Maghamfar, The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act, 53 Env’t L. Rep. 10017, 10018, 10029 (2023)

Organization: Environmental Defense Fund (EDF) (1of 2)

II. EPA has authority to set standards under the Clean Air Act that ensure deep reductions in harmful pollution based on the availability of ZEV technologies.

EPA has clear authority to establish performance-based emission standards under Section 202(a)(1). EPA's approach, including setting performance-based standards, considering ZEVs, and continuing the longstanding use of averaging, banking, and trading (ABT), is consistent with the text and structure of the CAA and the history of EPA regulation of vehicular emissions under CAA Section 202(a). Moreover, the recent enactment of the IRA strongly reaffirms EPA's authority under the CAA and removes any doubt that EPA's actions here are fully consistent with Congress's will. [EPA-HQ-OAR-2022-0829-0786, p. 9]

The IRA and BIL both include myriad provisions that seek to support a transition to ZEV technology through funding of credits for vehicles, components, and critical infrastructure. These laws were passed with the knowledge that EPA was already setting standards under Section 202(a) that would increase ZEV proliferation and an intent to support those regulations.15 Congress' aim with the funding was to "combine[] new economic incentives to reduce climate pollution with bolstered regulatory drivers that will allow EPA to drive further reduction under its CAA authorities,"16 with the expectation that "future EPA regulations will increasingly rely on and incentivize zero-emission vehicles as appropriate."17 [EPA-HQ-OAR-2022-0829-0786, pp. 10-11]

15 The BIL was passed after EPA's 2023-2026 light-duty GHG standards, which rely on ZEV technology, had been proposed and the IRA was passed 9 months after they were finalized. Brief of Senator Thomas R. Carper and Representative Frank Pallone, Jr. as Amici Curiae in Support of Respondents, Texas v. EPA, No. 22-1031, 29 (D.C. Cir, Mar. 2, 2023), https://www.edf.org/sites/default/files/2023-03/Texas%20-%20Members%20of%20Congress%20%28Sen.%20Carper%20and%20Rep.%20Pallone%29.pdf (Attachment J).

16 168 Cong. Rec. E868-02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone discussing the IRA).

17 168 Cong. Rec. at 880-02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone); see also Greg Dotson and Dustin J. Maghamfar, The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act, 53 ENV'T L. REP. 10017, 10030 (2023) ("The IRA directs EPA to support zero emission technologies for heavy-duty vehicles and port equipment, to reduce emissions in low-income and disadvantaged communities, as well as to support state ZEV requirements. This is a recognition of the evolving importance and availability of zero emission technologies."), https://www.eli.org/sites/default/files/files-pdf/53.10017.pdf (Attachment K).

Additionally, several provisions in the IRA directly affirm EPA's authority to consider ZEVs under Section 202(a). Section 60106 of the law provides $5 million for EPA "to provide grants to States to adopt and implement greenhouse gas and zero-emission standards for mobile sources pursuant to section 177 of the [CAA]."18 Section 177 allows other states to adopt California's vehicle emission standards, which must be at least as protective as the federal standards and meet certain other statutory requirements.19 As members of Congress explained in an amicus brief supporting EPA's MY 2023-2026 light-duty GHG standards, "Congress's explicit endorsement of states' use of Section 177 to enact 'greenhouse gas and zero-emission standards' clearly demonstrates its comfort with and support for state and federal standards that contemplate compliance through zero-emission vehicle manufacturing."20 [EPA-HQ-OAR-2022-0829-0786, p. 11]

18 Inflation Reduction Act of 2022, P.L. 117-1698 ,136 Stat. 2068-69 (2022).

19 42 U.S.C. § 7507, 7543(b).

20 Brief of Senator Thomas R. Carper and Representative Frank Pallone, Jr. as Amici Curiae in Support of Respondents, Texas v. EPA, No. 22-1031, 33 (D.C. Cir, Mar. 2, 2023); see also Greg Dotson and Dustin J.

Maghamfar, The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act, 53 ENV'T L. REP. 10017, 10030 (2023) ("[I]t is a necessary precondition [of the IRA's funding for zero-emission standards under section 177] that . . . EPA can establish zero emission standards pursuant to the CAA.").

The IRA also made amendments to the CAA affirming that Congress regards programs incorporating ZEV technology as an important aspect of EPA's mission to reduce air pollution under the law.21 Those amendments include adding a definition of "zero-emission vehicle" into the newly added CAA Section 132, which consists of a program of EPA grants and rebates towards the purchase of zero-emission heavy duty vehicles.22 In passing the IRA, Congress made clear that it "recognizes EPA's longstanding authority under CAA Section 202 to adopt standards that rely on zero emission technologies."23 [EPA-HQ-OAR-2022-0829-0786, p. 11]

21 Brief of Senator Thomas R. Carper and Representative Frank Pallone, Jr. as Amici Curiae in Support of Respondents, Texas v. EPA, No. 22-1031, 32 (D.C. Cir, Mar. 2, 2023) ("By incorporating these new programs into the Act's existing air pollution control framework, Congress clearly demonstrated that clean energy and zero- emission vehicle programs are central to the Act's implementation going forward.").

22 42 U.S.C. § 7432(d)(5); see also Inflation Reduction Act of 2022, P.L. 117-1698, 136 Stat. 2064-65 (2022) (creating new CAA section 133 to provide grants for "zero-emission port equipment or technology.").

23 168 Cong. Rec. E879–02, at 880 (daily ed. Aug. 26, 2022) (statement of Rep. Pallone).

Organization: Governing for Impact and Evergreen Action (GFI)

Our comment explains why the Proposed Rule, if finalized, would not implicate the Major Questions Doctrine ("MQD") under West Virginia v. E.P.A., the doctrine's landmark case.4 Some opponents to the regulation have argued otherwise, pointing in particular to the Proposed Rule's projected impact on electric vehicle ("EV") sales.5 However, such claims rest on mischaracterizations of the Proposed Rule's effects and mistaken readings of West Virginia (and related cases). [EPA-HQ-OAR-2022-0829-0621, pp. 1-2]

4 See generally, West Virginia v. Environmental Protection Agency, 142 S.Ct. 2587 (2022).

5 See, e.g., Press Release, "The EPA Is At It Again: Attorney General Morrisey Blasts Biden Rule Forcing EV on American Consumers," West Virginia Attorney General's Office (April 12, 2023) ("the EPA likely doesn't have the statutory authority to do what it proposes to do, and the whole exercise may run afoul of the major-questions doctrine recognized in West Virginia v. EPA."), https://mailchi.mp/2c52bdb49f71/the-epa-is-at-it-again-wva-agblasts-biden-rule- forcing-ev-on-american-consumers-713977; Texas Public Policy Foundation, "RE: Docket Numbers EPA-HQ-OAR- 2022-0985 and EPA-HQ-OAR2022-0829; Comments," 2 (June 15, 2022) (available here: https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0829-0510). Opponents, including the West Virginia attorney general, to the most recent greenhouse gas emissions tailpipe rule, finalized in December 2021, have already challenged that regulation on MQD grounds. See, e.g., Private Petitioners' brief, Texas v. E.P.A., D.C. Cir. No. 22-1031.

Much has been made of the EPA's projection that, under the Proposed Rule, EV sales will increase to 67 percent of new vehicle sales by model year ("MY") 2032.6 Pointing to this projection, commentators have described the proposal as "a major step toward a ban on the vehicles Americans rely on," "nothing short of a complete transformation of the automotive industrial base," and "requiring nothing short of a revolution."7 [EPA-HQ-OAR-2022-0829-0621, pp. 1-2]

6 Proposed Rule at 29329.

7 Jennifer Hijazi, “Biden Tailpipe Emission Rules Face ‘Major Questions’ Legal Wave,” Bloomberg Law (April 14, 2023), https://news.bloomberglaw.com/environment-and-energy/biden-tailpipe-emission-rules-face-major-questions-legal- wave; Coral Davenport, “E.P.A. Is Said to Propose Rules Meant to Drive Up Electric Car Sales Tenfold,” N.Y. Times (April 8, 2023), https://www.nytimes.com/2023/04/08/climate/biden-electric-cars-epa.html?smid=nytcore-ios-share&referringSource=articleShare; Coral Davenport, “E.P.A. Lays Out Rules to Turbocharge Sales of Electric Cars and Trucks,” N.Y. Times (April 12, 2023), https://www.nytimes.com/2023/04/12/climate/biden-electric-cars-epa.html.

Yet it is important to appreciate that, according to both the EPA and outside analysts, the primary drivers of projected EV growth are market trends and the Inflation Reduction Act’s (2022) new tax incentives—not the Proposed Rule.8 For example, according to a new analysis of EPA modeling data by the Institute for Policy Integrity, the rule would only boost the EV-share of the total auto fleet by 6 percentage points in 2032.9 Nor is the Proposed Rule’s compliance burden out of step with past tailpipe emissions rules.10 [EPA-HQ-OAR-2022-0829-0621, pp. 1-2]

8 See discussion infra at 7–10. Specific Infrastructure Investment and Jobs Act (2021) funding programs for EV charging also contribute to expected growth.

9 See infra at 9.

10 See discussion infra at 10–12.

An accurate accounting of the Proposed Rule’s EV impacts and compliance costs will favor the agency in any forthcoming MQD legal challenge. Indeed, a survey of the Supreme Court’s MQD cases reveals a number of distinctions between the regulatory schemes at issue in those cases, including the Clean Power Plan, and the Proposed Rule. [EPA-HQ-OAR-2022-0829-0621, p. 2]

In short, and as this comment will demonstrate, the Proposed Rule’s legal vulnerabilities under the MQD have been grossly exaggerated—mostly due to misunderstandings about the rule’s impact and the doctrine’s contours. [EPA-HQ-OAR-2022-0829-0621, p. 2]

According to West Virginia, the MQD operates by subjecting “certain extraordinary cases” to a more demanding legal standard, in which regulations must demonstrate “something more than a merely plausible textual basis” in a statute in order to avoid invalidation.29 In West Virginia, the majority refers to this heightened legal bar as “clear congressional authority”—but whatever its name, it marks a break from the past several decades of judicial practice. Under the once-regnant Chevron Doctrine,30 courts deferred to agency legal interpretations about ambiguous statutes so long as those interpretations were reasonable. In other words, demonstrating “a merely plausible textual basis” was once all that an agency needed to do in order to survive legal challenge; now, if a court deems a rule to be a “major question,” that is no longer true.31 [EPA-HQ-OAR-2022-0829-0621, p. 4]

29 W. Virginia at 2609.

30 Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837 (1984). The Supreme Court may limit or overturn Chevron in a case it will consider next term, Loper Bright Enterprises v. Raimondo. And even though Chevron formally remains good law, the Supreme Court has declined to invoke the doctrine for several years. See Thomas W. Merrill, “The Major Questions Doctrine: Right Diagnosis, Wrong Remedy,” 3 (January 2023) (working paper available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4437332).

31 As noted above (see supra at fn. 28), many have criticized this development for effectively shifting core policy making functions from the politically accountable branches — Congress and the presidency — to the unelected judiciary.

A. The Major Questions Doctrine

The Major Questions Doctrine ("MQD") traces its lineage to a pair of cases at the turn of the millennium, but has taken on a more aggressive (and controversial27) form in recent years—culminating in last summer's landmark decision, West Virginia v. E.P.A.28 [EPA-HQ-OAR-2022-0829-0621, p. 4]

27 See, e.g., Jody Freeman and Matthew Stephenson, "The Anti-democratic Major Questions Doctrine," The Supreme Court Review (forthcoming) (explaining that "the new MQD is more likely to weaken democratic accountability by shifting power from the elected branches to the courts, undermining transparency, and exacerbating the already excessive tendency toward minoritarian obstruction in Congress") (available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4409630); Dan Deacon and Leah Litman, "The New Major Questions Doctrine," Virginia Law Rev. (forthcoming) ("The Court's new approach allows political parties and political movements more broadly to effectively amend otherwise broad regulatory statutes outside of the formal legislative process by generating controversy surrounding an agency policy… It supplies an additional means for minority rule in a constitutional system that already skews toward minority rule. And it operates as a powerful deregulatory tool that limits or substantially nullifies congressional delegations to agencies in the circumstances where delegations are more likely to be used, and more likely to be effective.") (available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4165724). Criticism of the doctrine has spanned the political spectrum, and includes those sympathetic to the doctrine's apparent goals. See infra at fn. 37.

28 See MCI Telecommunications Corp. v. AT&T, 512 U.S. 218 (1994); FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120 (2000); Alabama Ass'n of Realtors v. Dep't of Health & Hum. Servs., 141 S. Ct. 2485 (2021); Nat'l Fed'n of Indep. Bus. v. Dep't of Lab., Occupational Safety & Health Admin., 142 S. Ct. 661 (2022); and West Virginia. For a thorough review of the MQD up until West Virginia, see Natasha Brunstein & Donald L. R. Goodson, "Unheralded and Transformative: The Test for Major Questions After West Virginia," 47 Wm. & Mary Env't L. & Pol'y Rev. (forthcoming 2023) (working paper available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4300622).

Specifically, Chief Justice John Roberts, who authored the West Virginia majority opinion, articulated a two- step test for resolving MQD cases. First, a court will determine whether a given exercise of regulatory power poses a "major question"—a task accomplished by assessing "the history and breadth of the authority that [the agency] has asserted, and the economic and political significance of that assertion."32 Put differently: a "major question" exists, the Court suggested, when an agency (a) claims "to discover in a long-extant statute an unheralded power" that (b) represents "a transformative expansion in its regulatory authority."33 Second, and only if a court decides the first inquiry in the affirmative, an agency regulation will only survive if the government can point to "clear congressional authorization" for its interpretation.34 [EPA-HQ-OAR-2022-0829-0621, p. 5]

32 W. Virginia at 2608 (internal citations omitted).

33 Id. at 2610 (internal citations omitted).

34 Which, as noted above, requires "something more than a merely plausible textual basis." Id. at 2609 (internal citations omitted).

With a single exception, noted below, every regulation that the Supreme Court has deemed to be a "major question" has also failed to meet the "clear congressional authority" standard (and so has been invalidated).35 As a consequence, most MQD challenges hinge primarily on the first inquiry: whether the regulation at issue poses a "major question." [EPA-HQ-OAR-2022-0829-0621, p. 5]

35 That exception came in King v. Burwell, 576 U.S. 473 (2015). Of the twenty-one lower court decisions to grapple with the doctrine since last June, only one upheld the agency action at issue under the second, "clear congressional authorization" step of the MQD inquiry. See Natasha Brunstein, "Taking Stock of West Virginia on its One-Year Anniversary," Yale J. Reg., https://www.yalejreg.com/nc/taking-stock-of-west-virginia-on-its-one-year-anniversary-by- natasha-brunstein/ (June 18, 2023).

Given the MQD's infancy,36 a degree of uncertainty remains about how future courts will conduct that threshold inquiry.37 However, Natasha Brunstein and Donald L. R. Goodson have persuasively argued that "major question" status under West Virginia depends on a court concluding that both of two features are present: (1) the agency is effecting a "transformative expansion in its regulatory authority,"38 in a manner reminiscent of past MQD cases; and (2) the agency is deploying its authority in an "unheralded"39 or "unprecedented"40 manner that strays from the agency's own past practice.41 [EPA-HQ-OAR-2022-0829-0621, p. 5]

36 No Supreme Court majority opinion had ever used the phrase "Major Questions Doctrine" until West Virginia.

37 Even some sympathetic to the doctrine's apparent goals have criticized Roberts's West Virginia opinion for articulating a "problematic" standard. See, e.g., Merrill at 24; Randolph J. May, "A Critique of the 'Congressional Dysfunction' Critique of the Major Questions Doctrine," The Federalist Society (Jan. 23, 2023), https://fedsoc.org/commentary/fedsoc-blog/a-critique-of-the-congressional-dysfunction-critique-of-the-major- questions-doctrine ("I admit there are many aspects of the major questions doctrine worthy of debate, including, perhaps foremost, the feasibility of distinguishing, on a principled basis, between major and non-major questions").

38 W. Virginia at 2610.

39 Ibid.

40 Id. at 2611.

41 See Brunstein & Goodson, "Unheralded and Transformative: The Test for Major Questions After West Virginia," 47 Wm. & Mary Env't L. & Pol'y Rev. (forthcoming 2023) (working paper available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4300622).
For one thing, as EPA itself admitted when requesting special funding, 'Understand[ing] and project[ing] system-wide ... trends in areas such as electricity transmission, distribution, and storage' requires 'technical and policy expertise not traditionally needed in EPA regulatory development.' … 'When [an] agency has no comparative expertise' in making certain policy judgments, we have said, 'Congress presumably would not' task it with doing so").

As to the first, "transformative expansion" prong, the Supreme Court's MQD line of cases provide a sense of the relevant indicia for concluding that an agency has overstepped, including: whether the agency is acting outside of its traditional area of expertise;42 whether the agency is seeking to exert control over a new or greatly expanded class of private entities or persons;43 whether the agency is relying on a little-used statutory provision;44 whether the rule creates a program that Congress has "conspicuously and repeatedly declined to enact itself";45 and whether the regulation at issue is of vast "economic and political significance."46 [EPA-HQ-OAR-2022-0829-0621, pp. 5-6]

42 See Gonzales v. Oregon, 546 U.S. 243, 274 (2006) ("The Government's interpretation of the prescription requirement also fails under the objection that the Attorney General is an unlikely recipient of such broad authority, given the Secretary's primacy in shaping medical policy under the CSA, and the statute's otherwise careful allocation of decisionmaking powers"); NFIB at 665 ("The Act empowers the Secretary to set workplace safety standards, not broad public health measures… And no provision of the Act addresses public health more generally, which falls outside of OSHA's sphere of expertise"); W. Virginia at 2612–13 ("There is little reason to think Congress assigned such decisions to the Agency.

43 See Utility Air Regulation Group v. E.P.A., 573 U.S. 302, 322 (2014).

44 W. Virginia at 2609–10.

45 W. Virginia at 2610.

46 See, e.g., Alabama Assoc. at 2489; W. Virginia at 2608. Some commentators prefer to conceive of this as a third prong in the "major question" status inquiry. See Merrill at 6.

The second feature that determines a regulation's "major question" status, as various legal commentators have observed, is its novelty relative to past agency practice.47 For example, the Supreme Court invalidated the Centers for Disease Control's Covid-19 eviction moratorium under the MQD partly because "no regulation premised on [the statutory provision] has even begun to approach the size or scope of the eviction moratorium," since that provision's enactment.48 By contrast, a past pattern of analogous agency conduct — in which the agency has previously deployed comparable regulatory mechanisms or imposed similar compliance costs on private entities — weighs in the agency's favor under the MQD. [EPA-HQ-OAR-2022-0829-0621, p. 6]

47 See, e.g., Dan Deacon and Leah Litman, "The New Major Questions Doctrine," Virginia Law Rev. (forthcoming) 49 (available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4165724); Richard L. Revesz and Max Sarinsky, "Regulatory Antecedents and the Major Questions Doctrine," Gtown Enviro. L. Rev. (forthcoming) (available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4291030).

48 Alabama Assoc. at 2489.

It is also important to appreciate what West Virginia (and its predecessors) did not say—especially about the role of a rule's "economic and political significance" in the MQD analysis. As one forthcoming law review article keenly observes, "in no case has economic significance or political controversy alone been enough to trigger application of the MQD."49 Justice Gorsuch perhaps argues for such a standard in his West Virginia concurrence, but that opinion was joined by only one other justice (and so does not constitute binding legal precedent).50 Rather, the case law makes clear that in order to implicate the doctrine, a rule must be of vast economic and political significance and meet the MQD's other "contextual factors," described above.51 [EPA-HQ-OAR-2022-0829-0621, p. 6]

49 Brianne J. Gorod et al., "Major Questions Doctrine: An Extraordinary Doctrine for 'Extraordinary' Cases," 19 Wake Forest L. Rev. (forthcoming) 19 (available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4419602) (emphasis added).

50 W. Virginia at 2620–21 (Gorsuch, J., concurring) ("First, this Court has indicated that the doctrine applies when an agency claims the power to resolve a matter of great 'political significance,' … Second, this Court has said that an agency must point to clear congressional authorization when it seeks to regulate 'a significant portion of the American economy'").

51 See Gorod et al. at 18.

Nor did West Virginia hold that any regulation touching on climate change constitutes a major question.52 In fact, that decision never suggested that the EPA lacks the power to regulate carbon emissions from power plants under the relevant section of the CAA—it merely held that the Clean Power Plan's particular method for doing so was impermissible.53 [EPA-HQ-OAR-2022-0829-0621, pp. 6-7]

52 Commentators have suggested as much across various regulatory proposals. See e.g., Letter from Attorney General Patrick Morrisey, West Virginia, et al. to Chair Rostin Behnam, CFTC, re: Comments on the CFTC's "Climate-Related Financial Risk RFI" by the Attorneys General of the States of West Virginia, Alabama, Alaska, Arizona, Arkansas, Georgia, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Montana, Nebraska, North Dakota, Ohio, Oklahoma, South Carolina, Texas, Utah, Virginia, and Wyoming (Oct. 7, 2022), comments.cftc.gov/PublicComments/ViewComment.aspx?id=70868&SearchText=. In comments to a Federal Acquisition Regulatory Council proposal requiring certain large federal contractors to make limited disclosures about carbon emissions, the Washington Legal Foundation cited West Virginia for the proposition that "climate policy is the exclusive prerogative of Congress"—concluding that executive action touching on the issue therefore poses a "major question." Comment of Washington Legal Foundation, "FEDERAL ACQUISITION REGULATION: DISCLOSURE OF GREENHOUSE GAS EMISSIONS AND CLIMATE-RELATED FINANCIAL RISK," 1 (Feb. 13, 2023), https://www.regulations.gov/comment/FAR-2021-0015-0158.

53 See W. Virginia at 2615 ("the only interpretive question before us, and the only one we answer, is more narrow: whether the 'best system of emission reduction' identified by EPA in the Clean Power Plan was within the authority granted to the Agency in Section 111(d) of the Clean Air Act. For the reasons given, the answer is no").

Finally, note that even if a court concludes that an agency action constitutes a "major question," the court's work is not complete. The regulation can still survive if the agency can demonstrate "clear congressional authority" for its interpretation that goes beyond "a merely plausible textual basis."54 To date, most regulations that the Supreme Court has characterized as "major questions" have failed to meet this standard. But in King v. Burwell, a majority of the Court led by Chief Justice Roberts upheld an Internal Revenue Service interpretation concerning Affordable Care Act tax credits, even after finding that the action effectively qualified as a major question.55 [EPA-HQ-OAR-2022-0829-0621, pp. 6-7]

54 W. Virginia at 2609.

55 King at 485 ("In extraordinary cases, however, there may be reason to hesitate before concluding that Congress has intended such an implicit delegation… This is one of those cases") (internal citations omitted).

II. The Proposed Rule, if finalized, will survive scrutiny under the Major Questions Doctrine.

As explained below, the Proposed Rule does not pose a major question under the Supreme Court's MQD precedents. But even if a court found otherwise, the Proposed Rule should still survive because the EPA can demonstrate "clear congressional authority" for its proposal. [EPA-HQ-OAR-2022-0829-0621, p. 7]

A. The Proposed Rule does not pose a "major question" under West Virginia.

Above we explained that whether a rule poses a major question hinges on two main inquiries: (1) whether the action seeks to transform the nature of the agency's regulatory power; and (2) whether the action represents a stark departure from past regulatory practice. Here, both inquiries weigh against a finding of "major question" status. [EPA-HQ-OAR-2022-0829-0621, p. 7]

1. The Proposed Rule does not seek to transformatively expand the EPA's authority.

A likely source of MQD objections to the Proposed Rule stems from the EPA's projections about EV uptake in the rule's wake.56 According to the agency, if the Proposed Rule were to go into effect, EVs could comprise 67 percent of new light- and medium-duty vehicle production for Model Year ("MY") 2032, based on the EPA's modeling of automakers' possible cost-effective compliance pathways.57 [EPA-HQ-OAR-2022-0829-0621, pp. 7-8]

56 See Jennifer Hijazi, "Biden Tailpipe Emission Rules Face 'Major Questions' Legal Wave," Bloomberg Law (April 14, 2023), https://news.bloomberglaw.com/environment-and-energy/biden-tailpipe-emission-rules-face-major-questions- legal-wave (quoting a statement from the American Petroleum Institute that the "deeply flawed proposal is a major step toward a ban on the vehicles Americans rely on").

57 Proposed Rule at 29329.

But it is crucial to recognize that projection does not attribute this uptick exclusively (or even primarily) to the Proposed Rule. In fact, according to the EPA and outside analysts, most of the projected progress on EV uptake will result from market demand and the IRA's historic set of tax incentives, which are already catalyzing private sector action.58 Consequently, any claim that the Proposed Rule's impact on future EV sales will qualify it for MQD scrutiny must contend with the fact that most of the likely boost to EV sales described in the rule is due mainly to factors beyond the forthcoming regulation. [EPA-HQ-OAR-2022-0829-0621, pp. 7-8]

58 As discussed below, predictable technological adoption dynamics will also contribute.

According to EPA estimates, if the agency declines to finalize any new tailpipe emissions regulations at all — under what the agency calls its central "No Action" baseline — EV sales will nonetheless comprise approximately 39 percent of new car sales by MY 2032.59 As the EPA itself acknowledges, this may prove a conservative estimate of IRA and other non-rule impacts on EV adoption.60 For example, a synthesis of automakers' public EV commitments to date compiled by the International Energy Agency, which the EPA declined to incorporate into its projections, suggested that EVs would comprise 50 percent of new car sales by 2030 (again, even in the Proposed Rule's absence).61 Nor, in reaching its central No Action baseline, did the EPA take into account certain new state level policies, like California's, which may drive EV penetration even further.62 [EPA-HQ-OAR-2022-0829-0621, p. 8]

59 Proposed Rule at 29329, "Fleet BEV Penetration Rates, by Body Style, Under the No Action Case," Table 81. As discussed below, the EPA also conducted alternate No Action sensitivity cases.

60 Proposed Rule at 29296.

61 See Proposed Rule at 29296 ("[F]or purposes of this proposal we have not integrated manufacturer announcements directly into our modeling of the No Action baseline") (citing International Energy Agency, "Global EV Outlook 2022," p. 107, May 2022, https://iea.blob.core.windows.net/assets/e0d2081d-487d-4818-8c59-69b638969f9e/ GlobalElectricVehicleOutlook2022.pdf).

62 Proposed Rule at 29296 ("[O]ur analysis does not include the effect of state-level policies whereas projections from other sources may include those policies. We did not include these policies because many are still not in effect; however, we do anticipate that in the next decade, state level policies may play an important role in driving BEV penetration.").

Moreover, as other advocates have noted elsewhere, adoption of innovative technologies does not follow a linear trajectory, but rather "an S-shaped curve, with the adoption rate increasing more rapidly once a critical mass is reached—as we are now seeing with electric vehicles."63 As a result, now that the United States has crossed the EV "tipping point,"64 we would expect steep growth over the next several years regardless of the EPA's regulatory path. [EPA-HQ-OAR-2022-0829-0621, p. 8]

63 See Proof Brief of the Institute for Policy Integrity, Texas v. E.P.A., D.C. Cir. No. 22-1031 8 (Mar. 3, 2023), https://policyintegrity.org/documents/Amicus_Brief_of_the_Institute_for_Policy_Integrity_4.pdf (citing Everett M. Rogers, Diffusion of Innovations 344 (5th ed. 2003) and Tom Randall, US Crosses the Electric-Car Tipping Point for Mass Adoption, Bloomberg (July 9, 2022), https://www.bloomberg.com/news/articles/2022-07-09/us-electric-carsales- reach-key-milestone (discussing the S-shaped technology adoption curve and noting that the United States has crossed the 5% market share "tipping point" that triggers "rapidly accelerating demand")).

64 See Randall.

Isolating the Proposed Rule's contribution to EV penetration projections reveals that the Proposed Rule follows a well-marked trail. Past GHG tailpipe standards have also projected boosts to EV uptake. The 2012 GHG tailpipe regulations, for example, were projected to boost EV production from 0 percent to 2 percent.70 And the EPA estimated that the 2021 GHG emissions rule for passenger vehicles would yield an increase of 11 points for EV production as a share of overall auto manufacturing by MY 2026 (from a "no action" projection of 6 percent penetration to a projected 17 percent under the standards).71 [EPA-HQ-OAR-2022-0829-0621, p. 9]

70 EPA, "Regulatory Impact Analysis: Final Rulemaking for 2017–2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards," 3-48 tbl.3.5-19, 3-54 tbl.3.5-25 (Aug. 2012), https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EZI1.PDF?Dockey=P100EZI1.PDF (hereafter "2012 Final Rule RIA").

71 EPA, "Regulatory Impact Analysis: Final Rulemaking for Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards," 4–29, Table 4-31 (2021), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1013ORN.pdf (hereafter "2021 Final Rule RIA").

Other metrics offer a fuller sense of the Proposed Rule's relative modesty. New York University School of Law's Institute for Policy Integrity ("IPI") used the data presented in Figures 9–1 and 9–2 of the draft Regulatory Impact Assessment to calculate how the proposal will affect the makeup of the total motor vehicle fleet on the road (as opposed to just that of new car sales in a given model year).72 The analysis concludes that under a No Action baseline, EVs will comprise 15 percent of automobiles on the road in 2032; by comparison, a finalized version of the Proposed Rule, IPI calculates, will result in EVs comprising 21 percent of the on-road fleet that year—an increase of just 6 points.73 [EPA-HQ-OAR-2022-0829-0621, p. 9]

72 The full analysis will be available in the Institute for Policy Integrity's forthcoming comment to the rulemaking docket; see also EPA, "Draft Regulatory Impact Analysis: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," 9–2, Figures 9–1, 9–2 (April 2023), https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0360 (hereafter "Proposed Rule RIA").

73 Ibid.

In short, the Proposed Rule hardly represents the harbinger of revolution that its critics claim. This is true beyond the headline-grabbing EV-growth estimates as well. Recall that the Supreme Court's MQD jurisprudence has identified a set of characteristics that suggest an agency is impermissibly seeking to expand its regulatory authority, including: straying outside of the agency's sphere of expertise; seeking to exert agency authority over a new class of regulated entities; or relying on a little-used statutory provision.74 None of those features apply to the Proposed Rule, which concerns a subject of core EPA expertise (vehicle emissions standards, which Congress has tasked the agency with setting since the 1970s), applies to a traditional set of regulated entities (automakers), and is premised on one of the landmark provisions of the Clean Air Act (Section 202(a)). [EPA-HQ-OAR-2022-0829-0621, p. 9]

74 See discussion supra at 5–6.

B. Even if the Proposed Rule does pose a "major question," Congress has provided clear authorization affirming the EPA's action.

For all the above reasons, the Proposed Rule does not pose a "major question." But even if a court found otherwise, the Proposed Rule would still survive scrutiny at the final step of the MQD inquiry: whether the agency can demonstrate "clear congressional authority" that goes beyond a "merely plausible textual basis."100 [EPA-HQ-OAR-2022-0829-0621, p. 12]

100 W. Virginia at 2609.

As a preliminary matter, the plain text of the CAA appears to unambiguously suggest that the EPA can rely on electrification in setting Section 202(a) regulations for "new motor vehicles."101 The statute defines "motor vehicle," as "any self-propelled vehicle designed for transporting persons or property on a street or highway."102 Note that definition omits any reference to a specific type of technology, like the internal combustion engine. Section 202 also makes clear that the standards are to apply to vehicles whether they are "designed as complete systems or incorporate devices to prevent or control" pollution—language that clearly anticipates vehicles, like EVs, designed as complete systems to prevent pollution.103 Indeed, given Section 202(a)'s charge to protect the "public health and welfare," it would arguably be arbitrary (and therefore unlawful) for EPA to fail to facilitate the adoption of zero-emission technology. [EPA-HQ-OAR-2022-0829-0621, p. 12]

101 See 42 U.S.C. §7521.

102 42 U.S.C. §7550(2).

103 42 U.S.C. §7521(a)(1)

In addition to this plain-faced textual basis for EPA's authority, Congress has provided clear authorization affirming the EPA's action in at least two additional ways. [EPA-HQ-OAR-2022-0829-0621, p. 12]

First, legislative history from the 1970 CAA amendments suggests Congress anticipated that the EPA would use its authorities to reduce air quality hazards, including by encouraging the development and adoption of technologies beyond the internal combustion engine.104 As the agency notes in its Proposed Rule, the Senate Report accompanying those amendments explained that the EPA "is expected to press for the development and application of improved technology rather than be limited by that which exists."105 That report further added that motor vehicle emissions standards should be "a function of the degree of [emission] control required, not the degree of technology available today."106 And so Congress also eventually granted the EPA the power to fund "low emission alternatives to the present internal combustion engine."107 It additionally, in Section 202(e), permitted the EPA to certify new types of motor vehicles based on "new power source[s] or propulsion system[s]."108 Indeed, electric vehicles, which had proved popular among early car consumers during the first years of the 20th century, were a topic of renewed national interest (thanks to oil price spikes and resulting gas shortages) during the period that Congress was debating the CAA.109 As a D.C. Circuit panel summarized in 1973, "[i]t is clear from the legislative history that Congress expected the Clean Air Amendments to force the industry to broaden the scope of its research–to study new types of engines and new control systems."110 [EPA-HQ-OAR-2022-0829-0621, p. 12]

104 See generally, EPA's Proof Answering Brief at 7–10.

105 S. Rep. No. 91–1196, at 24–27 (1970); see also Proposed Rule at 29233.

106 S. Rep. No. 91–1196, at 24.

107 42 U.S.C. §7404(a)(2)(B).

108 42 U.S.C. §7521(e).

109 U.S. Dep't of Energy, "The History of the Electric Car," https://www.energy.gov/articles/history-electric-car (last accessed May 25, 2023).

110 International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 634–35 (D.C. Cir. 1973) (citing 116 Cong. Rec. 32,906 (1970) (Sen. Muskie); H.R.Rep. No. 91-1146, 91st Cong., 2d Sess. 6 (1970)).

As a result, 202(a) standards have historically served a technology-forcing function, pushing the market to develop and adopt innovative technologies that will better serve the public health and welfare. In the 1970's and 1980's, for example, the EPA used its Section 202(a) authority to facilitate uptake of a then-nascent technology: catalytic converters, now commonplace.111 The fact that, some forty-plus years later, the innovation has shifted to zero emissions engines does not change the fundamental tenor of the legal analysis or EPA's core statutory responsibilities. [EPA-HQ-OAR-2022-0829-0621, p. 13]

111 See "Timeline of Major Accomplishments in Transportation, Air Pollution, and Climate Change," U.S. Enviro. Prot. Agency, https://www.epa.gov/transportation-air-pollution-and-climate-change/timeline-major-accomplishments- transportation-air (last visited June 15, 2023).

Second, as the EPA also notes in its Proposed Rule, the IRA includes language reaffirming the core holding of Massachusetts v. E.P.A. and the agency's subsequent scientific conclusions: that the EPA is obligated to regulate GHGs as air pollutants under the CAA, and specifically to regulate such emissions from mobile sources.112 In the IRA, Congress appropriated funds for states "to adopt and implement greenhouse gas and zero-emission standards for mobile sources pursuant to §177 of the Clean Air Act (42 U.S.C. 7507)."113 The CAA cross-reference in this IRA provision holds important implications. CAA §177 allows states, which are normally preempted from setting their own motor vehicle emissions standards under the CAA, to adopt California's standards (for which the EPA must waive pre-emption unless specific findings are made).114 So to expressly fund "greenhouse gas and zero emission" activities under §177 necessarily implies that these are the types of standards states would normally be preempted from pursuing because the CAA reserves their regulation to EPA. The IRA, then, necessarily implies that GHGs are regulable under the CAA.115 Indeed, during consideration and passage of the IRA, key drafters explicitly stated on the record their understanding that the IRA's provisions statutorily affirmed the Supreme Court's Mass v. EPA decision.116 [EPA-HQ-OAR-2022-0829-0621, p. 13]

112 See generally, Greg Dotson and Dustin J. Maghamfar, “THE CLEAN AIR ACT AMENDMENTS OF 2022: CLEAN AIR, CLIMATE CHANGE, AND THE INFLATION REDUCTION ACT,” 53 Enviro. L. Rep. 10017, 10030 (2023), https://www.eli.org/sites/default/files/files-pdf/53.10017.pdf.

113 IRA, Pub. L. No. 117-169, §60105(g), 136 Stat. 1818 (2022).

114 See 42 U.S.C. §7507.

115 See Dotson and Maghamfar at 10030 (“If GHGs were not considered to be air pollutants or EPA could not regulate GHGs from motor vehicles pursuant to the CAA, then §177 would not apply to state GHG and zero emission standards because such standards for motor vehicles would not be preempted by §209(a)”).

116 See Lisa Friedman, “Democrats Designed the Climate Law to Be a Game Changer. Here’s How,” N.Y. Times, https://www.nytimes.com/2022/08/22/climate/epa-supreme-court-pollution.html (Aug. 22, 2022) (quoting Senate Environmental and Public Works Chairman Tom Carper, a lead drafter, explaining that “[t]he language, we think, makes pretty clear that greenhouse gases are pollutants under the Clean Air Act”). See also Proposed Rule at 29233 (quoting House Energy and Commerce Chairman Frank Pallone explaining that the IRA “reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air act” and “the IRA clearly and deliberately instructs EPA to use” this authority by “combin[ing] economic incentives to reduce climate pollution with regulatory drivers to spur greater reductions under EPA’s CAA authorities”); 168 Cong. Rec. E868–02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone); 168 Cong. Rec. E879–02, at 880 (daily ed. Aug. 26, 2022) (statement of Rep. Pallone).

III. Conclusion

Suggestions that the Proposed Rule, if finalized, will pose a “major question” are misguided. The Proposed Rule’s impact on the motor vehicle fleet, especially as concerns projected EV uptake, has been overblown. And its compliance costs and regulatory mechanisms closely follow in the footsteps of past 202(a) rulemakings. As a result, we urge the EPA, at minimum, to finalize the rule as proposed. [EPA-HQ-OAR-2022-0829-0621, p. 14]

Organization: HF Sinclair Corporation

By mandating the rapid electrification of the U.S. LD and MD passenger fleet, EPA’s Proposed Rule exceeds its statutory and Congressional authority and severely constrains consumer choice. In so doing, EPA fails to fully account for the total carbon footprint of PEVs. [EPA-HQ-OAR-2022-0829-0579, p. 2]

Notably, EPA’s assumption that PEVs produce zero GHGs – coupled with its failure to account for the overall carbon intensity associated with not only powering PEVs but also the emissions tied to mining, processing, and manufacturing of critical minerals necessary for PEV batteries – impedes the agency’s ability to conduct a complete comparison of the GHG emissions resulting from different vehicle technologies. [EPA-HQ-OAR-2022-0829-0579, p. 2]

EPA’s regulations also have a chilling effect on additional investments by companies, such as HF Sinclair, in carbon reducing technologies like carbon capture and sequestration projects, green hydrogen, renewable fuels and other low-carbon liquid fuel technologies that can reduce emissions from ICE vehicles. In addition, HF Sinclair has voluntarily announced a target to reduce its net greenhouse gas emissions intensity by 25% by 2030 compared to a 2020 baseline. [EPA-HQ-OAR-2022-0829-0579, p. 2]

The “major questions doctrine” holds that Congress must “speak clearly when authorizing an agency to exercise [such] powers” of “vast economic and political significance.”4 As EPA is aware, this doctrine applies in the context of environmental regulation. Last year, in West Virginia v. EPA, the Supreme Court relied on the major questions doctrine in holding that the EPA exceeded its statutory authority in adopting the Clean Power Plan. That regulation sought to impose caps on GHG emissions by requiring utilities and other providers to shift electricity production from coal-fired power plants to natural gas and then to renewable energy in place of imposing source-specific requirements reflective of the application of state-of-the-art emission reduction technologies.5 [EPA-HQ-OAR-2022-0829-0579, p. 3]

4 Nat'l Fed. Of Indep. Bus. v. Dep't of Labor, 595 U.S. , slip op. at 6 (Jan 13, 2022); see also Ala. Assoc. of Realtors v. Dep't of Health & Human Servs., 141 S. Ct. 2485, 2489 (2021); Utility Air Regulatory Group v. EPA, 573 U.S. 302, 324 (2014); U.S. Telecom Assoc. v. FCC, 855 F.3d 381, 419-21 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc) (explaining provenance of "major rules doctrine").

5 West Virginia v. EPA, 597 U.S. (2022).

As noted by the Court, EPA "announc[ed] what the market share of coal, natural gas, wind, and solar must be, and then require[d] plants to reduce operations or subsidize their competitors to get there."6 EPA's attempt to devise GHG emissions caps based on a generation-shifting approach would have had major economic and political significance impacting vast swaths of American life and substantially restructuring the American energy market; however, EPA's purported authority was only based on a "vague statutory grant" within Section 111(d) of the Clean Air Act—far from the "clear authorization required by [Supreme Court] precedents."7 [EPA-HQ-OAR-2022-0829-0579, p. 3]

6 Id., slip op. at 33, n.4.

7 Id., slip op. at 24. EPA's Proposed Rule here presents an analogous, if not identical, situation. Mandating a shift from ICE to PEV will reshape the American automotive market with profound collateral effects, making clear that EPA is encroaching upon an issue of "vast economic and political significance." As further discussed herein, the direct compliance costs are enormous—EPA estimates that the cost of vehicle technology (not including the vehicle or battery tax credits) would be approximately $180 billion–$280 billion respectively, in addition to over $7 billion in electric vehicle supply equipment ("ESVE") costs through 2055, and these figures do not include the complete transformation of the electric power sector.8 The Proposed Rule will go above and beyond natural market forces to change what consumers are able to purchase by requiring the production of a different product. The Proposed Rule undoubtedly forces OEMs to meet production lead times that would not exist but for EPA's new PEV mandate.

8 Proposed Rule at 29,199.

As discussed in further detail below, the Proposed Rule will have significant impacts beyond the traditional automotive market. It will eliminate American jobs in the refining sector, which directly employs more than 100,000 individuals across the United States – it is also widely accepted that every refinery job is a job multiplier of ten. It will significantly strain the electric grid, requiring utilities to rapidly increase generation, transmission, and distribution capacity to a degree not fully contemplated by EPA. [EPA-HQ-OAR-2022-0829-0579, pp. 3-4]

And it will have profound impacts on national security by forcing the American automotive industry to depend on critical minerals from foreign suppliers, with geopolitical challenges—most notably, China—rather than a domestically-abundant and secure resource. These issues go well beyond EPA's expertise, and the Agency is not positioned to fully grapple with the consequences that such a rapid push for PEV will have across the nation. As a result, EPA can only proceed with the Proposed Rule if Congress bestowed upon EPA clear authorization to do so. But Congress did not. [EPA-HQ-OAR-2022-0829-0579, p. 4]

II. EPA's Proposed Rule Exceeds its Statutory Authority and Contravenes Federal Law

a. Phasing out the Internal Combustion Engine (ICE) is a "Major Question" that Congress did not Delegate to EPA

The Proposed Rule does not represent appropriate and feasible technological improvements in the efficiency of ICE vehicles; rather, it requires the manufacturing of PEVs and ultimately replacement of ICE vehicles in the U.S. transportation sector. Though EPA contends the proposed standards do not mandate a specific technology (e.g., PEVs), OEMs cannot comply with the proposed standards unless they drastically shift production away from ICE and to PEVs. Consequently, the Proposed Rule obligates OEMs to increase the percentage of PEVs in their fleets and to do so at rates well in excess of market forces. EPA predicts that for MY 2032, PEV adoption rates will be between 62–78% across all body styles (sedans, crossovers/SUVs, and pickups).2 This is an exponential increase from the roughly 4.4 percent of the LD market share by PEVs in 2021.3 The Proposed Rule will introduce a transformational shift in the automotive industry far beyond that which EPA is able to mandate under the authority delegated to it by Congress. But the question of whether this shift is necessary and, if so, how to accomplish this shift, is a "major question" reserved for Congress, not EPA. [EPA-HQ-OAR-2022-0829-0579, pp. 2-3]

2 Proposed Rule at 29,329; U.S. Environmental Protection Agency, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis" (April 2023) pg. 13-36, 13-37, available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf [hereinafter, "RIA"].

3 Proposed Rule at 29,189 (identifying the percentage that was plug in electric ("PEV"), which included plug-in hybrid electric vehicles ("PHEV") and BEVs).

As with the Clean Power Plan, EPA lacks Congressional authorization in the Clean Air Act to impose a manufacturing shifting standard to a preferred powertrain and effectively order regulated parties to phase out combustion engine technologies. EPA's standard-setting tools are limited to those which Congress provided in Section 202(a) of the Clean Air Act. Here, EPA is only authorized to set "standards" for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to," potentially harmful air pollution. EPA has elected to focus solely on tailpipe emissions and not the entire lifecycle analysis. But PEVs do not have tailpipe emissions of carbon dioxide, the pollutant of concern here, so the operation of such vehicles alone cannot "cause, or contribute to," air pollution within the constructs of a tailpipe emissions regulation, especially when EPA does not require vehicle manufactures to account for the upstream emissions from PEVs in their compliance calculations. [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

Far from "clear congressional authorization," Section 202(a) provides EPA no authority to set standards that go above and beyond that which could be achieved by improvements to ICE vehicles alone such that OEMs must completely cease to produce the underlying technology governed at the time the Clean Air Act was adopted and amended. Nor does it permit EPA to establish a fleet averaging and credit trading program as a mechanism to limit ICE sales.9 Notably, Congress instituted a clean fuel vehicles program with reference to "clean alternative fuel" vehicles, which includes BEVs, in its 1990 updates to the Clean Air Act. In doing so, Congress explicitly distinguished such vehicles from "conventional gasoline-fueled or diesel-fueled vehicles of the same category and model year," dispelling the notion that BEVs and ICE vehicles can be lumped together to set standards that will enable the former to eventually displace the latter.10 EPA does not—and cannot—explain how such authority can be read to regulate PEVs and ICE vehicles under a common standard. It is no surprise then that up until the current Administration, EPA has never claimed the authority to mandate even partial electrification. [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

9 See supra, II.B.

10 42 U.S.C. §§ 7581, 7582(b); see also § 7585(a) (defining NOx and non-methane hydrocarbon emission standards for heavy-duty clean-fuel vehicles as a percentage of conventional heavy-duty vehicles).

Congress clarified that it, not EPA, must make the important policy decisions affecting if, when, and how the American automotive industry will transition from ICE vehicles to BEVs. In the 116th Congress, for example, Congress introduced 44 bills seeking to reduce petroleum-based fuel consumption and GHG emissions from the transportation sector through customer rebates, vehicle and fuel producer incentives, local funding, development of standards, and research and development. But none went so far as to propose requiring adoption, let alone mass adoption of heavy duty PEVs through the phase-out of ICE vehicles.11 In fact, Congress rejected bills that would have banned the sale of new LD ICE vehicles by 2040,12 and it has consistently disapproved of EPA's efforts to hamstring the automotive sector with more stringent air pollution standards than are feasible.13 [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

11 "Alternative Fuel and Vehicles: Legislative Proposals," Congressional Research Service (July 28, 2021).

12 See Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018); see also 116 Cong. Rec. 19238-40 (1970) (proposed amendment to Title II that would have banned ICE vehicles by 1978).

13 See, e.g., S. J. Res. 11, 118th Cong. (2023) (Although passed only by the Senate thus far, the joint resolution calls for disapproval of the rule submitted by the Administrator of the Environmental Protection Agency relating to "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 88 Fed. Reg. 4296 (January 24, 2023).).

It should be no surprise then in the wake of the Proposed Rule, members of Congress have requested that the Agency rescind the proposals, asserting they "effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction."14 That Congress intended for it, not EPA, to direct these policy decisions is made all the more clear by the passage of the IRA and BIL whereby Congress identified the policy levers it deemed appropriate. Congress could have, but did not, delegate the authority to (or otherwise direct) EPA to establish a fleet-wide credit trading regime to further drive PEV development and rapid adoption. Instead, the Proposed Rule stands in direct contrast to other legislation, such as the Renewable Fuel Standard Program, whereby Congress mandated that "gasoline sold or introduced into commerce in the United States" must contain a year-over-year increasing share of renewable fuels15 and, in 2022, must include tens of billions of gallons of renewable fuel.16 An EPA-mandated shift in transportation technology from vehicles that can operate on increasing volumes of renewable fuel to PEVs does not square with such requirements. Consequently, Congress, not EPA, should determine how to regulate electrification of transportation.17 [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

14 Letter from Senator Shelley Capito, et al. to Administrator Michael S. Regan, EPA (May 25, 2023); see also Senate Resolution S.J. Res. 11, 118th Congress (April 26, 2026) (Although related to heavy duty vehicles ("HDVs"), Congress has expressed its disapproval of EPA's overreach in this space. For example, in April of this year both houses of Congress passed a Congressional Review Act resolution to rescind EPA's December 2022 heavy duty NOx standards, sending a strong signal that Congress views EPA's efforts in this space as unnecessary, infeasible, and uniformed in light of economic and energy security concerns); House Resolution H2523 (May 23, 2023); see also Congressional Record, H2523 (May 23, 2023) at 1444, Statement from Mr. Walberg (R-MI) ("From tailpipe emissions regulations that will force people to buy expensive and less practical EVs to new rules on power plants that will threaten the reliability of our electric grid. It seems like the EPA hasn't even thought about the economic and energy security of our constituents.").

15 42 U.S.C. § 7545(o)(2)(A)(i).

16 Id., § 7545(o)(2)(B); 87 Fed. Reg. 39,600 (July 1, 2022).

17 See "Grassley-Cornyn Bill Pulls Plug on Latest Biden Boon for EVs," (May 18, 2023), https://www.grassley.senate.gov/news/news-releases/grassley-cornyn-bill-pulls-plug-on-latest-biden-boon-for-evs (discussing proposed legislation entitled "No Fuel Credits for Batteries Act" introduced to "preserve the integrity of the Renewable Fuels Standard" in light of EPA's proposed E-RINS rule").

III. The Proposed Rule is Arbitrary and Capricious

a. EPA Fails to Properly Account for All GHG Emissions from PEVs

In an attempt to hinder consumer choice and penalize specific forms of technology, EPA's proposed rule fails fully account for the lifecycle GHG emissions that come from PEVs, creating a disparity between how ICE and PEV vehicle emissions are treated. While EPA purports to have considered the GHG emissions attributed to upstream emissions impacts from fuel production at refineries and electricity generating units,27 EPA assumes – without any factual basis – that the power sector will become cleaner over time through the increased use of wind and solar generation and electricity storage (i.e., more batteries). This in turn will purportedly mitigate EPA's recognized concern that, as a result of the proposed rule, "increases in emissions from [Electric Generating Units] . . . would lead to changes in exposure for people living in communities near these facilities."28 But, EPA glosses over this analysis, and instead only focuses on tailpipe emissions. And even if EPA's assumptions on a cleaner electric grid are correct, EPA fails to account for the increased GHG emissions that will come from an increasing effort to mine, process, and manufacture the critical minerals that will be required to both deliver batteries to power an all-electric future fleet as well as deliver "zero-emission" power to the grid. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

27 Proposed Rule at 29,252.

28 Proposed Rule at 29,327.

Moreover, EPA's proposal to remove upstream emissions from vehicle compliance determinations will incentivize vehicle manufacturers to produce PEVs without having to account for any of the associated emissions impact while ignoring labor and environmental standards of other nations. Preferentially accounting for certain air pollutant emissions over others within the same regulated vehicle class flies in the face of both EPA's statutory authority to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles…"29 and its purported regulatory objective to reduce GHG emissions. If PEVs are vehicles which cause or contribute to air pollution, then all associated pollution must be accounted for. If not, EPA may not include PEVs in the regulated "class" of motor vehicles along with comparable ICE vehicles. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

29 42 U.S.C. § 7521(a)(1).

For instance, the power source of a PEV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces emissions. The fact such emissions occur 100% upstream of the vehicle's operation and therefore fall outside of the tailpipe emissions calculation stacks the deck in favor of this technology. In fact, according to the International Energy Association, PEVs require six times the raw materials as a traditional ICE vehicle.30 There is no logical basis for this omission because, as EPA is aware, concerns about GHG emissions relate to their longer term global concentrations. Consequently, air pollutant emissions should be an important consideration regardless of where such emissions occur and, by myopically prioritizing PEVs, EPA fails to look at all technologically feasible options that may provide commensurate GHG reductions in a more cost-efficient manner. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

30 IEA, "In the transition to clean energy, critical minerals bring new challenges to energy security," (June 2023), available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary.

The flaw in EPA's approach is illustrated by the fact that emissions standards easily become meaningless by changing the engine's location. The proposed rule would treat a PEV charged by a diesel-powered generator as if it had zero tailpipe emissions, notwithstanding the fact that it remains "powered" by a diesel engine located outside the vehicle. A light-duty vehicle directly powered by a diesel engine inside the vehicle, however, is credited with the emissions produced by that engine. Thus, the source of the "fuel" matters. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

Finally, EPA has not considered the foreseeable, indirect impacts the Proposed Rule will have on ambient air quality. First, with the high purchase price of new PEVs, consumers will likely hold on to their older, higher-emitting ICE vehicles to avoid the increased purchase price of a PEV. Second, PEVs are heavier, and will increase particulate matter emissions through increased brake, tire, and road wear. Ultimately, EPA arbitrarily ignores the full scope of emissions that will come from PEVs, and a full lifecycle analysis of all potential vehicle technologies must be conducted to fully understand the environmental impacts of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

b. EPA Cannot Adequately Substantiate the Need for Regulatory Action

EPA has not demonstrated a compelling need to accelerate emissions reductions within the timeframe for which MY27–32 vehicles are subject to the Proposed Rule. PEVs accounted for less than 5% of light-duty vehicles sold in the U.S. in 2021, yet EPA's proposal would require PEVs to account for over 60% of light-duty vehicle sales by 2030 despite the White House setting a goal of 50% in this same timeframe.31 EPA provides no information supporting the need for such an accelerated schedule and instead makes conclusory assertions that the "need for regulatory action" is supported by the Bipartisan Infrastructure Law32 ("BIL") and the Inflation Reduction Act33 ("IRA"),34 which "together provide further support for a government-wide approach to reducing emissions by providing significant funding and support for air pollution and GHG reductions across the economy, including specifically, for the component technology and infrastructure for the manufacture, sales, and use of electric vehicles."35 But far from capturing the automotive industry's current pace of electrification, the Proposed Rule exceeds rational projections on the rate of electrification, which expect PEVs (including plug-in hybrid vehicles) to account for only 13-29% of new light-duty vehicle sales in 2050.36 [EPA-HQ-OAR-2022-0829-0579, pp. 9-10]

31 Executive Order 14037, "Strengthening American Leadership in Clean Cars and Trucks," 86 Fed. Reg. 43583 (Aug. 5, 2021).

32 Public Law 117-58, Nov. 15, 2021.

33 Public Law 117-169, Aug. 16, 2022.

34 EPA, Draft Regulatory Impact Analysis for Proposed Rule, 3-19–29 (Apr. 2023) [hereinafter "DRIA"]. Notably, EPA concludes that U.S. oil consumption is projected to be fairly steady for the time period from 2027 to 2050" and will actually increase gradually over that time. Id. at 11-26 (Table 11-1). EPA also concludes that the Proposed Rule will result in a 90.7% reduction in oil imports.

35 Proposed Rule at 29,187.

36 EIA, "Incentives and lower costs drive electric vehicle adoption in our Annual Energy Outlook," (May 15, 2023) available at https://www.eia.gov/todayinenergy/detail.php?id=56480.

In fact, during a House Energy and Commerce Hearing on June 22, 2023, Joseph Goffman, Principal Deputy Assistant Administrator for U.S. EPA's Office of Air and Radiation, testified that he had not reviewed the petition from the state of California requesting a Clean Air Act Waiver that ultimately seeks to ban ICE vehicles.37 This is concerning given the fact that the justification provided for the Proposed Rule was that same petition by the state of California, further demonstrating EPA's incomplete analysis and lack of preparedness to compel consumers into a single technology solution to combat climate change. [EPA-HQ-OAR-2022-0829-0579, pp. 9-10]

37 Testimony of Joseph Goffman, Principal Deputy Assistant Administrator, Office of Air and Radiation, U.S. EPA before the House Energy and Commerce Subcommittee for Environment, Manufacturing, and Critical Materials Legislative Hearing: ""Driving Affordability: Preserving People's Freedom to Buy Affordable Vehicles and Fuel," (June 22, 2023) available at https://energycommerce.house.gov/events/environment-manufacturing-and-critical- materials-subcommittee-legislative-hearing-driving-affordability-preserving-people-s-freedom-to-buy-affordable-vehicles-and-fuel.

Moreover, EPA's reliance on the BIL and IRA is further problematic because Congress could have, but did not, choose to mandate PEVs directly through these actions. Congress provided subsidies, not mandates, and EPA cannot rely on these subsidies as a basis for the feasibility of its mandates. Furthermore, 66% of Americans do not support policies and regulations that ban the sale of new ICE vehicles, while only 23% support such mandates.38 Doing so contravenes Congress's intent and results in a regulatory structure premised on federal funding that can easily vanish under a new Administration or Congress.39 [EPA-HQ-OAR-2022-0829-0579, pp. 9-10]

38 RFA, "New Poll: Voters Support Ethanol and RFS, Oppose EV Mandates," (Jan. 9, 2023), available at https://ethanolrfa.org/media-and-news/category/news-releases/article/2023/01/new-poll-voters-support-ethanol-and- rfs-oppose-ev-mandates.

39 The BIL and IRA themselves are at risk of recission under a new Administration or Congress. See, e.g., Josh Siegel and Kelsey Tamborrino, Politico, GOP's debt-limit plan would gut Biden's climate law. White House's response: 'Jobs' (Apr. 20, 2023), available at https://www.politico.com/news/2023/04/20/house-gop-debt-limit- plan-inflation-reduction-act-00092891 ("The GOP proposal would revive a prior $7,500 tax

credit for qualifying electric vehicles, but would restore that tax break's per-manufacturer limit of 200,000 vehicles. It would entirely repeal the IRA's new incentives for critical battery minerals that are extracted from the U.S. or a close trading partner, and for batteries manufactured or assembled in North America.").

Organization: Institute for Energy Research (IER)

EPA's claimed authority contradicts recent Supreme Court precedent

EPA's asserted power to force a transition is an impermissible claim of new authority. The Supreme Court made clear in the various cases around the Clean Power Plan, culminating with West Virginia v. EPA, that such forced shifting (in that case from coal to natural gas or renewables) is a claim of new authority, and thus needs clear statutory mandate from Congress Just like in the West Virginia case, EPA is seeking to force a shift from one product to another. Thus this rulemaking raises the same major question issues as the Clean Power Plan. Absent express authorization from Congress, EPA cannot claim this power to shift the motor vehicle industry from internal combustion-powered to electric-powered engines. [EPA-HQ-OAR-2022-0829-0673, p. 3]

Organization: Institute for Policy Integrity at NYU School of Law et al.

I. Extensive Justification Supports EPA's Reliance on Global Climate Damage Valuations

In the Proposed Rule, EPA appropriately focuses on a global estimate of climate benefits, continuing its historical approach and once again rejecting its temporary and arbitrary practice during the Trump administration of disregarding all climate effects that occur outside the physical borders of the United States. While EPA offers persuasive justifications for this decision, many additional justifications—some of which EPA itself provides in the Draft SC-GHG Update12—further support this approach.13 In particular, EPA could emphasize the concern for the impacts of U.S. pollution on foreign welfare in the Clean Air Act and other sources of law, further highlight the significance of U.S. strategic interests and reciprocity, further emphasize the importance of extraterritorial impacts and spillovers, and highlight the inconsistency that would occur if the agency considered only domestic benefits while focusing on global costs. [EPA-HQ-OAR-2022-0829-0743, p. 3]

12 Draft SC-GHG Update, supra note 9, at 10–15.

13 See generally Jason A. Schwartz, Inst. for Pol'y Integrity, Strategically Estimating Climate Pollution Costs in a Global Environment (2021), https://policyintegrity.org/files/publications/Strategically_Estimating_Climate_Pollution_Costs_in_a_Glob al_Envir onment.pdf.

A. Relevant Statutes and Executive Orders Compel, and Certainly Permit, a Global Perspective on Climate Damages

The Clean Air Act, National Environmental Policy Act, Administrative Procedure Act, and other key sources of law not only permit, but in fact require, EPA to consider international effects. EPA should highlight these legal requirements as justification for its focus on global climate impacts. [EPA-HQ-OAR-2022-0829-0743, pp. 3-4]

Section 202 of the Clean Air Act, under which EPA issues the Proposed Rule, charges EPA with regulating "air pollutant[s] which may be reasonably anticipated to endanger public health or welfare,"14 where "welfare" is defined to include "effects on . . . weather . . . and climate."15 When interpreting Section 202, the Supreme Court found "there is nothing counterintuitive to the notion that EPA can curtail the emission of substances that are putting the global climate out of kilter."16 And when industry challenged another EPA climate program under Title I of the Clean Air Act by arguing that the statute "was concerned about local, not global effects," the U.S. Court of Appeals for the D.C. Circuit had "little trouble disposing of Industry Petitioners' argument that the [Clean Air Act's prevention of significant deterioration] program is specifically focused solely on localized air pollution," finding instead that the statute was "meant to address a much broader range of harms," including "precisely the types of harms caused by greenhouse gases."17 [EPA-HQ-OAR-2022-0829-0743, pp. 3-4]

14 42 U.S.C. § 7521(a)(1).

15 42 U.S.C. § 7602(h); Massachusetts v. EPA, 127 S. Ct. 1438, 1447 (2007).

16 Massachusetts, 127 S. Ct. at 1461 (emphasis added). This case concerned Section 202 of the Clean Air Act, which similarly permits EPA to regulate "any air pollutant . . . which may reasonably be anticipated to endanger public health or welfare." Id. at 1454 (quoting 42 U.S.C. § 7521(a)(1)).

17 Coalition for Responsible Regulation v. EPA, 684 F.3d 102, 137-38 (D.C. Cir. 2012), aff'd in part, rev'd in part sub nom. Util. Air Regulatory Grp. v. EPA, 134 S. Ct. 2427 (2014).

A recent law-review article exhaustively reviewed the legislative history of the Clean Air Act's definition of "welfare" and concluded that "when Congress included the 'effects on . . . climate' language in the statute, it understood that adverse climate effects could occur on a global scale."18 For instance, Senator Caleb Boggs, a Republican from Delaware and ranking minority member of the Public Works Subcommittee on Air and Water Pollution, which was considering the Clean Air Act in 1970, entered a report into the record stating that air pollution "alters climate and may produce global changes in temperature."19 Senator Jennings Randolph of West Virginia likewise submitted a statement into the record explaining that U.S. air pollution could "produce unacceptable worldwide climate changes."20 Congress's clear concern for the effects of domestic pollution on the global climate—many more examples of which are discussed in this law-review article—demonstrates that a global perspective is appropriate, if not required, when EPA regulates under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0743, p. 4]

18 Richard L. Revesz, Bostock and the End of the Climate Change Double Standard, 46 COLUM. J. ENV'T L. 1, 9 (2020).

19 Id. at 32–33.

20 Id. at 3

This interpretation is further compelled by the National Environmental Policy Act (NEPA). Though best known for requiring agencies to prepare environmental impact statements before taking certain actions (a requirement that does not apply to Clean Air Act actions),21 NEPA also much more broadly declares a national environmental policy and requires of all agencies that "to the fullest extent possible[,] the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this chapter,"22 including the need to "recognize the worldwide and long-range character of environmental problems" and to "lend appropriate support" to help "maximize international cooperation."23 In other words, especially because adopting a global perspective on climate damages will advance U.S. foreign policy goals (see the next subsection), NEPA requires EPA to interpret all of its laws, including the Clean Air Act, in ways that recognize the worldwide character of environmental problems. As EPA recognizes in the Draft SC-GHG Update,24 using global social cost of greenhouse gas estimates helps fulfill that requirement. Likewise, in a recent guidance document, the Council on Environmental Quality highlighted this very statutory language to conclude that "it is most appropriate for agencies to focus on [social cost of greenhouse gases] estimates that capture global climate damages."25 [EPA-HQ-OAR-2022-0829-0743, pp. 4-5]

21 While actions taken under the Clean Air Act "shall [not] be deemed a major Federal action significantly affecting the quality of the human environment within the meaning of [42 U.S.C. § 4332(2)(C)]," 15 U.S.C. § 793(c)(1), the other provisions of NEPA—including those quoted and cited in this paragraph—continue to apply.

22 42 U.S.C. § 4332(1) (emphasis added).

23 Id. § 4332(2)(I); see also EDF v. Massey, 986 F.2d 528, 536 (D.C. Cir. 1993) ("Section 102(2)(F) further supports the conclusion that Congress, when enacting NEPA, was concerned with worldwide as well as domestic problems facing the environment . . . Compliance with one of the subsections can hardly be construed to relieve the agency from its duty to fulfill the obligations articulated in other subsections."); NRDC v. NRC, 647 F.2d 1345, 1387 (D.C. Cir. 1981) (J. Robinson, concurring; J. Wilkey wrote for the Court, but there was no majority opinion) (concluding that even if a conflict with another statute prevents the agency from conducting an environmental impact statement, that "does not imply that NRC may ignore its other NEPA obligations," including the "provision for multinational cooperation" and the "policy of the United States with respect to the ecological well-being of this planet"; rather, the agency "should remain cognizant of this responsibility"); Greene County Planning Bd. v. Federal Power Comm'n, 455 F.2d 412, 424 (2d Cir. 1972) ("The Commission's 'hands-off' attitude is even more startling in view of the explicit requirement in NEPA that the Commission 'recognize the worldwide and long-range character of environmental problems' and interpret its mandate under the Federal Power Act in accordance with the policies set forth in NEPA.").

24 Draft SC-GHG Update, supra note 9, at 15 n.37.

25 Council on Env't Quality, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change, 88 Fed. Reg. 1196, 1203 (Jan. 9, 2023).

I. EPA Should More Extensively Document Why the Proposed Rule Does Not Trigger the Major Questions Doctrine

Litigation over the 2021 Rule has focused primarily on the major questions doctrine, and some opponents of the Proposed Rule have raised similar objections. Petitioners in the ongoing D.C. Circuit litigation argue that the 2021 Rule triggered the major questions doctrine primarily because, in their words, "[t]he rule effectively mandates that a decreasing percentage of the fleet be gasoline-powered, and an increasing percentage be electric." [EPA-HQ-OAR-2022-0829-0601, pp. 5-6]

22 Brief for Private Petitioners at 24, Texas v. EPA (D.C. Cir. filed Nov. 3, 2022).

Challenges to both the 2021 Rule and this rule under the major questions doctrine lack merit. Nonetheless, as explained in this section, EPA could provide more extensive legal analysis rebutting these challenges. Specifically, EPA should catalog regulatory antecedents for its approach to considering vehicle electrification and provide additional context about the economic significance of the Proposed Rule. We begin, however, with a brief description of the major questions doctrine. [EPA-HQ-OAR-2022-0829-0601, pp. 5-6]

A. Economic and Political Significance Are Not Sufficient to Trigger the Major Questions Doctrine—The Agency's Action Must Also Be Unlike Anything It Has Done Before and Represent a "Transformative Expansion" of Its Authority

Litigants and commenters invoking the major questions doctrine—including challengers in the ongoing litigation over the 2021 Rule—often invoke the major questions doctrine without properly describing its contours. To provide legal context, this section describes how the Supreme Court has articulated the doctrine. [EPA-HQ-OAR-2022-0829-0601, pp. 5-6]

In West Virginia v. EPA, the Supreme Court stressed that only "extraordinary cases" trigger the major questions doctrine—"cases in which the 'history and the breadth of the authority that the agency has asserted,' and the 'economic and political significance' of that assertion, provide a 'reason to hesitate before concluding that Congress' meant to confer such authority."23 The bulk of West Virginia's legal analysis of the doctrine's triggers examined whether EPA had "'claim[ed] to discover in a long-extant statute [1] an unheralded power' [2] representing a 'transformative expansion in [its] regulatory authority.'"24 In other words, the Supreme Court focused on (1) regulatory history and (2) the transformative nature of the agency's asserted authority. In Biden v. Nebraska, the Supreme Court again reiterated the importance of "the 'history and the breadth of the authority that the agency had asserted,'" in addition to "the 'economic and political significance' of that assertion."25 For example, the Court stressed that "[t]he Secretary [of Education] has never previously claimed powers of this magnitude under" the statute at issue in Nebraska and, "[u]nder the Government's reading of [that statute], the Secretary would enjoy virtually unlimited power to rewrite" it.26 Both West Virginia and Nebraska reveal that an agency action does not trigger the major questions doctrine unless its history and breadth and economic and political significance provide a reason for a court to be skeptical of the agency's action. [EPA-HQ-OAR-2022-0829-0601, pp. 5-6]

23 West Virginia v. EPA, 142 S. Ct. 2587, 2608 (2022) (quoting FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 159–60 (2000)) (alteration omitted).

24 Id. at 2610 (quoting Util. Air Regul. Grp. v. EPA (UARG), 573 U.S. 302, 324 (2014)).

25 Biden v. Nebraska, --- S. Ct. ---, 2023 WL 4277210, at *12 (June 30, 2023) (quoting West Virginia, 142 S. Ct. at 2608) (alterations omitted).

26 Id. at *12–*13.

To trigger the major questions doctrine, regulatory history must reveal that an agency action is unlike anything the agency has ever done. Of course, the agency need not identify an identical regulatory antecedent, because new regulations will rarely, if ever, be identical to previous ones as they would then be unnecessary. Rather, West Virginia's and Nebraska's analyses suggest that the relevant regulatory antecedent must be an analogous exercise of authority. The cases cited in West Virginia similarly focus on the unprecedented nature of the agency's action.27 And the Court reaffirmed the centrality of "past practice under the statute" in Nebraska, both in terms of the "scope" of prior agency actions and the "size" of those actions' effects.28 [EPA-HQ-OAR-2022-0829-0601, pp. 5-6]

27 For example, UARG notes that EPA's newfound statutory interpretation would have "swept" many sources under the agency's control that it had "not previously regulated." 573 U.S. at 310. Alabama Association of Realtors v. Department of Health and Human Services (Alabama Realtors)] also highlights that the "expansive authority" asserted was "unprecedented." 141 S. Ct. 2485, 2489 (2021) (per curiam). And National Federation of Independent Business v. Occupational Safety & Health Administration

likewise focused on the “lack of historical precedent” for the agency’s action. 142 S. Ct. 661, 666 (2022) (per curiam) (cleaned up). In contrast, the Supreme Court rejected a challenge to a vaccine mandate from the Department of Health and Human Services for certain healthcare workers because “the Secretary routinely imposes conditions of participation that relate to the qualifications and duties of healthcare workers.” Biden v. Missouri, 142 S. Ct. 647, 653 (2022) (per curiam).

28 Nebraska, 2023 WL 4277210, at *12 (quoting Alabama Realtors, 141 S. Ct. at 2489)); see also id. at *14 (describing the action as “unprecedented”).

To trigger the major questions doctrine, the breadth of the agency action must also suggest the agency is dramatically changing its authority. In West Virginia, the Supreme Court explained that the challenged Clean Power Plan represented a “transformative expansion [of EPA’s] regulatory authority.”29 In other words, the Supreme Court concluded that it “effected a ‘fundamental revision of the statute, changing it from [one sort of] scheme of . . . regulation’ into an entirely different kind.”30 In discussing this factor, the Court focused on whether the challenged action transformed the role of the regulator (i.e., EPA), not the regulated sector.31 Nebraska32 and the major questions cases cited in West Virginia33 contain similar analyses of whether the agency action represented a transformation of the agency’s authority. [EPA-HQ-OAR-2022-0829-0601, pp. 6-8]

29 West Virginia, 142 S. Ct. at 2610.

30 Id. at 2612 (citation omitted).

31 See id.; see also Mayes v. Biden, 67 F.4th 921, 934–35 (9th Cir. 2023) (focusing not on whether the government sought “to regulate a significant portion of the American economy,” but on whether its action “represent[ed] an ‘enormous and transformative expansion in [its] regulatory authority’” (quoting UARG, 573 U.S. at 324)).

32 Nebraska, 2023 WL 4277210, at *13 (“[The Government’s reading of the [statute] . . . would ‘effect a “fundamental revision of the statute, changing it from one sort of scheme of regulation” into an entirely different kind ’” (quoting West Virginia, 142 S. Ct. at 2596) (alterations omitted)).

33 See, e.g., UARG, 573 U.S. at 312, 325 (noting that EPA’s action “would radically expand” the programs at issue, “making them both unadministrable and ‘unrecognizable to the Congress that designed’ them” (citation omitted)); MCI Telecom. Corp. v. Am. Tel. & Tel. Co., 512 U.S. 218, 225, 229, 234 (1994) (finding that the agency action had effected a “basic and fundamental” change that went to the “heart” of the statute and constituted “effectively the introduction of a whole new regime of regulation”).

The economic and political significance of an agency’s action is necessary but insufficient to trigger the major questions doctrine. Although the Supreme Court often references economic and political significance in its major questions cases, these indicators alone have never sufficed to trigger the doctrine. For example, West Virginia’s legal analysis omits any references to economic significance, such as regulatory costs or the number of persons or entities affected. Moreover, the Supreme Court has decided numerous recent cases under sizable government programs without resort to the major questions doctrine, including cases involving gargantuan programs like Medicare34 and myriad other agency actions implicating the energy, utility, and telecommunications industries.35 And although Nebraska discusses economic and political significance, it does so only after reviewing regulatory antecedents and the transformation of the regulatory scheme.36 Much of Nebraska’s economic discussion also focused on the relative costs of the challenged action compared to prior agency actions under the same statute, highlighting how this aspect of the regulatory history demonstrated the action was unlike anything the Secretary of Education had done before.37 [EPA-HQ-OAR-2022-0829-0601, pp. 6-8]

34 See, e.g., Becerra v. Empire Health Found., 142 S. Ct. 2354 (2022); Am. Hosp. Ass'n v. Becerra, 142 S. Ct. 1896 (2022); Azar v. Allina Health Servs., 139 S. Ct. 1804 (2019).

35 See, e.g., EPA v. EME Homer City Generation, L.P., 572 U.S. 489 (2014); Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. 967 (2005); New York v. FERC, 535 U.S. 1 (2002).

36 Nebraska, 2023 WL 4277210, at *12–*13.

37 Id. at *12 (noting that "past waivers and modifications issued under the Act have been extremely modest and narrow in scope").

In short, economic significance38 and political significance are sometimes relevant but have never been sufficient by themselves to trigger the major questions doctrine, which instead also requires examining whether the agency action at issue is of sufficient novelty and breadth to counsel skepticism. Only when the doctrine is so triggered must the agency point to "clear congressional authorization" for the agency's approach.39 But this is not the same as a "clear statement rule"—a phrase found nowhere in the majority opinions in either West Virginia or Nebraska (or any the Court's other major question precedents).40 Or, as Justice Barrett explained in her concurrence in Nebraska, the necessary clear congressional authorization should not be equated with "'an "unequivocal declaration"' from Congress authorizing the precise agency action under review, as [the Court's] clear-statement cases do in their respective domains."41 This explanation of "clear Congressional authorization" reflects the Court's interpretive approach in West Virginia.42 [EPA-HQ-OAR-2022-0829-0601, pp. 6-8]

38 As discussed above, relative economic significance as compared to regulatory antecedents is also relevant and is most appropriately considered when evaluating whether the action is sufficiently novel in scope or size.

39 West Virginia, 142 S. Ct. at 2614 (quoting UARG, 573 U.S. at 324).

40 Natasha Brunstein & Donald L. R. Goodson, Unheralded and Transformative: The Test for Major Questions After West Virginia, 47 WM. & MARY ENV'T L. & POL'Y REV. 47, 95–100 (2022).

41 Nebraska, 2023 WL 4277210, at *17 (Barrett, J., concurring) (quoting Financial Oversight and Management Bd. for P. R. v. Centro De Periodismo Investigativo, Inc., 143 S. Ct. 1176, 1183 (2023)).

42 Brunstein & Goodson, supra note 40, at 99–100 ("[A]lthough a court must approach an agency's assertion of authority with 'skepticism' after having determined it is 'unheralded' and represents a 'transformative' change, if the most natural reading of the statute would permit the agency action, the agency has 'clear congressional authorization' for the action.").

B. EPA Should More Thoroughly Document Regulatory Antecedents for Vehicle Electrification

EPA thoroughly documents antecedents for certain aspects of the Proposed Rule, such as the treatment of upstream emissions and the application of averaging, banking, and trading.43 But EPA should do more to emphasize that its current treatment of vehicle electrification (the issue at the heart of the major questions challenge to the 2021 Rule) is not of sufficient novelty or breadth to trigger the doctrine. Although it is not legally required for EPA to provide regulatory antecedents to survive a major questions challenge, relevant antecedents provided in the regulation itself would assist in a future defense of the rule.44 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

43 Proposed Rule, 88 Fed. Reg. at 29,245 (averaging, banking, and trading); id. at 29,252 (treatment of upstream emissions).

44 See Richard L. Revesz & Max Sarinsky, Regulatory Antecedents and the Major Questions Doctrine, GEO. ENV'T L. REV. (forthcoming 2023) (manuscript at 29).

The Proposed Rule includes only a limited discussion of how EPA's current approach to electrification continues that of prior rulemakings.45 EPA should say more. EPA's brief in the D.C. Circuit defending the 2021 Rule presents a table of greenhouse gas vehicle regulations that considered electrification, complete with pincites.46 At a minimum, EPA should incorporate this table by reference (as the Proposed Rule already does for the same brief's discussion of the regulatory antecedents for averaging, banking, and trading47). [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

45 E.g., Proposed Rule, 88 Fed. Reg. at 29,297 (noting that "[i]n EPA's 2021 rule that set GHG emission standards for MYs 2023 through 2026, we projected that manufacturers would comply with the 2026 standards with about 17 percent PEVs at the industry-wide level"); id. at 29,243 (describing the history of advanced technology credits for hybrid powertrains, all-electric vehicles, and fuel cell electric vehicles for heavy-duty vehicles).

46 Brief for EPA at 16 tbl.1, Texas v. EPA (D.C. Cir. filed Feb. 24, 2023).

47 See Proposed Rule, 88 Fed. Reg. at 29,233 n.393.

EPA could also provide more detail on these antecedents. For instance, EPA might describe specific features and provide quotations demonstrating that EPA has consistently exercised its power to consider and incentivize electrification.48 For example, the 2012 Rule was projected to increase electric vehicle penetration from 0% to 2% by model year 2025,49 and to increase penetration of mild hybrid electric vehicles from 0% to 26%.50 And the 2020 Rule was projected to increase fleetwide electric vehicle sales to 7.9% by model year 2029, as compared to 6.9% had EPA not required emissions reductions.51 (These increases are relatively small in absolute numbers because these rules covered model years in which electric vehicles were at the bottom of an S-shaped curve, which is how adoptions rates are typically represented.52 But the adoption rate for electric vehicles is now increasing more rapidly after a critical mass has been reached.53) In addition to greenhouse gas rules, EPA may also discuss the Tier 2 criteria pollutant standards from 2000, in which the agency established a zero-emissions-vehicles bin and weighted these vehicles double when calculating a manufacturer's fleet average NOX emissions.54 EPA retained a zero-emissions bin for the Tier 3 standards in 2014.55 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

48 See Revesz & Sarinsky, supra note 44, at 24–25.

49 EPA, REGULATORY IMPACT ANALYSIS: FINAL RULEMAKING FOR 2017–2025 LIGHT-DUTY VEHICLE GREENHOUSE GAS EMISSION STANDARDS AND CORPORATE AVERAGE FUEL ECONOMY STANDARDS 3-48 tbl.3.5-19, 3-54 tbl.3.5-25 (2012) [hereinafter 2012 RIA].

50 Compare id. 3-48 at tbl.3.5-19 with id. at 3-54 tbl.3.5-25.

51 NHTSA & EPA, FINAL REGULATORY IMPACT ANALYSIS: THE SAFER AFFORDABLE FUEL-EFFICIENT (SAFE) VEHICLES RULE FOR MODEL YEAR 2021–2026 PASSENGER CARS AND LIGHT TRUCKS 2018 tbl.VIII-11 (2020).

52 E.g., Everett M. Rogers, Diffusion of Innovations 344 (5th ed. 2003) (describing S-shaped adoption curve).

53 Tom Randall, US Crosses the Electric-Car Tipping Point for Mass Adoption, BLOOMBERG (July 9, 2022), https://www.bloomberg.com/news/articles/2022-07-09/us-electric-carsales-reach-key-milestone (discussing the S- shaped technology adoption curve and noting that the United States has crossed the 5% market share "tipping point" that triggers "rapidly accelerating demand").

54 Brief of Amicus Curiae Margo Oge & John Hannon at 25, Texas v. EPA (D.C. Cir. filed Mar. 8, 2023) (citing 65 Fed. Reg. 6,698, 6,734 tbl. IV.B.–2A, 6,746 (Feb. 10, 2000)).

55 Id. at 27 (citing 79 Fed. Reg. 23,414, 23,714 tbl. 2 of § 86.1811-17(b)(4)(i) (Apr. 18, 2014)).

Finally, EPA should provide more historical examples of how its standards have caused manufacturers to adopt emerging technologies. For example, just looking at the 2010 and 2012 rules reveals numerous potentially helpful examples: [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

- The 2010 Rule was projected to boost the penetration of six-speed dual-clutch transmission from 7% to 55% by model year 2016.56 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

- The 2010 Rule was projected to boost the penetration of 42-volt stop-start hybrid system technology from 3% to 42%.57 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

- The 2012 Rule was projected to boost the penetration of high-efficiency gearbox technology from 0% to 95% by model year 2025.58 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

- The 2012 Rule was projected to boost the penetration of exhaust gas recirculation technology from 6% to 68%.59 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

- The 2012 Rule was projected to boost the penetration of lower rolling resistance tires from 0% to 97%.60 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

- The 2012 Rule was projected to boost the penetration of engine friction reduction technology from 0% to 95%.61 [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

56 Compare EPA, REGULATORY IMPACT ANALYSIS: FINAL RULEMAKING TO ESTABLISH LIGHT-DUTY VEHICLE GREENHOUSE GAS EMISSION STANDARDS AND CORPORATE AVERAGE FUEL ECONOMY STANDARDS 4-22 tbl.4-10 (2010) with id. at 4-25 tbl.4-13.

57 Id.

58 2012 RIA, supra note 49, at 3-48 tbl.3.5-19, 3-54 tbl.3.5-25.

59 Id.

60 Id.

61 Id.

The Proposed Rule's discussion of legal authority already mentions how "EPA's CAA Title II emissions standards have been based on and stimulated the development of a broad set of advanced automotive technologies, such as on-board computers and fuel injection systems."62 But EPA could further plumb these and other examples to demonstrate that the Proposed Rule's treatment of vehicle electrification would not transform EPA's authority as a regulator. To the extent that EPA regulations have previously considered the adoption of electronic/computerized updates of once-analog vehicle components,63 EPA should document these especially relevant examples as further support for its current consideration of electric motors. [EPA-HQ-OAR-2022-0829-0601, pp. 8-10]

62 Proposed Rule, 88 Fed. Reg. at 29,233.

63 See Oge & Hannon, supra note 54, at 21–22 (describing how "[m]anufacturers transformed the combustion process from a mechanical one to a sophisticated system with feedback loops, run by computers with electronic sensors and controls," and "[e]lectronic controls were developed to optimize the [catalytic] converter's efficiency"); 2012 Rule, 77 Fed. Reg. at 62,672 (noting that EPA tailpipe standards have "stimulated the development of a much broader set of advanced automotive technologies, such as on-board computers and fuel injection systems, which are the building blocks of today's automotive designs and have yielded not only lower pollutant emissions, but improved vehicle performance, reliability, and durability").

C. EPA Should Better Contextualize the Proposed Rule's Economic Significance, in Both Relative and Absolute Terms

EPA could better insulate the Proposed Rule from a future major questions challenge by providing a more nuanced discussion of economic effects, both as compared to prior EPA tailpipe rules and in absolute terms.64 In terms of relative costs, the Proposed Rule already notes that the estimated average cost to manufacturers per vehicle is within the range of costs projected in prior tailpipe rules.65 EPA could strengthen this point by also providing a table that comprehensively describes annualized costs of prior tailpipe rules updated for inflation.66 This table would bolster EPA's conclusion that the costs of the Proposed Rule are not exceptional. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

64 EPA does make clear that the projected BEV penetration rate of 67% by 2032 should be compared to the projected 39% penetration under the No Action case, not today's penetration rate. Compare Proposed Rule, 88 Fed. Reg. at 29,329 tbl. 80, with id. tbl. 81.

65 Proposed Rule, 88 Fed. Reg. at 29,343.

66 Governing for Impact & Evergreen Action, Comment Regarding NPRM "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles" 10–12 (July 5, 2023).

EPA should further underscore this point by explaining that this cost similarity with prior regulations obtains even though the Proposed Rule would simultaneously establish GHG and criteria pollutant standards, instead of only one or the other. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

In terms of absolute economic significance, EPA discusses BEV adoption primarily in terms of the annual percentage of new vehicle sales,67 but an even more useful statistic would be the percentage of BEVs out of all the vehicles on the road at a given time. First and foremost, doing so would help the public better comprehend the rule's anticipated effects. It may be easier to conceptualize increased vehicle electrification in terms of the percentage of vehicles on the road, rather than the percentage of new sales. Presenting the data in this way would also help the public to better understand how the Proposed Rule would affect transportation emissions, the need for charging infrastructure, the demand for gasoline, and the demand for vehicle repair and maintenance services. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

67 Proposed Rule, 88 Fed. Reg. 29,329 tbl.80.

In terms of the major questions doctrine, reporting such data would provide compelling context regarding economic significance. For example, under the proposed program, in 2032, new vehicle sales would be 67% BEVs compared to 39% under the No Action case.68 But BEVs would comprise only 21.2% of the total fleet compared to 15% for the No Action case.69 [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

68 Id. & id. at 29,329 tbl.81.

69 This presentation would also enable a more apt comparison to the stock numbers of electricity generation that the Supreme Court noted in West Virginia's background section. West Virginia, 142 S. Ct. at 2593.

The RIA provides two figures that relate to this issue: Figure 9-1 depicts the total number of internal combustion engine (ICE) vehicles on the road every year under the proposed program, and Figure 9-2 does the same for BEVs.70 Using EPA's data underlying these two figures,71 Policy Integrity generated the table below showing percentage rates by year for the No Action case, EPA's proposed program, and Alternative 1. (For brevity, this table provides figures annually from 2027–2032, and then every five years beginning in 2035.) EPA should provide such a table or similar information in the regulation. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

70 RIA at 9-2 tbls. 9-1, 9-2.

71 Optimization Model for Reducing Emissions of Greenhouse Gases from Automobiles, EPA (Apr. 2023), https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions- greenhouse-gases (download "Light- and medium-duty effects (zip); select "20230315_091353_effects_central"; select "20230315_091353_cost_effects_annual.csv"; refer to "registered_count").

Table 1: Share of BEVs in U.S. Fleet by Year

Year	No Action BEV %	Proposed Program BEV %	Alt. 1 BEV %
2027	5.2%	5.7%	5.7%
2028	6.9%	8.1%	8.3%
2029	8.9%	11.1%	11.2%
2030	11.0%	14.3%	14.6%
2031	13.1%	17.7%	18.0%
2032	15.0%	21.2%	21.6%
2035	19.2%	30.8%	31.7%
2040	24.6%	44.1%	46.0%
2045	27.4%	52.6%	55.3%
2050	28.4%	56.6%	59.8%
2055	29.2%	58.1%	61.5%

[EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

As Table 1 illustrates, under both the proposed program and Alternative 1, the share of BEVs out of all cars in the U.S. vehicle fleet compared to the No Action case increases gradually, reaching less than seven percentage points higher than the No Action case by 2032. This difference increases in later years. This relatively slow growth—particularly when viewed in comparison to the share of all vehicles sold per year, which EPA provides in the Proposed Rule—is not surprising given that cars remain on the road for many years, and the new cars sold in a single year reflect a small percentage of vehicles on the road at that time. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

Monetizing climate impacts may also be legally required. In 2007, the U.S. Court of Appeals for the Ninth Circuit held that the federal government must monetize climate impacts when it conducts a cost-benefit analysis. In Center for Biological Diversity v. National Highway Traffic Safety Administration, the Ninth Circuit remanded a fuel economy rule to the Department of Transportation (DOT) for failing to monetize the benefits of carbon dioxide reductions in its regulatory analysis.153 The Court recognized the presence of uncertainty in the valuation of climate damages, but explained that "the value of carbon emissions reduction is certainly not zero."154 By failing to value the benefit of greenhouse gas emission reductions in its analysis, the Court continued, DOT effectively ignored the adverse impacts of greenhouse gas emissions and thus "put a thumb on the scale by undervaluing the benefits . . . of more stringent standards."155 [EPA-HQ-OAR-2022-0829-0743, p. 23]

153 Ctr. for Biological Diversity, 538 F.3d at 1198–1203 (9th Cir. 2008).

154 Id. at 1200.

155 Id. at 1198.

In the Proposed Rule, EPA monetizes not only the expected benefits of the proposal but also the expected compliance costs from industry. EPA then compares quantified cost and benefit estimates in determining whether and how to regulate, as instructed by federal guidance and executive order.158 Capturing climate benefits is thus essential to ensuring a balanced analysis. As the Ninth Circuit has recognized, "failure to monetize the most significant benefit of more stringent standards: reduction in carbon emissions"—while continuing to value estimated compliance costs—would "put a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards."159 [EPA-HQ-OAR-2022-0829-0743, p. 24]

158 Exec. Order No. 12,866 § 1(a), 58 Fed. Reg. 51,735 (Oct. 4, 1993) (directing that "in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits").

159 Ctr. for Biological Diversity, 538 F.3d at 1198–99.

2. The Working Group Did Not Bias Its Estimates by Ignoring Positive Impacts of Climate Change

Critics sometimes claim that the Working Group's social cost values ignore important positive impacts of a warming climate. Examples that have been offered to support this argument include alleged agricultural benefits from higher temperatures and decreased wintertime mortality. But these arguments are legally and factually dubious, and miss the forest for the trees. [EPA-HQ-OAR-2022-0829-0743, pp. 26-27]

Mere omission of some impacts does not counsel for abandoning the social cost estimates, particularly since independent experts—and EPA's Draft SC-GHG Update—widely agree that those estimates likely undervalue true climate damages because they omit far more negative effects than positive ones. For instance, the Working Group has explained that several of the underlying economic models omit certain major damage categories such as catastrophic damages and certain cross-regional spillover effects.176 These effects can be massive: One paper, for instance, finds that the inclusion of tipping points doubles the social cost estimates,177 with another paper concluding that the effect is even greater and thus the Working Group's existing values “may be significantly underestimating the needs for controlling climate change.”178 The current consensus of experts puts damages for a 3°C increase at roughly 5% to 10% of gross domestic product,179 which is substantially higher than the damages estimated by the IAMs.180 And as the Ninth Circuit has explained, the presence of some omitted damages does not provide a legal basis to ignore established methodologies to monetize climate damages, since while “there is a range of [plausible] values, the value of carbon emissions reduction is certainly not zero.”181 [EPA-HQ-OAR-2022-0829-0743, pp. 26-27]

176 2010 TSD, supra note 171, at 26, 32.

177 Derek Lemoine & Christian P. Traeger, Economics of Tipping the Climate Dominoes. 6 NATURE CLIMATE CHANGE 514 (2016).

178 Yongyang Cai et al., Environmental Tipping Points Significantly Affect the Cost-Benefit Assessment of Climate Policies, 112 PROCS. NAT’L ACADS. SCIS. 4606 (2015).

179 See, e.g., Peter Howard & Derek Sylvan, Inst. for Pol’y Integrity, Gauging Economic Consensus on Climate Change 25 (2021) (reporting mean estimate of 8.5% GPD loss and median estimate of 5% loss, based on elicitation of over 700 climate-policy experts).

180 2010 TSD, supra note 171, at 9 fig.1A (showing range of GDP loss below 5% for 3°C temperature increase).

181 Ctr. for Biological Diversity, 38 F.3d at 1200.

For the reasons discussed in supra Section I and elsewhere in this letter, Alternative 1 would not substantially increase legal risk under the major questions doctrine. Alternative 1 relies on the same regulatory approaches that have considerable precedent in prior EPA tailpipe rules.212 It also has similar effects on BEV penetration.213 [EPA-HQ-OAR-2022-0829-0601, pp. 30-31]

212 See generally supra Part I.B.

213 See supra p. 10 tbl.2.

Accordingly, barring a compelling reason otherwise, EPA should select the regulatory alternative that maximizes net benefits—according to EPA’s current analysis, Alternative 1. [EPA-HQ-OAR-2022-0829-0601, pp. 30-31]

Organization: Job Creators Network Foundation (JCNF)

EPA’s Proposed Rule Is Illegal

To begin, JCNF does not believe that EPA has the legal authority to issue these proposed regulations. Although it claims authority under the Clean Air Act to promulgate such a transformative rule, recent decisions issued by the United States Supreme Court indicate that the CAA does not give EPA such broad authority. In what has come to be known as the “major questions doctrine,” the Court has rejected agency claims of authority to act when the claim of authority concerns an issue of “vast ‘economic and political significance’” and Congress has not expressly delegated such vast power to the agency.2 While the doctrine has “arisen from all corners of the administrative state,”3 in West Virginia v. EPA the Court applied it to EPA’s power under the CAA.3 In that case the Court rejected EPA’s attempt to use the CAA to “substantially restructure the American energy market.”5 [EPA-HQ-OAR-2022-0829-0709, pp. 1-2]

2 Congressional Research Service, “The Major Questions Doctrine,” (Link: https://crsreports.congress.gov/product/pdf/IF/IF12077) In Focus (Nov. 2, 2022).

3 Biden v. Nebraska, Slip Op. at 24 (June 30, 2023).

4 West Virginia v. EPA, 142 S. Ct. 2587 (2022).

5 Id. at 2610.

By requiring that sixty-seven percent of new vehicle sales be electric by 2032, with this proposed rule the agency would restructure the entire automobile industry. Absent express authorization from Congress, EPA does not have the legal authority to issue this rule. [EPA-HQ-OAR-2022-0829-0709, pp. 1-2]

Organization: John Graham

EPA’s Response to Comments document for the 2023-2026 light-duty standards dismissed lifecycle arguments as irrelevant since the Agency has not proposed to address a possible change in the “form” of the standard. However, lifecycle emissions are not a “form of the standard”, they are part of what determines the total amount of CO2 emissions caused by vehicles. It is disingenuous to suggest that, for example, selecting between footprint- and weight-based adjustments to the standards, which is well accepted as a change in the form of the standards, is the same as ignoring CO2 emissions equivalent to 40% of 2021 ICEV emissions. Delaying indefinitely a move to a lifecycle standard is not technology-neutral, as it retards HEV deployment and innovation, while hurting the environment and the economy. [EPA-HQ-OAR-2022-0829-0585, p. 38]

Therefore, we are requesting that EPA also consider our comment as a petition for rulemaking (under the APA and CAA) to adopt a lifecycle emissions standard for vehicles. If necessary, the agency could go final with the 2027 standards with the tailpipe metric and hold on finalization of the 2028-2032 standards until the lifecycle rulemaking is completed. This would ensure that automakers have ample lead time (4-5 years) to adjust to the new lifecycle metric and the new lifecycle performance standards. [EPA-HQ-OAR-2022-0829-0585, p. 38]

Organization: Kentucky Office of the Attorney General et al.

The Proposed Rule tries to expand EPA’s authority under Section 202 of the CAA to force automobile manufacturers to build fewer vehicles with internal combustion engines and make more EVs instead—many more, and quickly. The numbers are staggering: EPA expects that the proposal will create enough EVs to penetrate 67% and 46% of overall light- and medium-duty vehicle sales respectively in less than a decade. 88 Fed. Reg. at 29,329, 29,331. Forcing that market transformation goes far beyond the statutory limits Congress set. And it is bad policy. [EPA-HQ-OAR-2022-0829-0649, p. 3]

The Agency points to no textual hook for the Proposed Rule in Section 202—much less a connection clear enough to support the hefty political and economic issues at stake. [EPA-HQ-OAR-2022-0829-0649, p. 3]

The Proposed Rule also generates tension with the regulatory efforts of agencies in other areas. As described above, the Department of Transportation, through NHTSA, has the authority to set average fuel economy standards for automobiles. 49 U.S.C. § 32902(a). EPA and NHTSA have previously acted in concert. Now that those efforts have been bifurcated, EPA's proposals could limit dramatically not just the effect of NHTSA's regulatory scheme, but also automakers' ability to comply with the suite of regulations. It seems this may have been the plan all along. See Private Pet'r Opening Br., Texas v. EPA, No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF No. 1996915, at 9-10 ("Before joining the administration, the heads of the Council on Environmental Quality and EPA's Office of Air and Radiation (which wrote this rule) advocated this 'decoupling' precisely so that EPA could take 'a bolder approach on light duty vehicle electrification.'" (quoting Climate 21 Proj., Transition Memo: Environmental Protection Agency 11 (2021))). But EPA has no authority to wield this kind of power and reduce NHTSA's role in this way, especially considering that Congress has spoken clearly that NHTSA "may not consider" EV fuel economy in setting its own standards. 49 U.S.C. § 32902(h)(1). EPA's apparent attempt to expand its own authority under the CAA ignores the broader statutory context. [EPA-HQ-OAR-2022-0829-0649, p. 5]

The Proposed Rule also does not grapple with the fact that EPA needs more than a "plausible textual basis" to issue rules that, as here, implicate significant political and economic issues. West Virginia v. EPA, 142 S. Ct. 2587, 2610 (2022). Indeed, the proposal is long on explaining that climate change "threatens human health." 88 Fed. Reg. at 29,207. And it does not hide the ball that the Agency is "forc[ing] the industry to" make EVs that it would not otherwise. Id. at 29,233 (quoting International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 634-35 (D.C. Cir. 1973)). But the Proposed Rule is short on explaining how Congress made it "clea[r]" that the CAA "authoriz[es] [the] agency to exercise powers of [such] 'vast economic and political significance." [EPA-HQ-OAR-2022-0829-0649, pp. 5-6]

Alabama Ass'n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021) (quoting Utility Air Regul. Grp. v. EPA, 573 U.S. 302, 324 (2014) ("UARG")). [EPA-HQ-OAR-2022-0829-0649, pp. 5-6]

So the reality is that the Proposed Rule is another EPA attempt to "substantially restructure" an important sector of the American economy. West Virginia, 142 S. Ct. at 2610. Yet in the 263 Federal Register pages the Proposed Rule spans, the Agency does not reckon with the Supreme Court's recent rebuke of a similarly "transformative expansion" of "regulatory authority," UARG, 573 U.S. at 324, nor explain where Congress clearly delegated EPA power to remake the nation's car fleets. [EPA-HQ-OAR-2022-0829-0649, p. 6]

In fact, many of the same indicators that made West Virginia "a relatively easy case for the [major questions] doctrine's application," are present here, too. 142 S. Ct. at 2621 (Gorsuch, J., concurring). The "serious[ness] [of] the problem"—in both cases, climate change policy—does not excuse an attempt to exert "authority in a manner that is inconsistent with the administrative structure that Congress enacted into law." FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 125 (2000) (cleaned up). Rather, regulating in an area that remains "the subject of an earnest and profound debate across the country" should counsel more restraint, not less. West Virginia, 142 S. Ct at 2614. Yet the Proposed Rule shifts a longstanding scheme to regulate internal combustion engine vehicles into one that erases most of those same cars from the market. Major questions often follow "transformative expansion[s]" of agency power like these. West Virginia, 142 S. Ct. at 2614 (cleaned up); see also id. at 2612 (describing agency interpretations that "effect a fundamental revision of [a] statute, changing it from [one sort of] scheme of . . . regulation into an entirely different kind"). [EPA-HQ-OAR-2022-0829-0649, p. 6]

Organization: Kentucky Office of the Attorney General et al.

EPA first regulated GHG emissions from motor vehicles following the Supreme Court's decision in Massachusetts v. EPA, which held that EPA had certain authority under the CAA to regulate greenhouse gas emissions from new motor vehicles. 549 U.S. 497 (2007). Following the Massachusetts decision, EPA issued an endangerment finding for "six well-mixed greenhouse gases," including carbon dioxide ("CO2"). 74 Fed. Reg. 66,496 (Dec. 15, 2009). EPA then promulgated its initial standards for these gases through joint rulemaking with the National Highway Traffic Safety Administration ("NHTSA"). NHTSA is authorized to set corporate average fuel economy standards under the Energy Policy and Conservation Act, Pub. L. No. 94-163, 89 Stat. 871 (1975). [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

The first of these joint EPA-NHTSA rulemakings occurred in 2010. At that time, EPA and NHTSA set initial CO2 emissions standards for model years 2012–2016 and later. 75 Fed. Reg. 25,234 (May 7, 2010). In 2012, EPA and NHTSA set new, more stringent CO2 emissions standards for model years 2017–2025 and later. 77 Fed. Reg. 62,624 (Oct. 15, 2012). In 2020, EPA and NHTSA issued a rule ("the 2020 Rule") that revised the standards for model years 2022– 2025, making those standards less stringent and setting a new standard for model years 2026 and later. 85 Fed. Reg. 24,174 (Apr. 30, 2020). [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

Then President Biden took office and began instituting his climate agenda. By executive order, he required the whole of the federal government to commit the full extent of its authority to reducing GHG emissions. Executive Order on Tackling the Climate Crisis at Home and Abroad, Exec. Order No. 14008 of January 27, 2021 ("[W]e must combat the climate crisis with bold, progressive action that combines the full capacity of the Federal Government with efforts from every corner of our Nation, every level of government, and every sector of our economy."). In response, EPA revised the CO2 emissions standard for model years 2023 and later (the "2021 Rule"). 86 Fed. Reg. 74,434 (Dec. 30, 2021). [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

The 2021 Rule fundamentally changed EPA's approach to the regulation of motor vehicle emissions. Previously, emissions standards occurred via joint rulemaking with NHTSA and were set in concert with its promulgation of fuel economy standards. This approach made sense because emissions and fuel economy standards are inextricably linked. But the President's climate agenda made joint rulemaking with NHTSA problematic. NHTSA is statutorily prohibited from considering the fuel economy of EVs when setting fuel economy standards. 49 U.S.C. § 32902(h)(1). Consequently, to avoid legal impediments to the President's climate agenda, the 2021 Rule decoupled EPA emissions standards from NHTSA fuel economy standards. The State of Texas, the Commonwealth of Kentucky, and other state and private petitioners challenged the 2021 Rule in the United States Court of Appeals for the D.C Circuit. Texas, et al. v. EPA, et al., Case No. 22-1031. Those challenges remain pending. [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

In December 2021, President Biden issued yet another executive order, stating that "America must lead the world on clean and efficient cars and trucks" by "bolstering our domestic market by setting a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles." Strengthening American Leadership in Clean Cars and Trucks, Exec. Order 14037 of August 5, 2021. In support of this policy, the President specifically dictated that "[t]he Administrator of the Environmental Protection Agency (EPA) shall, as appropriate and consistent with applicable law, consider beginning work on a rulemaking under the [CAA] to establish new multi-pollutant emissions standards, including for greenhouse gas emissions, for light- and medium-duty vehicles beginning with model year 2027 and extending through and including at least model year 2030." Id. [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

The Proposed Rule is the result of the President's mandate. The Proposed Rule sets "increasingly stringent" standards for CO2. 88 Fed. Reg. at 29,240. For light-duty passenger cars, the proposal would require a reduction in emissions from 152 grams of CO2 emitted per mile traveled ("g/mile") for model year 2026 to 73 g/mile for model years 2032 and later—a reduction of 52%. 88 Fed. Reg. at 29,239. For light-duty trucks, the Proposed Rule would require a reduction from 207 g/mile for model year 2026 to 89 g/mile for model years 2032 and later—a reduction of 57%. Id. Fleet-wide for all light-duty vehicles, the Proposed Rule would require a reduction in emissions from 186 g/mile for model year 2026 to 82 g/mile for model years 2032 and later—a reduction of 56%. Id. at 29,239-29,240. For medium-duty vehicles, the Proposed Rule would require a reduction in CO2 emissions from 438 g/mile for model year 2027 to 275 g/mile for model years 2032 and later—a reduction of 37%. Id. at 29,243. In addition to the revised CO2 standards, EPA's proposal establishes more stringent emissions standards for non-methane organic gases plus nitrogen oxides, particulate matter, carbon monoxide, and formaldehyde. [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

I. The Proposed Rule Exceeds EPA's Statutory Authority.

The Proposed Rule violates EPA's statutory limitations in several ways. EPA may "prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(1). Such standards "shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." Id. § 7521(a)(2). [EPA-HQ-OAR-2022-0829-0649, p. 4]

A vehicle must be tested to determine whether it complies with emissions standards. The administrator "shall test, or require to be tested in such a manner as he deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer to determine whether such a vehicle or engine conforms with the regulations prescribed under section 7521 of this title." 42 U.S.C. § 7525(a)(1). If a vehicle or engine complies, each manufacturer must "indicate by means of a label or tag permanently affixed to such a vehicle or engine that such vehicle or engine is covered by a certificate of conformity issued for the purpose of assuring achievement of emissions standards prescribed under section 7521 of this title." Id. § 7541(c)(3)(C). [EPA-HQ-OAR-2022-0829-0649, p. 4]

The Proposed Rule exceeds EPA's authority because EPA is permitted to set emissions standards only for classes of new motor vehicles that "cause, or contribute to, air pollution." 42 U.S.C. § 7521(a)(1). But EPA asserts that EVs do not emit CO2. 88 Fed. Reg. at 29,252 ("Electric vehicle operation would therefore continue to be counted as 0 g/mile."). If EVs are not subject to the Agency's emissions standards, then it follows that EPA cannot include EVs in any calculations that determine those emissions standards. By allowing EVs to help set standards for internal combustion engines, the Proposed Rule puts its thumb on the scale of free markets. This preference for EVs goes well beyond EPA's statutory role, as it contemplates a wholesale substitution of a new vehicle or engine rather than the mere "application" of a "technology" to an existing vehicle or engine type. 42 U.S.C. § 7521(a)(2). [EPA-HQ-OAR-2022-0829-0649, p. 4]

And even if a shift to EVs could be termed the "development and application of [a] requisite technology," EPA has failed to recognize the "period" that will be "necessary" to develop and implement that technology, as required. 42 U.S.C. § 7521(a)(2). [EPA-HQ-OAR-2022-0829-0649, p. 4]

But as for EVs, EPA does not adequately explain how it can expand its authority to designate certain batteries and other "associated electric powertrain components" in the same way. Id. at 29,286-29,287. It says only that the expansion is an important one, and that these components "were not in general use prior to 1990" and exceed the necessary cost threshold. Id. Missing, of course, is an adequate explanation of how these batteries and other nameless associated electric powertrain components qualify as "pollution control device[s] or component[s]" under the statute. 42 U.S.C. § 7541(i)(2). And given the robust body of state warranty law already in place, a power grab this bold—and in an area (consumer protection) that is typically under the purview of other agencies—needs a much more thorough explanation than the passing one EPA provided. [EPA-HQ-OAR-2022-0829-0649, pp. 4-5]

Congress has also "conspicuously and repeatedly declined to enact" legislation targeting the precise issues the Proposed Rule presses, West Virginia, 142 S. Ct. at 2610, making EPA's "claimed delegation all the more suspect," Gonzales v. Oregon, 546 U.S. 243, 267 (2006); cf. Private Pet'r Opening Br., Texas v. EPA, No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF No. 1996915, at 28-29, 31-33 (noting that Congress "remains in factfinding mode" on the issue of electrification and has "previously considered and rejected multiple bills with effects similar to EPA's rule"); see also Letter to the EPA Administrator of May 25, 2023, https://bit.ly/42EwSBI (letter from 27 U.S. Senators asking EPA to withdraw the Proposed Rule because, among other things, it "violates the separation of powers"); Letter to the EPA Administrator of May 22, 2023, https://bit.ly/43AvMs7 (letter from over 150 members of the U.S. House of Representatives expressing concern about the "unworkable and impractical" standards in the Proposed Rule). [EPA-HQ-OAR-2022-0829-0649, pp. 7-8]

So there is a strong potential that reviewing courts will conclude that whether EPA can force electrification of the vast majority of the nation's automobile industry is a major question that only Congress can answer, or else it must delegate in exceedingly clear terms. And just as in West Virginia, the Proposed Rule fails to identify the necessary textual hook. It is not enough to say that the proposal just "prescribe[s] . . . standards" for a "class" of vehicles. 42 U.S.C. § 7521(a)(1). When the rule deliberately forces car dealers to take two-thirds of the most common types of vehicles off showroom floors to meet those "standards," the rule has morphed into something else. Under the Proposed Rule's approach, for instance, EPA could "demand much greater reductions in emissions based on a very different kind of policy judgment" than what technology allows for existing fleets: "that it would be 'best' if" internal combustion engine vehicles "made up a much smaller share of" automobile manufacturing and sales. West Virginia, 142 S. Ct. at 2612. What, after all, would stop EPA from "go[ing] further, perhaps forcing" automakers "to cease making [internal combustion engine vehicles] altogether"? Id. [EPA-HQ-OAR-2022-0829-0649, pp. 7-8]

And recall that Congress went out of its way to recognize that rules under this portion of the CAA may need waiting periods "to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance." 42 U.S.C. § 7521(a)(2). Again, and as detailed below, EPA is ignoring this requirement by putting automakers in the impossible position of trying to satisfy the Proposed Rule's fast-and-furious production demands with a supply chain that is not ready for it, and at the cost of innovation that would have otherwise improved EV efforts in the short and long term. Clearly, Congress was concerned with not outpacing existing technology. In other words, though EPA can put a thumb on the scale to speed developments along, it cannot use its standard-setting power to will new fleets into existence that the market cannot deliver. [EPA-HQ-OAR-2022-0829-0649, pp. 7-8]

II. The Proposed Rule Is Arbitrary And Capricious.

The Administrative Procedure Act requires EPA "to engage in reasoned decisionmaking, and directs that agency actions be set aside if they are arbitrary or capricious." Dep't of Homeland Sec. v. Regents of the Univ. of Cal., 140 S. Ct. 1891, 1905 (2020) (cleaned up). Courts will evaluate whether the Proposed Rule "was based on a consideration of the relevant factors and whether there has been a clear error of judgment." Id. (cleaned up). So among other things, EPA must show that it "examined the relevant data and articulated a satisfactory explanation for [its] decision, including a rational connection between the facts found and the choice made." Dep't of Com. v. New York, 139 S. Ct. 2551, 2569 (2019) (cleaned up). "Unsubstantiated or bare assumptions" are not enough. Nat. Res. Def. Council v. EPA, 31 F.4th 1203, 1207 (9th Cir. 2022) (cleaned up). [EPA-HQ-OAR-2022-0829-0649, p. 8]

The Proposed Rule would not survive this review for several reasons. EPA built it on faulty premises and inaccurate cost-benefit projections. And EPA ignored critical aspects of the problem that make the Proposed Rule's world unrealistic and dangerous. [EPA-HQ-OAR-2022-0829-0649, p. 8]

Organization: Landmark Legal Foundation

Further exacerbating its affronts against the separation of powers, the Proposed Rule also violates the Major Questions Doctrine. According to the EPA's own projections, this regulation could incur up to $565 billion in costs to industry. 88 Fed. Reg. 29,199n130 (see: Table 156) (May 5, 2023). This figure comes from the "present future value" of repair, maintenance, and refueling time costs that this regulation imposes. [EPA-HQ-OAR-2022-0829-0547, pp. 4-5]

In just the past two years, the U.S. Supreme Court struck down several economically overreaching agency actions. In 2021, the Justices upheld a stay on a nationwide eviction moratorium instituted by the HHS, concerned by economic costs that could be estimated at "nearly $50 billion." Alabama Assoc. of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021). Last year, the Court struck down an EPA program which would have raised nationwide electricity costs by "over $200 billion." West Virginia v. EPA, 142 S. Ct. 2587, 2623 (2022) (Gorsuch, J., concurring). In both cases, the tremendous economic burden factored heavily into their rulings. A government program costing the public over $565 billion would fall well within the totals established by these earlier Major Questions Doctrine cases. [EPA-HQ-OAR-2022-0829-0547, pp. 4-5]

Levying such dramatic economic impacts via a federal regulation, and without a clear delegation from Congress, is not within the prerogatives of the executive branch. The government may not justify hundreds of billions in costs to the public by accounting for the “benefits” of reducing SC-GHGs, which totals themselves were estimated in a manner that lacked public comment. At best, to do so is a colossal regulatory mistake. At worst, it is an intentional deception of the American public. [EPA-HQ-OAR-2022-0829-0547, pp. 4-5]

Organization: Mario Loyola

Discussion

A. Statutory Background

In the Proposed Rule, EPA proposes to set standards for multiple pollutants from multiple classes and categories of vehicles and engines in MYs 2027-2032, under multiple provisions of the CAA. With respect to “Light Duty Vehicles” (“LDVs”), which includes cars and light trucks, the Proposed Rule would promulgate standards under Section 202(a)(1) of the CAA. With respect to “Medium Duty Vehicles” (“MDVs”), which includes heavy-duty pickups and vans, the Proposed Rule would promulgate standards under Section 202(a)(3). [EPA-HQ-OAR-2022-0829-0689, pp. 2-3]

Section 202(a)(1) is the general standard-setting provision for mobile sources, while Section 202(a)(3) provides further specificity for heavy-duty vehicles (which includes MDVs) with respect to emissions of hydrocarbons and certain criteria pollutants, and does not apply to most GHGs . The two sections differ with respect to how standards are set and what factors EPA must consider in setting them. Section 202(a)(1) authorizes the EPA’s Administrator to set “standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” Section 202(a)(2) provides that any regulation promulgated under the basic provision of (a)(1) can only take effect “after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.” For heavy duty vehicles (including MDVs), Section 202(a)(3) further requires that emissions standards must “reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology.” [EPA-HQ-OAR-2022-0829-0689, pp. 2-3]

Both sections refer to standards applicable to “classes or categories” of vehicles. For LDVs, EPA has used a system of “footprint” classification, with different standards applicable to different classes of vehicle depending on the surface area covered by the vehicle, in square feet. For MDVs, by contrast, EPA relies on a “work factor” classification that it has used for heavy-duty vehicles, with different standards applicable to different vehicles depending on a weighting of factors that include payload and towing capacity. Importantly, Section 202(a)(3)(A)(ii), which provides that the Administrator “may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors,” applies only to the classes or categories of heavy-duty vehicles mentioned in paragraph (a)(3)(A), which in turn applies mostly to criteria pollutants, and does not apply to most GHGs. [EPA-HQ-OAR-2022-0829-0689, pp. 2-3]

It is important to highlight that the Proposed Rule's GHG emission standards for both LDVs and MDVs would be promulgated under Section 202(a)(1). [EPA-HQ-OAR-2022-0829-0689, pp. 2-3]

B. Battery Electric Vehicles Do Not Belong to Any Class of Vehicle Subject to Regulation under Title II of the CAA.

EPA is explicit about its purpose in the Proposed Rule: "Our analysis projects that for the industry overall, 65 percent of new vehicles in MY 2032 would be BEVs,"7 referring to fully electrical vehicles.8 That compares to less than six percent of new vehicle registrations for fully electric vehicles last year.9 As EPA says in the Proposed Rule: [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

7 88 Fed. Reg. at 29,342.

8 EPA distinguishes between Batery Electric Vehicles ("BEVs"), which are fully electric, and other sorts of electric vehicles, such as hybrids.

9 Ana Faguy, "Planned EPA Rules Could Make 67% of New U.S. Cars Electric by 2032," Forbes, April 12, 2023.

Among the range of technologies that have been demonstrated over the past decade, electrification technologies have seen particularly rapid development and lower costs, and as a result the number of PEVs projected across all the policy alternatives considered here is much higher than in any of EPA's prior rulemaking analyses. In particular, BEVs have zero tailpipe emissions and so are capable of supporting rates of annual stringency increases that are much greater than were typical in earlier rulemakings.10 [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

10 88 Fed. Reg. at 29341

The Proposed Rule is designed to accomplish its mission by imposing emissions standards on new motor vehicles so strict that no vehicle powered by an internal combustion engine would be able to comply with them. Hence, if the Proposed Rule applied only to vehicles with emissions subject to regulation under the CAA, the rule would not satisfy statutory requirements, which include feasibility and reasonable cost-of-compliance. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

EPA gets around this by what amounts to a clever accounting trick. It defines the "classes" of vehicles subject to Title II as including EVs, even though, according to EPA, they have zero emissions and should therefore be excluded from regulation under the CAA entirely. EPA then sets "emission standards" that reflect not its estimate of how much time manufacturers of regulated vehicles would need to develop and adopt any emissions-control technology on the vehicles subject to regulation—the determination required by Section 202 of the CAA—but rather only its estimate of the average emissions from vehicles of various sizes that would result from its guestimate of the extent to which EVs will displace combustion engine vehicles during the MYs in question. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

Because Title II of the CAA provides no guidance on how the Administrator is to define the "class or classes" of vehicles subject to Section 202(a)(1), the phrase "any class or classes of new motor vehicles" must be given its natural, plain meaning. While the Administrator doubtless has wide latitude to define the classes subject to regulation under Section 202(a)(1), and no federal court has ruled on this precise question, the phrase "class or classes of new motor vehicles" cannot mean whatever the Administrator wants it to mean. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

The phrase could not, for example, include both electric scooters and gasoline-powered cars, even though both are "motor vehicles" under the Clean Air Act.11 The structure of Title II clearly precludes that possibility. Section 202(a)(2) provides that any standard issued under Section 201(a) can only take effect after "such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." Common sense dictates that this could not be read as authorizing EPA to force car manufacturers to produce electric scooters instead of cars in order to comply with emissions standards under Title II. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

11 The CAA defines "motor vehicle" as "any self-propelled vehicle designed for transporting persons or property on a street or highway." Section 216, 42 U.S.C. Sec. 7550.

Section 202(a)(1) obviously contemplates that a "class or classes of new motor vehicles" will share a common configuration, such that "the requisite technology" can be developed and applied to all vehicles of a future MY of that vehicle class. In that sense, "class or classes of new motor vehicles" is akin to the source categories under the New Source Performance Standards program of Section 111. Clearly, EPA could not define Portland Cement Manufacturing to include artisanal pottery for the purpose of imposing the latter's emissions rates on the former. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

One further observation bears mentioning in this connection. Section 202(a) authorizes EPA to regulate emissions "from any class or classes of new motor vehicles." EPA has made no effort to study the emissions from battery EVs, because, as it explains in the Proposed Rule, "BEVs have zero tailpipe emissions." But Section 202 is not limited to "tailpipe emissions." Its purview is much broader, referring to emissions "from" new motor vehicles. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

That the word "from" is susceptible of a broader meaning becomes clear when one considers that in the Proposed Rule, EPA continues the practice, introduced in the 2014 "Tier 3" final rule, of "considering the vehicle and its fuel as an integrated system."12 As the Proposed Rule explains, "The Tier 3 standards achieved reductions of up to 80 percent in tailpipe criteria pollutant emissions by treating the engine and fuel as an integrated system and requiring cleaner fuel as well as improved catalytic emissions control systems."13 [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

12 Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards",79 Fed. Reg. 23414, 23416 (April 28, 2014).

13 88 Fed. Reg. at 29188.

EPA's practice of treating "the engine and fuel as an integrated system" is fully in keeping with the general scope of Section 202(a). There is no reason, and no reasonable basis, for EPA not to follow this same practice with EVs that EPA insists on including EVs in its definition of "classes" of new motor vehicles subject to Title II. EVs are not perpetual motion machines. Like all other motor vehicles, they use fuel, namely the fuel needed to produce the electricity needed to charge them. And that fuel—only a small fraction of which is renewable—produces significant emissions, including carbon emissions. The difference between EVs and combustion engine vehicles is not that EVs have zero emissions, but rather that their emissions occur elsewhere than at the tailpipe. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

This is particularly important considering the massive increases in electrical grid capacity that would be required by a transition to widespread EV use. There is a limit to how much renewable energy can be put on a grid while still maintaining grid reliability, and under current technology the limit appears to be quite low: At 30 percent renewable, the California grid is beset by a massive excess of solar electricity in the middle of the day and is often on the verge of blackouts by evening, particularly in summer months.14 Hence, in the near term, the Proposed Rule will result in a massive increase in the need for dispatchable power, which (given the long construction and permitting lead-times of nuclear power) can only come from coal and natural gas. That puts the Proposed Rule on a collision course with the EPA's proposed new power plant rule,15 which will require many coal and natural gas plants to cease operations at the same time as the Proposed Rule on vehicle emissions will require many more such plants to be built. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

14 Mario Loyola, "Unleashing America's Energy Abundance Permitting Reform Is Vital for Affordable Clean Energy," Competitive Enterprise Institute, September 27, 2022.

15 New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 Fed. Reg. 33240 (May 23, 2023).

EPA's failure to recognize that power plant emissions associated with EVs should be considered "emissions from" such vehicles is understandable, given that Title II of the CAA was clearly not designed with EVs in mind. That only highlights the absurdity of including them in the same "classes of new motor vehicles" as combustion engine vehicles subject to regulation under Title II. It also highlights the great political significance of the choices that EPA is taking upon itself to make, on the basis of sweeping powers that it claims to have found in a long-extant provision of the Clean Air Act that explicitly delegates no such power. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

C. EPA's Interpretation of Section 202(a) Would Give it Sweeping Powers to Reorganize the American Economy.

The Supreme Court recently struck down a rule very similar to the Proposed Rule, namely the 2015 Clean Power Plan. In West Virginia v. EPA,16 the Court took a close look at EPA's authority to set emissions limits for existing stationary sources under Section 111(d) of the CAA. Section 111(d) provides that EPA may set, for particular source categories, the emissions limits that are achievable by application of the "best system of emissions reduction" that has been adequately demonstrated in that source category. [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

16 142 S. Ct. 2587 (2022).

That standard, known as "BSER," had always been interpreted to refer to technologies, such as scrubbers, that sources like coal plants could feasibly install within the facility to reduce emissions. But in a move at least as clever as defining "classes" of gasoline vehicles to include EVs, EPA decided that the BSER could extend beyond the fence line to the whole economy, encompassing utilities' choice of power sources for generating electricity—a matter that the Federal Power Act specifically leaves to the states and, in certain situations, to the Federal Energy Regulatory Commission.17 Under its power to regulate emissions from coal plants, the Clean Power Plan would have forced states to switch to natural gas and eventually renewables. Indeed, as originally proposed the Clean Power Plan would have established EPA's authority to control how and when people are allowed to use electricity in their own homes.18 [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

17 16 U.S.C. §§ 791-828c (1940), as amended.

18 See, Block 4 (demand side) BSER, "Carbon Emissions Guidelines for Existing Stationary Sources: Electrical Utility Generating Units," 79 Fed. Reg. 34,830 (June 18, 2014) (proposed rulemaking).

As the Supreme Court explained, once EPA expanded the concept of "BSER" from power plants to utilities' choice of power sources, it could set the emission standard at whatever level it liked:

The Agency recognized that—given the nature of generation shifting—it could choose from "a wide range of potential stringencies for the BSER." 80 Fed. Reg. 64730. Put differently, in translating the BSER into an operational emissions limit, EPA could choose whether to require anything from a little generation shifting to a great deal.19 [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

19 142 S. Ct. at 2603.

The standards in the Clean Power Plan "resulted in numerical emissions ceilings so strict that no existing coal plant would have been able to achieve them without engaging in [generation-shifting]."20 The Court went on to note, "Rather than focus on improving the performance of individual sources, it would improve the overall power system by lowering the carbon intensity of power generation. And it would do that by forcing a shift throughout the power grid from one type of energy source to another":21 [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

20 142 S. Ct. at 2604.

21 142 S. Ct. at 2611 (quotations and citations omitted).

On EPA's view of Section 111(d), Congress implicitly tasked it, and it alone, with balancing the many vital considerations of national policy implicated in deciding how Americans will get their energy. EPA decides, for instance, how much of a switch from coal to natural gas is practically feasible by 2020, 2025, and 2030 before the grid collapses, and how high energy prices can go as a result before they become unreasonably "exorbitant." There is little reason to think Congress assigned such decisions to the Agency.22 [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

22 142 S. Ct. at 2612.

"We presume that Congress intends to make major policy decisions itself, not leave those decisions to agencies."23 The same may be said of the Proposed Rule. Its emissions limits are so strict that no manufacturer of combustion engine vehicles will be able to comply with it except by switching to the production of a completely different type of vehicle. The switch from traditional cars to renewable cars is the definition of a major policy decision, and nowhere in the

CAA does it say that Congress wanted EPA to make the choice of where, how, and when that switch should happen. [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

23 142 S. Ct. at 2609 (quotations and citations omitted).

"In arguing that Section 111(d) empowers it to substantially restructure the American energy market," the Supreme Court held, "EPA claimed to discover in a long-extant statute an unheralded power representing a transformative expansion in its regulatory authority."24 That is virtually indistinguishable from what EPA is trying to do in the Proposed Rule: It is claiming to have found in a long-extant statute the power to substantially restructure the transportation sector, and with it, a major part of the American economy. [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

24 142 S. Ct. at 2610 (quotations and citations omitted).

In West Virginia v. EPA, the Court held that the EPA's sudden discovery of a "transformative expansion" in its regulatory authority based on an obscure provision of "a long-extant statute" raised a "major question" about the agency's authority, requiring Congress to speak with far greater clarity than it had in the statute. The EPA's expansive definition of BSER entailed impacts of great political significance and sought to regulate a significant portion of the American economy. [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

Just so, EPA's infinitely elastic interpretation of its authority under Title II of the CAA presents a major question. The claimed power entails impacts of great political significance and would regulate a significant portion of the American economy. [EPA-HQ-OAR-2022-0829-0689, pp. 6-7]

Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

Outcomes

The final standards should:

- Ensure the LDV and HDV standards support greater zero-emission vehicle adoption by considering market growth expected from IRA and IIJA investments (which will surpass existing commitments outlined in Executive Order 14037);
- Put the nation on a trajectory to ensure 100 percent of all LDVs and HDVs sold in 2035 are zero-emission vehicles including pathway milestones assuring continuous progress; and
- Reflect recently adopted state LDV and HDV emissions standards, consistent with state authority under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0732, p. 2]

By implementing these recommendations, we believe that the resultant standards will not only meet the Clean Air Act's statutory command to protect public health, but will also help lower fuel costs for consumers, create good, green jobs, and reduce burden on frontline communities. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Organization: National Association of Clean Air Agencies (NACAA)

Importance of More Protective Federal Standards for Light-Duty Vehicle and Medium-Duty Vehicle Emissions of Multiple Pollutants [EPA-HQ-OAR-2022-0829-0559, p. 2]

The U.S. transportation sector has surpassed the manufacturing and power generation sectors as the largest source of GHG emissions in the country, representing over 27 percent of total GHG emissions nationwide. However, in numerous areas of the country the contribution of the transportation sector is far greater – 40 percent or more. Light-duty vehicles (LDVs) alone, not even considering the medium-duty vehicles (MDVs) also addressed by this rule, are the largest contributor nationwide to transportation-sector GHG emissions at 57 percent and are responsible for 15.5 percent of total U.S. GHG emissions. LDVs are also responsible for an overwhelming portion of pollutants that cause or contribute to ozone and soot and cancer-causing pollutants, particularly in disadvantaged communities, reinforcing the need for continuously strengthened standards to cut, and eventually eliminate, emissions from these vehicles.6 [EPA-HQ-OAR-2022-0829-0559, p. 2]

6 Supra note 1, at 29,186

In its March 20, 2023, "AR6 Synthesis Report: Climate Change 2023," the United Nations Intergovernmental Panel on Climate Change concludes, among many other things, that 1) "Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850–1900 in 2011–2020. Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals"; 2) "Policies and laws addressing mitigation have consistently expanded since AR5. Global GHG emissions in 2030 implied by nationally determined contributions (NDCs) announced by October 2021 make it likely that warming will exceed 1.5°C during the 21st century and make it harder to limit warming below 2°C. There are gaps between projected emissions from implemented policies and those from NDCs and finance flows fall short of the levels needed to meet climate goals across all sectors and regions"; and 3) "For any given future warming level, many climate-related risks are higher than assessed in AR5, and projected long-term impacts are up to multiple times higher than currently observed. Risks and projected adverse impacts and related losses and damages from climate change escalate with every increment of global warming. Climatic and non-climatic risks will increasingly interact, creating compound and cascading risks that are more complex and difficult to manage."7 [EPA-HQ-OAR-2022-0829-0559, p. 2]

7 https://www.ipcc.ch/report/ar6/syr/

Organization: National Association of Convenience Stores (NACS) et al.

V. EPA's Proposed Rule Is a "Major Question" Reserved for Congress.

EPA's proposed standards should not favor one technology over another. The Proposed Rule, however, goes beyond favoritism and signals the Agency's intention to phase out non-EV technologies, such as ICE vehicles. Despite EPA's assertions to the contrary, the Proposed Rule mandates non-ICE technologies because auto manufacturers cannot comply with the standards through the sale of ICE vehicles alone. And EPA explicitly anticipates EV adoption rates high and above current market rates to achieve these standards. By MY2032, EPA predicts an EV adoption rate between 62–78 percent across all subcategories of vehicles to achieve compliance with the proposed standards.44 The Proposed Rule will therefore introduce a transformational shift in the automotive industry—including the fuel retail industry—far beyond that which EPA has authority to mandate as delegated by Congress. Whether this shift is necessary and how best to achieve such a shift are "major questions" reserved for Congress and Congress alone.45 [EPA-HQ-OAR-2022-0829-0648, pp. 14-15]

44 Proposed Rule at 29,329.

45 Importantly, the U.S. Supreme Court reaffirmed the "major questions" doctrine just one week ago, concluding that the tradeoffs "inherent in a mass debt cancellation program 'are ones that Congress would likely have intended for itself." Biden v. Nebraska, No. 22-506, slip op. at 24–25 (Jun. 30, 2023) (internal citations omitted) (applying major questions doctrine to strike down student loan repayment program that will cost taxpayers approximately $500 billion and affects nearly every student loan borrower). Similarly, the tradeoffs inherent in a mass EV-adoption program are those that Congress would have intended for itself, not EPA.

Consistent with the "major questions doctrine," Congress must "speak clearly" to authorize an agency to exercise powers of "vast economic and political significance."46 Overreaching environmental regulatory programs like the Proposed Rule fit precisely into this doctrine. In West Virginia v. EPA, the Supreme Court invoked the doctrine when it held that EPA had exceeded its statutory authority in adopting the Clean Power Plan.47 Through the Clean Power Plan, EPA sought to reduce emissions by requiring utilities and other power generators to transition from coal-fired power to natural gas and, ultimately, renewable energy sources rather than by imposing source- specific requirements reflective of the best available emission reduction technologies, as it had done in the past.48 EPA announced the Clean Power Plan would dictate "what the market share of coal, natural gas, wind, and solar must be, and then require[e] plants to reduce operations or subsidize their competitors to get there."49 The Supreme Court struck down the proposed program, concluding that EPA's relied upon "vague statutory grant" within the Clean Air Act was far from the "clear authorization required" for a regulatory program that would have major economic and political significance, impacting vast swaths of American life, and substantially restructuring the American energy market.50 [EPA-HQ-OAR-2022-0829-0648, pp. 14-15]

46 Nat'l Fed. Of Indep. Bus. v. Dep't of Labor, 595 U.S. , slip op. at 6 (Jan 13, 2022); see also Ala. Assoc. of Realtors v. Dep't of Health & Human Servs., 141 S. Ct. 2485, 2489 (2021); Utility Air Regulatory Group v. EPA, 573 U.S. 302, 324 (2014); U.S. Telecom Assoc. v. FCC, 855 F.3d 381, 419-21 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc) (explaining provenance of "major rules doctrine").

47 West Virginia v. EPA, 597 U.S. (2022).

48 Id.

49 Id., slip op. at 33, n. 4.

50 Id., slip op. at 24.

EPA's Proposed Rule presents an analogous situation. Mandating a rapid shift from ICE to EV technology will reshape the American automotive market with profound and far-reaching collateral effects, thus encroaching on an issue of "vast economic and political significance." These standards are contrary to natural market forces and would vastly alter what consumers are able to purchase by indirectly requiring the production of a product different from that currently being purchased (e.g., ICE vehicles). The Proposed Rule forces both the manufacturers' and consumer's hand in requiring rapid scaling to meet production lead times and adoption rate requirements that would not exist but for EPA's electrification mandate. [EPA-HQ-OAR-2022-0829-0648, pp. 14-15]

Further evidencing EPA's lack of authority, the Proposal attempts to sidestep regulatory requirements established by the Energy Policy and Conservation Act of 1975 ("EPCA") and the Energy Independence and Security Act ("EISA"). Pursuant to these authorities, NHTSA has the authority to issue Corporate Average Fuel Economy (CAFE) standards, but may not consider the fuel economy of EVs in doing so.58 Notably, this restricts how NHTSA evaluates the technological feasibility of fuel economy standards. Thus, joint rulemakings by EPA and NHTSA for complementary emissions and CAFE requirements ensure that manufacturers can comply with both agencies' standards with the same fleet. Foregoing a joint rulemaking, as EPA does here, ignores Congress's determination that EVs cannot be taken into account when considering what the maximum feasible fuel economy level from which to develop regulations. Importantly, this directly contravenes the underlying premise of the Supreme Court's holding in Massachusetts v. EPA—"[EPA and NHTSA] obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency."59 That EPA ignores these directives undercuts Congress' intent in EPCA and regulating in a way that is inconsistent with NHTSA's authority as well as its own.60 [EPA-HQ-OAR-2022-0829-0648, pp. 16-17]

58 49 U.S.C. § 32902(h). Here, NHTSA may not consider the fuel economy of "dedicated automobiles," which are defined as those that operate only on "alternative fuel." Alternative fuel, in turn, includes electricity. 49 U.S.C. § 32901(j).

59 Massachusetts v. EPA, 549 U.S. 497, 532 (2007) ("The [EPA and NHTSA] obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.").

60 Id.

Moreover, EPA has never before claimed authority to mandate even partial electrification—similar to EPA's reliance on Section 111(d) of the Clean Air Act for promulgation of the Clean Power Plan. Congress has made clear that it, not EPA, must make policy decisions— or, rather, answer the "major question"—regarding if, when, and how the American automotive industry will transition from ICE vehicles to EVs. In the 116th Congress (2019–21), Congress introduced 44 bills seeking to reduce petroleum-based fuel consumption and GHG emissions from the transportation sector through customer rebates, vehicle and fuel producer incentives, local funding, development of standards, and research and development.61 But none went so far as to propose the mass adoption of EVs through the phase-out of ICE vehicles.62 In fact, Congress rejected one bill that would have banned the sale of new light-duty ICE vehicles by 2040,63 and it has continuously disapproved of EPA's efforts to hamstring the automotive sector with more stringent air pollution standards than are feasible.64 [EPA-HQ-OAR-2022-0829-0648, pp. 16-17]

61 CONGRESSIONAL RESEARCH SERVICE, "Alternative Fuel and Vehicles: Legislative Proposals" (Jul. 28, 2021).

62 Id.

63 See Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018); see also 116 Cong. Rec. 19238-40 (1970) (proposed amendment to Title II that would have banned ICE vehicles by 1978).

64 See, e.g., S. J. Res. 11, 118th Cong. (2023). (Although passed only by the Senate thus far, the joint resolution calls for disapproval of the rule submitted by the Administrator of the Environmental Protection Agency relating to "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 88 Fed. Reg. 4296 (January 24, 2023).)

More telling, in the wake of the Proposed Rule and EPA's parallel proceedings proposing new standards for light-duty vehicles,65 members of Congress have requested that the Agency rescind the proposals, asserting they "effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction."66 That Congress intended for it, not EPA, to direct these policy decisions is made all the more clear by the passage of the Bipartisan Infrastructure Law67 and the Inflation Reduction Act68 whereby Congress identified the policy levers it deemed appropriate. Congress could have, but did not, direct EPA to establish a fleet-wide credit trading regime to further drive EV development and rapid adoption. Instead, the Proposed Rule stands in direct contrast to other legislation, such as the RFS, whereby Congress mandated that "gasoline sold or introduced into commerce in the United States" must contain a year-over-year increasing share of renewable fuels69 and, in 2022, must include tens of billions of gallons of renewable fuel.70 An EPA-mandated shift in transportation technology from vehicles that can operate on increasing volumes of renewable fuel to EVs does not square with such requirements. Consequently, Congress, not EPA, should determine how to regulate electrification of transportation and the many industries affected thereby.71 [EPA-HQ-OAR-2022-0829-0648, pp. 16-17]

65 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,184 (May 5, 2023).

66 Letter from Senator Shelley Capito, et al. to Administrator Michael S. Regan, EPA (May 25, 2023).

67 Public Law 117–58, November 15, 2021.

68 Public Law 117–169, August 16, 2022.

69 42 U.S.C. § 7545(o)(2)(A)(i).

70 Id., § 7545(o)(2)(B); 87 Fed. Reg. 39,600 (July 1, 2022).

71 See "Grassley-Cornyn Bill Pulls Plug on Latest Biden Boon for EVs" (May 18, 2023), available at https://www.grassley.senate.gov/news/news-releases/grassley-cornyn-bill-pulls-plug-on-latest-biden-boon-for-evs (discussing proposed legislation entitled "No Fuel Credits for Batteries Act" introduced to "preserve the integrity of the Renewable Fuels Standard" in light of EPA's proposed E-RINS rule").

Similar to the Supreme Court's finding in West Virginia, EPA lacks congressional authorization in the Clean Air Act to impose a shifting manufacturing standard to a preferred powertrain and effectively require regulated manufacturers to phase out combustion engine technology. EPA's authority to impose emissions standards is limited to that provided in Section 202(a) of the Clean Air Act. The Proposed Rule results in fleet-wide standards that cannot be met by ICE vehicles alone; however, under the Clean Air Act, EPA's authority is limited to setting individual vehicle-level "standards" for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicles engines, which … cause or contribute to," potentially harmful air pollution.51 The plain language of this provision authorizes EPA to set standards for classes of individual vehicles or engines that emit air pollutants. EVs do not have tailpipe emissions, however. Thus, operating such vehicles alone cannot "cause, or contribute to," air pollution. In stark contrast to "clear congressional authorization," Section 202(a) of the Clean Air Act provides EPA no authority to set fleet-wide standards, and certainly not standards beyond that which could be achieved by improvements to the tailpipe emissions of ICE vehicles. Even if EPA had such authority, it could not lawfully use it to force electrification by including vehicles that have no tailpipe emissions in the fleetwide average standard for ICE vehicles. [EPA-HQ-OAR-2022-0829-0648, pp. 15-16]

51 42 U.S.C. § 7521(a)(1).

EVs are simply not the "technology" contemplated by Congress. Instead, Congress enabled EPA to increase emission standard stringency through cleaner fuels and improved emissions-related systems to be incorporated into ICE vehicles such as advances in fuel injection, exhaust gas combustion management, and advances catalysts to neutralize pollutants of concern.52 By factoring in EV performance as a part of its averaging scheme, EPA is ignoring the technological feasibility of emissions-related systems and simply requiring the production of fewer ICE vehicles. EPA does not consider advances to ICE technologies under the Proposed Rule. [EPA-HQ-OAR-2022-0829-0648, pp. 15-16]

52 For example, Section 202(m) requires the monitoring of "emission-related systems" such as the "catalytic converter and oxygen sensor." 42 U.S.C. § 7521(m)(l).

The Clean Air Act similarly says nothing about averaging across fleets or banking and trading credits across different model years, different vehicle classes, and manufacturers for criteria pollutants emitted from ICE vehicles. Despite EPA previously adopting fleetwide averaging, it acknowledges that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act."53 And "[j]ust as the statute does not explicitly address EPA's authority to allow averaging, it does not address the Agency's authority to permit banking and trading."54 By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading in a manner that mandates electrification of the national vehicle fleet of motor vehicles and motor vehicle engines. [EPA-HQ-OAR-2022-0829-0648, pp. 15-16]

53 48 Fed. Reg. 33,456, 33,458 (July 21, 1983)

54 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same).

The structure of the Clean Air Act and its regulatory provisions for standard setting, certification, compliance enforcement, warranties, and penalties also directly conflict with a fleet- wide averaging regulatory regime. Notably, under Section 202(a), EPA "shall test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer" and issue a certificate of conformity "if such vehicle or engine" complies with the standards.55 And EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such a system enables such vehicle or engine to conform to the standards required to be prescribe under [Section 202(b)] of the Act.56 Section 202(b)(3) further authorizes EPA to grant waivers from certain nitrogen-oxide emission standards-which, again, are standards "under" Section 202(a), for no "more than five percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater."57 This provision would be nonsensical under a fleetwide-averaging regime where, if applied, a manufacturer could essentially give itself a waiver for large swaths of its fleet by electrifying certain product lines. Taken together, the Clean Air Act regulatory framework contemplates EPA regulating vehicles on an individual basis according to the powertrain of those vehicles. This cannot be accomplished if there is not a clear emission standard applicable to a single vehicle at the start of a model year. Thus, EPA lacks clear authorization from Congress to impose a regulatory program restructuring the American automotive market. [EPA-HQ-OAR-2022-0829-0648, pp. 15-16]

55 42 U.S.C. § 7525(a)(1).

56 42 U.S.C. § 7525(a)(2).

57 42 U.S.C. § 7521(b)(3).

Organization: Our Children's Trust (OCT)

The Earth's Energy Is Imbalanced and thus the EPA's Must Cease Infringing the Constitutional Rights of Youth. EPA has Public Trust and Constitutional Obligations to use its Authority to Protect the Atmosphere. [EPA-HQ-OAR-2022-0829-0542, p. 3]

Under the 5th Amendment to the U.S. Constitution, the government is restrained from engaging in conduct that infringes upon fundamental rights to life, liberty, and property, and equal protection of the law, all of which includes a climate system that sustains human life and liberty. Under the Public Trust Doctrine, embedded in our Constitution and other founding documents, and in the very sovereignty of our Nation, U.S. residents (both present and future, i.e., Posterity) have a right to access and use crucial natural resources, like air and water. The U.S. government, and its executive agencies, have fiduciary duties as trustees to manage, protect, and prevent substantial impairment to our country's vital natural resources which the government holds in trust for present and future generations. 20 [EPA-HQ-OAR-2022-0829-0542, p. 5]

20 Juliana v. United States, 217 F. Supp. 3d 1224, 1254 (D. Or. 2016).

Given the fact that U.S. government conduct has resulted in a quarter of all global GHG emissions that are causing the current climate catastrophe, it is well past time for the EPA to take all steps within its power to ensure its GHG emission standards for cars and trucks are aligned with the best available science and are eliminating tailpipe GHG emissions from all new vehicles by 2030, which is technically feasible and economically beneficial, and at minimum by 2035. EPA must set a national ambient air quality standard for greenhouse gases immediately, including a CO_2 standard of 350 ppm, as it has been petitioned to do, which will protect children and require climate stabilization. Without immediate effective action, our children and future generations will continue to suffer injury with long-lasting and potentially irreversible consequences. 21 [EPA-HQ-OAR-2022-0829-0542, p. 6]

21 See Assessing "Dangerous Climate Change"; James Hansen et al., Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming Could be Dangerous, 16 Atmos. Chem. & Phys. 3761 (2016); U.S. Global Change Research Program, Fourth National Climate Assessment, Vol. II (2018).

Organization: Pacific Legal Foundation (PLF)

PLF offers comments to highlight the serious separation-of-powers problems with the Proposed Tailpipe Rule. The American people delegated to Congress the legislative power to make the laws and policies governing society. And for good reason: the Constitution's lawmaking process provides checks and balances to protect against arbitrary government and ensure the government will not restrict freedom without broad consensus.1 Indeed, the Constitution's structural provisions reflect the founding generation's deep conviction that lawmaking should be hard and that “checks and balances were the foundation of a structure of government that would protect liberty.”2 The Proposed Tailpipe Rule contravenes this fundamental first principle and should be withdrawn. [EPA-HQ-OAR-2022-0829-0680, pp. 1-2]

1 See Bond v. United States, 564 U.S. 211, 222–23 (2011) (finding the Constitution’s “checks and balances” protect individual liberty); Myers v. United States, 272 U.S. 52, 293 (1926) (Brandeis, J., dissenting) (“The doctrine of the separation of powers was adopted by the convention of 1787 not to promote efficiency but to preclude the exercise of arbitrary power.”).

2 Bowsher v. Synar, 478 U.S. 714, 722 (1986).

First, the Proposed Tailpipe Rule violates the major questions doctrine. That doctrine establishes that executive agencies cannot assert unheralded regulatory power over issues of vast political and economic significance without clear congressional authorization. Yet that is what the Proposed Tailpipe Rule seeks to do. At the President’s direction, EPA is attempting to phase out the internal combustion engine and alter the automobile market without clear authority from Congress. Congress did not give EPA the power to reshape the entire auto industry through the Clean Air Act’s broad language. [EPA-HQ-OAR-2022-0829-0680, pp. 1-2]

Second, if Congress gave EPA the unfettered discretion to alter the automobile market— with no limiting principle on its power to do so—then the Clean Air Act violates the Constitution’s nondelegation doctrine. Article I of the Constitution delegates only to Congress the power to enact legislative policy, and it cannot delegate that power to the executive branch. Yet under the EPA’s reading of the Act, Congress has given EPA unbounded authority to set emissions standards at a level forcing automobile manufacturers to shift to electric vehicles. [EPA-HQ-OAR-2022-0829-0680, pp. 1-2]

* * * * *

There is a national debate about what, if any, balance needs to be struck between economic policies and environmental regulation. In our constitutional system, this debate must take place in the legislative branch, but the President and EPA have removed that debate from the American people and are illegally exercising legislative power to strike that balance in the Proposed Tailpipe Rule. If the federal government will revamp an entire industry and force automobile manufacturers to transition their fleets, that policy must come from Congress. Accordingly, EPA should withdraw the proposed rule. [EPA-HQ-OAR-2022-0829-0680, pp. 1-2]

B. The Tailpipe Rule is a sweeping regulation with vast economic and political consequences that Congress has not clearly authorized.

The Proposed Tailpipe Rule’s requirement that the automobile industry “shift” their fleets from the internal combustion engine to electric vehicles is, in effect, a rerun of West Virginia. Indeed, just like West Virginia, the Tailpipe Rule is an example of “presidential administration” seeking to alter an entire sector of the economy under the Clean Air Act with no clear authority from Congress. In this way, it is almost on all fours with West Virginia. [EPA-HQ-OAR-2022-0829-0680, pp. 6-7]

Rather than persuade Congress to enact legislation to regulate automobile emissions and mandate electric vehicles, President Biden issued an executive order. In doing so, he announced his administration’s “goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles."21 To put this policy into practice, he directed EPA to consider suspending, revising, or rescinding the automobile emissions standards issued by his predecessor administration.22 [EPA-HQ-OAR-2022-0829-0680, pp. 6-7]

21 86 Fed. Reg. 43,583, 43,583 (Aug. 5, 2021).

22 86 Fed. Reg. 7037, 7037–38 (Jan. 20, 2021).

EPA responded by issuing substantially more stringent emissions standards for vehicle carbon dioxide emissions in 2022.23 That regulation sought to force the nationwide vehicle fleet to reach 17% electrification by 2026.24 In doing so, EPA attempted to expand its power into new territory: functionally forcing vehicle manufacturers to start shifting their fleet production to an ever-increasing share of electric vehicles. They did that by measuring not whether an individual vehicle complies with the emission standards but whether a manufacturer's fleet as a whole complies after averaging the emissions from vehicles fleet-wide. And that averaging counted electric vehicle emissions as zero. So stringent were those standards that, in EPA's own words, they would "necessitate" that manufacturers "further deploy[]" electric vehicles to comply under the fleet-averaging.25 By some estimates, that rule was the most expensive regulation in the nation's history.26 [EPA-HQ-OAR-2022-0829-0680, pp. 6-7]

23 86 Fed. Reg. 74,434 (Dec. 20, 2021) (effective date Feb 28, 2022).

24 Id. at 74,485.

25 Id. at 74,493.

26 https://www.heritage.org/government-regulation/commentary/the-biden-administrations- electric-vehicle-gambit-illegal-and

That rule is now being challenged by state governments and various industry petitioners as unconstitutional in the U.S. Court of Appeals for the District of Columbia Circuit.27 Yet rather than wait for the outcome of that litigation, EPA is now, less than a year later, seeking to exponentially compound the costs to the American public by mandating that the automobile industry shift to 67% electrification by 2032—which is neither reasonable nor achievable in the time frame mandated by the Proposed Tailpipe Rule.28 [EPA-HQ-OAR-2022-0829-0680, pp. 6-7]

27 Texas v. EPA, Dkt. No. 22-1031 (D.C. Cir. 2022).

28 Comment submitted by Alliance for Automotive Innovation, https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0829-0481.

But it is not just the price tag that makes the Proposed Tailpipe Rule a major question; the proposed rule, like the 2022 rule, is also an unprecedented agency action that would significantly expand EPA's authority.29 EPA is attempting to issue a rule setting emissions standards without the National Highway Transportation and Safety Administration (NHTSA). Why? Because NHTSA operates under a statutory restraint on its discretion to factor electric vehicles into its decision-making.30 By "decoupling" itself from NHTSA, the EPA is expanding its purported authority to transform the automobile market through the forced adoption of electric vehicles. Of course, other factors abound. Directing the automobile market is not within the EPA's expertise and mandating the transition to electric vehicles is a policy that Congress has repeatedly considered but declined to enact into law. [EPA-HQ-OAR-2022-0829-0680, pp. 6-7]

29 The major questions doctrine not only applies for claims of authority specific to an issue addressed in a single case, but also to future uses an agency can use with the power it is claiming. See The Past and Future of the Major Questions Doctrine, supra note 12, at 33 (citing Daniel T. Deacon & Leah M. Litman, The New Major Questions Doctrine, 109 Va. L. Rev. at 3 (forthcoming 2023)).

30 49 U.S.C. § 32902(h)(l).

At bottom, the Tailpipe Rule's attempt to set emissions standards to require manufacturers to shift to electric vehicles—and thus transform the automobile market— is a major question that Congress has not enacted into law. And like West Virginia, its attempt violates the major questions doctrine. [EPA-HQ-OAR-2022-0829-0680, pp. 6-7]

II. If Congress subdelegated the EPA the extraordinary legislative power to alter the entire automobile market through a vague delegation, then the Clean Air Act violates the nondelegation doctrine. [EPA-HQ-OAR-2022-0829-0680, pp. 7-9]

The alternative is that Congress violated the nondelegation doctrine by delegating EPA open-ended legislative authority through a vague provision in the Clean Air Act. But Congress cannot delegate EPA the power in broad, open-ended language to legislate— which is what it is doing by altering the automobile market by mandating manufacturers transition to electric vehicles. Yet under the EPA's reading of the statute, Congress did just that. Indeed, under the agency's reading, "the law would afford it almost unlimited discretion—and certainly, impose no 'specific restrictions' that 'meaningfully constrai[n]' the agency."31 [EPA-HQ-OAR-2022-0829-0680, pp. 7-9]

31 Nat'l Fed'n of Indep. Bus., 142 U.S. at 669 (Gorsuch, J., concurring) (citing Touby v. United States, 500 U.S. 160, 166–67 (1991)).

It is a fundamental rule of the Constitution's Separation of Powers that Congress cannot delegate its lawmaking power to the executive branch.32 That fundamental principle is enforced through the nondelegation doctrine—which requires that Congress resolve fundamental policy issues and provide a governing standard enabling courts to judge whether the executive has faithfully executed, and not made, the law.33 In other words, legislation must provide a governing standard to limit and channel the executive's exercise of discretion; Congress must decide the "important subjects," and the executive is left to merely "fill in the details."34 [EPA-HQ-OAR-2022-0829-0680, pp. 7-9]

32 See U.S. Const. art. I, § 1 ("[a]ll legislative Powers herein granted shall be vested in a Congress of the United States"). See also Gundy v. United States, 139 S. Ct. 2116, 2123 (2019) ("Congress, this Court explained early on, may not transfer to another branch 'powers which are strictly and exclusively legislative.'" (quoting Wayman v. Southard, 23 U.S. (10 Wheat.) 1, 42–43 (1825))); Mistretta, 488 U.S. at 371–72 (quoting U.S. Const. art. 1, § 1).

33 E.g., Caha v. United States, 152 U.S. 210 (1894) (finding that Congress had decided the important subject).

34 Wayman v. Southard, 23 U.S. (10 Wheat.) 1, 43 (1825); see also Gundy v. United States, 139 S. Ct. 2116, 2136 (2019) (Gorsuch, J., dissenting).

Put into practice, the Supreme Court has distilled this precept into a requirement that legislation provide an "intelligible principle" to properly direct the executive branch when it implements statutes.35 For example, in Panama Refining v. Ryan, the Court found a provision of the National Recovery Act (NRA) unconstitutional because it gave unfettered discretion to the

President to decide whether and under what conditions to prohibit the transport of hot oil.36 Even though the statute had the general goal of improving American economic conditions, the NRA was unconstitutional because Congress made no policy decision governing when the proscription applied.37 In other words, the President was not merely left to fill in the details but was simply free to weigh competing policy considerations as he deemed "fit."38 [EPA-HQ-OAR-2022-0829-0680, pp. 7-9]

35 See Whitman v. American Trucking Ass'n, 531 U.S. 457, 472–73 (2001). See also Mistretta, 488 U.S. at 371–72 (1989) (finding that the nondelegation doctrine "is rooted in the principle of separation of powers" and the Constitution's provision that "[a]ll legislative Powers . . . shall be vested in . . . Congress" (quoting U.S. Const. art. 1, § 1)).

36 293 U.S. 388, 430 (1935).

37 Id. at 416–18.

38 Id. at 415.

Under the Clean Air Act, EPA has the power to promulgate "standards which reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology."39 Yet nothing in this grant of authority allows the EPA to regulate in a way that pushes the use of electric vehicles over internal-combustion vehicles. Put another way, under EPA's assertion of authority in the Proposed Tailpipe Rule, the Clean Air Act is essentially a blank check under which the President and EPA may fill in their preferred policy, and Congress will have effectively enacted a law that is "nothing except a raw delegation to enact rules."40 It will have "designated a lawmaker, not a law interpreter."41 [EPA-HQ-OAR-2022-0829-0680, pp. 7-9]

39 42 U.S.C. § 7521(a)(3)(A)(i).

40 G. Lawson & G. Seidman, "A Great Power of Attorney:" Understanding the Fiduciary Constitution 126 (2017).

41 Id.

In short, if Congress delegated EPA the authority to legislate under the Clean Air Act and set emissions standards at a level forcing automobile manufacturers to shift to electric vehicles—despite that being near if not downright impossible—there is simply no limiting, much less intelligible, principle in the statutory scheme. [EPA-HQ-OAR-2022-0829-0680, pp. 7-9]

Conclusion

For these reasons, PLF requests EPA withdraw the Proposed Tailpipe Rule. [EPA-HQ-OAR-2022-0829-0680, pp. 7-9]

Organization: POET, LLC

Incorporating renewable fuels could also shore up the rule against a challenge that it violates precedent of the U.S. Supreme Court in West Virginia v. EPA. That case overturned EPA's Clean Power Plan because the Court determined that EPA's regulatory program went too far toward requiring a shift from conventional sources of electricity generation to renewables, which in the Court's view would have substantially restructured the American energy market.61 Crediting biofuels in the Proposed Rule would have the opposite effect. Biofuels are already a key component of the American transportation sector. This is not the case in which, as the Supreme Court stated in West Virginia v. EPA, the "history and the breadth of the authority that [EPA] has asserted, and the economic and political significance of that assertion, provide a reason to hesitate before concluding that Congress meant to confer such authority."62 Congress has given EPA plain authority to incentivize biofuels under the Clean Air Act and RFS. Those preexisting programs have encouraged producers to make billions of gallons of renewable fuels every year. Congress' mandate was clear. The RFS was meant to encourage the production of renewable fuels that are "used to replace or reduce the quantity of fossil fuel present in a transportation fuel."63 EPA must interpret its § 202 authority in a manner that is consistent with the other directives that Congress has imposed on the transportation sector. [EPA-HQ-OAR-2022-0829-0609, pp. 18-19]

61 See West Virginia, 142 S. Ct. at 2616.

62 Id. at 2595 (quotations omitted).

62 42 U.S.C. § 7545(o)(1)(J).

63 42 U.S.C. § 7545(o)(1)(J).

Organization: Scott Wilson

Assuming the rule is adopted, opponents will turn to the legal system and rely on an alleged bedrock (but actually recently invented) legal concept called the "major questions doctrine". "Major" is in the eye of the beholder. Whether or not a particular trade group is impacted is not a major question, even if it is offset by an economic bonanza for another trade group. Climate change is a major question. Particulate air pollution affecting human health is a major question. Economic cost due to climate impacts is a major question. As far as major questions, this rule will be a major win for Americans. [EPA-HQ-OAR-2022-0829-0515, p. 1]

Organization: Senator Shelley Moore Capito et al.

Forcing a transition to battery electric vehicles (BEVs) through regulation without explicit delegated authority from Congress violates the separation of powers, as reaffirmed by the Supreme Court's decision in West Virginia v. Environmental Protection Agency, 142 S. Ct. 2587 (2022). Under that precedent, the EPA cannot force a wholesale change to "substantially restructure the American energy market" without explicit congressional authorization. According to the EPA' s own analysis for the light- and medium-duty rule, the proposal will require approximately 67 percent of new vehicles sold in model year 2032 to be BEV s - a dramatic shift away from internal combustion engine vehicles, which made up around 95 percent of the new light-duty vehicle market in 2022.1 The heavy-duty vehicle rule will require 40-percent sales of zero-emission vehicles by 2032, up from a mere 0.1 percent globally for heavy-duty trucks and 4 percent globally for bus fleets.2 If finalized, these proposals will effectively require a wholesale conversion from powering vehicles with widely available liquid fuel to charging BEVs off our nation's electric grid. This is a major, multi-billion dollar, policy-driven technology transition mandate to be imposed on American consumers by your Agency, without any semblance of the clear and direct statutory authority required by the ruling in West Virginia v. EPA. [EPA-HQ-OAR-2022-0829-5083, p. 1]

1 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,329.

2 Trends in electric heavy-duty vehicles, IEA (2022).

Organization: Steven G. Bradbury

Congress has not delegated to EPA the power to force the conversion to elec- tric vehicles. [EPA-HQ-OAR-2022-0829-0647, p. 6]

EPA is very candid about the goal of its proposed rules: The Agency is trying to use tailpipe emissions limits on carbon dioxide and criteria pollutants as a tool to coerce the automotive industry to build far more electric vehicles (EVs) than market demand would currently support. [EPA-HQ-OAR-2022-0829-0647, p. 6]

Right now, EVs account for less than 6 percent of new light-duty vehicle sales in the United States and an even lower percentage of medium- and heavy-duty commercial truck sales. Following the script laid down by President Biden in an executive order,12 the EPA is aiming to force those percentages way up—to 60 percent of light-duty vehicle sales by 2030 and 67 percent by 2032. [EPA-HQ-OAR-2022-0829-0647, p. 6]

12 See Executive Order 14037 ("Strengthening American Leadership in Clean Cars and Trucks"), August 5, 2021 (setting goal of 50 percent of U.S. new vehicle sales to be zero-emission vehicles by 2030).

And through these rulemakings, the Agency is proposing to align its regulatory objec- tives with the zero-emission vehicle, or ZEV, mandates recently issued by CARB, the Cali- fornia Air Resources Board, which are designed to phase out the sale of all gas-powered passenger cars and light trucks by 2035 and all medium- and heavy-duty trucks by 2045. The EPA now appears to be committed to a similar trajectory. [EPA-HQ-OAR-2022-0829-0647, p. 6]

It is not surprising the Agency would act to conform its policies to CARB's, since CARB was able to issue its mandates only because the EPA has granted California a special waiver from preemption under the Clean Air Act. Both sets of rules flow from the policy decisions of the EPA in accordance with directions from the White House. [EPA-HQ-OAR-2022-0829-0647, p. 6]

Where does EPA purport to find this authority in the Clean Air Act?

The logic is as follows:

Because most automakers have announced ambitious timetables for transitioning to the production of EVs going forward and have pledged to make large capital investments to finance this gradual switchover,13 and because Congress has recently approved generous federal subsidies for some EV purchases and charging infrastructure,14 EPA says it can now declare that battery-electric vehicle technology is a "feasible" alternative to the tradi- tional internal-combustion engine (ICE) powertrain.15 And on that basis, EPA is proposing to treat EVs as an available "control technology" for achieving compliance with the tailpipe emissions restrictions under Clean Air Act section 202.16 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

13 See 88 FR at 29191, Figure 1 (reproducing a chart prepared by the Environmental Defense Fund depicting the automakers' announced goals for future electrified vehicle sales as a percentage of total sales); id. at 29193-94 (summarizing automakers' announced plans for investments in EV technology).

14 See id. at 29195-96; Infrastructure Investment and Jobs Act, Public Law 117–58, 135 Stat. 429 (2021), https://www.congress.gov/117/plaws/publ58/PLAW117publ58.pdf; Inflation Reduction Act of 2022, Public Law 117–169, 136 Stat. 1818 (2022), https://www.congress.gov/117/bills/hr5376/BILLS117hr5376enr.pdf.

15 See 88 FR at 29194 (light-duty and medium-duty vehicles); 88 FR at 25972 (heavy-duty trucks).

16 See 88 FR at 29284 (for light-duty and medium-duty vehicles); 88 FR at 26015 (for heavy-duty trucks).

This reasoning obviously depends on a kind of feedback loop. The automakers are pledging to invest in the transition to EVs because governments around the world—like China, the EU, the Biden White House, and Governor Gavin Newsom and his climate regulators in California—are demanding that they do so. But everyone knows there is a large looming impediment to this Green Dream: resistance from American consumers. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

The American public is not jumping on the electric bandwagon. EVs are expensive— beyond the reach of many American families—and most Americans remain skeptical that EVs will reliably serve the full range of their needs, that quick and convenient charging stations will be widely available, that EVs will maintain their promised driving range over time or in cold weather, that they will have any significant resale or trade-in value down the road, and that insurance carriers will cover the huge costs of battery replacement when the battery wears out or is damaged in a minor accident.17 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

17 See Nick Carey, Paul Lienert, and Sarah McFarlane, "Scratched EV battery? Your insurer may have to junk the whole car," Reuters, March 20, 2023, https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk-whole-car-2023-03-20/ ("For many electric vehicles, there is no way to repair or assess even slightly damaged battery packs after accidents, forcing insurance companies to write off cars with few miles—leading to higher premiums and under-cutting gains from going electric.").

To push the automakers to convert to EV production in the absence of sufficient mar- ket demand, EPA plans to ratchet down the emissions limits for carbon dioxide and for the traditional criteria and other pollutants associated with smog (such as unburned hydrocar- bons, particulate matter, oxides of nitrogen, and ozone) to super-stringent levels that are technologically impossible for gas-powered vehicles (even hybrids) to satisfy.18 At the same time, EPA is proposing to phase out certain regulatory buffers that allow automakers to report better emissions compliance results, such as "off-cycle credits" for the addition of onboard technologies that improve the fuel efficiency of ICE vehicles.19 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

18 See, e.g., 88 FR at 29237-38; id. at 29257-61.

19 See id. at 29249-50.

The automakers' only recourse will be to replace more and more of the ICE vehicles in their fleets (including hybrids) with the "alternative control technology" of battery-elec- tric vehicles.

And here is the trick: For enforcement purposes, EPA applies the emissions limits to each automaker on a fleetwide average basis, and it proposes to reduce these fleetwide averages dramatically each model year from 2027 through 2032 on a ramp rate calculated to achieve the

Biden administration's desired percentage mix of EVs in the U.S. auto fleets. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

In other words, EPA is now proposing to set fleetwide average tailpipe pollution limits that are intended by design to apply increasingly over time to vehicles that have no tailpipes and that EPA says emit none of the pollutants covered by the regulations.20 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

20 Automakers can avoid violating the average emissions limits in certain circumstances with regulatory "credits," earned by producing vehicles, like EVs, that outperform the limits. Under the EPA's rules, credits can be "banked" from one model year to another within limits, "transferred" from one fleet to another (for example, from the automaker's light truck fleet to its passenger car fleet), or "traded" between automakers, which usually involves a privately negotiated purchase. Tesla, which manufactures nothing but EVs and accounts for approximately 70 percent of the U.S. EV market, receives a large portion of its income from selling emissions credits to the other automakers. Predictably, the EPA is proposing to retain this credit system to continue the subsidization of EV manufacturing. See 88 FR at 26245-46.

EPA should withdraw and reconsider these rulemaking proposals. [EPA-HQ-OAR-2022-0829-0647, pp. 21-22]

In light of the deficiencies in the cost analyses and underlying assumptions laid out above, EPA should withdraw and reconsider both of its proposed tailpipe rules. If EPA had more carefully considered its legal authorities under the Clean Air Act and more thoroughly accounted for the market realities and facts relevant to these proposals, I am confident EPA would not have proposed the radical and far-reaching approach to emissions control reflected in the current proposals. [EPA-HQ-OAR-2022-0829-0647, pp. 21-22]

Even if EPA persists in proposing something along the same lines, at a minimum, it should put these concepts out for public comment in a much more preliminary form—for example, in an advanced notice of proposed rulemaking, or ANPRM. By setting out the general ideas it plans to consider in an ANPRM, EPA could suggest its own preliminary supporting analysis and view of the relevant facts and considerations and then ask for meaningful input on all aspects of the issues, seeking recommendations for alternative approaches from interested parties and the public. That would be more respectful of the American people and all interested stakeholders and would be more accommodating of the need for and the value of greater public input and deliberation. [EPA-HQ-OAR-2022-0829-0647, pp. 21-22]

Such an alternative process would provide the opportunity for EPA to receive deeper and broader information on all sides of the issues raised by these regulatory proposals, as well as a more probing analysis of the scope of EPA's authority to set emissions limits for automobiles and commercial trucks. In that way, an ANPRM process would help redirect EPA's thinking about the true costs, market disruptions, and secondary consequences of its preferred approach and about its authority to undertake these transformational pro- posals. [EPA-HQ-OAR-2022-0829-0647, pp. 21-22]

Organization: Tesla, Inc.

Foundationally, the primary dynamics that have driven progress in the development of EPA's program in the past and its fundamental architecture remain and, if anything, have become even clearer and more imperative, including: the ongoing need to achieve significant additional emissions reductions from the motor vehicle sector, including for conventional pollutants and greenhouse gases; the increasingly capable role of advanced vehicle technologies, led by zero-emissions BEVs, in providing those reductions; the benefits to the automotive industry of achieving a uniform national program integrating California-led and Federal authorities and operating seamlessly across EPA, the Department of Transportation (DOT), and state authorities; and the importance of regulatory stability to the industry -- and of standards of sufficiently long duration -- to foster the significant investment needed to cement this transformation to advanced technology vehicles. The continuation and amplification of these trends provide a sound legal basis for an even more stringent set of standards than EPA's current proposal. [EPA-HQ-OAR-2022-0829-0792, p. 2]

> 6 See, 40 C.F.R. §1037.150(f) (Electric vehicles. Tailpipe emissions of regulated pollutants from electric vehicles . . . are deemed to be zero.).

II. Rapid Electrification of the Light-Duty Vehicle Sector Is Necessary to Protect the Public Health and Welfare

Tesla supports EPA's efforts to accelerate light-duty vehicle electrification as it is essential for reducing greenhouse gas (GHG) and criteria pollutants and addressing the rapidly escalating climate crisis. Regardless of the application, EPA has long considered BEVs to be the most effective mobile source pollution mitigating technology, stating over a decade ago, "From a vehicle tailpipe perspective, EVs are a game-changing technology."38 Additionally, study after study shows BEVs are a superior technology for reducing air pollution and GHG emissions over their lifetime.39 [EPA-HQ-OAR-2022-0829-0792, p. 7]

In short, electrifying the light-duty duty sector will provide significant improvements in air quality and benefits to all Americans through reduced GHG, NOX, PM, and other air pollutant emissions. Tesla believes it is essential for EPA to establish stringent longer-term light-duty multi-pollutant emission standards that actively embrace a more rapid transition to BEVs. A failure of the agency to finalize a performance standard that substantially puts the light-duty sector on a path to full electrification by at least 2035 and sufficiently reduces U.S. emissions commensurate with the country's commitment to holding global warming to well below 2 degrees Celsius would not meet the legal benchmark of the Clean Air Act to protect the nation's public health and welfare. [EPA-HQ-OAR-2022-0829-0792, p. 11]

The Clean Air Act (CAA), and Section 202(a), is directed at protecting public health and welfare. See 42 U.S.C. § 7401 (identifying the Act's purpose as to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population."); 42 U.S.C. § 7521(a)(1) (providing that the Administrator shall prescribe and from time to time revise "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."). The Proposed Rule recognizes that the purpose of adopting standards under CAA section 202 is to address air pollution that may reasonably be anticipated to endanger public health and welfare. Indeed, as EPA notes, "Since the earliest days of the CAA, Congress has emphasized that the goal of section 202 is to address air quality hazards from motor vehicles, not to simply reduce emissions from internal combustion engines to the extent feasible."124 As courts have recognized, given the overriding goal of the statute to protect public health and welfare, EPA may "plac[e] primary significance on the 'greatest degree of emission reduction achievable,'" and consider other factors such as "cost . . . energy and safety factors as important but secondary factors."125 [EPA-HQ-OAR-2022-0829-0792, p. 20]

124 88 Fed. Reg. at 29233.

125 Husqvarna AB v. EPA, 254 F.3d 195, 200 (D.C. Cir. 2001).

Further, there should be no doubt, in view of recent amendments to the Clean Air Act and Congressional ratification accomplished by the IRA,126 that EPA has ample authority to address the regulation of greenhouse gas pollutants, from motor vehicles, through electrification, and in the light-duty sector.127 [EPA-HQ-OAR-2022-0829-0792, p. 21]

126 Pub. L. No. 117-169, 136 Stat. 1818 (2022).

127 See, Greg Dotson and Dustin J. Maghamfar, The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act, 53 ELR 10017 at 10019, 10032 (2023) (discussing Clean Air Act sec. 137 and other revisions) available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4338903

The criteria referred to in §209(a) relate to the emission characteristics of a vehicle or engine. To meet them the vehicle or engine must not emit more than a certain amount of a given pollutant, must be equipped with a certain type of pollution-control device, or must have some other design feature related to the control of emissions.137 [EPA-HQ-OAR-2022-0829-0792, p. 22]

137 Id.

Certainly zero emissions technology capabilities are such a design feature, and should be factored into the overall fleet performance that manufacturers must meet. [EPA-HQ-OAR-2022-0829-0792, p. 22]

Likewise, other courts have held that full ZEV programs are appropriately considered to be standards under the Clean Air Act:

To be sure, the ZEV sales requirement does not impose precise overall quantitative limits on levels of emissions, as do the classification system and fleet averages. It mandates only that a specified percentage of the cars sold by a manufacturer in any model year be ZEVs. Nevertheless, the ZEV sales requirement must be considered a standard 'relating to the control of emissions.' ZEV, after all, stands for 'zero-emission vehicle,' and a requirement that a particular percentage of vehicle sales be ZEVs has no purpose other than to effect a general reduction in emissions.138 [EPA-HQ-OAR-2022-0829-0792, p. 22]

138 Am. Auto Mfrs. Ass'n v. Cahill, 152 F.3d 196, 200 (2d Cir. 1998); Ass'n of Int'l Auto. Mfrs. v. Comm'r, 208 F.3d 1, 6 (1st Cir. 2000)

If such a percentage designation of zero emissions vehicle targets is permissible under the Clean Air Act, EPA's approach merely incorporating consideration of that technology is a fortiorari an appropriate emissions standard setting exercise of authority. [EPA-HQ-OAR-2022-0829-0792, p. 22]

Nor is it a particularly large conceptual leap from EPA's well-established embrace of overall fleet emissions averages,139 a practice which has long departed from strict pollutant-by-pollutant numerical limits, to the concept of addressing such emissions at the federal level by recognizing the possibility that an increasingly large proportion of BEVs may become part of a manufacturer's compliance strategy and should be factored into the overall level of permissible emissions. As technology has evolved, the overriding Clean Air Act statutory command to set standards that reflect the greatest degree of emission reduction achievable through the application of such available technology, is fully consistent with this approach. [EPA-HQ-OAR-2022-0829-0792, p. 22]

139 See, e.g., 79 Fed. Reg. at 451 (EPA adoption of sales-weighted fleet averages for its Tier 3 emissions regulations).

For the U.S. to meet its decarbonization goals and to mitigate the public health and welfare impacts from climate change, EPA's proposal should be amended to meet increasingly more stringent regulatory requirements that incentivize all vehicle manufacturers to rapidly scale up delivery of high-quality BEVs. [EPA-HQ-OAR-2022-0829-0792, p. 23]

The Clean Air Act is designed to be "technology-forcing" and light- and medium-duty manufacturers are poised to meet significant new emission reduction performance standards.143 The Clean Air Act is "intended to be a 'drastic remedy to . . . a serious and otherwise uncheckable problem.' . . . Subsequent legislative history confirms that the technology-forcing goals of the 1970 amendments are still paramount in today's Act."144 As courts have recognized in the specific context of CAA section 202(a)(1) and as the preamble to the proposal appropriately acknowledges, "Congress intended the agency to project future advances in pollution control capability. It was 'expected to press for the development and application of improved technology rather than be limited by that which exists today.'"145 [EPA-HQ-OAR-2022-0829-0792, p. 23]

143 Union Elec. Co. v. EPA, 427 U.S. 246, 258 (1976); Train v. NRDC, 421 U.S. 60, 90 (1975).

144 Whitman v. American Trucking Ass'n, 531 U.S. 457, 491-92, (Breyer, J. concurring), citing Union Elec. 427 U.S. at 256.

145 NRDC v. EPA, 655 F.2d 318, 328 (D.C. Cir. 1981).

At the outset, nothing in the statute directs EPA to give great weight to infrastructure or similar considerations in evaluating whether a standard can be implemented in a time period the Administrator finds sufficient "to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."184 This is in contrast to other portions of the statute, which specifically direct the agency to consider, for example, "the impact of renewable fuels on the infrastructure of the United States, including deliverability of materials, goods, and products other than renewable fuel, and the sufficiency of infrastructure to deliver and use renewable fuel."185 [EPA-HQ-OAR-2022-0829-0792, p. 30]

184 42 U.S.C. § 7521(a)(2).

185 42 U.S.C. § 7545(o)(2)(B)(ii)(IV).

Organization: Valero Energy Corporation

Finally, as discussed in detail below, EPA must consider the consequences of reduced demand for and production of renewable fuels such as ethanol and renewable diesel. By phasing out the vehicles that consume these fuels, the proposed rule stands in direct conflict to EPA's statutory obligations under the Energy Independence and Security Act of 2007 (EISA), which was designed to reduce greenhouse gas emissions from the domestic transportation sector while enhancing energy security by promoting increased volumes of renewable fuel production, including requirement that EPA provide for specific minimum volumes of advanced biofuel (including renewable diesel) and biomass-based diesel from 2022 onward.299 In response to the incentives created by the RFS as well as state programs like the California Low Carbon Fuel Standard, Valero as well as some of our competitors have responded by investing heavily in renewable fuel production capacity. EPA must consider the chilling effect the proposed action will have on production of ethanol and renewable diesel and the corresponding loss of jobs in the agricultural and fuel production sectors. [EPA-HQ-OAR-2022-0829-0707, pp. 54-55]

299 42 U.S.C. § 7545(o)(2)(B)(iii),(v).

H. EPA should consider the consequences of diminishing liquid fuel supplies as refineries and renewable fuel production facilities are shut down.

When proposing rules to implement the phase-out of liquid fuels, a foundational issue to address is the impact(s) of refinery shutdowns. In the proposed EV rules, EPA takes credit for reduced emissions from oil production and refinery operation and places points on the positive ledger for energy security in dollar amounts as a result of reduced reliance on oil. But EPA does not account for the loss of jobs or other impacts related to refinery shutdowns, reduced renewable fuel production, and the loss of liquid fuel supplies. [EPA-HQ-OAR-2022-0829-0707, p. 54]

EPA acknowledges that existing ICEs will continue to operate but has not accounted for any increased burden on those owners of ICEs related to fewer options for fuel or decreased competition in the fuel market. EPA must consider how reducing volumes of liquid fuels will change regional pricing and availability of fueling options for consumers as reducing reliance on liquid fuels will also lead to a direct decrease in both federal and state excise tax revenues from gasoline and diesel, as has been demonstrated in the numerous states that have already adopted ZEV mandates.297 This, in turn, will decrease state and federal funding for construction and maintenance of transportation infrastructure in the US, which is primarily funded from these tax revenues.298 Thus, not only will ZEV-centric policy destroy the domestic production of asphalt used primarily for road construction and repairs, it will also lead to a precipitous decline in each state's ability to pay for road maintenance. [EPA-HQ-OAR-2022-0829-0707, p. 54]

297 See Berkeley Research Group, Policy Briefs, The Effect of Zero-Emission Vehicle Policies on Dedicated Highway Infrastructure Funding in Maryland, Minnesota, New Jersey, Nevada, New York, Oregon, and Virginia, available at https://www.thinkbrg.com/insights/publications/effect-of- zev-policies-on-dedicated-highway-infrastructure-funding/.

298 Id.

Finally, as discussed in detail below, EPA must consider the consequences of reduced demand for and production of renewable fuels such as ethanol and renewable diesel. By phasing out the vehicles that consume these fuels, the proposed rule stands in direct conflict to EPA's statutory obligations under the Energy Independence and Security Act of 2007 (EISA), which was designed to reduce greenhouse gas emissions from the domestic transportation sector while enhancing energy security by promoting increased volumes of renewable fuel production, including requirement that EPA provide for specific minimum volumes of advanced biofuel (including renewable diesel) and biomass-based diesel from 2022 onward.299 In response to the incentives created by the RFS as well as state programs like the California Low Carbon Fuel Standard, Valero as well as some of our competitors have responded by investing heavily in renewable fuel production capacity. EPA must consider the chilling effect the proposed action will have on production of ethanol and renewable diesel and the corresponding loss of jobs in the agricultural and fuel production sectors. [EPA-HQ-OAR-2022-0829-0707, pp. 54-55]

299 42 U.S.C. § 7545(o)(2)(B)(iii),(v).

A. The proposed action addresses a major question for which EPA must have clear congressional authority.

Under the major-questions doctrine, a court may not construe a statute to "authoriz[e] an agency to exercise powers of 'vast economic and political significance'" unless the statute does so in "clea[r]" terms.352 Thus, an agency seeking to exercise such significant powers must identify "something more than a merely plausible textual basis for the agency action."353 "The agency instead must point to 'clear congressional authorization' for the power it claims." Id. [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

352 Alabama Ass'n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021) (quoting Utility Air Regulatory Grp. v. EPA, 573 U.S. 302, 324 (2014)).

353 West Virginia v. EPA, 142 S. Ct. 2587, 2609 (2022) (quoting Utility Air, 573 U.S. at 324).

In assessing the economic and political significance of a rule, the Supreme Court has considered both the rule's direct effects and the implications of the agency's underlying claim of authority. For example, in West Virginia, although EPA's Clean Power Plan only incrementally shifted power generation, EPA had asserted the "highly consequential power" to "announc[e] what the market share of coal, natural gas, wind, and solar must be, and then requir[e] plants to reduce operations or subsidize their competitors to get there."354 An agency cannot avoid the need for clear backing from Congress by claiming an awesome power but exercising only a little of it in the first instance. [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

354 142 S. Ct. at 2609 & 2613 n.4; see Alabama Ass'n of Realtors, 141 S. Ct. at 2489 (considering the "sheer scope of the [agency's] claimed authority" in addition to the rule's "economic impact").

If EPA were to finalize this proposal, just as in West Virginia, EPA would be claiming the power to effect a wholesale shift in energy policy: moving the Nation's light and medium duty vehicle fleets from vehicles powered by internal-combustion engines ("ICEs") that use liquid fuels to vehicles powered by battery-operated electric motors. The only difference is that EPA is waving its wand over motor vehicles instead of power plants. At a more specific level, the Supreme Court in West Virginia identified several clues from the statutory and regulatory scheme indicating that EPA needed clear congressional authorization for its Clean Power Plan. Those same clues are present here in spades. The lesson should be unavoidable: EPA needs clear support from Congress to redefine the source and replace the kind of vehicles America drives on its roads and uses for work and delivery of goods that keep the economy running. In this proposal, EPA claims power to radically change numerous sectors in the economy that depend on LDVs and MDVs, including for every day personal transportation and for services that deliver goods, supplies and equipment throughout the country, as well as the numerous sectors that depend on the liquid fuels (and related byproducts) on which such vehicles currently run.355 [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

355 Of course, the proposed rule electrifying LD and MD vehicles is only part of the current administration's broader plan to electrify the entire fleet of the nation's vehicles. See E.O. 14307, 88 Fed. Reg. 43,583 (Aug. 5, 2021) ("50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles.") ("Given the significant expertise and historical leadership demonstrated by the State of California with respect to establishing emissions standards for light-, medium-, and heavy-duty vehicles, the Administrator of the EPA shall coordinate the agency's activities … with the State of California as well as other States that are leading the way in reducing vehicle emissions, including by adopting California's standards."); EPA Finalizes Greenhouse Gas Standards for Passenger Vehicles, Paving Way for a Zero-Emissions Future (Dec. 20, 2021), https://bit.ly/3wJFsTD (EPA Administrator declaring the rule "a giant step forward" in "paving the way toward an all-electric, zero-emission transportation future."); https:joebiden.com/climate-plan/# (promising to "use the full authority of the executive branch to make progress and significantly reduce emissions" by "developing rigorous new fuel economy standards aimed at ensuring 100% of new sales for light- and medium-duty vehicles will be electrified." EPA's claimed authority to mandate EVs in place of ICE vehicles is the same for Light Duty, Medium Duty, and Heavy Duty vehicles; therefore, it is appropriate to consider (for purposes of the major question issue) not just the effects of this proposed rule but the effect of the entire "whole of government" approach to electrify all vehicles.

1. EPA claims a power of vast economic significance.

At the threshold, the rule's economic significance is staggering, in both its direct effects and the implications of the authority EPA claims. Several considerations underscore the rule's enormous economic cost. [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

Transformation of the LD and MD Vehicle Market. EPA makes no secret of its approach to setting the standards for LDVs and MDVs—the standards require replacing ICE vehicles with BEVs or FCEVs. The result of this transition has dramatic consequences, as described more fully in these comments and by others. Such consequences include increased consumer acquisition costs, lack of adequate public and personal charging infrastructure (e.g., multi-family housing and rural areas), increased charging times (particularly for those relying on public charging stations), increased demand for electricity, increased wear on public roads from heavier ZEVs, and increased tire wear, among others. And beyond personal, everyday use, there are also many other sectors that rely on LDVs and MDVs and the liquid fuels on which they currently run (and indeed, the byproducts of such fuels)—e.g., the refining, agriculture, and manufacturing industries—each with transition issues of their own. But EPA has not acknowledged the obstacles and burdens that will be on such industries or considered whether those obstacles or burdens can be reasonably overcome. [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

In West Virginia, the Court explained that EPA had sought to "substantially restructure the American energy market." 142 S. Ct. at 2611. With this proposal, EPA seeks to "substantially restructure" the American LD and MD vehicle markets, and with them, many sectors and supply chains in the U.S. economy. As discussed above, the overall cost and economic impact of this proposed restructure is staggering—despite EPA's gross understatements to the contrary. And EPA's failure to consider the full extent of this economic impact is indicative of its limited authority; if Congress truly meant to grant such an awesome power to EPA, it would not have restricted EPA's cost considerations to vehicle manufacturers only. [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

Indeed, the effects of EPA's rule would extend well beyond personal consumer use. As described previously in these comments, the rule will impact, among other sectors, the refining, agriculture, and manufacturing industries, how and to what extent they operate, where they source their supply chains, and how and whether they continue to produce products that are essential to modern life. This will have ripple effects throughout the economy, both with regard to supply chain costs and availability and, ultimately, increased costs to consumers. Moreover, many industries dependent upon the refining sector, such as the asphalt, petrochemical and sulfur industries (all of which are, ironically, essential to increased EV production), will see their supply chains reduced and prices increased to the extent the proposal reduces liquid fuel demand and, consequently, impacts refining. [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

By any relevant economic measure—"the amount of money involved for regulated and affected parties, the overall impact on the economy, [or] the number of people affected," U.S. Telecom Ass'n v. FCC, 855 F.3d 381, 422 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc)—EPA's asserted power to force a transition from diesel- and gasoline-powered LD and MD vehicles to electric ones represents "an enormous and transformative expansion in [its own] regulatory authority," affecting "a significant portion of the American economy." Utility Air, 573 U.S. at 324. [EPA-HQ-OAR-2022-0829-0707, pp. 66-68]

2. EPA claims a power of vast political significance.

The rule's political significance is just as vast. In West Virginia, the Court identified several considerations that are equally present here. [EPA-HQ-OAR-2022-0829-0707, pp. 68-69]

Ongoing Policy Debate. The target of EPA's rule—to say nothing of climate change more generally356—is "the subject of an earnest and profound debate across the country." West Virginia, 142 S. Ct. at 2614. While California is moving aggressively to accelerate electrification by regulatory fiat,357 other States oppose efforts to shift energy-investment and generation from petroleum to other sources, see, e.g., Act Relating to Financial Institutions Engaged in Boycotts of Energy Companies, 2022 W. Va. Legis. Ch. 235. [EPA-HQ-OAR-2022-0829-0707, pp. 68-69]

356 See West Virginia, 142 S. Ct. at 2625 (Gorsuch, J., concurring) ("As the dissent observes, the agency's challenged action before us concerns one of 'the greatest … challenge[s] of our time.' If this case does not implicate a 'question of deep economic and political significance,' King, 576 U.S. at 486, 135 S. Ct. 2480 (internal quotation marks omitted), it is unclear what might."

357 See, e.g., Cal. Code Regs. Tit. 13, § 1962.4 (Zero-Emission Vehicle Standards for 2026 and Subsequent Model Year Passenger Cars and Light-Duty Trucks); California Air Resources Board Final Regulation Order, "Advanced Clean Fleets Regulation: 2036 100 Percent Medium and Heavy Duty Zero Emissions Vehicle Sales Requirements," https://ww2.arb.ca.gov/rulemaking/2022/acf2022.

Congress itself is debating this very issue, which makes EPA's claim to policymaking authority "all the more suspect." West Virginia, 142 S. Ct. at 2614; see FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 155 (2000). Congress has yet to reach an answer and instead remains in factfinding mode as it considers the benefits and risks of electrification. Congress enacted the Infrastructure Investment and Jobs Act of 2021, which requires several agencies— notably not EPA—to prepare three separate reports for Congress on the implications of electrifying the Nation's vehicle fleet. Pub. L. No. 117-58, §§ 25006, 40435, 40436, 135 Stat. 429, 845-49, 1050 (2021) (requiring reports on "the cradle to grave environmental impact of electric vehicles" and "the impact of forced labor in China on the electric vehicle supply chain," among other things). [EPA-HQ-OAR-2022-0829-0707, pp. 68-69]

Balancing National Policy Considerations. In West Virginia, the Court found it significant that EPA's rule would put the agency in the position of "balancing the many vital considerations of national policy implicated in the basic regulation of how Americans get their energy." 142 S. Ct. at 2612. The Court was concerned that the agency would decide "how much of a switch from coal to gas" the grid could tolerate, and "how high energy prices [could] go" before becoming "exorbitant." Id. Here, too, EPA's rule puts it in the position of deciding "how much of a switch" to electrification the nation's power grids can tolerate, and how high vehicle and electricity prices can climb without being "exorbitant." [EPA-HQ-OAR-2022-0829-0707, pp. 68-69]

EPA's asserted authority also implicates another key "consideration[] of national policy": national security. NHTSA has acknowledged that the United States "has very little capacity in mining and refining any of the key raw materials" for electric vehicles. 86 Fed. Reg. 49,602, 49,797 (Sept. 3, 2021). And unlike biofuels and petroleum, most of the supply of critical components of batteries and motors for electric vehicles is controlled by hostile or unstable foreign powers, in particular China. Shifting to electric vehicles would thus make the American automotive industry critically dependent on one of the Nation's primary geopolitical rivals. [EPA-HQ-OAR-2022-0829-0707, pp. 68-69]

Specifically, China is by far the largest source of graphite, which is used for lithium- ion batteries, and rare-earth elements like neodymium, which are used for permanent-magnet motors. By some estimates, a transition to electric vehicles would raise demand for graphite by 2500% and rare-earth elements by 1500%. International Energy Agency, The Role of Critical Minerals in Clean Energy Transitions 97 (March 2022). Another key component of lithium batteries, cobalt, is controlled by the Democratic Republic of the Congo, which is implicated in significant human-rights concerns (including child labor), and Chinese state-owned enterprises have a controlling interest in 70% of Congo's cobalt mines. [EPA-HQ-OAR-2022-0829-0707, pp. 68-69]

Lack of Agency Expertise. To force electrification, EPA would need to understand and weigh "many vital considerations of national policy." West Virginia, 142 S. Ct. at 2612. The policy judgments here involve not only climate impacts but millions of jobs, the restructuring of entire industries, the Nation's energy independence and relationship with hostile powers, and supply-chain and electric-grid vulnerabilities. EPA does not have any expertise in those matters. The judgments here are not ones "Congress presumably would" entrust to "an agency [with] no comparative expertise," but are "ones Congress would likely have intended for itself." West Virginia, 142 S. Ct. at 2612-13. [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

Prior Rejections by Congress of Similar Policies. As evidence that the judgments here belong to Congress rather than the Executive, both Houses of Congress have previously "considered and rejected" multiple bills with effects similar to EPA's rule. West Virginia, 142 S. Ct. at 2614 (quoting Brown & Williamson, 529 U.S. at 144). Congress even rejected one bill that would have mandated a level of electric- vehicle penetration roughly equal to the 50%-by-2030 target EPA embraces in this proposal. See, e.g., Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018); see also 116 Cong. Rec. 19238-40 (1970) (proposed amendment to Title II that would have banned internal-combustion vehicles by 1978). Congress's "consistent judgment" against the very sorts of mandates imposed by EPA undercuts any claim of congressional authorization. Brown & Williamson, 529 U.S. at 147-48, 160; accord West Virginia, 142 S. Ct. at 2614. The fact that the current administration has been required to rely on executive actions to force electrification of the vehicle fleets demonstrates the lack of congressional authority. [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

Indeed, the U.S. House and Senate recently passed a joint resolution358 nullifying EPA's recent rule on HDVs relating to air pollution, including ozone and particulate matter. The resolution was subsequently vetoed by President Biden,359 which only further confirms that EPA's recent attempts to alter the Nation's vehicle fleet is unsupported by Congress and instead driven by the current administration's agenda. [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

358 Heavy Duty Truck rule Congressional Review Act joint resolution (S.J. Res. 11)("A Joint resolution providing for congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Environmental Protection Agency relating to "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards").

359 https://www.whitehouse.gov/briefing-room/statements-releases/2023/06/14/message-to-the-senate- on-the-presidents-veto-of-s-j-res-11/

To be sure, with regard to this proposal on LDVs and MDVs, as well as EPA's related proposal for HDVs, 151 members of the House submitted a letter360 to EPA urging the rescission of the proposals, citing such concerns as the proposal being "unworkable," "impractical," a "deliberate market manipulation to prop up EVs," a benefit to the Chinese Communist Party ("as China has a stranglehold on the critical minerals supply chain and manufacturing of EV batteries"), "not necessarily better for the environment in terms of emissions reductions," and "worst of all," a burden on Americans and their families, forcing them to pay "an excessive amount for a car they do not want and cannot afford." Similarly, 26 senators issued a letter361 to EPA requesting withdrawal of the LDV, MDV, and HDV proposals, which "effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction." (emphasis added). The Senate letter further cited the proposal's increased burden on the electric grid, the lack of supporting charging infrastructure, safety risks associated with EVs, roadway lifespan impacts and planning, consumer choice and affordability, domestic job losses, national security, and questionable cost metrics as concerns with, and flaws under, the proposal and also emphasized the application of the major questions doctrine and EPA's lack of clear authority: [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

360 https://d1dth6e84htgma.cloudfront.net/DRAFT_05_22_23_EPA_Tailpipe_Letter_af5a5b04a5.pdf?updated_at=2023-05-19T17:01:36.343Z; see also https://mccaul.house.gov/media-center/press-releases/mccaul-mcmorris-rodgers-demand-epa-end-effort-dictate-cars-americans.

361 https://www.epw.senate.gov/public/_cache/files/4/c/4c8a1ccf-a225-4e7b-b028-f4674c12bdaf/0EBFAF9F23EC0CCA86DDFCBBCF6044F8.05.25.2023-capito-letter-to-epa-on- tailpipe-standards.pdf; see also https://www.capito.senate.gov/news/press-releases/capito- colleagues-urge-epa-to-withdraw-recent-vehicle-emissions-rules-.

If finalized, these proposals will effectively require a wholesale conversion from powering vehicles with widely available liquid fuel to charging BEVs off our nation's electric grid. This is a major, multi-billion dollar, policy-driven technology transition mandate to be imposed on American consumers by your Agency, without any semblance of the clear and direct statutory authority required by the ruling in West Virginia v. EPA. [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

In short, Congress has rejected not only a mandatory shift to EVs in general, but also this precise proposal. [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

Conflict with Congress's Broader Design. EPA's rule is also inconsistent with the broader statutory scheme and Congress's plan for tackling climate change. See Utility Air, 573 U.S. at 321. When Congress has sought to address greenhouse-gas emissions from the transportation sector, it has done so by promoting corn ethanol and other biofuels, which are used in conventional vehicles and which—unlike electric-vehicle components—are in abundant domestic supply. See, e.g., Inflation Reduction Act of 2022, Pub. L. No. 117-169. §§ 13202, 13404, 22003, 136 Stat 1818, 1932, 1966-69, 2020 (2022). Indeed, Congress has consistently legislated against the background expectation that conventional vehicles powered by liquid fuels will remain on the market. The Renewable Fuel Standard program is designed to promote, not diminish, renewable fuel demand. [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

For example, in Title II's Renewable Fuel Standard Program, Congress mandated year-over-year increases in renewable fuel. EPA is thus working at cross-purposes with Congress, which has required increases in liquid renewable fuels at the same time that EPA is seeking to eliminate vehicles that use such fuels.362 The obvious reason for the mismatch is that Congress has not decided to mandate electrification—nor has it placed that power in EPA's hands. See West Virginia, 142 S. Ct. at 2633 (Kagan, J., dissenting) (noting that when the agency's "action, if allowed, would have conflicted with, or even wreaked havoc on, Congress's broader design" it should not be allowed based on normal statutory interpretation of a broad delegation of authority). [EPA-HQ-OAR-2022-0829-0707, pp. 69-71]

362 362 87 Fed. Reg. 80582, "Renewable Fuel Standard (RFS) Program: Standards for 2023-2025 and Other Changes" (December 30, 2022).

B. The Clean Air Act's general grants of authority and EPA's new interpretations of the same do not authorize the proposal's mandatory shift in the Nation's vehicle fleet. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

Not only does EPA lack the clear congressional authorization necessary to support the proposal's wholesale shift in energy policy pursuant to West Virginia, but the text, structure, and legislative history of the Clean Air Act demonstrate that it also lacks general statutory authority to force the electrification of LDVs and MDVs. The proposed standards thus exceed EPA's statutory authority, even absent application of the major-questions doctrine. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

1. EPA has incorrectly interpreted the text of the Clean Air Act provisions cited as a general authorization to mandate ZEVs.

EPA claims that Section 202(a) of the CAA authorizes it to force a change in technology. But the cases EPA cites as authoritative are not based on Section 202(a), and Section 202(a) does not provide EPA clear authority to force technology. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

EPA makes several additional critical errors in its interpretation of its authority to conclude that the Clean Air Act authorizes EPA to set standards that mandate increasing percentages of sales of ZEVs. To set these standards, EPA first assumes that the standards can regulate any "motor vehicles," including electric vehicles, even if it has deemed such vehicles to not emit the relevant pollutant. Second, EPA characterizes electrification, more specifically BEVs and

FCEVs, as a “pollution control device or system” that would apply to motor vehicles. Third, EPA assumes authority to use fleetwide averaging rather than to set standards for individual vehicles and engines. Fourth, EPA ignores other sections of the Clean Air Act, which are inconsistent with the proposal’s forced shift in energy. Finally, EPA relies on a novel and highly revisionist spin on legislative history to support its authority to mandate electrification. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

EPA errs with each of these steps.

a) The statutory text demonstrates that the vehicles covered by the standards must emit the relevant pollutant.

Section 202(a)(l) provides that EPA shall prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(l). The statute, of course, does not expressly specify which vehicles are to be included in any average emission standard because, as discussed below, it does not contemplate averaging in the first place. But to the extent averaging is permissible, the text makes clear that the vehicles included in such averaging must, in EPA's judgment, actually emit the relevant pollutant. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

To begin with, EPA improperly relies on a broad definition of “motor vehicle,” as the statute focuses on standards for the "emission" of an air pollutant, which immediately indicates Congress's focus on vehicles deemed to actually "emi[t]" the relevant pollutant. 42 U.S.C. § 7521(a)(l) (emphasis added). Here, EPA's proposal stipulates that electric vehicles are to be treated for averaging purposes as if they emit no carbon dioxide (even when they pull electricity from a grid that is powered by carbon-emitting sources and rely on batteries whose production, disposal, and recycling emits carbon) or criteria pollutants.364 EPA has thus decided that electric vehicles as a class do not "emi[t]" the relevant pollutants. 42 U.S.C. § 7521(a)(l). And given the textual focus on harmful emissions, EPA cannot include vehicles it determines to be non-emitting in the standards that EPA calculates and imposes. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

364 See, e.g., 88 Fed. Reg. 29,187.

Next, the statute is explicit that the things for which EPA sets standards must "in [EPA's] judgment, cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(l). The key textual question is thus what exactly EPA must "judg[e]" to "cause, or contribute to" potentially dangerous air pollution. The grammatical structure of the provision offers only two plausible options. Because the verbs "cause" and "contribute" are in the plural form, their subject must be plural as well. See Scalia & Garner, supra, at 140 ("Judges rightly presume . . . that legislators understand subject-verb agreement."). The only plural nouns that could plausibly "cause" or "contribute" to pollution are either the "new motor vehicles or new motor vehicle engines," or the "class or classes" of those vehicles or engines. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

Under either reading, all of the covered vehicles must emit the relevant pollutants. If it is the "vehicles" or "engines" that EPA must judge to "cause, or contribute to, air pollution," then Section 202(a) authorizes EPA to set standards only for "new motor vehicles or new motor vehicle engines which in [EPA's] judgment cause, or contribute to" potentially dangerous pollution. In other words, EPA may set standards only for motor vehicles that in its judgment actually emit the regulated pollutants—here, combustion-engine vehicles that emit greenhouse gases and criteria pollutants. The converse is equally true: Section 202(a) does not authorize EPA to set standards for vehicles that it deems not to cause or contribute to harmful pollution. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

That is the natural reading of the statute under the "grammatical 'rule of the last antecedent,'" which provides that a "limiting clause or phrase ... should ordinarily be read as modifying only the noun or phrase that it immediately follows." Barnhart v. Thomas, 540 U.S. 20, 26 (2003). Here, the relevant limiting phrase is: "which in [EPA's] judgment cause, or contribute, to air pollution." And the immediately antecedent phrase is "new motor vehicles or new motor vehicle engines." The rule of the last antecedent thus indicates that it is the "vehicles" in the class that must "cause, or contribute" to the pollution, and not the "class" as a whole. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

Courts have also adopted that natural reading. The D.C. Circuit Court of Appeals, for example, has observed that Section 202(a) "requires the EPA to set emissions standards for new motor vehicles and their engines if they emit harmful air pollutants." Truck Trailers Mfrs. Ass'n v. EPA, 17 F.4th 1198, 1201 (D.C. Cir. 2021) (emphasis added); see NRDC v. EPA, 954 F.3d 150, 152 (2d Cir. 2020) (Section 202(a) "requires EPA to regulate emissions from new motor vehicles if EPA determines that the vehicles 'cause, or contribute to,' [potentially dangerous] air pollution") (emphasis added). [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

Alternatively, if it is the "class or classes" of vehicles or engines that must "cause, or contribute to, air pollution," the result is the same. When we refer to a class of objects that does something, the ordinary and accurate meaning is that all the members of the class do that thing. For example, when a doctor warns a patient about a "class of medications that cause drowsiness," the class does not include non- drowsiness-inducing medicines. And that is the best way to read the statute here: a class that causes pollution is most naturally defined to include only those vehicles that cause pollution. EPA has broad leeway to group those pollution-emitting vehicles into classes how it sees fit. See NRDC v. EPA, 655 F.2d 318, 338 (D.C. Cir. 1981). But the vehicles must actually be pollution-emitting in EPA's judgment. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

In short, under either plausible reading of the statute, when EPA sets an emission standard for a pollutant, it must consider only the vehicles that it judges to emit the relevant pollutant. Even if fleetwide averaging were allowed as a general matter, averaging would be permissible only among types of vehicles that "emi[t]" the harmful pollutant and that, "in [EPA's] judgment cause, or contribute" to harmful air pollution. If EPA determines that a particular category of vehicle is not "emi[tting]" the relevant pollutant or "caus[ing], or contribut[ing] to" the resulting pollution, it makes no sense to include that category in calculating the emission standard. That is not really "averaging" at all, as it does not help EPA arrive at a technologically feasible threshold for pollutant-emitting vehicles. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

EPA has adopted such a faux "average" here. The agency proposes carbon- dioxide and criteria pollutant emissions targets for LDVs and MDVs that "average" in a category of vehicles that it deems not to emit either carbon dioxide or criteria pollutants. EPA treats electric vehicles as "zero-emission vehicles," and assumes they contribute "zero grams/mile" of carbon dioxide or criteria pollutants “from their tailpipes.”365 Setting aside the flaws in that assumption, if EPA chooses to treat electric vehicles as "zero emission," it must abide by the statutory consequences of that decision: the electric-vehicle category cannot textually or logically be "averaged" into the emission standards under Section 202(a). [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

365 88 Fed. Reg. 29,187, 29,197.

This error is not new. The Supreme Court recently rejected parallel reasoning in West Virginia. There, a similar provision of the Clean Air Act authorized EPA to guide States in "establish[ing] standards of performance for any existing [power plant] for any air pollutant." 42 U.S.C. § 7411(d)(l). The Court explained that authorization to "establish[] standards of performance for existing source[s]" does not equate to the power "to direct existing sources to effectively cease to exist." West Virginia, 142 S. Ct. at 2612 n.3 (quoting42 U.S.C. § 7411(d)) (second alteration in original). The same logic applies to Section 202(a): in empowering EPA to set emission standards for "vehicles" or "classes" of "vehicles" that "cause, or contribute to, air pollution," Congress did not permit EPA "to direct [conventional vehicles] to effectively cease to exist." Id. [EPA-HQ-OAR-2022-0829-0707, pp. 73-76]

b) EVs and ZEVs do not constitute “emission control devices or systems,” rather, they are different technologies altogether.

EPA next claims that Congress gave it clear authority to require automotive manufacturers to use ZEVs as “emission control devices or systems” to prevent or control the emission of greenhouse gases and criteria pollutants from LDV and MDV tailpipes.366 EPA first asserted this novel argument in response to litigation challenging its attempt to force electrification of LDVs in its Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 FR 74434. See EPA’s Answering Brief in Texas v. EPA (D.C. Cir. 22-1031), pp. 40-47. In that case, EPA claimed that when 42 U.S.C. §7521(a)(1), which allows it to prescribe pollution-emission standards to vehicles whether they are “designed as complete systems or incorporate devices to prevent or control such pollution,” is read in conjunction with subsection (a)(2), which prohibits EPA from prescribing such standards until “the requisite technology” can be developed and applied in a cost-efficient manner, Congress provided EPA “clear authorization” to mandate electric vehicles. EPA’s Answering Brief at pp. 40-41, 47. In other words, EPA reads the limiting language in (a)(2) to somehow expand the authority granted in (a)(1), which as described above does not apply to ZEVs deemed not to emit the relevant pollutant. But neither the plain language nor the statutory history provides EPA with newfound authority to replace ICEVs with ZEVs. [EPA-HQ-OAR-2022-0829-0707, pp. 76-78]

366 88 Fed. Reg. at 29,286.

Not only does the statute not mention EVs or any other type of purported ZEVs, which one would expect if Congress were providing EPA clear authority to force electrification of the nation’s vehicle fleet, but ZEVs are also not even “systems” or “devices” that “prevent or control” pollution; they are just different kinds of vehicles that EPA states do not emit the relevant pollutant in the first place. [EPA-HQ-OAR-2022-0829-0707, pp. 76-78]

ZEVs are not “designed as complete systems” to prevent or control harmful pollution, because they do not have “built-in pollution control” or prevention. Truck Trailer Mfrs. Ass’n, Inc. v. EPA, 17 F.4th 1198, 1202 (D.C. Cir. 2021). To “prevent” something means to “keep [it] from happening” or “impede” it. American Heritage Dictionary 1038 (1st ed. 1969). To “control” means to “hold in restraint” or “check.” Id. at 290. Thus, a vehicle with “built-in pollution control" or prevention is one that has a self-contained mechanism to block or capture pollution that would otherwise be emitted. This is consistent with EPA's own definition of "emission control system," as "a unique group of emission control devices, auxiliary emission control devices, engine modifications and strategies, and other elements of design designated by the Administrator used to control emissions of vehicles." 40 C.F.R. §86.1803-01 (emphasis added). ZEVs, on the other hand, are designed to run on an entirely different power system, not to limit or control pollution from a carbon- dioxide- or criteria-pollutant-emitting engine. To draw an analogy, it would not be natural to refer to an iPod as "a system that prevents or controls record skips." An iPod is not a record player with some built-in method of impeding or reducing record skips; it is a different technology altogether. [EPA-HQ-OAR-2022-0829-0707, pp. 76-78]

Nor do electric vehicles incorporate "add-in devices for pollution control" or prevention. Truck Trailer Mfrs., 17 F.4th at 1202. The component parts of ZEVs, such as their batteries, are not merely add-in devices that block the emission of pollution or minimize pollution that would otherwise occur. They are integral to the basic functioning of the vehicle, which does not emit the relevant pollutant in the first place. [EPA-HQ-OAR-2022-0829-0707, pp. 76-78]

EPA also notes that the statutory definition of "motor vehicles" is "broad" and includes the phrase "any self-propelled vehicle."367 But the statutory history refutes any implication that this definition was intended to cover EVs. The relevant "motor vehicle" definition was introduced to the Clean Air Act in 1965 and has remained unchanged since. Pub. L. No. 89-272, § 101, 79 Stat. 992, 995 (1965). In 1965, the ordinary vehicle on the road had an internal-combustion engine, so there was no need for Congress to specify that the term meant anything else. By contrast, for example, Congress added the reference to "nonroad vehicles" in 1990, when other types of power were being explored and it made sense to clarify which type of engine was covered. See Pub. L. 101-549, § 223, 104 Stat. 2399, 2503 (1990); see also id. § 229, 104 Stat. 2511 (establishing pilot program for "clean fuel vehicles" including those powered by "electricity"). There is nothing to read into Congress's omission of that qualifier 25 years earlier. [EPA-HQ-OAR-2022-0829-0707, pp. 76-78]

367 88 Fed. Reg. at 92,231.

2. The statutory structure of the Clean Air Act further confirms that EPA is not authorized to mandate the sale of ZEVs.

i. The statutory structure confirms Congress' focus on technologically achievable emission controls.

Several provisions of Section 202 of the Clean Air Act confirm that Congress focused on technologically feasible standards for vehicles deemed to emit pollutants that actually cause or contribute to pollution. Section 202(a)(2) requires EPA to provide manufacturers with lead time to comply with the standards, in order "to permit the development and application of the requisite technology." 42 U.S.C. § 7521(a)(2). Similarly, Section 202(a)(3)(A)(i) provides that EPA's HDV standards for certain criteria pollutants should reflect the "greatest degree of emission reduction achievable through the application of technology which the [EPA] determines will be available" during the relevant model year. Id. § 7521(a)(3)(A)(i). Those provisions contemplate that technological feasibility will meaningfully constrain the emission standards that EPA sets under Section 202(a). EPA cannot ignore technological feasibility and simply decide to require production of fewer internal combustion vehicles. [EPA-HQ-OAR-2022-0829-0707, p. 78]

Other provisions show the type of "technology" that Congress contemplated vehicle manufacturers would develop to meet those standards. Section 202(m) requires EPA to command manufacturers to install on "all" new light-duty vehicles and trucks "diagnostic systems" that identify "emission-related systems deterioration or malfunction ... which could ... result in failure of the vehicles to comply with emission standards established under this section." 42 U.S.C. § 7521(m)(l). The required diagnostic systems must monitor, "at a minimum, the catalytic converter and oxygen sensor." Id. [EPA-HQ-OAR-2022-0829-0707, p. 78]

In other words, to ensure compliance with emission standards under Section 202(a), Congress required "emissions-related systems" and accompanying "diagnostic systems" on each vehicle—again underscoring Congress's view that the vehicles subject to an emission standard actually emit the relevant pollutant in EPA's judgment. [EPA-HQ-OAR-2022-0829-0707, p. 78]

As the statutory structure demonstrates, EPA may set standards that are "technology-forcing," because they require manufacturers to adopt nascent technology that may not yet be "adequately demonstrated." NRDC, 805 F .2d at 419. EPA's rules thus have promoted the development of "automotive technologies, such as on-board computers and fuel injection systems" that improve emissions from combustion engines. 86 Fed. Reg. at 74,451. But the statute does not permit what EPA proposes here: enacting "average" standards divorced from technologically achievable limits on emitting vehicles, which instead force manufacturers to produce a different type of supposedly non-emitting vehicle altogether. [EPA-HQ-OAR-2022-0829-0707, p. 78]

a) The statutory structure confirms EPA lacks statutory authority to use fleetwide averaging to mandate ZEVs.

EPA’s proposal would require electrification by setting average emission standards for manufacturers' nationwide fleets and "averaging" in more and more zeros to represent the electric vehicles it wants to see in future years. Manufacturers that exceed the standards may bank credits and trade them to other manufacturers that fall short. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

EPA relies on NRDC v. Thomas, 805 F.2d 410 (D.C. Cir. 1986), for the proposition that it is authorized to average vehicles. That case found EPA could average a manufacturer’s different engine families. Id. at 425. It did so, however, with some caveats. First, its reasoning was based on a deference to EPA’s interpretation of the statute “in the absence of clear evidence Congress meant to prohibit averaging.” This standard, of course, is directly contrary to the standard applicable in this case in which EPA is proposing regulations that affect a major question—clear Congressional authority to permit averaging to mandate electric vehicles. Second, the parties failed to raise a textual argument against averaging. Id. at n.24 (“Although it was not raised by any party before the agency, and accordingly cannot be dispositive here … there is an additional argument against emissions averaging. The Act’s testing and certification provision, 42 U.S.C. § 7525 [Link: https://1.next.westlaw.com/Link/Document/FullText?findType=L&pubNum=1000546&cite=42USCAS7525&originatingDoc=I80714eef94d311d9a707f4371c9c34f0&refType=LQ&originationContext=document&transitionType=DocumentItem&ppcid=0591cc222593448083058c4608d3c583&contextData=(sc.UserEnteredCitation)], speaks of ‘any,’ ‘a,’ or ‘such’ motor vehicle or engine being tested and certified. With averaging, some vehicles or engines would not be required to comply with the standards and would not be subject to NCPs for failing to so comply. This practice appears inconsistent with the requirement that 'any,' 'a,' or 'such' vehicle or engine be tested and required to comply with emissions standards."). [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

On the other hand, EPA has previously acknowledged that the Act is silent on the mechanisms of averaging, banking, and trading (ABT). When EPA first adopted fleetwide averaging, it recognized that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act." 48 Fed. Reg. 33,456, 33,458 (July 21, 1983). And "[j]ust as the statute does not explicitly address EPA's authority to allow averaging, it does not address the Agency's authority to permit banking and trading." 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same). By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading to electrify the Nation's vehicle fleet. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

That should be the end of the analysis. Section 202 of the Clean Air Act does not itself "direct [conventional vehicles] to effectively cease to exist." West Virginia, 142 S. Ct. at 2612 n.3. EPA has instead relied on mechanisms that are not themselves spelled out in the statute and that have never before been used to mandate LD and MD electric vehicles. Just as in West Virginia, EPA has nothing "close to the sort of clear authorization" necessary for such a transformational policy shift. 142 S. Ct. at 2614. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

But in truth, the problem is far worse for EPA than that. As explained below, the Act unambiguously precludes fleetwide-average emission standards under Section 202(a). And even if the statute permitted some fleetwide averaging, it does not allow EPA to take the additional step of incorporating non-emitting vehicles into emission averages and thus forcing the market toward electric vehicles. The proposal is not merely stretching vague statutory language. It is defying clear statutory text. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

The text and structure of Section 202, and of Title II more broadly, unambiguously require that emission standards under Section 202(a) apply to individual vehicles, not manufacturers' fleets on average. EPA claims to find authority for fleetwide averaging in Section 202(a), which authorizes EPA to issue "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles ... which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a). [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

On its face, that provision authorizes EPA to set standards for vehicles that emit harmful air pollutants. It says nothing about averaging across fleets. As noted, when EPA first adopted fleetwide averaging, it acknowledged that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act." 48 Fed. Reg. at 33,458. EPA claimed to have the authority because the Act "does not explicitly preclude standards" based on averaging. 54 Fed. Reg. at22,666 (emphasis added). EPA was wrong. "[T]he broader context of the statute as a whole," Robinson v. Shell Oil Co., 519 U.S. 337, 341 (1997), makes clear that Section 202(a) does not permit fleetwide averaging. And, even if EPA could somehow show that the statute tacitly or implicitly allows (or does not expressly preclude) averaging, that would still be insufficient to meet the necessary clear congressional authority to use fleetwide averaging as a means to force a transition from internal-combustion engines to ZEVs. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

a. Other provisions in Section 202 demonstrate that emission standards may not be based on averaging.

Title II is replete with provisions that necessarily apply to vehicles individually, not to fleets on average. That is evident first in the emission standards prescribed by Section 202 itself. For example, in Section 202(b), the Act sets forth specific light-duty vehicle emission standards that EPA must promulgate in "regulations under" Section 202(a). 42 U.S.C. § 7521(b). For vehicles in model years 1977 to 1979, the standards must provide that "emissions from such vehicles and engines may not exceed 1.5 grams per vehicle mile of hydrocarbons and 15.0 grams per vehicle mile of carbon monoxide." Id. § 7521(b)(l)(A). [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Those provisions require that the "regulations under [Section 202(a)]" apply to "vehicles and engines," not "vehicles and engines on an average basis across a fleet." Construing those provisions to allow averaging would, in effect, add words to the statute that change its meaning. Neither courts nor agencies may "supply words ... that have been omitted." Antonin Scalia & Bryan Garner, Reading Law: The Interpretation of Legal Texts 93 (2012); accord Rotkiske.v. Klemm, 140 S. Ct. 355, 360-361 (2019). And supplying the extra words "on average" would have a significant substantive effect: "roller coaster riders must be 48 inches tall" means something very different from "roller coaster riders must be 48 inches tall on average." [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

The testing requirements accompanying the Section 202(b) standards confirm that those standards apply to all vehicles. In particular, EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine ... to determine whether such system enables such vehicle or engine to conform to the standards required to be prescribed under [Section 202(b) of the Act]." 42 U.S.C. § 7525(a)(2). If the system complies, EPA must issue a "verification of compliance with emission standards for such system." Id. Those requirements plainly contemplate standards that apply to individual vehicles and their emission-control systems. Not only does the statutory text frame the inquiry as whether an individual "vehicle" or "engine" conforms to the emission standards, but the provision's foundational premise-that an emission-control system can enable a vehicle to meet emission standards depends on individually applied standards. [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Other parts of Section 202 further demonstrate that emission standards under Section 202(a) cannot rely on averaging. Section 202(b)(3), for example, authorizes EPA to grant waivers from certain nitrogen-oxide emission standards—which, again, are standards "under" Section 202(a), see 42 U.S.C. § 7521(b)(l)(B)—for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater." Id. § 7521(b)(3). This provision would be nonsensical under a fleetwide-averaging regime. It contemplates a default under which every vehicle meets a standard, then gives manufacturers a waiver from that default for up to 5% of the fleet. But under fleetwide averaging, no waiver is needed. Instead, a vast proportion of a manufacturer's fleet—perhaps 50% or more— effectively has a "waiver" so long as a sufficient number of vehicles outperform the standard. Likewise, Section 202(g), which specifies an increasing "percentage of each manufacturer's sales volume" of each model year's vehicles that must comply with specified emission standards, is fundamentally incompatible with averaging. Id. § 7521(g)(l). [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Similarly, under Section 202(m), EPA must require manufacturers to install on "all" new light-duty vehicles and trucks "diagnostic systems" capable of identifying malfunctions that "could cause or result in failure of the vehicles to comply with emission standards established under this section." Id. § 7521(m)(l). As this requirement makes clear, individual vehicles must "comply with emissions standards established under [Section 202]." Id. Otherwise, requiring diagnostic equipment on "all" vehicles makes no sense. In a fleetwide-averaging regime, this requirement would be pointless, as the deterioration or malfunction of an individual vehicle's emission-related systems would provide virtually no information about whether the fleet as a whole is compliant. [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

b. Title II's compliance and enforcement provisions for emission standards confirm that EPA cannot use fleetwide averaging.

Fleetwide averaging also clashes with "the design and structure of [Title II] as a whole." Utility Air, 573 U.S. at 321 (citation omitted). Title II sets forth a comprehensive, interlocking scheme for enforcing emission standards through testing, certification, warranties, remediation, and penalties. Fleetwide-average standards are incompatible with these provisions, which are "designed to apply to" individual vehicles and "cannot rationally be extended" to fleets. Id. at 322. [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

Testing and Certification. Under Title II, EPA must "test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer to determine whether such vehicle or engine conforms with the regulations prescribed under [Section 202]." 42 U.S.C. § 7525(a)(l). If the "vehicle or engine conforms to such regulations," EPA must issue the manufacturer a "certificate of conformity." Id. EPA may later test a manufacturer's vehicles and engines, and if "such vehicle or engine does not conform with such regulations and requirements, [EPA] may suspend or revoke such certificate insofar as it applies to such vehicle or engine." Id. § 7525(b)(2)(A)(ii). A manufacturer may not sell a vehicle or engine not "covered by a certificate of conformity." Id. § 7522(a)(l). [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

Fleetwide averaging is incompatible with these requirements in at least two respects. First, by using the singular terms "vehicle" and "engine," along with "any" and "such," the statute contemplates that individual vehicles may be tested, determined to "not conform" with the standards, and have their certificates of conformity suspended or revoked. In a fleetwide-averaging regime, testing an individual vehicle or engine does not enable EPA to determine whether it "conforms with the regulations prescribed under [Section 202]," 42 U.S.C. § 7525(a)(l), because conformity turns not on an individual vehicle's emissions but on the fleet's average performance overall. Second, fleetwide averaging also makes it impossible to determine compliance with applicable emission standards before a vehicle is sold, as required to obtain the certificate of conformity needed for a sale. See 42 U.S.C. § 7522(a)(l). Under fleetwide-average standards, a vehicle's "conform[ity] with the regulations prescribed under [Section 202]" cannot be determined until the manufacturer calculates its production-weighted average at "the end of each model year," when the manufacturer knows the quantity and model of "vehicles produced and delivered for sale." 40 C.F.R. §§ 86.1818-12(c)(2)(2), 86.1865-12(i)(l), (j)(3). [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

For similar reasons, fleetwide averaging is inconsistent with the statutory definition of an "emission standard," which "limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis." 42 U.S.C. § 7602(k). It is impossible to know on a "continuous basis" whether a manufacturer's fleet complies with EPA's proposed average standards, because a manufacturer cannot calculate its production-weighted average until the end of the year. Simply put, an after-the-fact compliance regime is incompatible with the Act's testing and certification scheme. [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

c. The broader text and history of Title II confirm that the rule exceeds EPA’s authority through fleetwide averaging.

Other indicia of statutory meaning demonstrate that the proposed rule exceeds EPA's statutory authority under Section 202(a). Elsewhere in Title II, Congress showed that it knew how to legislate with respect to "average annual aggregate emissions." 42 U.S.C. § 7545(k)(l)(B)(v)(II) (directing EPA to take certain actions if "the reduction of the average annual aggregate emissions of toxic air pollutants in a [designated district] fails to meet" certain standards). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

Thus, "if Congress had wanted to adopt an [averaging] approach" for motor vehicle standards under Section 202(a), "it knew how to do so." SAS Inst., Inc. v. Iancu, 138 S. Ct. 1348, 1351 (2018); see Rotkiske, 140 S. Ct. at 360-361 ("Atextual judicial supplementation is particularly inappropriate when, as here, Congress has shown that it knows how to adopt the omitted language or provision."). It did not choose that approach in Section 202(a). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

The Energy Policy Conservation Act, enacted just two years before the 1977 Clean Air Act amendments, reinforces that conclusion. There, Congress directed the Secretary of Transportation to issue regulations setting "average fuel economy standards for automobiles manufactured by a manufacturer" in a given model year. 49 U.S.C. § 32902(a). That Congress has not used similar language in Section 202(a) of the Clean Air Act is a "telling clue" that the Act does not permit fleetwide averaging. Epic Sys. Corp. v. Lewis, 138 S. Ct. 1612, 1626 (2018). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

The Clean Air Act's history also reflects Congress's understanding that emission standards would apply to all vehicles individually. Congress was so focused on reducing emissions at the level of the individual vehicle that, in the 1970 amendments, Congress permitted EPA to test any individual vehicle as it comes off the assembly line. See Pub. L. No. 91-601, § 8, 84 Stat. 1676, 1694-1696. Such a vehicle-by-vehicle test was meant to supplement the pre-1970 testing of prototypes. Congress explained that while testing of prototypes "will continue," "tests should require each prototype rather than the average of prototypes to comply with regulations establishing emission standards." H.R. Rep. No. 91-1146, at 6 (1970). And if Congress forbade averaging across prototypes, it certainly did not permit averaging across entire fleets. [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

d. Related provisions confirm that Section 202(a) does not authorize averaging of non-emitting electric vehicles.

Other provisions of the Clean Air Act drive home the lack of statutory authorization to mandate electrification as well. In the Clean Air Act Amendments of 1990, Congress spoke directly to the phase-in of electric vehicles on America's roads. Congress instructed EPA to establish standards for "clean-fuel vehicles" operating on "clean alternative fuel," including "electricity." Pub. L. No. 101-549, § 229, 104 Stat. 2399, 2513 (codified at 42 U.S.C. §§ 7581(2), (7), 7582(a)). Congress required that certain areas of the country with the worst pollution would have to "phase-in" a "specified percentage" of "clean-fuel vehicles" using "clean alternative fuels" (defined to include "electricity") in certain fleets. 42 U.S.C. § 7586; see id. § 758l(a). The 1990 amendments highlight that Congress knows how to clearly establish standards that apply to electric vehicles, and to directly require that such vehicles be phased into a particular fleet. But Congress chose to do so only on a targeted, regional basis. The contrast between the 1990 amendments and Section 202(a) highlights the absence of any statutory authority for EPA's rule. [EPA-HQ-OAR-2022-0829-0707, p. 84]

Other related statutes also suggest the same. In the Energy Policy Act of 1992, Congress directed NHTSA to set fuel-economy standards based on averages, but prohibited NHTSA from setting fuel-economy standards that average in the fuel economy of electric vehicles. See Pub. L. No. 102-486 §§ 302, 403, 106 Stat. 2776, 2870-2871, 2876 (later codified at 49 U.S.C. § 32902(h)). This prohibition bars NHTSA from doing exactly what EPA is doing here: misusing its regulatory authority to force a transition from conventional vehicles to electric vehicles by artificially tightening the "average" standard a fleet must meet. Of course, when Congress finalized the language of Section 202(a)(l) in 1977, it had no need to explicitly block EPA from considering electric vehicles, because it did not contemplate that EPA would set emission standards using averaging in the first place (or that EPA would be setting standards for greenhouse gases). The prohibition on NHTSA nevertheless underscores just how far EPA is reaching here: it is straining statutory language to seize a power that Congress expressly denied to a sister agency that actually has authority to promulgate fleetwide-average standards. [EPA-HQ-OAR-2022-0829-0707, p. 84]

e. EPA’s lack of authority for a credit-trading scheme further confirms its lack of authority to set fleetwide averages.

The proposal’s credit banking and trading program is critical to EPA's electrification mandate. But the agency also lacks authority under Title II to establish a credit scheme as part of its emission standards under Section 202(a). [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

As with fleetwide averaging, EPA has previously acknowledged that Title II says nothing about banking and trading credits in connection with motor-vehicle emission standards. See 54 Fed. Reg. at 22,665. What EPA has ignored, however, is that Title II is not silent regarding banking and trading in other contexts. Indeed, in multiple other provisions under Title II, Congress expressly authorized the use of bankable and tradable credits. See, e.g., 42 U.S.C. § 7545(k)(7) (reformulated gasoline credits); § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(i) (renewable fuel credits); id. § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(ii) (biodiesel credits); id. § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(iii) (small refineries credits); id. § 7586(f) (clean- fuel fleet-operator credits); id. § 7589(d) (California pilot test program's clean-fuel vehicle manufacturer credit). [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Under EPA's proposed approach, those provisions would all be superfluous, because EPA already had the discretion to adopt a credit-trading regime for any program. If Congress had wanted to permit credits in connection with emission standards under Section 202(a), it knew how to and would have done so expressly. See SAS Inst., 138 S. Ct. at 1351. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

For all these reasons, courts have cast substantial doubt on EPA's authority to set fleetwide-average emission standards. As the D.C. Circuit Court of Appeals explained in NRDC v. Thomas, 805 F.2d 410 (D.C. Cir. 1986), the "engine specific thrust" of Title II's "testing and compliance provisions" is evident both in Congress's choice to "spea[k] of 'any,' 'a,' or 'such' motor vehicle or engine" in the text of the statute and in the "troubling" legislative history recounted above. Id. at 425 n.24. The arguments were not dispositive in Thomas only because the parties there had failed to present them. Id. But the Court nevertheless recognized that the arguments were relevant to "future proceedings." Id.. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

f. At a minimum, EPA may not use fleetwide averaging to require electrification.

Despite the absence of statutory authorization for fleetwide averaging, EPA has long employed that mechanism without significant industry pushback. That is likely because fleetwide averaging has generally been offered as an accommodation to regulated parties, allowing them flexibility that the statute does not in fact permit. In its current proposal, however, EPA is not offering an extrastatutory accommodation. It is taking an additional step away from the statutory text by using fleetwide averaging to mandate electrification. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

To be clear, in prior rules EPA set an average emission standard and allowed manufacturers to make some vehicles that emitted more and some that emitted less. Here, EPA has set tailpipe emission standards at a level so stringent that manufacturers must incorporate an increasing percentage of LD and MD electric vehicles—which EPA treats as zero-emission vehicles—into their averages in order to comply with the "standards." See p. 13, supra. Put differently, the agency is proposing an emission standard that is artificially low because it incorporates electric vehicles, which EPA treats as emitting zero pollutants for averaging purposes. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Whatever the permissibility of fleetwide averaging, the text and structure of Title II make plain that EPA cannot manipulate averaging as a means to force production of an increasing market share of electric vehicles. Section 202 does not grant EPA the power to make the internal-combustion engine go the way of the horse and carriage. At the very least, Section 202 is hardly clear in granting that awesome power—which is what matters under West Virginia. For automobiles as for power plants, EPA has purported to discover in the Clean Air Act the authority to "forc[e]" manufacturers to "cease making" a particular type of energy "altogether." 142 S. Ct. at 2612. We have seen that play recently before, and it should end the same way. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

C. EPA's action would undermine the Renewable Fuel Standard and Congress'goals for renewable fuels and energy security.

EPA's proposal and ZEV sales mandate are also inconsistent with the broader statutory scheme and Congress's plan for tackling climate change. When Congress sought to address greenhouse-gas emissions from the transportation sector, it did so by promoting renewable liquid fuels, which are used in conventional vehicles and which—unlike electric-vehicle components—are in abundant domestic supply. See, e.g., Inflation Reduction Act of 2022, Pub. L. No. 117-169. §§ 13202, 13404, 22003, 136 Stat 1818, 1932, 1966-69, 2020 (2022). Indeed, Congress has consistently legislated against the background expectation that conventional vehicles powered by liquid fuels will remain on the market. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

The Clean Air Act also includes the Renewable Fuel Standard (RFS) program, which "requires that increasing volumes of renewable fuel be introduced into the Nation's supply of transportation fuel each year." Americans for Clean Energy v. EPA (ACE), 864 F.3d 691, 697 (D.C. Cir. 2017). Two goals animate the RFS: (1) to "move the United States toward greater energy independence and security," and (2) to "increase the production of clean renewable fuels." Id. (quoting Pub. L. No. 110-140, 121 Stat. 1492, 1492 (2007)). To these ends, "Congress ordained the inclusion of 4 billion gallons of renewable fuel in the Nation's fuel supply" for calendar year 2006, and required that, "[b]y 2022, the number will climb to 36 billion gallons." HollyFrontier Cheyenne Refining, LLC v. Renewable Fuels Ass'n, 141 S. Ct. 2172, 2175 (2021). [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

In other words, through the RFS, which is also in the Clean Air Act, Congress mandated that "fuel sold or introduced into commerce in the United States" must contain increasing shares of renewable fuels and specifically increasing shares of advanced biofuel, cellulosic biofuel, and biomass-based diesel. 42 U.S.C. § 7545(o)(2)(A)(i). For these fuels, Congress called for not simply a percentage of the fuel market but mandated a minimum volume of biofuel in the market. The proposed standards, on the other hand, would reduce the use of renewable fuels, particularly renewable diesel and other advanced biofuels, cellulosic biofuels, and biomass-based diesel, and make it impossible to meet the mandates of the RFS. EPA is thus working at cross-purposes with Congress, which has required a move toward increases in liquid renewable fuels at the same time that EPA is seeking to eliminate vehicles that use such fuels. Congress has never mandated, nor authorized, that EPA issue regulations to phase out the use of liquid fuels. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

The congressional intent underlying these mandated obligations under the RFS was to incentivize liquid fuels with lower lifecycle greenhouse gas emissions. For example, renewable diesel generates credits under the RFS, whereas traditional diesel generates an obligation. Here, however, treating renewable diesel and traditional diesel the same—giving no recognition of or benefit to manufacturers based on use of liquid fuels with lower lifecycle greenhouse gas emissions— underscores EPA's failure to read its statutory authority as a whole and emphasizes the conflict between the proposal and the RFS. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

Congress also cited national energy security as one of the primary reasons for implementing the RFS. In the proposal, EPA deigns to resolve energy security concerns by reducing use of liquid fuels without accounting for the impact on renewable fuels. EPA has also not adequately accounted for increased energy security risks associated with battery production and use in the transportation of the nation's commerce and in all the industries that use and rely on LDVs and MDVs. See supra at XX. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

With no apparent recognition that its proposed vehicle standards will reduce consumption of both nonrenewable and renewable fuels, EPA continues to mandate increasing volumes of renewable fuels consistent with its mandates under the RFS, proposing a 1.7 billion gallon increase in all renewable fuels by 2025 in its proposed "RFS Set" rule.368

368 Final Rule: Renewable Fuel Standard (RFS) Program: Standards for 2023-2025 and Other Changes, signed June 2023, pre-publication version available at https://www.epa.gov/renewable-fuel- standard-program/final-renewable-fuels-standards-rule-2023-2024-and-2025 .

i. Legislative History

Lacking in direct authority, EPA resorts to non-textual, legislative history, emphasizing that at various times Congress has made clear it "expected the Clean Air Amendments to force the industry to broaden the scope of its research—to study new types of engines and new control systems." Under the major questions doctrine, however, only a clear textual statement is sufficient to grant such sweeping and consequential authority as contemplated by the proposal. Yet even in the absence of the major questions doctrine, each source of legislative history relied on by EPA is irrelevant to the question of whether Congress authorized EPA to mandate electrification of the Nation's LDV and MDV fleets. [EPA-HQ-OAR-2022-0829-0707, pp. 87-88]

First, EPA cites five days of public hearings regarding "electric vehicles and other alternatives to the internal combustion engine" held by the Senate Committee on Commerce and Public Works in 1967 as evidence that "ICE vehicles might be inadequate to achieve the country's air quality goals." (emphasis added). These standalone statements regarding the potential benefits of the electric car as an additional technology are not only wholly unrelated to the enactment of the Clean Air Act and its amendments, but they also do not speak to EPA's emission standards, much less indicate a grant of authority to EPA to mandate such vehicles nationwide through such standards. [EPA-HQ-OAR-2022-0829-0707, pp. 87-88]

EPA's citation to a statement made by President Nixon in 1970 regarding a program to develop "an unconventionally powered, virtually pollution free automobile" likewise fails to support EPA's asserted authority to mandate vehicles that it purports to be zero-emitting. Not only is this statement made by the executive, rather than legislative, branch, but the mere announcement of a research program is also a far cry from a delegation of authority to mandate wholesale policy changes for the nation. For this same reason, EPA's claimed authority to "fund the development" of low emission alternatives, to certify low emission vehicles and encourage federal purchases of such vehicles, and to institute a clean fuel vehicles program are also irrelevant to EPA's authority for the proposed rule; researching and incentivizing electric vehicles is simply not equivalent to mandating them—far from it. [EPA-HQ-OAR-2022-0829-0707, pp. 87-88]

EPA next states that, in 1970, when Congress amended the Clean Air Act to target criteria pollutants, it considered "unconventional" technologies like steam and natural-gas piston. EPA relies on a Senate Report that addressed emissions associated with those sources. See S. Rep. No. 91-1196, at 27 (1970). But again, the report nowhere suggested that EPA would have authority to require automakers to shift to those technologies. Moreover, according to the report, all of those technologies emitted some pollutants. Id. So EPA's resort to legislative history as a means to replace ICE vehicles with vehicles it deems to have zero emissions proves nothing. [EPA-HQ-OAR-2022-0829-0707, pp. 87-88]

EPA's resurrection of 50-year-old dicta369 in International Harvester Co. v. Ruckelshaus, 478 F.2d 615 (D.C. Cir. 1973), as the basis for its authority to replace the combustion engine as an emission-control technology also fails, as the court was discussing legislative history, not text requiring electric vehicles. [EPA-HQ-OAR-2022-0829-0707, pp. 88-89]

> 369 EPA claims that International Harvester "held" that the legislative history indicates that Congress authorized EPA to replace ICEVs. The only holding in International Harvester was that EPA erred when it denied the automakers' request for a one-year suspension of the 1975 emissions standards prescribed by Congress. Id. at 649-50.

As a final attempt to find Congressional authorization, EPA turns to more recent legislation, which of course has nothing to do with any purported authority of EPA under the Clean Air Act. The Inflation Reduction Act, like all appropriations bills which "have the limited and specific purpose of providing funds," Tennessee Valley Auth. v. Hill, 437 U.S. 153, 190 (1978), cannot be construed to provide any agency authority and, even then, merely incentivized rather than mandated the use of electric vehicles. [EPA-HQ-OAR-2022-0829-0707, pp. 88-89]

Ultimately, Congress's limited approval of electric vehicles hurts EPA's position. Where Congress has sought to increase the usage of electric vehicles, it has done so only through incentives; as explained previously, each time a proposal to mandate the sale of electric vehicles has been presented in Congress, it has failed to even make it out of committee. And when Congress chose to set standards focused on electric vehicles, it did so on a regionally targeted, pilot basis only. It did not bury a nationwide program in Section 202, at EPA's sole discretion. [EPA-HQ-OAR-2022-0829-0707, pp. 88-89]

E. The proposal may violate other constitutional provisions and principles.

Finally, EPA's proposal may violate other constitutional provisions and principles, which EPA should consider in making its final rule. These include, but may not be limited to, the Takings Clause of the Fifth Amendment, which precludes the taking of private party (or the elimination of entire industries) for public use without just compensation, as contemplated by the proposal with regard to liquid fuels and related industries (e.g., asphalt, sulfur, etc.), as well as the following to the extent the final rule relies on and/or incorporates state ZEV mandates: the Dormant Commerce Clause, which prohibits state regulations that improperly discriminate against out-of-state commercial interests or that unduly burden interstate commerce (such as by increasing transportation and logistics costs, disrupting entire supply chains and industries, and effectively requiring other states to adopt electric vehicles that would not otherwise be adopted); the dormant foreign affairs preemption doctrine under the Supremacy Clause, which preempts state laws that intrude on the exclusive federal power to conduct foreign affairs (such as by increasing the Nation's reliance on foreign minerals and by creating two separate and incompatible vehicle fleets on either side of the U.S.-Mexico border, thereby increasing the cost of conducting international personal and business travel and disrupting international trade and supply chains); the equal sovereignty doctrine, which constrains the federal government from treating States disparately (such as by allowing California alone to dictate national transportation policy); the Import-Export Clause, which prohibits any State from imposing "any Imposts or Duties on Imports or Exports, except what may be absolutely necessary for executing" its "inspection Laws," Art. I, § 10, cl. 2, see Nat'l Pork Producers Council v. Ross, 143 S.Ct. 1142, 1175 (2023) (Kavanaugh, J., concurring in part and dissenting in part) ("In other words, if one State conditions sale of a good on the use of preferred farming, manufacturing, or production practices in another State where the good was grown or made, serious questions may arise under the Import-Export Clause."); the Privileges and Immunities Clause, which provides that the

“Citizens of each State shall be entitled to all Privileges and Immunities of Citizens in the several States,” Art. IV, § 2, cl. 1, see Nat’l Pork Producers Council, 143 S.Ct. 1175 (“Under this Court’s precedents, one State’s efforts to effectively regulate farming, manufacturing, or production in other States could raise significant questions under that Clause.”); and the Full Faith and Credit Clause, which requires each State to afford “Full Faith and Credit” to the “public Acts” of “Every other State,” Art. IV, § 1, and prevents States from adopting any policy of hostility to the public Acts of another State, see Nat’l Pork Producers Council, 143 S.Ct. 1175 (“A State’s efforts to regulate farming, manufacturing, and production practices in another State (in a manner different from how that other State’s laws regulate those practices) could in some circumstances raise questions under that Clause”). [EPA-HQ-OAR-2022-0829-0707, pp. 91-92]

Organization: Western Energy Alliance

Arbitrary and Capricious

The proposed rule is arbitrary and capricious because EPA relies on incomplete facts, biased studies, and mistaken assumptions in an attempt to restructure the entire vehicle market. The rule exposes the country to severe grid instability and increases the chances for electricity blackouts and brownouts. EPA’s reasoning and justification for the rule are similarly flawed, based on a market assessment that is faulty. [EPA-HQ-OAR-2022-0829-0679, p. 8]

However, with the generous assumption that the market penetration numbers are correct, then why does EPA need to move forward with this rule at all? If EPA is right and EV sales will increase to 67% by 2032 anyway, why is the rule necessary? We are inclined to think that a more robust market analysis would reach another conclusion, especially as market penetration increases and the effects from the strain on the electrical grid would become apparent. Given the fundamental lack of authority to force this transition, EPA’s own analysis of market penetration by 2032 suggests the rule is unwise. [EPA-HQ-OAR-2022-0829-0679, p. 8]

New Legislation: EPA also cites the impact of the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) to show increased market penetration of EVs. While it is a simple statement of fact that, “These measures represent significant Congressional support for investment in expanding the manufacture, sale, and use of zero emission vehicles …” (p. 29195), the existence of these laws to fund EV infrastructure and subsidize their sale is not akin to giving EPA authority to compel carmakers to manufacture more EVs and consumers to buy them. [EPA-HQ-OAR-2022-0829-0679, p. 9]

Further, EPA unwittingly offers the counter argument for this rule. With the BIL and IRA, Congress spoken clearly on the desire specifically to incentivize EVs, not compel their use. Coupled with the lack of authority in the Clean Air Act to reorient an entire industry and with the Supreme Court’s ruling in West Virginia v. EPA, EPA must reverse the justification in Section I. A. iii for the proposed rule that relies on these two laws. The reasoning is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0679, p. 9]

Organization: Wisconsin Automobile and Truck Dealers Association

Just one year ago, the U.S. Supreme Court ruled in West Virginia v. EPA that agencies do not have unfettered authority to make sweeping rule changes that have major economic impact without specific direction from Congress. Under this proposed Rule, the EPA is proposing to disrupt the world's largest transportation system. The astronomical cost of converting the U.S. transportation fleet and its power source is being loaded onto the backs of American taxpayers. Electric motor vehicles (be they passenger cars, buses, trucks, earth moving equipment, etc.) are an unproven and less efficient technology compared to internal combustion vehicles. [EPA-HQ-OAR-2022-0829-0494, p. 2]

EPA Summary and Response

EPA responds to these comments, together with the comments reprinted in sections 2.1 and 2.2, below in section 2.3.

2.1 - GHG standards

Comments by Organizations

Organization: A. Longo

I will continue to reiterate that clean air is important. However, the debate over what level of clean air is necessary to balance against the cost of regulation does not seem to be resolved, and the timeline and levels sought are very aggressive without much analysis of economic impact. Lastly, the Supreme Court ruled in West Virginia v. EPA, that the Environmental Protection Agency does not have broad authority to regulate greenhouse gas emissions from power plants. The six to three decision, written by Chief Justice John Roberts, was a major victory for states that had challenged the EPA's authority. The EPA had argued that it had broad authority under the Clean Air Act to regulate greenhouse gas emissions from power plants, analogous to the attempt here to regulate light to medium-duty vehicles. However, the Supreme Court ruled that the EPA's authority is limited to emissions that "contribute significantly" to air pollution. The Court found that the EPA's emissions standards for power plants went beyond what is allowed under the Clean Air Act. It is more than likely that this regulation would face similar scrutiny around the ability to prove that light to medium-duty vehicles reach the bar that they currently “contribute significantly” to air pollution. Instead of mandating emission standards, which will result in legal challenges I urge the EPA to use the carrot and not the stick approach by working with manufacturers and providing incentives to switch to alternative fuels or consider funding research to accelerate technology advancement making more fuel-efficient vehicles less costly to produce. [EPA-HQ-OAR-2022-0829-0517, p. 2]

Organization: Alliance for Automotive Innovation

2. Statutory Authority

Auto Innovators shares EPA’s goal of addressing climate change by achieving a net-zero carbon transportation future, as part of an ambitious, comprehensive, and national strategy. The Proposed Rule, however, contemplates a rapid and transformative nationwide shift to electrification that may be well beyond what the industry or market can bear now or in the foreseeable future. Given the significant policy and economic consequences that would flow from this restructuring of the nation’s vehicle market, and the breadth and unprecedented nature of EPA's proposed action, clear congressional authorization is required for the Proposed Rule. EPA lacks this clear authorization. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

The Proposed Rule seeks to use Clean Air Act section 202 rulemaking to force an extraordinary transformation of the nation's vehicle fleet away from ICE-based vehicles to BEVs, and it is not at all clear that the level of consumer demand and infrastructure that exists now and is expected in the future can support the expedited, aggressive timeline in the Proposed Rule. The Proposed Rule does not include an explicit electrification target, and EPA states that "a compliant fleet under the proposed standards will include a diverse range of technologies."152 But in practice, the stringency of the proposed standards is such that automakers will have no choice but to convert to BEV fleets on a massive scale. This is the result not only of the Proposed Rule's GHG emissions standards, but also its criteria pollutant standards and its tightening of credit programs and other flexibilities. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

152 NPRM at 29187.

As EPA notes, BEVs accounted for 5.8% of the new U.S. light-duty passenger vehicle market in 2022.153 Moreover, EPA's MY 2023-2026 GHG emissions standards that were finalized at the end of 2021 projected only a 17% light-duty penetration rate for both BEVs and PHEVs by MY 2026.154 Despite this low rate of consumer acceptance, the Proposed Rule projects a light-duty BEV penetration rate of 67% by MY 2032, up from 36% in MY 2027.155 Importantly, in the absence of these and other strict regulatory programs (such as California's ZEV mandate), EPA projects a significantly lower MY 2032 BEV penetration rate of only 39%.156 It is unclear from EPA's analysis how the regulations alone justify a 28 percentage point increase in BEV market between having regulations versus not. This is particularly concerning given that EPA's no- action analysis presumably includes the same level of existing supportive mechanisms such as the IRA and IIJA, assumptions for infrastructure development, and other market-enabling features. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

153 Id. at 29189

154 See Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74485, Table 33 (Dec. 30, 2021).

155 NPRM at 29329, Table 80.

156 Id. at 29329, Table 81.

In other words, a staggering increase in the implementation and adoption of BEV technology underpins the Proposed Rule and is the central means by which the rule effectuates its contemplated emissions reductions. But this shift to electrification is not a simple matter of swapping one technology for another. The mass adoption of BEVs on the scale required for compliance with the Proposed Rule's standards requires a much broader transformation in the way vehicles are manufactured, purchased, fueled, serviced, and disposed of. Indeed, the Proposed Rule would reorder much of the U.S. automobile industry—which supports roughly 10.3 million American jobs and $558 billion in annual car sales, and about 6% of the U.S.'s Gross Domestic Product (GDP).157 Consumers must be willing to purchase BEVs at mass scale; the power sector must be able to generate and deliver adequate electricity158—which itself will contribute to emissions—while maintaining grid reliability and otherwise meeting consumer and industrial demand; adequate charging infrastructure must be available; batteries and other components must be manufactured at an increasing rate, critical minerals sourced, and supply chains developed. These needs must be met not only for light-duty vehicles, but also for medium- and heavy-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

157 See Economic Insights, Alliance for Automotive Innovation, https://www.autosinnovate.org/resources/insights.

158 In addition to increasing electricity capacity, utilities are also facing a transition in technology types and more renewable sources, as proposed under the "Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants" [88 FR 33240, May 23, 2023].

As expressed throughout this comment, we have serious concerns that the market will not be able to bear the requirements of the Proposed Rule and that those requirements will not be feasible given these considerations. Compliance will impose significant costs, and require extraordinary effort, on the part of regulated parties—costs which will be passed along to consumers. Setting such stringent standards has the potential to create a significant market disruption, with consequences not only for the automobile industry but for the entire U.S. economy. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

In other words, the Proposed Rule is enormously consequential for the automobile industry, and for the economy and consumers as a whole. The Proposed Rule's provisions insert EPA into crucial policy tradeoffs and debates, such as concerns about the extraction and supply of critical minerals overseas, or the need to maintain a reliable, efficient electric grid.159 These considerations range far afield from the traditional ambit of section 202 rulemaking, delving into areas that are the subject of other regulatory schemes, or within the unique purview and authority of other agencies and other branches and levels of government. In short, the dramatic shift toward electrification required by the Proposed Rule implicates issues of tremendous political, economic, and social significance. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

159 See, e.g., NPRM at 29311-24.

Nor is such a transformative rule, with such wide-ranging implications, a typical feature of section 202 rulemaking. We acknowledge that some past EPA section 202 rules, most notably the MY 2023-2026 rule, have contemplated greater deployment of EVs as one of many options for complying with emissions standards. The Proposed Rule, however, is different not merely in degree but in kind, seeking to impose what is, at bottom, a mandate toward nationwide electrification. Such a proposal amounts to an unprecedented assertion of power on the part of EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

"[A]n enormous and transformative expansion in EPA's regulatory authority" such as this necessitates "clear congressional authorization," as Congress is expected to "speak clearly if it wishes to assign to an agency decision of vast 'economic and political significance.'"160 But section 202 does not confer such clear authority. Section 202 authorizes EPA to promulgate "standards applicable to the emission of any air pollutant" from vehicles; it does not empower EPA to force a historic shift in the makeup of the nation's entire vehicle fleet. In the absence of plain statutory authorization, such a decision, and the tradeoffs and consequences it entails, properly belongs to Congress. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

160 Utility Air Regulatory Group v. E.P.A., 573 U.S. 302, 324 (2014) (quoting FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 160 (2000)).

The Proposed Rule frequently cites to the IIJA, also known as the "Bipartisan Infrastructure Law,"161 and the Inflation Reduction Act.162 To the extent EPA purports to rely on either statute as providing a legal basis for the Proposed Rule,163 it should not do so. No provision of the IIJA or the IRA expands or modifies EPA's regulatory authority under section 202 or the Clean Air Act more broadly. Nor can these laws be considered to have implicitly altered EPA's authority. After all, "implied amendments require 'clear and manifest' evidence of congressional intent,"164 and "neither courts nor federal agencies can rewrite a statute's plain text to correspond to its supposed purposes."165 Those conditions are not satisfied here. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

161 Pub. L. 117-58, 135 Stat. 429 (2021).

162 Pub. L. 117-169, 136 Stat. 1818 (2022). See, e.g., NPRM at 29187-90, 29195-96, 29233, 29300, 29308, 29313, 29318, 29322-24, 29341 (referencing the IIJA and/or IRA).

163 See, e.g., NPRM at 29233 ("The recently enacted Inflation Reduction Act 'reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act'") (quoting floor statement by Rep. Pallone).

164 Sackett v. E.P.A., 598 U.S   , 2023 WL 3632751, at *13 (U.S. May 25, 2023) (internal quotation omitted).

165 Landstar Exp. America, Inc. v. Fed. Maritime Comm'n, 569 F.3d 493, 498 (D.C. Cir. 2009).

We reaffirm that we are fundamentally supportive of EPA's goals of reducing GHG emissions and transitioning to a net-zero carbon transportation future. Section 202 standards have a place in this effort, as we have previously expressed. We remain concerned, however, that the extraordinary and unprecedented nature of the Proposed Rule places it outside the bounds of EPA's statutory authority. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

d) EPA's Reliance on Credit Trading for SVMs to Meet the Proposed GHG Standards

Despite EPA's projections for rapid EV update and ICE improvement, EPA's modeling also suggests that SVMs will be required to heavily rely on credit trading flexibility to maintain compliance with GHG standards.320 We believe this is inappropriate for several reasons and demonstrates that the proposed alternative standards do not meet the requirements of CAA § 202(a) that standards "take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such a period." First, it is inappropriate to set a standard so stringent as to effectively require a manufacturer to entirely rely on another manufacturer to maintain compliance. Additionally, there is an inherent risk that even if a credit-generating manufacturer is willing to sell credits, the credits may be purchased by other parties before SVMs can access them. [EPA-HQ-OAR-2022-0829-0701, p. 211]

320 Credit purchase claim based on examination of EPA's proposal central analysis OMEGA output files for credit transactions, noting degree of credit balances listed as "PAST DUE". Such deficits would require credit purchases.

These proposed standards for SVMs do not meet the Clean Air Act's requirement to provide adequate time for the development and application of the necessary technologies (BEVs in the case of such rapid increases in stringency and overall stringency levels). They are also not equitable to those of other manufacturers given the significantly higher BEV market share required to meet them and the more rapid increases in stringency. [EPA-HQ-OAR-2022-0829-0701, p. 211]

2. Recommendations for SVM GHG Standards

Auto Innovators proposes the following approach to address these concerns:

We support EPA's proposal to sunset the individual application process for alternative standards. However, for the above reasons, we recommend that EPA maintain the approved MY 2021 individual standards through MY 2026. Such an approach would provide time to start implementing electrification-compatible technologies, help address lead-time concerns in general, and make the timing of later changes consistent with the model years EPA is focused on in this rulemaking. [EPA-HQ-OAR-2022-0829-0701, p. 211]

As described above, and related to overall industry concerns highlighted in Section I of these comments (EV Feasibility), SVMs are concerned with both the overall level of electrification likely required by EPA's proposed standards and the relatively greater improvements that EPA is proposing for SVMs relative to industry as a whole. For MY 2032 SVM alternative standards, we recommend that EPA address these concerns by requiring SVMs to improve their emissions levels by the same percentage as the primary standards require between MY 2026 (which would be based on MY 2021 for SVMs) and MY 2032. (E.g., 50% under the current proposal.) [EPA-HQ-OAR-2022-0829-0701, p. 211]

2. Classification of Batteries as "Major Emission Control Components"

Utilizing the Administrator's authority mandated in Section 207(i)(1) of the CAA, EPA is proposing under this NPRM to designate high-voltage battery systems and associated powertrain components as "specified major emission control components," thus imposing a warranty period of eight years or 80,000 miles of use, whichever first occurs. Such a designation for BEVs, however, is entirely inconsistent with the statute. [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

Section 207(i)(2) enumerates a discrete list of items that qualify as "specified major emission control components," and authorizes the Administrator to designate "any other pollution control device or component" as such if certain conditions are met.334 But a BEV produces zero emissions from its battery and associated electric powertrain components. It follows that no device or component of a BEV could logically be a "pollution control device or component" that can be designated as a "specified major emission control component" under section 207(i)(2), because there are no emissions from the BEV to control.335 [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

334 42 U.S.C. § 7541(i)(2).

335 We acknowledge that this designation for PHEVs is more consistent with the statutory authorization, because the battery-electric power displaces use of the vehicle's ICE, controlling the PHEV's emissions.

The NPRM attempts to justify its counter-textual reasoning in the NPRM, but its reasoning cannot cure the fundamental legal flaw in its proposal. For instance, the NPRM claims that its "proposed warranty requirements would be equivalent to those that EPA has the authority to require and has historically applied to other specified major emission control-related components for ICE vehicles under EPA's light-duty vehicle regulations..."336 But this is a false equivalency, because ICE vehicles produce emissions, and a component in the vehicle designed to reduce those emissions (such as, for example, a catalytic converter or an electronic emissions control unit) can be considered a "major emission control component." The same cannot be said of any component of a BEV that produced no emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

336 NPRM at 29286.

Recognizing that BEVs do not have any emission themselves, the NPRM nonetheless argues that BEV batteries can be considered a major emissions control component to the extent that BEVs are used to displace ICE vehicles. This portion of the NPRM refers back to the battery durability requirements,337 which argues that a "loss of a large portion of the original driving range capability as the vehicle ages could reduce total lifetime mileage and the ability for electric miles to displace conventional miles traveled."338 Not only does this argument find no support in the statute, but it proves way too much. Just about any component on a BEV that helps it run or that is important to the consumer will impact the extent to which the BEV will continue to displace conventional miles traveled. For instance, a consumer may elect to not to drive their BEV if that vehicle's infotainment system fails completely, but that certainly would not make the infotainment system a "major emissions control component." Simply put, there is absolutely no basis in the CAA for EPA to impose any battery warranty requirements on BEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

337 NPRM at 29286 – 87.

338 Id. At 29284

C. EPA Has the Authority to Regulate Fuels to Improve GHG Emissions

The Clean Air Act provides statutory authority for the EPA to regulate GHG emissions, which can "cause, or contribute to, air pollution which may reasonably be anticipated to endanger the public health or welfare."408 Section 211 of the Clean Air Act provides EPA with the authority to regulate motor vehicle fuels in furtherance of the Act's goals. Specifically, Section 211(c) of the Act grants EPA the authority to set new national fuel standards, including octane rating, under the following circumstances: [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

408 Massachusetts v. EPA, 549 U.S. 497 (2007).

- (1)(A) "if in the judgment of the Administrator, any fuel or fuel additive or any emission product of such fuel or fuel additive causes or contributes to air pollution or water pollution… that may reasonably be anticipated to endanger the public health or welfare," or

- (1)(B)"if emission products of such fuel or fuel additive will impair to a significant degree the performance of any emission control device or system which is in general use, or has been developed to a point where in a reasonable time it would be in general use were such regulations to be promulgated." [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

It is important to note that the addition of GHGs to the list of Clean Air Act "pollutants" is changing how one thinks of emissions control. For purposes of considering EPA's authority under 211(c)(1)(B), it is important to realize that the term "any emission control device or system" must be understood more broadly than it once was. With this realization, it is easy to see that engine efficiency improvements offer emission control benefits. However, low-octane fuel acts as a barrier to these efficiency benefits. EPA has the authority and must stand firmly on the side of removing these barriers and providing manufacturers with a full menu of options for striving to meet the future GHG standards. [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

In light of increasing GHG and CAFE requirements, it continues to be essential for vehicles and the fuels they operate on to be treated as a system and developed in tandem. Prospective fuels should enable greater vehicle efficiency and lower emissions, optimize the consumer experience, and fulfill societal values. Technology is in place to produce advanced engines. However, without a promulgated higher-octane fuel standard, the advanced engines cannot optimize their potential operational efficiency. It is now timely for EPA to undertake an accelerated process to implement and synchronize the market introduction of higher-octane gasoline that will enable the benefits of advanced technologies and support manufacturer investments. EPA has the authority to regulate national commercial gasoline octane specifications under the Clean Air Act. EPA should initiate a fast-track process to assure higher octane gasoline that meets the market and timing needs of new vehicle technologies for the U.S. commercial supply. [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

the proposed Light- and Medium-Duty rule would impose strict GHG and criteria-pollutant standards for model year 2027 through 2032, which become more stringent each year. 88 Fed. Reg. at 29,196. Although the proposed rule portrays those emission standards as “performance-based” and as allowing manufacturers to choose which emissions-control technologies to adopt, id. at 29,255, 29,257, EPA has stated openly that it expects manufactur- ers to shift from internal-combustion engines toward battery-electric vehicles, id. at 29,297–98. By 2032, EPA projects, for instance, that 78 percent of sedans, 62 percent of crossovers and SUVs, and 98 percent of vans will be battery-electric vehicles. See id. at 29,329–31. In a break from its historic practice, EPA now overtly proposes to wield its Section 202 authority over emission levels to mandate the adoption of alternatives to internal-combustion engines—replacing pollutant-emitting motor vehicles that Section 202 governs with other, non- emitting vehicles that the statute does not cover. The proposed Light- and Medium-Duty rule seeks to accomplish that unprecedented transformation on a highly compressed timeline, remaking the sectors within less than a decade. [EPA-HQ-OAR-2022-0829-0683, pp. 7-8]

I. The Proposed Rule Exceeds EPA’s Statutory Authority

Like every agency, EPA “‘literally has no power to act’ . . . unless and until Congress authorizes it to do so by statute.” FEC v. Ted Cruz for Senate, 142 S. Ct. 1638, 1649 (2022) (citation omitted). Moreover, under the major-questions doctrine, given the nature and breadth of the power EPA claims to reshape a large sector of the economy, congressional authorization would have to be unmistakably clear. But nothing in the Clean Air Act plausibly—let alone clearly— authorizes EPA to mandate replacing a particular percentage of internal-com- bustion-engine vehicles with a different category of vehicles that themselves emit no GHGs at all. [EPA-HQ-OAR-2022-0829-0683, pp. 8-9]

EPA cannot justify the proposed rule’s attempted transformation of the light-and-medium-duty-vehicle sector as an application of its fleetwide-averaging approach to emissions. Fleetwide averaging itself contravenes the Clean Air Act. At a minimum, it is not clearly and unmistakably authorized as a back- door means of remaking the auto industry, as the major-questions doctrine requires. [EPA-HQ-OAR-2022-0829-0683, pp. 8-9]

A. The Forced Electrification Of The Country's Light- and Medium- Duty Vehicles Is A Major Question

EPA recognizes that its proposed light- and medium-duty vehicle-emissions standards cannot be met by internal-combustion-engine vehicles alone. Instead, as EPA forthrightly admits, its proposed Light- and Medium-Duty rule (like its proposed Heavy-Duty rule) would compel manufacturers to transform their light- and medium-duty vehicle fleets. From a starting point roughly in the single digits, manufacturers would have to increase the percentage of electric vehicles in their light-duty fleets to 67 percent by 2032. See 88 Fed. Reg. at 29,189, 29,329. And they would have to increase the percentage of electric vehicles in their medium-duty fleets from virtually zero percent today to 46 percent by 2032. See 88 Fed. Reg. at 29,331; Draft RIA at 3-11. That is the proposed rule's purpose, consistent with the Administration's avowed goal "that at least 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles."2 [EPA-HQ-OAR-2022-0829-0683, pp. 9-10]

2 FACT SHEET: Biden-Harris Administration Proposes New Standards to Protect Public Health that Will Save Consumers Money, and Increase Energy Security, White House Briefing Room (Apr. 12, 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/12/fact- sheet-biden-harris-administration-proposes-new-standards-to-protect-public-health-that-will- save-consumers-money-and-increase-energy-security/.

EPA's proposal "to substantially restructure" a major sector of the American economy implicates the major-questions doctrine, under which EPA must identify "'clear congressional authorization' for the power [EPA] claims." West Virginia v. EPA, 142 S. Ct. 2587, 2609–10 (2022) (citation omitted). The Supreme Court formally recognized and applied the major-questions doctrine last Term in West Virginia, which rejected a similarly aggressive assertion of regulatory power by EPA under the Clean Air Act. Under West Virginia and in a long line of cases predating it, the proposed rule here presents a major question, for at least three reasons. [EPA-HQ-OAR-2022-0829-0683, pp. 9-10]

First, EPA has claimed a power of "vast economic . . . significance," West Virginia, 142 S. Ct. at 2605 (citation omitted): the power, in effect, to phase out internal-combustion-engine light- and medium-duty vehicles in favor of electric vehicles. The financial consequences alone are staggering: EPA's own esti- mates project that the rule will have a net effect of $1.6 trillion, orders of mag- nitude more than in West Virginia. 88 Fed. Reg. at 29,361; cf. Ala. Ass'n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021) (per curiam) (noting that the "sheer scope" of the agency's "claimed authority . . . counsel[s] against the Govern- ment's interpretation"). The economic significance of the proposed rule extends beyond those immediate financial effects. A shift of this scale would have spillover effects on the broader economy that EPA's projections do not even attempt to capture. For example, in addition to those who manufacture and purchase conventional vehicles, the proposed rule would affect those who fuel them (oil, natural-gas, and biofuel producers), and in turn other sectors that depend on those products (from asphalt to lubricants). These effects would also spread to industries that rely on light- and medium-duty vehicles, such as the passenger-transportation, delivery, and logistics industries. From any standpoint, the "magnitude" of the "'unprecedented power over American industry'" EPA has claimed reflects a major question. West Virginia, 142 S. Ct. at 2612 (quoting Indus. Union Dep't, AFL-CIO v. Am. Petroleum Inst., 448 U.S. 607, 645 (1980)). [EPA-HQ-OAR-2022-0829-0683, p. 10]

EPA’s assertion of authority here is an “unheralded power representing a transformative expansion in its regulatory authority.” West Virginia, 142 S. Ct. at 2610 (quotation marks omitted). Although EPA has long set emis- sions standards with which manufacturers must comply, until recently it has treated shifting to electric vehicles merely as one “option” manufacturers may select that provides them “flexibility” in meeting much less radical emissions standards. See, e.g., 77 Fed. Reg. 62,624, 62,917 (Oct. 15, 2012); NRDC v. Thomas, 805 F.2d 410, 425 (D.C. Cir. 1986) (“EPA’s argument that averaging will allow manufacturers more flexibility in cost allocation while ensuring that a manufacturer’s overall fleet still meets the emissions reduction standards makes sense.” (emphasis added)). Unlike the proposed rule, prior emissions standards “were predominantly based on advancements in [internal-combustion-engine] technologies that provided incremental emissions reductions,” not on a large- scale shift toward electric-vehicle technologies. 88 Fed. Reg. at 29,196. [EPA-HQ-OAR-2022-0829-0683, pp. 11-12]

Under the proposed rule, however, manufacturers will have no choice but to introduce a significant number of electric light- and medium-duty vehicles into their fleets to meet EPA’s stringent standards. EPA “anticipates that a compliant fleet under the proposed standards will include a diverse range of technologies, including higher penetrations of advanced gasoline technologies as well as zero-emission vehicles,” 88 Fed. Reg. at 29,187, and it projects that by 2032, in order for manufacturers to comply with the standards, electric vehicles will have to make up 67 percent of their light-duty fleets (78 percent of sedans, 62 percent of SUVs, and 68 percent of pickups) and 46 percent of their medium-duty fleets (98 percent of vans and 19 percent of pickups), id. at 29,329, 29,331. EPA’s projections of a massive shift to a new, purportedly non-emitting category of motor vehicles belie its suggestion that the proposed rule amounts to business as usual and merely continues a longstanding regulatory approach. See id. at 29,187. As in West Virginia, EPA has never previously claimed power to use emissions limitations to shift a significant portion of this industry from one technology to another. Its proposed rule thus embodies “an enormous and transformative expansion [of] EPA’s regulatory authority.” Util. Air Regul. Grp. v. EPA, 573 U.S. 302, 324 (2014). [EPA-HQ-OAR-2022-0829-0683, pp. 11-12]

Like EPA’s assertion of authority in West Virginia, its unprecedented claim of power in the proposed rule to reshape a major industry through emissions limitations presents a major question. EPA therefore lacks authority to promulgate the rule absent “‘clear congressional authorization’ for the power [EPA] claims.” West Virginia, 142 S. Ct. at 2609 (citation omitted). [EPA-HQ-OAR-2022-0829-0683, pp. 11-12]

EPA has no clear congressional authorization for the proposed rule’s electrification mandate. Under Section 202 of the Clean Air Act, EPA may “prescribe . . . standards” applicable to GHG emissions “from any class or classes of new motor vehicles or new motor vehicle engines” that EPA determines “cause, or contribute to, air pollution.” 42 U.S.C. § 7521(a)(1); see also Massa-chusetts v. EPA, 549 U.S. 497, 532 (2007); 74 Fed. Reg. 66,496 (Dec. 15, 2009). Section 202 specifies that “[s]uch standards shall be applicable to such vehicles and engines for their useful life . . . whether such vehicles and engines are de- signed as complete systems or incorporate devices to prevent or control such pollution.” 42 U.S.C. § 7521(a)(1). Nothing in the statutory text clearly author- izes EPA to mandate a compulsory shift toward zero-emission vehicles. [EPA-HQ-OAR-2022-0829-0683, pp. 12-13]

EPA has attempted to ground its electrification mandate in its standard- setting authority under Section 202 through fleetwide averaging. Averaging and its corollaries in EPA's ABT program—crediting (whereby manufacturers can use "credits" generated for one fleet that surpassed the emissions level to offset a deficit in another fleet), banking (saving credits earned one year to offset deficits in future years), and trading (selling credits to competitors for money)— are crucial to EPA's effort to mandate electrification. The proposed rule speci- fies emissions standards that would operate not as maximum-emission thresh- olds for particular pollutants that any individual vehicle must meet, but rather as fleetwide-average emission levels that manufacturers' fleets must collectively satisfy. See 88 Fed. Reg. at 29,196–97 ("EPA is not reopening its averaging, banking, and trading provisions, which continue to be a central part of its fleet average standards compliance program and which help manufacturers to em- ploy a wide range of compliance paths."). That averaging approach is essential to EPA's electrification mandate because it plainly would not be feasible for EPA to set maximum permissible GHG emissions at zero for individual vehi- cles: the "cost of compliance" with a zero-emissions mandate for every light- and medium-duty vehicle would doom such a requirement. 42 U.S.C. § 7521(a)(2). Instead, by allowing lower-emitting vehicles in a manufacturer's fleet to offset higher-emitting vehicles (in its own fleet or that of another man- ufacturer, through trading of credits), and by setting very stringent fleetwide- average GHG-emission standards that no conventional motor vehicle could satisfy, EPA's proposed rule forces manufacturers to produce a significant number of zero-emission (i.e., electric) vehicles. See 88 Fed. Reg. at 29,342; see also id. at 29,284 ("[V]ehicles of all types (including [internal-combustion-en- gine] vehicles as well as PEVs) are assessed on a fleet average basis in which credits that are generated by vehicles that over-comply with their footprint- based standard act to offset debits generated by vehicles that do not themselves meet the proposed standards, and these credits can also be traded among man- ufacturers."). [EPA-HQ-OAR-2022-0829-0683, pp. 12-13]

The Clean Air Act, however, does not authorize EPA to employ that fleet- wide-averaging approach at all—much less with the unmistakable clarity the major-questions doctrine demands. EPA's contrary interpretation has no foun- dation in the statutory text and would make a hash of the statutory structure, which repeatedly uses language that makes sense only in the context of emis- sions standards applicable to individual vehicles. Even if fleetwide averaging were permissible as a general matter, it cannot be exploited to shoehorn zero- emission vehicles—i.e., vehicles that do not "cause, or contribute to, air pollu- tion," 42 U.S.C. § 7521(a)(1), and thus fall outside Section 202 entirely—into the fleetwide-average calculation as a means of mandating electrification. [EPA-HQ-OAR-2022-0829-0683, pp. 12-13]

In any event, the Clean Air Act refutes EPA's view that Congress left the door open to fleetwide averaging. Other provisions in Section 202 itself and Title II as a whole make clear that fleetwide averaging is fundamentally incom- patible with the statutory structure and design. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

Other portions of Section 202 confirm Section 202(a)(1)'s focus on emission standards applicable to individual vehicles. For example:

- Under 42 U.S.C. § 7521(b)(1)(A), the standards for light-duty vehicles and engines in model years 1977–79 must provide that "emissions from such ve- hicles and engines may not exceed 1.5 grams per vehicle mile of hydrocarbons and 15.0 grams per vehicle mile of carbon monoxide." Id. (emphasis added). This provision contemplates that "such vehicles"—i.e., individual light-duty vehicles—will not exceed these limits. Under an averaging ap- proach, however, individual vehicles would be permitted to exceed these statutorily mandated standards. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

- Similarly, 42 U.S.C. § 7521(b)(3) authorizes EPA to grant waivers from cer- tain nitrogen-oxide emission "standards," see id. § 7521(b)(1)(B), for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater." Id. § 7521(b)(3). The provision thus provides a default rule under which every vehicle must meet a per-vehicle emissions standard, then permits a waiver from that default rule for up to 5 percent of the fleet. Averaging is inconsistent with this pro- vision, which depends on a set number of individual vehicles meeting the standards. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

- And under 42 U.S.C. § 7521(m)(1), EPA must require manufacturers to in- stall "diagnostic systems" on "all" new light-duty vehicles and trucks that are capable of identifying malfunctions that "could cause or result in failure of the vehicles to comply with emission standards established under this section." Requiring diagnostic equipment on "all" vehicles makes no sense on an averaging approach; each vehicle must have a diagnostic system that ensures that vehicle's "compl[iance] with emission standards established un- der [Section 202]," id., yet under EPA's averaging approach, no particular vehicle need be in compliance. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

Beyond Section 202 itself, averaging is also deeply in tension with "the de- sign and structure of [Title II] as a whole." Util. Air, 573 U.S. at 321 (citation omitted). Consider Title II's provisions addressing testing, warranties, and pen- alties: [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

Organization: American Fuel & Petrochemical Manufacturers

There is no doubt that if promulgated in its current form, the proposal would have major implications for consumers, our economy, and our national security. The Supreme Court made clear in a string of recent rulings that regulations of such magnitude require unambiguous Congressional authority. Congress has never come anywhere close to providing EPA with the authority it asserts here – the power to effectively ban internal combustion engine vehicles by setting emission standards that only battery electric vehicles can achieve. To comply with the Clean Air Act, EPA must set emission standards that individual, well-controlled ICEV can attain. [EPA-HQ-OAR-2022-0829-0733, p. 1]

EPA proposed unachievable standards for light- and medium-duty ICEVs. This attempt to force an unprecedented transformation of the national transportation system to ZEVs goes far beyond the authority delegated to the Agency by Congress. The Proposal—which will likely require hundreds of billions of dollars, dictate what vehicles are permissible for automakers to sell, and has significant ramifications for the U.S. energy sector, national security, and consumers—clearly addresses questions of major economic and political significance that EPA is neither authorized nor equipped to address. [EPA-HQ-OAR-2022-0829-0733, p. 2]

EPA also misinterprets its authority to establish feasible efficiency improvements by proposing standards that cannot be achieved with ICEV technologies. First, EPA is not permitted to rely on averaging, banking, and trading mechanisms as a means to establish the relevant standards. Second, because ZEVs do not have tailpipe emissions, they do not directly “cause or contribute to” air pollution within the construct of a tailpipe emissions standard, and therefore any standard applicable to “any class or classes” of vehicles “which . . . cause, or contribute” to air pollution cannot include ZEVs. [EPA-HQ-OAR-2022-0829-0733, p. 2]

Even if EPA had Congressional authority to promulgate the proposed standards, the proposal is arbitrary and capricious due to the Agency’s reliance on incomplete facts, overly optimistic or outright mistaken assumptions, and failure to use reason-based decision-making. The Agency significantly overestimates environmental benefits and feasibility, underestimates costs, and relies on little more than unsupported hope that consumer preferences will change to enable the Agency’s intended policy. EPA’s decision to not only ignore lifecycle emissions of ZEVs, but to explicitly propose removing the requirement for automakers to account for them, serves neither consumers nor the environment. EPA’s reasoning, that its policy of not accounting for these emissions serves its goal of promoting the use of EVs, is the definition of arbitrary and capricious biased decision-making. Unfortunately, the Agency also ignored significant issues related to energy security and U.S. national security. [EPA-HQ-OAR-2022-0829-0733, p. 2]

The “major questions doctrine” holds that Congress must “speak clearly when authorizing an agency to exercise [such] powers” of “vast economic and political significance.”61 And as EPA is aware, this doctrine applies in the context of environmental regulation. Last year, in West Virginia v. EPA, the Supreme Court relied on the major questions doctrine in holding that the EPA exceeded its statutory authority in adopting its Clean Power Plan. That regulation sought to impose caps on GHG emissions by requiring utilities and other providers to shift electricity production from coal-fired power to natural gas and then to renewable energy in place of imposing source-specific requirements reflective of the application of state-of-the-art emission reduction technologies.62 [EPA-HQ-OAR-2022-0829-0733, p. 18]

61 Nat’l Fed. Of Indep. Bus. v. Dep’t of Labor, 142 S. Ct. 661,665 (2022); see also Ala. Assoc. of Realtors

v. Dep’t of Health & Human Servs., 141 S. Ct. 2485, 2489 (2021); Utility Air Regulatory Group v. EPA, 573 U.S. 302, 324 (2014); U.S. Telecom Assoc. v. FCC, 855 F.3d 381, 419-21 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc) (explaining provenance of “major rules doctrine”). [EPA-HQ-OAR-2022-0829-0733, p. 18]

62 West Virginia v. EPA, 142 S. Ct. 2587 (2022).

As noted by the Court, EPA “announc[ed] what the market share of coal, natural gas, wind, and solar must be, and then require[d] plants to reduce operations or subsidize their competitors to get there.”63 EPA’s attempt to devise GHG emissions caps based on a generation-shifting approach would have had major economic and political significance impacting vast swaths of American life and substantially restructured the American energy market; however, EPA’s purported authority was only based on a “vague statutory grant” within Section 111(d) of the Clean Air Act—far from the “clear authorization required by [Supreme Court] precedents.”64 The need for clear congressional authorization for such sweeping regulatory programs is nothing new – just last week the Supreme Court reaffirmed the major questions doctrine “as an identifiable body of law that has developed over a series of significant cases spanning decades.”65 [EPA-HQ-OAR-2022-0829-0733, p. 18]

63 Id. at 2613, n4.

64 Id. at 2614.

65 Biden v. Nebraska, No. 22-506, slip op. at 23 (June 30, 2023) (internal quotations omitted) (applying major questions doctrine to strike down student loan repayment program that will cost taxpayers approximately $500 billion and affects nearly every student loan borrower). Just as the trade-offs inherent in a mass debt cancelation program are ones that Congress would likely have reserved for itself, id., slip op. at 25, so too are those that must be considered for the mass adoption of electric vehicles.

As with the Clean Power Plan, EPA lacks Congressional authorization in the Clean Air Act to impose a manufacturing-shifting standard to a preferred powertrain and effectively order regulated parties to phase out combustion engine technologies. EPA's standard-setting tools are limited to those which Congress provided in Section 202(a) of the Clean Air Act. Here, EPA is only authorized to set "standards" for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to," potentially harmful air pollution. EPA has elected to focus solely on tailpipe emissions. But EPA acknowledges that ZEVs do not have tailpipe emissions of carbon dioxide, nitrogen oxides, non-methane organic gases, particulate matter, carbon monoxide, or formaldehyde, the pollutants of concern here, so the operation of such vehicles alone cannot "cause, or contribute to," air pollution within the constructs of a tailpipe emissions regulation, especially when EPA does not require vehicle manufactures to account for the upstream emissions from ZEVs in their compliance calculations. [EPA-HQ-OAR-2022-0829-0733, pp. 19-20]

Far from "clear congressional authorization," Section 202(a) provides EPA no authority to set standards that go beyond that which could be achieved by improvements to ICEVs alone such that OEMs are required to cease producing the underlying technology governed at the time the Clean Air Act was adopted and amended. Nor does it permit EPA to establish a fleet averaging and emission credit trading program as a mechanism to limit ICEV sales.68 Notably, in its 1990 updates to the Clean Air Act, Congress instituted a clean fuel vehicles program with reference to "clean alternative fuel" vehicles, which includes ZEVs. In doing so, Congress explicitly distinguished such vehicles from "conventional gasoline-fueled or diesel-fueled vehicles of the same category and model year," dispelling the notion that ZEVs and ICEVs can be lumped together to set standards that will enable the former to eventually displace the latter.69 EPA does not—and cannot—explain how such authority can be read to regulate ZEVs and ICEVs under a common standard, especially in light of the statutory language requiring EPA to set standards for any class or classes of vehicles. It is no surprise then that up until the current Administration, EPA has never claimed the authority to mandate even partial electrification. [EPA-HQ-OAR-2022-0829-0733, pp. 19-20]

68 See supra II.A.

69 42 U.S.C. §§ 7581, 7582(b).

Congress clarified that it, not EPA, must make the important policy decisions affecting if, when, and how the American automotive industry will transition from ICEVs to ZEVs. In the 116th Congress, for example, Congress introduced 44 bills seeking to reduce petroleum-based fuel consumption and GHG emissions from the transportation sector through customer rebates, vehicle and fuel producer incentives, local funding, development of standards, and research and development. Congress rejected bills that would have banned the sale of new light duty ICEVs by 204070 and it has consistently disapproved of EPA's efforts to hamstring the automotive sector with more stringent air pollution standards than are feasible.71 [EPA-HQ-OAR-2022-0829-0733, pp. 20-21]

70 See Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018); see also 116 Cong. Rec. 19238-40 (1970) (proposed amendment to Title II that would have banned ICEVs by 1978).

71 See, e.g., S. J. Res. 11, 118th Cong. (2023) (Although passed only by the Senate thus far, the joint resolution calls for disapproval of a similar rule submitted by the Administrator of the Environmental Protection Agency relating to "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 88 Fed. Reg. 4296 (Jan. 24, 2023)).

It should be no surprise then that in the wake of the Proposed Rule, members of Congress requested that the Agency rescind the proposals, asserting they "effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction."72 That Congress intended for it, not EPA, to direct these policy decisions is made all the more clear by the passage of the IRA and the BIL whereby Congress identified the policy levers it deemed appropriate. Congress could have, but did not, delegate the authority to (or otherwise direct) EPA to establish a fleet-wide credit trading regime to further drive ZEV development and rapid adoption. [EPA-HQ-OAR-2022-0829-0733, pp. 20-21]

72 Letter from Senator Shelley Capito, et al. to Administrator Michael S. Regan, EPA (May 25, 2023); see also Senate Resolution S.J. Res. 11, 118th Congress (Apr. 26, 2023) (Although related to heavy duty vehicles ("HDVs"), Congress has expressed its disapproval of EPA's overreach in this space. For example, in April of this year both houses of Congress passed a Congressional Review Act resolution to rescind EPA's December 2022 heavy duty NOx standards, sending a strong signal that Congress views EPA's efforts in this space as unnecessary, infeasible, and uniformed in light of economic and energy security concerns); House Resolution H2523 (May 23, 2023); see also Congressional Record, H2523 (May 23, 2023) at 1444, Statement from Mr. Walberg (R-MI) ("From tailpipe emissions regulations that will force people to buy expensive and less practical EVs to new rules on power plants that will threaten the reliability of our electric grid. It seems like the EPA has not even thought about the economic and energy security of our constituents.").

The Proposed Rule stands in direct contrast to other legislation, such as the Renewable Fuel Standard Program ("RFS"), whereby Congress mandated that "gasoline sold or introduced into commerce in the United States" must contain renewable fuels73 and, in 2022, must include billions of gallons of renewable fuel.74 In fact, EPA's Proposal directly conflicts with the statutory framework that Congress provided in the RFS for lowering GHG emissions from the transportation sector. In the proposed rule, EPA cites only its authority under section 202(a) of the Clean Air Act and Executive Order 14037 as the basis for requirements that will extend from MY 2027 to 2032.75 Because Executive Orders have no force of law,76 EPA at bottom contends that a few general paragraphs of the Clean Air Act, enacted over 50 years ago, provides sufficient legislative authority and direction for the entirety of its proposed rule. But Congress demonstrated in the RFS that when it wants to transform the transportation sector, and specifically, when it desires to address GHGs associated with that sector, it does so with precision and within the context of a prescribed statutory framework. [EPA-HQ-OAR-2022-0829-0733, p. 21]

73 42 U.S.C. § 7545(o)(2)(A)(i).

74 Id., § 7545(o)(2)(B); 87 Fed. Reg. 39,600 (July 1, 2022).

75 88 Fed. Reg. at 29,186.

76 Rather, Executive Orders "simply serve as presidential directives to agency officials to consider certain policies when making rulemaking decisions." State of California v. EPA, No. 21-1018 (D.C. Cir. 2023), Slip Op. at 17.

III. The Proposed Rule Contravenes or is Otherwise Contrary to the Clean Air Act and Energy Policy and Conservation Act

A. EPA Lacks Statutory Authority Under the Clean Air Act.

1. The Clean Air Act Requires Standards With Which All Vehicles In A Class Can Comply

As set forth in detail in the brief appended as Attachment 1, EPA lacks statutory authority under Section 202(a) of the Clean Air Act to set fleetwide emission standards, and even if it had such authority, it could not lawfully use it to force electrification by including vehicles that have no tailpipe emissions in the fleetwide average standard for ICEVs. While EPA purports to rebut arguments that it lacks such statutory authority, EPA's own search for its expansive authority turns into a circular argument. If "Congress's focus was on emissions from classes of motor vehicles and the 'requisite technologies' that could feasibly reduce those emissions" as EPA suggests, it follows that those "requisite technologies" must be applied to directly reduce emissions from the vehicles on which they are installed.77 And those technologies must remain with the vehicle for its useful life.78 [EPA-HQ-OAR-2022-0829-0733, p. 21]

77 Proposed Rule at 29,231 (emphasis added).

78 42 U.S.C. § 7521(a)(1).

The Proposed Rule results in fleet-wide standards that cannot be met by ICEVs alone; however, under the Clean Air Act, EPA may only set individual vehicle-level emission standards. Such standards must be for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to," potentially harmful air pollution.79 The plain language of this provision authorizes EPA to set standards for classes of individual vehicles or engines that emit air pollutants. As EPA acknowledges, EPA's "rules have historically not required the use of any particular technology, but rather have allowed manufacturers to use any technology that demonstrates the engines or vehicles meet the standards over the applicable test procedures."80 This precedent is squarely at odds with the Proposed Rule, where "any technology" cannot be used to meet the proposed emission standards, which can only be met by phasing out ICEVs, distorting as well as exceeding EPA's authority to set standards to permit the "development and application of the requisite technology."81 [EPA-HQ-OAR-2022-0829-0733, pp. 21-22]

79 42 U.S.C. § 7521(a)(1).

80 Id. at 29,232. Moreover, while EPA suggests that the Clean Air Act's legislative history shows that Congress contemplated replacing the ICEV with ZEVs, id., such an interpretation is squarely at odds with the text of the statute. If EPA were to replace ICEVs with ZEVs – as the Proposed Rule would put it on track to do – each and every statutory reference to an "engine" would be meaningless as ZEVs do not have engines.

81 42 U.S.C. § 7521(a)(2).

The Clean Air Act does not provide EPA authority to regulate vehicles that have tailpipe emissions by including them within the same standards that apply to vehicles without tailpipe emissions. For LDVs specifically, emission standards must reflect "the greatest degree of emission reduction achievable through the application of technology which the [EPA] determines will be available" during the relevant model year.85 The Supreme Court noted that similar language in Section 111(d) of the Act generally refers to "measures that would reduce pollution by causing [sources] to operate more cleanly."86 Congress enabled EPA to increase emission standard stringency through cleaner fuels and improved emissions-related systems to be incorporated into ICEVs such as advances in fuel injection, exhaust gas combustion management, and advances in catalysts to neutralize pollutants of concern.87 ZEVs are not similarly situated "technology" originally contemplated by Congress. To ensure compliance with emission standards under Section 202(a), Congress required "emissions-related systems" and accompanying "diagnostic systems" on each vehicle, underscoring its view that the vehicles subject to an emission standard emit the relevant pollutant in EPA's judgment. [EPA-HQ-OAR-2022-0829-0733, p. 22]

85 42 U.S.C. § 7521(a)(3)(A)(i).

86 West Virginia, 142 S. Ct. at 2599.

87 For example, Section 202(m) requires the monitoring of "emission-related systems" such as the "catalytic converter and oxygen sensor." 42 U.S.C. § 7521(m)(l).

The structure of the Clean Air Act and its regulatory provisions for standard setting, certification, compliance enforcement, warranties, and penalties also directly conflict with a fleet- wide averaging regulatory regime. Notably, under Section 202(a), EPA "shall test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer" and issue a certificate of conformity "if such vehicle or engine" complies with the standards.94 And EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such a system enables such vehicle or engine to conform to the standards required to be prescribe under [Section 202(b)]" of the Act.95 EPA's use of a fleetwide averaging regulatory regime directly conflicts with the statutory provisions that Congress already included to provide manufacturers with compliance flexibility. For example, section 202(b)(3) provided compliance flexibilities for NOx, but only for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater."96 This provision would be nonsensical under a fleetwide-averaging regime where, if applied, an OEM could give itself a waiver for large swaths of its fleet by over-complying for certain product lines well beyond its 5 percent or 50,000 vehicle allotment.97 Together, the Clean Air Act regulatory framework contemplates EPA regulating vehicles individually. But this cannot be accomplished if there is not a clear emission standard applicable to a single vehicle at the start of a model year. [EPA-HQ-OAR-2022-0829-0733, pp. 23-24]

94 42 U.S.C. § 7525(a)(1).

95 42 U.S.C. § 7525(a)(2).

96 42 U.S.C. § 7521(b)(3).

97 While Clean Air Act Section 202(b)(3) is specific to legacy light-duty vehicles through model year 1985 subject to a 1.5 grams/mile NOx standard and no longer directly applicable, the provision is incongruent with fleet-wide averaging, and no associated amendments to Section 202(a) would support a different reading today.

Relatedly, Congress established the need to consider technology feasibility in establishing fuel economy regulations under the Energy Policy and Conservation Act ("EPCA"). Here, the National Highway Traffic Safety Administration ("NHTSA") "may not consider" the fuel economy of EVs in setting Corporate Average Fuel Economy (CAFE) standards.107 Conducting joint EPA- NHTSA rulemakings for complementary GHG and CAFE requirements helps OEMs comply with both agencies' standards. But in forgoing joint rulemaking, EPA ignores Congress' determination that EVs cannot be considered when determining what is the maximum feasible fuel economy level from which to develop regulations. Allowing EPA to consider EVs and, in turn, establish de facto ZEV mandates (and de facto average fuel economy standards) ultimately skews the new vehicle market and impede NHTSA's ability to establish its own CAFE standards that comport with EPCA. Most importantly, such an approach directly contravenes the underlying premise of the Supreme Court's holding in Massachusetts v. EPA that "[EPA and NHTSA] obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency."108 After implementing GHG standards jointly with NHTSA's fuel economy standards since 2012, and despite Government Accountability Office recommendations to the contrary,109 EPA separated the rulemaking to undo previously established MY 2023-2026 standards and, in this case, to avoid the direct statutory prohibition on consideration of EVs when establishing fuel economy standards. [EPA-HQ-OAR-2022-0829-0733, pp. 25-26]

107 49 U.S.C. § 32902(h). Here, NHTSA may not consider the fuel economy of "dedicated automobiles," which are defined as those that operate only on "alternative fuel." Alternative fuel, in turn, includes electricity. 49 U.S.C. § 32901(j).

108 549 U.S. 497, 532 (2007).

109 GOVERNMENT ACCOUNTABILITY OFFICE, "NHTSA and EPA's Partnership for Setting Fuel Economy and Greenhouse Gas Emissions Standards Improved Analysis and Should be Maintained" (February 2010) available at https://www.gao.gov/assets/gao-10-336.pdf

Organization: American Petroleum Institute (API)

EPA is Not Taking a Realistic Approach.

i. EPA's limits are not set on a realistic scientific based approach.

EPA's proposed standards are based on projected ZEV penetration rates based on OEM stated ambitions and on California ZEV mandates and states that follow California rules under Section 177 of the Clean Air Act. These ambitions are stretch goals that OEMs may not reach. [EPA-HQ-OAR-2022-0829-0641, p. 11]

h. Legal Concerns.

The aggressive push to electrify the LDV and MDV fleet is the defining characteristic of the Proposed Rule from a legal standpoint. EPA explains that its "feasibility assessments in past rulemaking were predominantly based on ICE-based technologies that provided incremental tailpipe GHG reductions." 88 Fed. Reg. at 29238. Here, in contrast, EPA projects that the Proposed Rule at full implementation would result in the electrification of 67% of the LDV fleet – over 25% more than the 39% penetration rate that EPA projects in the no action base case. Id. at 29329. EPA similarly projects that 46% of the MDV fleet will be electrified, reflecting 98% electrification of all vans. Id. at 29331. These numbers make it clear that the Proposed Rule would establish a legal mandate effectively requiring that electric vehicles must comprise a significantly greater proportion of the LDV and MDV fleet than otherwise would be the case. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

While BEVs can and should be a choice available to manufacturers and vehicle purchasers, we disagree that EPA should impose a binding mandate for the production of BEVs and outline why such a mandate exceeds EPA's authority under the Clean Air Act (CAA). [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

i. EPA does not have authority to impose standards that are only achievable through the use of BEV technology because there is no clear statement in the Clean Air Act authorizing EPA to mandate a shift away from internal combustion engines. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

The Proposed Rule marks a shift in EPA's approach to regulating emissions from LDVs and MDVs. EPA, consistent with the Clean Air Act, has traditionally established standards based on technology that can control the amount of emissions from LDVs and MDVs. EPA deviated from this approach in its 2021 GHG standards, setting standards based on a formula that the agency estimated would increase the market share for electric vehicles from 3.6% to 7% for model year 2023 and 17% for model year 2026. But even then, EPA contended that its "assessment, consistent with past EPA assessments, shows that the final standards can largely be met with increased sales of advanced gasoline vehicle technologies, and projects modest (17 percent) penetration rates of electrified vehicle technology" by 2026. 86 Fed. Reg. 74434, 74484 (Dec. 30, 2021). And EPA argued that it relied on advances in internal combustion engine ("ICE") powertrains to achieve the required GHG reductions and purported not to push for a shift from ICE powertrains to electrified vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

Here, EPA goes even further and seeks to totally transform the transportation sector. It proposes standards that would effectively require that BEVs must comprise two-thirds of the LDV fleet and nearly half of the MDV fleet at full implementation, which is a substantially greater proportion of the fleet any prediction of the market demand would support. Indeed, according to EPA, "[in] MY 2032 when the proposed standards reach the lowest level, it is possible that only BEVs and PHEVs are generating positive credits, and all ICE vehicles generate varying levels of deficits." 88 Fed. Reg. at 29342. In other words, EPA predicts that manufacturers will not be able to comply with the proposed rule without producing significant numbers of electric vehicles. EPA thus seeks to require a fundamental transformation of the LDV fleet from ICE powertrain technology to electric vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

Such a shift from ICE powertrains to electric powertrains would be truly transformative. BEVs require fundamentally different vehicle technologies than those used on conventionally fueled vehicles – e.g., electric motors instead of internal combustion engines, batteries to store power rather than on-board fuel tanks. Moreover, BEVs rely on a wholly different infrastructure (e.g., electric power generation and distribution, charging stations, battery manufacturing) – much of which does not yet exist or exists only in limited form. Additionally, switching to BEVs will fundamentally change the manner in which vehicles are used, for example requiring careful scheduling of vehicle operations to accommodate the long periods needed to adequately charge the vehicles. Lastly, a BEV mandate would produce widespread effects on the national economy, such as the reduced need for oil and gas production, gas processing, changes to petroleum refining, and distribution. Such changes are extraordinary and far more expansive than those caused by EPA's LDV and MDV GHG standards up to now. [EPA-HQ-OAR-2022-0829-0641, pp. 24-26]

EPA asserts that the BEV mandate is authorized under Clean Air Act ("CAA") Sections 202(a)(1) and (2). 88 Fed. Reg. at 29231. EPA claims that these provisions "are technology forcing when EPA considers that to be appropriate." Id. at 29232. EPA further asserts that "Section 202 does not specify or expect any particular type of motor vehicle propulsion system to remain prevalent." Id. The Agency also asserts that its extraordinary new interpretation of the statute is supported by legislative history claiming that Congress understood that powertrain technologies might evolve over time and quotes Representative Pallone as opining that the "recently enacted [Inflation Reduction Act] "reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act," 204 and "the IRA clearly and deliberately instructs EPA to use" this authority by "combin[ing] economic incentives to reduce climate pollution with regulatory drivers to spur greater reductions under EPA's CAA authorities."" Id. at 29233. [EPA-HQ-OAR-2022-0829-0641, pp. 26-27]

But the U.S. Supreme Court has concluded that such an "extraordinary" claim of authority exists only when there is "clear congressional authorization." West Virginia v. EPA, 142 S.Ct. 2587, 2609 (2022). CAA §§ 202(a)(1) and (2) contain no such clear authorization. At their core, CAA §§ 202(a)(1) and (2) authorize EPA to establish "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [the Administrator's] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." Because this provision includes no clear statement that EPA may mandate a fundamental shift in propulsion technology, EPA lacks authority to impose emissions limitations that effectively will require the production and sale of electric vehicles. EPA cannot rely on the views of individual Members who participated in the CAA or the IRA to claim vast new authority from long extant statutory provisions. [EPA-HQ-OAR-2022-0829-0641, pp. 26-27]

The lack of a clear statement is particularly notable given that Congress's most recent efforts to address GHG emissions – the Inflation Reduction Act and the Bipartisan Infrastructure Act – almost exclusively consisted of economic incentives and pointedly gave EPA no new or expanded authority to substantively regulate GHG emissions. If Congress had intended to give EPA authority to mandate a fundamental shift in powertrain technology, surely it would have done more than create consumer facing incentives. Moreover, EPA's claim of authority plainly conflicts with other relevant statutes, such as the Renewable Fuel Program, under which Congress mandated that significant and increasing volumes of renewable fuels should be blended into that national motor fuel supply. In contrast, the Proposed Rule is designed to significantly reduce the amount of motor fuel consumed by the light and medium duty fleet. The Proposed Rule thus would frustrate Congressional intent by reducing rather than expanding the volume of renewable fuel consumed by motor vehicles in the U.S. [EPA-HQ-OAR-2022-0829-0641, pp. 26-27]

It also is telling that EPA has abandoned any pretense of "co-regulating" with NHTSA, the national regulatory authority that actually has been authorized by Congress to establish motor vehicle fuel effciency standards. Id. at 29227 n. 384. Among other things, this is a clear attempt to free EPA from unambiguous statutory obligations that otherwise would constrain a joint rulemaking (e.g., NHTSA ”may not consider “the fuel economy (i.e., the availability) of dedicated alternative fueled automobiles – including battery-electric vehicles – in any model year for which standards are being set.” 87 Fed. Reg. 25710, 25994 (May 2, 2022)). It is simply not plausible that the general standard-setting authority of CAA § 202(a) can be construed to confer omnibus authority for EPA to effectively rewrite directly relevant statutory directives. [EPA-HQ-OAR-2022-0829-0641, pp. 26-27]

ii. EPA’s authority under CAA §§ 202(a)(1) and (2) to prescribe emissions standards for vehicles and engines does not extend to a mandatory shift in powertrain technology. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

As explained above, the Proposed Rule would effectively require that a significant proportion of new LDV and MDV must be powered by electric drivetrains. That proportion significantly exceeds the level of new vehicle electric vehicle sales that otherwise would occur. As a result, the Proposed Rule would constitute a mandate to produce electric vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

Moreover, electric vehicles are not just another form of conventional diesel or gasoline fueled ICE-driven vehicles. For example, a BEV cannot be produced by modifying a conventional ICE drivetrain (e.g., by changing combustion conditions) or by adding pollution control technology to a conventional ICE drivetrain (e.g., catalytic converter or gasoline particulate filter). Rather, BEVs employ wholly different propulsion technology as compared with conventional ICE drivetrains. BEVs use electricity and batteries rather than liquid fuels stored in fuel tanks and employ electric motors for propulsion rather than ICE engines. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

EPA asserts that CAA §§ 202(a)(1) and (2) authorize the imposition of an electric vehicle mandate. But for the following four reasons, EPA does not have authority under CAA §§ 202(a)(1) and (2) or under any other CAA provision to impose such a fundamental and mandatory shift in powertrain technology. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

First, EPA may regulate a class of motor vehicles under CAA § 202(a)(1) only if emissions from that class of vehicles “cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” EPA treats BEVs as if they do not have emissions for the purposes of this proposal. 88 Fed. Reg. at 29297. As a result, under EPA’s rationale, BEVs do not emit the pollutants that are the object of the Proposed Rule and cannot cause or contribute to the endangerment that EPA asserts as the basis for its authority to regulate here under CAA § 202(a)(1). Thus, it is beyond EPA’s authority to include electric vehicles in its regulations under § 202(a) or to impose an electrification mandate. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

Second, CAA § 202(e) – entitled “New power sources or propulsion systems” – states that EPA may defer the certification for a new motor vehicle employing a new power source or propulsion system until after the Agency has “prescribed standards for any air pollutants emitted by such vehicle or engine which in [the Administrator’s] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger the public health or welfare but for which standards have not been prescribed under [CAA § 202(a)].” Thus, EPA must take two actions when assessing a new power source or propulsion system. EPA first must determine whether emissions from the new power source or propulsion system cause or contribute to air pollution that endangers public health or welfare. If the answer is yes, EPA must then establish new emissions standards for the new power source or propulsion system or, alternatively, determine that appropriate standards have already been established. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

BEVs clearly constitute a new power source or propulsion system. As a result, before certifying any BEVs, CAA § 202(e) requires that EPA determine whether emissions from BEVs cause or contribute to air pollution that endangers public health or welfare. But, EPA treats BEVs as if they do not have emissions. Consequently, EPA cannot determine that emissions from BEVs cause or contribute to any endangerment caused by emissions and, therefore, the Agency has no need or authority to impose emissions standards on BEVs prior to certifying them. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

Third, CAA § 202(a)(1) authorizes EPA to establish "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines." CAA § 202(a)(1) (emphasis added). This provision requires EPA to define appropriate classes of vehicles for purposes of making the cause/contribute finding and in subsequently establishing emission standards. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

From the outset of its CAA-based motor vehicle regulatory program, EPA has properly distinguished between fundamentally different powertrain technologies – e.g., regularly developing and issuing separate standards for gasoline-powered vehicles and diesel-powered vehicles. In contrast, EPA here combines all powertrain types into the same classes for purposes of imposing emission standards. That is contrary to the statute, arbitrary, and capricious because conventionally powered vehicles have fundamentally different emissions characteristics than electric powered vehicles. See also CAA § 202(e) (requiring EPA to separately evaluate emissions from "a new power source or propulsion system.") [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

As demonstrated by EPA's prior LDV GHG standards, there is a wide variety of emissions control techniques that may be applied to conventionally powered LDV to reduce GHG emissions – including such things as improved engine effciency, better aerodynamics, and lower rolling resistance. Applying such measures to BEVs does not affect their GHG emissions profile because, by EPA's definition, BEVs do not emit GHGs. This shows that conventionally powered vehicles and BEVs should not occupy the same class under these rules because wholly different regulatory approaches are needed to appropriately control GHG emissions from these two fundamentally different types of vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

Fourth, EPA's regulatory approach is unlawful because it treats BEVs as if their powertrain were an emissions control technology and then mandates the use of that purported emission control technology. EPA claims throughout the proposed rule that its proposed standards do not require manufacturers to implement any specific technology and, instead, that they retain flexibility to comply with the rule in whatever manner they deem appropriate. See, e.g., 88 Fed. Reg. at 29232. But the proposed rule inescapably will require a significant industry- wide shift from internal combustion to BEVs. A particular manufacturer may avoid producing a BEV though creative use of the ABT provisions, but the industry as a whole will have no choice but to produce increasing numbers of BEVs over time. This is contrary to CAA § 202(a), which authorizes EPA to set emissions standards, but does not authorize EPA to mandate the use of any particular emissions control technology in meeting those standards. [EPA-HQ-OAR-2022-0829-0641, pp. 27-29]

iii. EPA has no authority under CAA §§ 202(a)(1) and (2) to establish emissions standards based on credit trading among manufacturers. [EPA-HQ-OAR-2022-0829-0641, p. 29]

The Proposed Rule is fundamentally different from prior LDV GHG rules in that EPA factors credit trading among manufacturers into its standard setting analysis. EPA explains that "[i]n light of the evidence of increased adoption of trading as a compliance strategy, EPA has included the ability of manufacturers to trade credits as part of our central case compliance modeling for this proposal, rather than as a sensitivity analysis as we did in the modeling for the 2021 rule." 88 Fed. Reg. at 29343. So, rather than allowing for credit trading as a "compliance flexibility" for purposes of implementing the standards, credit trading is included in setting the standards in the first instance. [EPA-HQ-OAR-2022-0829-0641, p. 29]

The use of credit trading in standard setting is legally flawed for two reasons. First, it is true that EPA has long used credit trading as a compliance method under its vehicle emissions standards. But here EPA is doing more – EPA uses credit trading in setting the standards themselves. EPA provides no explanation of its legal authority for this novel approach. [EPA-HQ-OAR-2022-0829-0641, p. 29]

Second, CAA § 202(a)(2) requires EPA to consider cost and technical feasibility in setting emissions standards. By factoring credit trading into standard setting, EPA unreasonably is diluting the cost impact of the Proposed Rule on manufacturers that opt not to engage in credit trading. As EPA notes, "trading is an optional compliance flexibility." 88 Fed. Reg. at 29343. And EPA acknowledges "that automakers may choose to use it in their compliance strategies to varying degrees." Id. But rather than assess the costs of compliance for manufacturers that choose not to engage in credit trading, EPA asserts without analysis or other support that "reduced use of credit trading may result in somewhat higher costs for the program, but we do not believe it would alter our conclusion that the standards are feasible." Id. An agency "belief" that is untethered to facts or analysis does not provide an adequate basis for EPA to conclude that the proposed emissions standards are cost effective in the absence of trading. EPA thus fails to satisfy its clear statutory obligation to factor costs into the proposed emissions standards. [EPA-HQ-OAR-2022-0829-0641, p. 29]

v. The use of BEV technology is not an emissions standard under CAA §§ 202(a)(1) and (2). [EPA-HQ-OAR-2022-0829-0641, pp. 30-31]

By factoring BEVs into the proposed emission standards, EPA effectively is treating BEVs as an emissions control technology that can form the basis of an emission standard. This exceeds EPA's authority under CAA § 202(a). [EPA-HQ-OAR-2022-0829-0641, pp. 30-31]

CAA § 202(a)(1) authorizes EPA to prescribe "standards applicable to emissions." In other words, EPA is authorized to prescribe emission standards for motor vehicles. The term "emission standard" means a requirement "which limits the quantity, rate, or concentration of emissions of air pollutants." CAA § 302(k). [EPA-HQ-OAR-2022-0829-0641, pp. 30-31]

The problem with EPA's regulatory approach here is that a BEV is not an emissions control technology for a conventionally powered vehicle. A BEV does not and cannot limit the "quantity, rate, or concentration" of air pollutant emissions from a conventionally powered vehicle. Rather, a BEV represents an entirely different type of propulsion system and powertrain. The existence of BEVs has no bearing on the relative emissions from conventionally powered vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 30-31]

Consequently, a BEV powertrain is not an emissions reduction technology applicable to conventionally powered vehicles and cannot form the basis of emission standards applicable to conventionally powered vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 30-31]

vi. The Clean Air Act already expressly provides a regulatory scheme for Clean Fuel Vehicles in Part C of Title II. That regulatory scheme precludes the regulation of BEVs together with internal combustion engines. [EPA-HQ-OAR-2022-0829-0641, pp. 31-32]

CAA § 242(a) requires EPA to "promulgate regulations under this part containing clean- fuel vehicle standards for the clean-fuel vehicles specified in this part." A clean fuel vehicle is one that is powered by a "clean alternative fuel," which is defined to include electricity. CAA § 241(2). The state implementation plan for areas designated in severe or greater nonattainment with ozone National Ambient Air Quality Standards must include a clean-fuel vehicle program. CAA § 182(c)(4). The program must apply to centrally fueled fleets. Id. at § 246. [EPA-HQ-OAR-2022-0829-0641, pp. 31-32]

EPA cities the Clean Fuel Vehicles program as an indication that Congress generally intended to "promote further progress in emissions reductions." 88 Fed. Reg. at 29233. EPA thus points to the Clean Fuel Vehicles program as supporting its proposed interpretation that CAA §§ 202(a)(1) and (2) authorize EPA to mandate the production and sale of BEVs. But in doing so, EPA fails to address the regulatory program required under the Clean Fuel Vehicles program and fails to reconcile the particular requirements of that program with the CAA § 202(a) general rulemaking authority on which it relies as the primary authority for the Proposed Rule. [EPA-HQ-OAR-2022-0829-0641, pp. 31-32]

The Clean Fuel Vehicles program plainly requires EPA to establish a separate regulatory scheme for clean fuel vehicles, including electric powered vehicles. "Clean-fuel vehicles . . . subject to standards set forth in this part shall comply with all motor vehicle requirements of this subchapter. . . which are applicable to conventional gasoline-fueled vehicles of the same category and model year . . . except to the extent that any such requirement is in conflict with the provisions of this part." CAA § 242(b), 42 U.S.C. § 7582(b). This provision clearly signals that Congress intended for EPA to develop specific standards for clean fuel vehicles (including BEVs) and also ensure that those clean fuel vehicles comply with the separate emissions standards set for ICE powered vehicles. In the very least, Congress's explicit inclusion of electric powered vehicles in the Clean Fuel Vehicles program and its exclusion of any mention of electric powered vehicles in Section 202 must be given meaning. Compare 42 U.S.C. § 7581 with 42 U.S.C. § 7521(a), (e); Bittner v. United States, 143 S. Ct. 713, 720 (2023) ("When Congress includes particular language in one section of a statute but omits it from a neighbor, we normally understand that difference in language to convey a difference in meaning (expressio unius est exclusio alterius).") This Clean Fuel Vehicles Program would be rendered meaningless if, as in the Proposed Rule, EPA were to consider conventionally fueled vehicles together with clean fuel vehicles (including BEVs) in developing and implementing emissions standards. [EPA-HQ-OAR-2022-0829-0641, pp. 31-32]

Moreover, the Clean Fuel Vehicles program is narrowly targeted to the worst ozone nonattainment areas and to the pollutants that contribute to ambient ozone levels. The program also imposes important constraints on how vehicles may be regulated (for example, as explained above, it dictates separate emissions standards for clean fuel vehicles). These detailed and prescriptive requirements demonstrate that Congress intended EPA to regulate clean fuel vehicles only in particular ways. EPA's claim in the Proposed Rule of omnibus authority to regulate clean fuel vehicles along with conventionally fueled vehicles cannot be reconciled with the targeted and carefully crafted regulatory scheme set out in the Clean Fuel Vehicles program. [EPA-HQ-OAR-2022-0829-0641, pp. 31-32]

In sum, the CAA clearly instructs EPA as to where and how clean fuel vehicles should be regulated. Those specific requirements displace any authority EPA might otherwise have had to regulate clean fuel vehicles under the general authority of CAA §§ 202(a)(1) and (2). EPA is thus mistaken in asserting that CAA §§ 202(a)(1) and (2) authorize the proposed LDV and MDV emissions standards. In addition, by failing to explain the legal basis on which EPA purports to fulfil its obligations under CAA §§ 202 and 242, the Proposed Rule fails to provide adequate notice and opportunity to commenters on the important legal questions surrounding the scope and extent of the Clean Fuel Vehicles program and how the specific regulatory scheme established under that program can be reconciled with EPA's claim of authority under CAA §§ 202(a)(1) and (2). [EPA-HQ-OAR-2022-0829-0641, pp. 31-32]

5. Statutory Authority

The proposed rule asks for comments on whether EPA should engage in a rulemaking to address potential limits on aromatics and high-boiling material as fuel standards under CAA § 211(c). Although EPA has not proposed to engage in a rulemaking at this time, API urges the agency to avoid a costly and burdensome rulemaking effort that would exceed its authority. [EPA-HQ-OAR-2022-0829-0641, p. 53]

The proposed rule acknowledges that fuel standards would not assist the new vehicle fleet to comply with the new standards, but suggests the agency is thinking about them to reduce particulate matter from the existing fleet. However, EPA lacks authority to set fuel standards to address vehicle emissions from the existing vehicles, which are already able to comply with their applicable particulate matter standards. [EPA-HQ-OAR-2022-0829-0641, p. 53]

EPA's authority to regulate vehicle emissions applies only prospectively. EPA may only set standards for classes of "new motor vehicles." CAA § 202(a)(1). In turn, EPA may only consider controlling or regulating fuel after it has determined there are no other "economically feasible means of achieving emissions standards under section [202]." Regulating fuel cannot be needed to achieve the Section 202 standards for existing vehicles because those vehicles already meet their applicable particulate matter standards without any additional fuel regulation. Any attempt to rely on the inability of existing vehicles to comply with the particulate matter standards for new vehicles because of lack of alternative controls would be contrary to the Act's focus on prospective standards. [EPA-HQ-OAR-2022-0829-0641, p. 53]

In any event, EPA may not issue standards under CAA § 211(c) at this time because, as the proposed rule readily admits, EPA has not "considered all relevant medical and scientific evidence available to [it], including consideration of other technologically or economically feasible means of achieving" the standards under section 202. See § 202(c)(2)(A). Unless and until EPA completes that analysis and allows stakeholders an opportunity to comment on it, EPA may not set new standards under CAA § 211(c). [EPA-HQ-OAR-2022-0829-0641, p. 53]

Please note that due to the compressed comment period for such a complex request for information, coupled with the lack of an extension, API may supplement the docket. [EPA-HQ-OAR-2022-0829-0641, p. 53]

Organization: Arizona State Legislature

A. The proposed rule violates the Major Questions Doctrine because Congress did not clearly delegate EPA this authority.

But Congress has not delegated to EPA the authority to transform the automotive industry. EPA relies on Clean Air Act section 202(a)(1)-(2) for its authority to issue the proposed regulation. See 88 Fed. Reg. 29,184, 29,186 (May 5, 2023). This portion of Section 202(a) provides in full: [EPA-HQ-OAR-2022-0829-0537, pp. 4-5]

(a) Authority of Administrator to prescribe by regulation Except as otherwise provided in subsection (b)--

(1) The Administrator shall by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare. Such standards shall be applicable to such vehicles and engines for their useful life (as determined under subsection (d), relating to useful life of vehicles for purposes of certification), whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution. [EPA-HQ-OAR-2022-0829-0537, pp. 4-5]

(2) Any regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period. [EPA-HQ-OAR-2022-0829-0537, pp. 4-5]

42 U.S.C. § 7521(a).

EPA's proposal extends beyond this authority because it seeks to transform the automotive industry. EPA implicitly acknowledges that its emissions standards for carbon dioxide cannot be met exclusively with existing internal combustion engines. See, e.g., 88 Fed. Reg. 29,187 ("EPA anticipates that a compliant fleet under the proposed standards will include a diverse range of technologies, including higher penetrations of advanced gasoline technologies as well as zero-emission vehicles."). In addition, EPA's analysis of requisite technology and cost-benefit balancing focuses primarily on production and purchase of electric vehicles. See, e.g., id. at 29,199 ("Note EPA projects lower maintenance and repair costs for several advanced technologies (e.g., battery electric vehicles) and those societal maintenance and repair savings grow significantly over time, and by 2040 and later are larger than our projected new vehicle technology costs."); id. at 29,201 ("While the average purchase price of vehicles is estimated to be higher, this is attributable to the larger share of [battery electric vehicles] relative to [internal combustion engine] vehicles."). Although EPA uses averaging to avoid requiring a specific percentage of electric and hydrogen- powered vehicles, EPA "projects that one potential pathway for the industry to meet the proposed standards would be through" nearly 70% battery electric vehicles for passenger cars, SUVs, and light-duty pickup trucks, and about 40% battery electric vehicles for medium duty vans and pickup trucks in model year 2032.11 [EPA-HQ-OAR-2022-0829-0537, pp. 4-5]

11 U.S. EPA Fact Sheet, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Apr. 2023, 5, available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017626.pdf.

The transformative nature of EPA's proposal is reminiscent of EPA's past attempt to transform power plants, which the Supreme Court struck down under the Major Questions Doctrine last year. See West Virginia v. Env't Prot. Agency, 142 S. Ct. 2587 (2022). As set forth in West Virginia, the Supreme Court presumes that "Congress intends to make major policy decisions itself, not leave those decisions to agencies." Id. at 2609 (internal citation omitted). In "extraordinary cases," like here with a regulation that seeks to transform the entire automotive industry and entire American vehicle fleet, "[t]he agency instead must point to 'clear congressional authorization' for the power it claims." Id. (internal citation omitted). [EPA-HQ-OAR-2022-0829-0537, p. 5]

The Court's description of what happened in West Virginia closely resembles what EPA proposes here. "Prior to 2015, EPA had always set emissions limits under Section 111 based on the application of measures that would reduce pollution by causing the regulated source to operate more cleanly," explained the Court. Id. at 2610 (internal citation omitted). EPA "had never devised a cap by looking to a 'system' that would reduce pollution simply by 'shifting' polluting activity 'from dirtier to cleaner sources.'" Id. (internal citation omitted). Shifting polluting activity from "dirtier" to "cleaner" sources is exactly what EPA proposes here by forcing a transition from internal combustion engines powered by fossil fuel to zero-emission vehicles powered by electricity or hydrogen fuel cells. [EPA-HQ-OAR-2022-0829-0537, p. 5]

The West Virginia Court also focused on the technology-based approach to individual sources. "A technology-based standard, recall, is one that focuses on improving the emissions performance of individual sources." Id. at 2611. But "[r]ather than focus on improving the performance of individual sources, [EPA] would 'improve the overall power system by lowering the carbon intensity of power generation.' And it would do that by forcing a shift throughout the power grid from one type of energy source to another." Id. at 2611-12 (internal citation omitted) (emphasis original). With this position, "EPA can demand much greater reductions in emissions based on a very different kind of policy judgment: that it would be 'best' if coal made up a much smaller share of national electricity generation. And on this view of EPA's authority, it could go further, perhaps forcing coal plants to 'shift' away virtually all of their generation—i.e., to cease making power altogether." Id. at 2612. [EPA-HQ-OAR-2022-0829-0537, pp. 5-6]

EPA's proposed standards here require another massive shift away from current market operations. EPA projects that its proposed standards could be satisfied through a mix of nearly 70% battery electric vehicles for passenger cars, SUVs, and light-duty pickup trucks, and about 40% battery electric vehicles for medium duty vans and pickup trucks by model year 2032.12 But in 2021, less than 1% of the 250 million passenger cars, SUVs, and light-duty trucks in the United States were electric.13 [EPA-HQ-OAR-2022-0829-0537, pp. 5-6]

12 U.S. EPA Fact Sheet, supra note 11.

13 Feilding Cage, The long road to electric cars, REUTERS, Feb. 7, 2022, available at https://www.reuters.com/graphics/AUTOS-ELECTRIC/USA/mopanyqxwva/.

In West Virginia, “EPA decides, for instance, how much of a switch from coal to natural gas is practically feasible by 2020, 2025, and 2030 before the grid collapses, and how high energy prices can go as a result before they become unreasonably ‘exorbitant.’” West Virginia, 142 S. Ct. at 2612. Here, EPA is deciding how much of a switch from internal combustion engine trucks to zero-emission vehicles or hydrogen-powered vehicles is practically feasible by model years 2027 to 2032. The West Virginia Court found it “highly unlikely that Congress would leave to agency discretion the decision of how much coal- based generation there should be over the coming decades.” Id. at 2613. Instead, “[t]he basic and consequential tradeoffs involved in such a choice are ones that Congress would likely have intended for itself.” Id. [EPA-HQ-OAR-2022-0829-0537, p. 6]

The magnitude of EPA’s proposed rule implicates the Major Questions Doctrine. EPA is attempting to use emissions standards for vehicles to force a shift from gasoline-powered vehicles to electric- and hydrogen-powered vehicles. The shift will impact energy production by dropping demand for oil exploration and refineries and increasing demand for electricity generation and mining for rare earth minerals. The rule will cost billions of dollars. 88 Fed. Reg. 29,200. [EPA-HQ-OAR-2022-0829-0537, p. 6]

Under the Major Questions Doctrine, EPA must point to “clear congressional authorization” to regulate in this manner. West Virginia, 142 S. Ct. at 2614. EPA relies exclusively on Section 202(a), which provides EPA with authority to set vehicle emissions standards for any air pollutant that causes or contributes to air pollution “which may reasonably be anticipated to endanger public health or welfare.” 42 U.S.C. § 7521(a). This terse provision does not vest EPA with authority to determine the types of vehicles manufactures can make or the proper vehicle energy mix in the country. “A decision of such magnitude and consequence rests with Congress itself, or an agency acting pursuant to a clear delegation from that representative body.” West Virginia, 142 S. Ct. at 2616. [EPA-HQ-OAR-2022-0829-0537, p. 6]

Accordingly, EPA should reject the proposed rule because it violates the Major Questions Doctrine. [EPA-HQ-OAR-2022-0829-0537, p. 6]

B. The proposed rule violates the Major Questions Doctrine because it conflicts with authority Congress delegated to another agency. [EPA-HQ-OAR-2022-0829-0537, p. 7]

In determining that the Clean Power Plan violated the Major Questions Doctrine, the West Virginia Court also emphasized EPA’s lack of expertise. West Virginia, 142 S. Ct. at 2612-13. “When an agency has no comparative expertise in making certain policy judgments, we have said, Congress presumably would not task it with doing so.” Id. (internal quotations omitted). [EPA-HQ-OAR-2022-0829-0537, p. 7]

For almost 50 years, Congress has looked to the U.S. Department of Transportation to set vehicle fuel efficiency standards. 49 U.S.C. § 32902. Indeed, as recently as 2007, Congress directed the Secretary of Transportation to set a fuel efficiency improvement program for heavy-duty trucks. Id. at § 32902(k). Congress prohibited the Department of Transportation from considering electric vehicles when it sets fuel efficiency standards. Id. at § 32902(h)(2). [EPA-HQ-OAR-2022-0829-0537, p. 7]

When EPA has previously proposed vehicle greenhouse gas emissions standards, it has done so in a joint rulemaking with the Department of Transportation's National Highway Traffic Safety Administration. See Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57106 (Sept. 15, 2011); Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, 81 Fed. Reg. 73478 (Oct. 25, 2016). Yet this time, EPA only "coordinated" with the Department of Transportation and the National Highway Traffic Safety Administration and did not issue a proposed joint rulemaking. 88 Fed. Reg. 29,293. In the preamble, EPA states, "EPA has similarly concluded that it is not necessary for this EPA proposal to be issued in a joint action with NHTSA." Id. [EPA-HQ-OAR-2022-0829-0537, p. 7]

EPA does not explain why it did not issue a proposed joint rulemaking with the National Highway Traffic Safety Administration. EPA claims there is no "statutory requirement for EPA to consult with NHTSA" and that its charge to protect public health and welfare is "wholly independent" of the Department of Transportation's energy efficiency mandate. Id. However, EPA does not reconcile how its independent rulemaking will affect the Department of Transportation's energy efficiency standards. EPA even rejected a request to extend the public comment period "to align with the end of the soon to be released National Highway Safety Administration (NHTSA) Corporate Average Fuel Economy (CAFE) proposed rulemaking comment deadline since the intent of NHTSA's CAFE rulemaking and your greenhouse gas (GHG) rulemaking overlaps."14 [EPA-HQ-OAR-2022-0829-0537, p. 7]

14 Letter from Alliance for Automotive Innovation to EPA, May 25, 2023, available at https://www.epa.gov/system/files/documents/2023-06/lmdv-alliance-auto-inno-comment-period-ext-req-2023-05- 25_0.pdf; Letter from EPA to Alliance for Automotive Innovation, June 2, 2023, available at https://www.epa.gov/system/files/documents/2023-06/lmdv-alliance-auto-inno-comment-period-ext-req-response- 2023-06-02_0.pdf; see also Letter from National Automobile Dealers Association to EPA, May 30, 2023, available at https://www.epa.gov/system/files/documents/2023-06/lmdv-nada-comment-period-ext-req-2023-05-30_0.pdf (expressing full support for Alliance for Automotive Innovation's request to extend the public comment period to align with NHTSA's proposed CAFE rulemaking); Letter from Hyundai Motor America to EPA, June 1, 2023, available at https://www.epa.gov/system/files/documents/2023-06/lmdv-hyundai-motor-america-comment-period-ext-request- 2023-06-01.pdf (requesting extension to align with NHTSA's proposed CAFE rulemaking).

EPA's proposed rule intrudes upon the Department of Transportation's delegated authority to determine energy efficiency standards. Under EPA's stringent standards, manufacturers that are fully compliant with the Department of Transportation's standards will be unable to meet EPA's standards without changing production to non-fossil-fuel-powered vehicles. [EPA-HQ-OAR-2022-0829-0537, p. 8]

Congress charged the Department of Transportation with setting energy efficiency standards, not EPA. This is further evidence that the proposed rule exceeds EPA's authority and violates the Major Questions Doctrine. [EPA-HQ-OAR-2022-0829-0537, p. 8]

II. The proposed rule is arbitrary and capricious because it fails to rely on a cost- benefit analysis. [EPA-HQ-OAR-2022-0829-0537, p. 8]

The proposed rule also is arbitrary and capricious. An agency rule is arbitrary and capricious if "the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). [EPA-HQ-OAR-2022-0829-0537, p. 8]

In a Clean Air Act case involving power plant regulation, the Supreme Court held that EPA "must consider cost—including, most importantly, cost of compliance—before deciding whether regulation is appropriate and necessary." Michigan v. E.P.A., 576 U.S. 743, 759 (2015). EPA had determined that the statute conferring authority to regulate if EPA found that "such regulation is appropriate and necessary" did not require EPA to consider costs. Id. at 750-51 (citing 42 U.S.C. § 7412(n)(1)(A)). The Supreme Court found EPA's interpretation unreasonable. Id. at 760. [EPA-HQ-OAR-2022-0829-0537, p. 8]

The law applicable to EPA's proposed rule here even more expressly requires consideration of costs than the law before the Court in Michigan v. EPA. Section 202(a) requires "appropriate consideration to the cost of compliance within such period." 42 U.S.C. § 7521(a)(2) (emphasis added). And when revising standards for heavy-duty trucks or other mobile sources, which would include light- and medium-duty vehicles, Congress specifically directed EPA to consider costs: "On the basis of information available to the Administrator concerning the effects of air pollutants emitted from heavy-duty vehicles or engines and from other sources of mobile source related pollutants on the public health and welfare, and taking costs into account, the Administrator may promulgate regulations under paragraph (1) of this subsection . . . ." Id. at § 7521(a)(3)(B)(i) (emphasis added). [EPA-HQ-OAR-2022-0829-0537, pp. 8-9]

Despite this clear direction, EPA openly admits that it did not rely on a cost-benefit analysis to set the standards in the proposed rule. According to EPA, "EPA's practice has been to set standards to achieve improved air quality consistent with CAA section 202, and not to rely on cost- benefit calculations, with their uncertainties and limitations, as identifying the appropriate standards." 88 Fed. Reg. 29,198; see also 29,347 ("We recognize the uncertainties and limitations in these estimates (including unquantified benefits), and the Administrator has not relied on these estimates in identifying the appropriate standards under section 202."). EPA provides no citation of statutory authority to support its "practice," and the applicable statutes instruct EPA to do the opposite. [EPA-HQ-OAR-2022-0829-0537, pp. 8-9]

By openly admitting that it did not rely on a cost-benefit analysis to set the standards in the proposed rule, EPA runs afoul of the clear statutory requirements in Section 202(a) and the reasoning in Michigan v. EPA requiring it to consider costs. EPA's failure to consider cost-benefit analysis to set the requirements in the proposed rule is thus arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0537, pp. 8-9]

Organization: California Attorney General's Office, et al.

Standards more stringent than EPA's proposed standards would comport with its statutory mandate in Section 202(a) and further the statutory objective by reducing the threats from vehicle pollution to public health and welfare. EPA projects that the proposed standards will reduce GHG emissions by more than 7.3 billion metric tons of carbon dioxide (CO_2), 120,000 metric tons of methane (CH_4), and 130,000 metric tons of nitrous oxide (N_2O) through 2055, in addition to criteria pollutant reductions of 44,000 tons per year of nitrogen oxides (NO_x), 9,800 tons per year of fine particulate matter (PM2.5), 200,000 tons per year of non-methane organic gases (NMOG), 2,800 tons per year of sulfur oxides (SOx), and 1.8 million tons per year of carbon monoxide (CO) by 2055. 88 Fed. Reg. at 29,348 (Table 135); id. at 29,351 (Table 139). More emission reductions are feasible. See CARB Comment at 17-22. Given EPA's description of these emissions reductions as an "essential factor" in its determination of the appropriate level of the proposed standards, id. at 29,344, and the primacy Congress placed on addressing pollution's danger to public health and welfare in Section 202(a), 42 U.S.C. § 7521(a)(1), our States and Cities urge EPA to increase the stringency of its standards beyond those proposed. [EPA-HQ-OAR-2022-0829-0746, p. 28]

Organization: Competitive Enterprise Institute

The IRA Does Not Override West Virginia

One week after President Biden signed the IRA,41 Senate Environment and Public Works Chairman Tom Carper (D-Del.), Harvard Law professor Jody Freeman, and other unnamed "experts" told the New York Times that "Democrats designed" certain IRA provisions to undercut West Virginia. Supposedly, those provisions supply "clear" language authorizing "aggressive" GHG regulations, including California's ZEV mandates. 42 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

41 Public Law 117–169, August 16, 2022, https://www.congress.gov/117/plaws/publ169/PLAW-117publ169.pdf.

42 Lisa Friedman, "Democrats Designed the Climate Law to be a Game Changer. Here's How," New York Times, August 22, 2022, https://www.nytimes.com/2022/08/22/climate/epa-supreme-court-pollution.html,

To its credit, the proposal does not affirm that viewpoint, but perhaps because it says nothing about West Virginia. The proposal details the "clean vehicle" "incentives" in the BIL 43 and IRA, and touts those statutes as "pivotal milestones in the creation of a broad-based infrastructure instrumental to the expansion of clean transportation, including light- and medium-duty zero- emission vehicles."44 Careless readers may infer that the EPA is simply proposing to effectuate congressional intent. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

43 Public Law 117–58, November 15, 2021, https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf.

44 88 FR 29196.

For the record, the BIL and IRA do not enlarge the scope of the EPA's regulatory authorities under the Clean Air Act. The BIL mentions the Clean Air Act three times: [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- BIL Section 11115 establishes a "Congestion mitigation and air quality improvement program" (CMAQI) and stipulates that eligible projects must use "verified technologies" as "defined in section 216 of the Clean Air Act." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- BIL Section 11516 requires the Comptroller General to report on the CMAQI program's progress with "respect to attainment or maintenance of national ambient air quality standards under section 109 of the Clean Air Act." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- BIL Section 71101 amends the 2005 Energy Policy Act's Clean School Bus program to define a zero-emission school bus as one that has zero exhaust emissions of "any air pollutant that is listed pursuant to section 108(a) of the Clean Air Act (42 U.S.C. 7408(a)) (or any precursor to such an air pollutant.)" [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Clearly, the BIL does not amend the Clean Air Act. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Six IRA provisions expressly amend the Clean Air Act, lending a superficial plausibility to Carper's theory. However, all those provisions are fiscal in nature; none expands or otherwise modifies existing CAA regulatory authority: [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- IRA Section 60101 establishes a "Clean heavy-duty vehicles" program, authorizing up to $600 million in grants, rebates, and contracts for zero-emission heavy-duty vehicles, infrastructure, and workforce training. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- IRA Section 60102 authorizes grants to reduce air pollution at ports—up to $2.25 billion through 2027 for the purchase and installation of zero-emission port equipment. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- IRA Section 60103 establishes a "Greenhouse gas reduction fund," authorizing billions of dollars in support for States, municipalities, and tribal governments to "deploy or benefit from zero-emission technologies, including distributed technologies on residential rooftops, and to carry out other greenhouse gas emission reduction activities." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- IRA Section 60107 establishes a Low Emission Electricity Program, authorizing $17 million in grants and technical assistance to each of four groups—households, low- income communities, industries, and State and Tribal governments—for the purpose of reducing electricity-related emissions. The provision also authorizes $1 million for program monitoring, and $18 million for EPA efforts to ensure reductions are achieved. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- IRA Section 60113 establishes the "Methane emissions reduction program," authorizing up to $850 million in "grants, rebates, contracts, loans, and other activities of the Environmental Protection Agency for the purposes of providing financial and technical assistance to owners and operators of applicable facilities." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- IRA Section 60114 authorizes billions of dollars in "greenhouse gas air pollution planning grants" to state governments. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

- IRA Section 60201 authorizes billions of dollars in "environmental and climate justice block grants." [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

In short, where the IRA amends the CAA, it authorizes subsidies, not mandates. The amending provisions create new carrots, but no new sticks.45 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

45 For example, the IRA Low Emission Electricity Program is a non-regulatory substitute for policies President Biden could not persuade Congress to enact: a national clean energy standard, mandating a nationwide transition to 100 percent zero-emission electricity, and a Clean Electricity Performance Program, imposing tax penalties on utilities that fail to decarbonize according to a national schedule. See

Ashley J. Lawson, "Clean Energy Standards: Selective Issues for the 117th Congress," Congressional Research Service, November 2, 2021, https://crsreports.congress.gov/product/pdf/R/R46691, and Ben Adler, "Biden's emission pledge hanging by a thread after Manchin's climate budget cut," October 21, 2021, Yahoo News, https://news.yahoo.com/biden- emissions-pledge-hanging-by-a-thread-after-manchins-climate-change-budget-cut-090056653.html.

Sen. Carper, Prof. Freeman, and the other "experts" interviewed by the Times surely know that post-enactment elucidation of a statute's meaning carries little to no weight in ascertaining congressional intent. 46 As it happens, the actual legislative history Carper made on August 6, 2022 when debating the IRA on the Senate floor before passage, contradicts the post-hoc spin he later shared with the Times. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

46 And whatever interpretive force one attaches to legislative history, the Court normally gives little weight to statements, such as those of the individual legislators, made after the bill in question has become law." Barber v. Thomas, 560 U.S. 474, 486 (2010). "The Court has previously found the post-enactment elucidation of the meaning of a statute to be of little relevance in determining the intent of the legislature contemporaneous to the passage of the statute." Edwards v. Aguillard, 482 U.S. 578, 596 n.19 (1987). "This is a good example of why floor statements by individual legislators rank among the least illuminating forms of legislative history." N.L.R.B. v. SW Gen., Inc., 580 U.S. 288, 137 S. Ct. 929, 943 (2017).

Only once during the day-long Vote-A-Rama, in a two-minute exchange between Sens. Shelley Capito (R-W.Va.) and Carper, did senators debate the IRA's potential impact on West Virginia v. EPA. The exchange occurs on page 4178 of the Congressional Record.47 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

47 Congressional Record, Senate, August 6, 2022, p. 4178, https://www.congress.gov/117/crec/2022/08/06/168/133/CREC-2022-08-06-senate.pdf.

Sen. Capito offered an amendment to strike what was then IRA Sec. 60105(g), which would appropriate $45 million for the EPA "to carry out" CAA Section 111 and eight other sections "with respect to greenhouse gases." Here is the text:

(G) OTHER ACTIVITIES – In addition to amounts otherwise available, there is appropriated to the Administrator of the Environmental Protection Agency for fascial year 2022, out of any money in the Treasury not otherwise appropriated, $45,000,000, to remain available until September 30, 2031, to carry out, with respect to greenhouse gases, sections 111, 115, 163, 177, 202, 211, 213, 231, and 612 of the Clean Air Act (42 U.S.C. 7411, 7415, 7475, 7507, 7521, 7545, 7547, 7571, and 7671k). [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Capito warned that Sec. 60105(g) would create talking points for EPA lawyers and environmental groups "when they try and convince courts to uphold future overreaching climate regulations," such as the CPP. Sen. Carper countered that Section 60105(g) "would fund the EPA to use its existing narrow Clean Air Act authorities to address greenhouse gas emissions."48 [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

48 Emphasis added.

In short, before passage, Sen. Carper effectively denied Sec. 60105(g) would reverse or undercut West Virginia. Rather, the IRA language would fund the EPA's use of "existing narrow" CAA authorities. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

Although Capito's amendment lost on a 50-50 vote, Section 60105(g) was later deleted on a point of order. That means the final IRA does not even contain a section authorizing the EPA to use “existing narrow” regulatory authorities with respect to greenhouse gases. And, as noted above, all the CAA amendments in the IRA are fiscal policy provisions, which as such cannot create or expand any CAA regulatory authority. [EPA-HQ-OAR-2022-0829-0611, pp. 10-13]

IV. The Proposed Standards Are Unlawful as a Matter of Statutory Law

Fleet Average Standards Are Incompatible with CAA Title II

Unlike emission standards that apply to individual vehicles, the EPA’s GHG standards are fleet- average standards. That has been the case since 2010, when the EPA first promulgated GHG motor vehicle standards. The EPA’s reliance on fleet-average standards was inevitable for two main reasons. [EPA-HQ-OAR-2022-0829-0611, p. 13]

First, CO2 emissions from motor fuel consumption constitute more than 95 percent of all tailpipe GHG emissions, and no practical onboard CO2 filtration or capture technology has ever been invented. 49 That means the only feasible method of reducing tailpipe CO2 emissions per mile is to reduce fuel consumption per mile—in other words, boost fuel economy.50 [EPA-HQ-OAR-2022-0829-0611, p. 13]

49 NHTSA, Average Fuel Economy Standards for Light Trucks Model Years 2008-2011, Final Rule, 71 FR 17566, 17670, https://www.govinfo.gov/content/pkg/FR-2006-04-06/pdf/FR-2006-04-06.pdf.

50 EPA and Department of Transportation, Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, Final Rule, 75 FR 25324, 25327, May 7, 2010, https://www.govinfo.gov/content/pkg/FR-2010-05-07/pdf/2010-8159.pdf.

Apparently, the EPA got it right when it told the Court in Massachusetts v. EPA (2007) that motor vehicle GHG standards would either uselessly duplicate or supplant NHTSA’s CAFE standards.56 In any event, the EPA’s GHG standards are fleet-average standards. [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

56 Massachusetts v. EPA, 549 U.S. 497, 513 (2007).

That is a major problem, private petitioners in Texas v. EPA contend, because the Clean Air Act “unambiguously precludes fleetwide-average emission standards under Section 202(a).”57 Nor is that all: [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

57 Petitioners’ Initial Brief, p. 38.

Fleetwide averaging also clashes with “the design and structure of [Title II] as a whole.” Utility Air, 573 U.S. at 321 (citation omitted). Title II sets forth a comprehensive, interlocking scheme for enforcing emission standards through testing, certification, warranties, remediation, and penalties. Fleetwide-average standards are incompatible with these provisions, which are “designed to apply to” individual vehicles and “cannot rationally be extended” to fleets. Id. at 322.58 [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

58 Petitioners’ Initial Brief, pp. 43-44.

My comments will now excerpt and briefly summarize petitioners’ groundbreaking argument on this critical matter. [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

To begin with, CAA Section 202(a), the EPA’s putative statutory authority “says nothing about averaging across fleets.”59 Moreover, 202(a) specifies that the standards apply “to such vehicles and engines for their useful life (as determined under subsection (d) of this section, relating to useful life of vehicles for purposes of certification).” Useful life and certification are legal concepts that apply to individual vehicles, not fleets on average. [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

59 Petitioners’ Initial Brief, p. 39.

Certification and testing are addressed more broadly in CAA Section 206, hence the full meaning of 202(a) depends on the whole of interrelated parts to which it belongs.60 [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

60 Under the “whole-text cannon,” provisions should be read in the context of other provisions to which they are linked. See Antonin Scalia and Bryan A. Garner, Reading Law: The Interpretation of Legal Texts, pp. 145-149, https://jm919846758.files.wordpress.com/2020/09/rlilt.pdf.

CAA 202(a) is explicitly linked to CAA 202(b), which “sets forth specific light-duty vehicle emission standards that EPA must promulgate in ‘regulations under’ Section 202(a).”61 Such standards, which are required for carbon monoxide, hydrocarbons, and oxides of nitrogen, “necessarily apply to vehicles individually, not to fleets on average.”62 For example: [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

61 Petitioners’ Initial Brief, p. 40.

62 Petitioners’ Initial Brief, p. 40.

The regulations under subsection (a) of this section applicable to emissions of oxides of nitrogen from light-duty vehicles and engines manufactured during model years 1977 through 1980 shall contain standards which provide that such emissions from such vehicles and engines may not exceed 2.0 grams per vehicle mile. [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

There is no room in such language for averaging. Congress did not intend to allow automakers to produce some vehicles that emit more than the standard as long as other vehicles emit less. [EPA-HQ-OAR-2022-0829-0611, pp. 14-15]

Section 202(b) testing requirements confirm that those standards apply to individual vehicles, petitioners contend:

In particular, EPA must “test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such system enables such vehicle or engine to conform to the standards required to be prescribed under [Section 202(b) of the Act].” 42 U.S.C. § 7525(a)(2). If the system complies, EPA must issue a "verification of compliance with emission standards for such system.” 63 [EPA-HQ-OAR-2022-0829-0611, pp. 15-17]

63 Petitioners’ Initial Brief, p. 41.

Petitioners draw the only reasonable conclusion:

Those requirements plainly contemplate standards that apply to individual vehicles and their emission-control systems. Not only does the statutory text frame the inquiry as whether an individual “vehicle” or “engine” conforms to the emission standards, but the provision’s foundational premise—that an emission-control system can enable a vehicle to meet emission standards—depends on individually applied standards.64 [EPA-HQ-OAR-2022-0829-0611, pp. 15-17]

64 Petitioners’ Initial Brief, p. 42.

Other parts Section 202 further demonstrate that emission standards under Section 202(a) cannot rely on averaging, petitioners argue:

Section 202(b)(3), for example, authorizes EPA to grant waivers from certain nitrogen- oxide emission standards—which, again, are standards “under” Section 202(a), see 42 U.S.C. § 7521(b)(l)(B)—for no “more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater.” Id. § 7521(b)(3). This provision would be nonsensical under a fleetwide-averaging regime. It contemplates a default under which every vehicle meets a standard, then gives manufacturers a waiver from that default for up to 5% of the fleet. But under fleetwide averaging, no waiver is needed. Instead, a vast proportion of a manufacturer's fleet—perhaps 50% or more effectively has a “waiver” so long as a sufficient number of vehicles outperform the standard. Likewise, Section 202(g), which specifies an increasing “percentage of each manufacturer’s sales volume" of each model year’s vehicles that must comply with specified emission standards, is fundamentally incompatible with averaging. Id. § 7521(g)(l).65 [EPA-HQ-OAR-2022-0829-0611, pp. 15-17]

65 Petitioners’ Initial Brief, p. 42.

The same conclusion follows from Section 202(m), under which the EPA must require manufacturers to install on “all” new light-duty vehicles and trucks “diagnostic systems” capable of identifying malfunctions that “could cause or result in failure of the vehicles to comply with emission standards established under this section.” Id. § 7521(m)(l). Petitioners comment:

As this requirement makes clear, individual vehicles must “comply with emissions standards established under [Section 202].” Id. Otherwise, requiring diagnostic equipment on “all” vehicles makes no sense. In a fleetwide-averaging regime, this requirement would be pointless, as the deterioration or malfunction of an individual vehicle's emission-related systems would provide virtually no information about whether the fleet as a whole is compliant.66 [EPA-HQ-OAR-2022-0829-0611, pp. 15-17]

66 Petitioners’ Initial Brief, p. 43.

Petitioners go on to explain that “Title II sets forth a comprehensive, interlocking scheme for enforcing emission standards through testing, certification, warranties, remediation, and penalties,” and that “fleetwide-average standards are incompatible with these provisions, which are ‘designed to apply to’ individual vehicles and ‘cannot rationally be extended’ to fleets.” A few excerpts must here suffice. [EPA-HQ-OAR-2022-0829-0611, pp. 15-17]

Under Section 206, EPA must “test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer to determine whether such vehicle or engine conforms with the regulations prescribed under [Section 202]." 42 U.S.C. § 7525(a)(l).” Petitioners comment:

Fleetwide averaging is incompatible with these requirements in at least two respects. First, by using the singular terms “vehicle” and “engine,” along with “any” and “such,” the statute contemplates that individual vehicles may be tested, determined to “not conform” with the standards, and have their certificates of conformity suspended or revoked. In a fleetwide-averaging regime, testing an individual vehicle or engine does not enable EPA to determine whether it “conforms with the regulations prescribed under [Section 202],” 42 U.S.C. § 7525(a)(l), because conformity turns not on an individual vehicle's emissions but on the fleet's average performance overall. Second, fleetwide averaging also makes it impossible to determine compliance with applicable emission standards before a vehicle is sold, as required to obtain the certificate of conformity needed for a sale. See 42 U.S.C. § 7522(a)(l) … Simply put, an after-the-fact compliance regime is incompatible with the Act's testing and certification scheme. 67 [EPA-HQ-OAR-2022-0829-0611, pp. 15-17]

67 Petitioners' Initial Brief, pp. 45-46.

Fleetwide-average standards similarly clash with Section 207 warranty provisions. Petitioners explain:

Under Section 207, a manufacturer must "warrant to the ultimate purchaser and each subsequent purchaser" "at the time of sale" that each new vehicle complies with applicable regulations under [Section 202]. 42 U.S.C. § 7541(a)(l) (emphasis added). Yet, as with certificates of conformity, manufacturers cannot warrant conformity with fleetwide-average emission standards at the time of sale, because compliance can be determined only at the end of the year. See 40 C.F.R. § 86.1865-12(i)(l) (requiring manufacturers to compute their "production weighted fleet average" by "using actual production [data]" for the year in question).68 [EPA-HQ-OAR-2022-0829-0611, pp. 17-18]

68 Petitioners' Initial Brief, p. 46.

Fleetwide-average emission standards are also inconsistent with Section 207 remediation and notification provisions. Petitioners explain:

Those provisions state that if EPA "determines that a substantial number of any class or category of vehicles or engines . . . do not conform to the regulations prescribed under [Section 202]," the manufacturer must remedy "the nonconformity of any such vehicles or engines." 42 U.S.C. § 7541(c)(l). If "a motor vehicle fails to conform," the manufacturer bears the cost. Id. § 7541(h)(l). Further, "dealers, ultimate purchasers, and subsequent purchasers" must be given notice of any nonconformity, id. § 7541(c)(2), which requires identification of specific nonconforming vehicles. None of this is possible where the nonconformity is tied to a fleet on average.69 [EPA-HQ-OAR-2022-0829-0611, pp. 17-18]

69 Petitioners' Initial Brief, pp. 46-47.

Finally, fleetwide averaging is inconsistent with Section 205 penalty provisions. Petitioners explain:

Under Section 205, any violation "shall constitute a separate offense with respect to each motor vehicle or motor vehicle engine," with each offense subject to its own civil penalty of up to $25,000. 42 U.S.C. § 7524(a) (emphasis added). Under EPA's approach, however, no individual vehicle or engine violates the applicable standard, only the fleet as a whole. The statute provides no method for calculating penalties when a fleet fails to meet its fleetwide-average standard—because it does not authorize fleetwide-average standards.70 [EPA-HQ-OAR-2022-0829-0611, pp. 17-18]

70 Petitioners' Initial Brief, p. 47.

Organization: Elders Climate Action

C. EPA's Failure to Set Zero Emission Standards Violates the CAA.

The CAA declares that the primary purpose of the Act is "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." 42 U.S.C. §7401(b)(1). To implement this purpose, section 202(b)(1)(C) grants the Administrator discretion to commence a rulemaking to revise standards previously promulgated under subsection (a)(1), but once that rulemaking is commenced, as here, the Act requires that the Administrator determine what revisions are "needed to protect public health and welfare." That statutory benchmark has not been addressed in this rulemaking, either with respect to the emission reductions needed to prevent endangerment of the public health and welfare from the climate impacts of GHG emissions, or from the impacts of criteria pollutant violations of NAAQS on public health. The failure to undertake an analysis to determine what emission standards are needed to protect public health and welfare renders this rulemaking unlawful and fundamentally flawed. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

L/MDVs that are commercially available today with zero emission power trains obviously satisfy the available technology requirement. A large fraction of the CO2 emitted from on-road vehicles comes from L/MD vehicle types that are NOW commercially available with zero emission power trains. These include transit and school buses, delivery vans, service trucks, and shuttles serving airports, hotels and resorts. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

EPA admits that ZEV technologies are available, and are the most cost-effective technologies, but the Agency only estimates the zero emission L/MDVs that will likely be available in 2027 as a result of current incentive policies and state regulations. EPA does not estimate the potential availability of zero emission L/MDVs that could be produced and sold if EPA were to promulgate zero emission standards. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

Instead EPA assumes that the rule will marginally improve the efficiency of IC engines and "induce" enough ZEV sales to reduce CO2 emissions less than 5% by 2030 from new L/MDVs sold in 2027 and subsequent years. By failing to require the production and sale of zero emission L/MDVs along with a fleet averaging rule that allows engine manufacturers to sell "dirty" uncontrolled L/MDVs through the use of emission reduction credits obtained by selling zero emission vehicles in California and section 177 states, EPA is effectively allowing engine manufacturers to capture the benefits of clean zero emission vehicles for themselves while increasing the exposure of at-risk communities to harmful pollutants in non-177 states. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

We include a legal analysis that demonstrates EPA's failure to set standards that will achieve the maximum deployment of zero emission technologies fails to achieve the public health purpose of the Act, and is not consistent with the statutory text and the legislative history of the Act. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

By setting zero emission standards for NOx beginning in 2027 for the vehicle types currently available as zero emission vehicles (ZEVs), EPA should determine the NOx emissions that would be avoided in nonattainment areas where EPA's modeling for the 2022 HD rule shows that current and proposed HD emission standards will not be sufficient to provide for attainment. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

CONCLUSION.

EPA must determine the extent to which a zero emission standard for L/MD vehicles beginning in 2027 would be needed to put our nation's vehicle fleet on a clear path to attaining the ozone and PM NAAQS by the statutory deadline. In addition, EPA must, at a minimum, use the IPCC modeling analysis and data to estimate the endangerment that will result from climate warming if global mean temperature is allowed to exceed 1.5o C as the benchmark for determining endangerment to the public health and welfare, and determine what emission standard is needed for L/MD vehicles to achieve the reductions needed to ensure that the U.S. contribution to atmospheric loadings of CO2 will be reduced to the levels need to prevent more severe effects of climate warming. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

Organization: Environmental Defense Fund (EDF) (1of 2)

A. EPA has authority to consider ZEV technology in setting emission standards.

The language, structure, and legislative history of the CAA clearly show that Congress granted EPA authority to consider all available technologies, including ZEV technologies, in setting emission standards under Section 202(a). More recent acts of Congress have reaffirmed legislative intent that EPA consider the emissions-reducing potential of ZEVs in its rules. [EPA-HQ-OAR-2022-0829-0786, p. 10]

Section 202(a)(1) directs EPA to set emissions standards for new “motor vehicles” -- a term defined broadly and functionally to include “any self-propelled vehicle designed for transporting persons or property on a street or highway,” 42 U.S.C. 7550(2). Such standards are applicable regardless of “whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution.”9 The Act’s language thus explicitly rejects limitations to internal-combustion engines or to particular kinds of technologies. It just as clearly includes technology beyond ICEVs, including ZEVs, which are plainly a “complete system[]” that can “prevent” pollution. [EPA-HQ-OAR-2022-0829-0786, p. 10]

9 42 U.S.C. § 7521(a)(1).

This reading of Section 202 is well supported by its core function and by the long history of its interpretation by EPA and the courts. In Section 202, Congress authorized EPA to “project future advances” in technology, and not be confined to pollution-control methods that were currently available.10 Indeed, Congress expected EPA to “adjust to changing technology.”11 Based on its clear CAA authority, EPA has factored ZEV technologies (ranging from mild hybrid technologies to fully electric battery-powered vehicles) into its rules for more than two decades.12 EPA first included ZEVs in its fleetwide averages in its 2000 “Tier 2” criteria pollutant standards.13 The agency has continued to consider and incentivize these technologies in every one of its six greenhouse gas rules for both light- and heavy-duty vehicles.14 Accordingly, its decision to do so again in this rule now that ZEV technologies are more widely available is eminently reasonable. [EPA-HQ-OAR-2022-0829-0786, p. 10]

10 NRDC v. EPA, 655 F.2d 318, 329 (1981) (quoting Senate report from 1970 amendments stating EPA was “expected to press for the development and application of improved technology rather than be limited by that which exists today.” S. Rep. No. 1196, 91st Cong., 2d Sess. 24 (1970)).

11 S. Rep. No. 89-192, at 4 (1965).

12 65 Fed. Reg. 6698 (Feb. 10, 2000) (“Tier 2” criteria pollutant standards). For a detailed review of this history, see Brief of Amici Curiae Margo Oge and John Hannon in Support of Respondents, Texas v. EPA,

No. 22-1031, 24-31 (D.C. Cir, Mar. 2, 2023), Texas v. EPA, No. 22-1031, 33 (D.C. Cir, Mar. 2, 2023), https://www.edf.org/sites/default/files/2023-03/Texas%20-%20Former%20EPA%20Managers.pdf (Attachment H).

13 65 Fed. Reg. 6698 (Feb. 10, 2000).

14 75 Fed. Reg. 25324 (May 7, 2010) (Light-duty model year 2011 and later); 76 Fed. Reg. 57106 (Sept. 15, 2011) (Heavy-duty model year 2014 and later); 77 Fed. Reg. 62624 (Oct. 15, 2012) (Light-duty model year 2017 and later); 81 Fed. Reg. 73478 (Oct. 25, 2016) (Heavy-duty model year 2021 and later); 85 Fed. Reg. 24174 (Apr. 30, 2020) (Light-duty model year 2021 and later); 86 Fed. Reg. 74434 (Dec. 30, 2021) (Light-duty model year 2023 and later); See also EPA's Answering Brief, Texas v. EPA, No. 22-1031, 15-16 (D.C. Cir, Apr. 27, 2023), https://www.edf.org/sites/default/files/2023-05/Texas%20-%20EPA%20Final%20Brief.pdf (Attachment I).

Organization: Governing for Impact and Evergreen Action (GFI)

I. Background: the Proposed Rule & the Major Questions Doctrine

The EPA's Proposed Rule, covering light and medium duty vehicle emissions of both greenhouse gases ("GHGs") and criteria pollutants for MYs 2027-2032, appropriately fulfills the statutory obligation under Section 202(a) of the Clean Air Act ("CAA") to issue standards for motor vehicle emissions that "cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."11 It also marks a positive and necessary step towards reducing carbon emissions in line with current domestic and international climate commitments, as well as addressing environmental justice concerns. This administration has committed to reducing GHG pollution by 50-52 percent by 2030 (relative to 2005 levels)—and policies to address pollution from the transportation sector will be critical to achieving this goal.12 The transportation sector accounts for the largest share of domestic GHG pollution (29 percent); and light duty vehicles are responsible for the largest share of greenhouse emissions within the transportation sector (58 percent).13 Despite the EPA's previous GHG regulations under Section 202(a), transportation emissions in the United States continue to grow,14 demonstrating that greater action is needed to fulfill the CAA's statutory goals and achieve this administration's climate targets. [EPA-HQ-OAR-2022-0829-0621, p. 2]

11 42 U.S.C. §7521(a)(1).

12 "FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good- Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies," The White House, https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030- greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on- clean-energy-technologies/ (April 22, 2021).

13 Fast Facts on Transportation Greenhouse Gas Emissions," U.S. Enviro. Prot. Agency, https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions (last visited June 15, 2023).

14 See "Inventory of U.S. Greenhouse Gas Emissions and Sinks," U.S. Enviro. Prot. Agency, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks (last visited June 15, 2023).

The Proposed Rule, contrary to some public commentary,18 simply follows the course laid by decades of CAA §202(a) emissions standards for new motor vehicles and motor vehicle engines.19 Since the 1970s, the EPA has used this authority to set standards for passenger vehicles that reduced deadly emissions such as lead, carbon monoxide, particulate matter, and nitrogen oxide. In the wake of the Supreme Court's 2007 decision in Massachusetts v. E.P.A., which held that carbon dioxide and other greenhouse gas emissions as air pollutants under the CAA,20 the EPA released its first Section 202(a) standard targeting GHG emissions from light duty vehicles in 2010, covering MYs 2012-2016.21 As new data about the urgency of the climate crisis and its ensuing public health impacts, especially to environmental justice communities, have emerged over the last decade, the EPA has further tightened those standards in a series of subsequent rulemakings. [EPA-HQ-OAR-2022-0829-0621, p. 3]

18 18 See supra at 1.

19 See EPA, "Timeline of Major Accomplishments in Transportation, Air Pollution, and Climate Change," https://www.epa.gov/transportation-air-pollution-and-climate-change/timeline-major-accomplishments-transportation- air (last visited June 15, 2023).

20 549 U.S. 497.

21 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule," 75 Fed. Reg. 25324 (May 2010), https://www.govinfo.gov/content/pkg/FR-2010-05-07/pdf/2010-8159.pdf.

The Proposed Rule meets the moment. It carefully balances current technological capacities, market trends, and the need to reduce emissions on the most accelerated timeline possible in order to protect public health and welfare, as the CAA demands. Because the average vehicle lifespan is 10 years, and Section 202(a) rules only apply to new vehicles, it is rational for GHG standards to become iteratively more stringent so that we can achieve our climate and pollution (and therefore our public health and welfare) goals on an adequate timeline and in response to the latest scientific data—as the Proposed Rule does. While we are also supportive of the proposed Alternative I — as we believe the statute, ambitious automaker commitments, and scientific data robustly support an even stronger standard — this comment narrowly focuses on the Proposed Rule's central proposal, which has been the subject of MQD criticism.26 [EPA-HQ-OAR-2022-0829-0621, p. 4]

26 See supra at 1.

Finally, suggestions by some opponents that the EPA must promulgate its emissions standards in coordination with the National Highway Traffic Safety Administration ("NHTSA"),75 which sets fuel- economy standards but is prohibited from taking EVs' fuel economy into account in setting those standards, are wrong. While it is true that the two agencies have jointly promulgated GHG and fuel economy regulations in the past, there is no statutory requirement that they do so—and the agencies did not do so in 2021 when the EPA promulgated 202(a) GHG regulations for MYs 2023-2026.76 In fact, the Supreme Court has described the EPA's authority to regulate carbon emissions from motor vehicles as "a statutory obligation wholly independent" from NHTSA's energy efficiency mandate regarding mileage requirements.77 [EPA-HQ-OAR-2022-0829-0621, pp. 9-10]

75 See, e.g., Private Petitioners' brief, Texas v. E.P.A., D.C. Cir. No. 22-1031.

76 "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards," 86 Fed. Reg. 74434 (Dec. 2021), https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model-year- light-duty-vehicle-greenhouse-gas-emissions-standards.

77 Massachusetts v. E.P.A., 549 U.S. 497, 532 (2007). See also Coal. for Responsible Regul., Inc. v. E.P.A., 684 F.3d 102, 127 (D.C. Cir. 2012) (explaining why NHTSA's regulatory obligations do not affect

the EPA's obligations under the CAA); Proposed Rule at fn. 388; Dan Farber, "The Car Rule and the Major Questions Doctrine," Legal Planet (April 24, 2023), https://legal-planet.org/2023/04/24/the-car-rule-and-the-major-questions-doctrine/; Proof Brief of the Institute for Policy Integrity at 10–11.

2. The Proposed Rule does not mark a novel use of the EPA's regulatory authority.

A review of the agency's past actions also weighs in the agency's favor under the MQD. The EPA has deployed the same suite of regulatory mechanisms — for example, its reliance on fleetwide averages — for decades.78 As the Proposed Rule does for zero emission vehicles, past Section 202(a) standards have encouraged automakers to develop and deploy cutting edge technologies that fulfill the statute's "public health and welfare" mandates.79 And as noted above, the Proposed Rule's modest effects on EV growth find ample precedent in previous 202(a) GHG regulations.80 [EPA-HQ-OAR-2022-0829-0621, p. 10]

78 See Proposed Rule at 29233 ("Congress also directed EPA to phase-in certain section 202(a) standards, see CAA section 202(g), which confirms EPA's authority to promulgate standards, such as fleet averages, phase-ins, and averaging, banking, and trading programs, that are fulfilled through compliance over an entire fleet, or a portion thereof, rather than through compliance by individual vehicles"). See also EPA's Proof Answering Brief, Texas v. E.P.A., D.C. Cir. No. 22-1031 10–18 (Feb. 24, 2023), https://www.edf.org/sites/default/files/2023-02/Texas%20-%20EPA%20Opening%20Brief.pdf; Proof Brief of State and Public Interest Repondent-Intervenors, Texas V. E.P.A.,D.C. Cir. 22-1031 6–19 (Mar. 21, 2023), https://www.edf.org/sites/default/files/2023-03/Texas-%20NGO%20and%20State%20brief.pdf; Proof Brief of the Institute for Policy Integrity at 8–10.

79 See infra at 13.

80 See supra at 9.

Given the importance that the MQD places on regulatory antecedents,99 the agency might consider including in its final rule a more sophisticated version of the above chart (or an analogous qualitative description), which compares the agency's GHG tailpipe rules (and perhaps its criteria pollutant rules) across a range of metrics. Such an analysis would help demonstrate to a non-expert reviewing court that the Proposed Rule does not pose an impermissibly "unheralded" or "unprecedented" exercise of agency authority. [EPA-HQ-OAR-2022-0829-0621, pp. 11-12]

99 Revesz and Sarinsky at 2 ("[T]he concept of regulatory novelty plays an important role in the doctrine under both Supreme Court precedent and lower-court application. If an action represents a marked and substantial departure from anything the agency has done before (i.e., is "unheralded"), then this could favor the application of the major questions doctrine to strike down the challenge action—so long as the doctrine's other prongs are met. If, however, the agency can point to analogous exercises of authority in the past, such a showing could strongly support the agency's statutory authority for the challenged action").

As a result, 202(a) standards have historically served a technology-forcing function, pushing the market to develop and adopt innovative technologies that will better serve the public health and welfare. In the 1970's and 1980's, for example, the EPA used its Section 202(a) authority to facilitate uptake of a then-nascent technology: catalytic converters, now commonplace.111 The fact that, some forty-plus years later, the innovation has shifted to zero emissions engines does not change the fundamental tenor of the legal analysis or EPA's core statutory responsibilities. [EPA-HQ-OAR-2022-0829-0621, p. 13]

111 See "Timeline of Major Accomplishments in Transportation, Air Pollution, and Climate Change," U.S. Enviro. Prot. Agency, https://www.epa.gov/transportation-air-pollution-and-climate-change/timeline-major-accomplishments- transportation-air (last visited June 15, 2023).

Second, as the EPA also notes in its Proposed Rule, the IRA includes language reaffirming the core holding of Massachusetts v. E.P.A. and the agency's subsequent scientific conclusions: that the EPA is obligated to regulate GHGs as air pollutants under the CAA, and specifically to regulate such emissions from mobile sources.112 In the IRA, Congress appropriated funds for states "to adopt and implement greenhouse gas and zero-emission standards for mobile sources pursuant to §177 of the Clean Air Act (42 U.S.C. 7507)."113 The CAA cross-reference in this IRA provision holds important implications. CAA §177 allows states, which are normally preempted from setting their own motor vehicle emissions standards under the CAA, to adopt California's standards (for which the EPA must waive pre-emption unless specific findings are made).114 So to expressly fund "greenhouse gas and zero emission" activities under §177 necessarily implies that these are the types of standards states would normally be preempted from pursuing because the CAA reserves their regulation to EPA. The IRA, then, necessarily implies that GHGs are regulable under the CAA.115 Indeed, during consideration and passage of the IRA, key drafters explicitly stated on the record their understanding that the IRA's provisions statutorily affirmed the Supreme Court's Mass v. EPA decision.116 [EPA-HQ-OAR-2022-0829-0621, p. 13]

112 See generally, Greg Dotson and Dustin J. Maghamfar, "THE CLEAN AIR ACT AMENDMENTS OF 2022: CLEAN AIR, CLIMATE CHANGE, AND THE INFLATION REDUCTION ACT," 53 Enviro. L. Rep. 10017, 10030 (2023), https://www.eli.org/sites/default/files/files-pdf/53.10017.pdf.

113 IRA, Pub. L. No. 117-169, §60105(g), 136 Stat. 1818 (2022).

114 See 42 U.S.C. §7507.

115 See Dotson and Maghamfar at 10030 ("If GHGs were not considered to be air pollutants or EPA could not regulate GHGs from motor vehicles pursuant to the CAA, then §177 would not apply to state GHG and zero emission standards because such standards for motor vehicles would not be preempted by §209(a)").

116 See Lisa Friedman, "Democrats Designed the Climate Law to Be a Game Changer. Here's How," N.Y. Times, https://www.nytimes.com/2022/08/22/climate/epa-supreme-court-pollution.html (Aug. 22, 2022) (quoting Senate Environmental and Public Works Chairman Tom Carper, a lead drafter, explaining that "[t]he language, we think, makes pretty clear that greenhouse gases are pollutants under the Clean Air Act"). See also Proposed Rule at 29233 (quoting House Energy and Commerce Chairman Frank Pallone explaining that the IRA "reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air act" and "the IRA clearly and deliberately instructs EPA to use" this authority by "combin[ing] economic incentives to reduce climate pollution with regulatory drivers to spur greater reductions under EPA's CAA authorities"); 168 Cong. Rec. E868–02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone); 168 Cong. Re.

Organization: Growth Energy

And, more fundamentally, it will require manufacturers to primarily make EVs at the expense of ICE vehicles—including those that can use higher blends of biofuels. Effectively picking one greenhouse gas reduction technology to the exclusion of another is arbitrary and outside the scope of EPA's authority under Section 202 of the Clean Air Act. It is also inconsistent with Congress's directive in the 2007 EISA to establish and maintain a credit system for encouraging minimum levels of biofuel use. [EPA-HQ-OAR-2022-0829-0580, p. 4]

B. There is No Rational Basis for the Disparate Treatment of EVs and Biofuels.

EPA is by no means constrained to consider only emissions from the tailpipe in Section 202 of the Act. EPA itself has already concluded as much, explaining in response to a comment on a prior tailpipe rule that:

EPA disagrees with Nissan that excluding upstream GHGs is legally required under section 202(a)(1). In this rulemaking, EPA is adopting standards under section 202(a)(1), which provides EPA with broad discretion in setting emissions standards. This includes authority to structure the emissions standards in a way that provides an incentive to promote advances in emissions control technology. This discretion includes the adjustments to compliance values adopted in the final rule, the multipliers we proposed, and other kinds of incentives. [EPA-HQ-OAR-2022-0829-0580, p. 10]

75 Fed. Reg. at 25,437.

EPA's statutory analysis is correct. Section 202(a) broadly authorizes EPA to establish "standards" applicable to harmful pollutants emitted from new motor vehicles. Despite the colloquial framing of rules promulgated under Section 202 as "tailpipe rules," nothing about Section 202 constrains the standards EPA may set to apply strictly standards that affect the amount of a pollutant emitted from the tailpipe of a vehicle. In the past, EPA has used Section 202 to create a variety of types of standards and incentives related to non-tailpipe aspects of motor vehicle, like air conditioning efficiency credits and off-cycle credits. [EPA-HQ-OAR-2022-0829-0580, p. 10]

Indeed, EPA has already created a methodology for accounting for upstream emissions from EVs; prior light-duty vehicle rules committed to begin accounting for upstream emissions above a certain cap in future years. See, e.g., 77 Fed. Reg. 62624. [EPA-HQ-OAR-2022-0829-0580, p. 10]

EPA provided the following example of how that emissions accounting would work for a Nissan Leaf:

- A measured 2-cycle vehicle electricity consumption of 238 watt-hours/mile over the EPA city and highway tests[EPA-HQ-OAR-2022-0829-0580, p. 10]

- Adjusting this watt-hours/mile value upward to account for electricity losses during electricity transmission (dividing 238 watt-hours/mile by 0.935 to account for grid/transmission losses yields a value of 255 watt-hours/mile) [EPA-HQ-OAR-2022-0829-0580, p. 10]

- Multiplying the adjusted watt-hours/mile value by a 2030 EV/PHEV electricity upstream GHG emissions rate of 0.534 grams/watt-hour at the power plant (255 watt-hours/mile multiplied by 0.534 grams GHG/watt-hour yields 136 grams/mile) [EPA-HQ-OAR-2022-0829-0580, p. 10]

- Subtracting the upstream GHG emissions of a comparable midsize gasoline vehicle of 41 grams/mile to reflect a full net increase in upstream GHG emissions (136 grams/mile for the EV minus 41 grams/mile for the gasoline vehicle yields a net increase and EV compliance value of 95 grams/mile). [EPA-HQ-OAR-2022-0829-0580, p. 10]

Id. at 82,822. While that methodology is a simplification of the upstream emissions to a certain extent, it is an easily workable estimate for the upstream emissions from EVs. EPA could and should, at a minimum, use that approach or a similar one to account for EV emissions for 2027 and later years in this rule. [EPA-HQ-OAR-2022-0829-0580, p. 10]

Yet, EPA backed away from its promise to account for upstream emissions in the 2020 rule, and it has now proposed to make the continued lack of any such accounting “permanent.” 88 Fed. Reg. at 29,252. EPA articulated two purported reasons for doing so: (1) that its regulations have “functioned as intended” without any upstream accounting by “encouraging the continued development and introduction of electric vehicle technology,” and (2) that upstream emissions are “addressed by separate stationary source programs.” Id. [EPA-HQ-OAR-2022-0829-0580, p. 10]

Neither of those justifications is a rational reason to continue deliberately underestimating the emissions from EVs. To begin with, while it is true that systematic underestimates of emissions incentivize EV development, this ignores the fact that they disincentivize development in other promising GHG-reduction technologies like biofuels. By incentivizing one technology to the exclusion of others, EPA is reducing an opportunity to develop different technologies that will be appropriate for more applications across the country. [EPA-HQ-OAR-2022-0829-0580, p. 10]

And the fact that upstream emissions are addressed by stationary source permitting programs is no justification at all. Those programs help reduce emissions but do not eliminate them—EPA’s rule still fails to estimate the true lifecycle emissions from EVs even when considering that power plants must get Title V, PSD, and NSPS permits. [EPA-HQ-OAR-2022-0829-0580, p. 10]

EPA also points out that, if it estimated upstream emissions from EVs, “it would appear appropriate to do so for all vehicles, including gasoline-fueled vehicles.” 88 Fed. Reg. at 29,252. [EPA-HQ-OAR-2022-0829-0580, p. 10]

That’s right—EPA should compare apples to apples. But that additional burden of estimating another set of upstream emissions is no reason not to do it. By comparing the lifecycle emissions of EVs and the lifecycle emissions of ICE vehicles, EPA could much better align the incentives provided by its tailpipe rules with the real world. [EPA-HQ-OAR-2022-0829-0580, p. 10]

Moreover, whether EPA has authority to require what amounts to a mandate to shift mainly to EVs across the country presents a “major question.” See West Virginia v. EPA, 142 S. Ct. 2587, 2595 (2022). And Section 202 of the Clean Air Act does not provide the necessary “clear congressional authorization” for a regulation with such a fundamental economic and practical impact on U.S. citizen’s lives. Section 202 gives EPA authority to set “standards” that relate to particular air pollutants, not the authority to pick an entire set of vehicles over another. 42 U.S.C. § 7521(a). But the latter is exactly what EPA is proposing. The proposal’s very stringent standard, combined with EPA’s decision to both underestimate the emissions from BEVs and overestimate the emissions from biofuels, means that the only way for auto manufacturers to comply is to shift rapidly towards producing primarily EVs. If finalized in its current form, the proposal would exceed EPA’s Section 202 authority under West Virginia. [EPA-HQ-OAR-2022-0829-0580, pp. 14-15]

EPA’s proposal also conflicts with Congress’s instructions to incentivize greater biofuel use in the 2007 EISA. That statute, which established the Renewable Fuel Standard (“RFS”) program, requires refiners and importers of petroleum fuels to blend increasing percentages of biofuels into their products. See Clean Air Act §211(o), 42 U.S.C. § 7545(o). So, not only does Section 202 not give any indication that Congress delegated EPA authority to effectively mandate EV usage, Section 211(o) demonstrates that Congress spoke clearly to the contrary. EPA cannot ignore Congress's instructions in one part of the Clean Air Act to better fit its policy preferences under another part. [EPA-HQ-OAR-2022-0829-0580, pp. 14-15]

Organization: HF Sinclair Corporation

The "major questions doctrine" holds that Congress must "speak clearly when authorizing an agency to exercise [such] powers" of "vast economic and political significance."4 As EPA is aware, this doctrine applies in the context of environmental regulation. Last year, in West Virginia v. EPA, the Supreme Court relied on the major questions doctrine in holding that the EPA exceeded its statutory authority in adopting the Clean Power Plan. That regulation sought to impose caps on GHG emissions by requiring utilities and other providers to shift electricity production from coal-fired power plants to natural gas and then to renewable energy in place of imposing source- specific requirements reflective of the application of state-of-the-art emission reduction technologies.5 [EPA-HQ-OAR-2022-0829-0579, p. 3]

4 Nat'l Fed. Of Indep. Bus. v. Dep't of Labor, 595 U.S. , slip op. at 6 (Jan 13, 2022); see also Ala. Assoc. of Realtors v. Dep't of Health & Human Servs., 141 S. Ct. 2485, 2489 (2021); Utility Air Regulatory Group v. EPA, 573 U.S. 302, 324 (2014); U.S. Telecom Assoc. v. FCC, 855 F.3d 381, 419-21 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc) (explaining provenance of "major rules doctrine").

5 West Virginia v. EPA, 597 U.S. (2022).

As noted by the Court, EPA "announc[ed] what the market share of coal, natural gas, wind, and solar must be, and then require[d] plants to reduce operations or subsidize their competitors to get there."6 EPA's attempt to devise GHG emissions caps based on a generation-shifting approach would have had major economic and political significance impacting vast swaths of American life and substantially restructuring the American energy market; however, EPA's purported authority was only based on a "vague statutory grant" within Section 111(d) of the Clean Air Act—far from the "clear authorization required by [Supreme Court] precedents."7 [EPA-HQ-OAR-2022-0829-0579, p. 3]

6 Id., slip op. at 33, n.4.

7 Id., slip op. at 24. EPA's Proposed Rule here presents an analogous, if not identical, situation. Mandating a shift from ICE to PEV will reshape the American automotive market with profound collateral effects, making clear that EPA is encroaching upon an issue of "vast economic and political significance." As further discussed herein, the direct compliance costs are enormous—EPA estimates that the cost of vehicle technology (not including the vehicle or battery tax credits) would be approximately $180 billion–$280 billion respectively, in addition to over $7 billion in electric vehicle supply equipment ("ESVE") costs through 2055, and these figures do not include the complete transformation of the electric power sector.8 The Proposed Rule will go above and beyond natural market forces to change what consumers are able to purchase by requiring the production of a different product. The Proposed Rule undoubtedly forces OEMs to meet production lead times that would not exist but for EPA's new PEV mandate.

8 Proposed Rule at 29,199.

As with the Clean Power Plan, EPA lacks Congressional authorization in the Clean Air Act to impose a manufacturing shifting standard to a preferred powertrain and effectively order regulated parties to phase out combustion engine technologies. EPA's standard-setting tools are limited to those which Congress provided in Section 202(a) of the Clean Air Act. Here, EPA is only authorized to set "standards" for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to," potentially harmful air pollution. EPA has elected to focus solely on tailpipe emissions and not the entire lifecycle analysis. But PEVs do not have tailpipe emissions of carbon dioxide, the pollutant of concern here, so the operation of such vehicles alone cannot "cause, or contribute to," air pollution within the constructs of a tailpipe emissions regulation, especially when EPA does not require vehicle manufactures to account for the upstream emissions from PEVs in their compliance calculations. [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

Far from "clear congressional authorization," Section 202(a) provides EPA no authority to set standards that go above and beyond that which could be achieved by improvements to ICE vehicles alone such that OEMs must completely cease to produce the underlying technology governed at the time the Clean Air Act was adopted and amended. Nor does it permit EPA to establish a fleet averaging and credit trading program as a mechanism to limit ICE sales.9 Notably, Congress instituted a clean fuel vehicles program with reference to "clean alternative fuel" vehicles, which includes BEVs, in its 1990 updates to the Clean Air Act. In doing so, Congress explicitly distinguished such vehicles from "conventional gasoline-fueled or diesel-fueled vehicles of the same category and model year," dispelling the notion that BEVs and ICE vehicles can be lumped together to set standards that will enable the former to eventually displace the latter.10 EPA does not—and cannot—explain how such authority can be read to regulate PEVs and ICE vehicles under a common standard. It is no surprise then that up until the current Administration, EPA has never claimed the authority to mandate even partial electrification. [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

9 See supra, II.B.

10 42 U.S.C. §§ 7581, 7582(b); see also § 7585(a) (defining NOx and non-methane hydrocarbon emission standards for heavy-duty clean-fuel vehicles as a percentage of conventional heavy-duty vehicles).

Congress clarified that it, not EPA, must make the important policy decisions affecting if, when, and how the American automotive industry will transition from ICE vehicles to BEVs. In the 116th Congress, for example, Congress introduced 44 bills seeking to reduce petroleum-based fuel consumption and GHG emissions from the transportation sector through customer rebates, vehicle and fuel producer incentives, local funding, development of standards, and research and development. But none went so far as to propose requiring adoption, let alone mass adoption of heavy duty PEVs through the phase-out of ICE vehicles.11 In fact, Congress rejected bills that would have banned the sale of new LD ICE vehicles by 2040,12 and it has consistently disapproved of EPA's efforts to hamstring the automotive sector with more stringent air pollution standards than are feasible.13 [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

11 "Alternative Fuel and Vehicles: Legislative Proposals," Congressional Research Service (July 28, 2021).

12 See Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018); see also 116 Cong. Rec. 19238-40 (1970) (proposed amendment to Title II that would have banned ICE vehicles by 1978).

13 See, e.g., S. J. Res. 11, 118th Cong. (2023) (Although passed only by the Senate thus far, the joint resolution calls for disapproval of the rule submitted by the Administrator of the Environmental Protection Agency relating to "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 88 Fed. Reg. 4296 (January 24, 2023).).

It should be no surprise then in the wake of the Proposed Rule, members of Congress have requested that the Agency rescind the proposals, asserting they “effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction.”14 That Congress intended for it, not EPA, to direct these policy decisions is made all the more clear by the passage of the IRA and BIL whereby Congress identified the policy levers it deemed appropriate. Congress could have, but did not, delegate the authority to (or otherwise direct) EPA to establish a fleet- wide credit trading regime to further drive PEV development and rapid adoption. Instead, the Proposed Rule stands in direct contrast to other legislation, such as the Renewable Fuel Standard Program, whereby Congress mandated that “gasoline sold or introduced into commerce in the United States” must contain a year-over-year increasing share of renewable fuels15 and, in 2022, must include tens of billions of gallons of renewable fuel.16 An EPA-mandated shift in transportation technology from vehicles that can operate on increasing volumes of renewable fuel to PEVs does not square with such requirements. Consequently, Congress, not EPA, should determine how to regulate electrification of transportation.17 [EPA-HQ-OAR-2022-0829-0579, pp. 4-5]

14 Letter from Senator Shelley Capito, et al. to Administrator Michael S. Regan, EPA (May 25, 2023); see also Senate Resolution S.J. Res. 11, 118th Congress (April 26, 2026) (Although related to heavy duty vehicles (“HDVs”), Congress has expressed its disapproval of EPA’s overreach in this space. For example, in April of this year both houses of Congress passed a Congressional Review Act resolution to rescind EPA’s December 2022 heavy duty NOx standards, sending a strong signal that Congress views EPA’s efforts in this space as unnecessary, infeasible, and uniformed in light of economic and energy security concerns); House Resolution H2523 (May 23, 2023); see also Congressional Record, H2523 (May 23, 2023) at 1444, Statement from Mr. Walberg (R-MI) (“From tailpipe emissions regulations that will force people to buy expensive and less practical EVs to new rules on power plants that will threaten the reliability of our electric grid. It seems like the EPA hasn’t even thought about the economic and energy security of our constituents.”).

15 42 U.S.C. § 7545(o)(2)(A)(i).

16 Id., § 7545(o)(2)(B); 87 Fed. Reg. 39,600 (July 1, 2022).

17 See “Grassley-Cornyn Bill Pulls Plug on Latest Biden Boon for EVs,” (May 18, 2023), https://www.grassley.senate.gov/news/news-releases/grassley-cornyn-bill-pulls-plug-on-latest-biden-boon-for-evs (discussing proposed legislation entitled “No Fuel Credits for Batteries Act” introduced to “preserve the integrity of the Renewable Fuels Standard” in light of EPA’s proposed E-RINS rule”).

b. EPA Lacks Statutory Authority to Set Fleetwide Average Emission Standards, and In All Events May Not Average In Vehicles that Do Not Emit the Relevant Pollutant.

EPA lacks statutory authority under Section 202(a) of the Clean Air Act to set fleetwide emission standards, and even if it had such authority, it could not lawfully use it to force electrification by including vehicles that have no tailpipe emissions in the fleetwide average standard for ICE vehicles. The Proposed Rule results in fleetwide standards that cannot be met by ICE vehicles alone; however, under the Clean Air Act, EPA may only set individual vehicle-level emission standards. Such standards must be for “emission[s]” from “any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to,” potentially harmful air pollution.18 The plain language of this provision authorizes EPA to set standards for classes of individual vehicles or engines that emit air pollutants. Because PEVs do not directly “cause, or contribute to,” air pollution individually within the construct of a tailpipe emissions standard, any standard applicable to “any class or classes” of vehicles cannot include PEVs. [EPA-HQ-OAR-2022-0829-0579, p. 6]

18 42 U.S.C. § 7521(a)(1).

PEVs are simply not the “technology” contemplated by Congress here. Instead, Congress enabled EPA to increase emission standard stringency through cleaner fuels and improved emissions-related systems to be incorporated into ICE vehicles such as advances in fuel injection, exhaust gas combustion management, and advances catalysts to neutralize pollutants of concern.19 By factoring in PEV performance as a part of its averaging scheme, EPA is ignoring the technological feasibility of emissions-related systems and simply requiring the production of fewer ICE vehicles. The Proposed Rule does not consider advances to ICE technologies when setting the standard. [EPA-HQ-OAR-2022-0829-0579, p. 6]

19 For example, Section 202(m) requires the monitoring of “emission-related systems” such as the “catalytic converter and oxygen sensor.” 42 U.S.C. § 7521(m)(l).

And even for criteria pollutants emitted from ICE vehicles, the Clean Air Act says nothing about averaging across fleets or banking and trading credits across different model years, different vehicle classes, and OEMs. While EPA has previously adopted fleetwide averaging, it has also acknowledged that “Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act.”20 And “[j]ust as the statute does not explicitly address EPA’s authority to allow averaging, it does not address the Agency’s authority to permit banking and trading.”21 By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading in a manner that mandates electrification of the national vehicle fleet of motor vehicles and motor vehicle engines. [EPA-HQ-OAR-2022-0829-0579, p. 6]

20 48 Fed. Reg. 33,456, 33,458 (July 21, 1983).

21 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same).

The structure of the Clean Air Act and its regulatory provisions for standard setting, certification, compliance enforcement, warranties, and penalties also directly conflict with a fleet-wide averaging regulatory regime. Notably, under Section 202(a), EPA “shall test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer” and issue a certificate of conformity “if such vehicle or engine” complies with the standards.22 And EPA must “test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such a system enables such vehicle or engine to conform to the standards required to be prescribe under [Section 202(b)] of the Act.23 Section 202(b)(3) further authorizes EPA to grant waivers from certain nitrogen-oxide emission standards-which, again, are standards “under” Section 202(a), for no “more than 5 percent of [a] manufacturer’s production or more than fifty thousand vehicles or engines, whichever is greater.”24 This provision would be nonsensical under a fleetwide-averaging regime where, if applied, an OEM could essentially give itself a waiver for large swaths of its fleet by electrifying certain product lines. Taken together, the Clean Air Act regulatory framework contemplates EPA regulating vehicles on an individual basis according to the powertrain of those vehicles. But this cannot be accomplished if there is not a clear emission standard applicable to a single vehicle at the start of a model year. [EPA-HQ-OAR-2022-0829-0579, pp. 6-7]

22 42 U.S.C. § 7525(a)(1).

23 42 U.S.C. § 7525(a)(2).

24 42 U.S.C. § 7521(b)(3).

Organization: Institute for Energy Research (IER)

This proposed rule on tailpipe emissions standards from the Environmental Protection Agency (EPA) is a massive overreach, using a novel application of EPA motor vehicle authorities in an attempt to force a transition in the motor vehicles market to products that align with the ideological preferences of the Biden administration. This rule is a de facto electric vehicle mandate. Congress has not given EPA the authority to require the purchase or production of certain types of motor vehicles or outlaw the purchase or production of other types of vehicles. Congress has not given EPA the authority to require the purchase or production of electric vehicles. EPA's attempt to infer such power is contrary to longstanding administrative practice and contrary to recent Supreme Court precedent. Thus this rulemaking must be withdrawn and modified to fit within the motor vehicle regulatory authority granted by Congress. [EPA-HQ-OAR-2022-0829-0673, pp. 1-2]

EPA openly states that the intent of this rulemaking is to force a transition to electric vehicles [EPA-HQ-OAR-2022-0829-0673, pp. 1-2]

In this rulemaking and press announcements surrounding it, EPA repeatedly makes clear that the intent of this rulemaking is to transition the motor vehicles market to electric vehicles, pollution reduction is merely an aside. For example, the first sentence of EPA's press release announcing the rulemaking states "Today, the U.S. Environmental Protection Agency (EPA) announced new proposed federal vehicle emissions standards that will accelerate the ongoing transition to a clean vehicles future." The rulemaking itself extensively focuses on trends in electric vehicle manufacturing and announced plans from automakers and state governments regarding electric vehicles. But EPA's mandate from Congress is to reduce criteria pollutants from vehicles, not to pick and choose what type of vehicles can be sold. EPA cites an executive order from the Biden administration as impetus for this de facto electric vehicle mandate, but an executive order does not create new authority. Congress never intended the Clean Air Act motor vehicle regulations to be used to mandate or ban certain classes of product, it was always intended and has always been interpreted to give EPA the power to reduce pollution from those classes products. Yet EPA openly states that this rulemaking is meant to force a transition to electric vehicles. [EPA-HQ-OAR-2022-0829-0673, pp. 1-2]

1 https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and

EPA's statutory authority is to control emissions of vehicles, not to require the manufacture and sale of entirely different vehicles [EPA-HQ-OAR-2022-0829-0673, pp. 1-2]

Congress has not directed EPA to force the adoption of electric vehicles, EPA is claiming this mandate unilaterally. The Clean Air Act directs EPA to reduce pollutant emissions from vehicles themselves, by for example requiring emissions control devices like catalytic convertors. Electric vehicles are entirely separate products, they are not an emissions control device for internal combustion powered vehicles. EPA is thus for the first time seeking to mandate substitution of a different product in order to comply with its tailpipe emissions standards. This is a novel application of existing authority, and is frankly illegal. This illegality is made clear by an alternative scenario where EPA mandates the use of mass transit rather than individual motor vehicles. This would certainly reduce emissions from motor vehicles, but would be transparently beyond EPA's regulatory authority. [EPA-HQ-OAR-2022-0829-0673, pp. 1-2]

There is no authority to eliminate internal combustion engines or to require the sale of electric vehicles in the plain language of the Clean Air Act. That EPA is now claiming such authority raises a major question of whether Congress has in fact given EPA such authority. Without a clear statement from Congress, this claim of new authority cannot be assumed by administrative fiat. [EPA-HQ-OAR-2022-0829-0673, pp. 1-2]

EPA is attempting to hide its illegal electric vehicles mandate behind a "fleetwide" average [EPA-HQ-OAR-2022-0829-0673, pp. 2-3]

EPA is setting fleetwide average standards for vehicles rather than setting individual standards for specific classes of vehicles as a means of hiding its de facto electric vehicle mandate. While these two actions may appear indistinguishable in many applications, the distinctness is put on clear display by the EPA's proposed rulemaking here. Setting fleetwide average standards at reasonable levels allows for the inclusion of new emissions control technologies in new vehicles. This has similar effect to setting a reasonable emissions standard for each specific class of vehicles. [EPA-HQ-OAR-2022-0829-0673, pp. 2-3]

However, setting a fleetwide average at an unreasonably low level, as this rulemaking does, disguises that there is no means of compliance through new control technologies, the only means of compliance is transitioning to a different product. If EPA set the same unreasonably low standard for a given class of vehicles, it would effectively outlaw that class of vehicles. If EPA were to directly say that a class of vehicles was illegal and require that an alternative replacement must be purchased, that would be clearly acknowledged as beyond EPA's authority. Congress has given EPA no such power. But using the "fleetwide" average set at an unreasonably low rate, EPA can pretend it is not outlawing the manufacture or sale of any class of products, while it is effectively requiring carmakers to produce and sell an alternative product (electric vehicles) as that is the only way to comply with the unreasonable low standard. But hiding behind a "fleetwide" average to attempt to disguise this kind of impermissible mandate does not suddenly give EPA the power to impose such a mandate. [EPA-HQ-OAR-2022-0829-0673, pp. 2-3]

Organization: Mario Loyola

B. Battery Electric Vehicles Do Not Belong to Any Class of Vehicle Subject to Regulation under Title II of the CAA. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

EPA is explicit about its purpose in the Proposed Rule: "Our analysis projects that for the industry overall, 65 percent of new vehicles in MY 2032 would be BEVs,"7 referring to fully electrical vehicles.8 That compares to less than six percent of new vehicle registrations for fully electric vehicles last year.9 As EPA says in the Proposed Rule: [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

7 88 Fed. Reg. at 29,342.

8 EPA distinguishes between Batery Electric Vehicles ("BEVs"), which are fully electric, and other sorts of electric vehicles, such as hybrids.

9 Ana Faguy, "Planned EPA Rules Could Make 67% of New U.S. Cars Electric by 2032," Forbes, April 12, 2023.

Among the range of technologies that have been demonstrated over the past decade, electrification technologies have seen particularly rapid development and lower costs, and as a result the number of PEVs projected across all the policy alternatives considered here is much higher than in any of EPA's prior rulemaking analyses. In particular, BEVs have zero tailpipe emissions and so are capable of supporting rates of annual stringency increases that are much greater than were typical in earlier rulemakings.10 [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

10 88 Fed. Reg. at 29341

The Proposed Rule is designed to accomplish its mission by imposing emissions standards on new motor vehicles so strict that no vehicle powered by an internal combustion engine would be able to comply with them. Hence, if the Proposed Rule applied only to vehicles with emissions subject to regulation under the CAA, the rule would not satisfy statutory requirements, which include feasibility and reasonable cost-of-compliance. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

EPA gets around this by what amounts to a clever accounting trick. It defines the "classes" of vehicles subject to Title II as including EVs, even though, according to EPA, they have zero emissions and should therefore be excluded from regulation under the CAA entirely. EPA then sets "emission standards" that reflect not its estimate of how much time manufacturers of regulated vehicles would need to develop and adopt any emissions-control technology on the vehicles subject to regulation—the determination required by Section 202 of the CAA—but rather only its estimate of the average emissions from vehicles of various sizes that would result from its guestimate of the extent to which EVs will displace combustion engine vehicles during the MYs in question. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

Because Title II of the CAA provides no guidance on how the Administrator is to define the "class or classes" of vehicles subject to Section 202(a)(1), the phrase "any class or classes of new motor vehicles" must be given its natural, plain meaning. While the Administrator doubtless has wide latitude to define the classes subject to regulation under Section 202(a)(1), and no federal court has ruled on this precise question, the phrase "class or classes of new motor vehicles" cannot mean whatever the Administrator wants it to mean. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

The phrase could not, for example, include both electric scooters and gasoline-powered cars, even though both are "motor vehicles" under the Clean Air Act.11 The structure of Title II clearly precludes that possibility. Section 202(a)(2) provides that any standard issued under Section 201(a) can only take effect after "such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." Common sense dictates that this could not be read as authorizing EPA to force car manufacturers to produce electric scooters instead of cars in order to comply with emissions standards under Title II. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

11 The CAA defines "motor vehicle" as "any self-propelled vehicle designed for transporting persons or property on a street or highway." Section 216, 42 U.S.C. Sec. 7550.

Section 202(a)(1) obviously contemplates that a "class or classes of new motor vehicles" will share a common configuration, such that "the requisite technology" can be developed and applied to all vehicles of a future MY of that vehicle class. In that sense, "class or classes of new motor vehicles" is akin to the source categories under the New Source Performance Standards program of Section 111. Clearly, EPA could not define Portland Cement Manufacturing to include artisanal pottery for the purpose of imposing the latter's emissions rates on the former. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

One further observation bears mentioning in this connection. Section 202(a) authorizes EPA to regulate emissions "from any class or classes of new motor vehicles." EPA has made no effort to study the emissions from battery EVs, because, as it explains in the Proposed Rule, "BEVs have zero tailpipe emissions." But Section 202 is not limited to "tailpipe emissions." Its purview is much broader, referring to emissions "from" new motor vehicles. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

That the word "from" is susceptible of a broader meaning becomes clear when one considers that in the Proposed Rule, EPA continues the practice, introduced in the 2014 "Tier 3" final rule, of "considering the vehicle and its fuel as an integrated system."12 As the Proposed Rule explains, "The Tier 3 standards achieved reductions of up to 80 percent in tailpipe criteria pollutant emissions by treating the engine and fuel as an integrated system and requiring cleaner fuel as well as improved catalytic emissions control systems."13 [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

12 Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards",79 Fed. Reg. 23414, 23416 (April 28, 2014).

13 88 Fed. Reg. at 29188.

EPA's practice of treating "the engine and fuel as an integrated system" is fully in keeping with the general scope of Section 202(a). There is no reason, and no reasonable basis, for EPA not to follow this same practice with EVs that EPA insists on including EVs in its definition of "classes" of new motor vehicles subject to Title II. EVs are not perpetual motion machines. Like all other motor vehicles, they use fuel, namely the fuel needed to produce the electricity needed to charge them. And that fuel—only a small fraction of which is renewable—produces significant emissions, including carbon emissions. The difference between EVs and combustion engine vehicles is not that EVs have zero emissions, but rather that their emissions occur elsewhere than at the tailpipe. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

This is particularly important considering the massive increases in electrical grid capacity that would be required by a transition to widespread EV use. There is a limit to how much renewable energy can be put on a grid while still maintaining grid reliability, and under current technology the limit appears to be quite low: At 30 percent renewable, the California grid is beset by a massive excess of solar electricity in the middle of the day and is often on the verge of blackouts by evening, particularly in summer months.14 Hence, in the near term, the Proposed Rule will result in a massive increase in the need for dispatchable power, which (given the long construction and permitting lead-times of nuclear power) can only come from coal and natural gas. That puts the Proposed Rule on a collision course with the EPA's proposed new power plant rule,15 which will require many coal and natural gas plants to cease operations at the same time as the Proposed Rule on vehicle emissions will require many more such plants to be built. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

14 Mario Loyola, "Unleashing America's Energy Abundance Permitting Reform Is Vital for Affordable Clean Energy," Competitive Enterprise Institute, September 27, 2022.

15 New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 Fed. Reg. 33240 (May 23, 2023).

EPA's failure to recognize that power plant emissions associated with EVs should be considered "emissions from" such vehicles is understandable, given that Title II of the CAA was clearly not designed with EVs in mind. That only highlights the absurdity of including them in the same "classes of new motor vehicles" as combustion engine vehicles subject to regulation under Title II. It also highlights the great political significance of the choices that EPA is taking upon itself to make, on the basis of sweeping powers that it claims to have found in a long-extant provision of the Clean Air Act that explicitly delegates no such power. [EPA-HQ-OAR-2022-0829-0689, pp. 3-6]

Organization: National Association of Convenience Stores (NACS) et al.

The Proposed Rule also exceeds the scope of the Agency's statutory authority, which does not include the authority to set greenhouse gas emission standards that effectively mandate EVs. Indeed, Congress directly precluded EPA from using Section 202(a) of the Clean Air Act to phase out internal combustion vehicles. The Supreme Court has also made clear in recent decisions that an agency must have clear congressional authorization in order to exercise significant powers.2 The Agency's attempt to shift the U.S. transportation fleet to EVs is analogous to the shift in energy policy that EPA directed in the Clean Power Plan, which was rejected by the Supreme Court in West Virginia v. EPA. The Agency also projects its rule will result in enormous compliance costs, indicating that the Proposal is economically significant and therefore likely to fall within the Supreme Court's "major question" doctrine. [EPA-HQ-OAR-2022-0829-0628, p. 2]

2 See Alabama Ass'n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021); West Virginia v. EPA, 142 S. Ct. 2587, 2609 (2022).

Organization: National Parks Conservation Association (NPCA)

I. EPA has a Statutory Mandate to Develop Strong Rules to Reduce Climate Pollution from Light and Medium-Duty Vehicles.

The Clean Air Act (CAA) explicitly calls on EPA to promulgate emission standards for motor vehicles that "cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."1. As held by the Supreme Court in Massachusetts vs. EPA, greenhouse gases (GHGs) qualify as air pollutants that could endanger public welfare under § 202(a)(1), and EPA has statutory authority to regulate carbon dioxide and other GHG emissions from sources like light and medium-duty vehicles.2 Subsequently, EPA in their 2009 endangerment finding held that GHG emissions from motor vehicles, including LDVs and MDVs, "contribute to the total greenhouse gas air pollution, and thus to the climate change problem, which is reasonably anticipated to endanger public health and welfare."3 [EPA-HQ-OAR-2022-0829-0607, pp. 1-2]

1 42 U.S.C. § 7521(a)(1).

2 See generally, 549 U.S. 497, 531 (2007).

3 74 Fed. Reg. at 66499.

EPA thus has an affirmative duty to develop GHG standards for light and medium-duty vehicles that reflect the "greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply."4 While the CAA provides some room for considerations of cost, energy, and safety,5 "it must place primary importance on achieving the greatest degree of emissions reduction."6 We strongly agree with EPA's assessment that the greatest degree of emission reductions can be achieved through EPA acting on its statutory authority to rely on a variety of technologies to reduce LDV and MDV GHG pollution. We believe these technologies should include zero-emission vehicle (ZEV) technologies like battery electric vehicles (EVs), as well as improvements to combustion engine technologies.7 [EPA-HQ-OAR-2022-0829-0607, pp. 1-2]

4 42 U.S.C. § 7521(a)(3)(A)(i).

5 Id.

6 See Husqvarna AB v. EPA, 254 F.3d 195, at 200 (D.C. Cir. 2001).

7 See 88 Fed. Reg. at 29232-33.

We urge EPA to finalize these LDV and MDV regulations quickly and to strengthen this proposal to achieve the greatest degree of reductions that protect public health and welfare. [EPA-HQ-OAR-2022-0829-0607, pp. 1-2]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

IV. Conclusion

Given the urgency of the climate crisis, the impacts of pollution from transportation on air quality and public health, anticipated growth of the transportation sector, and the rapid growth in ZEV adoption, it is necessary and appropriate for EPA to exercise its authority in CAA Section 202(a) to establish new and more stringent GHG and criteria pollutant and emissions standards for MYs 2027 and later LDVs and MDVs. NESCAUM and the OTC urge EPA to finalize a rule with the most stringent standards feasible. [EPA-HQ-OAR-2022-0829-0584, p. 12]

Organization: Pacific Legal Foundation (PLF)

Analysis

I. The Proposed Tailpipe Rule violates the major questions doctrine.

A. The major questions doctrine prevents executive agencies from issuing rules with "vast political and economic consequences" without clear congressional authorization.

Courts have long applied clear statement rules to protect the freedom provided by the Constitution's structure and protect foundational constitutional guarantees.5 As Chief Justice Marshall explained, "the laws of the United States ought not, if it be avoidable, so to be construed as to infract the ... general doctrines of national law."6 The major questions doctrine is one such clear statement rule. It is grounded in the Constitution's exclusive delegation of legislative power to Congress and protects against other branches from claiming unheralded subdelegations of that power. In this way, the doctrine presumes that Congress did not seek to transgress the Constitution's nondelegation limits through vague, open-ended statutory text. In other words, the major questions doctrine, like the nondelegation doctrine, "ensures that the national government's power to make the laws that govern us remains where Article I of the Constitution says it belongs— with the people's elected representatives."7 [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

5 See West Virginia v. EPA, 142 S. Ct. 2587, 2616 (2022) (Gorsuch, J., concurring).

6 Talbot v. Seeman, 5 U.S. 1, 43 (1801).

7 Nat'l Fed'n of Indep. Bus. v. Dep't of Lab., 142 S. Ct. 661, 668 (2022) (Gorsuch, J., concurring). See also id. at 669–70 (Gorsuch, J., concurring) ("Whichever the doctrine, the point is the same[:] Both serve to prevent 'government by bureaucracy supplanting government by the people.'").

The doctrine thus is grounded in "separation of powers principles,"8 and requires "Congress to speak clearly when authorizing an agency to exercise powers of vast economic and political significance."9 [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

8 West Virginia, 142 S. Ct. at 2609.

9 Alabama Ass'n of Realtors v. Dep't of Health & Hum. Servs., 141 S. Ct. 2485, 2489 (2021) (per curiam) (internal quotation marks omitted).

The principle is not new. As Justice Gorsuch recently explained, "[s]ome version of [the major questions doctrine] can be traced to at least 1897," when the Supreme Court in ICC v. Cincinnati denied the agency's "vast and comprehensive" claim of authority absent a clear delegation in the statutory text.10 In ICC, the Court found that claims of delegations of legislative power to "any administrative body is not to be presumed or implied from any doubtful and uncertain language."11 And this principle has persisted, in some form or another, in state and federal courts throughout the last 125 years.12 [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

10 West Virginia, 142 S. Ct. at 2619 (Gorsuch, J., concurring) (citing ICC v. Cincinnati, N. O. & T. P. R. Co., 167 U.S. 479, 499 (1897)).

11 Id.

12 Louis Capozzi, The Past and Future of the Major Questions Doctrine, 84 Ohio St. L.J., vol. 84, no. 2, 191 (2023) (explaining the major questions doctrine's history in state and federal courts to prevent agencies from expanding their regulatory reach without a clear statement from respective legislative branches).

While the doctrine's principle is not new, it has become more prominent over the last few decades as the primary constitutional check against executive lawmaking. This is because the federal government today is characterized by "presidential administration," as famously described by then-professor Elena Kagan.13 Because of the relative ease of regulating compared to legislating, the President—and not Congress—now leads "in setting the direction and influencing the outcome of" administrative policy.14 Rather than go through proper constitutional procedures and persuade lawmakers to enact laws, contemporary presidents bypass the Constitution's checks and balances and chart a unilateral path by directing agencies to adopt expansive interpretations of long-extant statutes.15 [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

13 Elena Kagan, Presidential Administration, 114 Harv. L. Rev. 2245, 2248 (2001) (describing how "presidential control of administration … expanded dramatically during the Clinton years").

14 Id. at 2246.

15 To be sure, the President has the authority, indeed the duty, to make sure the laws are "faithfully executed." See Free Enterprise Fund v. Public Co. Accounting Oversight Bd., 561 U.S. 477, 498 (2010). But that does not mean the executive branch may transgress the Constitution's Separation of Powers through the laws' execution.

To curb the worst excesses of executive lawmaking inherent to "presidential administration," the Supreme Court has embraced the major questions doctrine. For example, the case that ushered in the resurgence of the doctrine, FDA v. Brown & Williamson Tobacco Corp., involved a challenge to one of the first examples of "presidential administration": a sweeping tobacco regulation ordered by President Clinton in the late 1990s.16 And the trend has continued. Indeed, the Supreme Court has applied the major questions doctrine mainly when presidents compelled agencies to exercise novel and capacious authority.17 [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

16 Compare 529 U.S. 120, 133 (2000) (reviewing tobacco regulation under major questions framework), with Kagan, 114 Harv. L. Rev. at 2282–83 (using same tobacco regulation as exemplar of presidential administration).

17 See, e.g., Biden v. Nebraska, No. 22-506, 2023 WL 4277210 (U.S. June 30, 2023); Nat'l Fed'n of Indep. Bus., 142 S. Ct. 661 (reviewing agency's vaccine mandate ordered by the president); Alabama Ass'n of Realtors, 141 S. Ct. 2485 (reviewing agency's eviction moratorium requested by the president).

This executive branch overreach is nowhere more pronounced than in environmental regulation. For years, presidents have directed EPA and similar agencies to expand their power and "update" laws to fit modern environmental problems—most prominently through the Clean Air Act. But the Court has been unwilling "to stand on the dock and wave goodbye as EPA embarks on [] multiyear voyage[s] of discovery" under the Act.18 [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

18 Util. Air Regul. Grp. v. EPA, 573 U.S. 302, 328 (2014).

Most recently, the Court applied the major questions doctrine to the EPA's overreach in West Virginia. After failing to persuade Congress to enact a bill addressing climate change, President Obama directed EPA to use the Clean Air Act to regulate powerplants and require them to "shift" from using traditional forms of energy, such as coal and natural gas, to "clean energy" such as wind and solar.19 [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

19 West Virginia, 142 S. Ct. at 2602–03.

The Court held EPA did not have this power. In doing so, the Court explained there are "extraordinary cases" where "both separation of powers principles and a practical understanding of legislative intent" should make courts hesitant to "read into ambiguous statutory text the delegation claimed to be lurking there."20 "To convince" the Court "otherwise, something more than a merely plausible textual basis for the agency action is necessary." Id. Instead, under the major questions doctrine, an agency "must point to clear congressional authorization for the power it claims." Id. EPA flunked the test. [EPA-HQ-OAR-2022-0829-0680, pp. 3-6]

20 Id. at 2609 (citing Util. Air Regul. Grp., 573 U.S. at 324).

Organization: POET, LLC

Under EPA's own justification for the Proposed Rule, bioethanol is an essential strategy that must be recognized and given due credit under the GHG standards. EPA justifies the proposal based on (i) GHG emission reduction benefits, (ii) manufacturer cost and consumer cost, (iii) energy security, (iv) “criteria” and toxic air pollutant reductions, and (v) environmental justice.7 EPA inadequately addresses each of these key factors because EPA fails to consider the benefits of bioethanol for each. By taking this narrow approach that effectively pushes biofuels out of the market, EPA undermines its own criteria for undertaking the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, pp. 5-6]

7 See e.g., 88 Fed. Reg. at 29347.

The Proposed Rule’s analytical gaps regarding the failure to credit real-world biogenic lifecycle emission benefits and BEV feasibility call into question the legality of the Proposed Rule as currently structured. As EPA knows, courts will invalidate rules if the agency has “entirely failed to consider an important aspect of the problem” or “offered an explanation for its decision that runs counter to the evidence before the agency.”8 Additionally, the United States Supreme Court in West Virginia v. EPA faulted EPA for exercising Clean Air Act authority to “substantially restructure the American energy market” in a way that “Congress had conspicuously and repeatedly declined to enact itself.”9 By pressing for the extraordinarily rapid deployment of light-duty BEVs without thoroughly evaluating the lifecycle drawbacks of BEVs and BEV feasibility, supply chain and infrastructure challenges, and by failing to credit the lifecycle benefits of biofuels, the Proposed Rule is similarly deficient. [EPA-HQ-OAR-2022-0829-0609, pp. 5-6]

8 Motor Vehicles Mfrs. Ass’n v. State Farm Mutual Automobile Ins. Co., 463 U.S. 29, 43 (1983).

9 142 S. Ct. 2587, 2610 (2022) (quotation omitted). Similarly, under the “major questions” doctrine, agencies may not construe a statute to authorize them to exercise powers of “vast economic and political significance” unless the statute does so in clear terms. Alabama Ass’n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021) (quoting Utility Air, 573 U.S. at 324 (2014)).

If EPA adds incentives for the real-world GHG benefits of renewable liquid fuels, EPA’s rule would build on historical carbon-reducing policies and help ensure the success of its light- duty GHG emission reduction program. EPA’s vehicle GHG program would not be, as the West Virginia Court put it, an impermissible “transformative expansion of” the agency’s “regulatory authority.”10 Instead, if EPA revises its proposed approach so as to credit bioethanol’s real-world GHG emission reductions, EPA would have more well-considered, legally durable, flexible, cost-effective, and successful regulations to reduce GHG emissions. [EPA-HQ-OAR-2022-0829-0609, p. 6]

10 West Virginia, 142 S. Ct. at 2595.

B. EPA Has the Authority to Set GHG Emissions Standards Based on Lifecycle GHG Emissions Reductions. [EPA-HQ-OAR-2022-0829-0609, pp. 11-12]

EPA has broad authority under Clean Air Action § 202 to set vehicle emissions standards that extends beyond tailpipe emissions reductions to other emissions in the fuel and vehicle manufacturing lifecycle. Clean Air Act § 202(a) requires EPA to set vehicle emissions standards for any air pollutant the Administrator determines may reasonably be anticipated to endanger public health or welfare. EPA may regulate emissions of such a pollutant “from any class or classes of new motor vehicles or new motor vehicle engines.”30 The statute does not expressly limit EPA to regulating emissions only from vehicle tailpipes or the engines themselves. Instead, it is broadly worded to include emissions of any air pollutant that “cause[s], or contribute[s] to, air pollution.”31 Lifecycle (upstream) emissions, especially for GHGs, fit that description.32

And in Massachusetts v. EPA, the Supreme Court confirmed EPA's broad authority to regulate additional, non-specified pollutants, provided the agency determines they endanger the public health or welfare.33 [EPA-HQ-OAR-2022-0829-0609, pp. 11-12]

30 42 U.S.C. § 7521(a)(1).

31 Id.

32 Other constraints in § 202(a) do not bar EPA from considering lifecycle emissions. The statute states that EPA's standards must apply to vehicles and engines during their useful life, cannot take effect until after a time that the EPA Administrator determines is necessary for the development and application of the technologies needed to meet EPA's standards, and must consider costs. Id. § 7521(a). None of those provisions prohibit EPA from crediting bioethanol vehicles for their positive lifecycle GHG emissions benefits.

33 See Massachusetts v. EPA, 549 U.S. 497, 506-07 (2007).

The best reading of Clean Air Act § 202(a) is that it mandates that EPA consider lifecycle GHG emissions as part of considering GHG emissions "from" motor vehicles. Otherwise, EPA would be failing "to consider an important aspect of the problem" in violation of U.S. Supreme Court precedent in Motor Vehicle Manufacturers Association v. State Farm.34 Emissions of GHGs, which are a globally mixed pollutant, from any phase of a LDV's lifecycle should be equally subject to § 202(a). Biofuels address the hazards caused by GHG emissions by reducing emissions on a lifecycle basis. As a result, the benefits generated by bioethanol in reducing lifecycle GHG emissions must be recognized through a crediting mechanism or other compliance flexibility benefits. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

34 See Motor Vehicle Mfrs. Ass'n v. State Farm, supra. If EPA considers accounting for upstream emissions inappropriate under 202(a), query if 202(a) is inappropriate for addressing GHGs at all since GHGs are a globally mixed pollutant not a "tailpipe" pollution issue. Such a question is timely now since EPA proposes in this rulemaking to affirmatively ignore EV upstream emissions (as opposed to temporarily excluding upstream emissions when EVs were only an emerging and de minimis share of the vehicle market).

Courts interpreting § 202 have also found that EPA has the type of discretion sufficient to allow crediting bioethanol compatible vehicles for their lifecycle benefits. The D.C. Circuit has observed that "[m]anufacturers produce a wide variety of motor vehicles of different sizes, some using different engine technologies resulting in unusual emission characteristics."35 If EPA's authority to set emissions standards is flexible enough to address those varying vehicle characteristics, it should be similarly flexible to allow EPA to credit lifecycle emissions reductions from bioethanol. Under a common sense reading of section 202(a), EPA's ability to regulate GHGs from vehicles includes those lifecycle emissions. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

35 Nat. Res. Def. Council, Inc. v. U. S. Envtl. Prot. Agency, 655 F.2d 318, 322 (1981).

EPA's statements in the Proposed Rule are consistent with the need for the vehicle GHG program to address lifecycle GHG emissions beyond a narrow focus on tailpipe emissions. EPA observes that, "[s]ince the earliest days of the CAA, Congress has emphasized that the goal of section 202 is to address air quality hazards from motor vehicles, not to simply reduce emissions from internal combustion engines to the extent feasible."36 While EPA is referring to electric vehicles, that sentiment also applies to the need for EPA to credit the lifecycle benefits of bioethanol. EPA's goal is to address air quality hazards from carbon dioxide emissions associated with classes of vehicles. One ton of GHG emissions causes the same harm whether it is released from a vehicle tailpipe or further upstream. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

36 88 Fed. Reg. at 29233.

The Proposed Rule's discussion of the legislative and regulatory history regarding automotive emissions under the Clean Air Act repeatedly refers to alternative power sources and fuels, which further supports EPA's authority to establish a crediting program that accounts for bioethanol's lifecycle emissions benefits.37 Nothing in the record suggests that alternative power sources exclude other low-carbon alternatives, such as liquid renewable fuels. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

37 Id.

The Proposed Rule, in fact, confirms that EPA believes it can regulate upstream emissions under § 202. EPA notes that its own current regulations would require "upstream emissions accounting for BEVs and PHEVs as part of a manufacturer's compliance calculation" to begin in MY 2027.38 EPA is now proposing, for the very first time, to permanently eliminate that upstream emissions accounting.39 But the fact that the current regulations do account for upstream emissions demonstrates that EPA knows it has the power to account for them in this Proposed Rule as well. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

38 Id. at 29197.

39 Id.

Incorporating lifecycle emissions reductions into the Proposed Rule is the best reading of § 202 for carbon dioxide as an air pollutant, because, unlike other regulated substances, carbon dioxide (as a GHG) is a global, rather than a local, pollutant, meaning that it does not necessarily cause adverse effects in the specific places where emitted. GHGs instead result in adverse effects at a global scale, such as rising sea levels and eroding coastlines, flooding, more frequent and intense storms, melting polar icecaps, and droughts. A GHG emissions rule that focuses only on tailpipe emissions when emissions at all lifecycle stages have equal import is the very definition of arbitrary and capricious.40 [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

40 See Section III.e of these comments regarding absurd results in terms of emissions increases that may arise from the Proposed Rule as currently structured.

EPA has broad authority under Section 211(c)(1)(A) of the Clean Air Act to issue regulations controlling fuels or fuel additives that cause and/or contribute to air pollution that may endanger public health.155 This authority permits EPA to limit high-boiling compounds/heavy aromatics because these fuel additives contribute to PM emissions which endanger public health. Pursuant to Section 211(c)(2)(A), EPA must consider all relevant scientific evidence available to the agency when setting these standards, including the significant evidence that bioethanol blending is the most practicable replacement for heavy aromatics, and that bioethanol has particularly significant emissions benefits for PM, other criteria pollutants, and GHGs.156 The further reduction of aromatics in gasoline would also be consistent with EPA's mandates and authority under the Mobile Source Air Toxics Program.157 [EPA-HQ-OAR-2022-0829-0609, p. 33]

155 42 U.S.C. § 7545(c)(1)(A).

156 Id. § 7545(c)(2)(A).

157 See Control of Hazardous Air Pollutants from Mobile Sources, 72 Fed. Reg. 8428 (Feb. 26, 2007).

Bioethanol does not receive the credit it deserves as a powerful tool in reducing both criteria pollutant and GHG emissions. Replacing heavy aromatics with bioethanol blending would maintain octane levels, reduce tailpipe PM emissions, and reduce lifecycle GHG emissions, furthering many of EPA's Clean Air Act mandates. EPA should carefully consider the benefits of bioethanol blending as a key solution in any potential rulemaking to further reduce tailpipe PM reductions. [EPA-HQ-OAR-2022-0829-0609, p. 33]

Organization: Renewable Fuels Association (RFA)

VIII. EPA Lacks Legal Authority to Force Electrification of the U.S. Transportation Fleet

Because of its emphasis on promoting EVs, EPA's proposed rule exceeds the scope of its statutory powers, which do not include authority to set GHG emission standards that effectively mandate electric vehicles. Indeed, Congress directly precluded EPA from using Section 202(a) of the Clean Air Act to phase out internal combustion vehicles. Section 202(a) requires EPA to set standards for emissions from any class or classes of new motor vehicles or new motor vehicle engines which cause or contribute to potentially harmful air pollution. If EPA maintains its assumption that electric vehicles do not emit any CO2 or other air pollution—which is inaccurate, as explained throughout these comments—it may only set standards for internal combustion vehicles. [EPA-HQ-OAR-2022-0829-0602, pp. 13-14]

In addition, EPA must have clear congressional authorization to promulgate electrification-forcing regulations, and it does not have that authorization here. The Supreme Court has made clear in recent decisions that an agency must have clear congressional authorization in order to exercise significant powers.30 EPA's attempt to shift the U.S. transportation fleet to EVs is analogous to the shift in energy policy that EPA directed in the clean power plan, which was rejected by the Supreme Court in West Virginia v. EPA. EPA also projects its standards will result in enormous compliance costs, indicating that the rule is economically significant and therefore likely to fall within the Supreme Court's "major question" doctrine. [EPA-HQ-OAR-2022-0829-0602, pp. 13-14]

30 See Alabama Ass'n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021); West Virginia v. EPA, 142 S. Ct. 2587, 2609 (2022).

EPA's proposed rule is also arbitrary and capricious because it fails to accurately account for the GHG emissions reductions achieved by both EVs and biofuels. EPA should use the best available science to accurately account for the lifecycle carbon intensity associated with particular fuels and technologies, but its proposed approach ignores the upstream emissions and emissions from electricity generation associated with EVs. Specifically, EPA proposes to assign a value of 0 grams/mile to EVs, which in effect assumes that electricity and battery minerals powering EVs are always 100% renewable and free of any CO2 emissions impacts. This assumption is flawed because the CO2 emissions associated with producing and transmitting electricity, as well as the emissions linked to critical mineral extraction and battery production, are significant. Indeed, lifecycle analysis studies show that some EVs (using coal-generated electricity and battery minerals from intensive mining practices) may have a larger carbon footprint than conventional vehicles using internal combustion engines. At the same time, EPA's proposal fails to recognize or account for the meaningful CO2 emissions savings that can be achieved through greater use of low-carbon ethanol in vehicles designed to accommodate higher blends (e.g., flex fuel vehicles). [EPA-HQ-OAR-2022-0829-0602, pp. 13-14]

In sum, we urge EPA to revise its proposal to create a technology neutral rule that accounts for all lifecycle emissions of the vehicles it regulates. A technology neutral rule will not only avoid some of the legal issues EPA's current proposal will face, but incentivizing multiple technologies is also the best way for EPA to achieve its ambitious goals. [EPA-HQ-OAR-2022-0829-0602, pp. 13-14]

Organization: South Dakota Department of Agriculture and Natural Resources (DANR)

Thank you for the opportunity to comment on the proposed regulations for both the light-duty/ medium-duty vehicles and heavy-duty vehicles - phase 3 published in the federal register on April 27, 2023, and May 5, 2023. [EPA-HQ-OAR-2022-0829-0523, p. 1]

DANR opposes the proposed emissions standards for the following reasons:

Lack of Clear Authority

EPA's fact sheet states the proposed standards would contribute "toward the goal of holding the increase in the global average temperature to well below 2 degrees Celsius ...." The U.S. Supreme Court has consistently told EPA it may not expand its federal regulatory reach beyond what Congress has given it authority to implement. The U.S. Congress has not established this 2 degrees Celsius goal under the requirements of Clean Air Act, and this goal is not found in a promulgated regulation. Using this standard for justification for the proposed regulations falls under the Supreme Court's major questions doctrine. It is evident that EPA lacks clear authority from Congress to require a generation-shifting approach to reduce vehicle emissions. Therefore, DANR does not think EPA has clear authority to implement these proposed emission standards and views this effort as federal overreach. [EPA-HQ-OAR-2022-0829-0523, p. 1]

Electric Vehicle (EV) Mandate

The proposed emissions standards are based on the projection that 70 percent of all new light duty passenger vehicles will need to be EVs for manufacturers to meet the standards. Setting the standards based on a projected level of EV production essentially mandates the manufacturing of EVs to comply. As discussed below, EVs do not make sense in all situations and environments and EPA should not be setting emissions standards that mandate their production. [EPA-HQ-OAR-2022-0829-0523, p. 2]

Organization: Southern Environmental Law Center (SELC)

EPA must adopt the strongest possible standards for light- and medium-duty vehicles under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0591, p. 6]

Given the substantial impacts that light- and medium-duty vehicle emissions have on communities and the environment, EPA must adopt the most stringent standards possible under the Clean Air Act. As EPA correctly notes, "Congress has emphasized that the goal of [this Clean Air Act provision] is to address air quality hazards from motor vehicles, not to simply reduce emissions from internal combustion engines to the extent feasible[]" and that it expects

EPA “to press for the development and application of improved technology rather than be limited by that which exists.”51 We are now at a point where technology already exists that eliminates—not just reduces—tailpipe pollution, and EPA should therefore implement tailpipe emissions standards that accelerate the transition to ZEVs. [EPA-HQ-OAR-2022-0829-0591, p. 6]

51 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 83 Fed. Reg. 29184, 29233 (May 5, 2023) (internal quotations omitted).

Organization: Steven G. Bradbury

My comments are divided into two parts:

First, I will explain why I believe these proposed rules far exceed the EPA’s authority under section 202 of the Clean Air Act4 and clearly implicate the Supreme Court’s “Major Questions Doctrine” under West Virginia v. EPA and related cases.5 Thus, if finalized as proposed, these rules would be “in excess of statutory … authority” within the meaning of the Administrative Procedure Act, or APA.6 [EPA-HQ-OAR-2022-0829-0647, p. 2]

4 42 U.S.C. § 7521, https://www.law.cornell.edu/uscode/text/42/7521.

5 See West Virginia v. EPA, No. 20-1530, 597 U.S. (2022), https://www.oyez.org/cases/2021/20-1530.

6 See 5 U.S.C. § 706(2)(C) (“The reviewing court shall … hold unlawful and set aside agency action, findings, and conclusions found to be … in excess of statutory … authority.”).

The Proposed Rules Exceed EPA’s Statutory Authority

Congress has never voted to cede to the Administrator of the EPA the far-reaching power and discretion the Agency is claiming in these rulemakings. There has been no dele- gation from the people’s elected representatives—let alone a clear and express delega- tion—of such economy-wide transformational power that could survive analysis under the Major Questions Doctrine. [EPA-HQ-OAR-2022-0829-0647, pp. 3-4]

If finalized as proposed, these rules would exceed the bounds of EPA’s statutory authority in two fundamental respects—one relating generally to the Agency’s regulation of carbon dioxide emissions from new motor vehicles; the other involving its leveraging of pollution-control authority to force on the American people a hyper-accelerated transi- tion to electric vehicles. [EPA-HQ-OAR-2022-0829-0647, pp. 3-4]

This scheme bears no resemblance to EPA’s past approach to the regulation of vehicle emissions under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

Previously, when EPA has set emissions limits for criteria pollutants under section 202, the available control technologies that EPA has recognized as feasible for achieving compliance have involved cleaner fuels and discrete types of equipment added to the ICE vehicle. This equipment includes, for example, enhanced catalytic converters to capture certain types of pollutants and scrub them out of the vehicle’s exhaust, onboard computers to control more precisely the fuel mixture burned by the vehicle’s engine, vapor-capture systems for refueling, and fuel-injection systems to recycle unburned fuel back into the cylinders. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

The use of these types of discrete control technologies has already achieved impres- sive reductions in smog-producing criteria pollutants. As EPA itself acknowledges, exist- ing control technologies applied under previous regulations have enabled automakers to attain “reductions of up to 80 percent in tailpipe criteria pollutant emissions” from ICE vehicles.21 [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

21 88 FR at 29188.

But now, in these rules, EPA is proposing to do something radically different. The so-called control technology here is not some discrete equipment added to the ICE vehicle to achieve lower emissions; it is entirely separate replacement technology that uses a new and different powertrain. These are replacement vehicles, not true control technology; they are different vehicles from bumper to bumper, built on entirely different production lines. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

The EPA’s current proposals are thus closely analogous to the Clean Power Plan that was struck down by the Supreme Court last year in West Virginia v. EPA:

There, EPA was relying on its Clean Air Act authority to regulate power plant emis- sions based on the “best system of emission reduction” available to the plant operator. EPA had previously exercised that authority by setting emissions standards that required indi- vidual plants to take measures “to operate more cleanly.” But in the Clean Power Plan, EPA concluded that coal-fired power plants could not eliminate enough carbon dioxide emissions to satisfy EPA simply by employing additional measures at the plant. Instead, EPA proposed to require them to choose between greatly reducing their own electricity production (potentially even shutting down the plant) or paying to subsidize increased elec- tricity generation from alternative sources, including natural gas, wind, and solar power (the so-called “generation shifting” concept). The overall goal was to reduce the percentage of national electricity generation supplied by coal and increase the percentage contribution from wind and solar. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

The Supreme Court held that the Clean Power Plan implicated the Major Questions Doctrine because EPA was claiming the power to “restructure the American energy mar- ket,” and this represented a “transformative expansion” in the Agency’s exercise of its regulatory authority. The Court was unconvinced that Congress had “implicitly tasked” the EPA “with balancing the many vital considerations of national policy implicated in deciding how Americans will get their energy,” or with the authority to decide “how much of a switch from coal to natural gas is practically feasible” for the nation. There was “little reason to think Congress” had assigned matters of such economic and political significance to the EPA’s discretion. “The basic and consequential tradeoffs involved” are “ones that Congress would likely have intended for itself.” [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

Everything the Supreme Court said about the Clean Power Plan can be said about the EPA’s current proposals for regulating vehicle emissions. As it tried to do with the power market, EPA is now attempting to leverage its authority to set emissions limits for particu- lar types of vehicles into a grand new scheme for shifting and rebalancing the overall mix of ICE, battery-electric, and other powertrains in the national auto fleet—an extravagant role for the Agency to play, and one with enormous economic and political implications. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

Indeed, the current proposals represent an even more extreme example of regulatory overreach than the Clean Power Plan. Here, EPA is attempting to coerce the automakers into financing the entire transformation of the manufacturing base of a major industrial sector by converting their own production of ICE vehicles to EVs on a large scale, not simply contributing toward the marginal subsidization of alternative investments by others. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

Moreover, in the name of ensuring that its own preferred "control technology" will actually deliver the expected performance as a suitable long-term substitute for ICE vehicles, EPA is also claiming the authority to regulate the design and functionality of battery-electric technology over the entire life cycle of EVs. Like CARB, EPA proposes to adopt and enforce "Global Technical Requirement" (GTR) No. 22, promulgated by the United Nations Economic Commission for Europe, which sets standards and requirements for validating electric battery durability.22 [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

22 See 88 FR at 29284-85; 88 FR at 26013-15.

Thus, EPA expects to be in the permanent business of regulating EV technologies, which involve no tailpipes at all, let alone tailpipe emissions—all under the aegis of a statute enacted by Congress to address air pollution from vehicle tailpipes. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

What is clear is that EPA sees an endless horizon for its new-found power to regulate practically all aspects of the American automotive market. No doubt, for example, the Agency intends to be involved in overseeing the buildout and operation of electric vehicle charging infrastructure around the country—once again, as an incident of the regulators' own expansive conception of their section 202 authority to ensure the adequacy of EPA's chosen control technology. [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

We can easily imagine that someday this self-assumed mandate will include the power to ration the timing and extent of drivers' access to charging networks, as EPA deems necessary to maintain the general supply of electricity for EVs. California is already doing this. Because the buildout of charging infrastructure will depend critically on gov- ernment subsidies and approvals, government rationing of access to this infrastructure is a very real prospect, especially given the strains on grid reliability that I discuss below. [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

The bottom line under the Major Questions Doctrine is that section 202, on which the proposed rules rest, contains no clear and express delegation of any authority that could sustain these massively consequential proposals. As the Court observed in West Virginia v. EPA, "Congress certainly has not conferred [such] authority upon EPA anywhere … in the Clean Air Act." [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

The Analyses and Assumptions on Which the Proposed Regulatory Actions Are Based Are Arbitrary, Fundamentally Flawed, and Fail to Recognize and Account Properly for the Hugely Negative Consequences that Would Result from These Actions [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

EPA claims that, despite the coercive power and industry-transforming ambition behind its proposals, these rules will somehow deliver a stupendous bounty of net benefits, ranging at the high end from $1.5 trillion to $2.3 trillion for the light- and medium-duty vehicle rule,23 plus another $180 billion to $320 billion for the heavy-duty truck rule.24 [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

23 Id. at 29200.

24 88 FR at 25937.

Organization: Tesla, Inc.

Tesla's proposed changes will significantly reduce emissions, result in increased deployment of the best available emissions reduction technology - BEVs6 - consistent with the emissions reduction technology requirements of the Clean Air Act standard setting mandate under section 202, and ensure the Administration is meeting it statutory mandate to protect the public health and welfare. [EPA-HQ-OAR-2022-0829-0792, p. 2]

Further, there should be no doubt, in view of recent amendments to the Clean Air Act and Congressional ratification accomplished by the IRA,126 that EPA has ample authority to address the regulation of greenhouse gas pollutants, from motor vehicles, through electrification, and in the light-duty sector.127 [EPA-HQ-OAR-2022-0829-0792, p. 21]

126 Pub. L. No. 117-169, 136 Stat. 1818 (2022).

127 See, Greg Dotson and Dustin J. Maghamfar, The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act, 53 ELR 10017 at 10019, 10032 (2023) (discussing Clean Air Act sec. 137 and other revisions) available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4338903

Tesla believes that this proposed rule -- in substance and structure -- is firmly in the mainstream of long and well-established agency motor vehicle emissions standard setting activities, and well within industry expectations and the agency's authorities. Indeed, the agency has deployed fleet averaging approaches for decades to provide manufacturers flexibility while increasing the stringency of motor vehicle emissions standards. 128 And it has addressed GHG emissions and criteria pollutants in doing so since 2010. 129 EPA's action has been rooted in the Clean Air Act's textual recognition that EPA is to set and revise standards controlling emissions from vehicles, "whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution."130 [EPA-HQ-OAR-2022-0829-0792, p. 21]

128 See, e.g., 45 Fed. Reg. 79382-83 (Nov. 28, 1980); Nat. Res. Defense Council v. Thomas, 805 F.2d 410, 425-26 (D.C. Cir. 1986).

129 75 Fed. Reg. 25324 (May 7, 2010) (Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule for MY 2011 and later).

130 42 U.S.C. § 7521(a)(1).

In addition, EPA has, for example, repeatedly expressed its own understanding that GHG standards should be viewed as a strategy to help control criteria pollutants to address National Ambient Air Quality Standards (NAAQS) nonattainment, as well as to address the climate crisis. EPA has previously explained that "[c]limate change is expected to increase regional ozone pollution, with associated risks in respiratory illnesses and premature death.”131 Whether through its impact on reducing atmospheric temperatures that contribute to the formation of ozone, or through its direct impact on air quality by lowering or eliminating altogether tailpipe emissions of smog-forming pollutants and PM, enhanced BEV recognition in the development of these requirements will have a significant impact on achieving air quality targets.132 [EPA-HQ-OAR-2022-0829-0792, p. 21]

131 Endangerment Finding, 74 Fed. Reg. at 66525 (“There is now consistent evidence from models and observations that 21st century climate change will worsen summertime surface ozone in polluted regions of North America compared to a future with no climate change.”); (While ozone “is a local or regional air pollution problem, the impacts of global climate change can nevertheless exacerbate this local air pollution problem.”).

132 Nonattainment for conventional pollutants such as NOx is also significantly affected by upstream fuel impacts from refinery emissions that are reduced or eliminated by a conversion to zero emissions vehicles. See California Air Resources Board, Analysis in Support of Comments on the SAFE Rule at 69, available at h ttps://www.edf.org/sites/default/files/CARB_Detailed_Comments_on_SAFE_NPRM.pdf.

Furthermore, the seemingly sharp former distinctions between regulatory strategies to address criteria pollutant emissions and GHG emissions have continued to erode in view of the appropriate control strategies and technologies and the increasingly smaller margins for improvement from conventional ICE emissions. States have noted that zero emission vehicles (ZEVs) produce no tailpipe emissions, reduce brake wear PM emissions, and have lower upstream emissions to contribute to their State Implementation Plan (SIP) strategies.133 EPA’s 2017 Tier 3 standards, for example, achieved reductions of methane (CH4) and nitrous oxide (N2O), each of which are GHGs that were part of EPA’s endangerment finding.134 [EPA-HQ-OAR-2022-0829-0792, pp. 21-22]

133 See e.g., CARB, Staff Report: Initial Statement of Reasons (Oct. 22, 2019) at 5, Table ES-1: Expected Emission Reductions of Proposed ACT Regulation Calendar Year (NOx (tpd) PM2.5 (tpd) WTW GHG (MMT/yr.) 2031 5.0 0.16 0.4 2040 16.9 0.46 1.7 (Proposed Rule)) available at h ttps://ww3.arb.ca.gov/regact/2019/act2019/isor.pdf

134 79 Fed. Reg. at 23445.

EPA has previously recognized the importance of this harmonization. In promulgating its Tier 3 motor vehicle emissions standards, for example, the agency noted:

The Tier 3 program addresses interactions with the 2017 LD GHG rule in a manner that aligns implementation of the two actions, to achieve significant criteria pollutant and GHG emissions reductions while providing regulatory certainty and compliance efficiency. As vehicle manufacturers introduce new vehicle platforms for compliance with the GHG standards, they will be able to design them for compliance with the Tier 3 standards at the same time.135 [EPA-HQ-OAR-2022-0829-0792, pp. 21-22]

135 79 Fed. Reg. at 23417.

Given the continuing need for emissions reductions in both the criteria pollutant and the GHG arenas and the increasing capabilities presented by advanced technologies, the multi-pollutant standards EPA is proposing are fully expected by automotive manufacturers, appropriate, and essential. Indeed, the Supreme Court has broadly defined emissions “standards” under the Clean Air Act as including instances where fleet ZEV standards were sought to be enforced.136 The Court explained that: [EPA-HQ-OAR-2022-0829-0792, p. 22]

136 Engine Mfrs. Ass'n v. S. Coast Air Quality Mgmt. Dist., 541 U.S. 246, 258 (2004).

Organization: Texas Public Policy Foundation (TPPF)

Both Tailpipe Rules Are Likely Unconstitutional [EPA-HQ-OAR-2022-0829-0510, pp. 2-3]

In the recent landmark West Virginia v. EPA decision, the Supreme Court ruled that the EPA did not have the power to "substantially restructure the American energy market" by regulation under the CAA. 142 S. Ct. 2587, 2610 (2022). That case dealt with the EPA's attempt to establish carbon dioxide ("CO2") emissions limits for new and existing coal-fired power plants under the Clean Power Plan, through regulations requiring plant operators to shift energy generation to cleaner sources. The EPA based the regulation on a misguided and overbroad reading of 42 U.S.C. § 7411 ("Section 111"). The Supreme Court informed the EPA that a scheme of regulations that restructures the national energy market to shift towards renewable energy did not qualify as the "best system of emission reduction" under Section 111, because Congress had not clearly delegated the "sweeping and consequential authority" to force vast energy market change by EPA regulation. See id. at 2608. [EPA-HQ-OAR-2022-0829-0510, pp. 2-3]

Yet that is exactly what the EPA seeks to do with these Tailpipe Rules. As the EPA's own press release states, the Tailpipe Rules are intended to "accelerate the ongoing transition to a clean vehicles future and tackle the climate crisis." Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future, ENVIRONMENTAL PROTECTION AGENCY (Apr. 12, 2023), https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and. The LMD Tailpipe Rule, specifically, is "projected to accelerate the transition to electric vehicles." Id. The EPA states that these regulatory changes are part of a push to "support the development and market for clean vehicle technologies and associated infrastructure" and to "expand the manufacture, sale, and use of zero emission vehicles." Id. [EPA-HQ-OAR-2022-0829-0510, pp. 2-3]

The EPA has no constitutional authority to make these regulatory changes. They have the power, and indeed the duty, to promulgate "standards which reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology." 42 U.S.C. § 7521(a)(3)(A)(i). Nothing in this grant of authority allows the EPA to regulate in a way that pushes the use of electric vehicles over internal-combustion vehicles. The EPA did the same thing when it tried to force power producers to adopt so-called clean energy solutions through the Clean Power Plan, which the Supreme Court rightly rejected. [EPA-HQ-OAR-2022-0829-0510, pp. 2-3]

Both Tailpipe Rules Violate The Administrative Procedure Act ("APA") [EPA-HQ-OAR-2022-0829-0510, p. 3]

The Tailpipe Rules also violate the Administrative Procedure Act's prohibition against agency action that is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law . . . ." 5 U.S.C. § 706. [EPA-HQ-OAR-2022-0829-0510, p. 3]

The statute defines "air pollutant" as "any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive (including source material, special nuclear material, and byproduct material) substance or matter which is emitted into or otherwise enters the ambient air." 42 U.S.C. § 7602. Because the statute fails to define the meaning of the term "air pollution agent," this definition is facially circular and therefore void for vagueness. Antonin Scalia & Bryan Garner, READING LAW 134 (Thomson/West 2012) ("An unintelligible text is inoperative."); see also Sackett v. EPA, 598 U.S. ____ (2023), slip op. at 24 (stating that a "broad and unqualified" interpretation of the Clean Water Act "gives rise to serious vagueness concerns"). [EPA-HQ-OAR-2022-0829-0510, p. 3]

Furthermore, carbon dioxide, the most plentiful greenhouse gas, is a natural substance essential to life on Earth. It is everywhere and in everything, yet EPA claims the power to regulate it. Congress could not possibly have intended to grant the EPA such wide-ranging regulatory power when it passed the Clean Air Act. Courts analyzing grants of authority to executive agencies must consider "whether Congress in fact meant to confer the power the agency has asserted." West Virginia v. EPA, 142 S. Ct. 2587, 2608 (2022). In West Virginia, the Supreme Court affirmed that when "the history and breadth of the authority that the agency has asserted, and the economic and political significance of that assertion" are large and weighty, courts have "reason to hesitate" before concluding Congress meant to delegate such power. Id. (cleaned up). At the very least, the Court "expect[s] Congress to speak clearly if it wishes to assign to an agency decisions of vast economic and political significance." Util. Air Regulatory Grp. v. EPA, 573 U.S. 302, 324 (2014) (cleaned up). Because EPA's interpretation of the CAA to regulate CO2 "would bring about an enormous and transformative expansion in EPA's regulatory authority without clear congressional authorization," it is "patently unreasonable" for EPA to seize such authority. Id. [EPA-HQ-OAR-2022-0829-0510, p. 3]

EPA points to their Greenhouse Gas Endangerment Finding, see 74 Fed. Reg. 66496 (Dec. 15, 2009), as the source of their conclusion that it may regulate greenhouse gases. EPA made this Endangerment Finding without seeking peer review from the Science Advisory Board ("SAB"), a blue-ribbon panel of experts established by Congress to ensure that EPA regulations are based on accurate data and credible scientific analyses. In enacting the peer review requirement, Congress was concerned that EPA not impose unnecessary restrictions on economic and personal freedom by unintelligently pursuing its regulatory goals. By ignoring the peer review requirement, EPA violated 42 U.S.C. § 4365(c)(1), which states that EPA "shall" make its regulatory proposals available to the SAB for peer review. That fundamental error stemmed from a desire to impress the community of nations by being among the first to regulate greenhouse gas emissions timed to coincide with the 2009 Copenhagen international climate conference. [EPA-HQ-OAR-2022-0829-0510, pp. 3-4]

The Endangerment Finding has other flaws. In making it, EPA made no showing that the Finding or any of its related greenhouse gas rules will remove any dangers to human health or welfare. Indeed, EPA disclaimed any obligation to define its ultimate regulatory objectives or its chosen means of achieving them and even refused to articulate how the Endangerment Finding could lead to successfully combating anthropogenic climate change. Furthermore, EPA claimed it was 90-99% certain that human-caused climate change threatened public health and welfare, see 74 Fed. Reg. at 66518 n.22, while failing to state what constitutes a safe climate, acceptable global temperature ranges, how levels of greenhouse gases in the atmosphere (whether natural or man-made) may affect those ranges, or even whether its regulatory actions would ameliorate any risk. Because of these substantial gaps in its analysis, no one could accurately judge whether EPA achieved any discernable public benefit or congressionally-authorized goal when it made the Endangerment Finding. Section 202(a)(1) of the CAA requires the EPA to exercise its own independent judgment to determine how its regulatory response to a perceived risk will reduce or eliminate that risk. Instead, the EPA left evidentiary analysis and risk assessment almost entirely to international non-governmental organizations ("NGOs") when making the Endangerment Finding. Congress did not clearly delegate the significant power to make regulatory determinations affecting public policy to NGOs. See Util. Air Regulatory Grp., 573 U.S. at 324. [EPA-HQ-OAR-2022-0829-0510, pp. 3-4]

For all these reasons, the Endangerment Finding was itself arbitrary, capricious, and ultra vires, and any regulation based on its authority suffers the same problems. [EPA-HQ-OAR-2022-0829-0510, pp. 3-4]

Organization: Travis Fisher

Thank you for the opportunity to comment on the Environmental Protection Agency's (EPA's) proposal regarding Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles in Docket No. EPA–HQ–OAR–2022–0829 (Proposed Rule). The Proposed Rule violates the Clean Air Act because it relies on an incorrect factual basis—on multiple counts discussed below—derived from a misinformed and incomplete Draft Regulatory Impact Analysis (DRIA). [EPA-HQ-OAR-2022-0829-0655, p. 1]

1. THE PROPOSED RULE VIOLATES SECTION 202 OF THE CLEAN AIR ACT

The Proposed Rule would establish new emissions standards for light-duty and medium-duty vehicles pursuant to section 202 of the Clean Air Act. Significantly, unlike other sections of the Clean Air Act (such as those covering National Ambient Air Quality Standards, for example), section 202 requires the EPA Administrator to consider the impacts of a new standard on cost, energy, and safety. Section 202 states that regulations should apply "standards which reflect the greatest degree of emission reduction achievable" while "giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology."4 [EPA-HQ-OAR-2022-0829-0655, p. 2]

4 42 U.S. Code § 7521(a)(3)(A)(i).

The EPA Administrator has not given appropriate consideration to cost, energy, and safety, and thus the Proposed Rule violates section 202 of the Clean Air Act. EPA's failure to consider cost, energy, and safety in the Proposed Rule is a major flaw that, if left uncorrected, would make the final rule arbitrary and capricious. Not only does the Proposed Rule not provide an accurate assessment of its own impacts in a vacuum, but it also fails to consider key, well-known interactions between the Proposed Rule and other EPA regulations. Because the Proposed Rule fails to offer the Administrator a sound factual basis upon which to build, it is impossible that the Administrator gave "appropriate consideration to cost, energy, and safety factors" when establishing the standards in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0655, p. 2]

Organization: Valero Energy Corporation

V. EPA lacks statutory authority—much less clear congressional authorization—to support the proposed action. [EPA-HQ-OAR-2022-0829-0707, pp. 65-66]

In this proposal and its companion proposal regarding HDV greenhouse gas emissions standards, EPA relies, for the first time outside of litigation, on its purported authority to mandate electrification as an "emission control device" or "emission control technology." It is also the first time that EPA proposes standards for MDVs, a subset of HDVs under the Clean Air Act, that rely on the availability of ZEV technologies.351 And it is also the first time that EPA utilizes its criteria pollutant standards, either standing alone or in combination with EPA's greenhouse gas emissions standards, to force further vehicle electrification. For these dramatic changes, however, EPA must have clear congressional authority. Yet EPA has failed to identify such clear authority for the standards and the electrification mandate. Instead, EPA relies on general authority and congressional statements that do not provide clear authority for the proposed action. To the contrary, EPA's references in the proposal demonstrate that Congress had many opportunities to provide clear authority but declined to do so. [EPA-HQ-OAR-2022-0829-0707, pp. 65-66]

351 Because the adoption of ZEVs contemplated by EPA in the proposal consists primarily, if not exclusively, of electric vehicles, these comments focus on the proposal's forced electrification of the Nation's LDV and MDV fleet; however, it should be noted that EPA's definition of ZEVs also includes other technologies, such as hydrogen fuel cell vehicles, which face even greater hurdles to widespread adoption and, more importantly, are equally unauthorized by Congress.

1. EPA claims an unheralded power with staggering implications.

In asserting the sweeping power to mandate increasingly high levels of electrification, EPA claims to have "discover[ed] in a long-extant statute an unheralded power to regulate 'a significant portion of the American economy.'" Utility Air, 573 U.S. at 324 (quoting Brown & Williamson, 529 U.S. at 159). The novelty and broad implications of the agency's approach are powerful clues that Congress never authorized it. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

Novel Assertion of Agency Authority.

Skepticism is warranted when an agency asserts an "unheralded power representing a transformative expansion in its regulatory authority." West Virginia, 142 S. Ct. at 2610 (internal quotation marks omitted). In prior rules setting greenhouse-gas emission standards, EPA has treated electric vehicles as a compliance "option" or "flexibility." In fact, for the 2021 GHG standards for LDVs, EPA argues that electrification was not mandated but was an option, that manufacturers could comply without using EVs. However, for the proposed LDV and MDV rule, EPA does not claim that electrification is merely an option and EPA's model clearly demonstrates that EPA expects OEMs to comply with the proposed standard by increasing production of BEVs and FCEVs while phasing out production of ICEVs. Indeed, with the exception of the companion HDV standards proposed in concert with this rule, forced electrification has never before even been on the table for MDVs (and other HDVs). Nor has EPA previously utilized its criteria pollutant standards in a thinly-cloaked strategy to disincentivize further ICEV production in favor of vehicle electrification, as it does in the proposal. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

Future Implications of the Agency's Claimed Power.

EPA has made no secret of the significance of the power it proposes to exercise here. In its proposed rule, EPA asserts the authority to force electrification as an "emission control technology" and notes that "[v]ehicle manufacturers can use powertrain electrification as an emissions control technology to comply with EPA standards and to generate credits for use in averaging, banking, and trading." 88 Fed. Reg. at 29184; see id. at 29346 ("This proposal seeks to build on the trends that these developments and projections indicate, and accelerate the continued deployment of these technologies…."); id. at 29312 ("Although the market share of PEVs in the U.S. is already rapidly growing, EPA recognizes that the proposed standards may accelerate this trend."). And as described above, this proposal is only part of a greater "whole of government" approach to mandate electrification at the Biden Administration's direction. By claiming the power of mandating some electrification of the Nation's vehicle fleet, EPA is claiming the authority to mandate 100% electrification as well. As in West Virginia, there is no reason to believe that EPA will stop here. "[O]n this view of EPA's authority, it could go further, perhaps forcing" LDV and MDV manufacturers to "cease making" internal-combustion vehicles altogether. 142 S. Ct. at 2612. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

In fact, this is exactly where EPA is headed. When EPA announced its proposal, it stated that the standards would "accelerate the ongoing transition" to an all-electric future, "delivering on" the Biden-Harris Administration's climate agenda.363 And in related rulemakings, EPA authorized California to adopt its own greenhouse-gas emission standards in its Advanced Clean Cars and Advanced Clean Trucks programs—an authority California is already citing to ban new combustion-engine vehicles and require 100-percent electrification of the LDV, MDV, and HDV fleets by 2036 via its Advanced Clean Cars II and Advanced Clean Fleets programs. See 87 Fed. Reg. 14,332; 88 Fed. Reg. 20,688. Both parts of EPA's strategy reveal the agency's goal to convert America to electric vehicles. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

363 https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and. (emphasis added).

Given the vast economic and political significance of EPA's proposal, it "must point to 'clear congressional authorization' for the power it claims." West Virginia, 142 S. Ct. at 2609. There is not one word in the Clean Air Act about a nationwide agency-led transition from conventional internal-combustion vehicles to electric vehicles, or any other so-called ZEV. To be sure, EPA has the power to set emission standards for air pollutants from motor vehicles, just as EPA had the power in West Virginia to set emission standards for air pollutants from power plants. But what EPA claims here for the first time is the authority to set standards in such a way that manufacturers can comply only by abandoning internal-combustion vehicles in favor of electric vehicles. And nothing in the Clean Air Act authorizes that. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

Organization: Western Energy Alliance

Congress did not give EPA authority to mandate the electrification of the vehicle fleet. The Energy Policy Act and Clean Air Act do not allow EPA to set standards that cannot be met with an internal combustion engine vehicles (ICEV). EPA does not have the authority to compel the transition to completely new vehicle types under the guise of setti ng tailpipe standards for ICEVs. Electric vehicles (EV) do not have a tailpipe, and although their emissions should be evaluated over the full lifecycle and not assumed to be zero as EPA does with this proposed rule, EPA only has authority to consider tailpipe emissions from ICEVs with this rule. EVs are technically not subject to the standards and thus ineligible for the fleet averaging scheme. [EPA-HQ-OAR-2022-0829-0679, p. 1]

The proposed rule would require 60% of new car sales to be battery-powered electric vehicles by 2030 and 67% by 2032, compared to 5.8% in 2022. With this rule, EPA is running afoul of the Supreme Court's ruling in West Virginia v. EPA. Congress nowhere provided authorization for EPA to effectively mandate a shift from ICEVs to electric vehicles (EV). Further, attempting to interfere with the market and compel market penetration up ten-fold in less than ten years is simply unrealistic. [EPA-HQ-OAR-2022-0829-0679, pp. 1-2]

EPA attempts to subvert the major questions doctrine by citing its authority under the Clean Air Act 202(a) to tighten emissions standards. Carbon Dioxide (CO2) emissions from vehicles constitute more than 95% of all tailpipe GHG emissions (75 FR 25326), yet there has not yet been invented a technology to control or capture these CO2 emissions from vehicles. In the absence of such a technology, the only means to meet the standards in the proposed rule is by switching to a so -called zero-emissions vehicle (ZEV). We encourage EPA to discard the use of the term "ZEV" in the rule, as no vehicle is zero emissions but merely transfers its emissions from the tailpipe to the power plant. I realize that EPA acknowledges that in its definition of ZEV, but that subtlety is largely lost on the public and serves as legerdemain. As we find EPA's use of BEVs, PEVs, PHEVs, and ZEVs to be inconsistent and at times interchangeable throughout the rule, we will use the simple term "EV" throughout these comments. [EPA-HQ-OAR-2022-0829-0679, pp. 1-2]

With its logic, EPA is equating emissions control technology to a EV, but an electric vehicle is not akin to a pollution control device. EPA cannot use its authority to control emissions under the CAA to treat EVs as pollution control devices, as doing so is an artifice that does not pass the major questions doctrine test and is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0679, pp. 1-2]

Despite finding that:

"…the standards proposed herein are consistent with EPA's responsibilities under the CAA and appropriate under CAA section 202(a). EPA has carefully considered the statutory factors, including technological feasibility and cost of the proposed standards and the available lead time for manufacturers to comply with them…Based on our analysis, it is our assessment that the proposed standards are appropriate and justified under section 202(a) of the CAA. Our analysis for this proposal supports the preliminary conclusion that the proposed standards are technologically feasible and that the costs of compliance for manufacturers would be reasonable." (p. 29187) [EPA-HQ-OAR-2022-0829-0679, pp. 1-2]

While acknowledging that EPA must:

"consider issues of technological feasibility, the cost of compliance, and lead time. EPA also may consider other factors, and in previous vehicle standards rulemakings, [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

as well as in this proposal, has considered the impacts of potential standards on emissions of air pollutants and associated public health and welfare effects, impacts on the automotive industry, impacts on the vehicle purchasers/consumers, oil conservation, energy security and other energy impacts, safety, and other relevant considerations." p. 29186 [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

it does not appear that EPA has actually done so. EPA's logic is often flawed in the analysis and the information relied on is biased or incomplete. [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

EPA Summary and Response

EPA responds to these comments, together with the comments reprinted in sections 2 and 2.2, below in section 2.3.

2.2 - Criteria pollutant standards

Comments by Organizations

Organization: Alliance for Automotive Innovation

2. Statutory Authority

Auto Innovators shares EPA's goal of addressing climate change by achieving a net-zero carbon transportation future, as part of an ambitious, comprehensive, and national strategy. The Proposed Rule, however, contemplates a rapid and transformative nationwide shift to electrification that may be well beyond what the industry or market can bear now or in the foreseeable future. Given the significant policy and economic consequences that would flow from this restructuring of the nation's vehicle market, and the breadth and unprecedented nature of EPA's proposed action, clear congressional authorization is required for the Proposed Rule. EPA lacks this clear authorization. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

The Proposed Rule seeks to use Clean Air Act section 202 rulemaking to force an extraordinary transformation of the nation's vehicle fleet away from ICE-based vehicles to BEVs, and it is not at all clear that the level of consumer demand and infrastructure that exists now and is expected in the future can support the expedited, aggressive timeline in the Proposed Rule. The Proposed Rule does not include an explicit electrification target, and EPA states that "a compliant fleet under the proposed standards will include a diverse range of technologies."152 But in practice, the stringency of the proposed standards is such that automakers will have no choice but to convert to BEV fleets on a massive scale. This is the result not only of the Proposed Rule's GHG emissions standards, but also its criteria pollutant standards and its tightening of credit programs and other flexibilities. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

152 NPRM at 29187.

As EPA notes, BEVs accounted for 5.8% of the new U.S. light-duty passenger vehicle market in 2022.153 Moreover, EPA's MY 2023-2026 GHG emissions standards that were finalized at the end of 2021 projected only a 17% light-duty penetration rate for both BEVs and PHEVs by MY 2026.154 Despite this low rate of consumer acceptance, the Proposed Rule projects a light-duty BEV penetration rate of 67% by MY 2032, up from 36% in MY 2027.155 Importantly, in the absence of these and other strict regulatory programs (such as California's ZEV mandate), EPA projects a significantly lower MY 2032 BEV penetration rate of only 39%.156 It is unclear from EPA's analysis how the regulations alone justify a 28 percentage point increase in BEV market between having regulations versus not. This is particularly concerning given that EPA's no- action analysis presumably includes the same level of existing supportive mechanisms such as the IRA and IIJA, assumptions for infrastructure development, and other market-enabling features. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

153 Id. at 29189

154 See Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74485, Table 33 (Dec. 30, 2021).

155 NPRM at 29329, Table 80.

156 Id. at 29329, Table 81.

In other words, a staggering increase in the implementation and adoption of BEV technology underpins the Proposed Rule and is the central means by which the rule effectuates its contemplated emissions reductions. But this shift to electrification is not a simple matter of swapping one technology for another. The mass adoption of BEVs on the scale required for compliance with the Proposed Rule's standards requires a much broader transformation in the way vehicles are manufactured, purchased, fueled, serviced, and disposed of. Indeed, the Proposed Rule would reorder much of the U.S. automobile industry—which supports roughly 10.3 million American jobs and $558 billion in annual car sales, and about 6% of the U.S.'s Gross Domestic Product (GDP).157 Consumers must be willing to purchase BEVs at mass scale; the power sector must be able to generate and deliver adequate electricity158—which itself will contribute to emissions—while maintaining grid reliability and otherwise meeting consumer and industrial demand; adequate charging infrastructure must be available; batteries and other components must be manufactured at an increasing rate, critical minerals sourced, and supply chains developed. These needs must be met not only for light-duty vehicles, but also for medium- and heavy-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

157 See Economic Insights, Alliance for Automotive Innovation, htps://www.autosinnovate.org/resources/insights.

158 In addition to increasing electricity capacity, utilities are also facing a transition in technology types and more renewable sources, as proposed under the "Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants" [88 FR 33240, May 23, 2023].

As expressed throughout this comment, we have serious concerns that the market will not be able to bear the requirements of the Proposed Rule and that those requirements will not be feasible given these considerations. Compliance will impose significant costs, and require extraordinary effort, on the part of regulated parties—costs which will be passed along to consumers. Setting such stringent standards has the potential to create a significant market disruption, with consequences not only for the automobile industry but for the entire U.S. economy. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

In other words, the Proposed Rule is enormously consequential for the automobile industry, and for the economy and consumers as a whole. The Proposed Rule's provisions insert EPA into crucial policy tradeoffs and debates, such as concerns about the extraction and supply of critical minerals overseas, or the need to maintain a reliable, efficient electric grid.159 These considerations range far afield from the traditional ambit of section 202 rulemaking, delving into areas that are the subject of other regulatory schemes, or within the unique purview and authority of other agencies and other branches and levels of government. In short, the dramatic shift toward electrification required by the Proposed Rule implicates issues of tremendous political, economic, and social significance. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

159 See, e.g., NPRM at 29311-24.

Nor is such a transformative rule, with such wide-ranging implications, a typical feature of section 202 rulemaking. We acknowledge that some past EPA section 202 rules, most notably the MY 2023-2026 rule, have contemplated greater deployment of EVs as one of many options for complying with emissions standards. The Proposed Rule, however, is different not merely in degree but in kind, seeking to impose what is, at bottom, a mandate toward nationwide electrification. Such a proposal amounts to an unprecedented assertion of power on the part of EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

"[A]n enormous and transformative expansion in EPA's regulatory authority" such as this necessitates "clear congressional authorization," as Congress is expected to "speak clearly if it wishes to assign to an agency decision of vast 'economic and political significance.'"160 But section 202 does not confer such clear authority. Section 202 authorizes EPA to promulgate "standards applicable to the emission of any air pollutant" from vehicles; it does not empower EPA to force a historic shift in the makeup of the nation's entire vehicle fleet. In the absence of plain statutory authorization, such a decision, and the tradeoffs and consequences it entails, properly belongs to Congress. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

160 Utility Air Regulatory Group v. E.P.A., 573 U.S. 302, 324 (2014) (quoting FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 160 (2000)).

The Proposed Rule frequently cites to the IIJA, also known as the "Bipartisan Infrastructure Law,"161 and the Inflation Reduction Act.162 To the extent EPA purports to rely on either statute as providing a legal basis for the Proposed Rule,163 it should not do so. No provision of the IIJA or the IRA expands or modifies EPA's regulatory authority under section 202 or the Clean Air Act more broadly. Nor can these laws be considered to have implicitly altered EPA's authority. After all, "implied amendments require 'clear and manifest' evidence of congressional intent,"164 and "neither courts nor federal agencies can rewrite a statute's plain text to correspond to its supposed purposes."165 Those conditions are not satisfied here. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

161 Pub. L. 117-58, 135 Stat. 429 (2021).

162 Pub. L. 117-169, 136 Stat. 1818 (2022). See, e.g., NPRM at 29187-90, 29195-96, 29233, 29300, 29308, 29313, 29318, 29322-24, 29341 (referencing the IIJA and/or IRA).

163 See, e.g., NPRM at 29233 ("The recently enacted Inflation Reduction Act 'reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act'") (quoting floor statement by Rep. Pallone).

164 Sackett v. E.P.A., 598 U.S , 2023 WL 3632751, at *13 (U.S. May 25, 2023) (internal quotation omitted).

165 Landstar Exp. America, Inc. v. Fed. Maritime Comm'n, 569 F.3d 493, 498 (D.C. Cir. 2009).

We reaffirm that we are fundamentally supportive of EPA's goals of reducing GHG emissions and transitioning to a net-zero carbon transportation future. Section 202 standards have a place in this effort, as we have previously expressed. We remain concerned, however, that the extraordinary and unprecedented nature of the Proposed Rule places it outside the bounds of EPA's statutory authority. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

n any event, the Clean Air Act refutes EPA's view that Congress left the door open to fleetwide averaging. Other provisions in Section 202 itself and Title II as a whole make clear that fleetwide averaging is fundamentally incompatible with the statutory structure and design. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

Other portions of Section 202 confirm Section 202(a)(1)'s focus on emission standards applicable to individual vehicles. For example: [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

- Under 42 U.S.C. § 7521(b)(1)(A), the standards for light-duty vehicles and engines in model years 1977–79 must provide that "emissions from such vehicles and engines may not exceed 1.5 grams per vehicle mile of hydrocarbons and 15.0 grams per vehicle mile of carbon monoxide." Id. (emphasis added). This provision contemplates that "such vehicles"—i.e., individual light-duty vehicles—will not exceed these limits. Under an averaging approach, however, individual vehicles would be permitted to exceed these statutorily mandated standards. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

- Similarly, 42 U.S.C. § 7521(b)(3) authorizes EPA to grant waivers from certain nitrogen-oxide emission "standards," see id. § 7521(b)(1)(B), for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater." Id. § 7521(b)(3). The provision thus provides a default rule under which every vehicle must meet a per-vehicle emissions standard, then permits a waiver from that default rule for up to 5 percent of the fleet. Averaging is inconsistent with this pro- vision, which depends on a set number of individual vehicles meeting the standards. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

- And under 42 U.S.C. § 7521(m)(1), EPA must require manufacturers to in- stall "diagnostic systems" on "all" new light-duty vehicles and trucks that are capable of identifying malfunctions that "could cause or result in failure of the vehicles to comply with emission standards established under this section." Requiring diagnostic equipment on "all" vehicles makes no sense on an averaging approach; each vehicle must have a diagnostic system that ensures that vehicle's "compl[iance] with emission standards established un- der [Section 202]," id., yet under EPA's averaging approach, no particular vehicle need be in compliance. [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

Beyond Section 202 itself, averaging is also deeply in tension with "the de- sign and structure of [Title II] as a whole." Util. Air, 573 U.S. at 321 (citation omitted). Consider Title II's provisions addressing testing, warranties, and penalties: [EPA-HQ-OAR-2022-0829-0683, pp. 14-15]

Organization: American Fuel & Petrochemical Manufacturers

And even for criteria pollutants emitted from ICEVs, the Clean Air Act says nothing about averaging across fleets or banking and trading credits across different model years, different vehicle classes, and OEMs. While EPA previously adopted fleetwide averaging, it has also acknowledged that “Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act.”91 And “[j]ust as the statute does not explicitly address EPA’s authority to allow averaging, it does not address the Agency’s authority to permit banking and trading.”92 By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading in a manner that mandates electrification of the national vehicle fleet of motor vehicles and motor vehicle engines. Instead, as EPA acknowledges, even if its authority to use averaging, banking, and trading could be inferred, such programs are limited to compliance flexibilities rather than setting the standards with which vehicles must comply or phasing out ICEVs on a national scale.93 [EPA-HQ-OAR-2022-0829-0733, p. 23]

91 48 Fed. Reg. 33,456, 33,458 (July 21, 1983)

92 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same).

93 Proposed Rule at 29,196-97 (describing averaging, banking, and trading provisions as “help[ing] manufacturers to employ a wide range of compliance paths”).

The structure of the Clean Air Act and its regulatory provisions for standard setting, certification, compliance enforcement, warranties, and penalties also directly conflict with a fleet- wide averaging regulatory regime. Notably, under Section 202(a), EPA “shall test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer” and issue a certificate of conformity “if such vehicle or engine” complies with the standards.94 And EPA must “test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such a system enables such vehicle or engine to conform to the standards required to be prescribe under [Section 202(b)]” of the Act.95 EPA’s use of a fleetwide averaging regulatory regime directly conflicts with the statutory provisions that Congress already included to provide manufacturers with compliance flexibility. For example, section 202(b)(3) provided compliance flexibilities for NOx, but only for no “more than 5 percent of [a] manufacturer’s production or more than fifty thousand vehicles or engines, whichever is greater.”96 This provision would be nonsensical under a fleetwide-averaging regime where, if applied, an OEM could give itself a waiver for large swaths of its fleet by over-complying for certain product lines well beyond its 5 percent or 50,000 vehicle allotment.97 Together, the Clean Air Act regulatory framework contemplates EPA regulating vehicles individually. But this cannot be accomplished if there is not a clear emission standard applicable to a single vehicle at the start of a model year. [EPA-HQ-OAR-2022-0829-0733, pp. 23-24]

94 42 U.S.C. § 7525(a)(1).

95 42 U.S.C. § 7525(a)(2).

96 42 U.S.C. § 7521(b)(3).

97 While Clean Air Act Section 202(b)(3) is specific to legacy light-duty vehicles through model year 1985 subject to a 1.5 grams/mile NOx standard and no longer directly applicable, the provision is incongruent with fleet-wide averaging, and no associated amendments to Section 202(a) would support a different reading today.

Organization: California Attorney General's Office, et al.

C. History of Regulation of Multi-Pollutant Emissions

More than half a century ago, Congress established a statutory regime to reduce motor vehicle emissions in light of evidence that “[t]he automobile has had a devastating impact on the American environment” and “automotive pollution constitutes in excess of 60% of our national air pollution problem.”103 Under this regime, Congress has directed EPA to promulgate “standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” 42 U.S.C. § 7521(a)(1).104 Congress has required that these standards apply “whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution.” Id.105 EPA’s standards “shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance.” 42 U.S.C. § 7521(a)(2). [EPA-HQ-OAR-2022-0829-0746, pp. 16-17]

103 Int’l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 623 (D.C. Cir. 1973); Pub. L. 89-272 § 201, 79 Stat. 992, 992-93 (1965).

104 Compare with Pub. L. 89-272 § 202(a), 79 Stat. 992, 992-93 (1965) (“The Secretary shall by regulation, giving appropriate consideration to technological feasibility and economic costs, prescribe as soon as practicable standards, applicable to the emission of any kind of substance, from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause or contribute to, or are likely to cause or contribute to, air pollution which endangers the health or welfare of any persons ”).

105 Compare with Pub. L. 89-272 § 202(a), 79 Stat. 992, 992-93 (1965) (“[S]uch standards shall apply to such vehicles or engines whether they are designed as complete systems or incorporate other devices to prevent or control such pollution.”).

From 1966 through 1970, pursuant to its statutory mandate, EPA’s predecessor106 promulgated three sets of emissions standards to control crankcase emissions, exhaust emissions of hydrocarbons and carbon monoxide, and evaporative fuel emissions. 31 Fed. Reg. 5,170 (Mar. 30, 1966); 33 Fed. Reg. 8,304 (June 4, 1968); 35 Fed. Reg. 17,288 (Nov. 10, 1970). Since it was formed in 1970, EPA has finalized upwards of fifty rules setting or amending emissions standards for various classes of vehicles and myriad air pollutants that EPA determined may endanger public health or welfare. See e.g., 36 Fed. Reg. 12,652 (Jul. 2, 1971) (EPA’s first emission standards for NOx), 45 Fed. Reg. 14,496 (Mar. 5, 1980) (EPA’s first emission standards for PM). [EPA-HQ-OAR-2022-0829-0746, pp. 16-17]

106 At the time, the federal body responsible for carrying out the statutory mandate was the U.S. Department of Health, Education, and Welfare.

Standards more stringent than EPA’s proposed standards would comport with its statutory mandate in Section 202(a) and further the statutory objective by reducing the threats from vehicle pollution to public health and welfare. EPA projects that the proposed standards will reduce GHG emissions by more than 7.3 billion metric tons of carbon dioxide (CO_2), 120,000 metric tons of methane (CH_4), and 130,000 metric tons of nitrous oxide (N_2O) through 2055, in addition to criteria pollutant reductions of 44,000 tons per year of nitrogen oxides (NO_x), 9,800 tons per year of fine particulate matter ($PM_{2.5}$), 200,000 tons per year of non-methane organic gases (NMOG), 2,800 tons per year of sulfur oxides (SO_x), and 1.8 million tons per year of carbon monoxide (CO) by 2055. 88 Fed. Reg. at 29,348 (Table 135); id. at 29,351 (Table 139). More emission reductions are feasible. See CARB Comment at 17-22. Given EPA’s description of these emissions reductions as an “essential factor” in its determination of the appropriate level of the proposed standards, id. at 29,344, and the primacy Congress placed on addressing pollution's danger to public health and welfare in Section 202(a), 42 U.S.C. § 7521(a)(1), our States and Cities urge EPA to increase the stringency of its standards beyond those proposed. [EPA-HQ-OAR-2022-0829-0746, p. 28]

Organization: Clean Fuels Development Coalition (CDFC)

EPA Experts Have Warned About "Atmospheric Transformation Products" from Aromatics for Many Years. Outside of OTAQ, EPA experts have been clear about EPA's duty under the Clean Air Act to control carcinogenic and mutagenic atmospheric reaction products, the predominant precursors of which are gasoline aromatics. [EPA-HQ-OAR-2022-0829-0630, p. 9]

"Although oxidized VOCs can be components of primary emissions from a variety of sources, most result from secondary reactions of hydrocarbons emitted into the atmosphere, making them late-generation atmospheric reaction products. Assessments of health effects based solely on direct emissions are incomplete if potentially important contributions from such products are neglected, as has been noted by the Clean Air Act, which mandates consideration of atmospheric transformation products. [EPA-HQ-OAR-2022-0829-0630, p. 9]

5. Conclusions and implications for control strategies

Other than 1,2,4- and 1,3,5-trimethylbenzene, all of the precursor aromatic VOCs investigated here are classified as hazardous air pollutants by the U.S. EPA, and therefore emissions of these species from industrial activities are controlled under the Clean Air Act (U.S. EPA, 2015a). Nonetheless, of the 8 VOCs that produced mutagenic atmospheres, all did so only under irradiation. Thus, only late-generation reaction products were responsible for the mutagenicity, not the precursor VOCs, raising an interesting point regarding potential control strategies when the photochemistry of certain chemical species is similar to those described here. Non-mutagenic primary compounds may be less likely to be controlled; however, the resulting late-generation products may be more likely to be mutagenic. Therefore, consideration should be given to precursor compounds based not only on their intrinsic health concerns but also on those of their potential late-generation atmospheric photochemical products. It seems that these products, which are typically not monitored or controlled, account for much of the gas-phase direct-acting mutagenicity. Based on these limited studies, reducing the concentrations of primary VOCs would likely result in a corresponding reduction in the concentrations of the products, with a parallel reduction in atmospheric mutagenicity."5 [EPA-HQ-OAR-2022-0829-0630, p. 9]

5 "Mutagenic atmospheres resulting from the photooxidation of aromatic hydrocarbon and NOx mixtures", Theran P. Riedela,∗ , David M. DeMarinib , Jose Zavalac , Sarah H. Warrenb , Eric W. Corsed , John H. Offenberga , Tadeusz E. Kleindiensta , Michael Lewandowski]

[Dr. Riedel is a senior scientist at EPA's National Exposure Research Lab in Research Triangle Park, NC. He and his colleagues published this study in 2018 ResearchGate https://www.researchgate.net/publication/315864231_Mutagenicity_and_Carcinogen icity] [EPA-HQ-OAR-2022-0829-0630, p. 9]

Organization: Elders Climate Action

C. EPA's Failure to Set Zero Emission Standards Violates the CAA.

The CAA declares that the primary purpose of the Act is "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." 42 U.S.C. §7401(b)(1). To implement this purpose, section 202(b)(1)(C) grants the Administrator discretion to commence a rulemaking to revise standards previously promulgated under subsection (a)(1), but once that rulemaking is commenced, as here, the Act requires that the Administrator determine what revisions are "needed to protect public health and welfare." That statutory benchmark has not been addressed in this rulemaking, either with respect to the emission reductions needed to prevent endangerment of the public health and welfare from the climate impacts of GHG emissions, or from the impacts of criteria pollutant violations of NAAQS on public health. The failure to undertake an analysis to determine what emission standards are needed to protect public health and welfare renders this rulemaking unlawful and fundamentally flawed. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

L/MDVs that are commercially available today with zero emission power trains obviously satisfy the available technology requirement. A large fraction of the CO2 emitted from on-road vehicles comes from L/MD vehicle types that are NOW commercially available with zero emission power trains. These include transit and school buses, delivery vans, service trucks, and shuttles serving airports, hotels and resorts. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

EPA admits that ZEV technologies are available, and are the most cost-effective technologies, but the Agency only estimates the zero emission L/MDVs that will likely be available in 2027 as a result of current incentive policies and state regulations. EPA does not estimate the potential availability of zero emission L/MDVs that could be produced and sold if EPA were to promulgate zero emission standards. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

Instead EPA assumes that the rule will marginally improve the efficiency of IC engines and "induce" enough ZEV sales to reduce CO2 emissions less than 5% by 2030 from new L/MDVs sold in 2027 and subsequent years. By failing to require the production and sale of zero emission L/MDVs along with a fleet averaging rule that allows engine manufacturers to sell "dirty" uncontrolled L/MDVs through the use of emission reduction credits obtained by selling zero emission vehicles in California and section 177 states, EPA is effectively allowing engine manufacturers to capture the benefits of clean zero emission vehicles for themselves while increasing the exposure of at-risk communities to harmful pollutants in non-177 states. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

We include a legal analysis that demonstrates EPA's failure to set standards that will achieve the maximum deployment of zero emission technologies fails to achieve the public health purpose of the Act, and is not consistent with the statutory text and the legislative history of the Act. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

By setting zero emission standards for NOx beginning in 2027 for the vehicle types currently available as zero emission vehicles (ZEVs), EPA should determine the NOx emissions that would be avoided in nonattainment areas where EPA's modeling for the 2022 HD rule shows that current and proposed HD emission standards will not be sufficient to provide for attainment. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

CONCLUSION.

EPA must determine the extent to which a zero emission standard for L/MD vehicles beginning in 2027 would be needed to put our nation's vehicle fleet on a clear path to attaining the ozone and PM NAAQS by the statutory deadline. In addition, EPA must, at a minimum, use the IPCC modeling analysis and data to estimate the endangerment that will result from climate warming if global mean temperature is allowed to exceed 1.5o C as the benchmark for determining endangerment to the public health and welfare, and determine what emission standard is needed for L/MD vehicles to achieve the reductions needed to ensure that the U.S. contribution to atmospheric loadings of CO2 will be reduced to the levels need to prevent more severe effects of climate warming. [EPA-HQ-OAR-2022-0829-0737, pp. 6-8]

Organization: Environmental. and Public Health Organizations

F. EPA should strengthen the Tier 4 NMOG+NOX standards and finalize the proposed PM requirements. [EPA-HQ-OAR-2022-0829-0759, p. 53]

We now turn to EPA’s proposed criteria pollutant standards for LDVs. As detailed below, while the proposed PM2.5 requirements are appropriate, EPA should strengthen the NMOG+NOX standards and consider ways to limit over-crediting. [EPA-HQ-OAR-2022-0829-0759, p. 53]

1. EPA should increase the stringency of the proposed NMOG+NOX standards. [EPA-HQ-OAR-2022-0829-0759, p. 53]

a. EPA should strengthen the NMOG+NOx standards to better reflect available, feasible, and cost-effective technologies. [EPA-HQ-OAR-2022-0829-0759, p. 53]

EPA’s 2014 Tier 3 emissions standards were set based on the deployment of technologies applicable to combustion vehicles. The NMOG+NOx standards are meant to continuously phase in from 2017-2025, ultimately reaching a fleet average of 30 mg/mile on the FTP and 50 mg/mile on the SFTP. However, over this time period, an increasing share of BEVs will be sold, which are certified to 0 mg/mile NMOG+NOx. While the deployment of BEVs will not alter the tailpipe emissions reductions anticipated under the Tier 3 program, the additional BEVs, counted as 0 mg/mile, substantially reduce manufacturers’ incentives to deploy the full extent of technologies EPA identified in the Tier 3 rulemaking to their combustion vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 53]

Two responses are possible from manufacturers: they either (1) deploy the same suite of internal combustion engine technologies to their combustion vehicle fleet, and therefore generate a significant amount of overcompliance credits that can be used to reduce their compliance obligations under the Tier 4 standards EPA is now proposing; or (2) reduce the deployment of technologies as EPA originally envisioned when setting the Tier 3 standards, leaving emissions reductions for their combustion vehicle fleet on the table. Either response weakens compliance with the standards. Strengthening the Tier 4 standards will help avoid these problems. [EPA-HQ-OAR-2022-0829-0759, p. 53]

Therefore, EPA’s proposed NMOG+NOx standards leave a significant gap between the feasible deployment of zero-emission technologies (indicated by the share of BEVs modeled for GHG compliance) and the feasible deployment of improvements to combustion vehicles (indicated by the achievement of a Tier 3 fleet average standard without the deployment of

BEVs). Figure VI.F-1 illustrates, on the left, the implicit requirements on combustion vehicles under the proposed NMOG+NOx standards with EPA's modeled adoption of BEVs under the GHG standards; and, on the right, the implied share of BEVs required by the proposed Tier 4 standards if combustion vehicles achieve Tier 3 compliance. If BEVs are deployed at levels modeled by the Agency to comply with its GHG Proposal, NMOG+NOx emissions from combustion vehicles would remain about 30% higher than the Tier 3 requirement over the timeframe of the rule. If, instead, the combustion vehicle fleet matches the Tier 3 requirements in 2027-2032, far fewer BEVs would need to be deployed to meet the Tier 4 proposed targets. These scenarios demonstrate that numerous technological pathways are available to manufacturers to comply with the Tier 4 standards and that stronger standards are entirely feasible. [EPA-HQ-OAR-2022-0829-0759, pp. 53-54]

SEE ORIGINAL COMMENT FOR Figure VI.F-1. Emissions performance and ZEV market share implied by the combination of achieving the proposed GHG standards and Tier 3 / Proposed Tier 4 NMOG+NOx standards [EPA-HQ-OAR-2022-0829-0759, p. 54]

If manufacturers deploy ZEVs consistent with EPA's projection of compliance with the GHG standards, tailpipe emissions performance from the remaining combustion vehicles will exceed Tier 3 standards (left). If combustion vehicles instead achieve Tier 3 emissions standards, far fewer ZEVs will be required to meet the proposed Tier 4 fleet average standards than are modeled to comply with the GHG standards (right). [EPA-HQ-OAR-2022-0829-0759, p. 54]

EPA should close this gap in relative stringency by setting a standard that reflects the full emissions reductions of the combustion vehicle technologies it has already identified as feasible (and which are readily available). Aligning the Agency's assessment of ZEV deployment and its analysis (covered primarily in the Tier 3 rulemaking) of what is achievable to reduce NMOG+NOx emissions from combustion vehicles would yield a 2032 target of 10 mg/mi, a 17% reduction from its Proposal. Interim targets would then be adjusted accordingly. [EPA-HQ-OAR-2022-0829-0759, p. 54]

Such a standard for LDVs would still be technology-neutral: The target corresponds to the lowest non-zero bin in the Proposal (Tier 4 Bin 10),137 and the Agency has already identified combustion vehicles that have certified FTP emissions below 10 mg/mi.138 Moreover, we expect that manufacturers seeking to comply with the multipollutant standards primarily through combustion vehicle technologies would be investing in further emission-reduction technologies from those vehicles, such as by ensuring their vehicles are more in line with the emissions profiles of the industry-leading vehicles, including through deployment of hybridization and other EPA-identified strategies to reduce tailpipe emissions. Alternatively, for manufacturers that want to comply with the multipollutant standards through greater deployment of zero-emission technologies, this pathway would still allow flexibility for their combustion vehicle fleet to fall short of the Tier 3 requirements, provided they sell ZEVs beyond EPA's modeled industry average. [EPA-HQ-OAR-2022-0829-0759, pp. 54-55]

137 88 Fed. Reg. at 29419.

138 DRIA at 3-41, Tbl. 3-14.

EPA has embarked on a multipollutant rulemaking precisely because technologies exist to simultaneously achieve reductions in GHGs and criteria pollutants.139 Reducing the stringency of the final standards to 10 mg/mi NMOG+NOx better aligns with the feasible and cost-appropriate technologies already identified by the Agency. [EPA-HQ-OAR-2022-0829-0759, p. 55]

139 88 Fed. Reg. at 29187.

b. EPA should consider ways to limit over-crediting.

Figure VI.F-1 (left side) shows a non-monotonic behavior—that is, the allowable emissions profile of the combustion vehicles (green line) first increases significantly from 2026-2029, then decreases. This is largely due to the delay in increasing stringency for LDT3, LDT4, and MDPV classes (Class 2 light trucks), the result of EPA's interpretation of lead time requirements under the Clean Air Act.140 The Agency has offered an optional "early compliance" pathway for manufacturers; however, this pathway increases the total stringency over the six years covered by the proposal, reducing the likelihood of manufacturers choosing this path to compliance.141[EPA-HQ-OAR-2022-0829-0759, p. 55]

140 See id. at 29258.

141 If EPA sets a 10 mg/mile standard in 2032 as recommended in Section VI.F.1.a, and thus reduces the step for Class 2 light trucks to 10 mg/mile, there would presumably be no such gap in stringency between the early and default compliance pathways.

In an effort to induce manufacturers to align with the early compliance pathway and to acknowledge the reduced emissions benefits of the stagnant standard for Class 2 light trucks from 2025-2029 (a full five-year window corresponding to the lifetime of Tier 3 credits) under the default compliance pathway, EPA should condition manufacturers' full utilization of credits in this time period on their utilization of the early compliance pathway. For example, EPA could set a limit on the amount of averaging, banking, and trading (ABT) credits that could be utilized for compliance, in order to limit windfall credits from reductions in fleet emissions that occur during the 4-year period of stagnation. This would also ensure that manufacturers do not artificially prolong compliance through an overreliance on such credits. [EPA-HQ-OAR-2022-0829-0759, p. 55]

2. The proposed PM2.5 requirements are appropriate.

EPA is also proposing to set a limit on the allowable particulate matter (PM2.5) emissions from all LDVs. This is an appropriate step under the Agency's authority and is well-grounded in both the need for additional emissions reductions and technical feasibility. [EPA-HQ-OAR-2022-0829-0759, p. 55]

Stoichiometric gasoline direct-injection is deployed in over half the new vehicle fleet in the United States and supports the deployment of turbocharged, downsized engines as well as high-compression ratio engines, both of which are key technologies to reduce GHG emissions.142 At the same time, moving from port-fuel injection to direct-injection leads to an increase in both the amount of PM2.5 and the particle count.143 Addressing PM2.5 emissions from the vehicles deploying these technologies is critical as they become a larger share of the on-road fleet. [EPA-HQ-OAR-2022-0829-0759, p. 56]

142 See U.S. EPA, The 2022 Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology Since 1975, EPA-420-R-22-029 (Dec. 2022), Chapter 4, available at https://www.epa.gov/automotive-trends/download-automotive-trends-report.

143 Omar I. Awad, et al, Particulate emissions from gasoline direct injection engines: A review of how current emission regulations are being met by automobile manufacturers, Sci. Total Env. 718, 137302 (2020), at https://doi.org/10.1016/j.scitotenv.2020.137302 (subscription required).

Gasoline particulate filters (GPFs) have been successfully deployed globally for years to address these emissions, as EPA has documented in the Draft Regulatory Impact Analysis (DRIA).144 Additionally, in-cylinder strategies can help mitigate emissions, including through the design of both the injector and the cylinder surface.145 Aftertreatment design can also be used to mitigate cold-start emissions, in particular.146 All of the technology developments described above are well-established, and many are analogous to technologies that have been deployed to limit PM2.5 emissions from diesel engines. [EPA-HQ-OAR-2022-0829-0759, p. 56]

144 DRIA, Section 3.2.5.

145 See Awad. et al. 2020 for a review.

146 Id.

As part of its Advanced Clean Cars program, California finalized a PM2.5 standard of 1 mg/mile, to begin phasing in with the 2025 model year.147 As part of its review, the California Air Resources Board (CARB) conducted tests demonstrating the feasibility of achieving this standard, including data on particle count, GPF effectiveness, and the ability to measure sub-mg quantities of PM2.5.148 While these standards have not gone into effect, the underlying data support EPA's proposed PM2.5 program. [EPA-HQ-OAR-2022-0829-0759, p. 56]

147 Cal. Code of Regs. Tit. 13, § 1961.2(a)(2)(A).

148 For measurement capability, see CARB, An Update on the Measurement Of PM Emissions at LEV III Levels, (2015), available at https://ww2.arb.ca.gov/sites/default/files/2020-01/lev_iii_pm_measurement_feasibility_tsd_20151008_ac.pdf. For additional tests on GPF capability, see CARB, California[']s Advanced Clean Cars Midterm Review, Appendix K: PM Emission Testing Results (Jan. 8, 2017), available at https://ww2.arb.ca.gov/sites/default/files/2020-01/appendix_k_pm_test_results_ac.pdf.

The benefits of the PM2.5 standards are significant—depending on the assumed rate of deployment, EPA's Proposed Standards could cut tailpipe PM2.5 emissions by up to 90% by 2050.149 This could lead to cumulative health benefits of $85 to $160 billion over that same timeframe, at a 3% discount rate.150 Importantly, it could also lead to measurable improvements in near-roadway air quality,151 which could be significant for the more than 41 million people living within close proximity of high-traffic roadways.152 [EPA-HQ-OAR-2022-0829-0759, pp. 56-57]

149 Oak Leaf Envtl., Impacts Analysis of a Revised Federal Light-Duty On-Road Particulate Matter Standard, Prepared for the Manufacturers of Emissions Controls Association (MECA) (June 2023), at 20, Fig. 7, available at https://www.meca.org/wp-content/uploads/2023/06/LDV_PM_Standard_Final_Report_06272023.pdf.

150 Id. at 22-23, Figs. 9, 10 & "9" [Fig. 11 appears to be incorrectly labeled as Fig. 9].

151 Id. at 24, Tbl. 5.

152 88 Fed. Reg. at 26060.

Organization: Governing for Impact and Evergreen Action (GFI)

I. Background: the Proposed Rule & the Major Questions Doctrine

The EPA's Proposed Rule, covering light and medium duty vehicle emissions of both greenhouse gases ("GHGs") and criteria pollutants for MYs 2027-2032, appropriately fulfills the statutory obligation under Section 202(a) of the Clean Air Act ("CAA") to issue standards for motor vehicle emissions that "cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."11 It also marks a positive and necessary step towards reducing carbon emissions in line with current domestic and international climate commitments, as well as addressing environmental justice concerns. This administration has committed to reducing GHG pollution by 50-52 percent by 2030 (relative to 2005 levels)—and policies to address pollution from the transportation sector will be critical to achieving this goal.12 The transportation sector accounts for the largest share of domestic GHG pollution (29 percent); and light duty vehicles are responsible for the largest share of greenhouse emissions within the transportation sector (58 percent).13 Despite the EPA's previous GHG regulations under Section 202(a), transportation emissions in the United States continue to grow,14 demonstrating that greater action is needed to fulfill the CAA's statutory goals and achieve this administration's climate targets. [EPA-HQ-OAR-2022-0829-0621, p. 2]

11 42 U.S.C. §7521(a)(1).

12 "FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good- Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies," The White House, https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030- greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on- clean-energy-technologies/ (April 22, 2021).

13 Fast Facts on Transportation Greenhouse Gas Emissions," U.S. Enviro. Prot. Agency, https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions (last visited June 15, 2023).

14 See "Inventory of U.S. Greenhouse Gas Emissions and Sinks," U.S. Enviro. Prot. Agency, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks (last visited June 15, 2023).

The Proposed Rule, contrary to some public commentary,18 simply follows the course laid by decades of CAA §202(a) emissions standards for new motor vehicles and motor vehicle engines.19 Since the 1970s, the EPA has used this authority to set standards for passenger vehicles that reduced deadly emissions such as lead, carbon monoxide, particulate matter, and nitrogen oxide. In the wake of the Supreme Court's 2007 decision in Massachusetts v. E.P.A., which held that carbon dioxide and other greenhouse gas emissions as air pollutants under the CAA,20 the EPA released its first Section 202(a) standard targeting GHG emissions from light duty vehicles in 2010, covering MYs 2012-2016.21 As new data about the urgency of the climate crisis and its ensuing public health impacts, especially to environmental justice communities, have emerged over the last decade, the EPA has further tightened those standards in a series of subsequent rulemakings. [EPA-HQ-OAR-2022-0829-0621, p. 3]

18 18 See supra at 1.

19 See EPA, "Timeline of Major Accomplishments in Transportation, Air Pollution, and Climate Change," https://www.epa.gov/transportation-air-pollution-and-climate-change/timeline-major-accomplishments-transportation- air (last visited June 15, 2023).

20 549 U.S. 497.

21 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule," 75 Fed. Reg. 25324 (May 2010), https://www.govinfo.gov/content/pkg/FR-2010-05-07/pdf/2010-8159.pdf.

Nor did West Virginia hold that any regulation touching on climate change constitutes a major question.52 In fact, that decision never suggested that the EPA lacks the power to regulate carbon emissions from power plants under the relevant section of the CAA—it merely held that the Clean Power Plan's particular method for doing so was impermissible.53 [EPA-HQ-OAR-2022-0829-0621, pp. 6-7]

52 Commentators have suggested as much across various regulatory proposals. See e.g., Letter from Attorney General Patrick Morrisey, West Virginia, et al. to Chair Rostin Behnam, CFTC, re: Comments on the CFTC's "Climate-Related Financial Risk RFI" by the Attorneys General of the States of West Virginia, Alabama, Alaska, Arizona, Arkansas, Georgia, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Montana, Nebraska, North Dakota, Ohio, Oklahoma, South Carolina, Texas, Utah, Virginia, and Wyoming (Oct. 7, 2022), comments.cftc.gov/PublicComments/ViewComment.aspx?id=70868&SearchText=. In comments to a Federal Acquisition Regulatory Council proposal requiring certain large federal contractors to make limited disclosures about carbon emissions, the Washington Legal Foundation cited West Virginia for the proposition that "climate policy is the exclusive prerogative of Congress"—concluding that executive action touching on the issue therefore poses a "major question." Comment of Washington Legal Foundation, "FEDERAL ACQUISITION REGULATION: DISCLOSURE OF GREENHOUSE GAS EMISSIONS AND CLIMATE-RELATED FINANCIAL RISK," 1 (Feb. 13, 2023), https://www.regulations.gov/comment/FAR-2021-0015-0158.

53 See W. Virginia at 2615 ("the only interpretive question before us, and the only one we answer, is more narrow: whether the 'best system of emission reduction' identified by EPA in the Clean Power Plan was within the authority granted to the Agency in Section 111(d) of the Clean Air Act. For the reasons given, the answer is no").

Finally, note that even if a court concludes that an agency action constitutes a "major question," the court's work is not complete. The regulation can still survive if the agency can demonstrate "clear congressional authority" for its interpretation that goes beyond "a merely plausible textual basis."54 To date, most regulations that the Supreme Court has characterized as "major questions" have failed to meet this standard. But in King v. Burwell, a majority of the Court led by Chief Justice Roberts upheld an Internal Revenue Service interpretation concerning Affordable Care Act tax credits, even after finding that the action effectively qualified as a major question.55 [EPA-HQ-OAR-2022-0829-0621, pp. 6-7]

54 W. Virginia at 2609.

55 King at 485 ("In extraordinary cases, however, there may be reason to hesitate before concluding that Congress has intended such an implicit delegation… This is one of those cases") (internal citations omitted).

Finally, suggestions by some opponents that the EPA must promulgate its emissions standards in coordination with the National Highway Traffic Safety Administration ("NHTSA"),75 which sets fuel- economy standards but is prohibited from taking EVs' fuel economy into account in setting those standards, are wrong. While it is true that the two agencies have jointly promulgated GHG and fuel economy regulations in the past, there is no statutory requirement that they do so—and the agencies did not do so in 2021 when the EPA promulgated 202(a) GHG regulations for MYs 2023-2026.76 In fact, the Supreme Court has described the EPA's authority to regulate carbon emissions from motor vehicles as "a statutory obligation wholly independent" from NHTSA's energy efficiency mandate regarding mileage requirements.77 [EPA-HQ-OAR-2022-0829-0621, pp. 9-10]

75 See, e.g., Private Petitioners' brief, Texas v. E.P.A., D.C. Cir. No. 22-1031.

76 "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards," 86 Fed. Reg. 74434 (Dec. 2021), https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model-year- light-duty-vehicle-greenhouse-gas-emissions-standards.

77 Massachusetts v. E.P.A., 549 U.S. 497, 532 (2007). See also Coal. for Responsible Regul., Inc. v. E.P.A., 684 F.3d 102, 127 (D.C. Cir. 2012) (explaining why NHTSA's regulatory obligations do not affect the EPA's obligations under the CAA); Proposed Rule at fn. 388; Dan Farber, "The Car Rule and the Major Questions Doctrine," Legal Planet (April 24, 2023), https://legal-planet.org/2023/04/24/the-car-rule-and-the-major-questions-doctrine/; Proof Brief of the Institute for Policy Integrity at 10–11.

Organization: HF Sinclair Corporation

b. EPA Lacks Statutory Authority to Set Fleetwide Average Emission Standards, and In All Events May Not Average In Vehicles that Do Not Emit the Relevant Pollutant. [EPA-HQ-OAR-2022-0829-0579, p. 6]

EPA lacks statutory authority under Section 202(a) of the Clean Air Act to set fleetwide emission standards, and even if it had such authority, it could not lawfully use it to force electrification by including vehicles that have no tailpipe emissions in the fleetwide average standard for ICE vehicles. The Proposed Rule results in fleetwide standards that cannot be met by ICE vehicles alone; however, under the Clean Air Act, EPA may only set individual vehicle-level emission standards. Such standards must be for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to," potentially harmful air pollution.18 The plain language of this provision authorizes EPA to set standards for classes of individual vehicles or engines that emit air pollutants. Because PEVs do not directly "cause, or contribute to," air pollution individually within the construct of a tailpipe emissions standard, any standard applicable to "any class or classes" of vehicles cannot include PEVs. [EPA-HQ-OAR-2022-0829-0579, p. 6]

18 42 U.S.C. § 7521(a)(1).

PEVs are simply not the "technology" contemplated by Congress here. Instead, Congress enabled EPA to increase emission standard stringency through cleaner fuels and improved emissions-related systems to be incorporated into ICE vehicles such as advances in fuel injection, exhaust gas combustion management, and advances catalysts to neutralize pollutants of concern.19 By factoring in PEV performance as a part of its averaging scheme, EPA is ignoring the technological feasibility of emissions-related systems and simply requiring the production of fewer ICE vehicles. The Proposed Rule does not consider advances to ICE technologies when setting the standard. [EPA-HQ-OAR-2022-0829-0579, p. 6]

19 For example, Section 202(m) requires the monitoring of "emission-related systems" such as the "catalytic converter and oxygen sensor." 42 U.S.C. § 7521(m)(l).

And even for criteria pollutants emitted from ICE vehicles, the Clean Air Act says nothing about averaging across fleets or banking and trading credits across different model years, different vehicle classes, and OEMs. While EPA has previously adopted fleetwide averaging, it has also acknowledged that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act."20 And "[j]ust as the statute does not explicitly address EPA's authority to allow averaging, it does not address the Agency's authority to permit banking and trading."21 By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading in a manner that mandates electrification of the national vehicle fleet of motor vehicles and motor vehicle engines. [EPA-HQ-OAR-2022-0829-0579, p. 6]

20 48 Fed. Reg. 33,456, 33,458 (July 21, 1983).

21 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same).

Organization: National Association of Clean Air Agencies (NACAA)

More than one-third of the U.S. population currently lives in an area that does not meet the health- and welfare-based National Ambient Air Quality Standards (NAAQS) for ozone, PM or both. Many of these areas are over-burdened communities whose citizens are exposed to a disproportionate share of harmful environmental conditions. Transportation-related emissions are a primary cause. EPA data show that in 2023, mobile sources will be responsible for about 54 percent of anthropogenic emissions of NOx, 5 percent of anthropogenic direct emissions of PM2.5 and 19 percent of anthropogenic emissions of VOCs – the key pollutants contributing to the formation of ozone and soot, which are linked with premature death as well as serious respiratory and cardiovascular impacts, cancer and other serious health effects. Of these amounts, about 20 percent of the NOx, 19 percent of the PM2.5 and 41 percent of the VOCs will come from LMDVs.8 [EPA-HQ-OAR-2022-0829-0559, pp. 2-3]

8 Supra note 1, at 29,186

While state and local air agencies have made great strides in reducing emissions from stationary sources, for the most part they lack the authority to regulate mobile sources and never have had the authority to regulate mobile sources across their borders. The regulation of mobile sources is an authority that lies almost entirely within the purview of the federal government. While air agencies in regions across the country may pursue standards under Clean Air Act (CAA) section 177 that are first adopted by California (under CAA section 209), most are precluded, by state policies or legislation, from adopting standards more stringent than those of the federal government. [EPA-HQ-OAR-2022-0829-0559, pp. 2-3]

As many parts of the country slip deeper into nonattainment, or are on the cusp of it, many state and local air agencies are left with few remaining mechanisms to achieve the emission reductions the CAA requires. Areas that miss their attainment deadlines face the threat of "bump-up" to a more demanding classification of nonattainment – if they are not already classified as Extreme – and statutorily required economic sanctions if they fail to meet their attainment deadlines. On October 7, 2022, EPA bumped up over 25 areas in nonattainment of the 20089 and 201510 ozone NAAQS, meaning the citizens of these areas continue to suffer the detrimental impacts of unhealthful air. [EPA-HQ-OAR-2022-0829-0559, pp. 2-3]

9 https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20458.pdf

10 https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20460.pdf

Further, EPA is now in the process of reconsidering the existing PM and ozone NAAQS, which were revised with greater stringency in 2012 and 2015, respectively, and retained without revision in December 2020. Regardless of whether either or both standards are strengthened, the fact is that many areas across the country need reductions in pollutants that contribute to PM2.5 and ozone just to meet or sustain the current NAAQS and provide clean air to their citizens. [EPA-HQ-OAR-2022-0829-0559, pp. 2-3]

Regarding attainment and maintenance of the ozone NAAQS, most areas of the country are “NOx- limited,” meaning that reducing NOx emissions is the key to success. In addition, research shows that in some areas of the country, such as much of the East Coast, NOx reductions are now “supercharged,” meaning that a one-pound reduction in NOx emissions equals more than one pound of ozone reduction. Failure to adequately address transportation-related NOx sources, including LDVs and MDVs, will have a direct and consequential impact on state and local air agencies’ abilities to fulfill their statutory obligations to attain and maintain federal air quality standards by mandated deadlines and achieve their environmental justice goals. [EPA-HQ-OAR-2022-0829-0559, pp. 2-3]

Carbon, criteria pollutant and toxic emissions from LMDVs harm public health and threaten our climate. Every area of the nation is adversely affected by these emissions and their growing impacts. Those living in communities that bear a disproportionately and unjustly greater burden of the consequences of these emissions must be the central focus, rather than on the margins, of EPA’s attention when the agency finalizes this rule. Toward all these ends, NACAA offers the following for EPA’s consideration. [EPA-HQ-OAR-2022-0829-0559, pp. 2-3]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

IV. Conclusion

Given the urgency of the climate crisis, the impacts of pollution from transportation on air quality and public health, anticipated growth of the transportation sector, and the rapid growth in ZEV adoption, it is necessary and appropriate for EPA to exercise its authority in CAA Section 202(a) to establish new and more stringent GHG and criteria pollutant and emissions standards for MYs 2027 and later LDVs and MDVs. NESCAUM and the OTC urge EPA to finalize a rule with the most stringent standards feasible. [EPA-HQ-OAR-2022-0829-0584, p. 12]

Organization: POET, LLC

EPA has broad authority under Section 211(c)(1)(A) of the Clean Air Act to issue regulations controlling fuels or fuel additives that cause and/or contribute to air pollution that may endanger public health.155 This authority permits EPA to limit high-boiling compounds/heavy aromatics because these fuel additives contribute to PM emissions which endanger public health. Pursuant to Section 211(c)(2)(A), EPA must consider all relevant scientific evidence available to the agency when setting these standards, including the significant evidence that bioethanol blending is the most practicable replacement for heavy aromatics, and that bioethanol has particularly significant emissions benefits for PM, other criteria pollutants, and GHGs.156 The further reduction of aromatics in gasoline would also be consistent with EPA’s mandates and authority under the Mobile Source Air Toxics Program.157 [EPA-HQ-OAR-2022-0829-0609, p. 33]

155 42 U.S.C. § 7545(c)(1)(A).

156 Id. § 7545(c)(2)(A).

157 See Control of Hazardous Air Pollutants from Mobile Sources, 72 Fed. Reg. 8428 (Feb. 26, 2007).

Bioethanol does not receive the credit it deserves as a powerful tool in reducing both criteria pollutant and GHG emissions. Replacing heavy aromatics with bioethanol blending would maintain octane levels, reduce tailpipe PM emissions, and reduce lifecycle GHG emissions, furthering many of EPA's Clean Air Act mandates. EPA should carefully consider the benefits of bioethanol blending as a key solution in any potential rulemaking to further reduce tailpipe PM reductions. [EPA-HQ-OAR-2022-0829-0609, p. 33]

Organization: Reginald Modlin and B. Reid Detchon

We note the comment in the Proposed Rule that "in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet – especially important considerations during the transition to zero-emission vehicles." Most vehicles entering the market today use gasoline direct injection (GDI) to enhance performance. DOE studies have identified a notable increase in ultrafine particle emissions from GDI engines. The increased number of particles and their size include emissions of toxic polycyclic aromatic hydrocarbons (PAHs). [EPA-HQ-OAR-2022-0829-0570, pp. 2-3]

For mobile source air toxics, such as PAHs derived from gasoline emissions, the Clean Air Act requires "the greatest degree of emission reduction achievable through the application of technology which will be available." In that context, just as with greenhouse gas emissions, vehicles and fuels must be seen as parts of an integrated system. The Department of Energy clearly understands the need for such an approach. Since 2016, the Co-Optimization of Fuels & Engines initiative (known as Co-Optima) has explored how simultaneous innovations in fuels and engines can boost fuel economy and vehicle performance, while reducing emissions. The Co-Optima team views fuels "not as standalone elements in the transportation system, but as dynamic design variables that can work with modern engines to optimize and revolutionize the entire on-road fleet." Their work will be useful as EPA considers the adoption of improved fuels in current and future rulemakings. [EPA-HQ-OAR-2022-0829-0570, pp. 2-3]

b. In the 30 years since the law was enacted, EPA has issued specific regulations on the subject of mobile source air toxics (MSATs) only twice – putting modest limits on benzene emissions in 2001 and on the benzene content of gasoline in 2007, but largely deferring action on the others. [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

i. The 2001 rule did list the BTEX aromatics as mobile source air toxics and noted that mobile sources accounted for more than 75% of total national emissions in each instance. Also listed was polycyclic organic matter: A group of seven PAHs, "which have been identified by EPA as probable human carcinogens" – including BaP – were used as surrogates for the larger group of POM compounds. Mobile sources were said to account for only 6% of total national emissions – but as measured by mass, not particle number. [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

129 U.S. EPA, "Control of Emissions of Hazardous Air Pollutants from Mobile Sources" (2001), op. cit., supra note 22.

c. Congress reiterated its 1990 mandate in the Energy Policy Act of 2005: "Not later than July 1, 2007, the [EPA] Administrator shall promulgate final regulations to control hazardous air pollutants from motor vehicles and motor vehicles fuels ... as authorized under section 202(l) of the Clean Air Act." [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

130 Energy Policy Act of 2005, P.L. 109-58, "Elimination Of Oxygen Content Requirement For Reformulated Gasoline," sec. 1504(b)(1)(vi): https://www.congress.gov/109/plaws/publ58/PLAW-109publ58.pdf (accessed Feb. 24, 2021). Codified at 42 U.S. Code, sec.?7545(k)(1)(B)(vi), "Regulation of fuels": https://www.law.cornell.edu/uscode/text/42/7545 (accessed Feb. 24, 2021).

i. EPA issued its 2007 mobile-source rule in response to this congressional directive. It acknowledged that "Recent studies have found that maternal exposures to PAHs in a population of pregnant women were associated with several adverse birth outcomes, including low birth weight and reduced length at birth, as well as impaired cognitive development at age three." [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

131 U.S. Environmental Protection Agency, "Control of Hazardous Air Pollutants From Mobile Sources; Final Rule," Federal Register (2007): 72(37): p. 8439: https://www.govinfo.gov/content/pkg/FR-2007-02-26/pdf/E7-2667.pdf (accessed Feb. 24, 2021).

1. But EPA took no action, saying that, according to its model, emissions of polycyclic organic matter "correlate directly with VOC emissions" and thus would decline as VOC emissions decline – failing to anticipate the contrary effect of new GDI engine technology, noted above. [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

132 Ibid., p. 8478.

ii. In proposing the rule, the agency also acknowledged "limited data that suggest that aromatic compounds (toluene, xylene, and benzene) react photochemically in the atmosphere to form secondary particulate matter (in the form of secondary organic aerosol (SOA)), although our current modeling tools do not fully reflect this" (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

133 U.S. Environmental Protection Agency, "Control of Hazardous Air Pollutants From Mobile Sources; Proposed Rule," Federal Register (2006): 71(60): p. 15864: https://www.govinfo.gov/content/pkg/FR-2006-03-29/pdf/06-2315.pdf#page=62 (accessed Feb. 24, 2021).

Organization: Steven G. Bradbury

My comments are divided into two parts:

First, I will explain why I believe these proposed rules far exceed the EPA's authority under section 202 of the Clean Air Act4 and clearly implicate the Supreme Court's "Major Questions Doctrine" under West Virginia v. EPA and related cases.5 Thus, if finalized as proposed, these rules would be "in excess of statutory … authority" within the meaning of the Administrative Procedure Act, or APA.6 [EPA-HQ-OAR-2022-0829-0647, p. 2]

4 42 U.S.C. § 7521, https://www.law.cornell.edu/uscode/text/42/7521.

5 See West Virginia v. EPA, No. 20-1530, 597 U.S. (2022), https://www.oyez.org/cases/2021/20-1530.

6 See 5 U.S.C. § 706(2)(C) ("The reviewing court shall … hold unlawful and set aside agency action, findings, and conclusions found to be … in excess of statutory … authority.").

The Proposed Rules Exceed EPA's Statutory Authority

Congress has never voted to cede to the Administrator of the EPA the far-reaching power and discretion the Agency is claiming in these rulemakings. There has been no delegation from the people's elected representatives—let alone a clear and express delegation—of such economy-wide transformational power that could survive analysis under the Major Questions Doctrine. [EPA-HQ-OAR-2022-0829-0647, pp. 3-4]

If finalized as proposed, these rules would exceed the bounds of EPA's statutory authority in two fundamental respects—one relating generally to the Agency's regulation of carbon dioxide emissions from new motor vehicles; the other involving its leveraging of pollution-control authority to force on the American people a hyper-accelerated transition to electric vehicles. [EPA-HQ-OAR-2022-0829-0647, pp. 3-4]

This scheme bears no resemblance to EPA's past approach to the regulation of vehicle emissions under the Clean Air Act.

Previously, when EPA has set emissions limits for criteria pollutants under section 202, the available control technologies that EPA has recognized as feasible for achieving compliance have involved cleaner fuels and discrete types of equipment added to the ICE vehicle. This equipment includes, for example, enhanced catalytic converters to capture certain types of pollutants and scrub them out of the vehicle's exhaust, onboard computers to control more precisely the fuel mixture burned by the vehicle's engine, vapor-capture systems for refueling, and fuel-injection systems to recycle unburned fuel back into the cylinders. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

The use of these types of discrete control technologies has already achieved impressive reductions in smog-producing criteria pollutants. As EPA itself acknowledges, exist- ing control technologies applied under previous regulations have enabled automakers to attain "reductions of up to 80 percent in tailpipe criteria pollutant emissions" from ICE vehicles.21 [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

21 88 FR at 29188.

But now, in these rules, EPA is proposing to do something radically different. The so-called control technology here is not some discrete equipment added to the ICE vehicle to achieve lower emissions; it is entirely separate replacement technology that uses a new and different powertrain. These are replacement vehicles, not true control technology; they are different vehicles from bumper to bumper, built on entirely different production lines. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

The EPA's current proposals are thus closely analogous to the Clean Power Plan that was struck down by the Supreme Court last year in West Virginia v. EPA:

There, EPA was relying on its Clean Air Act authority to regulate power plant emissions based on the "best system of emission reduction" available to the plant operator. EPA had previously exercised that authority by setting emissions standards that required individual plants to take measures "to operate more cleanly." But in the Clean Power Plan, EPA concluded that coal-fired power plants could not eliminate enough carbon dioxide emissions to satisfy EPA simply by employing additional measures at the plant. Instead, EPA proposed to require them to choose between greatly reducing their own electricity production (potentially even shutting down the plant) or paying to subsidize increased elec- tricity generation from alternative sources, including natural gas, wind, and solar power (the so-called "generation shifting" concept). The overall goal was to reduce the percentage of national electricity generation supplied by coal and increase the percentage contribution from wind and solar. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

The Supreme Court held that the Clean Power Plan implicated the Major Questions Doctrine because EPA was claiming the power to "restructure the American energy market," and this represented a "transformative expansion" in the Agency's exercise of its regulatory authority. The Court was unconvinced that Congress had "implicitly tasked" the EPA "with balancing the many vital considerations of national policy implicated in deciding how Americans will get their energy," or with the authority to decide "how much of a switch from coal to natural gas is practically feasible" for the nation. There was "little reason to think Congress" had assigned matters of such economic and political significance to the EPA's discretion. "The basic and consequential tradeoffs involved" are "ones that Congress would likely have intended for itself." [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

Everything the Supreme Court said about the Clean Power Plan can be said about the EPA's current proposals for regulating vehicle emissions. As it tried to do with the power market, EPA is now attempting to leverage its authority to set emissions limits for particular types of vehicles into a grand new scheme for shifting and rebalancing the overall mix of ICE, battery-electric, and other powertrains in the national auto fleet—an extravagant role for the Agency to play, and one with enormous economic and political implications. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

Indeed, the current proposals represent an even more extreme example of regulatory overreach than the Clean Power Plan. Here, EPA is attempting to coerce the automakers into financing the entire transformation of the manufacturing base of a major industrial sector by converting their own production of ICE vehicles to EVs on a large scale, not simply contributing toward the marginal subsidization of alternative investments by others. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

Moreover, in the name of ensuring that its own preferred "control technology" will actually deliver the expected performance as a suitable long-term substitute for ICE vehicles, EPA is also claiming the authority to regulate the design and functionality of battery-electric technology over the entire life cycle of EVs. Like CARB, EPA proposes to adopt and enforce "Global Technical Requirement" (GTR) No. 22, promulgated by the United Nations Economic Commission for Europe, which sets standards and requirements for validating electric battery durability.22 [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

22 See 88 FR at 29284-85; 88 FR at 26013-15.

Thus, EPA expects to be in the permanent business of regulating EV technologies, which involve no tailpipes at all, let alone tailpipe emissions—all under the aegis of a statute enacted by Congress to address air pollution from vehicle tailpipes. [EPA-HQ-OAR-2022-0829-0647, pp. 8-10]

What is clear is that EPA sees an endless horizon for its new-found power to regulate practically all aspects of the American automotive market. No doubt, for example, the Agency intends to be involved in overseeing the buildout and operation of electric vehicle charging infrastructure around the country—once again, as an incident of the regulators' own expansive conception of their section 202 authority to ensure the adequacy of EPA's chosen control technology. [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

We can easily imagine that someday this self-assumed mandate will include the power to ration the timing and extent of drivers' access to charging networks, as EPA deems necessary to maintain the general supply of electricity for EVs. California is already doing this. Because the buildout of charging infrastructure will depend critically on government subsidies and approvals, government rationing of access to this infrastructure is a very real prospect, especially given the strains on grid reliability that I discuss below. [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

The bottom line under the Major Questions Doctrine is that section 202, on which the proposed rules rest, contains no clear and express delegation of any authority that could sustain these massively consequential proposals. As the Court observed in West Virginia v. EPA, "Congress certainly has not conferred [such] authority upon EPA anywhere … in the Clean Air Act." [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

The Analyses and Assumptions on Which the Proposed Regulatory Actions Are Based Are Arbitrary, Fundamentally Flawed, and Fail to Recognize and Account Properly for the Hugely Negative Consequences that Would Result from These Actions [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

EPA claims that, despite the coercive power and industry-transforming ambition behind its proposals, these rules will somehow deliver a stupendous bounty of net benefits, ranging at the high end from $1.5 trillion to $2.3 trillion for the light- and medium-duty vehicle rule,23 plus another $180 billion to $320 billion for the heavy-duty truck rule.24 [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

23 Id. at 29200.

24 88 FR at 25937.

Organization: Tesla, Inc.

Tesla believes that this proposed rule -- in substance and structure -- is firmly in the mainstream of long and well-established agency motor vehicle emissions standard setting activities, and well within industry expectations and the agency's authorities. Indeed, the agency has deployed fleet averaging approaches for decades to provide manufacturers flexibility while increasing the stringency of motor vehicle emissions standards. 128 And it has addressed GHG emissions and criteria pollutants in doing so since 2010. 129 EPA's action has been rooted in the Clean Air Act's textual recognition that EPA is to set and revise standards controlling emissions from vehicles, "whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution."130 [EPA-HQ-OAR-2022-0829-0792, p. 21]

128 See, e.g., 45 Fed. Reg. 79382-83 (Nov. 28, 1980); Nat. Res. Defense Council v. Thomas, 805 F.2d 410, 425-26 (D.C. Cir. 1986).

129 75 Fed. Reg. 25324 (May 7, 2010) (Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule for MY 2011 and later).

130 42 U.S.C. § 7521(a)(1).

In addition, EPA has, for example, repeatedly expressed its own understanding that GHG standards should be viewed as a strategy to help control criteria pollutants to address National Ambient Air Quality Standards (NAAQS) nonattainment, as well as to address the climate crisis. EPA has previously explained that "[c]limate change is expected to increase regional ozone pollution, with associated risks in respiratory illnesses and premature death."131 Whether through its impact on reducing atmospheric temperatures that contribute to the formation of ozone, or through its direct impact on air quality by lowering or eliminating altogether tailpipe emissions of smog-forming pollutants and PM, enhanced BEV recognition in the development of these requirements will have a significant impact on achieving air quality targets.132 [EPA-HQ-OAR-2022-0829-0792, p. 21]

131 Endangerment Finding, 74 Fed. Reg. at 66525 ("There is now consistent evidence from models and observations that 21st century climate change will worsen summertime surface ozone in polluted regions of North America compared to a future with no climate change."); (While ozone "is a local or regional air pollution problem, the impacts of global climate change can nevertheless exacerbate this local air pollution problem.").

132 Nonattainment for conventional pollutants such as NOx is also significantly affected by upstream fuel impacts from refinery emissions that are reduced or eliminated by a conversion to zero emissions vehicles. See California Air Resources Board, Analysis in Support of Comments on the SAFE Rule at 69, available at h ttps://www.edf.org/sites/default/files/CARB_Detailed_Comments_on_SAFE_NPRM.pdf.

Furthermore, the seemingly sharp former distinctions between regulatory strategies to address criteria pollutant emissions and GHG emissions have continued to erode in view of the appropriate control strategies and technologies and the increasingly smaller margins for improvement from conventional ICE emissions. States have noted that zero emission vehicles (ZEVs) produce no tailpipe emissions, reduce brake wear PM emissions, and have lower upstream emissions to contribute to their State Implementation Plan (SIP) strategies.133 EPA's 2017 Tier 3 standards, for example, achieved reductions of methane (CH4) and nitrous oxide (N2O), each of which are GHGs that were part of EPA's endangerment finding.134 [EPA-HQ-OAR-2022-0829-0792, pp. 21-22]

133 See e.g., CARB, Staff Report: Initial Statement of Reasons (Oct. 22, 2019) at 5, Table ES-1: Expected Emission Reductions of Proposed ACT Regulation Calendar Year (NOx (tpd) PM2.5 (tpd) WTW GHG (MMT/yr.) 2031 5.0 0.16 0.4 2040 16.9 0.46 1.7 (Proposed Rule)) available at h ttps://ww3.arb.ca.gov/regact/2019/act2019/isor.pdf

134 79 Fed. Reg. at 23445.

EPA has previously recognized the importance of this harmonization. In promulgating its Tier 3 motor vehicle emissions standards, for example, the agency noted:

The Tier 3 program addresses interactions with the 2017 LD GHG rule in a manner that aligns implementation of the two actions, to achieve significant criteria pollutant and GHG emissions reductions while providing regulatory certainty and compliance efficiency. As vehicle manufacturers introduce new vehicle platforms for compliance with the GHG standards, they will be able to design them for compliance with the Tier 3 standards at the same time.135 [EPA-HQ-OAR-2022-0829-0792, pp. 21-22]

135 79 Fed. Reg. at 23417.

Given the continuing need for emissions reductions in both the criteria pollutant and the GHG arenas and the increasing capabilities presented by advanced technologies, the multi-pollutant standards EPA is proposing are fully expected by automotive manufacturers, appropriate, and essential. Indeed, the Supreme Court has broadly defined emissions "standards" under the Clean Air Act as including instances where fleet ZEV standards were sought to be enforced.136 The Court explained that: [EPA-HQ-OAR-2022-0829-0792, p. 22]

136 Engine Mfrs. Ass'n v. S. Coast Air Quality Mgmt. Dist., 541 U.S. 246, 258 (2004).

Organization: Valero Energy Corporation

V. EPA lacks statutory authority—much less clear congressional authorization—to support the proposed action. [EPA-HQ-OAR-2022-0829-0707, pp. 65-66]

In this proposal and its companion proposal regarding HDV greenhouse gas emissions standards, EPA relies, for the first time outside of litigation, on its purported authority to mandate electrification as an "emission control device" or "emission control technology." It is also the first time that EPA proposes standards for MDVs, a subset of HDVs under the Clean Air Act, that rely on the availability of ZEV technologies.351 And it is also the first time that EPA utilizes its criteria pollutant standards, either standing alone or in combination with EPA's greenhouse gas emissions standards, to force further vehicle electrification. For these dramatic changes, however, EPA must have clear congressional authority. Yet EPA has failed to identify such clear authority for the standards and the electrification mandate. Instead, EPA relies on general authority and congressional statements that do not provide clear authority for the proposed action. To the contrary, EPA's references in the proposal demonstrate that Congress had many opportunities to provide clear authority but declined to do so. [EPA-HQ-OAR-2022-0829-0707, pp. 65-66]

351 Because the adoption of ZEVs contemplated by EPA in the proposal consists primarily, if not exclusively, of electric vehicles, these comments focus on the proposal's forced electrification of the Nation's LDV and MDV fleet; however, it should be noted that EPA's definition of ZEVs also includes other technologies, such as hydrogen fuel cell vehicles, which face even greater hurdles to widespread adoption and, more importantly, are equally unauthorized by Congress.

1. EPA claims an unheralded power with staggering implications.

In asserting the sweeping power to mandate increasingly high levels of electrification, EPA claims to have "discover[ed] in a long-extant statute an unheralded power to regulate 'a significant portion of the American economy.'" Utility Air, 573 U.S. at 324 (quoting Brown & Williamson, 529 U.S. at 159). The novelty and broad implications of the agency's approach are powerful clues that Congress never authorized it. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

Novel Assertion of Agency Authority.

Skepticism is warranted when an agency asserts an "unheralded power representing a transformative expansion in its regulatory authority." West Virginia, 142 S. Ct. at 2610 (internal quotation marks omitted). In prior rules setting greenhouse-gas emission standards, EPA has treated electric vehicles as a compliance "option" or "flexibility." In fact, for the 2021 GHG standards for LDVs, EPA argues that electrification was not mandated but was an option, that manufacturers could comply without using EVs. However, for the proposed LDV and MDV rule, EPA does not claim that electrification is merely an option and EPA's model clearly demonstrates that EPA expects OEMs to comply with the proposed standard by increasing production of BEVs and FCEVs while phasing out production of ICEVs. Indeed, with the exception of the companion HDV standards proposed in concert with this rule, forced electrification has never before even been on the table for MDVs (and other HDVs). Nor has EPA previously utilized its criteria pollutant standards in a thinly-cloaked strategy to disincentivize further ICEV production in favor of vehicle electrification, as it does in the proposal. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

Future Implications of the Agency's Claimed Power. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

EPA has made no secret of the significance of the power it proposes to exercise here. In its proposed rule, EPA asserts the authority to force electrification as an "emission control technology" and notes that "[v]ehicle manufacturers can use powertrain electrification as an emissions control technology to comply with EPA standards and to generate credits for use in averaging, banking, and trading." 88 Fed. Reg. at 29184; see id. at 29346 ("This proposal seeks to build on the trends that these developments and projections indicate, and accelerate the continued deployment of these technologies…."); id. at 29312 ("Although the market share of PEVs in the U.S. is already rapidly growing, EPA recognizes that the proposed standards may accelerate this trend."). And as described above, this proposal is only part of a greater "whole of government" approach to mandate electrification at the Biden Administration's direction. By claiming the power of mandating some electrification of the Nation's vehicle fleet, EPA is claiming the authority to mandate 100% electrification as well. As in West Virginia, there is no reason to believe that EPA will stop here. "[O]n this view of EPA's authority, it could go further, perhaps forcing" LDV and MDV manufacturers to "cease making" internal-combustion vehicles altogether. 142 S. Ct. at 2612. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

In fact, this is exactly where EPA is headed. When EPA announced its proposal, it stated that the standards would "accelerate the ongoing transition" to an all-electric future, "delivering on" the Biden-Harris Administration's climate agenda.363 And in related rulemakings, EPA authorized California to adopt its own greenhouse-gas emission standards in its Advanced Clean Cars and Advanced Clean Trucks programs—an authority California is already citing to ban new combustion-engine vehicles and require 100-percent electrification of the LDV, MDV, and HDV fleets by 2036 via its Advanced Clean Cars II and Advanced Clean Fleets programs. See 87 Fed. Reg. 14,332; 88 Fed. Reg. 20,688. Both parts of EPA's strategy reveal the agency's goal to convert America to electric vehicles. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

363 https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and. (emphasis added).

Given the vast economic and political significance of EPA's proposal, it "must point to 'clear congressional authorization' for the power it claims." West Virginia, 142 S. Ct. at 2609. There is not one word in the Clean Air Act about a nationwide agency-led transition from conventional internal-combustion vehicles to electric vehicles, or any other so-called ZEV. To be sure, EPA has the power to set emission standards for air pollutants from motor vehicles, just as EPA had the power in West Virginia to set emission standards for air pollutants from power plants. But what EPA claims here for the first time is the authority to set standards in such a way that manufacturers can comply only by abandoning internal-combustion vehicles in favor of electric vehicles. And nothing in the Clean Air Act authorizes that. [EPA-HQ-OAR-2022-0829-0707, pp. 71-73]

Organization: Western Energy Alliance

While acknowledging that EPA must:

“consider issues of technological feasibility, the cost of compliance, and lead time. EPA also may consider other factors, and in previous vehicle standards rulemakings, [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

as well as in this proposal, has considered the impacts of potential standards on emissions of air pollutants and associated public health and welfare effects, impacts on the automotive industry, impacts on the vehicle purchasers/consumers, oil conservation, energy security and other energy impacts, safety, and other relevant considerations.” p. 29186 [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

it does not appear that EPA has actually done so. EPA’s logic is often flawed in the analysis and the information relied on is biased or incomplete. [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

EPA Summary and Response

EPA responds to these comments, together with the comments reprinted in sections 2 and 2.1, below in section 2.3.

2.3 - EPA responses to comments in section 2

Major Questions Doctrine

A number of commenters expressed views that EPA lacks statutory authority to adopt this rule because it is an extraordinary exercise of agency power for which EPA lacks clear authority from Congress. Other commenters express the view that CAA section 202(a)(1) provides clear authority for EPA to set performance-based standards using ABT that take into consideration electrification technologies, and this rule does not raise a so-called “major question.”

EPA agrees with the latter commenters. In Section 202(a), Congress directed EPA to regulate motor vehicle emissions based on its consideration of available technologies, their costs, and lead-time. In the final rule, consistent with its earlier rules, EPA considered updated data on pollution control technologies. The agency found that a range of technologies—including certain BEV technologies which prevent motor vehicle emissions—could be produced at a reasonable cost during the years covered by this rule, model years 2027-32. Based on the agency’s evaluation of all available technologies, EPA decided to strengthen the existing emissions standards for light and medium duty vehicles.

Commenters asserted that EPA lacks authority to adopt the final standards because the agency’s approach raised a major question and the statute is not sufficiently clear in granting EPA the necessary authority. Notwithstanding the plain statutory language in section 202(a) and EPA’s consideration of BEV technologies since the Tier 2 rule in 2000, commenters newly contended that the statute limits the agency to considering only technologies applicable to vehicles with specific types of engines—namely gasoline and diesel internal combustion engine (ICE) vehicles—or only encouraging the adoption of BEV technologies at some lower level.

Commenters' arguments are misplaced. As we discuss in preamble I.A-B and part I below, the statute provides clear Congressional authorization for EPA to consider updated data on all types of pollution control technologies—including BEV technologies—and to determine the emission standards accordingly. In section 202(a), Congress made the major policy decision to regulate air pollution from motor vehicles. Congress also prescribed that EPA should accomplish this mandate through a technology-based approach, and it plainly entrusted to the Administrator's judgment the evaluation of available pollution control technologies and the consequent determination of the emission standards. In the final rule, the Administrator determined that a wide variety of technologies exist to further control emissions from light and medium duty vehicles—including various ICE, hybrid, and BEV technologies, as well as add-on controls—and that such technologies could be applied at a reasonable cost to significantly reduce emissions of air pollutants that contribute to pollution that endangers the public health and welfare. These subsidiary technical and policy judgments were clearly within the Administrator's delegated authority. Because the meaning of the statutory text, read in its context, is unambiguous, there is no need to evaluate whether a major question exists.

In any event, EPA does not agree that this rule implicates the major questions doctrine as elucidated by the Court in *West Virginia* and related cases. The Court has made clear that the doctrine is reserved for extraordinary cases involving assertions of highly consequential power beyond what Congress could reasonably be understood to have granted.[1] The Court considers whether the agency's exercise of power is consistent with prior precedents or whether it claims "to discover in a long-extant statute an unheralded power representing a transformative expansion in [its] regulatory authority."[2] This is not such an extraordinary case in which congressional intent is unclear. Here, EPA is acting within the heartland of its statutory authority and faithfully implementing Congress's precise direction and intent. As we explain in part II, the final rule does not invoke a novel and transformative exercise of agency authority. Rather, the agency is acting in its traditional area of expertise, as it has for decades, to promulgate emission standards for motor vehicles. The rule maintains the fundamental regulatory structure of the existing program and iteratively strengthens the existing emissions standards, consistent with a long history of similar rules.

In part III, we assess the consequences of the rule. While this rule is a significant regulation of the motor vehicle industry, the nature and impacts of the rule are similar in kind to prior rules. On some important metrics, its impacts are smaller than prior rules. We also address commenters' reliance on alleged indirect impacts—on areas like national security, grid reliability, and the viability of fossil fuel companies—to claim that this rule creates extraordinary

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[1] *West Virginia*, 142 S. Ct. at 2607–08 (cleaned up).

[2] *West Virginia*, 142 S. Ct. at 2610 (citing Util. Air Regul. Grp. v. E.P.A., 573 U.S. 302, 324 (2014)) (alterations in original); id. at 2596 ("This view of EPA's authority was not only unprecedented; it also effected a "fundamental revision of the statute, changing it from [one sort of] scheme of ... regulation' into an entirely different kind."); Biden v. Nebraska, 143 S. Ct. 2355, 2372 (2023) (applying the doctrine upon noting that "past waivers and modifications issued under the Act have been extremely modest and narrow in scope"). But see Biden v. Missouri, 595 U.S. 87, 94, 95 (2022) (declining to apply the major questions doctrine in light of the "longstanding practice of Health and Human Services in implementing the relevant statutory authorities," even though "the vaccine mandate goes further than what the Secretary has done in the past").

consequences. We do not agree that these indirect impacts are relevant to assessing the consequential nature of this rule. The statute does not direct EPA to consider indirect impacts, the legislative history indicates that Congress intended for EPA to regulate despite them, and they are the routine consequence of agency regulation and thus unsuitable for identifying extraordinary exercises of power. Even if these indirect impacts were relevant, EPA has comprehensively assessed these issues, often in consultation with other expert agencies, and found that the final rule does not cause significant indirect harms as alleged by commenters and on balance creates net benefits for society.

In part IV, we consider several additional factors which also weigh against application of the major questions framework: the agency's assertion of authority does not create an unworkable conflict with any other statutory provision; the action does not significantly alter the balance of Federal and state power or the power of government over private property; and notwithstanding ongoing political interest in motor vehicle GHG regulation, the weight of statutory and legislative evidence supports EPA's authority.

I. THE STATUTE PROVIDES CLEAR CONGRESSIONAL AUTHORIZATION.

As we explain in great detail in preamble III.B, the statute clearly authorizes EPA to consider BEV technologies in setting emission standards under section 202(a). Section 202(a) requires the Administrator to establish emission standards for classes of motor vehicles based on the "development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."[3] "Motor vehicles" are defined broadly to mean "any self-propelled vehicle designed for transporting persons or property on a street or highway."[4] Electrification technologies, including BEVs, are "technologies" that reduce emissions and apply to "motor vehicles." Thus, EPA may consider such technologies in determining the emissions standards. The statutory context, purpose, and history, as well as administrative precedent, support this conclusion. Indeed, the statute unambiguously mandates EPA to consider BEVs on this record, as they are highly effective pollution control technologies available during the timeframe of this rule and at a reasonable cost.[5] In preamble III.B and later in this RTC section, we further address related statutory interpretation comments, including that BEVs cannot belong to the same "class" of vehicles as ICE vehicles and that BEVs are not "complete systems" or "devices" that "prevent or control" air pollution under section 202(a)(1).

We make three additional observations here in support of our argument that the statute provides clear Congressional authorization: (1) in section 202(a), Congress made the major policy decision to regulate air pollution from motor vehicles and appropriately delegated to EPA the interstitial judgments of identifying available pollution control technologies—like electrification technologies—and the level of the standards; (2) the statutory language is clear, and does not rely on modest or vague terms; and (3) the statutory provision is central to controlling motor vehicle emissions, not some ancillary or backwater enactment.

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[3] CAA section 202(a)(1), (a)(2).
[4] CAA section 216(2).
[5] *See Guedes v. ATF*, 45 F.4th 306, 313 (D.C. Cir. 2022) (holding that when "traditional tools of statutory interpretation" show that the agency's interpretation is "the best one," the court can uphold the interpretation without resorting to deference principles).

First, in enacting Section 202(a), Congress itself made the relevant major policy decision: to regulate dangerous air pollution from motor vehicles. Granting the Executive Branch such authority was a decision of enormous import. To that point, Congress's prior forays into air pollution control had largely focused on research, funding, and study. Motivated by recent environmental crises and a growing awareness of the dangers of air pollution to public health and welfare, Congress in 1965 conferred upon the agency authority to regulate motor vehicle emissions.[6]

Congress also made the key policy decision that motor vehicle emissions control would be achieved through a technology-based approach: EPA is to identify the available control technologies and establish emissions standards based on the performance of such technologies, their costs, and the lead-time necessary for their development and application. Congress charged the agency with technical determinations and policy judgments of an interstitial nature: what kind of pollution is harmful to public health and welfare, which classes of motor vehicles cause or contribute to such pollution, what technologies exist to mitigate such pollution, the rate and costs at which such technologies can be adopted, the appropriate stringency of the emissions standards in light of findings on technology and costs, and how such standards should be complied with and enforced.[7] Congress conferred on the Administrator the authority to make these subsidiary, but also significant, judgments, recognizing both his expertise in this area, as well as the need to confer "regulatory flexibility" absent which "changing circumstances and scientific developments would soon render the Clean Air Act obsolete."[8] These sorts of technical and policy determinations were well within Congress's power to delegate, and such delegations are ubiquitous throughout the Clean Air Act.[9]

In subsequent amendments to the Act, Congress made clear the reach of section 202(a): it could be used to drive not merely modest reductions in motor vehicle emissions, but order-of-magnitude reductions. For example, in the 1970 Clean Air Act Amendments, Congress mandated that the Administrator issue regulations to reduce emissions of certain pollutants by 90% over a five-year period.[10] The 1990 Amendments required 100% phase-in of a new set of demanding

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[6] Motor Vehicle Air Pollution Control Act, Pub. L. 89-272 (1965). *See generally* Arthur C. Stern, History of Air Pollution Legislation in the United States, 32 J. OF THE AIR POLLUTION CONTROL ASS'N 44 (1982), *available at* https://www.tandfonline.com/doi/abs/10.1080/00022470.1982.10465369.

[7] *See* CAA section 202(a)(1) (delegating authority to determine what "air pollution which may reasonably be anticipated to endanger public health or welfare" and which emissions of air pollutants from a class or classes of motor vehicles "cause, or contribute" to such air pollution, and to establish standards to control such emissions), CAA section 202(a)(2) (delegating authority to determine the "period … necessary to permit the development and application of the requisite technology" to control such emissions and the "cost of compliance," and to balance these factors in determining the emissions standards), CAA sections 203-208 (delegating authority to determine the manners of compliance and enforcement).

[8] *Massachusetts v. EPA*, 549 U.S. 497, 532 (2007); *see also NRDC. v. EPA*, 655 F.2d 318, 322 (D.C. Cir. 1981).

[9] *See, e.g.*, CAA section 108, 109, 111, 112, 169A, 202.

[10] *See* Clean Air Act Amendments of 1970, Pub. L. 91-604, at sec. 6, 84 Stat. 1676, 1690 (Dec. 31, 1970) (amending section 202 of the CAA and directing EPA to issue regulations to reduce carbon monoxide and hydrocarbons from LD vehicles and engines by 90 percent in MY 1975 compared to MY 1970 and directing EPA to issue regulations to reduce NOx emissions from LD vehicles and engines by 90 percent in MY 1976 compared to MY 1971). Subsequent factual developments led to relaxation of the standards, see CAA section 202(b)(1); however, the 1970 statute nonetheless illustrates the breadth of EPA's statutory authority to mandate rapid emissions reductions. *See generally* preamble III.B (discussing the statutory numeric standards in section 202(b), (g)-(j), which required dramatic and rapid reductions in emissions).

standards over a six to seven model year period.[11] Congress further clarified that EPA should not view even such enormous reductions as the full extent of Congress's pollution-control intentions, but expressly empowered the agency to go still further.[12]

Commenters do not seriously question that the final rule implements the major policy decision Congress made: regulating air pollution from motor vehicles. Nor do commenters raise any plausible argument against the fact that Section 202(a)(1)-(2) entrusts to the Administrator's judgment the evaluation of pollution control technologies, their costs, and their rate of adoption. Rather, commenters disagree with how the Administrator has considered specific pollution control technologies (i.e., BEVs) in determining the standards. But the evaluation of pollution control technologies is fundamentally an interstitial decision well within EPA's authority.[13]

Commenters fail to seriously question this beyond suggesting that the final rule is unlawful absent an explicit legislative command to consider BEVs or (conversely) to only consider technologies applicable to ICE vehicles.[14] But Congress intentionally chose not to limit EPA's authority to ICE vehicles. Instead, it made the major policy decision here to control motor vehicle pollution via a technology-based approach and delegated to the Administrator the responsibility to implement that policy. Were this not so, any time a significant new pollution control technology has come along—and many have over the years—Congress would need to pass a new statute. While some commenters may prefer this outcome, they articulate no good reason for why Congress must serve as a perpetual monitor of new technological developments in the field of motor vehicle emissions control, as opposed to delegating such technical matters to the expert agency.

Second, the statutory language is clear, and does not use modest words, vague terms, or subtle devices.[15] As explained above and in preamble III.B, the statute is replete with clear language. Among other things, section 202(a) directs the Administrator to regulate emissions from "motor vehicles," which the statute defines as "any self-propelled vehicle designed for transporting persons or property on a street or highway."[16] Unlike other statutory provisions, Congress intentionally abstained from using limiting language such as "internal combustion engine"[17] or "gasoline" or "diesel" engine vehicles.[18] Section 202(a)(2) then directs EPA to establish the

[11] *See* CAA section 202(g).
[12] *See*, *e.g.*, CAA section 202(b)(1)(C) ("The Administrator may promulgate regulations under subsection (a)(1) revising any standard prescribed or previously revised under this subsection…. Any revised standard shall require a reduction of emissions from the standard that was previously applicable."), (i)(3)(B)(iii) ("Nothing in this paragraph shall prohibit the Administrator from exercising the Administrator's authority under subsection (a) to promulgate more stringent standards for light-duty vehicles and light-duty trucks … at any other time thereafter in accordance with subsection (a).")
[13] *See also West Virginia*, 142 S. Ct. 2587, 2601, 2602, 2611 (2022) (under statutes that provide for a technology-based approach to pollution control, noting with approval EPA's determination that "more traditional pollution control measures" include "efficiency improvements, fuel-switching," and "add-on controls").
[14] *But see Nebraska*, 143 S. Ct. 2355, 2378 (2023) (Barrett, J., concurring) (concluding that none of the Court's cases "requires an unequivocal declaration from Congress authorizing the precise agency action under review").
[15] *West Virginia*, 142 S. Ct. at 2609.
[16] CAA section 216(2).
[17] *See* CAA section 216(10) (definition of nonroad engine).
[18] *Compare*, *e.g.*, CAA section 202(a)(1)-(2) (granting general power to the Administrator to establish emission standards for "any class or classes of new motor vehicles or new motor vehicle engines"), with section 202(a)(3)(B)(ii) (addressing regulations under section 202(a)(1) for certain "gasoline and diesel-fueled" vehicles), 202(h) tab. H (same), (i)(1) (same), (k) (addressing regulation of "all gasoline-fueled motor vehicles").

standards for motor vehicles based on the "development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." The statute does not confine the agency to consider any specific technology, but rather contains explicitly expansive language on the types of eligible technology.[19] Again, Congress made the major policy decision to regulate air pollution from motor vehicles and plainly entrusted the means of achieving such regulation to the Administrator's judgment. "The broad language of § 202(a)(1) reflects an intentional effort to confer the flexibility necessary to forestall … obsolescence."[20]

Third, section 202(a) is not a mere "ancillary" or backwater provision,[21] but rather has been the cornerstone of motor vehicle emissions regulation since its enactment in 1965. Section 202(a)(1) confers on EPA the "general regulatory power" to regulate motor vehicle emissions.[22] Additionally, over the course of the Clean Air Act Amendments of 1970, 1977, and 1990, Congress directed EPA to exercise this authority to promulgate many specific and stringent standards for controlling motor vehicle emissions.[23] Congress also enacted numerous other provisions providing for compliance with and enforcement of such standards.[24] Since section 202(a)'s enactment, EPA has also regularly exercised this authority to promulgate highly consequential motor vehicle emission standards, including numerous criteria pollutant and GHG standards.[25]

II. THE FINAL RULE DOES NOT ASSERT A TRANSFORMATIVE EXPANSION IN AGENCY POWER.

A. The final standards represent an iterative strengthening of existing standards.

The final rule is an iterative strengthening of existing emission standards, not "an unheralded power representing a transformative expansion in [the agency's] regulatory authority" or a "fundamental revision of the statute, changing it from one sort of scheme of regulation into an entirely different kind."[26] The rule asserts the same authority as asserted in earlier rules adopted under section 202(a), and it is premised on technical and policy judgments regarding motor vehicle pollution control that lie in the heartland of EPA's expertise.

[19] *See* CAA section 202(a)(1) ("Such standards shall be applicable to such vehicles and engines for their useful life … whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution.").
[20] *Massachusetts*, 549 U.S. 497, 532 (2007); *see also NRDC. v. EPA*, 655 F.2d 318, 322 (D.C. Cir. 1981) (characterizing section 202(a)(1) as a "general regulatory power" to establish "technology-based" standards for motor vehicles); S. REP. NO. 89-192, at 4 (1965) and H.R. REP. NO. 89-899, at 4 (1965) (House and Senate reports on 1965 legislation indicating the agency should adjust to changing technology in setting standards).
[21] *West Virginia*, 142 S. Ct. at 2610.
[22] *NRDC*, 655 F.2d 318, 322 (D.C. Cir. 1981).
[23] *See, e.g.*, CAA section 202(b), (g)-(j), (l).
[24] *See, e.g.,* CAA section 202(d), 203-08; *see also* CAA sections 209(b)(1)(C) (imposing consistency with section 202(a) as a condition for granting a waiver of preemption), 213 (modeling nonroad provisions on section 202).
[25] *See* EPA, *Emission Standards Reference Guide for On-road and Nonroad Vehicles and Engines*, https://www.epa.gov/emission-standards-reference-guide.
[26] *West Virginia*, 597 U.S. 697, 724, 728 (2022).

As a preliminary matter, we emphasize the real-world context antecedent to this rulemaking: the industry is making a significant shift to electrification and BEVs in particular. EPA's determination of what emissions reductions are feasible and appropriate is based first on its assessment of the future market for light and medium duty vehicles. EPA's assessment of the record—including technical information, manufacturer plans, third-party projections, and other relevant data—indicates that advancements in technology, together with the support provided by the BIL, IRA, and other government programs, will lead to significantly greater adoption of electrification technologies even absent new standards. For example, EPA anticipates that, absent this rule, PEVs will represent 39% of new light duty vehicles by MY 2030, as compared to our central estimate of 53% under the rule.[27] Some commenters may anticipate somewhat higher or lower figures than EPA's projection, but it is clear that increasing numbers of PEVs will be produced regardless of EPA rulemaking.

This fact is understood by the regulated community; Ford, Stellantis, and GM have all previously committed to selling 50% or more BEVs by 2030, and several other companies have indicated even higher targets; by comparison, EPA only projects 44% BEV penetration under the final standards. In comments on the proposal, manufacturers reiterated their continued commitment to electrification. Ford, for example, stated "Ford is all-in on electrification. We are investing more than $50 billion through 2026 to deliver breakthrough electric vehicles (EVs)" and expressed their support for a 2032 endpoint of approximately 67 percent PEVs.[28] GM's comments "reiterate[] our commitment" to sell 50 percent EVs by 2030 as "the appropriate path toward all EVs by 2035."[29] Stellantis stated it "is unwavering in its commitment to an all-electric portfolio and building an EV dominated market" including a 50 percent EV mix for passenger cars and light trucks by 2030.[30] Volkswagen expressed its goal of 20 percent BEV sales globally by 2025, and more than 50 percent by 2030.[31] Other OEMs also restated their own significant commitments to electrification, with Honda restating its commitment to selling 40 percent zero-emitting vehicles by 2030 and 80 percent by 2035[32] and Hyundai noting their support for selling 50 percent PEVs in 2030.[33] The final rule builds on these technological advancements, Congressional support, and industry trends.

As discussed in preamble III.B, the rule aligns with decades of the agency's exercise of its CAA section 202(a) authority and enacts an iterative strengthening of the emissions standards established in the earlier rules, including the Tier 3 rule and the 2021 Rule.[34] Since the 1970s, EPA has relied on its CAA section 202(a) authority to set emissions standards for classes of new motor vehicles. In 1971, EPA established the earliest standards for emissions of hydrocarbons, nitrogen oxides (NOx), and carbon monoxide (CO) from light-duty vehicles, requiring a 90% reduction in emissions. Since then, EPA has continued to set standards achieving significant reductions in criteria pollutant (and precursor) emissions for the full range of vehicle classes (including light-duty, medium-duty, and heavy-duty vehicles and passenger, cargo, and

[27] *See* Preamble section I.
[28] Ford Motor Company, EPA-HQ-OAR-2022-0829-0605 at p. 1.
[29] General Motors, LLC, EPA-HQ-OAR-2022-0829-0700 at p. 3-4.
[30] Stellantis, EPA-HQ-OAR-2022-0829-0678 at p. 2.
[31] Volkswagen Group of America, Inc., EPA-HQ-OAR-2022-0829-0669 at p. 2.
[32] American Honda Motor Co. Inc., EPA-HQ-OAR-2022-0829-0652 at p. 3.
[33] Hyundai Motor America, EPA-HQ-OAR-2022-0829-0599 at p. 2
[34] *See also* Brief of Amici Curiae Margo Oge and John Hannon in Support of Respondents, *Texas v. EPA* (D.C. Cir. No. 22-1031) (discussing the history of motor vehicle pollution control and EPA's emissions standards).

vocational vehicles). Over the last several decades, EPA has set progressively more stringent vehicle emissions standards for criteria pollutants. For example, in 1997 EPA adopted the National Low Emission Vehicle program, which included provisions for certifying zero emissions vehicles. In 2000, EPA adopted the Tier 2 standards, which required passenger vehicles to be 77 to 95 percent cleaner (and further encouraged certification of zero-emitting vehicles through the establishment of "Bin 1", which is now referred to as "Bin 0"). Most recently, in 2014, EPA adopted Tier 3 emissions standards, which required a further reduction of 60 to 80 percent of emissions (depending on pollutant and vehicle class). Similar to the prior Tier 2 standards, Tier 3 established “bins” of Federal Test Procedure (FTP) standards, including bins for zero-emitting vehicles. EPA has also consistently set GHG emissions standards applicable to light-duty vehicles pursuant to CAA section 202(a), beginning with the 2010 rule, and continuing through subsequent rulemakings in 2012, 2020, and 2021.[35]

This rule exercises the same basic authority as asserted in many prior rules. The standards are similar with their predecessors in six fundamental ways: they (1) are promulgated pursuant to the same statutory authority, CAA section 202(a)(1)-(2); (2) address the same endangerment findings for GHG and criteria pollutants as applicable; and (3) impose the same basic regulatory requirement to meet more protective, performance-based standards to reduce emissions from motor vehicles,[36] on (4) the same parties (manufacturers of new motor vehicles); are (5) based on the same basic kind of technical justification, as required by 202(a)(2), namely a demonstration that the standards can be met, within the timeframe of the rule, through the “development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period”; and (6) consider the ability of a manufacturer to average the emissions performance of different vehicles across its fleet, which enables manufacturers to achieve emissions reductions more rapidly and for lower cost.[37,38]

Not only is the nature of the power asserted the same as in earlier rules, but the final rule also involves making the same kinds of technical and policy judgments that lie in the heartland of EPA’s traditionally delegated authority, matters in which the agency has clear expertise. As in prior CAA section 202(a) rulemakings, EPA assessed the availability of potential technologies to

[35] *See* 75 FR 25324 (May 7, 2010) (setting GHG standards applicable to model year 2012-2016 LD vehicles); 77 FR 62624 (Oct. 15, 2012) (setting GHG standards for model year 2017-2025 LD vehicles and “building on the success of the first phase of the National program for these vehicles”); 86 FR 774434 (Dec. 30, 2021) (revising GHG standards for model year 2023 and later light-duty vehicle).

[36] Commenters suggest in passing that the rule raises a major question because EPA failed to consider lifecycle emissions impacts associated with BEVs. EPA has considered certain lifecycle impacts, including GHG emissions from both EGUs and oil refineries, in setting the standards. Further, to the extent that commenters are concerned about the rule asserting a transformative and unprecedented exercise of power, EPA fails to see how an expansive consideration of GHG impacts across the entire vehicle and fuels supply chain—e.g., farms, mines, and factories, both domestic and foreign—would mitigate that concern. We further respond to comments about lifecycle emissions impacts in RTC 19.

[37] Averaging provides compliance flexibilities for manufacturers, allowing them to decide how and when to redesign specific vehicles and to deploy new technologies, and to balance these considerations in the way that makes the most sense for their individual vehicle fleets. This flexible structure is consistent with many previous vehicle rules and is effectively designed to reflect the diverse nature of the motor vehicle industry. For further discussion of averaging, as well as banking and trading, please see the later response on ABT in this RTC 2.3.

[38] This sentence applies in its entirety to the GHG and LD NMOG+NOx fleet average standards. As we explain in preamble III, certain standards in this rule are subject to some different requirements, also consistent with their predecessors; for example, the criteria pollutant standards for statutory heavy-duty vehicles are subject to the additional requirements in CAA section 202(a)(3)(A)(i), and the PM standards are per-vehicle standards.

reduce the pollutant at issue, lead time necessary for development and deployment of those technologies, cost of compliance with the standards, cost to purchasers, and broader societal and economic impacts. And as in those prior rules, EPA exercised its policy judgment and technical expertise to determine the final standards giving due consideration to the statutory and other relevant criteria. For example, EPA evaluated the light and medium duty vehicles industry, the technologies to further control GHG and criteria pollutant emissions from such vehicles, their feasibility, and their effectiveness at controlling emissions. EPA designed and applied its state-of-the-art model, OMEGA. EPA calculated cost metrics, including costs of compliance to regulated entities, costs to purchasers, and social costs, as well as other economic impacts. The agency analyzed emissions impacts, including based on the agency's longstanding MOtor Vehicle Emission Simulator (MOVES), and evaluated the health and welfare impacts of the emission reductions. EPA also monetized certain benefits associated with emissions reductions and energy security and performed a cost-benefits analysis. EPA has fully documented all of these steps in the record, including in the preamble and RIA. Finally, the agency exercised its policy judgment to determine the emissions standards based on its assessment of technological feasibility, lead-time, costs, and other factors.[39] Although the specific facts surrounding each rule vary, these are all among the kinds of considerations that EPA regularly evaluates in its motor vehicle rules: the nature of the industry and the regulated vehicles, the availability of control technologies, costs, emissions impacts, health and welfare impacts, economic and other impacts, cost-benefits analysis,[40] and of course the resulting emissions standards.[41]

While these standards are more protective than their predecessors, this difference is premised not on any transformative assertion of agency power, but rather on changing circumstances, most notably the increasing market adoption of technological advances that permit greater emissions reductions, as well as BIL and IRA funding that support greater adoption of BEVs. As required by the statute, the rule incorporates an updated technical analysis, including of feasibility, lead time, and costs, for emissions control strategies. As we explain in the preamble (e.g., sections III and V), there are more effective control technologies, such as increased electrification, that are being used at greater rates and are available at a reasonable cost for the timeframe of this rule (MY 2027-32) than at the time of prior rules, including the recent 2021 LD GHG rule. The agency also considered updated data on ICE vehicle technologies that are also available to reduce emissions. On balance, we determined that the potential for increased adoption of control technologies, including add-on controls as well as lower emitting powertrains, warranted strengthening the emissions standards.

This iterative strengthening of the emissions standards thus presents an ordinary exercise of agency power and is in no way "a transformative expansion" of EPA's regulatory authority as commenters would suggest. Instead, it is yet another action in a long list of EPA's exercises of its standard-setting authority under CAA section 202. Considerable precedent holds that merely

[39] *See* Preamble V.

[40] As discussed in preamble V and RTC 8, in addition to the statutory factors, EPA also evaluated additional factors, including factors to comply with E.O. 12866. Our assessment of these additional factors lends further support to the final rule.

[41] See, e.g., the final rule preamble and RIA for the HD Phase 2 and Phase 1 rules, and the 2021, 2020, 2012, and 2010 LD GHG rules. As we explain in Part III.E below, the agency also consulted with numerous other expert agencies in formulating its judgments.

strengthening an existing regulatory program does not amount to an extraordinary assertion of power.[42]

Commenters nonetheless claim that EPA's assertion of power here augurs a future where the agency might require the complete elimination of tailpipe pollution from motor vehicles and is therefore transformative. EPA agrees that the *statute* contemplates the possibility of completely preventing motor vehicle tailpipe pollution which contributes to endangerment, where that result is supportable under the statutory criteria and the record.[43] The natural outcome of Congress's major policy decision to control dangerous air pollution from motor vehicles is that such pollution might one day be eliminated. Nowhere does the statute afford a perpetual safe harbor for the production of vehicles that emit pollutants that contribute to air pollution which is endangering public health and welfare when pollution-free vehicles are available at a reasonable cost. This was Congress's, not the Administrator's, decision. In any event, this rule does not require the complete elimination of pollutants from vehicles; such a result is not justified on the current record.

The regulated community also supports EPA's authority to consider BEVs in establishing the standards.[44] While regulated entities filed comments questioning the available lead-time and rate at which the emissions standards should be strengthened, they indicated support for standards that would achieve significantly greater penetration rates for BEVs relative to the status quo. The Alliance for Automotive Innovators, a major trade group representing entities regulated by the final rule, support the goal "to accelerate the transition to zero-emission vehicles"[45] and endorses a PEV market share of 40-50% in 2030, with continued increases through 2032.[46] As noted above, major vehicle manufacturers also filed comments supportive of significant increases in BEV penetration, demonstrating both their intention to produce BEV products and support for EPA's consideration of BEVs in setting the standards.

B. Key aspects of the final rule are not transformative.

Commenters' assertions that certain aspects of this rule—its regulation of GHGs, evaluation of electric technologies, and consideration of the ABT compliance provisions—are nonetheless so transformative as to implicate the major questions doctrine are misplaced. First, commenters

[42] *See West Virginia*, 142 S. Ct. 2587, 2610 (2022) (distinguishing EPA's Mercury Rule, 90 Fed. Reg. 28616 (2005), from the Clean Power Plan and noting that "[t]he Mercury Rule . . . is one more entry in an unbroken list of prior [CAA] section 111 rules"); *Missouri*, 595 U.S. 87, 95 (2022) ("Of course the vaccine mandate goes further than what the Secretary has done in the past to implement infection control. But he has never had to address an infection problem of this scale and scope before. In any event, there can be no doubt that addressing infection problems in Medicare and Medicaid facilities is what he does."); *Utility Air*, 573 U.S. 302, 332 (2014) (declining to apply the major questions doctrine where the regulation "moderately increas[es] the demands EPA (or a state permitting authority) can make of entities already subject to its regulation")

[43] Indeed, an analogous result—of completely preventing a type of emissions—was achieved as early as 1966. The Department of Health, Education, and Welfare (HEW), the agency then in charge of administering section 202, determined that a different type of emissions—crankcase emissions—could be completely prevented from certain motor vehicles. See 31 FR 5171 (Mar. 30, 1966) ("No crankcase emissions shall be discharged into the ambient atmosphere from any new motor vehicle or new motor vehicle engine subject to this subpart.").

[44] *Missouri*, 595 U.S. 87, 95 (2022) (regulated communities' "support suggests that a vaccination requirement under these circumstances is a straightforward and predictable example of the health and safety regulations that Congress has authorized the Secretary to impose").

[45] AAI comment at i.

[46] AAI comment at vi.

wrongly suggest that any significant regulation of motor vehicles to address climate change creates a major question. But *Massachusetts* considered and rejected a similar argument—"that climate change was so important that unless Congress spoke with exacting specificity, it could not have meant the Agency to address it" under section 202(a).[47] While the Court had occasion to revisit that conclusion in *American Electric*, *Utility Air*, and *West Virginia*, it did not. And since *Massachusetts*, EPA has promulgated 6 motor vehicle GHG rules including 4 light duty GHG rules—there is nothing new here.[48]

Second, commenters erroneously claim that EPA's consideration of electric technologies as a basis for the standards is novel. As we explain in preamble III, electric technologies are at the heart of motor-vehicle pollution control. They are used by all new motor vehicles produced today. Electric technologies are fundamental to key emissions control technologies currently in use, including catalytic converters, selective catalytic reduction, particulate filters, and engine and powertrain electrification. Without electric technologies, no motor vehicle would be able to start, or operate, or control emissions. Congress also recognized "electronic emission control units," a kind of electric technology, as a specified major emissions control device in CAA section 207(i)(2). EPA has also repeatedly considered engine and powertrain electrification, including BEV, technologies in its prior rules, as shown in Table 1 and discussed in Preamble III and in greater detail below.

Table 1. Certain Prior Criteria Pollutant and GHG Rules and their Consideration of Averaging in Standard-Setting, ABT, and Electrification Technologies

Rule	**Averaging in Standard-Setting**	**ABT**	**Considering Electrification Technologies**
Tier 2, 65 FR 6698 (Feb. 10, 2000)	6744	6743-44	6746, 6793-4
2010 LD (MY 2011 and later), 75 FR 25324 (May 7, 2010)	25405/1, 25412/1-3	25412/3	25328/3, 25456 (tbl. III.D.6-3)
HD Phase 1 (MY 2014 and later), 76 FR 57106 (Sept. 15, 2011)	57119/1	57238/2-39/1	57204/3-05/2, 57220/1-21/2, 57224/3-25/1, 57246/1
2012 LD (MY 2017 and later), 77 FR 62624 (Oct. 15, 2012)	62627/3-28/1	62628/1-2	62705/1-06/1, 62852/2-61
Tier 3, 79 FR 23414 (Apr. 28, 2014)	23480-81	23480-81, 23488-89	23471, RIA Tables 2-42, 2-43
HD Phase 2 (MY 2021 and later), 81 FR 73478 (Oct. 25, 2016)	73730/2-3, 73733/2-34/1	73495/2-3, 73568/2-69/3	73751/1-3
2020 LD (MY 2021 and later), 85 FR 24174 (Apr. 30, 2020)	24246/3-47/3	25206/3-07/1, 25275/1-76/2	24320/1, 24469/1-524/3
2021 LD (MY 2023 and later), 86 FR 74434 (Dec. 30, 2021)	74446/3-51/1	74453/1-56/1	74493/1-94/3, 74484/2-87/3

[47] *Massachusetts*, 549 U.S. 497, 512, 530-31 (2007) (distinguishing *Food & Drug Admin. v. Brown & Williamson Tobacco Corp*., 529 U.S. 120 (2000)).
[48] These rules are the 2010, 2012, 2020, and 2021 LD GHG rules, and the 2011 and 2016 HD GHG rules.

EPA has considered the role of electrification in national rulemakings since Tier 2.[49] In that rule, EPA stated that "we believe it is appropriate to provide inducements to manufacturers to certify vehicles to very low levels and that these inducements may help pave the way for greater and/or more cost effective emission reductions from future vehicles."[50] Accordingly, EPA adopted a "multiplier" to allow BEVs to be counted more than once in compliance calculations for the standards and allowed manufacturers to "propose HEV contribution factors for NOx to EPA . . . [to] be used in the calculation of a manufacturer's fleet average NOx emissions and . . . provide a mechanism to credit an HEV for operating with no emissions over some portion of its life."[51] EPA continued to consider electrification, and where appropriate to incentivize BEVs, in multiple rules under 202(a) since 2000.

EPA built on this technological approach in 2010 when it first adopted standards controlling emissions of GHG, stating we "expect[ed] that automobile manufacturers will meet these standards by utilizing technologies that will reduce vehicle GHG emissions . . . [including] increased use of hybrid and other advanced technologies, and the initial commercialization of electric vehicles and plug-in hybrids."[52] As technology advanced by the time of the 2012 LD GHG Rule, EPA continued to expand its consideration of electrification technology, including electric power steering/electro-hydraulic power steering, improved accessories (such as electrically driven water pumps and cooling fans), 12-volt stop-start, higher voltage stop-start/belt integrated starter generator, integrated motor assist/crank integrated starter generator, P2 hybrid (transmission integrated electric motor placed between engine and a gearbox or continuously variable transmission), 2-mode hybrid, power-split hybrid, plug-in hybrid electric vehicles, and electric vehicles with all-electric drive.[53] In 2014, EPA adopted the Tier 3 rule, coordinating its criteria pollutant standards with the recently adopted GHG standards. EPA projected that manufacturers would choose to meet the criteria pollutant standards with an increase in electric vehicle sales.[54]

In 2020, EPA continued to consider the above technologies in the context of "electric paths [which] include a large set of technologies that share the common element of using electrical power for certain vehicle functions that were traditionally powered mechanically by engine power. Electrification technologies thus can range from electrification of specific accessories . . . to electrification of the entire powertrain."[55] In the 2021 light duty vehicle rule, covering vehicles from MY 2023 to 2026, EPA explained that "[t]he technological readiness of the auto industry to meet the final standards . . . is best understood in the context of the decade-long light-duty vehicle GHG emission reduction program . . . . [M]anufacturers have access to a wide range

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[49] Even before Tier 2, the voluntary National Low Emission Vehicle (NLEV) program allowed LD motor-vehicle manufacturers to comply with tailpipe standards for cars and light-duty trucks more stringent than that required by EPA in exchange for compliance credits for such low emission and zero emission vehicles. 63 FR 926 (Jan. 7, 1998).
[50] 65 FR 6698, 6746 (Feb. 10, 2000)
[51] 65 FR 6793.
[52] 75 FR 25324, 25328 (May 7, 2010) ("Although many of these technologies are available today, the emissions reductions . . . finalized in this notice will involve more widespread use of these technologies across the light-duty vehicle fleet.").
[53] 77 FR 62706 (Oct. 15, 2012).
[54] Tier 3 RIA, Tables 2-42 and 2-43.
[55] 85 FR 24174, 24320 (Apr. 30, 2020).

of GHG-reducing technologies, many of which were in the early stages of development at the beginning of EPA's program in 2012, and which still have potential to reach greater penetration across all new vehicles."[56] We noted that, "[i]n addition to the technologies that were anticipated by EPA in the 2012 rule . . . recent technological advancements and successful implementations of electrification have been particularly significant and have greatly increased the available options for manufacturers to meet more stringent standards."[57] As in prior rules, EPA continued to consider electrified vehicles of all kinds alongside every other form of propulsion available and anticipated in light-duty vehicles.

In addition to the above-cited rules regulating the light-duty sector, EPA has also considered electrification in rules regulating the heavy-duty sector. Within the HD GHG program, EPA has considered the role of electrification since the Phase 1 rule in 2011. In that rule, EPA stated that "[t]echnologies such as hybrid drivetrains, advanced bottoming cycle engines, and full electric vehicles [were] promoted in this first step through incentive concepts . . . but we believe[d] that these advance technologies [would] not be necessary to meet the final standards."[58] However, we "expect[ed] these advanced technologies to be an important part of the regulatory program and [would] consider them in setting the stringency of any standards beyond the 2018 model year."[59] In 2016, when EPA promulgated the HD Phase 2 GHG standards, EPA continued to look toward electrification in the future because "we [had] found only one all-electric heavy-duty vehicle manufacturer that [had] certified through 2016."[60]

As electrified HD vehicles have become available in the market in the intervening years and with more HD electric vehicles under development, EPA's most recent rulemaking for the HD sector in 2023 again included consideration of HD electric vehicles.[61] This rulemaking finalized emission standards for NOx, PM, and other pollutants for model years 2027 and later HD vehicles. EPA explained that we developed "performance-based final standards" that allow "manufacturers [to] choose from any number of technology pathways to comply with the final standards (e.g., alternative fuels, including biodiesel, renewable diesel, renewable natural gas, renewable propane, or hydrogen in combination with relevant emissions aftertreatment technologies, and *electrification, including plug-in hybrid electric vehicles, battery-electric or fuel cell electric vehicles*)."[62]

In sum, there is nothing novel about EPA's consideration of electrification technologies, including BEVs, in promulgating the standards. To the contrary, were EPA to ignore BEV technologies in establishing these standards as these commenters suggest, that would be an unprecedented and extraordinary break from the agency's consistent historical practice. The resulting standards under such an approach would also bear little correlation with the regulated community's own plans for reducing emissions. For example, some commenters suggest that EPA—lacking authority to consider the emissions performance of BEV and ICE vehicles in the same class—could instead adopt a more stringent GHG standard specifically for ICE vehicles alone, while ignoring electrification technologies. Such an approach would likely lead to a

[56] 86 FR 74434, 74493 (Dec. 30, 2021).
[57] *Id.*
[58] 76 FR 57106, 57133 (Sept. 15, 2011).
[59] Id.
[60] 81 FR 73478, 73500 (Oct. 25, 2016).
[61] 88 FR 4296, 4330–31 (Jan. 24, 2023).
[62] 88 FR 4296, 4330–31 (Jan. 24, 2023) (emphasis added).

significant loss in emissions reductions, and by restricting or eliminating manufacturers' ability to average the emissions performance of BEV and ICE vehicles, also increase the costs of compliance. And given the enormous investments that the regulated community has made in BEVs and their support for the agency's consideration of BEVs in setting the standards, such a shift would create enormous regulatory uncertainty and undermine significant reliance interests.[63]

As we detail in Preamble ES and III, and as the manufacturers themselves state in their comments,[64] manufacturers have already shifted their research and development programs and selected BEVs as a central element of their future sales strategy, and as a principal, and in some cases the exclusive, long-term GHG emissions reduction strategy. To now prohibit manufacturers from complying through fleet-average emissions reductions achieved through BEVs and instead force them to deliver cleaner ICE vehicles would upend the industry's plans.

The agency appreciates that some commenters, especially those representing or supporting oil and biofuel companies, oppose BEV technologies as BEVs do not demand the liquid fuels these companies produce. But the purpose of section 202(a) is to reduce air pollution from motor vehicles, not to preserve the market share of any particular type of fuel or drivetrain. In light of the statutory language as described in Preamble III.B, BEVs being highly effective technologies available for controlling GHG emissions during MY 2027-32, the agency's longstanding practice of considering such technologies, and the regulated community's reliance on such technologies to achieve emissions goals, the agency can identify no reasoned justification for ignoring BEV technologies in establishing the standards. As we explain in Preamble III.B, such an approach is impermissible under the statute; it would also be arbitrary and capricious.

Commenters raise some sub-flavors of their argument that consideration of electric technologies is novel. They claim, for example, that consideration of electrification technologies that reduce or eliminate the use of liquid fossil fuels, or that prevent pollution from being generated entirely as opposed to controlling it after the fact, are novel. These comments are misplaced. To date, there has been no commercially viable technology that blocks or controls carbon pollution in motor vehicles after such pollution has been created. Rather, all motor vehicle GHG technologies, including all technologies that can be applied to ICE vehicles, result in the reduction of liquid fossil fuel consumption. All of these technologies also prevent pollution from being generated in the first place, for example by increasing engine efficiency, improving aerodynamics, or relying on fuel-switching (to electricity or hydrogen). These

[63] *Encino Motorcars, LLC v. Navarro*, 579 U.S. 211, 222 (2016) ("longstanding policies may have engendered serious reliance interests that must be taken into account. In such cases … a reasoned explanation is needed for disregarding facts and circumstances that underlay or were engendered by the prior policy. It follows that an unexplained inconsistency in agency policy is a reason for holding an interpretation to be an arbitrary and capricious change from agency practice. An arbitrary and capricious regulation of this sort is itself unlawful ….").

[64] *See e.g.*, Ford Motor Company, EPA-HQ-OAR-2022-0829-0605 at p. 1; General Motors, LLC, EPA-HQ-OAR-2022-0829-0700 at p. 3-4; Stellantis, EPA-HQ-OAR-2022-0829-0678 at p. 2; Volkswagen Group of America, Inc., EPA-HQ-OAR-2022-0829-0669 at p. 2; American Honda Motor Co. Inc., EPA-HQ-OAR-2022-0829-0652 at p. 3; Hyundai Motor America, EPA-HQ-OAR-2022-0829-0599 at p. 2.

technologies, moreover, prevent not only GHGs, but criteria pollution.[65] We further address this issue later in this RTC 2.3.

Some commenters, recognizing EPA's authority to consider BEVs, nonetheless claim that the *extent* to which EPA is basing the standards on increased adoption of BEVs, or increased electrification generally, is novel. EPA agrees that BEV technologies will be available in greater quantities and at lower costs during the timeframe for this rulemaking relative to earlier years, and that manufacturers will likely significantly increase their adoption of BEV technologies. These are new factual developments since our earlier rules, which we detail in Preamble ES and III, and these changing facts support more stringent standards. But regulation responsive to changing facts is part and parcel of the normal course of agency administration, not the sort of transformative action that gives rise to a major question.[66] Just as questions about the appropriate level of stringency of a standard are not extraordinary, so too questions about the penetration rates of a given technology that may be expected to occur under different stringencies are not extraordinary.

Commenters also wrongly claim that EPA's consideration of ABT is novel, whether in isolation or specifically with respect to how EPA considers ABT and BEVs in determining the stringency of the standards. As shown in Table 1, ABT is not at all novel: EPA has employed ABT throughout all its GHG rules and many criteria pollutant rules, and the use of averaging, both as a compliance provision and in standard-setting, dates back to 1985.[67] EPA did not even reopen the ABT program in this rule (excepting certain discrete changes discussed in Preamble III). Regulated entities also strongly support ABT and have come to rely on it as a cost-effective way to comply with the standards. By contrast, it would be an extraordinary break from precedent to now cease the ABT program or to cease considering the availability of averaging in determining the standards. We further address comments regarding ABT later in this RTC 2.3.

In sum, the final rule does not assert an unprecedented and transformative expansion of agency power, but merely iterates on the existing criteria pollutant and GHG control programs.

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[65] Criteria pollutants have historically been controlled by both systems that treat pollution after it has been created (such as catalytic converters) as well as by systems that prevent pollution from being created in the first place. Examples of criteria pollution prevention technologies include exhaust gas recirculation (EGR) and other combustion chamber improvements that lead to a cleaner combustion process. *See, e.g.*, 66 FR 5002, 5035 (explaining that as of time of the 2001 HD rule, "the emission control development work for diesels has concentrated on improvements to the engine itself to limit the emissions leaving the combustion chamber"), 5055 ("non-catalyst related improvements to gasoline emission control technology include higher speed computer processors which enable more sophisticated engine control algorithms and improved fuel injectors providing better fuel atomization thereby improving fuel combustion"), 5092 (expecting certain vehicles to meet the standards through various technologies, including EGR and other combustion process improvements).

[66] *See, e.g., Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co*., 463 U.S. 29, 42 (1983) ("[W]e fully recognize regulatory agencies do not establish rules of conduct to last forever and that an agency must be given ample latitude to adapt their rules and policies to the demands of changing circumstances.… there is no more reason to presume that changing circumstances require the rescission of prior action, instead of a revision in or even the extension of current regulation."); *Missouri*, 595 U.S. 87, 94, 95 (2022) ("Of course the vaccine mandate goes further than what the Secretary has done in the past to implement infection control. But he has never had to address an infection problem of this scale and scope before. In any event, there can be no doubt that addressing infection problems in Medicare and Medicaid facilities is what he does.").

[67] *See* 50 FR 10606 (Mar. 15, 1985). The availability of averaging as a compliance flexibility has an even earlier pedigree. *See also* 48 FR 33456 (July 21, 1983) (EPA's first averaging program for mobile sources); 45 FR 79382 (Nov. 28, 1980) (advance notice of proposed rulemaking investigating averaging for mobile sources).

The nature and scope of the agency's authority is the same as in prior rules. The rule is premised on technical and policy judgments that lie in the heartland of EPA's traditionally delegated authority. And the agency's consideration of electrification and ABT in setting the standards follow decades of precedent.

III. THE FINAL RULE DOES NOT IMPOSE UNPRECEDENTED CONSEQUENCES.

A. The final rule standards impose similar regulatory costs to earlier rules.

In evaluating whether a regulation is of vast economic and political significance, the Supreme Court has typically compared the effects of the current rule with those of prior exercises of the agency's authority.[68] In particular, the Court has paid special attention to the number of directly affected entities and the costs of complying with the regulation[69]—whether in the form of dollars or other economic consequences such as forced plant closures or permitting delays.[70] In some cases, the Court has also considered the costs to customers of the regulated entity.[71]

Table 2 of this response presents a comparison of the impacts of this rule with three prior LD GHG rules: the original 2010 LD GHG rule, the 2012 LD GHG rule, and the most recent 2021 LD GHG rule. We begin by explaining why we chose to compare this rule with prior LD GHG rules. First, we believe this comparison is most responsive to commenters raising major questions doctrine concerns. With regard to their major questions arguments, commenters were principally concerned with the increasing penetration of vehicle electrification technologies EPA projected to meet the GHG standards, as opposed to, for instance, the application of gasoline particulate filters to meet the PM standards. Commenters also expressed significantly greater interest in the LD GHG standards as opposed to the MD GHG standards.

Second, as we explain in Section III of the preamble, we previously regulated MD vehicles under the heavy-duty program, for instance, as part of the HD Phase 1 and Phase 2 GHG rules. We also previously regulated criteria pollutants in separate rulemakings from GHGs. As such, there is no ready comparison between this rule, which regulates both criteria pollutants and GHGs and both LD and MD, with a particular past rule that regulates all the above. More importantly, this choice of presentation makes the comparisons we draw highly conservative from the perspective of the major questions doctrine. Were we to combine the aggregate impacts

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[68] The Court has not viewed vast consequences, in isolation, as sufficient to warrant departure from the traditional principles of statutory interpretation. *See* Brianne J. Gorod et al., *Major Questions Doctrine: An Extraordinary Doctrine for 'Extraordinary' Cases*, 19 WAKE FOREST L. REV. (forthcoming) 19 ("in no case has economic significance or political controversy alone been enough to trigger application of the MQD"), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4419602.

[69] *See, e.g.*, *Nebraska*, 143 S. Ct. 2355, 2372 (2023) ("43 million borrowers from their obligations to repay $430 billion in student loans"); *West Virginia*, 142 S. Ct. 2587, 2604 (2022); id at 2622 (Gorsuch, J., concurring); *Alabama Association*, 141 S. Ct. 2485, 2489 (2021); *Utility Air*, 573 U.S. 302, 322 (2014).

[70] *West Virginia*, 142 S. Ct. 2587, 2604 (2022) (closures of coal power plants); *Utility Air*, 573 U.S. 302, 322 (2014) (permitting delays).

[71] *West Virginia*, 142 S. Ct. 2587, 2604 (2022) (noting the impact of EPA's EGU regulation on "retail electricity prices").

of prior LD and MD GHG and criteria pollutant rules, those aggregate impacts would be significantly greater than the impacts of just prior LD GHG rules.

Table 2. Comparison of the Impacts of the Final Rule and Prior Light-Duty Vehicle GHG Rules.

Rulemaking	**2010 LD**	**2012 LD**	**2021 LD**	**2024 LMD**
Phase-In Schedule (MY)	2012-2016	2017-2025	2023-2026	2027-2032
Costs of Compliance for Manufacturers, Total (PV 3% billion 2022$) [a, b]	475[72]	689[73]	323[74]	760[75]
Average Per-Vehicle Costs of Compliance at Full Phase-In, LD Vehicles (Car + Truck) (2022$) [a, c]	1,302[76]	2,429[77]	1,153[78]	2,074[79]
Net GHG Reductions, Final Year (million metric tons CO2e) [d]	506[80]	569[81]	172[82]	410[83]
Reduction in Oil Consumption (billion barrels)	22[84]	22[85]	6.8[86]	15[87]
Net Benefits, Final Year (billion 2022$) [a, d]	275 [88]	287[89]	42[90]	270[91]
Net Benefits (PV 3% trillion 2022$) [a, d]	2.3[92]	1.9[93]	0.19[94]	2.0[95]

[a] **Comparing Values:** We present all dollar values in constant 2022$ to facilitate ease of comparison between the rules. We adjusted values from prior rules for inflation. Where values have been adjusted, the original values are noted in footnotes. For total costs of compliance and net benefits, we note there are differences in the methodologies used to present and estimate these values across the rules, including updates in certain modeling and monetization

[72] 2010 RIA Table 6-14 ($345,940 ($2007)).
[73] 2012 RIA Table 5.2-1 ($521,000 ($2010)).
[74] 86 FR 74509 Table 43.
[75] RIA Table 9-21 “Summary of costs, fuel savings and benefits of the final standards (billions of 2022 dollars).”
[76] 75 FR 25463, Table III.D.6-4. ($948 ($2007)).
[77] 77 FR 62853, Table III-25 ($1,836 ($2010)).
[78] 86 FR74444, Table 5; 86 FR 74483, Table 28 ($1,000) ($2018)).
[79] RIA 12-25, Table 12-40.
[80] 2010 LD RIA at ES-5, Table 4.
[81] 2012 LD RIA Table 4.3-17.
[82] 86 FR 74488, Table 34; 2021 RIA Table 5-1. The value presented above is the sum of reductions of CO2, CH4, and NO2 (166 million metric tons, 178,391 metric tons, 5,187 metric tons, respectively), adjusted for global warming potential of each pollutant (1, 28, and 265, respectively).
[83] Preamble VI.B Table “Estimated GHG impacts of the final standards relative to the No Action scenario,” RIA Table 8-22 “Greenhouse gas emission inventory impacts, Final standards.”
[84] 2010 LD RIA Table 6-16. The value presented above is the sum of fuel impacts in the RIA table in millions of gallons (CY2012-50) and then converted to barrels.
[85] 2012 RIA Table 4.3-23.
[86] 86 FR 74521; 2021 LD RIA at 5-16, Table 5-10.
[87] RIA Table 8-40.
[88] 2010 LD RIA at 8-25, Table 8-13 ($200,700 million (2007$)).
[89] 2012 LD RIA at 7-35, Table 7.3-5. ($217,000 million (2010$)).
[90] 86 FR 74511, Table 48 ($36 billion (2018$)).
[91] RIA Table 9-21 “Summary of costs, fuel savings and benefits of the final standards (billions of 2022 dollars).”
[92] 75 FR 25536, Table III.H.10-3 ($1,653,900 million (2007$)).
[93] 2012 LD RIA at 7-35, Table 7.3-5. ($1,430,000 million (2010$)).
[94] 86 FR 74443, Table 4 ($190 billion (2018$)).
[95] RIA Table 9-21 “Summary of costs, fuel savings and benefits of the final standards (billions of 2022 dollars).”

approaches (e.g., updates to MOVES and SC-GHG). Nonetheless, as EPA estimated these figures at the time of each rule, they appropriately reflect the impacts of the agency's exercise of authority in each such rule. Thus, these figures are suitable for evaluating the scope of the agency's exercise of authority in this rule compared to prior rules.

Specifically with respect to net benefits, for the 2010, 2012, and 2021 LD GHG rules, we present net benefits using a 3% average social cost of carbon (SC-GHG) figure, based on the social cost of carbon methodology developed and recommended by the IWG on the SC-GHG, as described in the RIAs for those rules. For this rule, we present the climate benefits associated with the SC-GHG estimates under the 2-percent near-term Ramsey discount rate. See RIA 6.2 for a discussion of changes to the methodology for monetizing the social cost of carbon. Were EPA to apply the methodology developed and recommended by the IWG on the SC-GHG for calculating the social cost of carbon, the net benefits of this rule would appear smaller. See RIA 9 Appendix Table 6.

More generally, we note there are differences in how values are presented across the preambles for various rules. For example, in some cases, we highlight the impacts of the program through 2050 or 2055, whereas in other cases we highlight the impacts during the years of the phase-in (e.g., MY 2012-16 for the 2010 LD GHG Rule). We compare like values to the fullest extent possible. For example, with regard to total costs of compliance and net benefits, we compare the 3% net present value over the full program (through 2050 or 2055). See also note d below on Final Year. Detailed discussion of the approach to calculating costs and benefits for each rule may be found in that rule's RIA.

[b] **Costs of Compliance, Total:** The costs of compliance for manufacturers represents the total vehicle technology costs for the program relative to the regulatory baseline for each rule. We note that for this rule, the value presented is taken from the summary table of costs and benefits and does not include the battery tax credit, which reduces the costs of compliance to manufacturers below that stated in the table. As shown in RIA 9.7 Table 9-25, the value of the battery tax credit is $17 billion (3% PV).

[c] **Average Per-Vehicle Costs of Compliance:** This row refers to the average per-vehicle cost for the light-duty fleet (passenger cars and light trucks) for the year of full-phase in for the program, i.e., the last year shown on the phase-in schedule row for each rule.

[d] **Final Year**: For this table, the "Final Year" for prior rules refer to 2050, and for this rule refers to 2055. These years approximate when most of the regulated fleet will consist of vehicles subject to the relevant standards due to fleet turnover.

We turn now to the comparison and highlight some key observations. First, this rule regulates the same community of regulated entities as earlier EPA rules: vehicle manufacturers.[96,97] Congress provided explicit textual authorization for regulating these entities, which EPA has been doing for five decades,[98] and they comprise "a relative handful of large sources capable of shouldering heavy substantive and procedural burdens" of section 202(a) regulation, and distinct from the millions of regulated entities that the Court found to give rise to major questions in other cases.[99]

As for the costs of compliance, the rule's costs are not so vast as to be unprecedented or transformative relative to earlier rules. The average costs per-vehicle for LD vehicles in the final year of the phase-in ($2,100 in MY 2032) fall within the range of prior rules, for example less than that of the 2012 rule ($2,400 in MY 2025) but greater than the costs of the 2010 and 2021 rule.[100] The per-vehicle costs, moreover, are small relative to what Congress itself accepted in enacting section 202.[101] The per-vehicle costs for earlier years of the program are also significantly lower, for example, with costs of about $200 in MY 2027.[102] We acknowledge that the total costs of compliance for this rule are greater than for prior rules, for example slightly over 10% higher than the costs for the 2012 rule after adjusting for inflation ($760 billion versus $689 billion in 2022$ (3% PV)). This is partly because, notwithstanding the significant emissions reductions achieved through compliance with prior GHG rules, we expect the regulated community to produce more vehicles than ever before to meet increasing consumer demand. And even these kinds of metrics reflect an iterative strengthening of the program, not the kind of unprecedented and transformative change that gives rise to a major question. They are a far cry, for instance, from the multiple order-of-magnitude increases in the number of regulated entities and in costs that the Court found in *Utility Air*. [103] The changes here reflect

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[96] As noted in the text above, this rule regulates both LD and MD vehicle manufacturers. EPA previously regulated LD and MD vehicles separately, for instance, with the latter under the heavy-duty program through the Phase 1 and 2 GHG Rules. The more important point here, however, is that we continue to regulate the same regulated community as in prior rules.

[97] Perhaps the most notable development in the automotive market in recent years has been the rise of EV-only automakers. Since EPA adopted its first light duty GHG rule, Tesla's market has grown from virtually zero to 4.2%, ahead of Volkwagen, Subaru, and BMW. *See* Pras Subramian, *Tesla's US Market Share Now Tops Volkswagen, Subaru, and BMW*, Yahoo Finance (Jan. 9, 2024), https://finance.yahoo.com/news/teslas-us-market-share-now-tops-volkswagen-subaru-and-bmw-161055575.html.

[98] See CAA sections 202, 203, 216.

[99] *Utility Air*, 573 U.S. 302, 322 (2014).

[100] Note that per-vehicle costs for earlier years of the program are significantly lower than the costs in MY 2032.

[101] Compare Preamble V ("the highest estimated model year cost (MY 2032) of $2,100 represents about 4.5 percent of the projected average cost of a new MY 2032 light-duty vehicle (about $46,700)"), with *Motor & Equip. Mfrs. Ass'n, Inc. v. EPA*, 627 F.2d 1095, 1118 (D.C. Cir. 1979) ("Congress wanted to avoid undue economic disruption in the automotive manufacturing industry and also sought to avoid doubling or tripling the cost of motor vehicles to purchasers.").

[102] See preamble V for further discussion of costs in different years of the program.

[103] See, e.g., *Utility Air*, 573 U.S. 302, 322 (2014) ("Under the PSD program, annual permit applications would jump from about 800 to nearly 82,000; annual administrative costs would swell from $12 million to over $1.5 billion…. The picture under Title V was equally bleak: The number of sources required to have permits would jump from fewer than 15,000 to about 6.1 million; annual administrative costs would balloon from $62 million to $21 billion; and collectively the newly covered sources would face permitting costs of $147 billion.")

nothing more than an ordinary fluctuation in regulatory impacts in response to changed circumstances.[104]

Nor does the rule impose the kinds of other economic disruptions that the Supreme Court has noted in prior cases. For example, the rule does not require, legally or practically, any vehicle manufacturers to shut down or even to reduce their production. Nor does the rule create excessive, or any, delays in their ability to continue to produce vehicles—we expect that the certification process for compliance will continue entirely uninterrupted.

As for consumer costs, the statute does not require consideration of such costs.[105] Congress, of course, recognized that pollution control would entail costs, and the technologies used to meet EPA's motor vehicle emissions standards have historically increased costs for consumers. There is a subset of pollution control technologies, however, that provide savings to the consumer over the operational lifetime of a vehicle. When such technologies are available, they will obviously be of greater interest to customers. In the final rule, EPA considered the upfront costs associated with purchasing cleaner vehicles, including the costs of any charging infrastructure where applicable, as well as the costs of operating such vehicles over their lifetime. EPA found that lower operating costs for vehicles substantially outweigh the increased costs of meeting the standards over the life of the vehicles. For example, over the average period of first ownership of eight years, we estimate a MY 2032 PEV owner will on average save more than $8,000 on purchase and operating costs compared to a gasoline vehicle that meets these standards.[106]

We also carefully designed the final rule to avoid other kinds of disruptions to consumers. For example, we recognized that light and medium duty vehicles represent a very diverse array of vehicles (e.g., passenger cars, light trucks, work vans, etc.), and that even within a single grouping, there are a diversity of vehicle types and use cases. We carefully tailored the standards so that manufacturers would not be incentivized by the standards to limit the types of vehicles and vehicle sizes they offer to consumers. Furthermore, we recognize that vehicles require supporting infrastructure (e.g., fueling and charging stations) to operate, and we accounted for sufficient lead-time for the development of that infrastructure, including electric charging infrastructure. We also identified numerous industry standards and safety protocols to ensure the safety of vehicles, including BEVs.

Commenters generally failed to acknowledge the analog between this rule and prior rules. In some cases, they focused on the absolute size of the rules' impacts. But as we explain above, the major questions doctrine cases have evaluated the consequential nature of the regulation relative to prior exercises of agency power. And many regulations with large absolute impact, by virtue

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[104] See Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 42 (1983); *Missouri,* 595 U.S. 87, 94, 95 (2022); All. for Fair Bd. Recruitment v. Sec. & Exch. Comm'n, 85 F.4th 226, 256-58 (5th Cir. 2023).

[105] See *Motor & Equipment Mfrs. Ass'n Inc. v. EPA*, 627 F. 2d 1095, 1118 (D.C. Cir. 1979) ("Section 202's cost of compliance concern, juxtaposed as it is with the requirement that the Administrator provide the requisite lead time to allow technological developments, refers to the economic costs of motor vehicle emission standards and accompanying enforcement procedures. It relates to the timing of a particular emission control regulation rather than to its social implications."); *Int'l Harvester Co. v. Ruckelshaus*, 478 F.2d 615, 640 (D.C. Cir. 1973) ("as long as feasible technology permits the demand for new passenger automobiles to be generally met, the basic requirements of the Act would be satisfied, even though this might occasion fewer models and a more limited choice of engine types. The driving preferences of hot rodders are not to outweigh the goal of a clean environment.").

[106] See Preamble I.C; RIA 4.2.2.

of their continuity with earlier assertions of authority, are not subject to major questions scrutiny.[107] The size of the impacts, moreover, is largely a product of the large size of the vehicle market,[108] as well as EPA's choice to assess impacts through 2055, which allows the agency to consider the long-term impacts of the rule in light of the gradual turnover of the motor-vehicle fleet.

B. The final rule does not impose a BEV mandate

Commenters also claim that the final rule imposes vast economic and political consequences because it effectively mandates specific pollution control technologies—namely BEVs—and effectively bans ICE vehicles. As an initial matter, commenters fail to explain why they believe establishing standards based on particular pollution control technologies imposes vast economic and political consequences inconsistent with congressional intent. More importantly, the rule does not require manufacturers to follow a particular technology pathway.[109] The rule is not a BEV mandate or ICE ban.

To begin with, commenters do not explain why emissions standards based on a specific pollution control technology run afoul of EPA's authority. *West Virginia v. EPA* addressed an analogous issue. In *West Virginia*, the Supreme Court reviewed the legality of EPA's Clean Power Plan, which regulated GHGs from the power sector by requiring a shift from regulated sources—coal fired plants—to completely different facilities—natural gas and renewable power plants. The agency determined that a coal fired power plant operator could comply by reducing its own production of electricity, building a new natural gas or renewable power facility, investing in another entity's such facility, or buying allowances generated by such facilities.[110] The Court applied the major questions doctrine to hold that this generation shifting scheme exceeded the agency's statutory authority under CAA section 111(d) to establish standards based on the "best system of emission reduction." By contrast, the Court noted a "technology-based" approach to regulation traditionally "focuses upon the control technologies that are available to industrial entities and *requires the agency to ensure that regulated firms adopt the appropriate cleanup technology*."[111] The Court observed that a wide range of technologies could fall under

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107 Compare, e.g., *Missouri*, 595 U.S. 87 (2022) (declining to apply the major questions doctrine), with id. at 104 (Thomas, J., dissenting) (arguing the rule should be applied because it "is undoubtedly significant—it requires millions of healthcare workers to choose between losing their livelihoods and acquiescing to a vaccine they have rejected for months"); see also, e.g., *Becerra v. Empire Health Found.*, 142 S. Ct. 2354 (2022); *EPA v. EME Homer City Generation, L.P.*, 572 U.S. 489 (2014)).

108 See Alliance for Automotive Innovation, Economic Insights Map, available at https://www.autosinnovate.org/resources/insights ($1.21 trillion total car sales in 2022).

109 But see *Engine Mfrs. Ass'n v. S. Coast Air Quality Mgmt. Dist.*, 541 U.S. 246, 252-53 (2004) (noting "the use of 'standard' throughout Title II of the CAA…to denote requirements such as numerical emission levels with which vehicles or engines must comply… or emission-control technology with which they must be equipped.").

110 *West Virginia*, 142 S. Ct. at 2603.

111 *West Virginia*, 142 S. Ct. 2587, 2601 (2022) (emphasis added); see also id. at 2610 (describing that the Mercury and Air Toxics Rule, which was "no precedent for the Clean Power Plan" but only "one more entry in an unbroken list of prior Section 111 rules," as one where EPA "set the cap based on the application of particular controls, and regulated sources could have complied by installing them.").

this approach, including “more traditional air pollution control measures” such as “efficiency improvements, fuel-switching,” and “add-on controls.”[112]

The final rule is unlike the generation shifting that the Court condemned, but rather a prototypical example of the traditional technology-based approach. The statute authorizes EPA to regulate pollutant emissions from motor vehicles. Unlike the Clean Power Plan, the final rule does not require any manufacturer to reduce its production of motor vehicles; rather, as with all prior section 202(a) rules, manufacturers can produce as many vehicles as they want, so long as their fleet meets the emissions standards.[113] The rule also does not require manufacturers to build, invest in, or otherwise support any other forms of transportation, or any strategies to reduce transportation-sector emissions, besides producing cleaner motor vehicles—for example, we do not require motor vehicle manufacturers to build or invest in railroads, public transportation, bicycles, or smart zoning. The rule does not decree that “it would be best if [cars] made up a much smaller share of national [transportation],” [114] or prescribe that only X% of transportation can be accomplished by car, while Y% must occur via lower emitting modes such as rail, boat, or bicycle.[115] Nor does the final rule even require manufacturers to shift production within the light and medium duty vehicle categories toward subcategories that can achieve greater emissions reductions. Rather, EPA recognizes the diverse needs of consumers, and, consistent with its past rulemakings, has maintained separate car and truck standards, with the continuation of existing attribute-based standards for light and medium duty vehicles. EPA’s goal in keeping this approach was to avoid unduly influencing the market strategies of manufacturers (e.g., by incentivizing upsizing or downsizing of vehicles, or the use of cars over light trucks for transportation of people) and instead to preserve the diversity of products in the market. The final rule thus enacts no “sector-wide shift” in transportation.[116] The agency is not seeking to “improve the overall [transportation] system by lowering the carbon intensity of [transportation].”[117]

Rather, EPA is requiring manufacturers who make motor vehicles to produce vehicles that pollute less. The final standards are based on the application of pollution control technology to such vehicles: “traditional air pollution control measures” such as “efficiency improvements” that allow vehicles to consume less fuel and therefore produce fewer GHGs and “fuel-switching” including from gasoline and diesel to fuels such as electricity and hydrogen.[118] To be clear, the final rule does require manufacturers to apply some additional control technology, but it does not

[112] *West Virginia*, 142 S. Ct. 2587, 2611 (2022) (citing 80 Fed. Reg. 64784); see also id. at 2602 (“high-efficiency production processes and carbon capture technology” (citing 80 Fed. Reg. 64512)).
[113] Cf. *West Virginia*, 142 S. Ct. 2587, 2610 (2022) (“[O]ur traditional interpretation ... has allowed regulated entities to produce as much of a particular good as they desire provided that they do so through an appropriately clean (or low-emitting) process.” (citing 80 Fed. Reg. 64726, 64738)).
[114] *West Virginia*, 142 S. Ct. 2587, 2612 (2022).
[115] We offer these other forms of transportation for illustrative purposes only, not to suggest any finding regarding their relative GHG emissions.
[116] While the final rule does allow for credit trading, credits are generated solely by manufacturers of vehicles, not by other kinds of sources, like railroad, bike, or fitness product manufacturers. In other words, as with the MATS trading program that the Court recognized as falling within EPA’s authority, “EPA set the cap based on the application of particular controls, and regulated sources could have complied by installing them.” *West Virginia*, 142 S. Ct. 2587, 2610 (2022). Below, we further explain why the ABT program does not implicate a major question.
[117] *West Virginia*, 142 S. Ct. at 2611.
[118] *West Virginia*, 142 S. Ct. 2587, 2611 (2022). *Cf.* CAA section 241(2) (defining “clean alternative fuel” to mean any fuel including specifically “hydrogen” and “electricity”).

mandate any particular technology pathway. As a legal matter, the rule imposes performance-based standards, not a specific technology mandate. So although EPA accounted for BEV technologies along with other technologies in determining the level of the standards, there is no requirement for any manufacturer to produce a certain number of BEVs, ICE vehicles, or any particular kind of vehicle. This is in significant contrast to other programs to which commenters refer, such as California's ACT program or the Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019), both of which are ZEV sales mandates.

Commenters are correct that EPA considered available technologies, including BEV technologies, in assessing the feasibility of the standards; the standards are based on our assessment of various technologies. But this kind of technological assessment is what the statute requires. Section 202(a)(1) commands EPA to set technology-based standards, considering among other things the time "necessary to permit the development of the requisite technology" and the "cost of compliance." To do so, EPA must necessarily identify potential control technologies, evaluate the rate the technology could be introduced, and its cost.[119] In setting the standards, EPA has accordingly investigated potential compliance pathways, considering technological feasibility, costs, and lead time. Having identified a means of compliance, EPA's task is to "answer[] any theoretical objections" to that means of compliance, and to "offer[] plausible reasons for believing that each of those steps can be completed in the time available."[120] That is what EPA has done here, and indeed, what it has done in all of the emission standards rules implementing section 202(a) of the Act.[121]

As a practical matter, EPA's technical modeling demonstrates that the final standards do not require manufacturers to produce additional BEVs for compliance. EPA's modeling of a potential compliance pathway in preamble Section IV.D does show an increasing penetration of BEVs. But this is just one possible path for manufacturers to comply. In Section IV.F of the preamble, EPA presents several alternate pathways for attaining the standards, based on other technologies, including advanced ICE, hybrids, and PHEVs. In addition to our "central case," where BEVs reach 56% in 2032, we also provide details on a Lower BEV Production pathway in which BEVs reach 43%, and a higher HEV/PHEV pathway where BEVs never exceed 35 percent (which is what we project in our No Action case). Finally, in preamble Section IV.H, we discuss a potential illustrative compliance scenario in which BEVs never exceed 5%, which is well below their share of the market for 2023.[122] In Section IV of the preamble and in the RIA, EPA further discusses the feasibility, lead-time, costs of compliance, and consumer acceptance associated with these alternate technological pathways. Manufacturers have the discretion to choose to produce any of these vehicle mixes, or any other vehicle mix they choose, so long as they meet the numerical standards.

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[119] *See NRDC v. EPA*, 655 F. 2d 321, 328 (D.C. Cir. 1981) (noting that in order to provide a reasoned explanation for its section 202(a)(1) standards, EPA must "include[] a defense of the methodology for arriving at numerical estimates").
[120] *NRDC v. EPA*, 655 F. 2d at 332.
[121] *See, e.g.*, 77 FR 62624, 62777 (Oct. 15, 2012) (light duty vehicle GHG standards predicated on a mix of potential technologies to improve engine and vehicle fuel economy); 66 FR 5002, 5035–36 (Jan. 18, 2001) (standards for PM and NOx from heavy duty diesel engines predicated on use of catalyzed diesel particulate traps and NOx adsorbers, respectively)
[122] EIA, "Electric vehicles and hybrids surpass 16% of total 2023 U.S. light-duty vehicle sales" Jan. 31, 2024, *available at* https://www.eia.gov/todayinenergy/detail.php?id=61344#.

Further, even under the modeled central compliance pathway, the rate at which BEVs enter the overall onroad fleet is gradual. This is largely due to the lengthy operational lives of vehicles, which can be decades. Our modeling for this pathway shows that 84% of light-duty vehicles on the road will still use gasoline or diesel in 2032.[123] This is a far cry from the commenters' claims of 100% electrification or a gasoline engine ban.[124]

Historical precedent shows that EPA's performance-based standards have provided real choices to manufacturers. For example, in promulgating the 2010 LD GHG rule, EPA modeled a technology pathway for compliance with the MY 2016 standards. In actuality, manufacturers significantly diverged from EPA's projections across a wide range of technologies, instead choosing their own technology pathways best suited for their fleets.[125] For example, EPA projected 62 percent dual clutch transmissions, but in practice less than 3 percent of the MY 2016 vehicles used them; by contrast, EPA projected 28 percent 6 speed automatic transmissions, but in actuality 55 percent of vehicles used them. Looking specifically at electrification technologies, start-stop systems were projected at 45 percent and were used in 10 percent of vehicles, while strong hybrids were projected to be 6.5 percent of the MY 2016 fleet and were actually only 2 percent.[126] Notwithstanding these differences between EPA's projections and actual manufacturer decisions, the industry as a whole was not only able to comply with the standards during the period of those standards (2012-2016), but to generate substantial additional credits for overcompliance.[127]

Likewise, for the HD Phase 2 rule, EPA projected compliance pathways for each of the HD subcategories.[128] To date, of the approximately 415,000 successful certifications showing compliance with the Phase 2 standards, not one has utilized the exact mix of technologies that EPA analyzed in its potential compliance pathways.

Manufacturers may also adopt entirely different strategies than what EPA anticipated. For example, in 1985, EPA set HD PM standards that were anticipated to require the use of particulate filters.[129] Manufacturers chose not to adopt such filters but rather to address the combustion process instead.[130] In 2001, EPA set HD NOx standards. We analyzed the feasibility

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[123] See RIA Figure 8-5.

[124] Commenters point to various aspirational statements about achieving 100% PEVs, such as those made by the White House press office and the Joe Biden Presidential campaign, often citing to dead hyperlinks. While the President did direct EPA to initiate consideration of more stringent motor vehicle GHG standards, the Administrator is promulgating this final rule under his own statutory authority in section 202(a) based on his policy judgment and the voluminous technical record developed by EPA's technical experts. Aspirational statements made in White House press releases and campaign promises are not the basis for the final rule, and in any event, cannot alter the authority Congress granted in section 202(a).

[125] *See* EPA Memorandum to the docket for this rulemaking, "Comparison of EPA CO2 Reducing Technology Projections between 2010 Light-duty Vehicle Rulemaking and Actual Technology Production for Model Year 2016."

[126] Although in 2010, EPA overestimated technology penetrations for strong hybrids, in the 2012 LD GHG Rule, we underestimated technology penetrations for PEVs, projecting only 1 percent penetration by MY 2021, while actual sales exceeded 4 percent. Compare 2012 Rule RIA, table 3.5-22 with 2022 Automotive Trends Report, table 4.1.

[127] *See* 2022 Automotive Trends Report, Fig. ES-8 (industry generated credits each year from 2012-2015 and generated net credits for the years 2012-2016).

[128] *See, e.g.*, 81 FR at 73620–21 (technology packages in support of numerical GHG standard for class 7 and 8 tractors).

[129] 50 FR 10606, (Mar. 15, 1985).

[130] *See* 66 FR 5002, 5035-36 (Jan. 18, 2001).

of selective catalyst reduction (SCR) and concluded that “there [were] significant barriers to” the use of SCR, [131] such that the NOx adsorber would “be the only likely broadly applicable technology choice by the makers of engines and vehicles for the national fleet in this timeframe.”[132] Manufacturers instead chose to implement SCR to achieve the standards. In other cases, manufacturers did uniformly choose to adopt a single technology—for example, manufacturers have installed catalytic converters on all new ICE vehicles. But this is not because EPA mandates catalytic converters, but rather because manufacturers have themselves chosen that technology as the most effective way to comply with the performance-based standards.

Commenters’ subsidiary argument—that even if EPA could drive BEV adoption, the agency has done so at too rapid a rate—fails for similar reasons: EPA is not mandating any manufacturer to adopt BEVs at any rate. The majority of the shift to BEVs that is expected to occur over the next decade is reflected in our No Action scenario, or a rate of BEV adoption that is expected regardless of whether EPA adopts this final rule.[133] In addition, the rate at which EPA projects uptake of BEV, as well as PHEV, technologies in its modeled compliance pathway is consistent with, and often significantly smaller relative to uptake of new technologies projected in prior rules. Table 3 of this response presents projected technology adoption rates for the central case for this rule, as well as for the 2010 and 2012 LD GHG rules. The table shows that the increased adoption rates for BEV and PHEV technologies are well within the range of increased adoption rates for technologies evaluated in prior rules.

[131] *Id.* at 5053.
[132] *Id.* at 5036; *see also id.* at 5049.
[133] As discussed in the preamble, many third-party “moderate” projections anticipate even higher BEV projections than EPA’s No Action scenario.

Table 3. Technology Penetration Rates for Previous Vehicle Rules

Rulemaking	Technology	Initial Penetration Rate (MY)[134]	Projected Penetration Rate (First MY of Phase-in)	Projected Penetration Rate (Final MY of Phase-in)
2024 LMD Rule	BEV	10% (2023)[135]	26% (2027)	56% (2032)
2024 LMD Rule	PHEV	2% (2023)[136]	6% (2027)	13% (2032)
2012 LD Rule	High-efficiency gearbox	0% (2013)[137]	44% (2021)[138]	95% (2025)[139]
2012 LD Rule	Exhaust gas recirculation	6% (2021)[140]	12% (2021)[141]	68% (2025)[142]
2012 LD Rule	Gasoline direct injection	9 (2010)[143]	65% (2021)[144]	94% (2025)[145]
2010 LD Rule	42-volt stop-start	0% (2008)[146]	–	42% (2016)[147]

Indeed, premising protective emission standards on rapid technology adoption has been a mainstay of section 202(a) regulation since the earliest days of the Act. In 1971, EPA finalized standards for MY 1975, just three model years away, based on catalytic converter technology.[148]

[134] The Initial Penetration Rate column reflects the level of technology adoption prior to the promulgation of the rule. The data on this varies by rule; for example, in some cases, we report the level of adoption at the time the analysis for the rule was completed, while in other cases, we report the level of adoption for the baseline fleet evaluated in the rule.
[135] Environmental Protection Agency, "The 2023 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975," EPA-420-R-23-033, December 2023.
[136] Environmental Protection Agency, "The 2023 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975," EPA-420-R-23-033, December 2023.
[137] EPA and NHTSA Joint Technical Support Document for 2012 LD Rule at 3-105. This refers to a suite of incremental gearbox improvements that were to be available within the 2017 to 2025 timeframe and were not previously used.
[138] 77 FR 62867, Table III-36.
[139] 77 FR 62856-7.
[140] The 2012 Rule does not appear to report existing EGR use. However, the 2012 Rule does report 6% EGR in the reference case for MY 2021, suggesting that existing EGR use at or before the time of the rule's publication was very low. 77 FR 62855 Table III-26.
[141] 77 FR 62867, Table III-36.
[142] 77 FR 62868, Table III-38.
[143] EPA and NHTSA Joint Technical Support Document for 2012 LD Rule at 1-37, Table 1-22.
[144] 77 FR 62867, Table III-36.
[145] 77 FR 62868, Table III-38.
[146] EPA and NHTSA Joint Technical Support Document for 2010 LD Rule at 1-11, Table 1-2. 42-volt stop-start hybrid technology is also referred to as "BISG."
[147] *See* 2010 LD Rule RIA at 4-25, Table 4-13.
[148] 36 FR 12652 (1971); 36 FR 12657 (1971).

At the time of the final rule, catalytic converters were not yet in widespread commercial production.[149] Faced with the ongoing air pollution crisis, EPA nonetheless established stringent standards premised on a technology that the agency believed would become available in the lead-time permitted. Many in the industry argued that the technology would not be ready in time and sought extensions, including based on testing data showing that many vehicles were not expected to meet the standards. The Administrator denied those requests.[150] By MY 1975, automakers began installing catalytic converters on their vehicles that achieved 85% reductions in emissions.[151] Over time, greater use of electrification technologies to control and monitor the performance of catalytic converters further increased their efficacy. Today, the catalytic converter "is considered to be one of the great environmental inventions of all time."[152] This history dating back to the very beginning of the Clean Air Act further reflects that the major questions comments, notwithstanding their citation to recent court cases, reflect fairly ordinary concerns. We emphasize, however, a critical difference between EPA's 1971 rules and this rule: unlike the catalytic converter, which was unproven at the time of the 1971 rule, PEV technology has been around for many years. For example, as noted above in table 3, we expect 10% of new MY 2023 vehicles to be BEVs. EPA's rule is predicated on a technological pathway associated with more of an existing commercialized technology, and in that respect it is far less transformative than the agency's earliest CAA section 202(a) rulemakings.

The size of emissions decreases also reflect a rule that is in line with its predecessors. Table 2 shows that the net GHG emissions reductions in the final year of the program are greater than the 2021 LD GHG Rule, but smaller than the 2010 and 2012 LD GHG Rules. When considering emissions reductions on a percent basis, the same is true: EPA's projected emissions reduction of 50% of GHG and NMOG+NOx emissions from light duty vehicles (and somewhat larger NMOG+NOx reductions and slightly smaller GHG reductions for medium duty vehicles) are well within the range of recent rules.[153] The statute itself also contemplates rapid emissions reductions. As noted in Part I above, the Clean Air Act Amendments of 1970 required emissions

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[149] See Glenn Rifkin, John Mooney, a father of the catalytic converter, dies at 90, Washington Post (June 26, 2020), https://www.washingtonpost.com/local/obituaries/john-mooney-a-father-of-the-catalytic-converter-dies-at-90/2020/06/26/afbd87da-b7b4-11ea-aca5-ebb63d27e1ff_story.html (describing "the development of the first wave of production catalytic converters in 1973" in response to "new requirements for reduced auto emissions in the Clean Air Act of 1970").

[150] See generally Aaron Robinson, Fifty years ago, the government decided to clean up car exhaust. It's still at it., HAGERTY (Oct. 7, 2020), https://www.hagerty.com/media/magazine-features/fifty-years-ago-the-government-decided-to-clean-up-car-exhaust-its-still-at-it/ 7, 2020), https://www.hagerty.com/media/magazine-features/fifty-years-ago-the-government-decided-to-clean-up-car-exhaust-its-still-at-it/; EPA, EPA: A Retrospective, 1970-1990 (Nov. 29, 1990), https://www.epa.gov/archive/epa/aboutepa/epa-retrospective-1970-1990.html ("The Agency's strong stand led to strict enforcement of the Clean Air Act. Ruckelshaus refused to grant extensions requested by automobile manufacturers to meet hydrocarbon and carbon monoxide standards. In effect, he forced the adoption of the catalytic converter."); EPA, Hearings Set on Automobile Pollution Control (Mar. 4, 1971), https://www.epa.gov/archive/epa/aboutepa/hearings-set-automobile-pollution-control.html;

[151] Dennis C. Williams, The Guardian: EPA's Formative Years, 1970-1973 (Sept. 1993), https://www.epa.gov/archive/epa/aboutepa/guardian-epas-formative-years-1970-1973.html ("By 1973, EPA and auto manufacturers had agreed to adopt the catalytic converter as a means to reduce automobile emissions by 85% in 1975 year model cars.").

[152] EPA, Accomplishments and Successes of Reducing Air Pollution from Transportation in the United States (Jan. 3, 2024), https://www.epa.gov/transportation-air-pollution-and-climate-change/accomplishments-and-successes-reducing-air

[153] The 2010 and 2012 LD GHG rules when considered together achieved approximately a 50% reduction of GHG emissions and Tier 2 required reductions in NOx emissions of 77-95%.

decreases of 90% over a five-model-year period, the 1990 Amendments required a 100% phase-in of demanding standards over a six- to seven-year period, and Congress expressly preserved the Administrator's authority to promulgate even more stringent standards.

C. The final rule's indirect impacts do not give rise to a major question.

Commenters claiming the existence of a major question generally did not grapple with the considerable similarities between this rule and its predecessors. Rather, they focused on the rule's alleged impacts on third parties beyond the regulated entities and their customers, which we refer to here as "indirect impacts." They cite considerations as diverse as how demand for critical minerals could implicate US-China geopolitics, increased consumption of electricity to operate BEVs could destabilize the electric grid, decreased oil consumption could cause oil companies to fail, and so on. They claim that the proposal's costs grossly underestimate the rule's "true costs," based on their assertion that the proper metric is "aggregate cost" for the rule's significance to the "national economy." But commenters fail to identify any precedent holding that mere indirect impacts on unregulated entities give rise to a major question.[154] To the contrary, legal and technical reasons provide substantial reasons to hesitate before relying on indirect impacts to ascertain the existence of a major question.

First, the statute here does not require consideration of such indirect impacts, suggesting that their presence should not limit the agency's statutory authority. Section 202(a) mandates the Administrator to regulate emissions from motor vehicles, upon making the endangerment finding, subject to considerations of feasibility, lead-time, costs of compliance, and safety. While EPA is authorized to consider other factors and has in this rulemaking considered certain indirect impacts, as described in Part III.E below, consideration of other factors is not mandated by law.[155] As such, the agency's consideration of these additional impacts does not limit the agency's authority.

Second, the statutory context and legislative history supports not relying on indirect impacts to gauge the limits of statutory authority. For example, with respect to employment, Congress in enacting the 1977 Clean Air Act Amendments debated the employment impacts associated with the addition of new control technology for motor vehicles, with some Members projecting job increases of up to 180,000 new jobs and others projecting job losses in the tens of thousands.[156] Nonetheless, Congress enacted stringent statutory standards for motor vehicle emissions control. Congress in the 1990 Clean Air Act Amendments chose to further address labor dislocations through funding and training. It added Clean Air Employment Transition Assistance provisions

[154] See, e.g., *West Virginia*, 142 S. Ct. 2587 (2022) (considering the consequential nature of a regulation of electric generating units with regard to its direct burdens on that sector), 2613 (noting "an obvious difference between (1) issuing a rule that may end up causing an incidental loss of coal's market share, and (2) simply announcing what the market share of coal, natural gas, wind, and solar must be, and then requiring plants to reduce operations or subsidize their competitors to get there").

[155] *Motor & Equip. Mfrs. Ass'n, Inc. v. EPA*, 627 F.2d 1095, 1118 (D.C. Cir. 1979); see also id. ("There is no indication that Congress intended section 202's cost of compliance consideration to embody social costs of the type petitioners advance," and holding that the statute does not require EPA to consider antitrust concerns); *Coal. for Responsible Regul., Inc. v. EPA*, 684 F.3d 102, 128 (D.C. Cir. 2012) (holding that the statute "does not mandate consideration of costs to other entities not directly subject to the proposed standards"); *Massachusetts*, 549 U.S. 497, 534 (2007) (impacts on "foreign affairs" are not sufficient reason for EPA to decline making an endangerment finding under section 202(a)(1)).

[156] 123 Cong. Rec. 18182 (1977).

to the Job Training Partnership Act. The added provisions provided funding for "training, adjustment assistance, and employment services to [eligible dislocated workers] adversely affected by compliance with the Clean Air Act" and for "needs-related payments to such individuals."[157] In short, Congress was well aware that impacts to employment were a possibility and provided funding and training for affected workers; but it did not prohibit the agency from further regulation on the basis of employment.

To take another example, in enacting the CAA Amendments of 1990, Congress recognized the need for the critical mineral rhodium for the production of catalytic converters (a ubiquitous motor vehicle pollution control technology) and that South Africa was home to the vast majority of the world's then-known rhodium deposits.[158] While Congress acknowledged concerns with South Africa's human rights record, it nonetheless proceeded to significantly strengthen the motor vehicle emissions standards, such that the production of the necessary technologies could require dependence on South African rhodium supplies. Thus, Congress understood that the nation may need to look to other countries for critical materials where necessary to improve motor vehicle emissions control technology, but mandated emissions reductions regardless. At the same time, Congress also mandated that EPA study the appropriateness of even stronger standards and expressly reserved the agency's authority to promulgate such standards, without including critical minerals as a specific factor to consider.[159]

Third, indirect impacts are often subject to greater uncertainties, and in many cases are not reasonably foreseeable, particularly when separated from the agency's action by a lengthy causal chain. For instance, while EPA has assessed indirect impacts in calculating the rule's costs and benefits—and the presence of positive net benefits supports the rationality of the Administrator's judgment—we do not rely on cost-benefit calculations, with their uncertainties and limitations, in identifying the appropriate standards.[160] Some other impacts are so tenuously linked that they are not amenable to estimation at all, such as—to provide one example raised by a commenter—how the final rule might impact child labor in Congo, a matter which the final rule does not regulate

[157] Pub. L. 101-549, at sec. 1101, amending the Job Training Partnership Act, 29 U.S.C. 1501 et seq. (since repealed). *See also* 136 Cong. Reg. H12911-01 (Oct. 26, 1990) (statement of Representative William D. Ford) ("When a business closes or lays off workers as a consequence of this act, because demand for its products or services is adversely affected, because a product is banned, or because its production processes have become uneconomical, State government, substate grantees, employers, employer associations, and representatives of employees may apply to the Secretary of Labor for funds to help laid off workers find new employment.").

[158] See 136 Cong. Rec. 5102-04 (1990). The 1990 CAA Amendment are not the first time that Congress wrestled with potential dependence on South Africa for rhodium. Congress also recognized this issue when developing the 1977 CAA Amendments. See 123 Cong. Rec. 18173-74 (1977).

[159] See CAA section 202(i), (i)(3)(B).

[160] To provide a more specific example, the agency has modeled the impacts of the final rule on grid reliability and found that grid reliability is not expected to be adversely affected by the modest increase in electricity demand associated with increasing use of PEVs. Yet, as the agency explains in the Resource Adequacy and Grid Reliability Technical Memo, any potential reliability impacts would not be a direct result of this rule but rather of the compliance choices source owners, operators, ISOs and RTOs may pursue, none of which are directly regulated under the final rule. This is a critical difference between this rule and the rule under review in *West Virginia*, where EPA did directly regulate EGUs, and is why grid reliability impacts are of limited relevance to ascertaining the existence of a major question here.

and which, to the extent the United States has any influence, would involve matters of trade and foreign policy outside the scope of the CAA.[161]

Finally, regulations routinely have wide-ranging indirect impacts, so such impacts cannot practically be relied on to identify "extraordinary" cases. For example, EPA's motor vehicle rules generally impose costs on industry, and as such may affect the economics of the regulated entities as well as their employees, suppliers, and customers; fuel producers, distributors, and retailers; and generally the global supply chains to manufacture vehicles, parts, and raw materials. The same can be said for every major regulation, such that relying on indirect effects would offer no limiting principle in determining the existence of major questions.

As such, commenters' assertions about the myriad indirect effects do not reflect the rule's extraordinary nature, but rather the ordinary state of the global supply chain associated with motor vehicles. For instance, although commenters criticize US motor vehicles manufacturers' reliance on China for certain critical minerals used in manufacturing batteries, they fail to acknowledge that reliance on foreign trade is not unique to BEVs; rather manufacturers rely on imports from China and other nations for a wide range of inputs used in production of ICE vehicles,[162] and such reliance is continuously adapting to changing market and regulatory forces.[163] For example, a 2018 EPA case study of Ford found that Ford has "approximately 11,000 suppliers in over 60 countries."[164] Such reliance is not unique to the motor vehicle industry. Aluminium, for instance, is an important raw material used in motor vehicle manufacturing and numerous other industrial applications. It is largely imported, and such

[161] The commenter claims that EPA's final rule will increase demand for cobalt, the Democratic Republic of the Congo controls large reserves of cobalt, and therefore the final rule will aggravate the human rights concerns associated with Congolese child labor as well as geopolitical risks with China, which owns and refines a significant portion of Congolese cobalt output. But the final rule does not regulate battery manufacturers, much less the labor practices at Congolese critical minerals mines, or Chinese ownership of Congolese companies, rendering any such associated impacts highly speculative. (The same, of course, can be said in relation to critical minerals used in ICE vehicles emissions control technologies—e.g., the final rule does not regulate the labor practices of those mines either.) We also note that future technological developments may diminish the use of cobalt in vehicle batteries, which provides another reason not to place weight on the extended chain of hypothetical causation raised by the commenter. See Chen et al., "A Layered Organic Cathode for High-Energy, Fast Charging, and Long-Lasting Li-Ion Batteries," *ACS Cent. Sci.* 2024 (demonstrating "the operational competitiveness of sustainable organic electrode materials [derived from earth-abundant elements] in practical batteries"), available at https://pubs.acs.org/doi/epdf/10.1021/acscentsci.3c01478.

[162] *See, e.g.*, David Coffin, *China's Growing Role in U.S. Automotive Supply Chains*, Office of Industries of the U.S. International Trade Commission (USITC) Working Paper ID-060 (Aug. 2019).

[163] For example, the US motor vehicle industry relies on the global supply chain for semiconductors. The recent shortage in semiconductors caused significant impacts on the motor vehicle industry. *See, e.g.*, Jeanne Whalen, Semiconductor Shortage that Has Hobbled Manufacturing Worldwide is Getting Worse (Sep. 23, 2021), https://www.washingtonpost.com/us-policy/2021/09/23/chip-shortage-forecast-automakers/. The shortage was due to numerous factors, ranging from impacts of pandemic lockdowns on semiconductor production and international trade; the impacts of the pandemic in increasing demand for automobiles and other electronics that use semiconductors; natural disasters that shuttered production facilities; trade conflicts between the US, China, Korea, and Japan; and the Russia-Ukraine conflict. *See* KPMG, *Russia-Ukraine war: Impact on the Semiconductor Industry*, https://kpmg.com/ua/en/home/insights/2022/05/russia-ukraine-war-impact-semiconductor-industry.html; Esther Shein, *Global Chip Shortage: Everything You Need to Know* (Oct. 19, 2023), https://www.techrepublic.com/article/global-chip-shortage-cheat-sheet/.

[164] *See* EPA Center for Corporate Climate Leadership, *Success Stories: Case Studies in Supply Chain Engagement* (Aug. 21, 2023), https://www.epa.gov/climateleadership/success-stories-case-studies-supply-chain-engagement.

imports can have potential national security implications.[165] To provide another example, Apple's supply chain comprises "more than 400 facilities across 180 regions in nearly 30 countries."[166] Overcoming supply chain vulnerabilities is a key component of managing any significant manufacturing operation in today's global world.[167]

Turning to infrastructure, although commenters take aim at the need for new electric charging infrastructure to supply BEVs, they fail to mention that ICE vehicles depend on extensive infrastructure for their operation too,[168] and that infrastructure has changed considerably over the decades in response to environmental regulation. Important changes include the elimination of lead from gasoline, the provisioning of diesel exhaust fluid (DEF) at truck stops to support selective catalytic reduction (SCR) technologies, and the introduction of low sulfur diesel fuel to support diesel particulate filter (DPF) technologies.[169] Each of these changes required establishment of new manufacturing and distribution systems to ensure these fuels and DEF were available to drivers across the country.

Commenters also speculated that the costs of the rule will dramatically increase the costs of transportation; but all pollution control technologies impose upfront costs. And commenters neglected to mention that BEV technologies are actually expected to save purchasers money due to their lower operating expenses, such that the economic costs of transportation are likely to decrease.[170] Commenters also complain about the potential losses for the petroleum industry but fail to mention that this is true for all of EPA's motor vehicle GHG rules, which have continually been premised on reducing petroleum consumption.[171] Indeed, as shown in Table 2 of this response, both the 2010 and 2012 LD GHG rules were anticipated to cause even greater reductions in petroleum consumption. And commenters fail to grapple with the fact that increased demand for fossil fuels is associated with adverse impacts to US energy security.

D. EPA has expertise in assessing indirect impacts of its environmental regulations.

To the extent indirect impacts are relevant, EPA has relevant expertise in assessing such impacts, particularly in consultation with other expert agencies. In addition to the agency's principal expertise in pollution control, EPA also has broad expertise in evaluating the indirect impacts of its actions, both independently and in consultation with other expert agencies.

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[165] *See, e.g*., White House Briefing Room, *A Proclamation on Adjusting Imports of Aluminum Into the United States* (Feb. 24, 2023), https://www.whitehouse.gov/briefing-room/presidential-actions/2023/02/24/a-proclamation-on-adjusting-imports-of-aluminum-into-the-united-states-4/.
[166] Bloomberg, *Apple's Supply Chain Is on a Collision Course with Climate Change* (Sep. 26, 2023), https://www.bloomberg.com/graphics/2023-opinion-apple-supply-chain-climate-change/.
[167] *See, e.*g., Willy C. Shih, *Global Supply Chains in a Post-Pandemic World* (Sept. – Oct. 2020), https://hbr.org/2020/09/global-supply-chains-in-a-post-pandemic-world; KPMG, *Vulnerable Supply in Automotive*, https://kpmg.com/xx/en/home/insights/2022/05/vulnerable-supply-in-automotive.html.
[168] Moreover, we expect that through 2055 the majority of light and medium duty PEV charging will occur at home; by contrast, ICE vehicles are typically not refueled at home, but require a trip to the gas station.
[169] *See, e.g*., 88 FR 4376 (inducement requirements associated with SCR and DEF); 79 FR 23414 (low sulfur fuel and advanced control technologies for gasoline vehicles); 66 FR 5002 (low sulfur fuel and diesel particulate filters); CAA 218 (Prohibition on production of engines requiring leaded gasoline).
[170] *See* Preamble VIII.
[171] Commenters also neglect to note that the vast majority of such reduced consumption (estimated by EPA as 94.8%) would come from reduced net imports, with only the remaining small fraction linked to reduced domestic production. *See* Preamble VIII.D.

Congress itself recognized that EPA's CAA actions could have a wide range of non-environmental impacts and entrusted the Administrator with regulating notwithstanding such impacts.[172] For example, in section 202(a)(3)(A), Congress directed EPA to establish motor vehicle emission standards "giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology." Congress also authorized EPA, in administering the motor vehicle emissions standards, to "exempt any new motor vehicle or new motor vehicle engine" from certain statutory requirements "upon such terms and conditions as he may find necessary . . . for reasons of national security."[173] Congress further directed EPA to promulgate emissions standards not only for domestically produced vehicles, but also vehicles imported into the United States from foreign nations.[174] Thus, while we agree that EPA is not the exclusive or principal Federal agency charged with regulating energy, safety, national security, international trade, and so forth, Congress nonetheless vested EPA with authority, and EPA possesses sufficient expertise, to evaluate concerns in these and other areas in relation to its motor vehicle emissions control program. It bears mentioning, moreover, Congress directed EPA alone—not in consultation with or subject to the agreement of any other agency—to evaluate the above effects, indicating Congress's decision to entrust such judgments to EPA's expertise.

More generally, Congress has also recognized the agency's general expertise in considering the "public health and welfare" implications of air pollution.[175] In addition to EPA's authority to act on its own, Congress further directed EPA, in consultation with other agencies, to conduct a "comprehensive analysis of the impact of this chapter on the public health, economy, and environment of the United States."[176] The statute also requires EPA to establish emission standards for electric generating units, including based on consideration of "the energy. . . impacts of compliance."[177] These statutory provisions further indicate that Congress believed EPA had sufficient expertise to evaluate manifold indirect impacts.[178] Moreover, EPA has in

[172] *See generally Am. Elec. Power Co. v. Connecticut*, 564 U.S. 410, 427, 428 (2011) ("As with other questions of national or international policy, informed assessment of competing interests is required. Along with the environmental benefit potentially achievable, our Nation's energy needs and the possibility of economic disruption must weigh in the balance. The Clean Air Act entrusts such complex balancing to EPA in the first instance, in combination with state regulators…. Congress designated an expert agency, here, EPA, as best suited to serve as primary regulator of greenhouse gas emissions.").

[173] CAA section 203(b)(1).

[174] CAA section 203(a)(1); see also, e.g., CAA section 216(1).

[175] *See, e.g.*, CAA section 202(a)(1) (requiring EPA to promulgate standards for emissions from motor vehicles "which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare"), 202(a)(4)(A) (precluding the use of any emissions control device that creates "unreasonable risk to public health, welfare, or safety in its operation or function").

[176] CAA section 312(a) (directing EPA to conduct a "comprehensive analysis of the impact of this chapter on the public health, economy, and environment of the United States").

[177] See, e.g., CAA section 169A(b), (g)(2) (requiring EPA to determine best available retrofit technology for existing "fossil-fuel fired generating powerplant[s]," giving consideration to factors including "the energy and nonair quality environmental impacts of compliance").

[178] See also, e.g., CAA section 202(l)(2) ("noise, energy, and safety factors"), 211(o)(2)(B)(ii)(II) ("energy security"), (IV) ("the infrastructure of the United States, including deliverability of materials, goods, and products other than renewable fuel, and the sufficiency of infrastructure to deliver and use renewable fuel"), (VI) ("job creation, the price and supply of agricultural commodities, rural economic development, and food prices").

numerous prior rulemakings considered the indirect impacts of its motor vehicle regulations on factors like employment, national security, and the electric grid.[179]

E. EPA determined that the final rule does not cause significant indirect harms and has large net benefits.

EPA carefully assessed the indirect impacts of the final rule, pursuant to its own expertise and in consultation with many expert agencies. The agency projects that the final rule accrues positive net benefits for society and will not cause significant indirect harms, such as to national security, grid reliability, or employment. The rule also creates the potential for positive benefits in these and other areas, including through mitigating air pollution and climate change, reducing dependence on foreign oil, and creating regulatory certainty for the manufacturing of advanced pollution control technologies and the development of electric charging infrastructure.

In promulgating the final rule, EPA applied its own considerable expertise in motor vehicle pollution control as well as assessing related environmental and economic impacts. Further, the agency engaged in extensive consultation both during the interagency review process pursuant to Executive Order 12,866 and outside of that process.[180] EPA consulted with numerous Federal agencies and workgroups[181] with a wide range of expertise, including in the availability of critical minerals, battery technologies, charging infrastructure, grid reliability, employment, safety, foreign trade, national security, and more. The agency also consulted with State and regional agencies with relevant expertise.[182] And EPA conducted extensive engagement with a diverse range of stakeholders, including vehicle manufacturers, labor unions, technology suppliers, dealers, utilities, charging providers, environmental justice organizations, environmental organizations, public health experts, tribal governments, and other organizations. EPA also carefully considered the input it received through the public hearing and written comments, including 252,439 comments representing diverse stakeholders.

EPA finds that this rule creates $99 billion in annualized net benefits (2022$ 2% AV). The rule's positive net benefits support the rationality of the Administrator's judgment. But the agency did not rely on the cost-benefit calculations, with their uncertainties and limitations, in identifying the appropriate standards. We recognize that some commenters claimed this large net

[179] See, e.g., HD Phase 2 RIA, 8.8 (Petroleum, Energy and National Security Impacts), 8.10 (Employment Impacts); HD Phase 1 RIA, 9.7 (Petroleum, Energy and National Security impact), 9.9 (Employment Impacts); 2021 LD RIA, 3.2 (energy security impacts); 8.2 (employment); 2021 LD RTC 12-83 (grid reliability), 19-18 (national security); see also EPA, Power Sector Modeling, https://www.epa.gov/power-sector-modeling (describing EPA's IPM model of the power sector, which the agency applies in its rulemaking affecting that sector and listing numerous rules that have applied the model).

[180] *See* Preamble ES.

[181] National Highway Traffic Safety Administration (NHTSA) at the Department of Transportation (DOT), Department of Energy (DOE) including several national laboratories (Argonne National Laboratory (ANL), Lawrence Berkeley National Laboratory (LBNL), National Renewable Energy Laboratory (NREL), and Oak Ridge National Laboratory (ORNL)), United States Geological Survey (USGS) at the Department of Interior (DOI), Joint Office of Energy and Transportation (JOET), Federal Energy Regulatory Commission (FERC), Department of Commerce (DOC), Department of Defense (DOD), Department of State, Federal Consortium for Advanced Batteries (FCAB), and Office of Management and Budget (OMB).

[182] California Air Resources Board (CARB), and other States, including members of the National Association of Clean Air Agencies (NACAA), the Association of Air Pollution Control Agencies (AAPCA), the Northeast States for Coordinated Air Use Management (NESCAUM), and the Ozone Transport Commission (OTC).

benefits figure itself amounted to vast economic and political consequences. We do not agree for the reasons stated above in Part III.C. It would also be particularly perverse, given Congress's grant of authority in section 202(a) to control motor vehicle air pollution, to conclude that where an agency action is accomplishing what Congress directed the agency to do and achieves large benefits, for those benefits to somehow call into question EPA's authority for the action in the first place. Even were the size of the net benefits to be relevant, as we show in Table 2 of this response, the rule's net benefits ($2.0 trillion) are not different in kind from its predecessors: just slightly higher than those of the 2012 LD GHG Rule ($1.9 trillion) and lower than those of the 2010 LD GHG Rule ($2.3 trillion, all values expressed in 3% PV, 2022$).

Throughout the Preamble, RIA, and RTC, EPA further addresses specific impacts, including those of particular concern to these commenters, including electric charging infrastructure and grid reliability; oil imports and energy security; critical minerals; and employment. We summarize some key observations here.

We project that there will be adequate electric charging and refueling infrastructure to support the standards. Grid reliability is not expected to be adversely affected by the modest increase in electricity demand associated with PEV charging, and managed charging strategies can be applied to further decrease grid impacts.[183] We anticipate sufficient supplies of critical minerals to support battery production, given both global supplies as well the significant government efforts through the BIL and IRA as well as private investments to develop domestic mining and processing capacity. The rule is projected to significantly reduce the consumption of petroleum, whether through increased adoption of BEVs or other advanced ICE vehicle technologies that reduce petroleum use; we expect the vast majority of this decrease (94.8%) to reflect decreased net imports, which yields significant positive benefits for energy security ($2.1 billion 2% AV), with relatively limited impacts on domestic refining. We find the potential for employment shifts between industries (e.g., from ICE and ICE vehicle manufacturing to BEV, battery); and while we do not have sufficient data to quantify employment impacts, there is evidence that—assuming production of PEVs and their power supplies are done in the US at the same rates as ICE vehicles—US employment is likely to increase in response to PEV adoption.

Moreover, as we explain in the Preamble, EPA considers our estimates of battery costs and BEV adoption to be conservative, such that there is a reasonable likelihood that the market moves even more quickly toward BEV adoption and achieves greater emissions reductions at a lower cost than we anticipate. At the same time, the standards do not mandate a specific level of BEV technologies—or any at all —such that in the event the barriers to BEV adoption are greater than we project, manufacturers have the flexibility to adopt other technologies and mitigate the need for BEV-related critical minerals, infrastructure, and so forth.

Furthermore, as discussed in Preamble ES and throughout the RIA, many ongoing efforts help ensure the smooth implementation of the final rule. Significant initiatives by the Federal government (such as the BIL and IRA), State and local government, and private firms complement EPA's final rule, including initiatives to reduce the costs to purchase BEVs; support the development of domestic critical mineral, battery, and BEV production; and accelerate the establishment of charging infrastructure. EPA is also monitoring industry's performance in

[183] Specifically, EPA assessed the cumulative impacts of BEV charging in response to the combined impact of this rule and the HD Phase 3 rule. Taken together, these rules are associated with a modest and manageable increase in electricity demand and are not expected to adversely impact grid reliability.

complying with mobile source emissions standards, including the final rule. As appropriate and consistent with our CAA section 202(a) authority, EPA may decide to issue guidance documents, initiate a future rulemaking to consider modifications to the final rule, or make no changes to the program.

Moreover, commenters raising major questions concerns unduly focused on the potential for negative indirect impacts associated with the final rule, while neglecting the negative impacts of inaction. Put differently, they ignored the rule's potential to create positive impacts, which—as many other stakeholders noted—are many and great. Foremost, the positive impacts include the beneficial impacts of mitigating air pollution—the primary purpose of section 202(a). Section II of the preamble extensively documents the adverse effects of criteria pollutants and carbon pollution on human health, the environment, and the economy.[184] Other positive impacts include reduced dependence on foreign oil and increased energy security and independence; increased regulatory certainty for encouraging domestic production of advanced pollution control technologies and their components (including BEVs, batteries, fuels cells, battery components, and critical minerals) and for the development of electric charging infrastructure, with attendant benefits for employment and US global competitiveness in these sectors; and increased use of electric charging and potential for vehicle-to-grid technologies that can support electric resource adequacy and grid reliability.[185]

In sum, the final rule does not create vast economic and political consequences of an unprecedented kind. The rule builds upon the market's transition to PEVs—in response to emerging technological developments, Congress's support in the IRA, and other factors—and strengthens the existing emissions standards. Its direct impacts are analogous to, and in some respects less impactful than, its predecessors. And contrary to what commenters claim, the final rule is not a BEV mandate, whether legally or practically, as a manufacturer can comply with the standards without producing additional BEVs. As for indirect impacts, there is nothing different in kind about the impacts of the final rule compared to the impacts of prior rules; the presence of such impacts merely reflects the ordinary nature of the global supply chain for motor vehicles. Even were the agency to consider indirect regulatory impacts, the final rule causes no significant indirect harms of the kinds that commenters allege, has the potential for positive impacts, and on balance provides positive net benefits to society.

IV. ADDITIONAL FACTORS COUNSEL AGAINST APPLICATION OF THE MAJOR QUESTIONS DOCTRINE

Additional factors present further evidence that the major questions doctrine does not apply: the agency's assertion of authority does not create an unworkable conflict with any other statutory provision, the action does not significantly alter the balance of Federal and state power or the power of government over private property, and notwithstanding political interest in motor

[184] *See* Preamble II (describing, for instance, the adverse impacts of climate change as including catastrophic risks for human health and the environment, water supply and quality, storm surge and flooding, electricity infrastructure, agricultural disruptions and crop failures, human rights, international trade, and national security).
[185] EPA did not rely on these other positive impacts, or the net benefits calculations, in identifying the level of the standards. Nonetheless, the potential for such positive impacts as well as the presence of positive net benefits support the rationality of the standards.

vehicle GHG regulation, the weight of statutory and legislative evidence supports EPA's authority.

First, the final rule is not in conflict with other statutory provisions. As an initial matter, commenters' attempts to wrap their many statutory interpretation challenges in the major questions cloth are misplaced. Ordinary claims of statutory inconsistency, even when "multiple Federal statutes" are allegedly in conflict, are governed by the "traditional rules of statutory interpretation."[186] For example, in *Utility Air*, the Court deferred to EPA's interpretation of the statute notwithstanding petitioners' arguments that the agency's approach was "fundamentally unsuited" given the statutory context, because such approach was not "so disastrously unworkable, and need not result in such a dramatic expansion of agency authority."[187] Here, the commenters' allegations of inconsistency with other statutory provisions[188] are basically run-of-the-mill interpretive disputes that can be resolved under traditional principles of interpretation, and in any event, lack merit. We generally respond to commenters' statutory interpretation arguments later in this section of the RTC. Here, we summarize a few of the responses specifically as they pertain to the major questions doctrine.

Commenters assert that EPA's averaging, banking, and trading (ABT) program is inconsistent with various compliance and enforcement provisions in the statute, e.g., CAA sections 203-207, and specifically criticize EPA's decision to assess the feasibility of the standards based on an average of the emissions performance of different vehicle technologies, including ICE vehicles and BEVs. We respond to the statutory interpretation arguments against ABT later in this RTC section. We also do not see how ABT gives rise to a major question either as to its own validity or to EPA's use of averaging as part of the process of determining stringency of the standards.

Congress has decided the major question here: EPA must control air pollution from motor vehicles. ABT is a compliance mechanism to achieve that aim. ABT recognizes the practical realities of the motor vehicle industry and its strategies for reducing certain pollutants; manufacturers do not redesign every vehicle in every single year, any given manufacturer may find it cheaper to reduce emissions on one kind of vehicle versus another, certain manufacturers may be more cost effective at reducing emissions than other ones, and advanced pollution control technologies are typically phased in over a period of time as opposed to all at once. ABT thus enables EPA to ensure emissions reductions from the class of motor vehicles, while providing manufacturers with greater flexibility in developing their products and achieving emissions reductions at lower cost. ABT also has a lengthy pedigree—beginning (with the averaging component) in 1985 and being applied consistently for NMOG+NOx since 2000 and GHG emissions standards since their inception in 2010. It would be extraordinary for an

[186] *POM Wonderful LLC v. Coca-Cola Co.*, 134 S. Ct. 2228, 2236 (2014); cf. Dep't of Agric. Rural Dev. Rural Hous. Serv. v. Kirtz, No. 22-846, 2024 WL 478567, at *11 (U.S. Feb. 8, 2024) ("we approach federal statutes touching on the same topic with a strong presumption they can coexist harmoniously…. Where two laws are merely complementary—as is undisputedly the case here—our duty lies not in preferring one over another but in giving effect to both.").
[187] *Utility Air*, 573 U.S. 302, 332 (2014)
[188] In some cases, commenters do not even identify an actual conflict, but base their argument primarily on the *expressio unius* canon. We offer specific responses regarding the application of *expressio unius* later in this RTC 2.3.

interstitial compliance mechanism that EPA has implemented for nearly forty years to suddenly become a major question.[189]

Commenters claim there is a conflict between the final rule and the statute's Clean Fuel Vehicles provisions.[190] But the Clean Fuel Vehicle provisions, which are contained in a separate Part of the statute, have little bearing on the scope of EPA's section 202(a) authority.[191] That program was a specific project to advance alternative fuels and technologies.[192] The program prescribes more stringent criteria pollutant standards for certain years (e.g., MY 1998 and later for HD vehicles)[193] in some ozone nonattainment areas, relative to the standards applicable nationwide.[194] There is an obvious mismatch between these requirements and EPA's section 202(a) authority, under which we are setting GHG standards applicable to the entire nation for MY 2027-32. Moreover, the specific provision on which commenters place most weight, section 242(b), actually says that clean fuel vehicles and "conventional gasoline-fueled or diesel fueled vehicles" may be part of the "same category" of vehicles.[195] Finally, commenters erroneously presume that the distinction between clean fuel and conventional vehicles is a distinction between electric vehicles and gasoline and diesel vehicles. Clean fuel vehicles as a category include all kinds of vehicles, including those fueled by diesel, reformulated gasoline, ethanol, hydrogen, electricity, and so on.[196]

Commenters also allege a conflict between the final rule and the Energy Policy and Conservation Act (EPCA). The Supreme Court has already rejected a similar argument as EPCA and the CAA are two different statutes that impose independent duties.[197] If anything, the fact that EPCA precludes DOT from considering battery electric vehicles in exercising certain regulatory powers, and the CAA contains no similar limitation, suggests that Congress knew

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[189] *West Virginia*, moreover, suggests this is not a major question. In describing the cap-and-trade program for the Mercury and Air Toxics Rule, the Court noted that there, "EPA set the cap based on the application of particular controls, and regulated sources could have complied by installing them." *West Virginia*, 142 S. Ct. 2587, 2610 (2022). This case is analogous. EPA sets the final standards based on technical factors such as feasibility, lead time, and costs, see section 202(a)(1)-(2), comparable to the "scientific, objective criterion" the Court noted with favor, not "wherever the Agency sees fit" based on vague notions of societal welfare.

[190] *See generally* Guidance for Fulfilling the Clean Fuel Fleets Requirement of the Clean Air Act, EPA-420-B-22-027 (June 2022).

[191] As we explain in Preamble III.B, however, we do think the Clean Fuel Vehicles program supports interpreting the statutory term "motor vehicle" to include electric vehicles. CAA section 241(2).

[192] *See* H. REP. NO. 101-490, pt. 1, at 283 (1990), 1990 WL 1222133, at *65-66 (Congress wanted "to encourage a broad range of vehicles," including those using electricity, and break the "chicken and the egg" supply-and-demand problem among automakers, consumers, and fuel producers).

[193] CAA section 245(a).

[194] Compare, e.g., clean fuel vehicle statutory numeric standards in CAA sections 243 and 245, with the those applying to conventional vehicles in CAA section 202(g)-(i).

[195] CAA section 242(b) says that clean fuel vehicles "shall comply with all requirements of this subchapter which are applicable in the case of conventional gasoline-fueled or diesel fueled vehicles of *the same category* and model year" (emphasis added).

[196] CAA section 241(2).

[197] *Massachusetts*, 549 U.S. 497, 532 (2007) (". . . [T]hat DOT sets mileage standards in no way licenses EPA to shirk its environmental responsibilities. EPA has been charged with protecting the public's "health" and "welfare," 42 U.S.C. § 7521(a)(1), a statutory obligation wholly independent of DOT's mandate to promote energy efficiency. *See* Energy Policy and Conservation Act, § 2(5), 89 Stat. 874, 42 U.S.C. § 6201(5). The two obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.").

how to limit EPA's authority but intentionally declined to do so. We address the consistency of this rule with NHTSA's authority later in RTC 2.3.

As for the Renewable Fuel Standards (RFS) program, the statute explicitly states that the RFS provisions do not limit EPA's other authorities to regulate GHGs.[198] Commenters, moreover, erroneously claim that the increasing statutory biofuel volumes in the RFS program suggest that any future GHG decreases from the transportation sector must come from renewable fuels; but actually, the statute imposes no such requirement. In fact, beginning in 2023, there are no increasing statutory biofuel requirements, and the only statutory biofuel volume is a requirement that biomass-based diesel is not less than the volume in 2012.[199] We further address this comment in RTC 19, finding among other things that the final rule is consistent with EPA's recently promulgated RFS "Set" rule, under which EPA exercised its discretion to mandate increased renewable fuel volumes.

Second, the final rule does not intrude upon areas traditionally reserved for State police power. While Congress recognized the importance of cooperative Federalism in the Clean Air Act, it intended for regulation of motor vehicle emissions to be principally the domain of the Federal EPA. As such, section 209(a) preempts most State and local standards "relating to the control of emissions from new motor vehicles or new motor vehicle engines."[200] Moreover, motor vehicles are instruments of interstate commerce, the air pollutants they emit readily travel over state lines, and the same manufacturers produce motor vehicles for sale nationwide, such that regulation of motor vehicle emissions is eminently suitable for the Federal government.

Third, the final rule does not "significantly alter the balance … the power of the Government over private property."[201] Pursuant to section 202(a), EPA has imposed emissions standards on the motor vehicle industry since the 1970s, and we have regulated GHG emissions from LD vehicles since 2010. The final rule continues regulation of the same regulated community by implementing iteratively more protective emissions standards.

Fourth and finally, commenters erroneously claim that the presence of earnest political debate gives rise to a major question here. Notwithstanding ongoing political interest in motor vehicle regulation, the weight of statutory and legislative evidence strongly favors EPA's authority. EPA summarizes in Preamble III.B the considerable Federal statutory enactments and legislative history that support the agency's consideration of BEVs.[202] Without restating that history, we note that Congress has declared a policy of supporting electric vehicles. 15 USC 2501(b)(4)

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[198] CAA section 211(o)(12) ("Nothing in this subsection, or regulations issued pursuant to this subsection, shall affect or be construed to affect the regulatory status of carbon dioxide or any other greenhouse gas, or to expand or limit regulatory authority regarding carbon dioxide or any other greenhouse gas, for purposes of other provisions (including section 7475) of this chapter….").
[199] *See* CAA section 211(o)(2)(B)(ii), (v).
[200] CAA section 209(b) creates an exception for "any State which has adopted standards (other than crankcase emission standards) for the control of emissions from new motor vehicles or new motor vehicle engines prior to March 30, 1966." The only State to meet this requirement is California, which has developed its own motor vehicle emissions program, subject to EPA's waivers of preemption. In addition, other States may adopt programs identical to the California program under section 177, but they may not establish their own programs. We note that California strongly supports EPA's further regulation of GHGs from motor vehicles.
[201] *Alabama Ass'n of Realtors v. Dep't of Health and Human Servs.*, 141 S. Ct. 2485, 2489 (2021) (citation omitted).
[202] *See also* Greg Dotson, Comments to Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles; Greg Dotson & Dustin Maghamfar, *The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act*, 53 ENVL. L, REPORTER 10017, 10030-32 (2023).

states that it is "the policy of Congress" to "support accelerated research into, and development of, electric and hybrid vehicle technologies," to "facilitate, and remove barriers to, the use of electric and hybrid vehicles in lieu of gasoline- and diesel-powered motor vehicles, where practicable," and "promote the substitution of electric and hybrid vehicles for many gasoline- and diesel-powered vehicles…." IRA Section 60106 provides $5 million for EPA "to provide grants to States to adopt and implement greenhouse gas and zero-emission standards for mobile sources pursuant to section 177 of the [CAA]."[203] The legislative history accompanying the IRA states, "Congress recognizes EPA's longstanding authority under CAA Section 202 to adopt standards that rely on zero emission technologies, and Congress expects that future EPA regulations will increasingly rely on and incentivize zero-emission vehicles as appropriate."[204] The statutory and legislative history unquestionably tilts in favor of Congress viewing electrified vehicles and BEVs as important technologies for pollution control, supporting EPA's authority to consider such technologies in establishing emissions standards.

In light of the substantial history in favor of BEV technologies, we think the various legislative history materials cited by commenters are of little relevance. Commenters point to a few failed bills. But failed legislation "offers a particularly dangerous basis on which to rest an interpretation of an existing law a different and earlier Congress" adopted.[205] Especially where, as here, Congress has passed laws regarding a topic, failed bills are of questionable relevance. Moreover, the specific failed bills that commenters cite sought to impose different regulatory outcomes than the final rule. For example, the Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019), which applied to light-duty vehicles, "sets a schedule for increasing the percentage of zero-emission vehicles a vehicle manufacturer delivers for sale, culminating in a requirement to sell only zero-emission vehicles from 2040 on."[206] The final rule, however, does not depart from EPA's historic approach of performance-based standards in favor of sales mandate-based standards, nor does the final rule project, much less require, that manufacturers only sell BEVs from 2040 on.

Separately, the commenters claim Congress's support for research and incentives for BEVs undermines EPA's Clean Air Act authority. But such efforts do not constitute a "distinct regulatory scheme"[207] that displaces the agency's authority. Rather, "[c]ollaboration and research do not conflict with any thoughtful regulatory effort; they complement it."[208] And as we explain in Section III of the preamble, the considerable incentives and other funding that Congress has provided for BEVs and their infrastructure support EPA's ability to establish strong emission standards accounting for the availability of such technologies. Besides, Congress's recent enactment of BEV incentives in the Bipartisan Infrastructure Law and the Inflation Reduction

[203] Inflation Reduction Act of 2022, P.L. 117-169, 136 Stat. 2068-69 (2022).
[204] 168 Cong. Rec. E879-02, at 880 (daily ed. Aug. 26, 2022) (statement of Rep. Pallone, Chairman of the House Energy and Commerce Committee).
[205] *Bostock v. Clayton County*, 140 S. Ct. 1731, 1747 (2020) (internal quotation marks omitted).
[206] https://www.congress.gov/bill/116th-congress/house-bill/2764. The similarly named Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018), is similar to the 2019 Act and differs from this final rule for similar reasons. *See* https://www.congress.gov/bill/115th-congress/senate-bill/3664?s=1&r=59. The proposed amendment to the 1970 CAA at 116 Cong. Rec. 19238-40 (1970) sought to ban ICE vehicles by 1978, but this final rule does not ban ICE vehicles and also regulates the industry nearly five decades later in the face of completely different facts.
[207] *Food & Drug Admin. v. Brown & Williamson Tobacco Corp*., 529 U.S. 120, 144 (2000).
[208] *Massachusetts*, 549 U.S. at 530 (2007).

Act occurred not "against a regulatory backdrop of disclaimers of regulatory authority,"[209] but rather with Congress's full knowledge that EPA was actively regulating motor vehicle GHG emissions; indeed the legislative history to the IRA shows affirmative Congressional support for EPA's efforts.[210]

Commenters also identify some letters from Congressional Members that criticized EPA's proposed rule. Member letters obviously have no legal effect on the agency's statutory authority.[211] To the extent they are relevant, many other Members of Congress sent letters supporting EPA's further regulation of GHGs from motor vehicles.[212]

We also give little weight to the commenters' claims about State-level political debates. As already explained, this rule relates to an area—control of emissions from new motor vehicles—where Congress has placed primary authority in the Federal government. To the extent State political action is relevant, the statute permits only certain State motor vehicle emissions regulation that is more stringent than the Federal regulation. Such regulations, moreover, can only be adopted in the first instance by California, and certain other States may then follow suit.[213] State regulation that is less stringent than the Federal program is expressly forbidden by the statute. So even if a State thinks less stringent motor vehicle emissions standards are better, that State cannot legally require that result. And notwithstanding the diversity of perspectives on BEVs, all states are actively taking actions to support BEVs. Among other things, all States are actively implementing plans for vehicle electrification infrastructure through the National Electric Vehicle Infrastructure (NEVI) Program.[214] And localities within all States have sought

[209] *Massachusetts*, 549 U.S. at 531 (2007).
[210] 168 Cong. Rec. E879-02, at 880 (daily ed. Aug. 26, 2022) (statement of Rep. Pallone).
[211] *See* U.S. Const. Art. 1 § 7.
[212] See, e.g., Padilla, Colleagues Lead Bicameral Letter Urging EPA to Impose Strong Emissions Standards for Heavy-Duty Vehicles (letter from 75 Members urging the agency to finalize the strongest feasible greenhouse gas emission standards for heavy-duty vehicles (HDVs) as part of their Phase 3 rule), available at https://www.padilla.senate.gov/newsroom/press-releases/padilla-colleagues-lead-bicameral-letter-urging-epa-to-impose-strong-emissions-standards-for-heavy-duty-vehicles/; Lawmakers lead 91 colleagues in pushing for robust light- and medium-duty vehicle emission standards to protect public health, benefit climate and economy (letter from 91 members urging the EPA to finalize the strongest feasible multi-pollutant vehicle emission standards for light- and medium-duty vehicles before the end of this year), available at https://matsui.house.gov/media/press-releases/matsui-clarke-markey-padilla-urge-epa-finalize-strongest-possible-light-and
[213] Section 209(b) allows the Administrator to waive preemption for the State of California where California's "standards will be, in the aggregate, at least as protective of public health and welfare as applicable Federal standards," while section 177 allows certain other States to adopt a program identical to that of California.
[214] US Department of Transportation, *Fiscal Year 2024 EV Infrastructure Deployment Plans* (Feb. 2, 2024), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/. *See, e.g*., West Virginia National Electric Vehicle Infrastructure (NEVI) Deployment Plan (July 2023), WV-NEVI-PLAN_9-28-23-Final.pdf (wboy.com); West Virginia Code §17-30-1, Department of Transportation to Develop Electric Vehicle Plan, *available at* https://code.wvlegislature.gov/17-30-1/; Team Kentucky Cabinet for Economic Development, Kentucky: Leading the Way Toward an Electric Future, https://ced.ky.gov/LP/electric_vehicle (asserting that "Kentucky is the premier location in the United States to manufacture electric vehicles and their parts," and there have been "$22.9 billion announced in investments by automotive-related facilities since 2014"); State of Ohio, *Ohio First State in Nation to Activate NEVI Chargers* (Dec. 8, 2023), https://governor.ohio.gov/media/news-and-media/ohio-first-state-in-activate-nevi-chargers (statement from Ohio Governor) ("Electric vehicles are the future of transportation, and we want drivers in Ohio to have access to this technology today."); Letter from Gov. Greg Abbott to Mr. Marc D. Williams (Mar. 22, 2022) (directing Texas Department of Transportation to develop a plan to "ensure that every Texan can access the infrastructure they need to charge an EV"), https://ftp.txdot.gov/pub/txdot/get-

and obtained funds to replace existing school buses with zero-emission and clean school buses under EPA's Clean School Bus Program.[215]

V. CONCLUSION

There is clear Congressional authorization for the final rule. In section 202(a), Congress made the major policy decision to control air pollution from motor vehicles and directed EPA to do so through a technology-based approach. The determination of what technology is available for achieving this policy is a subsidiary technical and policy judgment that Congress plainly entrusted to the Administrator's expertise. The statutory text of section 202(a), read in its context, is clear. And decades of legislative and administrative precedent specifically support the Administrator's authority to consider BEVs, a highly effective pollution control technology.

Even were the Court to apply the major questions framework, no major question exists. This rule represents an iterative strengthening of emissions standards based on the agency's evaluation of updated data within its technical expertise. The impacts of this rule are analogous to, and in some instances less significant than, its predecessor. And while the indirect impacts of the rule are not a suitable basis for assessing a major question, the agency performed a comprehensive assessment of such effects, finding that the final rule does not cause significant indirect harms, has the potential for indirect benefits, and creates net benefits for society. Additional factors considered by the courts also counsel against application of the major questions doctrine.

In the final rule, the Administrator did what he has been doing for over fifty years: evaluate updated data on pollution control technologies and set emissions standards accordingly. The agency recognizes that some stakeholders are unhappy with the increasing availability of BEV technologies, and they would prefer weaker standards, while others prefer stronger standards. But these are garden variety disputes amenable to arbitrary and capricious review. This rule is not an extraordinary and unprecedented assertion of agency power that implicates the major questions doctrine.

EPA's authority to issue standards under section 202 that determine compliance by reference to a fleetwide average

Several commenters suggest that various provisions of section 202 indicate that fleetwide averaging is inconsistent with provisions of title II. Other commenters support the use of averaging, noting that it has been used for more than two decades and is appropriate to continue to use, in light of BEVs becoming an increasingly large part of the vehicle fleet. EPA disagrees with commenters suggesting EPA lacks authority to incorporate ABT into emissions standards

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involved/statewide/EV%20Charging%20Plan/040422-Letter%20from%20Governor%20on%20Electric%20Vehicle%20Charging.pdf.

[215] EPA, *Clean School Bus Program Awards* (Feb. 7, 2024), https://www.epa.gov/cleanschoolbus/clean-school-bus-program-awards. *See also* US Department of Energy Alternative Fuels Data Center, Electricity Laws and Incentives, https://afdc.energy.gov/fuels/laws/ELEC (cataloguing additional state laws and incentives to support EV and EVSE infrastructure); US Department of Energy Alternative Fuels Data Center, Hydrogen Laws and Incentives, https://afdc.energy.gov/fuels/laws/HY (hydrogen).

for several reasons as explained in section III.B.3 of the preamble and as further detailed below. First, EPA has employed fleetwide averaging in standard-setting and compliance since 1985. The final rule merely maintains and did not reopen the existing ABT programs, such that these comments are beyond the scope of the rulemaking. Second, ABT is consistent with the standard-setting authority conferred by Congress in section 202(a)(1)-(3). Indeed, ABT furthers the goals of the statute in enabling greater emissions reductions with lower costs and greater lead time. Third, ABT is consistent with the compliance and enforcement provisions of the Act. Commenters are simply wrong that ABT precludes compliance and enforcement of individual vehicles; rather, the regulatory program explicitly requires the compliance of individual vehicles, and EPA may also enforce against individual vehicles. Fourth, the fact that Congress required EPA or other agencies to provide for tradable credits in some other programs outside of the motor vehicle emissions control context is not relevant in ascertaining the agency's authority to provide for ABT in our motor vehicle programs. Fifth, the statute does not require EPA to classify motor vehicles by whether they emit or have an ICE powertrain. Indeed, EPA previously defined the relevant classes for GHG regulation as including passenger cars, light-duty trucks, and medium and heavy-duty trucks, in the 2009 Endangerment Finding, and we did not reopen that finding in this proceeding. Moreover, the commenters' preferred classification is unreasonable as it would delay the adoption of effective and available pollution control technologies and forgo large benefits for the public health and welfare. EPA responds to comments about the major questions doctrine earlier in this RTC 2.3.[216]

I. The comments are untimely.

These comments are untimely and beyond the scope of this final rule. EPA did not reopen whether it is permissible to use an averaging approach to setting standards under section 202(a)(1)-(2), or the general ABT program's flexibilities. EPA disagrees that how EPA has used averaging in this rulemaking is novel as compared with past rulemakings; EPA has repeatedly used averaging in setting standards under section 202(a)(1)-(2), beginning as early as 1985[217] and as recently as the 2020 and 2021 light duty GHG rules, and noted the importance of ABT program flexibilities overall. EPA also repeatedly has explained that ABT is consistent with and gives full effect to the requirements of section 202 as well as the statutory scheme, including Title II's compliance and enforcement provisions applicable to vehicles.[218] Under such circumstances, it is eminently reasonable for EPA not to reconsider a question that has been settled for decades.[219] Additionally, the commenter's assertions of a change from EPA's historical approach rest on a false assertion that this rule mandates adoption of a specific compliance pathway; rather, the final standards are performance-based standards with many potential compliance pathways, of which we provide several examples to further support that EPA is agnostic as to what technologies are ultimately applied in complying with the standards.

[216] Some commenters recycle arguments from the petitioners' briefs in *Texas v. EPA*, No. 22-1031 (D.C. Cir.). To the extent applicable, EPA also incorporates its responsive brief in that case by reference. EPA's Br., *Texas v. EPA*, No. 22-1031 (D.C. Cir.).
[217] 50 FR 10606.
[218] To the extent the commenters suggest that the use of averaging is novel because it amounts to a BEV mandate, this contention is inaccurate both legally and factually, as discussed in the preceding response.
[219] *See Growth Energy v. EPA*, 5 F.4th 1, 13 (D.C. Cir. 2021).

Commenters' claims that this rule is novel in treating ABT as integral to standard-setting, while prior rules viewed ABT only as a flexibility, are misplaced.[220] EPA has relied on the availability of averaging in countless standard-setting rulemakings since 1985. For example, the 1985 rule found that averaging was a key consideration in supporting the technological feasibility and lead-time of the standards. That rule stated:

> Particulate trap technology is heretofore untried on the fleet level. EPA believes that the … standard which, through averaging, effectively requires use of traps on 70 percent of all heavy-duty vehicles will significantly reduce the risk of widespread noncompliance while allowing manufacturers to gain valuable experience with this new technology. To promulgate this standard without allowing averaging … would increase the technological risk associated with the standard because traps would have to be used in even the most difficult design applications.[221]

Numerous subsequent rules have followed the same approach.[222] For example, the 1990 rule stated that "the standards were set with averaging in mind, making averaging integral to the standard."[223] Further, EPA has always viewed averaging as integral to standard-setting in the LD GHG program. In the 2010 LD GHG final rule, EPA established "a system of averaging, banking, and trading of credits integral to the fleet averaging approach," that was "similar to averaging, banking, and trading (ABT) program EPA has established in other programs."[224] We stated that "ABT is an integral part of the standard setting itself, and not just an add-on to help reduce costs," as "ABT resolves issues of lead-time or technical feasibility…."[225] All subsequent GHG rules followed the same approach.[226]

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[220] EPA performed a no-credit-trading sensitivity and concluded that the standards can be met at a reasonable cost even in the absence of any credit trading. As such, while trading provides manufacturers with additional flexibility in meeting the standards, it is not necessary to EPA's judgment as to the feasibility of the standards. As such, trading is also severable from the final standards.

[221] 50 FR 10634-35.

[222] *See also, e.g.,* 65 FR 6698, 6743-46 (Feb. 10, 2000) (Tier 2) ("An ABT program is an important factor that EPA takes into consideration in setting emission standards that are appropriate under section 202 of the Clean Air Act. ABT allows us to consider a more stringent emission standard than might otherwise be appropriate under the CAA, since ABT reduces the cost and improves the technological feasibility of achieving the standard[;] ABT enhances the technological feasibility and cost effectiveness of the proposed standard and allows the standard to be attainable earlier than might otherwise be possible."); 64 FR 58471, 58481 (Oct. 29, 1999) (describing how EPA set the 2004 and later model year NOX+NMHC standards for HD diesel engines (62 FR 54694) in consideration of modified ABT provisions: "The final rule also contained modified ABT provisions for heavy-duty diesel engines, allowing EPA to finalize a more stringent engine standard than might otherwise be appropriate under the CAA, since ABT reduces the cost and improves the technological feasibility of achieving the NMHC+NOX standard.").

[223] 55 FR 30594.

[224] 75 FR 25412-13 (describing setting fleet average LD GHG standards, as EPA had previously set for Tier 2 NOx standards, and the integral role of ABT in standard setting itself for Title II engine and vehicle programs).

[225] 75 FR 25412-13 (May 7, 2010).

[226] *See* 77 FR 62788 ("ABT is an integral part of the standard setting itself, not just an add-on to help reduce costs. In many cases, ABT resolves issues of cost or technological feasibility which might otherwise arise…. The ABT provisions are integral to the fleet averaging approach established in the MY 2012-2016 rule and we view them as equally integral to the MY 2017-2025 standards."); 86 FR 74453 ("The ABT provisions are an integral part of the vehicle GHG program and the agency expects that manufacturers will continue to utilize these provisions into the future[.]"); see table 1 in the above response on Major Questions Doctrine.

Moreover, the legality of averaging under section 202(a) has already been litigated in *NRDC v. Thomas*, 805 F. 2d 410 (D.C. Cir. 1986), where the court of appeals ruled in favor of the agency. Commenters rely heavily on footnote dicta from that case to allege that the court identified potential statutory inconsistencies but did not reach them only because they were not raised in the litigation. We address the substance of these points later in our response. However, we note here that the footnote dicta were comprehensively addressed by EPA's 1989 proposal[227] and 1990 final rule,[228] where we also received copious comments on this specific issue. Any party wishing to challenge EPA's authority for averaging in light of the Agency's interpretation of *NRDC v. Thomas* had ample opportunity to do so following EPA's promulgation of the 1989 and 1990 rulemakings, and yet, no party did so.

EPA also disagrees with commenters who claim this is the first time EPA has considered electrified technologies in establishing standards based on averaging. As we explain in Section III.B.2-3 of the preamble and in our major questions doctrine response in RTC 2, all vehicles—including all ICE vehicles—today are electrified to some extent, and electrification exists on a large spectrum. The agency has considered powertrain electrification specifically since at least the 1998 NLEV rule and the 2000 Tier 2 standards. In the LD GHG program itself, EPA has previously adopted vehicle standards under 202(a)(1)-(2) where compliance pathways supporting the standards reflected inclusion of powertrain electrification technologies and included averaging with ICE vehicle technologies. For example, in the 2010 LD GHG Rule, EPA justified the feasibility of the standards based on a projection that strong hybrids would make up 6.5% of the MY 2016 fleet.[229] In promulgating the 2012 GHG Rule, EPA conducted a company-by-company projection of potential compliance pathways for MY 2021 and 2025 light duty vehicle GHG emission standards, indicating hybrid electric vehicle penetrations of up to 15% for some companies.[230] The 2012 Rule also projected the availability of PEV at 1% in MY 2021.[231] The

[227] 54 FR 22652, 22665-66 (May 25, 1989) ("EPA does not believe that the statutory text or legislative history cited by the court necessarily means that the CAA requires or that Congress intended that every vehicle or engine family emit at the same level. As the court itself noted, the Act gives EPA broad latitude in the testing of vehicles and, more fundamentally, in the formulation of standards. EPA promulgated the HDE NOx and PM emissions standards as averaged standards. It thus follows that in testing 'any' engine for compliance with those standards, EPA may hold particular engine families to different control levels as part of an averaged set of engine families so long as the engine families' average emission levels meet the applicable standard.").

[228] 55 FR 30584, 30593-94 (July 26, 1990) ("In [*NRDC v. Thomas*], the court upheld averaging, but expressed some reservations about averaging in light of a statutory provision and some legislative history not raised by the parties to the case. The court pointed out that under averaging some vehicles would not be required to comply with the standards and that this appeared inconsistent with the requirement that "any," a" or "such" vehicle or engine be tested and required to comply with emission standards. At the same time the court noted that the statutory language was ambiguous and that the testing and certification provisions empower the Agency to test vehicles and engines in the manner it 'deems appropriate' so as to conform to the prescribed standards. EPA fully discussed in the preamble to the proposed rule why the statute and its legislative history should be read to allow the Agency discretion to determine the manner of testing and certification of vehicles. EPA also found that the broad type of averaging represented by trading and banking would be consistent with the Congressional scheme. … EPA continues to believe that the statute provides the Agency discretion in this matter, and that trading and banking are consistent with the statutory aims.").

[229] *See* EPA Memorandum to the docket for this rulemaking, "Comparison of EPA CO2 Reducing Technology Projections between 2010 Light-duty Vehicle Rulemaking and Actual Technology Production for Model Year 2016."

[230] *See* 77 FR at 62854-55, 62856-57 (October 15, 2012).

[231] 2012 LD GHG Rule RIA, Table 3.5-22.

2021 rule projected further increases in powertrain electrification technologies, with PEV technologies reaching 17% in 2026.[232]

EPA also notes that given the lengthy pedigree of the ABT program, manufacturers have come to rely on it for compliance with many of EPA's motor vehicle programs. As we explain in Section V.B of the preamble, manufacturers are widely utilizing the various credit programs available, and we have every expectation that manufacturers will continue to take advantage of the compliance flexibilities and crediting programs to their fullest extent, thereby providing them with additional tools in finding the lowest cost compliance solutions in light of the revised standards. [233] Unsurprisingly, no directly regulated manufacturer is opposing the agency's authority for ABT or to establish standards with a fleet average form. While the agency has authority to change its policies when warranted, commenters have advanced no persuasive justification for reopening ABT at this time, particularly in light of manufacturers' reliance interests and the ABT program's ability to effectuate greater emissions reductions at lower costs. Indeed, their comments do not appear to even recognize the considerable reliance interests of directly regulated entities, recycle legal arguments that the agency considered and rejected long ago in the 1990 rule,[234] and effectively concede that abandoning averaging would delay the application of pollution control technologies and forgo otherwise feasible emission reductions. The little that commenters do say about manufacturers' interests is fundamentally wrong. They erroneously claim that the reason manufacturers have not pushed back on ABT is because the manufacturers view it solely as an extra-statutory accommodation that allows them greater flexibility. EPA thinks manufacturers understand very well how the agency has relied on averaging generally and ABT specifically to establish countless standards since 1985. In sum, commenters have not adduced sufficient reasons to adopt a policy, much less revisit a longstanding, foundational part of the motor vehicle program with a forty-year pedigree.

We reiterate that EPA did not reopen this issue in this rulemaking and the comments are outside the scope of the rule. In responding, EPA notes that we are not here "undertak[ing] a serious, substantive reconsideration of the existing" position.[235] EPA's response is intended solely to clarify and correct the misstatements and misrepresentations made by commenters concerning EPA's historical approach to averaging in standard setting and ABT program flexibilities, how EPA's ABT program is implemented, and the corresponding statutory basis. In providing this response, EPA also notes the extraordinary nature of commenters' claims: given the widespread use of ABT across EPA's section 202(a) programs, commenters—none of whom are regulated entities under section 202(a)—are implying that the agency has continually violated countless Title II compliance provisions for nearly forty years. That is completely false, and the agency here sets the record straight.

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[232] 2021 LD GHG Rule RIA, 4-28 to 29.

[233] *See also* Environmental Protection Agency, "The 2023 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975," EPA-420-R-23-033, December 2023.

[234] *See, e.g.,* 55 FR 30584, 30593-94.

[235] *Growth Energy v, EPA*, 5 F. 4th 1, 21 (D.C. Cir. 2021). *See also Pub. Emps. for Env't Resp. v. EPA*, 77 F.4th 899, 913 (D.C. Cir. 2023) ("PEER cites no cases, and we are aware of none, in which an agency reopened an issue by merely responding to a petition for rulemaking submitted by a third party.") (citing *Am. Rd.& Transp. Builders Ass'n. EPA*, 705 F.3d 453, 457 (D.C. Cir. 2013) ("[A]n agency's response to a petitioner's comments cannot provide the sole basis for reopening.")).

II. Section 202(a) delegates authority to EPA to adopt standards with a fleet average form.

Commenters maintained that section 202(a) does not mention averaging, banking, and trading. They assert that, whether under standard principles of statutory construction or under the major questions doctrine, Congressional silence is not tantamount to a delegation of authority.

The commenters are correct that section 202(a)(1) does not include the words "averaging, banking or trading."[236] But the standard-setting framework in section 202(a)(1) readily encompasses performance-based standards that are based on consideration of averaging. In later subsections, we explain how such a standard fits well within the Act's implementation and enforcement mechanisms, and how other provisions of section 202 and elsewhere confirm EPA's authority under section 202(a)(1) to set such standards.

Section 202(a)(1) mandates that EPA "prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles . . . ." The Supreme Court has made clear that fleet average and other requirements applicable at the fleet-wide (as opposed to individual vehicle) level are "standards" within the meaning of Title II of the Act. In *Engine Mfrs. Ass'n v. S. Coast Air Quality Mgmt. Dist.*, 541 U.S. 246 (2004),[237] the Court indicated that "standards" encompass "fleet average emission requirements," which "decrease over time, requiring manufacturers to sell progressively cleaner mixes of vehicles," and under which "[m]anufacturers retain flexibility to decide how many vehicles in each emission tier to sell in order to meet the fleet average."[238] The Court also found that "standards" include other types of fleet-wide requirements like mandates that fleet owners purchase vehicles of a given type,[239] and that a certain percentage of a manufacturer's new vehicle sales must consist of vehicles of a given type.[240]

Section 202(a)(1) also applies to "class or classes of new motor vehicles." "Class or classes" necessarily refers to groups of vehicles, as opposed to individual vehicles. So section 202(a)(1) is naturally read to authorize EPA to set standards for groups of vehicles, which would include a manufacturer's fleet of vehicles that are in this group.

Regulation under section 202(a)(1) is also conditioned on the Administrator finding that emissions from a class or classes of motor vehicles "cause, or contribute to, air pollution which

[236] EPA's response here focuses on averaging. However, "trading and banking are simply forms of averaging between manufacturers and over time. Thus, they pose similar legal issues." 54 FR 22665. With respect to the arguments raised by the adverse comments, EPA believes trading and banking are justified on similar bases as averaging. *See also generally* 54 FR 22665-67 (discussing the legal bases for trading and banking), 55 FR 30593-99 (same).

[237] The Court in. *S. Coast Air Quality Mgmt. Dist.* was construing CAA section 209(a), which refers to "any standard relating to control of emissions from new motor vehicles". This language is similar to the text of section 202(a). The *South Coast* Court made clear that there is no reason to read "standard" in section 202(a) differently than in section 209(a)): "A 'standard' is defined as that which 'is established by authority, custom, or general consent, as a model or example; criterion; test.' This interpretation is consistent with the use of 'standard' throughout Title II of the CAA (which governs emissions from moving sources) to denote requirements such as numerical emission levels with which vehicles or engines must comply, *e.g.*, [CAA section 202] (a)(3)(B)(ii), or emission-control technology with which they must be equipped, *e.g.*, [CAA section 206](a)(6)." *Id*. at 253.

[238] *Id*. at 250, n.3.

[239] *Id*. at 250, 258.

[240] *Id*. at 255.

may reasonably be anticipated to endanger public health or welfare." In enacting section 202(a)(1), Congress was concerned with classes of motor vehicles contributing to dangerous air pollution, not with individual vehicles doing so. Indeed, it is ordinarily only emissions from a group of vehicles (i.e., a class) not a single vehicle that could cause dangerous air pollution. As we explain later in this response, this is also how EPA has long interpreted the statute, including in making the 2009 GHG endangerment finding for motor vehicles. This further indicates that EPA may regulate the class of vehicles as a whole, including at the fleet-wide level, not just individual vehicles.

The statute explicitly subjects regulation under section 202(a)(1) to the requirements of section 202(a)(2), which states that "[a]ny regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." Fleet average standards relate directly to section 202(a)(2)'s considerations of technical feasibility, cost, and lead time. As we explain above, EPA has found for decades that establishing fleet average standards allows the agency to set standards at a given stringency for lower cost. It also affords regulated entities more flexibility in determining how to meet those standards, accommodating practical realities of vehicle redesign cycles and market fluctuations, and allowing additional lead-time for a portion of the fleet to meet the standards if the regulated entity decides to have another portion of the fleet achieve the standards more rapidly.[241] Similarly, the ability to generate credits promotes earlier introduction of advanced technologies, furthering the Act's emission reduction and technology advancement goals.

The D.C. Circuit reviewed and upheld EPA's use of averaging in promulgating section 202(a) standards in *NRDC v. Thomas*, 805 F.2d 410 (D.C. Cir. 1986). Observing that there was no "clear congressional prohibition of averaging," the Court held that "the EPA's argument that averaging will allow manufacturers more flexibility in cost allocation while ensuring that a manufacturer's overall fleet still meets the emissions reduction standards makes sense."[242] While the Court noted in dicta that its analysis did not consider certain potential arguments not raised by the litigants—arguments which we addressed in a subsequently rulemaking[243] and which we discuss later in this response—its holding was unquestionably to uphold EPA's averaging program.

Congress subsequently ratified EPA's and the Court's interpretation in the 1990 Clean Air Act Amendments. "Congress is presumed to be aware of an administrative or judicial interpretation of a statute and to adopt that interpretation when it re-enacts a statute without change."[244] Ratification is particularly applicable here because there is explicit evidence in both the House and Senate legislative history indicating that Congress knew of EPA's and the Court's

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[241] *See also White Stallion Energy Ctr., LLC v. EPA*, 748 F.3d 1222, 1253 (D.C. Cir. 2014) (allowing averaging across multiple utility units under CAA section 112(d), which "neither expressly allows nor disallows emissions averaging," where averaging is a "more flexible, and less costly alternative" than unit-by-unit compliance, even though "this may allow individual units to exceed the emissions limitation"), *rev'd on other grounds, Michigan v. EPA*, 576 U.S. 743 (2015).
[242] *NRDC v. Thomas*, 805 F.2d at 425.
[243] 55 FR 30584, 30593-94 (July 26, 1990); 54 FR 22652, 22665-66 (May 25, 1989).
[244] *See Lorillard v. Pons*, 434 U.S. 575, 580 (1978).

interpretation on this issue.[245] Legislative history from the House recognized that, under the Clean Air Act:

> EPA has promulgated regulations for averaging (50 Fed. Reg. 10606) and for banking and trading (55 Fed. Reg. 30584). Cognizant of these rules and the Court's decision in *NRDC v. Thomas*, 805 F.2d 410 (D.C. Cir. 1986) the House-Senate conferees chose not to amend the Clean Air Act to specifically prohibit averaging, banking and trading authority.
>
> Averaging, banking and trading programs, in fact, have very positive impacts on air quality. Such programs preserve the requirement that each family of engines must meet or exceed a preassigned standard. Furthermore, averaging programs create an incentive to produce engines lower than the applicable standard, and encourage the development and early use of improved emission control technologies, and the development and sale of alternative-fueled vehicles. Such programs also aid manufacturers in reducing the costs of controlling emissions.[246]

As such, "[t]he intention was to retain the status quo," that is, the agency's continued application of averaging in establishing the standards following *NRDC v. Thomas*.[247] Similar legislative history is found in the Senate.[248]

The text of the Clean Air Act further corroborates Congress's ratification of EPA's use of averaging in setting section 202(a) standards. In section 219 of the Act, Congress directed EPA to establish standards for urban buses pursuant to section 202(a). Section 219(b)(1) provides:

> The standards under section 7521(a) of this title applicable to urban buses shall require that, effective for the model year 1994 and thereafter, emissions of particulate matter (PM) from urban buses shall not exceed 50 percent of the emissions of particulate matter (PM) allowed under the emission standard applicable under section 7521(a) of this title as of November 15, 1990, for particulate matter (PM) in the case of heavy-duty diesel vehicles and engines manufactured in the model year 1994.

The referenced 1994 HD PM standard (i.e., "the emission standard applicable under section 7521(a) of this title as of November 15, 1990, for particulate matter (PM) in the case of heavy-duty diesel vehicles and engines manufactured in the model year 1994") was a standard with a fleet average form. Indeed, it was one of the standards litigated in *NRDC v. Thomas* on the issue of averaging.[249] Thus, Congress expressly recognized an EPA standard with an averaging form and endorsed such a standard as the basis for further standard-setting under section 202(a).

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245 136 Cong. Rec. 35,367 (1990), 1990 WL 1222469, at *1; 136 Cong. Rec. 36,713 (1990), 1990 WL 1222468, at *1.
246 136 Cong. Rec. 35,367, 1990 WL 1222469, at *1.
247 *Id.*
248 136 Cong. Rec. 36,713, 1990 WL 1222468, at *1. (Congress, noting *NRDC v. Thomas*, instead opted to let the existing law "remain in effect.").
249 *See NRDC v. Thomas*, 805 F.2d 410, 425 (D.C. Cir. 1986) ("The NRDC challenges the EPA's program of emissions averaging for the 1991 and 1994 PM standards and the 1991 NOx standard.").

Pursuant to this provision, EPA promulgated urban bus standards, and those standards provided for averaging, as well as banking and trading.[250]

Following the 1990 Amendments, EPA continued to establish many other motor vehicle standards based on averaging, and the use of ABT became a well-settled part of the regulatory landscape. Consistent with this, in enacting the Energy Independence and Security Act of 2007, Congress specifically recognized the possibility of fleet average GHG standards. The statute generally barred Federal agencies from acquiring "a light duty motor vehicle or medium duty passenger vehicle that is not a low greenhouse gas emitting vehicle."[251] It directed the Administrator to promulgate guidance on such "low greenhouse gas emitting vehicles," but explicitly prohibited vehicles from so qualifying "if the vehicle emits greenhouse gases at a higher rate than such standards allow for the *manufacturer's fleet average grams per mile of carbon dioxide-equivalent emissions for that class of vehicle*, taking into account any emissions allowances and adjustment factors such standards provide."[252] In other words, Congress explicitly contemplated the possibility of fleet-average GHG standards for motor vehicles.[253]

In light of the clear congressional authorization for averaging, EPA also does not agree with commenters who claim that averaging is precluded by the major questions doctrine. We further address the applicability of the major questions doctrine earlier in this RTC 2.3. We also disagree with commenters who claim that EPA is relying on silence as an implicit delegation of authority.[254] EPA is not asserting authority for ABT based on statutory silence; as explained above, the basis for ABT is the statutory text of section 202(a)(1)-(2), read in light of the context, purpose, and history.[255]

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[250] *See* 58 FR 15781, 15784, 15787.
[251] 42 USC 13212(f)(2)(A).
[252] 42 USC 13212(f)(3)(C) (emphasis added).
[253] 42 USC 13212 does not specifically refer back to section 202(a). However, we think it is plain that Congress intended for EPA to consider relevant section 202(a) standards in implementing section 13212. *See* 42 USC 13212(f)(3)(B) ("In identifying vehicles under subparagraph (A), the Administrator shall take into account the most stringent standards for vehicle greenhouse gas emissions applicable to and enforceable against motor vehicle manufacturers for vehicles sold anywhere in the United States.").
[254] In addition, the commenters' selective quotation from *Entergy v. Riverkeeper*, 556 U.S. 208,223 (2009), is inapposite. That case *upheld* EPA's determination that the delegation for EPA to issue standards reflecting "best technology available for minimizing adverse environmental impact" allowed standards based on cost-benefit analysis, notwithstanding that such an authorization appears nowhere in the statutory text. *Id.* at 218, 226. The commenters cite the following language from the opinion in support of their argument: "sometimes statutory silence, when viewed in context, is best interpreted as limiting agency discretion." *Id.* at 223. The following sentence of the opinion, however, states that "[f]or the reasons discussed earlier, § 1326(b)'s silence cannot bear that interpretation." *Id.* The Court thereupon concluded, "This extended consideration of the text of § 1326(b), and comparison of that with the text and statutory factors applicable to four parallel provisions of the Clean Water Act, lead us to the conclusion that it was well within the bounds of reasonable interpretation for the EPA to conclude that cost-benefit analysis is not categorically forbidden." *Id*. In any event, this case is not applicable because EPA is not relying on statutory silence here.
[255] Notwithstanding commenters' selective citations of past preambles, the agency has never touted statutory silence as the basis for the ABT program. We have, as we do today, noted the fact that the statute does not explicitly specify an ABT program. But in promulgating such programs, we have also consistently justified them in light of the text and purpose of the Act. See, e.g., 55 FR 30593-99 (describing in detail the legal bases for ABT and concluding on page 30599 that "EPA believes that trading, banking and expanded averaging are consistent with and support the goals and provisions of the Act. Compliance with the technology forcing 1991 and 1994 NOX and PM emissions

III. Standards with a fleet average form are consistent with the statutory context and structure.

As explained above, in section 202(a)(1), Congress delegated to EPA the authority to adopt new motor vehicle standards and to revise the standards as appropriate. Specifically, Congress entrusted to the Administrator the determination of the class or classes of vehicles subject to the standards, the form of the standard, the lead time provided, the consideration of the costs of compliance, and, taking all of these elements and other factors into account, the stringency of the standards. As we explain further in our response to the major questions doctrine comments, this delegation provides EPA the flexibility needed to appropriately address the widely varying circumstances that can arise under section 202, such as differences in the need for emissions control, and differences in technology and cost considerations. This provision's authority readily encompasses the kind of fleet averaging standards EPA has adopted over many years and covering many different types of vehicles and pollutants.

At various points, Congress directed EPA to exercise its section 202(a) authority to adopt certain specific standards.[256] These various provisions identify the specific group of vehicles to which they apply, as well as the specific model years, pollutants, and stringency of the standards. Although Congress limited EPA's discretion for those specific vehicles, model years, and pollutants, even in those cases Congress recognized and adopted provisions reflecting a variety of the flexibilities authorized in standard setting under section 202(a). For example, Congress directed that EPA provide for waivers; alternative standards for small volume manufacturers; phase-ins over time based on a percentage of a manufacturer's production; as well as standards that changed over the useful life of the vehicles.

In addition, Congress specifically addressed to what extent, if any, EPA's authority was limited to revise these standards in the future, including under its general section 202(a)(1) authority. In general, Congress placed only a few limitations on EPA's future standard setting. Congress typically specified that EPA's future revisions of the standards for these vehicles and pollutants had to preserve a specified degree of stringency, and in some cases Congress specified the number of model years before revisions were allowed. But these provisions do not constrain EPA's general authority to set standards under section 202(a)(1) in other circumstances. Most importantly for purposes of this response, none of these provisions limit fleetwide averaging or otherwise limit EPA's authority to structure the form of future section 202(a)(1) standards in this rulemaking.

These provisions place no other limits on EPA's standard setting under section 202(a)(1). They did not limit EPA's ability to structure the form and level of future standards for these vehicles and pollutants, only the stringency and lead time. Through these provisions Congress placed no limits at all on EPA's authority to set standards under section 202(a)(1) for other vehicles and other pollutants. Congress directly addressed the specific limits it placed on EPA's future standard setting, and those are the only limits it imposed on the authority it provided EPA in setting standards under section 202(a).

standards will be enhanced, emissions will be reduced, not increased, and the important role of NCPs will not be supplanted. Furthermore, as indicated in the discussion above, EPA does not think that banking, trading or expanded averaging contradict the provisions of section 206 regarding certification and testing.").

[256] *See, e.g.*, CAA section 202(a)(3)(A)(i), 202(b), (g), (h).

EPA's past fleet averaging standards, as well as the standards at issue in this rulemaking, are fully consistent with the grant of authority in section 202(a)(1). In no case do these standards violate the limited conditions Congress placed on future standard setting in the provisions discussed in section 202.

We now discuss each of these provisions that commenters cite. Commenters refer to section 202(a)(3)(A)(i) as evincing Congressional intent not to include averaging as part of the standard setting process for heavy duty vehicles. But this provision, like section 202(a)(1), refers to standards for emission from "classes" of heavy-duty vehicles (and from "categories" as well). This language is most naturally applicable to groups of vehicles like fleets.

Commenters viewed sections 202(b)(1) and 206(a)(2) as showing incompatibility with standards predicated on averaging. The argument goes that section 202(b)(1) commands standards for "vehicles and engines," and that the testing of "any emission control system incorporated in a motor vehicle or engine" provisions in section 206(a)(2) only make sense on a per vehicle basis. They further point to the 5 percent waiver authority in section 202(b)(3) and the testing provision for section 202(b) standards found in section 206(a)(2). They maintain that the waiver provision is unnecessary in a fleet averaging regime since well over 5% of a manufacturer's vehicles could be above a fleet average limit without the need of a waiver, and they further note that the testing provision is written in the singular ("vehicle or engine"), and so can only be read to mean vehicle-by-vehicle testing.

These arguments are misplaced. First, section 202(b)(1) is an explicit exception to EPA's general standard-setting authority (see section 202(a)(1) opening clause, "Except as otherwise provided in subsection (b)"). Section 202(b)(1) establishes standards for certain pollutants, model years, and classes of vehicles. It thus cannot derogate from the general scope of authority in section 202(a)(1) and has no applicability on its face to these standards. Moreover, section 202(b)(1) accords with fleet-average standards because it specifically refers to standards for certain classes of vehicles (e.g., light-duty vehicles for certain model years), as opposed to individual vehicles; the provision also uses the term "such vehicles and engines," which naturally refers back to the classes identified in the provision.

CAA section 206(a)(2) adds nothing to the commenters' argument. That provision requires EPA in some cases to test emission-control systems to determine whether they enable vehicles to conform with standards Congress prescribed in section 202(b). As such, section 206(a)(2) prescribes duties relating to standards under section 202(b), and as just discussed, that section has no bearing on the section 202(a) authority beyond the specific circumstances to which it applies, circumstances inapplicable here. Moreover, in section 206(a)(2), Congress had a specific reason to speak to individual vehicles. Added in 1970, it enabled a private party that developed a new "emission control system," such as a new catalyst, to submit a vehicle or engine incorporating that system for testing "to determine whether such system enables such vehicle or engine to conform to the [Subsection 202(b)] standards."[257] It was sensible for Congress to establish this mechanism for testing new technologies in the context of specific vehicles and individuals, rather than fleets. But there is no basis in section 206(a)(2) to think Congress meant to prohibit fleet averages even under section 202(b), let alone section 202(a). To the extent that it

[257] CAA section 206(a)(2); *see* Environmental Policy Division of the Congressional Research Service, Volume 1, 93d Cong., 2d Sess., A Legislative History of the Clean Air Amendments of 1970, at 128, 200 (Comm. Print 1974).

is relevant, section 206(a)(2) confirms that Congress intended EPA to consider all feasible emission-control technologies, even those that had not been developed as of 1970.

The commenters' reference to section 202(b)(3) is also mistaken.[258] That provision allows EPA to impose standards less stringent than subsection (b)(1) standards for nitrogen-oxides emissions for up to 5% of production of model-years 1977-1979 light-duty vehicles, where an automaker "demonstrates that such waiver is necessary to permit the use of an innovative power train technology."[259] Under subsection (b)(3), an automaker identifies its total production for the year and the specific emission standard to which each vehicle was certified. EPA would then assess whether at least 95% of the fleet met the subsection (b)(1)(B) standard and whether the rest met the subsection (b)(3) standard. But this would be true whether each of those standards was a vehicle specific standard, a fleet-average standard, or both. None of these approaches would be inconsistent with subsections (b)(1) and (b)(3). More basically, nothing in either subsection speaks to EPA's authority under section 202(a)(1). We reiterate that nothing in section 202(b), including the waiver provision in (b)(3), has any applicability beyond the specific circumstances to which it applies, which circumstances are inapplicable here. Nor does anything in section 202(g) constrain standards with a fleet average form. This provision—as well as the parallel provision in section 202(h)—is another example of Congress directing EPA to use its section 202(a) authority in a specific manner, for specific vehicles (light-duty trucks and light-duty vehicles), pollutants (NMHC, CO, NOx, and PM), and model years. Under this provision for these specified pollutants and model years, such vehicles must meet one or the other of the specified phase-in standards. These provisions say nothing about EPA's authority to establish standards for different types of vehicles, pollutants, or model years. It is worth noting, however, that the phase-in of standards Congress specified in section 202(g) is an example of the range of forms available to EPA. As we explain further below, a phase-in form of a standard requiring specified percentages of a manufacturer's production of vehicles to meet a standard is similar to the fleet averaging-based form used in this rule.

Commenters also assert that compliance with a fleet average is inconsistent with the definition of "emission standard" in section 302(k): "a requirement … which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis." The argument is that one cannot "know" "on a continuous basis" whether an automaker is meeting its fleet-average standard. It is not clear that the definitions in section 302 apply to Title II,[260] but even if they do, the emission standard definition requires standards to *apply* continuously, not that compliance be *measured* continuously. In general, fleet-average standards control emissions from vehicles on a continuous basis. The same is true for the vehicle-specific standards, such as the in-use LD GHG standard and the LD NMOG+NOx bin standard, which are both applicable continuously[261] and measurable at any time throughout the vehicle's useful life.

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[258] Fuel Br. 41.
[259] 42 U.S.C. § 7521(b)(3).
[260] *Motor & Equip. Mfrs. Ass'n*, 627 F.2d at 1112 n.35. The commenters' arguments are also inconsistent with the Supreme Court's interpretation of "standard' in the context of Title II provisions on controlling emissions from motor vehicles in *South Coast*, as explained above.
[261] The standards (whether fleet average or per-vehicle standards) are subject to different testing cycles, testing requirements, and other provisions, such that different requirements may apply in different circumstances. For example, vehicles are allowed under EPA's regulations to have excursions that exceed their certified levels of

Finally, we note that the commenters' reliance on specific provisions in section 202 to limit EPA's more general authority under section 202(a)(1)-(2) is at odds with normal tenets of statutory construction. Broad grants of discretionary authority like section 202(a)(1) are generally not limited by other narrower provisions focused on particular situations.[262] Moreover, Congress has expressly indicated what limitations the specific provisions impose on future EPA standard setting, but they do not impose any limitations which preclude fleet average standards, indicating that no such limitations should be implied.[263]

IV. Standards using a fleet average standard form fit the Act's implementation and enforcement provisions

A number of commenters viewed fleet average standards as fundamentally incompatible with the certification of conformity provisions of section 206. They maintain that these provisions are written as vehicle specific; they refer to "engine" and "vehicle" in the singular, and they require a determination "whether such vehicle or engine" (referring back to the individual vehicle or engine) "conforms with the [section 202 emission standards]." They argue that testing of an individual vehicle, however, does not indicate whether or not a fleet average is achieved, since in their view conformity cannot be determined until the conclusion of a model year. For similar reasons, these commenters claim that fleet average standards are inconsistent with section 203(a)(1), which prohibits sale of a vehicle or engine not "covered by a certificate of conformity," and section 205(a), under which any violation of applicable standards "shall constitute a separate offense with respect to each motor vehicle or motor vehicle engine."

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criteria pollutant emissions under certain operating conditions as controlled by the Auxiliary Emission Control Device definition.

[262] *See Catawba Cnty. v. EPA*, 571 F.3d 20, 36 (D.C. Cir. 2009) ("[A] congressional mandate in one section and silence in another often suggests … a decision not to mandate any solution in the second context, i.e., to leave the question to agency discretion."); *Corbett v. Transportation Sec. Admin*., 19 F.4th 478, 489 (D.C. Cir. 2021*), cert. denied*, 143 S. Ct. 395 (2022) ("Petitioner turns the holding in *Alabama Realtors* on its head by asking this court to apply limiting constructions to provisions plainly granting TSA broad authority to act by drawing on entirely separate provisions that appear throughout 49 U.S.C. Chapter 449.…There is no viable canon of construction that endorses this interpretive approach."); *Helicopter Ass'n Int'l, Inc. v. FAA*, 722 F.3d 430, 435 (D.C. Cir. 2013) (holding that specific statutory provisions amplifying the FAA's regulatory authority merely indicated that Congress intended to address the matters subject to regulation in several different ways, not to limit the statute's broad grant of authority); *Farrell v. Blinken*, 4 F.4th 124, 136–37 (D.C. Cir. 2021).

[263] *See Odhiambo v. Republic of Kenya*, 764 F. 3d 31 (D.C. Cir. 2014) ("the [Foreign Sovereign Immunities Act] is the sole way for a plaintiff suing a foreign sovereign to invoke the jurisdiction of U.S. courts, and the exceptions enumerated by the FSIA are exhaustive"); cf. *Law v. Siegel*, ––– U.S. ––––, 134 S. Ct. 1188, 1196, 188 L.Ed.2d 146 (2014) (enumeration of exemptions "confirms that courts are not authorized to create additional exceptions")*; Air Transp. Ass'n of Am., Inc. v. United States Dep't of Agric.*, 37 F.4th 667, 677 (D.C. Cir. 2022) (standing for the proposition that one does not infer a limitation from a provision authorizing a different sort of activity; "[t]he section containing the 'commensurate' language is a limitation on how much can be collected in fees from a particular user class. It is not a limitation on how those fees may be spent. Therefore, Appellants' argument that fees collected from multiple user classes cannot be comingled in a fund that pays for the inspections of fee-paying user classes fails because the FACT Act does not prohibit this form of cross-subsidization"); *GPA Midstream Ass'n v. United States Dep't of Transp.*, 67 F.4th 1188, 1196 (D.C. Cir. 2023) ("Section 4 creates neither a condition precedent nor a ban. As the petitioners themselves explain at length in their opening brief, § 4 does not apply to gathering pipelines. Section 4 by its plain terms applies only to "transmission pipeline facilities." We do not understand how § 4 could plausibly be read to create a condition precedent for a different type of pipeline facility.").

These commenters further maintain that fleetwide-average emission standards are inconsistent with Title II's remediation and notification provisions. Those provisions state that if EPA "determines that a substantial number of any class or category of vehicles or engines . . . do not conform to the regulations prescribed under [Section 202]," the manufacturer must remedy "the nonconformity of any such vehicles or engines."[264] If "a motor vehicle fails to conform," the manufacturer bears the cost.[265] Further, "dealers, ultimate purchasers, and subsequent purchasers" must be given notice of any nonconformity,[266] which requires identification of specific nonconforming vehicles. These commenters maintain that none of this is possible where the nonconformity is tied to a fleet average.

EPA disagrees with these comments. The regulatory provisions for demonstrating compliance with emissions standards have been successfully implemented for decades, including provisions in our regulations for demonstrating compliance through our ABT program. Commenters who alleged inconsistency with the compliance and enforcement provisions fundamentally misapprehend the nature of EPA's motor vehicle program and the ABT regulations, where compliance and enforcement do in fact apply to individual vehicles consistent with the statute. It is true that ABT allows manufacturers to meet emissions standards by offsetting emissions credits and debits for individual vehicles. However, individual vehicles must also continue to themselves comply with standards applicable on a vehicle-by-vehicle basis throughout that vehicle's useful life, as described below. As appropriate, EPA can suspend, revoke, or void certificates for individual vehicles. Manufacturers' warranties, which are mandated under CAA section 207, apply to individual vehicles. EPA and manufacturers perform testing on individual vehicles, and recalls can be implemented based on evidence of non-conformance by a substantial number of individual vehicles within the class. The above is true for all of EPA's ABT programs, including for NMOG+NOx and GHG for light- and medium-duty vehicles. Each program, however, differs somewhat from other programs, and below we examine in detail the ABT programs for LD NMOG+NOx and LD GHG. We then turn to specific statutory arguments raised by the commenters. The ultimate conclusion is that the regulatory scheme fully satisfies the compliance and enforcement requirements of the statute.

Under the Tier 3 fleet average standard for LD NMOG+NOx, each vehicle must certify its emissions performance using a "Bin" structure (i.e., a vehicle with no emissions will certify to Bin 0, a vehicle with emissions over 0 mg/mi but less than or equal to 10 mg/mi will certify to Bin 10, and so on, up to Bin 70; vehicles emitting over 70 mg/mi, can certify to Bin 125 or Bin 160).[267] No vehicle is required to certify to any particular bin, so long as the average of all vehicles is equal to or less than the fleet average standard (30 mg/mi under Tier 3). In other words, a manufacturer can certify all of its vehicles to Bin 30 to meet the Tier 3 standard, or it could certify half of its vehicles to Bin 0 and half to Bin 60, or any other combination that on average meets the fleet average standard. However, once a manufacturer certifies an individual vehicle to a particular bin, that individual vehicle is required to emit at the corresponding emissions level or below. Under a fleet average scheme, a manufacturers' compliance with fleet average obligations is determined by aggregating the compliance determinations for individual vehicles, and these individual vehicles must also meet their own obligations. These requirements

[264] CAA section 207(c)(l).
[265] CAA section 207(h)(l).
[266] CAA section 207(c)(2).
[267] *See* 79 FR 23451 ("Structure of the Primary Tier 3 Tailpipe Standards").

are therefore entirely consistent with Title II's compliance and enforcement provisions that apply to individual vehicles—including those related to a vehicle's conformance with applicable regulations, its certificate of conformity and warranty, and on-board diagnostics requirements. EPA retained and did not reopen this general scheme for NMOG+NOx standards in today's Tier 4 rulemaking, with some discrete changes to the bin structure as discussed in preamble III.D.2 (e.g., eliminating bin 125 and 160 so as to remove the dirtiest vehicles from the future fleet).

EPA's LD GHG fleetwide average standards are structured similarly.[268] Under the GHG program, instead of vehicles certifying to a bin value, manufacturers determine the emissions performance of each vehicle through testing. Based on that testing, EPA assigns each vehicle an in-use compliance value which it is obligated to meet. EPA also evaluates the manufacturer's compliance with the fleetwide average based on the testing results.[269] However, compliance with the GHG program is fundamentally established the same way as the NMOG+NOx program—by determining the emissions performance of individual vehicles—which are measurable and enforceable—and then determining compliance with the fleet average standards based on the emissions performance of individual vehicles. Again, the regulatory scheme is entirely consistent with the compliance and enforcement provisions in Title II.[270] We further discuss how GHG compliance and enforcement function in Section III.G.5 of the preamble.

The ABT program has been in place for decades and has worked admirably in practice, including as applied to both NMOG+NOx and GHG compliance. The elements of the program described above are entirely consistent with the Act, including all the provisions cited by commenters.[271] First, the argument that the regulatory approach is unlawful because conformity cannot be determined until the end of the model year is incorrect. Congress itself used this kind of approach when it mandated certain standards under section 202. For example, Congress

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[268] *See* 75 FR 25412-14 (establishing the ABT program for LD GHG and explaining its similarities and differences from criteria pollutant ABT programs). The somewhat different structure of the GHG ABT program is because GHG emissions performance, relative the criteria emissions performance, typically varies to a greater degree among different models of vehicles, and because the GHG ABT program structure allows for greater harmonization with NHTSA's fuel economy standards.

[269] Generally for the NMOG+NOx standard, manufacturers include a compliance margin in their compliance plans, such that a vehicle will not be certified to a bin unless the manufacturer's testing indicates that the vehicle performs sufficiently below the required level for that bin, in order to avoid compliance issues that could arise due to minor variability in testing and manufacturing of individual vehicles. The GHG program addresses this issue by allowing manufacturers a 10% compliance margin between the in-use compliance standard and the emissions performance level use.

[270] To spell things out further, under Title II's compliance and enforcement provisions, EPA issues a certificate of conformity for every vehicle, as required by 42 U.S.C. § 7525(a)(1). This certificate is conditioned on the automaker's compliance with the standards, including for example both the in-use and the fleet-average GHG standard, and warrant that each new vehicle is designed to comply with all applicable emissions standards. 75 FR 25412/1-2; 40 C.F.R. §§ 86.1848-10(c)(2), (5), (9), 86.1865-12(j)(2); 42 U.S.C. § 7541. Automakers (and EPA) then test vehicles post-sale, to obtain "real-world in-use data representing the majority of certified vehicles." 75 FR 25474/3; 40 C.F.R. §§ 86.1865-12(l)(2), 86.1848-10(c)(9), 600.010(d). This "ensure[s] that an individual vehicle complies with the [greenhouse-gas] standards in-use," and throughout the vehicle's useful life. 75 FR 25476/1; *see id*. at 25468/3. The certificate and the warranty are both based on the automaker's compliance plan and ability to manufacture individual vehicles meeting particular emission specifications. *See* 40 C.F.R. §§ 86.1848- 10(c)(2), (5), (9), 86.1865-12(j)(2).

[271] *See* CAA section 206(a)(1) (leaves to EPA the means of determining "whether such vehicle…conforms with" the section 202 emissions standards and authorizes EPA to "test, or require to be tested in such manner as he deems appropriate" for purposes of vehicle certification); *see also EDF v. Thomas*, 805 F.2d 410, 425 n.24 (D.C. Cir. 1986) (noting this discretion).

mandated phase-ins over time of certain emission standards for certain vehicles and model years.[272] Each of these provisions requires that a specified percentage of a manufacturer's production has to meet a specified standard. This made the level of a manufacturer's production over a model year a core element of the standard.[273] The form of the standard mandated by Congress recognized that pre-production certification would need to be based on a projection of production for the upcoming model year, with actual compliance with the required percentages not demonstrated until after the end of the model year.[274] EPA's ABT provisions use this same kind of approach, which also makes the level of a manufacturer's production a core element of the standard. In both forms, compliance is evaluated not only with respect to individual vehicles, but with respect to the fleet as a whole. The difference is that EPA's provisions provide manufacturers with greater flexibility in meeting the performance-based standards, allowing them the ability to achieve the required level of emissions reductions even more cost-effectively. That is, Congress's approach required a specific number of vehicles each year to meet more stringent standards, while EPA allows manufacturers to choose how many vehicles each year will meet the more stringent standards, subject to the overall constraint of a fleet average standard that gradually increases in stringency.[275]

Vehicle manufacturers also warrant at the time of sale that each new vehicle is designed to comply with all applicable emission standards and will be free from defects that may cause noncompliance.[276] Manufacturers must warrant to the ultimate purchaser, and to subsequent purchasers, that the vehicle is designed, built, and equipped to conform at time of sale with all applicable standards, and is free of defects that will cause it to fail to conform in use during the applicable warranty period. Components covered by the warranty include all emission-related components included in the manufacturer's application for a certificate of conformity.

Consistent with section 205, civil penalties are provided for under CAA section 205 for violations of section 203, which prohibits sale or offering into commerce any equipment not covered by a valid certificate of conformity, and authorizes assessment of civil penalties up to

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[272] CAA sections 202(a)(6), (g)(1) (as noted earlier), (g)(2), and (j) (all of which require EPA to issue standards pursuant to section 202(a)).

[273] *See, e.g.*, CAA section 202(g)(1) (defining "standards which provide that emissions from a percentage of *each manufacturer's sales volume of such vehicles and trucks* shall comply with the levels specified in table G" (emphasis added)).

[274] *See* 56 FR 25724, 25733-34 (June 5, 1991).

[275] EPA continues to apply phase-ins of emissions standards in some contexts. For reasons noted in Section III of the preamble, the PM standard is being phased in, with increasing percentages of automakers' fleets being subject to the new 0.5 mg/mi standard from 2027 to 2032. Again, each vehicle will have an individual emissions standard which that vehicle is required to meet. However, that standard could be 3 mg/mi (25° FTP) or it could be 0.5 mg/mi, depending to which standard the manufacturer certified the vehicle. If the phase-in percentage is 30%, a manufacturer is not allowed to simply represent 30% of all vehicles sold meet the 0.5 mg/mi standard. Rather the manufacturer must certify each vehicle to a particular performance level and 30% of those vehicles must be below 0.5 mg/mi. It is worth noting that there is nothing in theory or practice which would prevent EPA from combining both a fleet average and a phase in of standards if it were appropriate. EPA could decide to allow the revised PM standard to be met be through fleet averaging of individual vehicle PM emissions performance and also phase in the adoption of that standard, such that increasing percentages of the fleet would need to be included in the averaging set for the lower standard. These approaches are alternative approaches to addressing lead time for technology adoption, but they are certainly not inconsistent or mutually exclusive.

[276] CAA section 207.

$57,617 per vehicle in violation.[277] Individual certificates are conditioned on compliance with all regulatory requirements including all those pertaining to compliance demonstrations via averaging. A certificate can be voided "*ab initio*" in the event of a violation of averaging requirements. For example, if a manufacturer fails to meet the required standard using averaging, they can be required to identify the vehicles causing the deficit. The conditions in the certificates mean EPA may declare that the deficit-causing vehicles are not covered by the certificate. If EPA exercises that authority, the vehicles causing the deficit would no longer be considered to be covered by the certificate and would be deemed to be introduced into commerce without a valid certificate of conformity. This could lead to enforcement action and civil penalties for each of the vehicles not covered by a certificate, consistent with sections 203 and 205 of the Act. In addition, automakers can be penalized for prohibited acts like selling uncertified vehicles or failing to honor the emissions warranty, all of which apply under a fleet-average standard in the same way as they do under vehicle-specific standards.

Failure of vehicles to achieve their standards in-use could lead to a recall under section 207(c)(1). Commenters' arguments that there is no way to assess if a substantial number of vehicles are non-conforming is incorrect. Testing provides a ready means of determining if and how many vehicles fail to meet their applicable standard in-use. We further discuss the GHG compliance and enforcement program in preamble III.G.4, including discrete changes EPA is making to provisions relating to recall and in-use testing.

Similarly incorrect is the commenters' argument that the standards do not allow for section 202(m) emissions control diagnostic systems that accurately identify emissions control-related deterioration that could result in failure of vehicles to comply with emissions standards. Once again, every vehicle is certified to an emissions limit that is determinable, as are means of diagnosing potential deterioration of the vehicle's emission control system relative to this emissions limit.

Further, commenters reliance on the *NRDC v. Thomas* dicta is misplaced. First, the court noted that Section 206(a)'s testing and certification provisions refer to vehicles, not to classes of vehicles.[278] As explained above, however, the certification is conditioned not only on compliance with the fleet-average standards, but also on each vehicle complying with its vehicle-specific standards.[279]

Second, the *NRDC* court noted that in legislative history to the 1970 amendments, Congress indicated that each prototype, rather than the average of prototypes, should meet emission standards.[280] EPA addressed this concern in the preamble to a 1990 rule. Congress's concern was that "we did not have an adequate testing program" to "get to this problem of cleaning up the auto emissions,"[281] and that the testing of a small number of prototypes and averaging of those prototypes did not provide an accurate assessment of vehicle compliance with standards. But

[277] The statutory penalty figure in section 205 has been updated pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990, as amended through the Federal Civil Penalties Inflation Adjustment Act Improvements Act of 2015. *See* 88 FR 89309 (Dec. 27, 2023).
[278] *NRDC v. Thomas*, 805 F.2d at 425 n.24.
[279] The *NRDC* court also noted the "counterargument" to its concern, that "the manner of testing deemed appropriate or the content of the standards themselves is within the discretion of the agency." *NRDC v. Thomas*, 805 F.2d at 425 n.24.
[280] *Id.*
[281] *Id.*

EPA's current certification and in-use standards are vehicle-specific and "ensure that each engine meets the [applicable] limit."[282] Averaging as used in the current program does not create any uncertainty as to whether automakers are in compliance with the standards because every vehicle must achieve its certified emission performance as part of the fleetwide compliance framework.

V. The Russello Canon is inapplicable

Commenters invoked the Russello and *expressio unius* canons of statutory construction, claiming that various provisions of both the CAA and other statutes indicate that Congress knew how to specify ABT-based standards when it wished, and therefore that the absence of such an explicit delegation in section 202(a)(1) is an indication that no such delegation is intended. We disagree with the relevance of these canons here, which we refer to collectively as the Russello canon. To begin with, the "canon does not apply unless it is fair to suppose that Congress considered the unnamed possibility and meant to say no to it, and that the canon can be overcome by contrary indications that adopting a particular rule or statute was probably not meant to signal any exclusion."[283] As explained above, a more direct and explicit indication of Congressional intent vis-a-vis ABT is available, as Congress ratified EPA's use of ABT as upheld by the D.C. Circuit's decision in *NRDC v. Thomas*, 805 F. 2d 410, 425 (D.C. Cir. 1986).[284] For this reason alone, the Russello canon does not apply.

Moreover, the Russello canon has limited, if any, utility where wording is not identical or otherwise substantially similar.[285] That is the case with respect to the provisions cited by the commenters. Commenters cite the Clean Fuels Vehicle provisions in Part C of Title II for the proposition that Congress knew how to specify an ABT program.[286] This program is found in a separate Part of the statute, uses different language than section 202, and is not otherwise parallel to section 202. Namely, the Part C provisions direct EPA to set standards for clean-fuel vehicles operating on clean alternative fuel including electricity, but only on a targeted regional basis. This was a specific project to advance alternative fuels and technologies,[287] not a limit on EPA's general section 202(a)(1) authority. Moreover, the credit provisions are highly detailed, and in some cases, mandatory. For example, the credit provisions in section 246(f) are mandatory, specific to certain State Implementation Plan (SIP) revisions, and subject to limits on how the credits can be used, such as "to demonstrate compliance with other requirements applicable

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[282] 55 FR at 30594.
[283] *Marx v. Gen. Revenue Corp*., 568 U.S. 371, 381 (2013).
[284] *See* 88 FR at 25950.
[285] *See Nat'l Postal Pol'y Council v. Postal Regul. Comm'n,* 17 F.4th 1184, 1191 (D.C. Cir. 2021), *cert. denied*, 142 S. Ct. 2868 (2022) ("The Mailers also invoke the presumption in *Russello v. United States* — that the inclusion of a phrase in one provision and its absence in another is deliberate, 464 U.S. 16, 23, 104 S. Ct. 296, 78 L. Ed.2d 17 (1983) — to argue that the exception to the price cap for emergencies in § 3622(d)(1)(E) demonstrates that Congress decided not to grant the Commission the authority to override the price cap in § 3622(d)(3). Mailers Br. 20–21. That canon has limited force here, however, because the two provisions use different words and are not otherwise parallel. *See City of Columbus v. Ours Garage & Wrecker Serv., Inc*., 536 U.S. 424, 435–36, 122 S. Ct. 2226, 153 L. Ed.2d 430 (2002).").
[286] Commenters also cite to the Clean Fuel Vehicles program as evidence that Congress knew how to explicitly specify a program for electric vehicles. We respond to these comments in RTC 2.3.
[287] *See* H. Rep. No. 101-490, pt. 1, at 283 (1990), 1990 WL 1222133, at *65-66 (Congress wanted "to encourage a broad range of vehicles," including those using electricity, and break the "chicken and the egg" supply-and-demand problem among automakers, consumers, and fuel producers).

under this section in the same nonattainment area."[288] By contrast, section 202(a)(1) does not explicitly mandate or specify a credit program, and it also provides for nationally applicable standards. EPA's decision to implement ABT and fleet-average standards falls within Congress's delegation to the agency to establish the standards. Thus, sections 246 and 249 are quite different from section 202(a)(1), and the Russello canon is inapplicable.

Commenters cited the Reformulated Gasoline and Renewable Fuel Standards provisions of the Act as further examples of Congress knowing how to specify averaging or credit programs when it wished to adopt them.[289] These provisions involve fuels, not emissions from motor vehicles, and so are not the same or parallel to section 202(a). Moreover, the credit programs in those provisions are also mandatory.[290] Further, Congress explicitly specified that the RFS program does not limit the agency's authority to promulgate other GHG programs.[291]

EPA notes that the ABT program for section 202(a) standards is not unique in lacking an explicit statutory ABT provision. Over the decades, EPA has also promulgated ABT programs in other similar instances. For instance, EPA implemented a highly successful ABT program for fuels standards under section 211(c).[292] Indeed, many fuels companies, such as members of commenters API and AFPM, have historically supported and benefited from these ABT programs. Like the section 202(a) ABT programs, fuels programs containing ABT provisions that are promulgated under section 211(c) also lack an explicit statutory ABT provision. Such absence is also in marked contrast to the section 211(k) ABT program.

More broadly, in light of the history of Federal environmental law, it is not surprising that the later-enacted clean fuel vehicles, reformulated gasoline, and RFS programs have explicit provisions relating to credits, while the earlier-enacted sections 211(c) fuels and 202(a) motor vehicle programs do not. Credit programs generally and ABT programs specifically were not widely used in the early days of federal air pollution control, and the lawmakers likely had limited knowledge of such programs.[293] For instance, at the time of the Motor Vehicle Air Pollution Control Act of 1965, there was no ABT program for any federal air pollution regulatory program. Congress, recognizing the need for regulatory flexibility so as to avoid obsolescence, declined to specify the details of how the standards should be implemented, entrusting those technical judgments to the expertise of the administrative agency.

Even further afield is Valero's assertion that the Energy Policy Conservation Act provision directing NHTSA to issue regulations setting "average fuel economy standards for automobiles manufactured by a manufacturer" (49 U.S.C. § 32902(a)) constrains EPA's section 202(a) authority. EPCA is a different statute from the CAA, and it is also concerned with entirely different purposes. Section 202(a) is concerned with preventing or controlling emissions of air

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[288] CAA section 246(f)(2)(A).
[289] *See* CAA section 211(k)(7) (credits relating to reformulated gasoline), section 211(o)(5) (credit program for RFS).
[290] *See* CAA section 211(k)(7) (regulations "shall provide" for credits for certain reformulated gasoline), section 211(o)(5) (RFS regulations "shall provide" for credits).
[291] CAA section 211(o)(12).
[292] *See, e.g.,* 65 FR 6698 (Feb. 10, 2010); 79 FR 23416 (Apr. 28, 2014); 66 FR 5002 (Jan. 18, 2001); 72 FR 8428 (Feb. 26, 2007).
[293] *See* Ellerman, P.L. Joskow & D. Harrison, Jr., Emissions Trading in the U.S.: Experience, Lessons and Considerations for Greenhouse Gases (2003), *available at* https://globalchange.mit.edu/publication/13922 (discussing the history of ABT and other credit programs in US environmental law, summarized on p. 7 tab. 1).

pollutants from motor vehicles which contribute to endangerment, not with vehicular fuel economy.[294] The Russello canon has no applicability here.

VI. EPA may include BEV and ICE vehicles within a single regulatory class.

Several of the commenters argue that even if section 202(a)(1) authorizes fleet average standards, ICE and non-ICE vehicles' performance cannot be averaged together because they are not of the same "class" as required by section 202(a)(1). There are two versions of this argument: that all members of the class being averaged must emit the pollutant(s) which are contributing to endangerment, or that they have fundamentally different powertrains and so cannot be reasonably grouped together.

EPA disagrees. As discussed in Section III.B.1 of the preamble, Congress required EPA to prescribe standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles, which in his judgment cause, or contribute to, air pollution which endangers public health and welfare. Congress defined "motor vehicles" by their function: "any self-propelled vehicle designed for transporting persons or property on a street or highway."[295] Likewise, with regard to classes, Congress explicitly contemplated functional categories: "the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors."[296] It is indisputable that electric vehicles are "new motor vehicles" as defined by the statute and that they fall into the weight-based "classes" that EPA established with Congress's explicit support.

Under section 202(a), regulation of motor vehicle emissions has two distinct aspects: (1) if the Administrator finds that "any class or classes of new motor vehicles or new motor vehicle engines, … in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare," then (2) "[t]he Administrator shall by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the emission of any air pollutant from" such class or classes. The first step of this inquiry is the endangerment finding, while the second step is setting the standards.[297] As the Supreme Court held in *Massachusetts* and the D.C. Circuit reaffirmed in *Coalition for Responsible Regulation,* the Endangerment Finding is a matter of "scientific judgment"—whether air pollution endangers and whether the class of motor vehicles contributes

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[294] *See Massachusetts v. EPA,* 549 U.S. 497, 532 (2007) ("[T]hat DOT sets mileage standards in no way licenses EPA to shirk its environmental responsibilities. EPA has been charged with protecting the public's "health" and "welfare," 42 U.S.C. § 7521(a)(1), a statutory obligation wholly independent of DOT's mandate to promote energy efficiency. *See* Energy Policy and Conservation Act, § 2(5), 89 Stat. 874, 42 U.S.C. § 6201(5). The two obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.").

[295] CAA section 216(2).

[296] CAA section 202(a)(3)(A)(ii). This section applies to standards established under section 202(a)(3), not to standards otherwise established under section 202(a)(1). But it nonetheless provides guidance on what kinds of classifications and categorizations Congress thought were appropriate.

[297] See 74 FR 66544 ("the decisions on cause or contribute and endangerment are separate and distinct from the decisions on what emissions standards to set under CAA section 202(a)."); *see also id.* at 66501-02; Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act: EPA's Response to Public Comments, Volume 11: Miscellaneous Legal, Procedural, and Other Comments, 11.3.

to such pollution.[298] By contrast, the decision on what standards to set is a policy decision subsequent to the endangerment finding based on technical determinations of technology availability, cost of compliance, and lead-time.[299]

In making the GHG Endangerment Finding in 2009, EPA defined the classes of motor vehicles and engines as "Passenger cars, light-duty trucks, motorcycles, buses, and medium and heavy-duty trucks."[300] Light and medium-duty BEVs fall within the classes of passenger cars, light-duty trucks, and medium and heavy-duty trucks. In making the Endangerment Finding, EPA satisfied the statutory prerequisite for establishing GHG standards for these entire classes, which includes zero-emitting vehicles that do not emit pollutants.[301] That is, the Administrator's judgment as to endangerment applied to the above-stated classes as wholes, with no qualification as to the level of emissions, powertrain, or any other characteristic. The Endangerment Finding was upheld after extensive litigation.[302] EPA did not reopen the 2009 Endangerment Finding in this rulemaking, and comments collaterally challenging it are beyond the scope of this rulemaking. Once EPA made the endangerment finding for the class, EPA was required to set emission standards for vehicles in that class to address the contribution to endangerment. In the final rule, as in prior GHG rules, EPA acts consistently with the endangerment finding in promulgating GHG regulations for the classes of passenger cars, light-duty trucks, and medium and heavy-duty trucks. [303]

Some commenters nonetheless contend that BEVs fall outside of EPA's regulatory reach under this provision because they do not cause, or contribute to, air pollution which endangers human health and welfare. That misreads the statutory text. Section 202(a)(1)'s focus on regulating emissions from "class or classes" indicates that Congress was concerned by the air pollution problem generated by a class of vehicles, as opposed to from individual vehicles. Accordingly, Congress authorized EPA to regulate *classes* of vehicles, and EPA has concluded that the *classes* of passenger cars, light-duty trucks, and medium and heavy-duty trucks, cause or

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[298] *Massachusetts v. EPA*, 549 U.S. 497, 534 (2007); *Coal. for Responsible Regul., Inc. v. EPA*. 684 F.3d 102, 117-19 (D.C. Cir. 2012).

[299] *See Coal. for Responsible Regul., Inc. v. EPA*, 684 F.3d 102, 118 (Policy inquiries "muddle the rather straightforward scientific judgment about whether there may be endangerment by throwing the potential impact of responding to the danger into the initial question. To be sure, the subsection following § 202(a)(1), § 202(a)(2), requires that EPA address limited questions about the cost of compliance with new emission standards and the availability of technology for meeting those standards, but these judgments are not part of the § 202(a)(1) endangerment inquiry. The Supreme Court made clear in Massachusetts v. EPA that … policy concerns were not part of the calculus for the determination of the endangerment finding in the first instance."); *see generally id.* at 117-19.

[300] 74 FR 66496, 66537 (Dec. 15, 2009).

[301] We note that this is not special to GHGs. For example, EPA has also made endangerment findings and established criteria pollutant standards for an entire class or classes of vehicles (e.g., for light-duty vehicles and heavy-duty vehicles), with includes ICE only vehicles, hybrid vehicles, and ZEV vehicles. Of course the nature of compliance demonstration may differ by vehicle. For example, it would be a waste of resources to test BEVs for tailpipe emissions, and thus EPA allows BEVs to certify to certain standards without testing.

[302] *Coal. for Responsible Regul., Inc. v. EPA*, 684 F.3d 102, 117 (D.C. Cir. 2012) ("We ultimately conclude that the Endangerment Finding is consistent with *Massachusetts v. EPA* and the text and structure of the CAA, and is adequately supported by the administrative record.").

[303] Our response focuses on GHG regulation. However, similar arguments also apply to the regulation of criteria pollutants. *See, e.g.*, 79 FR 23414 (Tier 3 criteria pollutant rule) (establishing standards for "both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles"), 23416 (assessing the contribution to air pollution due to emissions from "passenger cars").

contribute to dangerous pollution. As noted, the *classes* of these vehicles include BEVs, along with ICE and hybrid vehicles. And EPA has consistently viewed passenger cars, light-duty trucks, and medium and heavy-duty trucks as classes of motor vehicles for regulatory purposes, including in our prior GHG rules.

Commenters do not seriously question that passenger cars, light duty trucks, and medium and heavy-duty trucks as defined by EPA are classes of vehicles, which they clearly are. A "class" is a "set, group, collection…containing members having…at least one attribute in common."[304] Each of these three classes is a "set" or "group" of vehicles "containing members" having attributes in common. The members of these classes are all motor vehicles as defined in section 216(2) of the Act, and the members of each class further share specific attributes. For example, EPA historically defined "light-duty truck" to mean:

> any motor vehicle rated at 8,500 pounds GVWR or less which as [sic] a vehicle curb weight of 6,000 pounds or less and which has a basic vehicle frontal area of 45 square feet or less, which is:
>
> (1) Designed primarily for purposes of transportation of property or is a derivation of such a vehicle, or
>
> (2) Designed primarily for transportation of persons and has a capacity of more than 12 persons, or
>
> (3) Available with special features enabling off-street or off-highway operation and use.[305]

The statute plainly permits this kind of classification. Congress ratified this historical approach in the 1990 amendments to the CAA. Congress added definitions in section 216 that incorporated into the statute EPA's prior inclusive definitions of "light duty vehicle" and "light duty truck" which "have the meaning provided in regulations promulgated by the Administrator and in effect as of November 15, 1990." Congress then mandated certain standards for light duty vehicles and light duty trucks that incorporated those inclusive definitions, which do not include any distinction based on whether a vehicle emits pollutants or has a certain powertrain. CAA sections 202(g), (h)(1), and (j)(1).[306]

Commenters fail to seriously grapple with these arguments, but nonetheless claim that the prerequisite for EPA regulation is the agency finding that *individual* regulated vehicles must themselves emit air pollutants. This claim is completely unmoored from the statutory text and purpose, which speaks in terms of "classes" of vehicles that emit pollutants. Section 202(a)(1) does not speak to emissions from individual vehicles at all. For that view to be right, section 202(a) would have to be rewritten to say the emission of air pollutants "*from any new motor vehicle*."

[304] Webster's II Universal Dictionary.
[305] 40 CFR 86.082-2; *see also id*. ("Light-duty vehicle means a passenger car or passenger car derivative capable of seating 12 passengers or less."); 46 FR 50464-01, 50476-77 (Oct. 13, 1981).
[306] EPA has subsequently revised the definition of "light-duty truck" over the years, including in this final rule; however, the revised definitions also are not based on whether vehicles emit pollution or have a certain powertrain. See the regulatory text at the end of this notice amending 40 CFR 86.1803-01 (defining "light-duty vehicle," "light-duty truck," "heavy-duty vehicle," "medium-duty passenger vehicle," and "medium-duty vehicle").

Furthermore, while an individual vehicle could possibly "contribute" to dangerous air pollution warranting regulation, it would not typically "cause" such pollution. Instead, the more common "cause" would be a group of vehicles aggregated as a class. This confirms that "cause, or contribute to" clause as a whole modifies emissions from a "class or classes" of vehicles, rather than emissions from individual vehicles.[307]

These commenters also misunderstand the broader statutory scheme. Congress directed EPA to apply the standards to vehicles whether they are designed as complete systems or incorporate devices to prevent or control pollution. Thus, Congress understood that the standards may be premised on and lead to technologies that prevent pollution in the first place. It would be perverse to conclude that in a scheme intended to control the emissions of dangerous pollution, Congress would have prohibited EPA from premising its standards on controls that completely prevent pollution, while also permitting the agency to premise them on a technology that reduces 99 percent of pollution. Such a nonsensical reading of the statute would mean that the availability of technology that can reduce 99 percent of pollution could serve as the basis for highly protective standards, while the availability of a technology that completely prevents the pollution could not be relied on to set emission standards at all. Such a reading would also create a perverse safe harbor allowing polluting vehicles to be perpetually produced, resulting in harmful emissions and adverse impacts on public health, even where available technology permits the complete prevention of such emissions and adverse impacts at a reasonable cost. That result cannot be squared with section 202(a)(1)'s purpose to reduce emissions that "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare,"[308] or with the statutory directive to not only "control" but also "prevent" pollution.

Commenters' suggestion that EPA define the class to exclude BEVs would also be unreasonable and unworkable. *Ex ante*, EPA does not know which vehicles a manufacturer may produce and, without technological controls including add-on devices and complete systems, *all* of the vehicles have the potential to emit dangerous pollution.[309] Therefore, EPA establishes standards for the entire class of vehicles, based upon its consideration of all available technologies. It is only after the manufacturers have applied those technologies to vehicles in actual production that the pollution is prevented or controlled. To put it differently, even hypothetically assuming EPA could not set standards for vehicles that manufacturers intend to build as electric vehicles—a proposition which we do not agree with—EPA could still regulate vehicles manufacturers intend *not* to build as electric vehicles and that would emit dangerous pollution in the absence of EPA regulation.[310] When regulating those vehicles, Congress

[307] The rule of last antecedent does not alter that conclusion. That rule is sometimes used to interpret "a list of terms or phrases followed by a limiting clause." *Lockhart v. United States*, 577 U.S. 347, 351 (2016). But section 7521(a)(1) presents no such list, and thus no conundrum of whether the final modifier applies to everything in a preceding list or just the last item.

[308] *See also Coal. for Responsible Regulation*, 684 F. 3d at 122 (explaining that the statutory purpose is to "prevent reasonably anticipated endangerment from maturing into concrete harm").

[309] As noted above, manufacturers in some cases choose to offer different models of the same vehicle with different levels of electrification. And it is the manufacturer who decides whether a given vehicle will be manufactured to produce no emissions, low emissions, or higher emissions controlled by add-on technology.

[310] In other words, the additional BEVs EPA projects in the modeled central case analysis exist in the baseline case as pollutant-emitting vehicles with ICE. We further note that it would be odd for EPA to have authority to regulate a given class of motor vehicles so long as those vehicles emit air pollution at the tailpipe, but to lose its authority to regulate those very same vehicles should they install emission control devices to limit such pollution or be designed to prevent the endangering pollution in the first place.

explicitly authorized EPA to premise its standards for those vehicles on a "complete system" technology that prevents pollution entirely, like BEV technologies.

Commenters' claim that EPA must classify or categorize vehicles by powertrain is also misplaced. For any given class of vehicles, the Administrator may make appropriate subcategorizations in establishing the standards.[311] Section 202(a)(1) does not explicitly delineate how EPA should categorize, indicating that Congress entrusted this subsidiary technical determination to the Administrator's judgment.[312] EPA routinely makes categorizations based on characteristics like vehicle weight and functionality, and establishes different standards for each category where that is warranted, for instance, often establishing less stringent standards for heavier vehicles as compared to lighter vehicles of the same functionality in light of differences in technological feasibility and costs. For example, as we explain in Section III.C.2 of the preamble, EPA's light-duty GHG program—which applies to both passenger cars and light-duty trucks—employs attribute-based standards that depend on the size of the vehicle's footprint and also provides additional offsets for towing and all-wheel drive functionality.

Commenters do not identify anything in the statute that mandates categorization based on whether a vehicle emits or whether it has a certain powertrain. And in fact, Section 202(a)(1) does not require categorization (or classification) on these bases. Moreover, the intention underlying the commenters' preferred categorization is to delay the introduction of effective pollution control technologies like BEVs, with the result of perpetuating dangerous air pollution. That is not a reasonable way to implement section 202(a)(1).

Although it does not directly apply to section 202(a)(1) standards, Section 202(a)(3)(A)(ii) provides guidance on what kinds of classifications and categorizations Congress thought were appropriate. [313] That section states "[i]n establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors." As noted above, the class of light-duty trucks, for instance, is distinguished from other motor vehicles by its members having a certain weight and function. Within that class, vehicles are subject to different standards based on their footprint and functionality (the availability of all-wheel drive and towing), which the Administrator views as "other appropriate factors."[314]

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[311] We acknowledge that we have not always clearly delineated between the terms "class" versus "category." But the key point here is not the semantics of these two words, but rather a substantive distinction: the "classes" of vehicles that contribute to dangerous pollution for which EPA makes the endangerment finding and are thereby subject to the regulation for the relevant pollutant, and the "categories" or "subcategories" of vehicles within a class for which the agency may in its discretion establish different standards based on the characteristics of those subcategories.

[312] Congress, however, did provide indicia as to what appropriate categorizations could be in section 202(a)(3)(A)(ii), which we discuss further below. This section does not apply directly to this rulemaking but is nonetheless instructive as to potential means of categorizing (as well as classifying) heavy duty vehicles.

[313] Section 202(a)(3)(A)(ii) applies to standards established under section 202(a)(3), not to standards otherwise established under section 202(a)(1). Nonetheless, we think it provides guidance more generally on what classifications and categorizations Congress thought appropriate.

[314] *See White Stallion Energy Center v. EPA*, 748 F. 3d 1222, 1249 (D.C. Cir. 2014) ("[N]othing in the Clean Air Act 'requires' EPA to create a CFB subcategory. Rather, the statute gives EPA substantial discretion in determining whether subcategorization is appropriate."); s*ee also* CAA § 112(d)(1), 42 U.S.C. § 7412(d)(1) (EPA "may distinguish among classes, types, and sizes of sources"); *Nat'l Ass'n of Clean Water Agencies v. EPA*, 734 F.3d 1115, 1159 (D.C.Cir.2013) ("EPA's subcategorization authority under § 112 involves an expert determination,

Moreover, we note that other parts of the statute do actually *require* distinctions based on powertrain or based on fuel type (which corresponds to powertrain). Even within section 202 itself, Congress specified certain standards applicable only to some “gasoline and diesel-fueled” vehicles.[315] In section 216(1), Congress also limited the definition of a nonroad engine to mean only certain kinds of “internal combustion engine.”[316] This treatment shows that when Congress wants to require distinctions related to powertrain, it knew how to do so. The conspicuous absence of any such limitation in section 202(a)(1) suggests that no such limitation should be implied.

Commenters’ suggestion that BEVs are somehow so fundamentally different from ICE vehicles as to require different classification or categorization is also misplaced. EPA has found that, during the timeframe for this rule, BEVs are generally capable of performing the same functions as ICE vehicles of their respective types and established the standards accordingly. Indeed, manufacturers will sometimes produce the same vehicle model with varying levels of electrification.[317]

Relatedly, a commenter claims that because there is no identifiable vehicle configuration that corresponds to the standards, industry as a whole would have to certify at least two fundamentally different types of vehicles to satisfy them. It is not entirely clear what this comment means. Motor vehicles are highly diverse, and different manufacturers produce different subsets of such vehicles, with diverse vehicle configurations. We expect manufacturers to continue to produce the kinds of vehicles they have traditionally produced as the standards do not limit manufacturers to only producing a single vehicle configuration or applying only a single type of pollution control technology. Moreover, it is up to manufacturers to decide how to comply with EPA’s standards, and we expect each manufacturer to choose the compliance pathway that best suits its business.

Commenters suggest that calculating a fleetwide average that includes both BEVs and other vehicles creates an illogical or false average, but EPA rejects that suggestion. It is entirely consistent with the history of motor vehicle regulation under the CAA for advanced pollution control technologies to be phased in across the fleet, and there is nothing false about the tailpipe emissions compliance figures being averaged together under this rule. After all, BEVs do indeed produce no tailpipe emissions, so it is accurate to account for them as such. Indeed, it would be more inaccurate to exclude BEVs in calculating fleetwide compliance. And there is nothing false about regulatory averages that include electric vehicles. Emission standards apply to all motor vehicles in the relevant class. Automakers count the emissions of every vehicle in their fleet when calculating fleet-average emissions. Electric vehicles are thus treated just like any other

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placing a heavy burden on a challenger to overcome deference to EPA's articulated rational connection between the facts found and the choice made.”); *NRDC v. EPA*, 489 F. 3d 1364, 1375 (D.C. Cir. 2007) (“Because Congress has vested EPA with subcategorization authority under Section 112(c)(1), and its exercise of that authority involves an expert determination, L–P carries a heavy burden to overcome deference to the agency's articulated rational connection between the facts found and the choices made.”).

[315] CAA section 202(a)(3)(B)(ii), (h) tab. H, (i)(1); *see also* CAA section 202(a)(5)(A) (“gasoline vapor recovery”), (g) tab. G (“diesel-fueled LDTs”), (k) (“gasoline-fueled motor vehicles”).

[316] CAA section 216(10).

[317] For example, the Ford F-150 has been offered in ICE and EV versions, while the Hyundai Ioniq and Kia Niro has been offered in HEV, PHEV, and EV versions. Jaguar Land Rover has also indicated that every model will be available with a fully electric version by the end of the decade. The Freightliner Cascadia and eCascadia are ICE and BEV versions of Freightliner’s HD semi truck.

vehicle with emission-control technology. For that reason, averaging is technology neutral. The impact a particular technology has on a fleet's performance depends on its effectiveness. And electric vehicles are very effective at reducing greenhouse-gas emissions. But that effectiveness does not mean EPA must categorize electric vehicles separately or that such vehicles are beyond EPA's regulatory authority.

EPA acknowledges that we have at times established separate categories for vehicles based on powertrain or fuel type. For example, EPA has traditionally established separate categories for spark ignition and compression ignition vocational vehicles for purposes of HD GHG regulation.[318] EPA proposed to retain this categorization scheme in the recent HD Phase 3 GHG rule. We expect manufacturers to continue producing both spark and compression ignition ICE vocational vehicles during the timeframe of that rule; that is, we projected that manufacturers will likely comply with the Phase 3 standards, as with their Phase 2 predecessors, in whole or in part based on the GHG performance of both types of vocational vehicle engines. Given technological differences, spark and compression ignition ICE emit different amounts of pollutants, including GHGs, and including when using the same pollution control technologies.[319] As such, EPA's standards and categorization scheme appropriately reflect the different feasible emissions performance of these two types of internal combustion engines and vehicles. In principle, this is no different than having different GHG standards for, say, an ICE long-haul tractor and an ICE light HD vocational vehicle: they emit different amounts of pollutants, even when using the same pollution control technologies, and the standards appropriately reflect this difference.[320]

We note the key difference between this scheme and the ones that commenters say are compelled. Under EPA's proposed HD Phase 3 rule, vocational vehicles with all engine types must meet GHG standards whose stringency is supported by the feasible emission reductions under the modeled compliance pathway, which includes both zero-emitting vehicles and ICE vehicles technologies.[321] Under the commenters' approach, EPA is precluded from requiring any emission reductions associated with zero-emitting vehicle technologies that are available at a reasonable cost, and the nation has to forgo large public health and welfare benefits. We do not think such a result is reasonable.

Finally, many of the commenters' arguments rest on a false premise that BEVs cannot emit any air pollutants. EPA structures its light duty standards to regulate GHG leakage from AC systems which occurs in BEVs as well as other vehicles,[322] and EPA recognizes that BEVs like other vehicles emit PM through tire wear. Thus, to the extent the commenters view BEVs as not being part of the class subject to regulation under section 202 because BEVs do not emit pollutants, that view is factually inaccurate as well.

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[318] *See* 40 CFR section 1037.105 (b)(1).

[319] *See, e.g.,* 81 FR at 73562, 73679, 73703 (Phase 2 rule discussions of engine technologies considered in vehicle standard-setting).

[320] To provide another example, EPA has promulgated specific provisions for light-duty PHEVs to properly account for the way the internal combustion engine is used in PHEVs under certain conditions. But broadly speaking the same light duty tailpipe standards apply to all vehicles regardless of powertrain or fuel type, including to gasoline vehicles, diesel vehicles, HEV, PHEV, BEV, etc.

[321] The standard can of course be met by any means a manufacturer chooses.

[322] *See* Preamble III.C.5.

BEVs as systems or devices to prevent or control emissions

Some commenters further suggest that BEVs are beyond the scope of regulation under section 202(a) because the provision does not specifically mention BEVs, and because they view the clause at the end of section 202(a) which requires standards to be applicable for the useful life of vehicles “whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control pollution” as not describing BEVs. Other commenters argue that BEVs are best considered a design feature related to the control of emissions which should be considered in determining fleet average standards in order to achieve the goals and requirements of the Clean Air Act, and that BEVs constitute vehicles designed as a “system” within the meaning of section 202.

EPA disagrees with these comments. First, section 202(a)(1) directs EPA to regulate emissions from motor vehicles, and BEVs are motor vehicles as defined in section 216(2) of the Act. Second, in the 2009 Endangerment Finding, EPA identified the classes of motor vehicles subject to GHG regulation without any distinction as to whether they emit or to their powertrain. Once EPA made the endangerment finding for the class, EPA was required to set emission standards for vehicles in that class to address the contribution to endangerment. Third, the last clause in section 202(a)(1)—“whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control pollution”— does not alter the scope of vehicles subject to regulation under the Act. It does, however, confirm the broad scope of Congressional intent of the kinds of technologies that EPA may consider in establishing the standards, including “complete systems” and technologies that “prevent” pollution, which describe BEVs. We reject the commenters’ subsidiary arguments, including that BEVs are beyond the scope of regulation because they do not control pollution from a carbon-dioxide or criteria-pollutant emitting engine, they are not designed for emissions control, or they do not block or capture pollution.

First, as we explain in Section III.B of the preamble, BEVs unambiguously fall under the statutory definition of motor vehicles in section 216(2), and the statute also unambiguously allows EPA to consider electrified technologies, including BEVs, in establishing section 202(a)(1) standards. Section 202(a)(1) applies to the “emission of any air pollutant from any class … of new motor vehicles …. which … cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” Vehicles with electric powertrains, including BEVs, are indisputably “motor vehicles,” since they are “self-propelled” and are “designed for transporting persons or property on a street or highway.”[323]

Commenters wrongly suggest that despite the very broad statutory definition of motor vehicles, which remained untouched through repeated revisions of Title II, Congress could not have possibly intended to include BEVs in that definition simply because most vehicles in 1965 were gasoline. It is worth noting that “[a]t the beginning of the 20th century, 40 percent of American automobiles were powered by steam, 38 percent by electricity, and 22 percent by

[323] CAA section 216(2).

gasoline,"[324] and as noted in the preamble and by other commenters, by the 1960s Congress was actively considering the potential role of EV technology for reducing motor vehicle pollution.[325] In any case, as the Supreme Court has held, "the Congresses that drafted § 202(a)(1) … did understand that without regulatory flexibility, changing circumstances and scientific developments would soon render the Clean Air Act obsolete. The broad language of § 202(a)(1) reflects an intentional effort to confer the flexibility necessary to forestall such obsolescence."[326] Just as greenhouse gases "fit well within the Clean Air Act's capacious definition of 'air pollutant,'"[327] BEVs likewise fit well within the definition of motor vehicles. And as we explain in the preamble, the Administrator appropriately considered BEVs in establishing the standards as they are a highly effective technology for reducing vehicle emissions and available at a reasonable cost during the timeframe of the rulemaking.

Second, as we explain in our prior response regarding ABT, EPA identified the classes of vehicles subject to GHG regulation in the 2009 Endangerment Finding. The classes identified included passenger cars, light duty trucks, and medium and heavy-duty trucks, without exception as to their level of emissions or powertrain. BEVs are included in each class of vehicles. Once EPA made the endangerment finding for the class, EPA is required to set emission standards for vehicles in that class to address the contribution to endangerment.

Third, contrary to what commenters argue, the final clause of section 202 (a)(1) does not change the class of vehicles for which EPA must promulgate emission standards. That clause states that the standards "shall be applicable to those vehicles for their useful life whether such vehicles … are designed as complete systems or incorporate devices to prevent or control such pollution." This language requires that the standards apply to vehicles over their useful life, as opposed to, for example, only at the certification stage. The final standards do this.

As we explain in Section III.B of the preamble, this statutory language also confirms the breadth of Congress's intent with regard to the technologies that EPA may consider. We think it is clear that BEVs fall under this language as they are designed as complete systems. It is also reasonable to view BEVs as incorporating devices (e.g., batteries and e-motors) that prevent pollution from being created. Either way, BEVs clearly fall within the statutory text.

The commenters' arguments to the contrary are all misplaced. Commenters suggest that EPA cannot consider BEVs in establishing the standards because BEVs are designed to run on an entirely different power system, not to limit or control pollution from a carbon-dioxide-emitting engine. The argument first of all ignores the statutory language in section 202(a)(1), which speaks to EPA establishing emissions standards for classes of motor vehicles that contribute to

[324] Britannica, *Early Electric Vehicles*, https://www.britannica.com/technology/automobile/Early-electric-automobiles; see also Amicus Brief of Margo Oge and John Hannon in *Texas v. EPA* (D.C. Cir. No. 22-1031) at 9, 16-17.
[325] For example, in 1967, Congress was working on research-and-development programs for vehicle electrification. See S. Rep. No. 90-403, at 59-61 (1967). As part of that effort, Congress held hearings on "electric vehicles and other alternatives to the internal combustion engine." Joint Hearings Before the Committees on Commerce and Public Works for S. 451 and S. 453, 90th Cong. 297 (1967). Later that year, a Senate report approvingly noted that electrified vehicles could comprise one third of the market by 1985. S. Rep. No. 90-403, at 60 (1967). A few years later, Congress amended the Clean Air Act to create a research program for new vehicle technology, including "low emission alternatives to the present internal combustion engine." CAA section 104 (a)(2).
[326] *Massachusetts v. EPA*, 549 U.S. 497, 532 (2007).
[327] *Id.*

dangerous air pollution, not for classes of "carbon-dioxide emitting engines." Moreover, the argument proves far too much. Many GHG and criteria pollution control technologies are "designed" for or have other purposes beyond merely pollution control. For instance, many of the technologies on which the GHG emissions standards are predicated – e.g., improved engines and transmissions, low rolling resistance tires, aerodynamic improvements, lightweighting, improved accessories, mild and strong hybrids[328]—also improve vehicle functionality (e.g., turbocharging and engine downsizing, high efficiency automatic transmissions, electrified power steering) and fuel economy. The same is true for criteria pollutant technologies that improve the combustion process, such as exhaust gas recirculation, which beyond improving emissions performance can also improve knock resistance, reduce the need for high load fuel enrichment, and so on.[329]

Commenters similarly maintain that BEVs are not designed as complete systems because they lack a self-contained mechanism to block or capture pollution that otherwise would be emitted. This argument lacks a statutory basis and is premised on an incorrect understanding of how pollution control technology works. The statute speaks to vehicles "designed as complete systems or incorporate devices to prevent or control such pollution." [330] Preventing pollution includes reducing or eliminating pollution at the source, as opposed to merely blocking or capturing the pollution after it has been emitted.[331] Relatedly, controlling pollution could mean blocking or capturing pollution that otherwise would be emitted, but could also mean using chemical processes to transform air pollutants into harmless compounds. Technologies to address GHG emissions work by preventing pollution, e.g., by making the vehicle lighter or more aerodynamic or by increasing engine efficiency, so as to reduce fuel consumption and associated emissions, or by relying on a different fuel (e.g., natural gas, hydrogen, or electricity) that inherently creates and emits less pollution from the motor vehicle. To date, no motor vehicle GHG add-on control or aftertreatment technologies have become widely available. Criteria emissions technologies can also prevent pollution—for example by increasing the efficiency of the fuel combustion process or by fuel-switching—or control it—for example by a catalyst transforming pollutants into less harmful compounds.

The commenters' reading is implausible for another obvious reason. It reads the statute as disallowing technologies which are best suited to "prevent" the emissions which contribute to endangerment. Instead of preventing and controlling the emissions which contribute to endangerment, the commenters' reading would preclude EPA from considering highly effective technologies for reducing emissions, with the result of perpetuating emissions that contribute to dangerous air pollution. This result is antithetical to the statutory goal of using emission standards to prevent endangerment from "maturing into concrete harm."[332]

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[328] 81 FR at 73747–53.

[329] See Hannu Jääskeläinen & Magdi K. Khair, Exhaust Gas Recirculation (May 2022), https://dieselnet.com/tech/engine_egr.php.

[330] EPA notes that some commenters, both those that read section 202(a) as authorizing consideration of electrification technologies in setting vehicles standards and those that do not, appear to read the last phrase of section 202(a)(1), "to prevent or control pollution," as modifying "designed as complete systems." An alternate reading would be to construe "to prevent or control pollution" as solely modifying "incorporate devices." EPA finds it is unnecessary to resolve this interpretive issue because either way BEVs do prevent pollution.

[331] See CAA section 101(a)(3) ("air pollution prevention (that is, the reduction or elimination, through any measures, of the amount of pollutants produced or created at the source)").

[332] *Coal. for Responsible Regulation*, 684 F. 3d at 122.

The commenters' reliance on *Truck Trailer Manufacturers Association, Inc. v. EPA*, 17 F.4th 1198, 1202 (D.C. Cir. 2021) is misplaced. The case involved whether trailers were "motor vehicles," not which emissions control technologies are permissible under the statute. The commenter seizes on language in the decision stating that section 202(a)(1) creates two categories of complete motor vehicles: those with built-in pollution control, and those with add-on devices for pollution control. Nothing in this language supports a reading that BEVs are not "complete systems" or "devices." Indeed, BEVs can be regarded as "built-in pollution control," since the pollution control system is integral to the vehicle design, as opposed to being an add-on. In this way, BEVs are similar to many other pollution prevention technologies described above. For example, improved vehicle aerodynamics, lightweighting, and ICE engine and transmission improvements are integral aspects of the vehicle that can also be regarded as "built-in pollution control." By contrast, for example, an aftertreatment system can be seen as an "add-on device." Thus, to the extent *Truck Trailer* is relevant to the issue, we think it, like the statutory language it glosses, confirms the breadth of technologies Congress intended for EPA to consider and further supports our decision to consider BEV technologies in setting the standards.

Further, as discussed in Section III of the preamble, EPA does not mandate which vehicles a manufacturer may produce or how a manufacturer may choose to design individual vehicles or their overall fleet composition to meet emission standards. Without technological controls, including add-on devices and complete systems, all of the vehicles EPA regulates under section 202(a) have the potential to emit dangerous pollution.[333] Therefore, EPA establishes standards for the entire class of vehicles, based upon its consideration of all available technologies. Once EPA promulgates the emission standards, it is incumbent upon manufacturers to determine which technology or mix of technologies, whether they be add-on devices or complete systems, to use to meet the standards for their individual fleets. Accordingly, and consistent with the text of section 202(a), EPA has authority to set standards for an entire class of motor vehicles—and must have this authority—irrespective of how manufacturers ultimately comply. It would be absurd for EPA to set standards for a class of motor vehicles only for EPA to lose its authority to regulate those very same vehicles based on how manufacturers ultimately choose to comply after EPA has issued its standards. And it is only after EPA issues standards, and manufacturers begin to produce cars to meet those standards that the Agency can know with certainty what technologies manufacturers are using to meet the standards; accordingly, it is only after the manufacturers have applied those technologies to vehicles in actual production that the pollution is prevented or controlled.

Section 202(e)

One commenter points to section 202(e) as support for their view that BEVs should not be treated as part of the same class as other vehicles, and argues that any new propulsion system must be evaluated by the Administrator under section 202(e) before being certified. However, that provision is mostly notable for the specific circumstances under which it applies and is entirely permissive as an optional additional source of authority for the Administrator regarding certification.

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[333] As noted above, manufacturers in some cases choose to offer different models of the same vehicle with different levels of electrification. And it is the manufacturer who decides whether a given vehicle will be manufactured to produce no emissions, low emissions, or higher emissions controlled by add-on technology.

Section 202(e) clarifies that if a vehicle or engine with a novel power source or propulsion system would meet currently applicable emissions requirements but would emit air pollutants which the Administrator judges are harmful but for which EPA has not yet established standards, the Administrator may postpone certifying the vehicle for sale (notwithstanding the fact that the vehicle nominally meets the currently applicable emissions standards) until standards to address the novel pollutants are issued.

For example, in 1975 an inventor sought, and in 1977 was issued, a US Patent (No. 4,006,595) for a “refrigerant-powered engine.”[334] In explaining the need for such an engine, the patent states, “[p]erhaps the most serious problem facing this generation is the creation of air pollution as a result of the by-products of the automobile internal combustion engine,” and thus there “exists a need for a practical alternative to the internal combustion engine.”[335] The engine in question would use Freon vapor to drive a turbine (the Freon would then be collected in a sealed system and reused).

Were an automaker to develop such an engine today (using Freon or a chemical with similar characteristics), it would appear that no standards would apply to leaks of the chemical from the powertrain of the vehicle. In the absence of section 202(e), the Administrator might be required to issue a certificate of conformity allowing the vehicles to be sold, even if the leaks of the chemical were expected to have serious, long-lasting adverse impacts on the environment. Section 202(e) authorizes the Administrator to delay issuing certificates to such vehicles until appropriate standards can be established to protect public health and the environment.

Thus, this provision simply confirms the breadth of EPA’s authority to regulate any self-propelled vehicles—regardless of their form of propulsion (be it internal combustion, external combustion, electric, or a technology unknown to Congress in 1970 or to the agency today). Notably the provision has no potential application where a vehicle does not emit novel air pollutants (i.e., those for which an endangerment finding has not been made), and the provision certainly does not limit EPA to classifying vehicles according to their fuel or method of propulsion. As a discretionary power regarding certification, the provision also does not limit EPA’s standard-setting authority in any way.

Coordination with NHTSA

Some commenters suggest that EPA is bound by the terms of EPCA, either implicitly or because EPA is required to coordinate its standards with NHTSA’s fuel economy standards. Similarly, some commenters suggest that EPA decided not to undertake a joint rulemaking with NHTSA in order to avoid legal constraints on its standard-setting that would otherwise have applied.

EPA disagrees with the view that it is required to engage in joint rulemaking with NHTSA, that its legal authority with respect to establishing section 202 standards changes in any way if it does not engage in joint rulemaking with NHTSA, or that EPCA in any way constrains the scope of EPA’s authority to set standards under section 202.

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[334] The patent also discloses a prior patent, filed in 1973, which likewise uses Freon in a piston-reciprocating engine.
[335] *Id*. at 7

EPA issued its earliest light duty GHG rules jointly with the National Highway Traffic Safety Administration. However, from the beginning the two agencies have recognized their standards have different statutory mandates and that each agency must set its standards according to its respective statute, which has always resulted in the agencies' standards being varied in certain ways. In the very first joint LD GHG rule, EPA and NHTSA explained at length the distinct statutory authority of each agency and the areas in which they were similar and in which they were different, and the ways in which the agencies would coordinate their standard-setting and the ways in which the standards would diverge.[336] EPA thus has never viewed joint rulemaking as altering the scope of its authority. As discussed in Section III of the preamble and in Chapter 26 of the RTC, EPA has continued to coordinate closely with NHTSA in setting GHG standards even when not proceeding through joint rulemaking, and EPA has continued that practice for this rule, closely coordinating with NHTSA on a full range of issues related to feasibility, modeling, and stringency.

EPA continues to believe that EPA and NHTSA can and should each implement their respective statutory authorities while avoiding inconsistency. However, EPA does not believe that to avoid inconsistency EPA must, or can, ignore technological developments that enable significant advances toward necessary pollution reductions. As the Supreme Court made clear, "EPA has been charged with protecting the public's 'health' and 'welfare,'"[337] a statutory obligation wholly independent of DOT's mandate to promote energy efficiency."[338] Congress specified for NHTSA how to consider alternative fueled vehicles for purposes of calculating fuel economy, and Congress directed EPA to be forward-looking in assessing all available technologies when assessing feasibility of emissions reductions. These two mandates may result in somewhat different treatment of BEVs for purposes of assessing the feasibility of standards, but that does not indicate that either approach is inconsistent with the relevant statute, or that the ultimate standards will necessarily be inconsistent with each other. As the Supreme Court has already held, these statutes are complementary and do not displace one another.[339] EPA further discusses the lack of relevance of EPCA for interpreting section 202 in the Section 2.3 of the RTC concerning major questions.

Need for standards to adequately protect public health and welfare

Several commenters stated that the purpose of CAA section 202 is to reduce threats to public health and welfare. They supported standards more stringent than the final standards, with some commenters supporting zero emissions standards (i.e., standards of 0 g/mile). One commenter suggested that EPA was required under CAA 202(b)(1)(C) to undertake an analysis to determine what emission standards are needed to protect public health and welfare, including the NOx and PM standards that are needed to attain the ozone and $PM_{2.5}$ NAAQS in all nonattainment areas, and then to establish standards on that basis. An association of state agencies commented that stringent emissions standards are needed to ensure state and local air agencies can meet their statutory obligations to timely attain and maintain NAAQS. Other commenters pointed to the

336 *See* 74 FR at 49460–67.
337 42 U.S.C. § 7521(a)(1).
338 *Massachusetts*, 549 U.S. at 532.
339 *See id.*

standard-setting provisions of CAA section 202(a)(3), which apply to criteria pollutant standards for heavy duty vehicles.

As discussed in Section III and elsewhere in the preamble, EPA agrees with commenters that the purpose of the Clean Air Act is to reduce emissions of air pollutants that have been determined to contribute to dangerous air pollution, and Congress expected and directed that EPA would consider a full range of available technologies (not only internal combustion engine technologies) in carrying out that statutory purpose. As further discussed in the preamble, EPA agrees that section 202(a)(3)(A), which applies to certain standards adopted in this rule, is intended to achieve the greatest degree of emission reduction achievable, subject to EPA's consideration of certain factors, although section 202(a)(1)-(2) (which applies to light duty standards and HD GHG standards) provides more discretion to EPA whether to adopt technology forcing standards or not. EPA agrees with commenters who pointed out that federal mobile source standards are critically necessary to reduce harmful air pollution and in particular to assist states to come into attainment with the NAAQS. EPA is promulgating standards to achieve significant reductions in criteria pollution, as well as GHG. For the reasons stated in Section V of the preamble, EPA finds that the standards in this rule are consistent with section 202(a) (including, where applicable, section 202(a)(3)). These topics are further addressed in Section II of the preamble, Chapter 6 of the RIA, and Section 11 of the RTC.

Some commenters supported standards even more stringent than the proposed (or final) standards, including "zero emission standards." Some commenters suggested that standards should be set by determining what reductions are necessary to attain the NAAQS or achieve other public health goals. EPA finds, for the reasons explained in Section V of the preamble, that more stringent standards would not be appropriate under section 202(a). In particular, EPA finds that zero emissions standards would not be feasible or appropriate for these model years, taking into consideration cost and lead time. Although EPA recognizes that emissions reductions are the primary focus and purpose of section 202, and has adopted standards to achieve significant reductions in emissions, EPA disagrees that standards must be set by first identifying a specific amount of reductions needed, such as NOx reductions needed to attain the NAAQS, and then setting the standards to achieve those reductions. Section 202(a) directs EPA to achieve reductions in air pollutants, but does not suggest that the level of the standard must be tied to achieving a particular amount of reductions. Rather, section 202(a) is focused on technological feasibility, including cost. This approach enables EPA to achieve significant reductions which are critical to achieving public health goals, including attainment of the NAAQS, but there is nothing in section 202(a) that directs EPA to set standards based on achieving a specific quantity of emissions reductions, and EPA disagrees that such an approach is required under section 202(a).

EPA recognizes that some commenters read the text of section 202(b)(1)(C) as applying to these standards and as requiring such an analysis of what standards are necessary to prevent endangerment of public health and welfare, but EPA disagrees. First, section 202(b)(1)(C) has no relevance to GHG standards or to medium duty vehicles, as section 202(b) does not specify any such standards for EPA to promulgate. Second, EPA disagrees that the light duty criteria pollutant standards promulgated in this rulemaking are revising standards prescribed under or previously revised under section 202(b).

Third, even hypothetically assuming section 202(b) was intended to displace section 202(a) for all rulemakings going forward as the statutory criteria for light duty criteria pollutant standards, EPA further disagrees that it has not satisfied this requirement. EPA does not read the clause “as needed to protect public health or welfare, taking costs, energy and safety into account” to require that EPA conduct an analysis of what mobile source standards would result in nationwide attainment of the NAAQS, or some more nebulous goal, before adopting standards. Certainly, EPA has considered the public health and welfare implications of these pollutants and the need for additional mobile source controls, as discussed at length in Section II of the preamble. As discussed in Section V of the preamble, EPA is setting standards that it views as appropriate in light of the critical need for further pollutant reductions, but also taking into consideration costs, as well as energy, safety, and other factors. For those vehicles over 6,000 lbs, EPA has expressly found that the standards being adopted reflect the greatest degree of emissions reduction achievable through the application of available technology, giving appropriate consideration to cost, energy, and safety. In this way, EPA, by considering both the need for additional emission reductions and cost, feasibility, and additional factors including energy and safety, is adopting standards “as needed to protect public health and safety, taking costs, energy and safety into account.” EPA does not find a separate analysis of what standards would be necessary to achieve attainment of the NAAQS across the country to be required or appropriate under section 202(b)(1)(C).

Had Congress wanted that result, it could have said so. Cf., e.g., CAA 110(a)(2)(C) (requiring certain measures “as necessary to assure that national ambient air quality standards are achieved”), 202(i)(2)(A) (requiring the Administrator to “examine the need for further reductions in emissions in order to attain or maintain the national ambient air quality standards”), 213(a)(2) (requiring a study of nonroad engine contribution to nonattainment of national ambient air quality standards for ozone or carbon monoxide). Instead, Congress in section 202(b)(1)(C) simply said that “[a]ny revised standard shall require a reduction of emissions from the standard that was previously applicable.” It would be strange to read the modest phrase “as needed to protect public health or welfare” coupled with an anti-backsliding provision to mean a newfound mandate to achieve the NAAQS. Further while light duty vehicles are significant sources of pollution, other mobile and stationary sources are also very significant sources for these pollutants. Thus, it is doubtful that it would even be possible to ensure attainment of the NAAQS solely through light duty standards. Moreover, it is evident from the extensive statutory provisions in title I, part D of the Clean Air Act that attainment of the NAAQS was never intended to be achieved solely by mobile sources (much less solely light duty vehicles). It would be unreasonable to read the requirement for EPA to consider the “need” for protecting public health and welfare as requiring an analysis of what light duty standards would result in attainment of the NAAQS. To the extent this provision applies to this rulemaking, EPA’s decision to set standards taking into account the critical need for further emissions reductions to protect public health and welfare but also considering cost, energy, and safety, is consistent with the provision.

Nondelegation

The Pacific Legal Foundation comments that “if Congress gave EPA the unfettered discretion to alter the automobile market—with no limiting principle on its power to do so—then the Clean Air Act violates the Constitution’s nondelegation doctrine.” They assert that under the EPA’s assertion of authority in this rule, "the Clean Air Act is essentially a blank check under which the President and EPA may fill in their preferred policy, and Congress will have effectively enacted a law that is 'nothing except a raw delegation to enact rules.'"

Contrary to Pacific Legal Foundation's comment, the Clean Air Act, and this rule's promulgation thereunder, is sound under the nondelegation doctrine. "All legislative Powers herein granted shall be vested in a Congress of the United States . . . ."[340] As reaffirmed in *Gundy v. United States*, the Supreme Court held "that a statutory delegation is constitutional as long as Congress 'lay[s] down by legislative act an intelligible principle to which the person or body authorized to [exercise the delegated authority] is directed to conform.'"[341] Justice Rehnquist described the doctrine further:

> First, and most abstractly, it ensures to the extent consistent with orderly governmental administration that important choices of social policy are made by Congress, the branch of our Government most responsive to the popular will. *See Arizona v. Californi*a, 373 U.S. 546, 626 (1963) (Harlan, J., dissenting in part); *United States v. Robel*, 389 U.S. 258 (1967) (Brennan, J., concurring in result). Second, the doctrine guarantees that, to the extent Congress finds it necessary to delegate authority, it provides the recipient of that authority with an "intelligible principle" to guide the exercise of the delegated discretion. *See J.W. Hampton & Co. v. United States*, 276 U.S. 394, 409 (1928); *Panama Refining Co. v. Ryan*, 293 U.S. 388, 430 (1935). Third, and derivative of the second, the doctrine ensures that courts charged with reviewing the exercise of delegated legislative discretion will be able to test that exercise against ascertainable standards. *See Arizona*, 373 U.S. at 626 (Harlan, J., dissenting in part); *American Power & Light Co. v. SEC*, 329 U.S. 90, 106 (1946).[342]

In considering nondelegation, the Court looks to both the statutory context of the provisions,[343] and the "statutory purpose."[344]

The scope of congressional delegation need not be precise to be effective. As of early 2001, "[i]n the history of the Court we have found the requisite 'intelligible principle' lacking in only two statutes, one of which provided literally no guidance for the exercise of discretion, and the other of which conferred authority to regulate the entire economy on the basis of no more precise a standard than stimulating the economy by assuring 'fair competition.'"[345] The Court has

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340 U.S. Const., Art. I, § 1.

341 588 U.S. ___, 139 S. Ct. 2116, 2123 (2019) (quoting *Mistretta v. United States*, 488 U.S. 361, 372 (1989) (internal citation omitted)).

342 *Industrial Union Dep't, AFL-CIO v. Am. Petroleum Inst.*, 448 U.S. 607, 685-86 (1980) (Rehnquist, J., concurring) (cleaned up).

343 *See Utility Air Regulatory Gp. v. EPA*, 573 U.S. 302, 321 (2014) ("[R]easonable statutory interpretation must account for both the specific context in which . . . language is used and the broader context of the statute as a whole" (internal quotation marks omitted).

344 *Gundy*, 588 U.S. at ___, 139 S. Ct. at 2,126 (quoting *Nat'l Broadcasting Co.*, 319 U.S. at 216; *Am. Power & Light*, 329 U.S. at 104 (stating that the delegation at issue "derive[d] much meaningful content from the purpose of the Act, its factual background and the statutory context").

345 *Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457, 474 (2001) (*citing Panama Refining Co. v. Ryan*, 293 U.S. 388 (1935); *A.L.A. Schechter Poultry Corp. v. United States*, 295 U.S. 495 (1935)).

upheld as providing sufficient guidance statutes authorizing the War Department to recover "excessive profits" earned on military contracts, *see Lichter v. United States*, 334 U.S. 742, 778–86 (1948); authorizing the Price Administrator to fix "fair and equitable" commodities prices, *see Yakus v. United States*, 321 U.S. 414, 426–27 (1948); and authorizing the Federal Communications Commission to regulate broadcast licensing in the "public interest," *see National Broadcasting Co. v. United States*, 319 U.S. 190, 225–26 (1943).[346]

The Court has "almost never felt qualified to second-guess Congress regarding the permissible degree of policy judgment that can be left to those executing or applying the law."[347]

As noted throughout the preamble and other sections of this rule regarding statutory authority, Congress clearly and intelligibly established EPA's mandate in the Clean Air Act with respect to air pollution from motor vehicles. The statute provides that "[t]he Administrator shall by regulation (and from time to time revise) . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."[348] Further, the statute requires that "[a]ny regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."[349] As we further explain in our response to major questions doctrine comments, Congress made the major policy decision here to control air pollution from motor vehicles, while delegating to the Administrator interstitial technical and policy judgments to achieve that goal. The statute lays down intelligible principles, and indeed numerous statutory criteria and constraints on EPA's discretion. These include, but are not limited to, (1) any standards must be premised on an endangerment finding—that some "air pollutant from any class or classes of new motor vehicles or new motor vehicle engines . . . cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare"; (2) the standards must be developed through an approach based on available "technology"; (3) the standards must provide for sufficient lead-time "to permit the development and application" of such technology; and (4) the standards give "appropriate consideration to the cost of compliance within such period."

Advanced Clean Cars II

Some commenters state that this rule cannot be based on California's ACC II program, as that program does not have a waiver, and suggest that the standards do rely on them.

EPA agrees that it has not issued a preemption waiver for the ACC II standards and without such waiver California and other states cannot enforce the ACC II program. However, this rule is independent from California's ACC II standards and EPA's feasibility analysis does not depend on the implementation of ACC II. EPA's authority to promulgate rules is independent from

[346] *Touby v. United States*, 500 U.S. 160, 165–66 (1991) (holding the Controlled Substances Act clause requiring "imminent hazard to the public safety" to be an intelligible principle, even in the higher-specificity criminal context).
[347] *Misretta*, 488 U.S. at 416 (Scalia, J., dissenting); *see id*. at 373 (majority opinion).
[348] 42 U.S.C. § 7521(a)(1).
[349] CAA section 202(a)(2).

California's; this rule is being promulgated in accordance with that independent authority. EPA has conducted a sensitivity analysis ("state level ZEV policies") to explore the potential impact implementation of ACC II in California and section 177 states might have. That analysis indicates that the costs of the standards would be less, compared to the No Action baseline, if ACC II were implemented than if it was not. However, EPA finds that the cost estimates of its central analysis (i.e., without ACC II) are reasonable and is not relying on the results of this sensitivity analysis to justify adoption of these standards. It is true that EPA pointed to the adoption of ACC II as an example of international and state trends towards encouraging further sales of PEVs, but this was illustrative of international market trends in the marketplace and the standards adopted in this rule do not depend on ACC II being implemented, or indeed on further international regulatory developments. ACC II has been fully adopted by California and although it may not be enforced until a waiver is granted, the very fact it has been adopted, and that other states have adopted the standards, is relevant information for automakers and in turn for EPA. Past experience has suggested that manufacturers may choose to consider in their product planning the adoption by California of new standards, even in the absence of a waiver. Similarly, EPA has taken certain ACC II standards into account in its planning, judging that EPA's standards are appropriate and will only become more appropriate if a waiver is granted. Thus, EPA is not relying on the waiver for ACC II being granted in the future, we are simply taking into consideration in a limited way the fact that ACC II has been adopted. EPA finds that this is entirely reasonable and consistent with the current status of ACC II (as adopted but lacking a waiver). EPA has judged the standards to be feasible and appropriate based on its assessment of the state of technology, lead-time, costs, and other relevant factors. To the extent that EPA considers ACC II in its impact analysis, such consideration does not contribute to the rule itself, only to the expected impact of this rule compared to various baselines, one of which is the potential impact of ACC II on the light-duty vehicle market.

Significance of Congressional enactment of IRA and BIL

Commenters disagree on the significance of Congressional action in the IRA and BIL for EPA's legal authority, with some commenters stating that these statutes do not add to EPA's regulatory authority, and other commenters stating that these statutes reinforce EPA's authority and confirm Congress's commitment to reducing motor vehicle emissions through electrification. Similarly, some commenters point to the fact that legislation passed under Congressional budget reconciliation rules must be related to spending, revenue, or the federal debt limit, as evidence that the legislation did not increase EPA's authority, while other commenters point to the fact that Congress only incentivized BEVs in the legislation and did not mandate them as evidence that EPA lacks authority to consider EVs in standard-setting under section 202(a).

EPA agrees with those commenters who state that the IRA and BIL reinforce EPA's authority. Although the BIL and IRA are not necessary to find that the statute plainly authorizes the final rule, they confirm and extend Congress's longstanding interest (which, as discussed in Section III of the preamble and elsewhere in this RTC, dates back to the 1960s) in encouraging the development and deployment of BEVs. EPA acknowledges that the IRA and BIL are not what gives EPA authority to include consideration of electrification technologies in standard-setting, but finds that this legislation, which is consistent with the long history of congressional support for cleaner alternative-fueled vehicles, provides further support for the conclusion that the

Congresses that enacted and amended section 202(a)(1) gave EPA the authority to take into consideration the emissions performance of BEVs when setting standards for motor vehicles.

Likewise, EPA does not find that it would be appropriate to infer from the massive incentives of this legislation that Congress wanted EPA to change course and stop taking into consideration the emissions performance of BEVs in setting standards. This rulemaking does not constitute an EV mandate, so the fact that Congress likewise did not adopt an EV mandate provides no basis for suggesting that this rulemaking is beyond the scope of EPA's authority. In fact, since EPA's 2021 rule was adopted shortly after the BIL but shortly before the IRA, Congress can be presumed to have acted in the IRA with knowledge of EPA's approach to regulating motor vehicles for GHG emissions. The fact that Congress increased incentives for EVs and provided funding for states to adopt GHG standards, rather than objecting to EPA's approach, confirms that the purpose of this legislation was not to displace EPA's authority (or to correct EPA's views of its authority) but to support EPA's authority to set standards based on BEV emissions performance—to "combine[] new economic incentives to reduce climate pollution with bolstered regulatory drivers that will allow EPA to drive further reduction under its CAA authorities."[350] We further address this issue in Section 2.3 of the response to comments regarding the major questions doctrine.

Other constitutional claims

Valero comments that the proposed rule may violate the Takings Clause of the Constitution and, to the extent that the rule relies on any state's ZEV mandate, a number of other Constitutional provisions: the Dormant Commerce Clause, the Import-Export Clause, the Privilege and Immunities Clause, and the Full Faith and Credit Clause.

Our Children's Trust comments that "[u]nder the Public Trust Doctrine . . . U.S. residents . . . have a right to access and use crucial natural resources, like air and water," and the government has "fiduciary duties as trustees to manage, protect, and prevent substantial impairment to our country's vital natural resources which the government holds in trust for present and future generations." They state that as such, the EPA has a duty to use its authority to protect "a climate system that sustains human life and liberty."

EPA disagrees with Valero that the Takings Clause applies here. The Takings Clause of the U.S. Constitution states that "private property [shall not] be taken for public use, without just compensation."[351] The purpose of the Takings Clause is to prevent "Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole."[352] The protections of the Takings Clause apply to real property,[353] personal property,[354] and intangible property.[355]

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[350] 168 Cong. Rec. E868-02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone discussing the IRA); see also 168 Cong. Rec. at 880-02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone).
[351] U.S. Const. amend. V.
[352] *Penn Central Trans. Co. v. City of New York*, 438 U.S. 104, 123 (1978).
[353] *See Lucas v. South Carolina Coastal Council*, 505 U.S. 1003, 1019 (1992).
[354] *See Andrus v. Allard*, 444 U.S. 51, 65 (1979).
[355] *See Ruckelshaus v. Monsanto Co*., 467 U.S. 986, 1003-04 (1984).

Regulatory takings are treated more narrowly. A compensable taking can occur by government regulations that unduly burden private property interests.[356] However, "[t]he mere regulation of the use of property, even if it results in the diminution of its value and profitability does not constitute a taking within the meaning of the fifth amendment."[357] In considering whether a regulation constitutes a taking of private property, "'the aggregate must be viewed in its entirety'" such that "for example, a regulation that prohibited commercial transactions in eagle feathers, but did not bar other uses or impose any physical invasion or restraint upon them, was not a taking."[358]

We do not believe the rule takes the property of any entity, let alone does it take the entirety of any industry. The rule sets feasible emission standards, allowing industry to comply by the means of its choosing. EPA's modeling of various pathways of compliance does not direct any certain path, and even shows that no particular industry need be ceased to comply. To the extent that a court could find a taking here, it cannot be viewed as barring all economic uses of such property. This is true for all industries affected by this rule, from vehicle manufactures to fuels and beyond.

Further, the injury that the commenter, who represents fuels interests, complains of is no more than derivative economic injury not recognized by the courts as a takings violation. A takings claimant must, at minimum, assert that its property interest was actually taken by the government action.[359] But where, as here, the regulation's indirect impact to the claimant flows only through its impact to another, the claimant lacks a cognizable property interest.[360] The rule addresses emissions from motor vehicles, without directing the means of reduction. Although the affected vehicles may decrease fossil fuel demand, that impact is secondary to the emissions controls required in the vehicles themselves. As such, the commenter's warning of a takings violation through the rule's perceived economic impact to fossil fuel demand is misplaced.

As for the remaining constitutional principles cited by the commenter relating to state ZEV mandates, EPA disagrees that any such principles apply. As noted in the response on ACC II, EPA is not basing its standards on any assumptions that ACC II will be implemented. This action is a final rule issued by the federal EPA, not an action issued by any State government. While EPA has carefully considered and addressed comments on how the agency should account for state ZEV mandates in assessing factors like technology availability and costs, comments on the constitutionality of those state ZEV mandates are beyond the scope of this rulemaking.

With respect to comments raising Public Trust legal theories, the Agency does not dispute that climate change poses a serious threat, nor that addressing climate change requires the active

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[356] *See Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922).
[357] *Nance v. EPA*, 645 F.2d 701, 715 (9th Cir. 1981), cert. denied, 454 U.S. 1081 (1981).
[358] *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Reg. Planning Agency*, 535 U.S. 302, 328 (2002) (quoting *Andrus*, 444 U.S. at 66); *see also Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470, 498 (1987) (holding that a requirement that coal pillars be left in place to prevent mine subsidence was not a regulatory taking).
[359] *See United States v. Gen. Motors Corps*., 323 U.S. 373, 379 (1945); *see also Yuba Nat. Res., Inc. v. United States*, 904 F.2d 1577, 1581 (Fed. Cir. 1990) (holding that "the measure of just compensation is the fair value of what was taken, and not the consequential damages the owner suffers as a result of the taking"); *Klein v. United States*, 375 F.2d 825, 829 (1967) (holding that "compensation under the Fifth Amendment may be recovered only for property taken and not for incidental or consequential losses, the rationale being that the sovereign need only pay for what it actually takes rather than for all that the owner has lost.").
[360] *Air Pegasus of D.C., Inc. v. United States*, 424 F.3d 1206, 1215 (Fed. Cir. 2014).

involvement of the federal government. Commenters espouse novel Constitutional and Public Trust legal theories not relevant to this rulemaking and cite *Juliana v. United States,* 947 F.3d. 1159 (9th Cir.), *Juliana v. United States*, 217 F. Supp. 3d 1224, 1254 (D. Or. 2016) and *Held v. Montana,* No. CDV-2020-307 (1st Dist. Ct. Mont., 2023). The Agency notes that the referenced district court decision in Juliana was overruled for lack of jurisdiction, and further notes that the referenced 9th Circuit decision did not reach the merits of the Constitutional and public trust theories at issue in that case. Juliana v. United States, 947 F.3d 1159, 1175 (9th Cir. 2020), reh'g en banc denied, 986 F.3d 1295 (9th Cir. 2021). Further, *Held v. Montana* (currently subject to appeal) is a case decided by a Montana state court judge interpreting Montana's constitution.

Role of cost/benefit analyses

One commenter suggests that the standards are arbitrary and capricious because EPA gave insufficient weight to the results of the benefit-cost analysis.

To be clear, as documented in Section VIII of the preamble (and in the RIA), EPA did assess the costs and benefits of the final standards. As explained in Sections III and V, when section 202(a) requires EPA to consider "the cost of compliance," it is referring to costs to automobile manufacturers, not total social costs. However, EPA considered both costs to manufacturers and total social costs before adopting the standards. The Administrator identified the standards that he finds appropriate taking into account emissions reductions, costs to manufacturers, feasibility, and other required and discretionary factors. The fact that the estimated benefits exceed the estimated costs of the program reinforces our view that the standards are appropriate under section 202(a). However, as noted in the preamble, EPA did not rely on benefit-cost analysis to *identify* the appropriate standards. That is, EPA did not seek to select standards that would maximize net benefits as calculated by the benefit-cost analysis. Based on the RIA and the range of scenarios we evaluated, we anticipate such an approach would have required significantly more stringent standards, which would, in EPA's judgment, be inconsistent with the requirement to give appropriate consideration to costs of compliance and lead time.[361] EPA finds that our approach, of placing weight on judging the appropriate level of emissions reduction in light of the costs of compliance and lead time, while still evaluating and considering total social costs and benefits, is consistent with both the Supreme Court's decision in *Michigan v. EPA*, 576 U.S. 743 (2015) and with section 202 of the CAA.

Limiting global temperature increases

A commenter alleged that the rule is directed at the goal of limiting global temperature increase to 2 degrees Celsius. EPA disagrees. The final rule is not predicated on any global temperature-specific metric. EPA is acting consistent with our CAA statutory authority and the applicable statutory factors in CAA section 202(a) to limit emissions from motor vehicles which contribute to air pollution that endangers public health and welfare.

[361] The benefit-cost analyses for this rulemaking suggest that, at least across the range being considered, more stringent standards have higher net benefits than less stringent standards.

3 - GHG Standards

3.1 - Program design and structure

Comments by Organizations

Organization: Alliance for Consumers (AFC)

Indeed, the path to compliance that EPA chose to highlight features nearly 70% of the passenger car market shifting to battery electric vehicles (and 40% or so of medium duty vans and pickup trucks). See EPA Fact Sheet, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Apr. 2023, at 5. This despite only about 1% of the current cars on the road being electric vehicles. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

The current EPA proposal is an unlawful EV mandate masquerading as a tailpipe regulation. That is the only conclusion that a disinterested observer or everyday consumer could reach, given how the proposal was promulgated, the limits that have been proposed, and the commentary surrounding its release. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

While an extreme EV mandate might be popular in progressive enclaves, and with federal employees who live in Washington, D.C., a rapid shift to electric vehicles along the lines proposed by EPA here will make lives worse for everyday consumers while costing them more for the privilege of having their lives inconvenienced. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

Early indications from places like California back up this conclusion and provide warning signs that were not properly addressed by EPA in the proposed rule. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

ACEEE commends EPA for proposing several positive changes to the standards. We support the phase-out of off-cycle credits, limiting A/C credits to internal combustion engine vehicles (ICEVs), eliminating the advanced vehicle multiplier incentives, and lowering the cut-points in the light truck curves. Many of these credits and incentives provide automakers with loopholes for meeting their fleetwide targets and have the potential to weaken the proposed standards. By limiting the off-cycle and A/C credits to vehicles with internal combustion engines, EPA is rightly avoiding over-crediting battery electric vehicles (BEVs) for compliance. Use of these credits by BEVs would result in negative emissions for these vehicles, which distorts their real-world GHG impact. Lowering the cut-points on the light truck curve, or the point at which the emissions level flatlines as footprint increases, from 74 sq-ft to 70 sq-ft ,over the life of the standards is a welcome change that will limit further upsizing in the pick-up truck market. [EPA-HQ-OAR-2022-0829-0642, pp. 2-3]

Organization: BMW of North America, LLC (BMW NA)

BMW NA strongly believes that hydrogen technology will play a key role on the path to climate neutrality across all industries and has great potential, particularly for individual mobility. The pilot series of the BMW iX5 Hydrogen, which is currently being presented to the public during various events all around the globe, highlights the possibilities of hydrogen technology in this context. [EPA-HQ-OAR-2022-0829-0677, p. 3]

BMW NA would like to encourage EPA to extend the regulatory guidance for FCEVs by the means of incorporating an official test procedure (e.g., incorporation of SAE J2572). We believe that this will benefit the automotive industry to better evaluate the technology's potential compared to BEV and quantify its contribution to the overall electrification goals. [EPA-HQ-OAR-2022-0829-0677, p. 3]

In general, we support that no changes have been proposed to the basic structure of the regulation (separate PC and LT fleet, footprint base, averaging, banking and trading possibility). We also support the treatment of EV with 0g/mile in the CREE fleet. Upstream emissions should not be part of a vehicle-based regulation but being treated by specific and targeted regulation regarding the emission sources. [EPA-HQ-OAR-2022-0829-0677, p. 3]

3. Extend the proposed rule to 2035, resulting in the equivalent of 100% ZEV sales by 2035, consistent with ACC II.

4. Lock in a rapid transition to a zero-carbon transportation system, while sending a clear market signal. [EPA-HQ-OAR-2022-0829-0618, p. 6]

Organization: BorgWarner Inc.

To meet EPA’s forecast for BEV penetration levels, there is little room for supply chain or production delays. Any setback could negatively impact the availability or purchase of new BEVs. EPA can reduce these risks to manufacturers by incentivizing vehicles with longer ranges and adjusting multipliers as better BEVs and plug-in hybrid electric vehicles (PHEVs) are introduced. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

BorgWarner supports the proposed adjustments to compliance credits. BorgWarner agrees with EPA’s proposed changes to the current compliance credits offered for BEVs, PHEVs and fuel cell electric vehicles (FCEVs). Credits can serve as a valuable tool to incentivize the development of new vehicle technologies and should be used to create new technology pathways. Once these technologies are clearly established, EPA should eliminate these credits. Offering credits once a technology is established could potentially disincentivize new innovations in efficiency-and performance-improving vehicle technologies.

Organization: California Air Resources Board (CARB)

Greenhouse Gas Standards

U.S. EPA is proposing more stringent GHG emission standards for the 2027 through 2032 MYs, along with several modifications to the existing GHG program. Generally, CARB supports U.S. EPA’s proposal, but offers several recommendations to further strengthen the proposed standards to achieve the greatest degree of emission reductions available, considering costs and technology readiness, to further protect public health and combat climate change. As described in detail below, CARB recommends that U.S. EPA adopt more stringent light-duty GHG emission standards; include provisions to ensure manufacturers do not allow emissions to increase from conventional vehicles and instead continue to apply all available cost-effective emission control technologies; estimate real-world PHEV emissions based on the best available data and collect additional data to inform future updates; and update elements of the comprehensive regulatory program, including retiring elements of the off-cycle and air conditioning credits programs as proposed, establishing explicit requirements to eliminate leaks from air conditioning systems, eliminating credit multipliers for medium-duty ZEVs as proposed, and requiring small-volume manufacturers to comply with the proposed standards as proposed. [EPA-HQ-OAR-2022-0829-0780, p. 12]

Medium-Duty Vehicle GHG Standards

In addition to the proposed light-duty standards, U.S. EPA is also proposing to tighten GHG fleet average standards for medium-duty vehicles along with other program modifications. CARB supports U.S. EPA's decision to better delineate the medium-duty vehicle class from heavy-duty vehicles to enable application of the most rigorous and appropriate GHG emission standards and procedures. [EPA-HQ-OAR-2022-0829-0780, p. 16]

CARB supports the proposed medium-duty vehicle GHG fleet average standards and has recently adopted several regulations that are driving emission reductions for this market segment. Adopted in June 2020, the Advanced Clean Trucks (ACT) regulation establishes requirements for manufacturers to sell zero-emission medium- and heavy-duty trucks. This regulation was followed in April 2023 by the Advanced Clean Fleets (ACF) regulation that further drives fleet purchases and turnover to ZEVs and requires that 100 percent of sales of vehicles above 8,500 lbs. gross vehicle weight rating be zero-emission beginning in 2036. Together, these regulations will dramatically increase penetration of ZEVs in the medium- and heavy-duty sectors. CARB has also previously adopted GHG fleet average standards largely aligned with U.S. EPA's Phase 2 heavy-duty GHG regulations for the 2021 through 2027 MYs. [EPA-HQ-OAR-2022-0829-0780, p. 16]

Conclusion

Reducing GHG emissions from motor vehicles is imperative to combat climate change and protect public health. Given the ZEV market trends, manufacturer commitments, and emission reduction opportunities associated with retaining cost-effective technologies on conventional vehicles, CARB finds that U.S. EPA could establish a more stringent light-duty GHG fleet average standard than it has proposed. CARB recommends that U.S. EPA adopt the most stringent standard feasible. [EPA-HQ-OAR-2022-0829-0780, p. 16]

The U.S. has no choice but to take bold action to dramatically reduce GHG emissions across the economy. Motor vehicles are a key GHG emissions source, and U.S. EPA's proposal represents an absolutely critical step towards reducing transportation emissions and stabilizing the climate. However, there are opportunities to do more, particularly protecting or insuring against conventional vehicles increasing their GHG emissions. Motor vehicles also continue to contribute to poor air quality for millions of people across the country. The public health benefits from the suite of proposed standards will reduce healthcare costs and improve quality of life. These benefits are especially important for our country's most vulnerable residents, many of whom face disproportionate exposure to air pollution and are the first to suffer the effects of climate change. [EPA-HQ-OAR-2022-0829-0780, p. 67]

CARB finds that a more stringent set of standards, and thus certainly the proposed standards as well, are technically feasible and cost-effective and recommends that U.S. EPA incorporate CARB's recommendations and adopt the most stringent standards feasible. [EPA-HQ-OAR-2022-0829-0780, p. 67]

Organization: Competitive Enterprise Institute

I. The Proposed Standards Are Electric Vehicle Mandates

The EPA protests that, unlike California's motor vehicle program, which officially bans the sale of gasoline-powered cars by 2035,2 "the GHG program in this proposal is performance-based and not a ZEV mandate."3 In fact, like the California program, the EPA program compels automakers to manufacture and sell increasing percentages of ZEVs, only at a slower pace. It does this by establishing fleet-average GHG emission standards that automakers can meet only by phasing out gasoline-powered vehicles. The EPA's program is not a bare-naked EV mandate, but almost. [EPA-HQ-OAR-2022-0829-0611, pp. 2-4]

2 California Air Resources Board, "California moves to accelerate to 100% new zero-emission vehicle sales by 2035, Press Release, August 25, 2022, https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero- emission-vehicle-sales-2035. The release explains: "The rule establishes a year-by-year roadmap so that by 2035 100% of new cars and light trucks sold in California will be zero-emission vehicles, including plug-in hybrid electric vehicles. The regulation realizes and codifies the light-duty vehicle goals set out in Governor Newsom's Executive Order N-79-20. [Link: https://www.gov.ca.gov/2020/09/23/governor-newsom-announces-california-will-phase-out-gasoline-powered-cars-drastically-reduce-demand-for-fossil-fuel-in-californias-fight-against-climate-change/]"

3 88 FR 29255.

The evidence is palpable. According to the EPA, in 2022, EVs accounted for 5.8 percent of new light-duty passenger vehicle sales. 4Under the policy baseline established by the EPA's MY 2023-2026 GHG emission standards, EV market share in 2032 is projected to reach 39 percent.5 Under the proposed standards, EV market share in 2032 is projected to reach 67 percent6—two-thirds of all new light-duty vehicles sold. The California Air Resources Board may be in the fast lane, but the EPA is driving down the same regulatory freeway and with no plan to stop before the final destination. [EPA-HQ-OAR-2022-0829-0611, pp. 2-4]

4 88 FR 29189.

5 88 FR 29296.

6 88 FR 29329.

Here's an easy way to visualize the substance of the EPA's proposal. The Toyota Prius is the most popular hybrid car. In terms of fuel efficiency and GHG emissions, the Prius is the best-in-class gasoline-powered car on the market.7 Could Toyota comply with the EPA's proposed standards in 2032 if all its light-duty vehicles were hybrids matching today's Prius in fuel economy and GHG emissions per mile? No, far from it. [EPA-HQ-OAR-2022-0829-0611, pp. 2-4]

7 TrueCar, Hybrids with Best Gas Mileage, https://www.truecar.com/best-cars-trucks/fuel-hybrid/by-gas-mileage/ (accessed June 27, 2023).

The EPA's GHG standards are calibrated in grams per mile (g/mi) of carbon dioxide (CO_2). According to the EPA, "for passenger cars, the proposed MY 2032 standards are projected to result in CO_2 fleet-average levels of 73 g/mi in MY 2032, which is 52 percent lower than that of the (adjusted) MY 2026 standards."8 The MY 2032 standard is less than half the CO_2 emissions per mile of MY 2023 Toyota Prius hybrids, which range from 155 g/mi to 179 g/mi.9 [EPA-HQ-OAR-2022-0829-0611, pp. 2-4]

8 88 FR 29239.

9 Fueleconomy.gov, Accessed June 26, 2023.

[See original for graphic on the gas mileage of various cars] [EPA-HQ-OAR-2022-0829-0611, pp. 2-4]

To comply with the proposed standards, the fleet-average CO_2 emissions of Toyota passenger cars in MY 2032 will have to be 52 to 60 percent lower than that of an MY 2023 Prius. To reach those targets, Toyota will have to rapidly increase the percentage of ZEVs it sells—and rapidly reduce the percentage of hybrids it sells. Toyota will have to do so regardless of whether most consumers can afford or want to buy ZEVs. [EPA-HQ-OAR-2022-0829-0611, pp. 2-4]

Even the EPA's previous (December 2021) rule establishing tailpipe GHG standards for MY 2023-2026 motor vehicles is functionally a ZEV mandate, although less ambitious, and therefore less conspicuous. [EPA-HQ-OAR-2022-0829-0611, pp. 2-4]

Organization: Consumer Energy Alliance (CEA)

As a practical, real-world policy solution, CEA, therefore, encourages the U.S. EPA to pursue attainable, technologically neutral standards to meet consumer needs and emission reduction targets. [EPA-HQ-OAR-2022-0829-0788, p. 2]

Organization: Cummins Inc.

II. General Principles

Aligned with Cummins' commitments described above, Cummins offer these principles for consideration as EPA develops its Final Rule addressing criteria pollutant and GHG emissions for light-duty (LD) and medium-duty vehicles (MDV): [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

A harmonized national program for criteria pollutant, GHG, and fuel efficiency standards by EPA, the California Air Resources Board (CARB), and the National Highway Traffic Safety Administration (NHTSA) is essential to assure the greatest improvements are achieved in the most cost-efficient manner and to provide vehicle and engine manufacturers, suppliers, and end-users with the certainty necessary for investment in technologies to improve emissions. We urge the agencies to work together towards a single, nationwide program. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Sufficient regulatory lead time and stability should be provided to allow manufacturers to develop and implement the technologies needed to improve emissions and spread investments over time to minimize cost to customers. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Standards should be performance-based and technology neutral, as opposed to standards which mandate a specific technology, to allow manufacturers to innovate across a broad range of technologies to meet customers' diverse needs. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Standards should be fuel neutral (i.e., same stringency regardless of fuel type) to ensure the environmental benefits of the regulation are achieved regardless of the fuel type chosen by customers. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

The tradeoff between oxides of nitrogen (NOx) and carbon dioxide (CO2) reductions must be considered when setting the stringency of standards. Also, linkage of criteria pollutant and GHG certification and compliance protocols is important so that improvement in one type of pollutant is not achieved at the expense of the other. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Well-to-wheels emissions should be considered in assessing technology effectiveness to ensure alignment of the standards with the most beneficial path to zero emissions. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Cummins currently certifies heavy-duty (HD) pickup trucks with gross vehicle weight ratings (GVWR) between 8,501 and 14,000 pounds, also known as Class 2b and 3 vehicles, meeting EPA's Tier 3 criteria pollutant emissions standards and Phase 2 GHG standards. Diesel Class 2b and 3 pickup trucks can have significant towing capability and are used in applications going beyond personal use such as construction and agriculture, and as such, do vital work for America. Our additional comments detailed below pertain to those vehicles. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Organization: Donn Viviani

Recommendations for changes in the rule to decrease emissions further

What can be done under this rule to extract additional reductions in GHGs? Reducing the average weight of the fleet can address both the NEE issue and reduce carbon emissions further. Lighter EVs extend mileage and reduce EGU emissions. Lighter IC vehicles will reduce fuel combustion. Lighter vehicles result in less NWW PM. Perhaps more importantly, lighter vehicles can reduce emissions in the manufacturing sector, especially important in light of the quantity new BEVs EPA projects will penetrate the market. EPA should investigate regulatory options for reducing fleet gross vehicle weights (GVW). One way to require lower fleet average weight and decrease the emissions from manufacture of vehicles is to limit the embedded carbon allowed per ton of vehicle. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Savings promoted by weight reduction are immediate and do not depend on the pace of decarbonization of the electricity grid. The sooner the emission reductions occur the better the chance of avoiding catastrophic non- linear feedback warming effects. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

GHG emissions embedded in the production of vehicles is responsible for ~10% of vehicle carbon footprints. Slowly reducing down the allowable embedded carbon by class will have several outcomes. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Limiting the embedded carbon per ton would result in, e.g., more steel made with green hydrogen, less metal and more plastic parts (already these are replacing metal) which can require less energy to produce, and even parts made with bio-based plastics which count as negative carbon. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Lighter vehicles burn less fuel or draw less electrical power from EGUs, all these reduce carbon emissions. The lighter weight will produce less NEE PM as well. Weight is one driver of road friction and resuspension of PM. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Lastly, here, it is important to ensure that imports would be subject to any such embedded carbon restrictions, as that would serve to increase pressure on overseas EGUs to transition away from coal. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Organization: Electric Drive Transportation Association (EDTA)

We recommend that the final rules integrate flexibility that recognizes the uncertainties of the policy and market landscapes, while establishing ambitious goals for Multi-Pollutant Emissions reductions. [EPA-HQ-OAR-2022-0829-0589, p. 2]

Organization: Electrification Coalition (EC)

III. The EPA should consider additional regulatory frameworks or policies to achieve mass adoption of EVs for MY 2032 and beyond.

The EPA specifically requests comments on whether the standards should increase in stringency beyond MY 2032, in particular through 2035, or whether EPA should consider additional approaches to the trajectory of any standards that were to continue increasing in stringency beyond 2032.6 The EC applauds the EPA for prioritizing emissions reductions through electrification. For future rulemakings, the EPA should consider policies that will further drive electrification and prioritize clean electricity as a transportation fuel. This could be accomplished through enabling electricity as an eligible pathway in the existing renewable fuel standard (RFS) program or modifying the RFS into a clean fuels standard (CFS). Both an RFS and CFS could direct a portion of the credits back to the EV industry that would then further promote and incentivize the manufacturing of clean vehicles such as EVs. [EPA-HQ-OAR-2022-0829-0588, p. 3]

Organization: Environmental. and Public Health Organizations

2.EPA should finalize a fuel-neutral standard and a maximum cap on the work factor.

EPA has made two significant changes to its GHG program for Class 2b-3 pickups and vans: 1) setting a fuel-neutral standard; and 2) setting a maximum cap on the work factor. As described below, both such changes are appropriate. [EPA-HQ-OAR-2022-0829-0759, p. 73]

208 88 Fed Reg. at 29242.

During the rulemaking process for the Phase 2 standards, numerous commenters opposed setting separate emissions standards for diesel and gasoline engines, with Cummins, Honeywell, Daimler, Bosch, and the Motor and Equipment Manufacturing Association all supporting a single fuel-neutral standard.209 As noted in the sections above on gasoline- and diesel-powered MDVs, there is a significant overlap in the available technologies to reduce emissions from either powertrain (e.g., variable geometry turbocharging, cylinder deactivation, hybridization). [EPA-HQ-OAR-2022-0829-0759, p. 73]

And technological advancements since finalization of the Phase 2 standards, including the advancement of zero-emission technologies, supports setting a single standard for the fleet that well exceeds the Phase 2 requirements for either gasoline- or diesel-powered Class 2b-3 vehicles. For these reasons, we support EPA setting a fuel-neutral standard for MDVs. [EPA-HQ-OAR-2022-0829-0759, p. 73]

209 81 Fed. Reg. at 73738-39.

We also support EPA setting a maximum cap on the work factor. As noted in Section

VIII.A.1.a regarding GM's latest Duramax diesel engine, manufacturers continue to prioritize increases in power for new engines for Class 2b-3 pickups. Unfortunately, the existing work factor structure creates no disincentive to this path, and may actually encourage manufacturers to try to game the system by increasing tow capacity across their fleets in order to increase the allowable emissions of their fleet, particularly since tow capacity is not captured in the emissions certification tests. EPA's proposal to cap the work factor at least creates a limit to this behavior. While concerns may remain about the safety and emissions impacts from manufacturers' efforts to out-spec their competition, a cap on the work factor would limit regulatory incentives for such behavior. [EPA-HQ-OAR-2022-0829-0759, p. 73]

Organization: General Motors, LLC (GM)

In many cases, an EPA final rule aligned with CARB's LEV IV in internal combustion engine criteria emission stringency and the associated test and certification procedures will help GM achieve significant emissions reductions for internal combustion engine products as soon as MY 2027 despite limited lead time, while continuing to transition to zero-emission vehicle technologies. [EPA-HQ-OAR-2022-0829-0700, p. 6]

Organization: Hyundai Motor America

The Final Rule Should Include Incentives for PEV Penetration Within Disadvantaged Communities. [EPA-HQ-OAR-2022-0829-0599, p. 8]

Hyundai appreciates EPA's specific request for comment on how to address the unique impacts of vehicle emissions on disadvantaged communities because we believe the NPRM simply does not go far enough. EPA acknowledges the "differential exposure levels" to criteria pollutants experienced by these communities and notes they are "especially vulnerable to the impacts of climate change."25 However, the NPRM simply concludes that "this action is likely to reduce existing disproportionate and adverse effects" and "the GHG emission reductions from this proposal would contribute to efforts to reduce the probability of severe impacts related to climate change."26 [EPA-HQ-OAR-2022-0829-0599, p. 8]

25 88 Fed. Reg. 29184, 29407 (May 5, 2023)

26 Id.

Increasing PEV penetration within these communities to reduce emissions throughout these neighborhoods is an untapped solution. For example, disadvantaged communities experience disproportionately higher exposure to emissions from higher polluting vehicles. This is due, in part, to the high cost of replacing their older and higher-emitting vehicles with a newer, cleaner car. [EPA-HQ-OAR-2022-0829-0599, p. 8]

Turning over the fleet of the dirtiest cars will go a long way in improving the health of disadvantaged communities.27 Unfortunately, the NPRM does not discuss these impacts or propose to address them. We believe that vehicle fleet turnover within these communities can improve quality of life by mitigating emissions impacts. Notably, these communities are less likely to have a place to charge their vehicles at home, a challenge that should be addressed either through the final rule or via credit flexibility eligibility. Accordingly, we urge the EPA to create a new flexibility that incentivizes automakers to place PEVs into disadvantaged communities. See Attachment 1. Due to its unprecedented nature, our concept provides a framework within which automakers may innovate solutions to access this credit but we are open to other concepts that will facilitate a meaningful difference in the lives of these vulnerable populations. The framework design is inspired in part by the off-cycle credit flexibility, which also was created to spur innovation. In the alternative, we encourage creation of a PEV Equity Taskforce, much like what California has commenced, to address issues of equitable access to zero- or low-emitting vehicles. To the extent such a taskforce is convened, Hyundai is interested in participating in this important work. [EPA-HQ-OAR-2022-0829-0599, p. 8]

27 Beyer, M., et al. Cleaner Cars, Cleaner Air. June 2023. Report available at https://www.ucsusa.org/sites/default/files/2023-06/cleaner- cars-cleaner-air-report.pdf.

Organization: International Council on Clean Transportation (ICCT)

COMPARISON WITH AUTOMAKER COMMITMENTS

In the proposed rule, EPA highlighted the proliferation of announcements by automakers in the past couple of years signaling a market shift away from internal-combustion technologies toward plug-in electric vehicles. The rapid growth in the global vehicle market shows that more automakers are committed to developing and investing in ZEV technologies at a global and regional level. ICCT recognizes the increasing number of commitments made by automakers and the speed at which the automotive industry is electrifying its fleet. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

ICCT previously collected information and analyzed announcements made by automakers on ZEV targets through the end of 2022. The analysis, from ICCT's 2022 Global Automaker Rating report, shows that 19 out of 20 top global automakers have made specific commitments on their pace of electrification. For example, General Motors and Ford Motors (the second and third largest automakers in the U.S by 2022 sales), as well as Mercedes-Benz have committed to cease internal combustion engine in leading markets by 2035 as COP26 ZEV declaration signatories. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

With the rapid development of ZEV technologies, automakers are constantly updating their targets. Consequently, ICCT recommends the EPA to incorporate more recent ZEV target announcements in Table 2 (right column) in addition to those outlined in page 24-28 of section II of the proposed rule (left column). We believe these developments further reflect the desirability of ZEV technologies in the market. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

The increased ambition in announced ZEV targets among automakers is observed to be in parallel with the growing number of regulations proposed by governments across the globe pledging for zero-emission transportation policies and transitioning to a ZEV fleet. The implementation of regulations in these jurisdictions that establish more stringent CO2 standards or require higher ZEV penetration can steer automakers to prioritize investments and ZEV deployment in these markets to comply. Thus, regulatory mechanisms can be one of the driving factors to accelerate ZEV penetration in the new vehicle fleet. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

In the case of the European Union, the CO2 emission standards, adopted in March 2023, sets a more stringent CO2 emission performance standards for LDVs, with a requirement for zero-CO2 LDVs in 2035. Aligned with this, automakers operating in the region have pledged more ambitious ZEV targets or commitment to electrify their new sales. For example, Volkswagen (VW) and Stellantis, the two biggest automakers in Europe (by sales), have pledged to sell 80% and 100% ZEVs, respectively, by 2030. This sales target is more ambitious than their targets in other regions including the U.S in which VW and Stellantis are committed to a 50% ZEV target by 2030 for its new passenger cars and light-duty vehicles respectively. Another example is Toyota, which aims for 100% CO2 emission reductions in all new vehicle sales in Europe by 2035 with at least 50% ZEV mix in 2030. In addition to the global ZEV target sales, Europe is the only region where Toyota is ready to commit to cease its ICE sales. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

The trend observed among automakers provides evidence of the suitability of ZEVs as emissions-reducing technologies. The developments outlined above further underscore the fact that ZEV technology is feasible and desirable as evidenced by the increasing fleet penetration. Automakers will need to transition toward ZEVs to stay on track as government policies continued to push for regulations that align with the Paris Agreement climate goals and as market forces continue to push in this direction. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

This changing reality is already reflected in new LDV sales. The share of EVs has been growing rapidly in leading markets such as China and Europe at 24% and 21%, respectively in 2022. The demand for these vehicles in the U.S., although lagging, also increased rapidly, even under the current standards. In 2022, PEV accounted for approximately 7.3% of total LDVs sold, an increase from 4.8% in 2021 and 2.6% in 2020. In terms of absolute number, total PEV sales in 2022 nearly reached 1 million with 80% of sales being BEVs, and 20% PHEVs. With the right supporting regulatory mechanism, the proposed regulation will enable the U.S. to achieve the ZEV penetration rate needed to achieve the emission reductions projected under the proposed scenario. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

In conclusion, a strong market force to advance ZEV technologies, as evidenced by the increasing commitment among automakers and a more stringent standards in place such as the proposed rule, can push the automotive industry to accelerate ZEV technology penetration in the fleet. ICCT supports the proposition of EPA to advance technologies that will further enable emission reductions and consequently the proposed rule needed to achieve those targets. [EPA-HQ-OAR-2022-0829-0569, pp. 19-22]

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

The footprint-based approach to increase efficiency and emissions reductions is a proven policy that acknowledges that stringency increases should be targeted based on the fact that different vehicles serve different functions and markets. Changes to the footprint-based formulas, particularly regarding the light- truck fleet, could undermine domestic manufacturing and quality union jobs. We urge EPA to continue to work with all key stakeholders to ensure the new rules do not disproportionately impact domestic union auto production. [EPA-HQ-OAR-2022-0829-0614, p. 8]

Organization: KALA Engineering Consultants

Before full comments begin, a personal note

As a personal note, the principal of KALA Consulting wants to let all of EPA administrators, scientists, and engineers know that I am ON YOUR SIDE. I happen to disagree with the approach used in this proposed rulemaking that appears to promote extensive electrification of the US fleet, which I believe to be unsupportable from a GHG reduction standpoint. I believe that you may not have reviewed the National Academy of Sciences 2010 report that shows, when all knowable upstream and downstream GHG emissions are considered, BEV associated GHG emissions are essentially the same as conventional gasoline-fueled vehicles for a projected 2030 time frame. Once Republican law makers and think tank mavens read my section on that study, they may use it to bash this attempted rulemaking the likes of which you may never have experienced. I hate to do this to the EPA because I support most of the emissions reduction efforts you have made up to now and your agency and the national laboratories were so beleaguered and mistreated by the Trump Administration. [EPA-HQ-OAR-2022-0829-0617, p. 2]

However in my best engineering judgement, this rulemaking is misguided. There is a biofuel substitute that could make significant reductions in both criterial pollutants and GHG emissions if it were to be made from cellulosic sources and entrained into the national fuel mix in high percentages. We have done extensive research and engineering adaptation of this biofuel, butanol, that could surprise many of you. We ask your forbearance as we have included a discussion of this advanced biofuel in our comments as an alternative to mass electrification. Therefore, we are extending our hand and our knowledge base to EPA and the Department of Energy to contact us and discuss what we might learn from each other. [EPA-HQ-OAR-2022-0829-0617, p. 2]

No Conflict of Interest Disclaimer Statement: The author(s) of this document, principals, officers, staff and others associated with KALA Consulting hereby declare that none of those persons or the Corporation itself have any potential employment, contracted services, financial, or familial interests or connections of any kind to any interest, corporations or other entities mentioned, referenced, or in any other way could be construed to benefit either financially, public relations or potential contracting of services or equipment sales from any statements or mentions by name or other reference in this document. No one associated with KALA Consulting has ever been employed nor wishes to be employed by any entity mentioned or refenced herein. [EPA-HQ-OAR-2022-0829-0617, p. 2]

Comments

2. We never expected to see blatant examples in the explanation given for proposed EPA rulemaking to be so obviously biased toward a so-called solution for emission reductions, the all-electric vehicle, using batteries as their propulsive energy source. Let us give some examples of what appears to us as rulemaking with what amounts to only one option for vehicle manufacturers to comply with the proposed regulatory standards, the BEV. EPA repeatedly states that the rulemaking provides “options” for auto makers when in reality few if any actually exist. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

From Section I. A. 2, i “[C]ontinued GHG emission reductions in the motor vehicle sector are needed to protect public health and welfare….Also separately from this proposal, the Administration has recognized the recent industry advancements in zero- emission vehicle technologies and their potential to bring about dramatic reductions in emissions….EPA anticipates that a compliant fleet under the proposed standards will include a diverse range of technologies, including higher penetrations of advanced gasoline technologies as well as zero-emission vehicles…. Based on our analysis, it is our assessment that the proposed standards are appropriate and justified under section 202(a) of the CAA. Our analysis for this proposal supports the preliminary conclusion that the proposed standards are technologically feasible and that the costs of compliance for manufacturers would be reasonable. The proposed standards would result in significant reductions in emissions of criteria pollutants, GHGs, and air toxics, resulting in significant benefits for public health and welfare. We also estimate that the proposal would result in reduced vehicle operating costs for consumers and that the benefits of the proposed program would significantly exceed the costs.” [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

Well, that all sounds good and substantially founded in good science and technological feasibility. However, in later statements in the FedReg text we begin to find indications of bias and attempts at “Steering” manufacturers toward one technology, the BEV. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

From Section I. A. 2, ii “In designing the scope, structure, and stringency of the proposed standards, the Administrator considered previous rulemakings, as well as the increasing availability of vehicle technologies that can be utilized by manufacturers to further reduce emissions. This proposal continues EPA’s longstanding approach of establishing an appropriate and achievable trajectory of emissions reductions by means of performance-based standards, for both criteria pollutant and GHG emissions, that can be achieved by employing feasible and available emissions-reducing vehicle technologies for the model years for which the standard will apply…. While standards promulgated pursuant to CAA section 202(a) are based on application of technology, the statute does not specify a particular technology or technologies that must be used to set such standards; rather, Congress has authorized and directed EPA to adapt its standards to emerging technologies. Compliance with the EPA GHG standards over the past decade has been achieved predominantly through the application of advanced technologies to internal combustion engine (ICE) vehicles. In that same time frame, as the EPA GHG standards have increased in stringency, automakers have relied to a greater degree on a range of electrification technologies, including hybrid electric vehicles (HEVs) and, in recent years, plug-in electric vehicles (PEVs) which include plug-in hybrid electric vehicles (PHEVs) and battery-electric vehicles (BEVs). As these technologies have been advancing rapidly in just the past several years, and battery costs have continued to decline, automakers have begun to include BEVs and PHEVs as an integral and growing part of their current and future product lines, leading to an increasing diversity of these clean vehicles planned for high volume production. As a result, zero and near-zero emission technologies are more feasible and cost-effective now than at the time of prior rulemakings.” [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

So now we start to see a rosy picture being painted of new vehicle propulsion technologies ready to become “planned for high-volume production.” It is as though the EPA is indirectly telling auto makers that the BEV is expected to become a greater and greater share of their model lines as a result of these new emission regulations. How nice that the EPA would be providing such guidance. But it gets worse from here. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

From Section I. A. 2, ii “The year-over-year growth in U.S. PEV sales suggests that an increasing share of new vehicle buyers are concluding that a PEV is the best vehicle to meet their needs. Many of the zero-emission vehicles already on the market today cost less to operate than ICE vehicles, offer improved performance and handling, have a driving range similar to that of ICE vehicles, and can be charged at a growing network of public chargers as well as at home.” [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

Again, EPA is painting a glowing portrait of the future where most people in the US will gladly accept the new BEV form of personal transportation and enjoy multiple benefits from this change. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

We can’t help compare this form of cheerleading for the latest new transportation “hot thing” to the EPA’s description of a wonderous new fuel additive that was going to make life in the US better: [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

MTBE, which is the most common fuel oxygenate, is used in more than 80 percent of oxygenated fuels. Since 1993, MTBE has been the second most produced organic chemical manufactured in the United States. Ethanol, which is the second most common fuel oxygenate, is used in about 15 percent of the oxygenated fuels…. Three major factors have influenced how these two fuel oxygenates are used in petroleum products. MTBE: In addition to requiring that fuels burn cleaner, EPA requires areas with high levels of smog (including but not limited to RFG areas) to reduce the vapor pressure of gasoline in the summer months in order to decrease the volatilization of petroleum constituents at storage facilities and during fuel transfer. Because MTBE- blended gasoline has a lower vapor pressure than ethanol- blended gasoline, MTBE is the preferred oxygenate in warm weather. The cost of transportation and the convenience of use favors MTBE over ethanol. Because MTBE is more compatible with gasoline, it can be blended at the refinery and distributed with gasoline through pipelines. Ethanol, on the other hand, must be shipped separately from gasoline and added at the distribution terminal soon before use. If ethanol-blended gasoline is exposed to water or even water vapor (as in pipelines), ethanol will bring the water into solution and make the gasoline unusable. In addition, if ethanol-blended gasoline is stored for an extended period, the ethanol will begin to separate from the gasoline (emphasis ours). [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

Methyl-Tertiary Butyl Ether (MTBE) is produced by combining methanol with iso- butylene. Refineries could produce methanol cheaply from natural gas and combine it with one of the by-products of refining oil, iso-butylene to obtain a very inexpensive oxygenate that it seemed EPA was favoring more than ethanol when EPA in a January 1998 publication by the EPA’s Office of

Underground Storage Tanks, the MTBE Fact Sheet #3, Use of and Distribution of MTBE and Ethanol gave short shrift to ethanol by extolling the virtues of MTBE in the quoted text provided above. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

We really cannot blame EPA for gushing over MTBE because the oil companies could freeze out ethanol producers and make the required oxygenate cheaply and entirely from fossil petroleum and natural gas with no one getting a piece of the profits but them, and EPA and the executive administration at the time, did not have a problem with that arrangement. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

But, there was one small problem with MTBE – it was poisoning the fresh water supplies of the nation. The environmental disaster-in-the-making was best described in the Harvard Environmental Law Review. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

The expanded use of MTBE as a gasoline additive in the 1990s and the deteriorating state of America's sixty-year-old infrastructure of Underground Storage Tank Systems (USTS) for gasoline combined to yield an MTBE groundwater crisis by the end of the 1990s when studies had documented "the widespread detection of MTBE in the nation's water supplies." The United States Geological Survey in 1999 reported a 27% incidence of MTBE-contaminated groundwater in urban areas where MTBE was used substantially. A 1999 EPA Blue Ribbon Panel reported that between 5 and 10% of community drinking water supplies in high MTBE-use areas contained detectable amounts of MTBE. Because of the "inadequacy of long-term monitoring data," however, the "extent and trends" of groundwater contamination in the country are "still not well known." [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

The Harvard Review continues by stating that the MTBE fiasco is the largest and most recent example of US regulatory failure and perhaps the new poster child for the Law of Unintended Consequences: [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

At the same time that MTBE was easing the transition away from tetra-ethyl lead and helping states attain the national ambient air quality standards ("NAAQS") for photochemical oxidants in some of the most heavily polluted areas of the country, it was silently polluting the groundwater feeding the aquifers used by cities throughout the country for their drinking water. Indeed, if taking the lead out of gasoline is a striking example of the virtues of the modern environmental regulatory regime, the addition of MTBE to gasoline in full view of a powerful regulatory agency armed with multiple authorities designed to prevent the kind of environmental damage that MTBE is now causing throughout the country represents one of its most striking failures. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

While we hate to bring up this example of American regulatory failure and perhaps the most embarrassing set of events ever for the US EPA, we must look at MTBE as a lesson in how not to move forward with a proposal for a major overhaul of our nation's transportation options, as presented by the EPA in this proposed rulemaking, without comprehensive engineering and environmental review of such a proposal. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

So, the question becomes: Is EPA favoring one method of meeting their new regulations over most others, as unfortunately, they seem to have done in the past? [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

The proof might lie in statements found in the FedReg text as follows:

From Section I. A. 2, ii “Taken together, these developments indicate that proven, zero-emissions technologies such as BEVs, PHEVs, and FCEVs are already poised to become a rapidly growing segment of the U.S. fleet… Accordingly, EPA considers these technologies to be an available and feasible way to greatly reduce emissions, and expects that these technologies will likely play a significant role in meeting the proposed standards for both criteria pollutants and GHGs.” [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

Aha! Now we have statements that reveal the “expectations” of the EPA that three different kinds of low operating emission vehicle types “will likely play a significant role in meeting the proposed standards for both criteria pollutants and GHGs.” Fuel Cell Electric Vehicles (FCEV) are a tiny fraction of low operating emission vehicles and will remain so for some time. Plug-In Hybrid Electric Vehicles (PHEV) are more numerous, but EPA has a special regulatory formula for those types in order to meet the new standards. Battery Electric Vehicles (BEV) are the only vehicles that can easily meet the more stringent emission standards being proposed for both air pollutants and GHG according to how EPA will consider emissions from BEVs. If you were an auto manufacturer what sort of signals would you be getting from statements like this? We could cite many more similar “Expectation/Anticipation” EPA statements in the FedReg publication, but we think the statement made below sums up the overt messaging to auto makers the EPA is sending. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

From Section III. C. “Given the cost effectiveness of BEVs for compliance with both criteria pollutant and GHG standards, EPA anticipates that most (if not all) automakers will include BEVs in their compliance strategies.” [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

We were astonished that EPA would allow such an obvious “Steering” statement to be published in the Federal Register publication, but there it is for everyone to see. When zealots take over the rulemaking, statements like this inevitably leak out because those zealots are so passionate about their “Mission from God” they have to tell everybody about it. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

Good sound science and sound engineering is what its needed to formulate sound environmental regulations that do not “Force” a change in vehicle propulsion methods that may never achieve the desired results, especially in reducing GHG emissions. We have more to say about changes that appear to be forced upon the American public by zealots at the EPA when it comes to the kind of vehicle they use for their transportation needs. [EPA-HQ-OAR-2022-0829-0617, pp. 4-8]

A statement of the definition of Scientific Integrity appears on Page 8 of The Framework” document. https://www.whitehouse.gov/wp-content/uploads/2023/01/01-2023-Framework-for-Federal-Scientific-Integrity-Policy-and-Practice.pdf [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

“A substantial gap identified in the Report was that the US Federal Government lacked a consistent definition of scientific integrity. A definition was developed and agreed upon by the National Science and Technology Council 2022 Scientific Integrity Framework Interagency Working Group and the 2021 Scientific Integrity Fast Track Action Committee. Federal agencies should adopt this definition, incorporate it into their scientific integrity policy, and communicate it to their workforce. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

Scientific integrity is the adherence to professional practices, ethical behavior, and the principles of honesty and objectivity when conducting, managing, using the results of, and communicating about science and scientific activities. Inclusivity, transparency, and protection from inappropriate influence are hallmarks of scientific integrity." [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

"The Framework" document further states in Section I on Page 30: [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

"I. Protecting Scientific Processes

Scientific Integrity fosters "honest scientific investigation, open discussion, refined understanding, and a firm commitment to evidence". It also enables consideration and documentation of differing scientific opinions, and includes peer review. Science, and public trust in science, thrives in an environment that shields scientific data and analyses and their use in policymaking from political interference or inappropriate influence. It is the policy of this agency to: [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

1. Prohibit political interference or inappropriate influence in the funding, design, proposal, conduct, review, management, evaluation, or reporting of scientific activities and the use of scientific information. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

2. Prohibit inappropriate restrictions on resources and capacity that limit and reduce the availability of science and scientific products outside of normal budgetary or priority- setting processes or without scientific justification." [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

We emphasized the requirements of a "firm commitment to evidence" and "consideration and documentation of differing scientific opinions," which includes peer review. We do so because KALA intends to present scientific findings from a group of scientists selected by the National Academy of Sciences (NAS) and the National Research Council (NRC) to respond to a study request and funding for same made by Congress. Therefore, the study segments and results depictions we present are part of the response made by NAS and NRC to a Congressional commission and are, therefore, part of the record of Federal Research studies made either by Federal Agencies or by outside contractors, such as NAS. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

The name of the study we are presenting material from is:

Hidden Costs of Energy
Unpriced Consequences of Energy Production and Use
Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption Board on Environmental Studies and Toxicology
Division on Earth and Life Studies
Board on Energy and Environmental Systems Division on Engineering and Physical Sciences
Board on Science, Technology, and Economic Policy Policy and Global Affairs Division
National Research Council of the National Academies The National Academies Press, Washington, DC

https://nap.nationalacademies.org/catalog/12794/hidden-costs-of- energy-unpriced-consequences-of-energy-production-and [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

The following are front matter statements and notices by the National Academy of Sciences for this publication:

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

This project was supported by Contract No. TOS-08-038 between the National Academy of Sciences and the U.S. Department of the Treasury. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the organizations or agencies that provided support for this project. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

International Standard Book Number-13: 978-0-309-14640-1 (Book)
International Standard Book Number-10: 0-309-14640-2 (Book)
International Standard Book Number-13: 978-0-309-14641-8 (PDF)
International Standard Book Number-10: 0-309-14641-0 (PDF)
Library of Congress Control Number: 2010925089

Preface

The U.S. Congress directed the U.S. Department of the Treasury to arrange for a review by the National Academy of Sciences to define and evaluate the health, environmental, security, and infrastructural external costs and benefits associated with the production and consumption of energy - costs and benefits that are not or may not be fully incorporated into the market price of energy, into the federal tax or fee, or into other applicable revenue measures related to production and consumption of energy.

In response, the National Research Council established the Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption, which prepared this report. Biographic information on the committee members is presented in Appendix A. In the course of preparing this report, the committee met six times. At two of the meetings, oral presentations were made by the following individuals at the invitation of the committee: Christopher Miller (staff for U.S. Senator Harry Reid); Mark Heil and John Worth (U.S. Department of the Treasury); Raymond Braitsch, Thomas Grahame, and Robert Marlay (U.S. Department of Energy); Robert Brenner and James Democker (U.S. Environmental Protection Agency); Arthur Rypinski (U.S. Department of Transportation); Nicholas Muller (Middlebury College); and Richard Tol (Economic and Social Research Institute, Dublin, Ireland). Interested members of the public at large were also given an opportunity to speak on these occasions. Subsequently, the committee held two teleconferences and one subgroup meeting to complete its deliberations. In addition to the information from those presentations, the committee made use of peer-reviewed scientific literature, government agency reports, and databases.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise in accordance with procedures approved by the National Research Council Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

We include the foregoing to emphasize that the study materials we will present below are serious business and were taken seriously by the NAS and NRC. A cavalcade of science, health and engineering professionals were selected to research and write the study results. Therefore, we view the Transportation Section results of this 2009 study as relevant today as it was when presented to Congress 14 years ago, due mainly to the fact that the laws of physics, thermodynamics, chemodynamics of battery chemistry, engineering principals, and the logical projections that could be made for the subject matter in the Transportation Section were subject to those and other predictable progressions in both transportation, energy production and emission controls. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

We would further point out that oral presentations were given just prior to publishing by EPA staff members at the time, Robert Brenner & James Democker, and we would have thought that a copy of the report would have made its way into the records kept by the EPA, since it was a Congressionally commissioned report and its contents may well have been informative to the EPA's future rulemaking. However, in our search of cited references and other materials cited in the materials relating to the current EPA Docket ID No. EPA–HQ–OAR– 2022–0829 the 2010 NAS report was never cited or mentioned. It is unknown whether EPA staff consulted this 2009-2010 study for this or any other docket and if it was not, why it was not consulted. [EPA-HQ-OAR-2022-0829-0617, pp. 16-19]

Organization: Lucid Group, Inc.

Battery/Vehicle Efficiency is Critical to Long-Term Viability of EVs

EPA solicited input on additional ways the program could provide alternative pathways encouraging manufacturers to achieve lower CO2 emissions earlier than projected in the proposal. Incentivizing EV efficiency measured by either miles/kWh or miles per gallon equivalent (MPGe) would help achieve lower CO2 emissions and reduce the demand for raw materials and on the grid. We must ensure that we do not electrify for the sake of electrification, but instead establish policies and programs that prioritize efficient use of electricity and resources, yielding benefits such as: [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

Reduced upstream emissions: Most EVs are charged from the power grid, which, while rapidly becoming cleaner, still includes emitting sources. More efficient EVs would use less grid electricity, thereby reducing the upstream emissions associated with their charging and vehicles miles traveled. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

Conservation of critical minerals and associated de-risking of the supply chain: Using fewer batteries reduces the demand per vehicle for lithium and other critical materials. Reducing the use of these materials reduces supply chain bottlenecks and enhances national security. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

Reduced consumer purchase costs: EV efficiency speeds mass adoption by reducing vehicle prices. It seeds a virtuous cycle—efficiency lowers vehicle production costs and purchase prices by reducing the number of batteries (the largest cost input for EVs) needed to achieve a targeted range. Fewer batteries lower the vehicle curb weight thereby further reducing the required cell count to achieve a desired range. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

Reduced consumer energy costs: Efficient vehicles require less energy to travel a given distance. More efficient ICE vehicles have demonstrably reduced the gas bill for consumers, and more efficient BEVs reduce consumers' electric bill. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

A more resilient grid through smarter energy consumption: While government programs have been known to encourage the use of electricity and have even extended to promote energy derived from wind, solar, and renewables, there exists a common denominator—use of energy. By focusing on increasing efficiency, we can foster smarter energy consumption easing the resources necessary for the grid's clean energy transition. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

Environmental Justice benefit: The U.S. Department of Transportation (DOT) states "low income and minority communities are more likely to be located near highways and other transportation facilities that produce local reduced air quality, and to suffer from negative health effects such as asthma." Addressing environmental inequality goes beyond roadway design and extends to the vehicles on the roads. Zero-emission vehicles (ZEVs) are a first line of defense in addressing respiratory and cardiovascular disease and other pollution-related health disparities by improving air quality in communities located in or near traffic-dense areas. Efficiency brings down the costs of such vehicles and will help increase equitable adoption of medium- and heavy-duty electric vehicles. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

Higher overall vehicle performance: There is a misconception regarding the correlation between vehicle efficiency and vehicle performance. Traditionally, fuel efficient vehicles were not associated with high performance. However, Lucid's vehicles demonstrate that increased efficiency in EVs yields faster charging, increased power density, and higher output power derived from the same energy input providing faster acceleration capability. With higher vehicle performance often comes increased consumer interest, which in the case of electrification supports consumer adoption. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

OEMs should be incentivized and rewarded for the engineering and production of highly efficient EVs and to continue developing cutting edge technologies that would further enhance vehicle efficiency. To gain additional efficiency, greater investment in technologies is generally required, and higher EV credit should be awarded to incentivize this investment. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

An example of such a bonus credit structure could involve EPA adding a fleet average MPGe for the OEM as a basis for an efficiency incentive, in the form of a bonus GHG credit. For demonstration purposes this method would use threshold values of MPGe, based on current

MY22 EV MPGe data to assign credit multipliers and a higher multiplication at higher values of MPGe. This method would not use vehicle footprint as a variable because previous CAFE MPG target curves as described in the CAFE Standards for Model Years 2024–2026 Passenger Cars and Light Trucks already allow for OEMs to meet lower MPG targets if they make larger footprint vehicles. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

Additional efficiency credits would be awarded to OEMs with a certain minimum MPGe fleet average which reflects the current competitiveness of the market. Above this minimum threshold, OEMs would continue to be awarded credits according to a linear function to incentivize incremental improvements in vehicle efficiency. Similarly, above a certain threshold, the linear function or slope increases to reward improvements at the higher end of technological limits. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

Under this example, a minimum threshold of 90 MPGe reflects the current competitiveness of the EV market at that range and encourages further efficiency development. The threshold of 115 MPGe recognizes the significant step in technology that is required to achieve a fleet MPGe in that range, as it becomes exponentially tougher to realize any incremental improvement in this range which the greater slope of credit multiplier targets specifically. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

The proposed credit structure would be determined as below:

- The minimum threshold to receive an efficiency credit multiplication is 90 MPGe. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

- From 90 MPGe to 115 MPGe, the linear scale is Credit Multiplier = 1+(0.0132*(x1- 90)); x1 being the fleet MPGe of the OEM. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

- Above 115 MPGe the linear scale is increased, and the function is Credit Multiplier =1.33+(0.0268*(x2-115)); x2 being the fleet MPGe of the OEM. Each 1 MPGe incremental gain in the 115 to 140 band is awarded a 103.03% more credit over the same gain in the 90 to 115 band. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

OEMs should be encouraged to produce more efficient EVs; such a program would inspire competitiveness that ultimately leads to the desired benefits of transportation electrification. This methodology is also highly flexible and adaptable. EPA would be able to adjust the threshold values of MPGe for credit multiplication based on available technologies, similar to what the agency and NHTSA do for GHG and CAFE standards. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

Like efficiency standards for ICE vehicles, MPGe as the basis for EV efficiency would indirectly achieve other benefits in vehicle weight and form. For example, OEMs producing compact EVs with high efficiency can leverage this to buffer larger SUV or truck offerings. This approach minimizes the complexities in calculations, thus lowering the administrative burden on OEMs and the EPA. [EPA-HQ-OAR-2022-0829-0664, pp. 9-10]

Organization: Mass Comment Campaign sponsored by Center for Biological Diversity. (web) (12,460 signatures)

To fight climate change and protect public health, the United States MUST confront the massive pollution from passenger cars. Fossil fueled vehicles worsen the climate crisis and air quality for everyone — especially for low-income communities and communities of color, which are disproportionately located near major roadways and transportation infrastructure. This is an unfortunate legacy of racist planning and policy that you have the power to remedy. Reducing vehicle emissions is the low-hanging fruit of the battle against climate change. We need you to set new clean car standards strong enough to protect our communities and our health. I urge you to instruct the Environmental Protection Agency to write new rules that: - Cut auto pollution 75% by 2030 — in line with the Paris Agreement — by rapidly increasing sales of electric vehicles and slashing pollution from new gas-powered cars and trucks. - Close all loopholes that allow manufacturers to make more gas guzzlers. - Ensure that the communities most impacted by fossil fuel pollution have ample access to affordable electric vehicles, purchase incentives, and charging infrastructure. Automakers already have the technology to safely improve vehicle efficiency and reduce emissions. You must require them to build the vehicles people want and need, as their past actions show that the key to low-pollution cars is strong government standards. NOW is the time for making strong and effective rules — not for half-measures. For you to truly protect public health, especially for those on the frontlines, clean car standards MUST meet this critical moment and lead the world. [EPA-HQ-OAR-2022-0829-0722]

Organization: Mass Comment Campaign sponsoring organization unknown (email) (5,313 signatures)

I write in opposition to the U.S. Environmental Protection Agency's proposed multipollutant standards for light-and medium-duty vehicles (Docket ID No. EPA–HQ–OAR–2022–0829). I have serious concerns with all three of the options included in the draft rulemaking, as the EPA seeks to lower carbon emissions under timelines that effectively make electric vehicles the only option for automakers to meet the pollution limits from 2027 through 2032. [EPA-HQ-OAR-2022-0829-1721]

The large-scale shift to electric vehicles, comprising two-thirds of all new-car sales in the U.S. by 2032 under this proposal, will hurt consumers, workers, and small businesses while doing little to help the environment. The proposed rule would lead to fewer vehicle choices for individuals and families, reducing the selection of vehicles that fit their household budgets and unique needs. [EPA-HQ-OAR-2022-0829-1721]

This proposal flies in the face of consumers being free to purchase the vehicles that best suit their needs. According to an April 2023 report from Kelley Blue Book, the average cost of a Battery electric vehicle (BEV) is $58,000, which is over 20% more than the average cost of a non-BEV which puts undue, financial burden on American consumers. The average cost of a BEV outpaces the medium salary of $54,132 of American as reported by the Bureau of Labor Statistics from 2022. In addition to the increased up-front costs to consumers to purchase a BEV, J.D. Power reported that approximately 28 million American homeowners must spend on average, an additional $1,300 to install at-home chargers. [EPA-HQ-OAR-2022-0829-1721]

While the goal of this proposal is to reduce the U.S. automotive fleet's carbon footprint, it simply shifts how emissions are produced. The EPA is ignoring the value of technologies produced by American workers, manufacturers, and farmers critical to our transportation future. Specialty automotive aftermarket businesses are leading the way through other fuel innovations. There are numerous lower-and-zero emissions fuels and technologies available today, such as hydrogen, domestic biofuels, hybrid technologies, and more. Today's innovations also include replacing older internal combustion engine technologies with newer, cleaner versions and converting older ICE vehicles to new electric, hydrogen, and other fuels. Sadly, the EPA's plans to reduce greenhouse gases and criteria pollutants do not factor this in nor provide an equal playing field for technologies beyond EV. Studies show that we can reach lower and zero-emissions goals faster by employing multiple technology solutions compared to the proposed "all-in" on EV rules. [EPA-HQ-OAR-2022-0829-1721]

The EPA's proposal boosts an electric vehicle supply chain dominated by China, which powers its manufacturing-base through coal-fired power plants and mines critical minerals for EV batteries with the use of environmental practices that we would never approve of in the United States. Emissions coming out of tailpipe matter, but so do the lifecycle emissions of building a car, constructing and charging a battery, and retiring vehicles. [EPA-HQ-OAR-2022-0829-1721]

During the pandemic, the average cost of new and used vehicles increased by five percent and 30 percent, respectively, according to Edmunds, who tracked prices from May 2020-2021. These increases resulted from supply chain issues, such as the ongoing global microchip shortage, which has upended the automotive market over the last couple of years. The shortage of critical components today will potentially be repeated as a direct result of this proposed rule, which still has many unanswered questions about how the U.S. is going to end its dependence on sourcing critical minerals and resources from foreign countries, including nations such as China that are geopolitical foes, that are needed to produce more electric batteries for vehicles. [EPA-HQ-OAR-2022-0829-1721]

As a consumer, I believe that the EPA should not dictate the types of vehicles that can be sold in the United States. Despite 8.5% of new vehicles sold being BEV, a May 2023 report from J.D. Power found that 21% of consumers are very unlikely to consider purchasing an EV due to issues such as price, range, and limited charging availability. [EPA-HQ-OAR-2022-0829-1721]

The future of automotive technology matters to consumers, millions of automotive enthusiasts, and all the men and women who work in the industry. Accordingly, I ask that the EPA does not follow through on any of the three options outlined in this proposed rulemaking and instead pursues a rulemaking for light and medium-duty vehicles that embrace a technology-neutral approach that factors in the infrastructure that exists, the innovation we are all capable of, consumer preferences, and the lifecycle emissions of the technology that powers our vehicles. [EPA-HQ-OAR-2022-0829-1721]

Organization: Minnesota Pollution Control Agency (MPCA)

Include regulatory mechanism(s) to prevent backsliding on emissions from non-EVs

EPA's fleet average standard would allow for increasing emissions from non-EVs as the EV share of the fleet rises. With EPA's projected EV shares, non-EV emissions could increase while the overall fleet would be compliant. While some emissions would result from the dirtier vehicles remaining in the fleet, the standard would not prevent new internal combustion engine vehicles from having higher emissions than earlier models. These vehicles should have equal if not lower emissions than their earlier models to prevent backsliding on emissions. Backsliding is inconsistent with climate goals that necessitate pursuing all feasible, cost-effective greenhouse gas emissions reductions. [EPA-HQ-OAR-2022-0829-0557, p. 5]

Organization: National Corn Growers Association (NCGA)

As stated in the proposed rule, the transportation sector is the largest source of U.S. GHG emissions, representing 27.2 percent of total U.S. emissions. Within the sector, light-duty vehicles are the largest contributor, comprising 15.5 percent of total U.S. GHG emissions. Immediate progress toward decarbonizing the light duty fleet will help meet the Administration's goal of cutting emissions by 2030 and reaching net zero emissions by 2050. Achieving those decarbonization goals in transportation will require a mix of solutions. As recent analysis from the Rhodium Group concludes, a "portfolio of strategies is the lowest cost and most likely to succeed," including low carbon liquid fuels such as biofuels. However, the singular focus of the currently proposed multi-pollutant emission standards for model year (MY) 2027 through 2032 light and medium duty vehicles on battery electric vehicles (BEVs), ignores the immediate and long-term benefits of leveraging a portfolio of various transportation technologies and the emission reductions they can achieve. [EPA-HQ-OAR-2022-0829-0643, p. 2]

In order to achieve emission reduction goals in the most robust, rapid, and affordable way, EPA must instead encourage multiple additional solutions such as hybrid electric vehicles (including plug-in hybrids), reinstating meaningful flex-fuel vehicle credits, and the introduction of credits that encourage the utilization of internal combustion engines (ICE) designed to utilize higher blends of biofuels (such as ethanol) by recognizing the combined carbon and multi-pollutant emission reduction benefits of the engine technology and fuel. [EPA-HQ-OAR-2022-0829-0643, p. 2]

Low-carbon liquid fuels have a unique and important role to play, immediately and in the long term. Fuels such as E15 (15% ethanol) are approved for and available for use in the millions of vehicles already on the road today, and thus offer immediate emissions benefits on a much larger scale than changes to only new vehicles. In the longer term, low-carbon or zero-carbon liquid fuels offer emissions solutions for market segments and customers that may not be well served by battery electric vehicles. [EPA-HQ-OAR-2022-0829-0643, p. 2]

To foster a vibrant and competitive landscape of multiple solutions, it is critical for EPA to set performance-based and technology-neutral emissions standards. Unfortunately, the proposed standard falls short of this ideal. It is essential to look beyond the tailpipe and use life cycle analysis for fair comparisons and a "level playing field". [EPA-HQ-OAR-2022-0829-0643, p. 2]

Organization: National Parks Conservation Association (NPCA)

As it relates to medium-duty vehicles, we believe that EPA underestimates the number of MDVs that can be electrified as well as the full scope of new technologies that can be used to reduce emissions of remaining fossil fuel powered MDVs. We request that EPA include additional MDV electrification in the final rule while also requiring technological improvements to make fossil fuel powered MDVs sold after 2027 more efficient and less polluting. [EPA-HQ-OAR-2022-0829-0607, p. 4]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

NESCAUM and the OTC have some concerns that EPA's fleet average allows for emissions from ICE vehicles manufactured during the regulated period to increase for MYs 2028 and later. Specifically, assuming EPA's projected increases in battery-electric vehicle (BEV) market share over time, it appears that non-BEV emissions could increase from approximately 240 g/mi in 2027 to approximately 250 g/mi in 2032. As a policy matter, we believe it is appropriate for EPA to include in its final rule a regulatory mechanism, such as a maximum allowable emissions rate, to ensure emissions from non-BEVs do not increase during the regulated period and beyond. [EPA-HQ-OAR-2022-0829-0584, p. 9]

Organization: Plug In America

Since the EPA has offered multiple scenarios for multi-pollutant emissions standards reduction for MY 2027 and later light- and medium-duty vehicles and has requested comments on these scenarios, Plug In America asks that for administrative consistency and efficiency, the final standards align with an overall goal of achieving a 50 percent to 52 percent reduction from 2005 levels in economy-wide net greenhouse gas pollution in 2030 to reach the U.S. Nationally Determined Contribution under the Paris Agreement. A holistic approach will be necessary to determine this pathway and requires incorporating other economic sectors into the calculations. Given that the ongoing rulemaking process for "New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule" this presents an opportunity to align the multi-pollutant emissions standards to levels consistent with the goal of limiting global warming to no more than 1.5 degrees Celsius by 2050. [EPA-HQ-OAR-2022-0829-0625, p. 2]

Organization: POET, LLC

II. POET Generally Supports Aggressive Emissions Reduction Standards for Light-Duty Vehicles, But Those Standards Must Truly Be Technology Neutral.

Light-duty vehicles are the largest contributor to GHG emissions from the transportation sector, accounting for over 57 percent of transportation emissions and over 15 percent of total GHG emissions nationwide.12 POET stands behind technology-neutral standards that achieve significant GHG emission reductions in the transportation sector. Indeed, reducing transportation GHG emissions is POET's business. POET produces more bioethanol and other low carbon bioproducts than any other company in existence. [EPA-HQ-OAR-2022-0829-0609, p. 7]

12 See 88 Fed. Reg. at 29186.

Regarding PHEV pickup trucks, the Proposed Rule correctly notes that "PHEV pickup architecture would provide several benefits" including among others "zero-emission electric range," "increased total vehicle range during heavy towing and hauling," and "job-site utility with auxiliary power capabilities." Also, pickup trucks have been a difficult-to-decarbonize class of vehicles. Even under the Proposed Rule's extremely aggressive electrification scenarios, medium-duty pickup trucks only obtain a 19% BEV deployment rate in 2032. [EPA-HQ-OAR-2022-0829-0609, p. 20]

EPA should specifically incentivize PHEV FFV pickup trucks with additional incentives, which could go even further beyond incentives for other FFVs. FFV architecture has been broadly used with pickup trucks, so consumers are familiar with the role biofuels can play. [EPA-HQ-OAR-2022-0829-0609, p. 20]

Pickup trucks are also broadly used in Midwestern states where bioethanol is readily available. Various precedent exists for specially incentivizing pickup trucks given the difficulties in decarbonizing pickup trucks and other work vehicles where consumers need high towing capacity, reliability, and extended range. [EPA-HQ-OAR-2022-0829-0609, p. 20]

Organization: Stellantis

Improve liquid fuels to reduce GHG and criteria emissions from the approximately 280M ICE vehicles on the road [EPA-HQ-OAR-2022-0829-0678, pp. 24-25]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

EPA should consider adding a small bonus for vehicles that have on-board AC bidirectional chargers or are integrated with multiple DC off-board chargers. Alternatively, at minimum, EPA should conduct an analysis on how EPA can advance bi-directional charging in the future. Justification: The promise of bi-directional charging (AC or DC) to address air pollution, GHG and electric grid issues is very significant with BEVs and PHEVS in light-, medium- and heavy-duty vehicles, or off-road equipment. For example, a recent May 2022 presentation by the World Resources Institute using Bloomberg NEF and Energy Information Administration data found the power capacity in 2030 for EVs to be 10 to 20 times more than the 2030 power capacity of stationary storage. EPA can and should play a role in helping to unlock this potential. [EPA-HQ-OAR-2022-0829-0646, p. 9]

a. For example, the internal combustion engine in a PHEV has a much lower emission signature than a stand-alone, backup generator. [EPA-HQ-OAR-2022-0829-0646, p. 9]

b. Bidirectional charging, like battery stationary energy storage, can reduce GHG and traditional pollutants from fossil fueled power plants by shifting electricity use to renewable energy in the cleanest hours of the day and reducing the need for high- emitting plants (such as traditional peaker power plants). [EPA-HQ-OAR-2022-0829-0646, p. 9]

c. Bidirectional charging can also provide many types of grid services including ancillary services, providing resource adequacy, and helping with the evening transition from renewables to other generation resources. Because the batteries are already paid for by the car and truck owners, utilities can gain a low-cost resource compared to battery stationary storage. [EPA-HQ-OAR-2022-0829-0646, p. 9]

d. The potential value is significant and can contribute to lower operating costs for BEVs and PHEVs. [EPA-HQ-OAR-2022-0829-0646, p. 9]

While we understand the desire by EPA to simplify the regulation and reduce the use of bonus multiplier credits, we believe a small bonus credit in the final regulation for a few years is justified and needed to unlock this technology because of the large emission reduction benefits and other benefits enabled by bidirectional charging. [EPA-HQ-OAR-2022-0829-0646, p. 9]

EPA should require automakers who sell PHEVs to include in the sale a portable cord set that can charge at level 1 and/or level 2 similar to the Advanced Clean Cars II regulation as this will increase the likelihood of consumers charging. While this adds cost, it does not add much cost and, like CARB, we think this will make it easier for purchasers and should increase consumers using a PHEV's all-electric miles. Similarly, we are concerned about automakers and dealers selling PHEVs without a portable cord set and potentially turning PHEVs into a so-called "compliance."

EPA should provide small bonus credits (multipliers) in 2027 to 2030 for several advanced technologies including PHEVs with a long all-electric range that are not being produced today. While we understand the need to simplify the regulation and dramatically reduce the use of multipliers, we do support very limited continuation of multiplier to advance technologies that do not exist today or are in very limited numbers such as bidirectional charging vehicles (recommendation 4) and PHEVs with an all-electric range of 60 or more miles. These technologies need extra lead time to develop. Having multiple technologies helps in reaching many hard-to-reach customer segments, and PHEVs with over 60 mile all-electric range by legacy automakers are not offered today and have rarely been produced and sold. Also see our recommendation 8 below. [EPA-HQ-OAR-2022-0829-0646, p. 10]

Organization: Tesla, Inc.

Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

- Eliminate off-cycle crediting for all types of vehicles; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Revisit the plug-in hybrid electric vehicle (PHEV) utility factor to accurately reflect real world emissions; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Amend the proposal to create parity in promoting motor vehicle air conditioning (MVAC) efficiency adoption; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Maintain the existing zero emissions upstream approach for BEVs; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Eliminate credit multipliers for all vehicles; and [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Ensure BEVs continue to be accounted for, and participate in, the NMOG + NOx reduction standard. [EPA-HQ-OAR-2022-0829-0792, p. 2]

Tesla also supports increasing the stringency of standards through MY 2035 in a manner that is consistent with the 100% ZEV sales achieved in California's Advanced Clean Car II (ACC II).4 However, recognizing that there are some uncertainties within the marketplace, in the final rule EPA should clearly denote that such an extension for MY 2033-35 is intended to be severable from the rest of the proposal and provide a rationale for this severability.5 [EPA-HQ-OAR-2022-0829-0792, p. 2]

4 88 Fed. Reg. at 29239; See also, California Air Resources Board (CARB), Advanced Clean Cars II Regulations: All New Passenger Vehicles Sold in California to be Zero Emissions by 2035 available at h ttps://ww2.arb.ca.gov/our- work/programs/advanced-clean-cars-program/advanced-clean-cars-ii.

5 See generally, Administrative Conference of the U.S., Severability in Agency Rulemaking (June 29, 2018) available ath ttps://www.acus.gov/recommendation/severability-agency-rulemaking.

Tesla welcomes the EPA's proposal to reduce GHG emission standards across the light- and medium- fleet and to adjust the footprint-based standards curves to reduce incentives to upsize vehicles.115 Further, Tesla encourages the agency to quickly implement more stringent emissions standards for light- duty vehicles, and to finalize standards well-before the end of the calendar year. [EPA-HQ-OAR-2022-0829-0792, p. 16]

115 88 Fed. Reg. at 29196.

Organization: Western Energy Alliance

While acknowledging that EPA must: "consider issues of technological feasibility, the cost of compliance, and lead time. EPA also may consider other factors, and in previous vehicle standards rulemakings, [EPA-HQ-OAR-2022-0829-0679, pp. 3-4] as well as in this proposal, has considered the impacts of potential standards on emissions of air pollutants and associated public health and welfare effects, impacts on the automotive industry, impacts on the vehicle purchasers/consumers, oil conservation, energy security and other energy impacts, safety, and other relevant considerations." p. 29186 [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

It does not appear that EPA has actually done so. EPA's logic is often flawed in the analysis and the information relied on is biased or incomplete. [EPA-HQ-OAR-2022-0829-0679, pp. 3-4]

EPA Summary and Response

Summary:

Supportive comments were received from American Council for an Energy-Efficient Economy, BMW, BorgWarner, California Air Resources Board, Consumer Energy Alliance, Electric Drive Transportation Association, Environmental. and Public Health Organizations, General Motors, ICCT, International Union, United Automobile Aerospace and Agricultural Implement Workers of America, Lucid Group, Mass Comment Campaign sponsored by Center for Biological Diversity, POET LLC, and Tesla. Many elements of the program were supported including phase-out of off-cycle credits, limiting A/C credits to internal combustion engine vehicles (ICEVs), eliminating the advanced vehicle multiplier incentives, lowering the cut-points in the light truck curves, technology neutrality, program flexibilities, work factor, and the footprint-based standard.

Response:

EPA appreciates the supportive comments.

Summary:

Alliance for Consumers, KALA Engineering Consultants, and Competitive Enterprise Institute commented with concern the rulemaking forces BEVs into the vehicle fleet. Cummins commented that standards should be performance-based and technology neutral, and not "mandate a specific technology" and also be fuel neutral.

Response:

For this rulemaking, we are continuing our longstanding approach (with over 50 years of experience in reducing criteria pollutants and 14 years of history for GHGs) of establishing an appropriate and achievable trajectory of emissions reductions by means of performance-based standards. As we state in Section I.A.2 of the preamble, we anticipate that a compliant fleet under the final performance-based emissions standards will include a diverse range of technologies. The standards are fuel neutral. In Section I.B.1. of the preamble we discuss the GHG emissions standards and illustrate multiple potential pathways which demonstrate compliance with varying mixes of non-hybrid ICE vehicles, hybrids, PHEVs and BEVs (Table 4).

Summary:

BMW NA submitted comments encouraging the Agency to adopt test procedures for hydrogen fuel cell electric vehicles. BMW believes hydrogen FCEVs will be a key technology for achieving climate neutrality. BMW requested EPA adopt SAE technical standard J2572, Recommended Practice for Measuring Fuel Consumption and Range of Fuel Cell and Hybrid Fuel Cell Vehicles Fueled by Compressed Gaseous Hydrogen, which defines a procedure for testing FCEVs and possibly adopting a time-limited advanced technology vehicle credit multiplier for hydrogen FCEVs.

Response:

EPA has considered BMW's comment encouraging the Agency to propose a specific test procedure for hydrogen FCEVs by adopting SAE technical standard J2572. At this time the Agency is not prepared to propose specific test procedures for hydrogen FCEVs. Manufacturers producing hydrogen FCEVs are eligible to propose special test procedures according to the provisions of §1065.10(c)(2). BMW and other hydrogen FCEVs are eligible to request approval to use SAE J2572 for testing. The request to use the special procedure needs to be made prior to the manufacturer beginning the test program.

Summary:

The American Council for an Energy-Efficient Economy and Donn Viviani, Alliance for Vehicle Efficiency, and Lucid Group commented with concern that zero emissions for PEVs, lack of requirements for PEV efficiency, and lack of requirements for mass reduction will contribute to larger vehicles being manufactured and consume additional energy. Donn Viviani commented on the need to account for embedded carbon in the manufacturing of vehicles.

Response:

The final rulemaking establishes performance-based standards allowing manufactures to choose any combination of technologies to meet the standards. Furthermore, EPA is adopting revised footprint curves that EPA considers will not encourage changes in the size of vehicles (see Section 3.2.1 of this RTC). For further discussion of the compliance treatment of PEVs with zero grams/mile CO2 tailpipe emissions, and related issues about vehicle efficiency, please refer to Section 3.1.5 of the RTC. EPA interprets comments from Mr. Viviani on embedded carbon to be in support of lifecycle analysis, which we are not adopting for this rulemaking. For further comments related to lifecycle emissions refer to Section 19.2 of this RTC.

Summary:

BMW, Electrification Coalition, National Corn Growers Association, Stellantis, and POET LLC commented with suggestions to include additional fuels such as gasoline blends, biofuels, and hydrogen in the program for compliance.

Response:

The final rule does not include any modifications to vehicle fuels. Some commenters noted the importance of hydrogen technology and fuel cell electric vehicles (FCEVs). While EPA is aware that a few vehicle manufacturers either are producing light-duty FCEVs today (e.g., Toyota Mirai, Hyundai Nexo) or have plans to produce FCEVs in the future, at present such vehicles are at low volumes, and EPA has not explicitly modeled FCEVs as a technology option in our rule analysis. Nevertheless, under our performance-based standards, manufacturers can choose to utilize FCEV technology as part of their mix in complying with the standards.

Summary:

Hyundai Motor America, Mass Comment Campaign, and Western Energy Alliance commented that the high cost of EVs present affordability issues and affect consumer choice.

Response:

EPA has considered impacts on consumers as part of this final rule. See RTC Section 13 for discussion of consumers issues, including affordability and consumer choice.

Summary:

Several commenters expressed the importance of PHEVs in the current and future vehicle fleet.

Response:

PHEVs were not included in the proposed rule as the necessary modeling data was unavailable at that time. As we had indicated in the proposal was our intention, EPA has in fact explicitly included PHEVs as a technology option within our modeling of potential compliance pathways to meet the final standards, as detailed in Section 12.2.4 of this RTC.

Summary:

Minnesota Pollution Control Agency, Environmental and Public Health Organizations, California Air Resources Board, District of Columbia Department of Energy and Environment, Northeast States for Coordinated Air Use Management, Ozone Transport Commission, and

International Council on Clean Transportation expressed concern of backsliding of ICE vehicle emissions due to the addition of PEVs to the fleet.

Response:

EPA understands that in theory some backsliding of individual vehicles is possible due to the nature of a fleetwide average standard. At the same time, the revised GHG and criteria pollutant standards require significant reductions. For example, the final standards for NMOG+NOX reduce the level of emissions from the worst performing vehicles by eliminating the highest "bins" and any backsliding would have to be offset with additional technologies to reduce emissions. As another example, the GHG standards require significant year-over-year emissions reductions, and though manufacturers are not prohibited by the standards from backsliding on existing ICE vehicles, if they were to do so, they would then be obligated to make even further emission reductions elsewhere in their fleet, as this is the nature of fleetwide averaging standards. For these reasons, EPA does not consider it likely that significant backsliding will occur or would undermine the public health and welfare benefits of the rule.

3.1.1 - Vehicle regulatory classifications

Comments by Organizations

Organization: Alliance for Automotive Innovation

3. Separate Car and Truck Standards

Auto Innovators supports EPA's intent to continue to set separate passenger car and light-duty truck / medium-duty passenger vehicle standards. Separate standards recognize the physical energy demands of larger, more capable vehicles. Appropriately set standards will continue to drive improvements in both passenger cars and light trucks. In the long term the two standards will naturally converge, assuming similar percentage reductions for both fleets. [EPA-HQ-OAR-2022-0829-0701, p. 110]

4. NHTSA Car and Truck Definitions

EPA intends to continue to use the NHTSA car and truck definitions for its light-duty GHG program. We generally support this approach. However, because NHTSA has yet to propose its CAFE rules for MY 2027 and beyond, we do not know for certain whether NHTSA will maintain the existing definitions that EPA has based its proposal upon. Additionally, our understanding is that NHTSA is developing test procedures that may have the effect of changing the classification of some vehicles regardless of the present definitions. [EPA-HQ-OAR-2022-0829-0701, pp. 110-111]

There is also the potential for misalignment between EPA and NHTSA in the definition of medium-duty passenger vehicles. EPA is proposing to modify the definitions of medium-duty vehicles / medium-duty passenger vehicles. It is unclear what NHTSA may or may not do to align with EPA's proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 110-111]

We urge EPA to coordinate with NHTSA in developing its final rule to ensure that the proposed greenhouse gas standards in the NPRM are not in conflict with changes NHTSA may propose in its CAFE rulemaking, or through later test procedure changes. [EPA-HQ-OAR-2022-0829-0701, pp. 110-111]

D. MDPV Definition

6. Background

In EPA's 2000 Tier 2 criteria pollutant rule299, EPA established a new regulatory classification: Medium Duty Passenger Vehicle (MDPV). EPA states it created this classification to include larger, heavier vehicles that were driven similarly to passenger vehicles in the passenger vehicle averaging sets for emissions.300 EPA defined this new regulatory class with references to Gross Vehicle Weight Rating (GVWR), seating configuration, and pickup bed length.301 Currently, the MDPV definition may include vehicles up to 10,000 lbs. GVWR. If a vehicle meets the EPA definition of an MDPV, the vehicle is removed from the Class 2b and 3 vehicle averaging set (proposed in the NPRM to be called Medium Duty Vehicles, or "MDVs"), which typically includes vehicles used for "work" purposes (i.e., trailering, towing, and hauling). [EPA-HQ-OAR-2022-0829-0701, pp. 195-196]

299 Add citation.

30 NPRM at 29278.

301 CFR-2014-title40-vol19-sec86-1803-01.pdf (govinfo.gov) page 10/14

EPA is proposing to expand the definition of MDPV to include heavier vehicles in the passenger vehicle emissions averaging sets. EPA recognizes that including zero emissions vehicles (ZEVs), and particularly BEVs, will be important to comply with its proposed Tier 4 multipollutant standards for passenger vehicles and MDVs. BEVs typically have higher curb weight than comparable-capability internal combustion engine vehicles due to battery weight, so it's likely that some EV light-duty trucks and sport utility vehicles will exceed the current 10,000 lbs. GVWR threshold for MDPV when equipped with BEV technology and change averaging sets. EPA's compliance pathway and cost-benefit analysis does not explicitly model vehicles switching regulatory classes due to BEV weight, but EPA purports that the proposed updates to the MDPV definition capture vehicles with significant weight changes due to batteries - and only these vehicles - to maintain regulatory continuity in emissions averaging sets. EPA states that "[i]n selecting the proposed 5,000-pound work factor cut point, EPA reviewed current vehicle offerings and does not believe this threshold would pull into the MDPV category a significant number of work vans or trucks."302 [EPA-HQ-OAR-2022-0829-0701, pp. 195-196]

302 NPRM at 29278.

7. Summary of EPA MDPV Definition Proposal

As shown below, EPA proposes to use "Work Factor (WF)," in combination with GVWR and pickup bed length, to expand the definition of MDPV, or rather to define which MDVs would not be MDPVs. [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

[See original comment for Figure 72: NPRM Table 56: Summary of Exclusions for the Proposed Revised MDPV Definition] [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

Previously, EPA has used WF to set GHG targets for Class 2b and 3 vehicles, and EPA proposes to carry-over the WF equation through 2029MY. In 2030MY, EPA proposes to limit the maximum threshold of Gross Combined Weight Rating (GCWR) to 22,000 pounds in the WF equation.303 [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

303 NPRM at 29425.

This means the calculated work factor for vehicles above 22,000 pounds GCWR will change between 2029MY and 2030MY (see text below). [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

[See original attachment for equations] [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

EPA largely carries over elements of the previous MDPV definition related to seating configurations and bed length. Pickups with one row of seating or an eight-foot pickup bed remain in Class 2b and 3 (MDV). [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

EPA proposes, however, to require manufacturers to use its new definition for MDPV in 2027MY. Alternatively, manufacturers may adopt the new definition of MDPV prior to 2027MY, and if the manufacturer chooses to do so, the manufacturer must apply the MDPV definition for GHG and criteria emissions standards. EPA proposes special consideration of criteria emissions in 2027MY-2029MY for vehicles that become MDPV due to the new definition:

"(vi) MDPV. Any vehicle that becomes an MDPV as a result of the revised definition in §86.1803 starting in model 2027 remains subject to the heavy-duty Tier 3 standards in § 86.1816-18 under the default phase-in specified in paragraph (b)(6)(ii) of this section for model years 2027 through 2029."304 [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

304 https://www.epa.gov/system/files/documents/2023-04/lmdv-multi-pollutant-emissions-nprm-redline-memo-2023-04.pdf (page 41 / 129).

Manufacturers may opt in to the new MDPV definition early without selecting an early phase-in schedule for Tier 4 multipollutant criteria standards. Said another way, manufacturers may opt- in to the MDPV definition early, and still choose the default compliance scenario (Scenario H).305 [EPA-HQ-OAR-2022-0829-0701, pp. 196-197]

305 NPRM at 29259.

8. Observations and Concerns with Proposed MDPV Definition

EPA's MDPV definition proposal may not produce the stated outcome EPA desires. For instance, the proposed expanded MDPV definition will capture some Class 2b and Class 3 internal combustion engine vehicles when the work factor is used in combination with the GCWR limit in MY 2030, resulting in those vehicles being included in a BIN12 averaging set. Many BEV trucks may be classified as MDPV, and therefore not be available to contribute to the stringent BIN60 criteria emissions standard for MDV. Some vehicles will both meet the MDPV definition and be regulated as light-duty, and yet paradoxically be over the proposed 22,000 pounds GCWR limit, which would otherwise require heavy-duty engine dyno certification for criteria emissions. If a manufacturer optionally adopts the MDPV definition early, the vehicle may change criteria emissions averaging sets three times in the span of five years. Certification and label requirements for MDPVs may complicate lab procedures. And finally, the EPA definition of MDPV may differ from the Department of Transportation regulatory classes used in the Corporate Average Fuel Economy / Corporate Average Fuel Consumption programs, adding complexity to certification workstreams. Each of these items is discussed in detail below along with Auto Innovators' suggested modifications to address these observations while working toward EPA's stated goals. [EPA-HQ-OAR-2022-0829-0701, pp. 196-198]

In the Proposed Rule, EPA makes clear that the expanded MDPV definition is intended to address heavier BEVs likely to be driven as passenger vehicles, and the definition updates are not meant to pull gasoline or diesel-powered work vehicles into light-duty standards:306 [EPA-HQ-OAR-2022-0829-0701, pp. 196-198]

306 NPRM at 29278.

- "First, EPA is proposing to include in the MDPV definition any passenger vehicles at or below 14,000 pounds GVWR with a work factor at or below 5,000 pounds except for pickups with an open bed interior length of eight feet or larger…This modification would address new BEVs that are primarily passenger vehicles but fall above the current 10,000 pound MDPV threshold primarily due to battery pack weight increasing the vehicle's GVWR." [EPA-HQ-OAR-2022-0829-0701, pp. 196-198]

- "In selecting the proposed 5,000 pound work factor cut point, EPA reviewed current vehicle offerings and does not believe this threshold would pull into the MDPV category a significant number of work vans or trucks…" [EPA-HQ-OAR-2022-0829-0701, pp. 196-198]

- "Currently, there is a clear distinction between pickups in the light-duty vehicle category and those in the medium-duty category…The proposed changes to the MDPV definition are intended to account for any new pickup offerings that would fall into the GVWR "space" at or above 8,501 pounds but below 9,900 pounds. EPA is not aware of any current or planned products that would be covered by this proposed modification." [EPA-HQ-OAR-2022-0829-0701, pp. 196-198]

However, when evaluating the existing vehicles pulled into the new MDPV definition and making conclusions that the proposed definition would not affect the classification of existing Class 2b and 3 ICE vehicles, it does not appear that EPA considered the proposed 22,000-pound limit to GCWR in the WF calculation, which is proposed to begin in MY 2030, in combination with the 5,000-pound WF threshold. After the WF GCWR limit, many ICE work trucks in the market today would be classified as MDPV in MY 2030 and beyond (see examples below). Manufacturers encourage EPA to review compliance data submissions to reassess how the proposed MDPV definition may interact with 2023MY and 2024MY ICE products. [EPA-HQ-OAR-2022-0829-0701, pp. 198-200]

[See original attachment for Figure 73: Sample ICE Work Trucks and Classifications]

307 Press Kit: 2023 Ram Heavy Duty, Towing specifications (Public "Base Weight Total" used for example may vary from "EPA Curb" weight) https://media.stellantisnorthamerica.com/newsrelease.do?id=24053&mid=,

The consequences of shifting ICE work vehicles to the MDPV regulatory class are significant. For criteria emissions, the MDPV NMOG+NOx targets are proposed to be 12 mg/mi in MY 2030 vs. 178 or 247 mg/mi for MDV in MY 2029 in the default compliance pathway308 (see Figure 74 below), and the MDPV definition would preclude these work trucks from certifying to proposed Bin 160 or Bin 125, which are reserved only for MDVs.309 The EPA NPRM analysis does not appear to recognize that many ICE work trucks would switch to MDPV with the proposed new MDPV definition, and no technology pathway is discussed to bring a 2029MY9

MDV work truck into a compliant light-duty averaging set. [EPA-HQ-OAR-2022-0829-0701, pp. 198-200]

308 NPRM at 29261, Table 41.

309 NPRM at 29261, Table 42.

[See original attachment for Figure 74: NPRM Table 41: LDV, LDT, MDPV and MDV Fleet Average NMOG+NOx Standards Under the Default Compliance Pathway] [EPA-HQ-OAR-2022-0829-0701, pp. 198-200]

With the proposed new MDPV definition, after the WF calculation adjustments beginning in MY 2030, many ICE work trucks over 22,000 pounds GCWR would otherwise be required to engine dyno cert if they were not MDPVs. The logic appears paradoxical and unintended. These vehicles cannot be both so alike to passenger vehicles that they should be regulated as passenger vehicles, and so alike to heavy-duty purpose-built work trucks that they should be regulated the same as light-heavy engines. Many of these ICE vehicles pulled into the new MDPV definition in MY 2030 today share engine hardware with vehicles that would be required to engine dyno cert under Part 1036 in MY 2030 due to the 22,000-pound GCWR limit. [EPA-HQ-OAR-2022-0829-0701, p. 200]

There is a stark difference between light-duty chassis dyno certification procedures, required for MDPVs, and engine dyno certification procedures for vehicles over 22,000-pound GCWR. Similar vehicles sharing parts and development resources today could be forced to pursue different development paths based on the proposed MY 2030 class definitions and test procedures. [EPA-HQ-OAR-2022-0829-0701, p. 200]

Complexity with the proposal is not limited to within the EPA program. Department of Transportation, through the Corporate Average Fuel Economy program, may have different regulatory class definitions for fuel consumption regulations than proposed by EPA. California Air Resources Board, through Advanced Clean Cars II, has different NMOG+NOx Bins, and different certification requirements than EPA proposes.310 [EPA-HQ-OAR-2022-0829-0701, p. 200]

310 htps://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/2acciifro1961.4.pdf

9. Recommendations on MDPV Definition

EPA is correct in its desire to ensure vehicles, including ZEVs, are included in the appropriate compliance category. EPA identifies that some light trucks and sport utility vehicles, used often passenger vehicles, will cross weight thresholds and regulatory class definitions. Adjusting the MDPV definition is one mechanism for EPA to maintain some continuity in GHG and criteria emissions averaging sets as more BEVs are required to meet proposed standards. EPA proposes changes to the MDPV definition, but the structure and mechanisms need improvement from the proposal to the final rule to better achieve the stated intent as well as address the concerns noted above. [EPA-HQ-OAR-2022-0829-0701, pp. 200-202]

EPA offers manufacturers the option to adopt the new MDPV definition early. Adopting the MDPV option early may help manufacturers apply credit for ZEVs in the light-truck fleet as GHG stringency increases, consistent with the compliance pathway of adding battery electric vehicle technology to light-trucks and large sport utility vehicles, possibly for the model years

2024 (depending on the timing of the final rule), 2025, and 2026. We agree with EPA's proposal to allow manufacturers to adopt the MDPV definition early independent of the choice of criteria pollutant phase-in scenario. [EPA-HQ-OAR-2022-0829-0701, pp. 200-202]

To reduce complexity and regulatory burden associated with the proposed MDPV definition, and to address some potentially unintended consequences of the NPRM as written, manufacturers recommend the following changes to the proposed MDPV definition for the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 200-202]

- Our preferred option is that EPA should maintain the current MDPV definition, and also allow Class 3 BEV/FCEV/PHEV vehicles the option to contribute to either Medium-Duty or Light-Duty GHG compliance, but not both. This is similar to the approach taken by CARB for compliance with the heavy-duty ZEV regulation. This is a common sense approach that would achieve agency goals and also enable OEMs the flexibility needed with Class 3 vehicles, given the very aggressive standards in both the Light- and Medium- Duty GHG rules along with the anticipated relatively low volume of traditionally light- duty vehicles that could end up with Class 3 weight. The added benefit of this proposal is that NHTSA's CAFE rule could remain aligned with EPA's, as NHTSA is statutorily constrained from revising the MDPV definition. When fleets are not aligned, this creates a stringency burden that neither agency may recognize, but drives additional cost and complexity on OEMs . Alignment between the various regulatory programs is an ongoing goal of (and necessity for) OEMs. [EPA-HQ-OAR-2022-0829-0701, pp. 200-202]

- If EPA chooses not to accept the above, the following alternatives are proposed; while either would be acceptable for addressing concerns, we recommend the first approach:

o Implement a new MDPV definition that would simply make Class 3 BEV/FCEV/PHEVs with a work factor less than 4,500 lbs subject to the MDPV requirements and otherwise maintain the current MDPV definition. Given the relative lack of popularity of bed lengths 72" and greater in the light-duty segment, this would accomplish essentially all of EPA's goals. [EPA-HQ-OAR-2022-0829-0701, pp. 200-202]

o Implement a 9,500-pound GVWR limit and a 4,500 pound work factor limit versus the proposed 9,900 and 5,000 pound limits. This would reduce the risk of unintentionally capturing Class 2b and 3 trucks as could occur with the proposed limits. [EPA-HQ-OAR-2022-0829-0701, pp. 200-202]

- Manufacturers should not be required to adopt the MDPV definition until MY 2030. Aligning the required use of a new MDPV definition with the required timing of engine dyno certification for Class 2b and 3 vehicles may reduce test burden and streamline lab procedures, while giving manufacturers reasonable lead time to produce a fleet that meets such stringent requirements. Alignment in timing of MDPV definitions and Part 1036 requirements is especially important given the narrow definition of MDVs qualifying for chassis certified criteria emissions in the proposal in MY 2030 and beyond. MY 2030 also aligns with the timing of the proposed cap in GCWR for the WF equation. The GCWR cap as proposed in the WF equation, both in terms of timing and the value and mechanism of the cap, would result in many ICE vehicles flipping between MDV and MDPV at a critical time for criteria emissions phase-ins. [EPA-HQ-OAR-2022-0829-0701, p. 202]

- Manufacturers recommend eliminating the proposed GCWR cap in the WF equation. If EPA's intention is to limit the upper bound of WF for determining GHG stringency, EPA should explicitly set an upper bound for WF or GHG stringency itself – like footprint and GHG stringency for light-trucks -- instead of adding limits to components of the WF calculation. The GCWR limit as proposed in the WF equation interacts with and disrupts the applicability of the MDPV definition, pulling capable ICE work trucks into MDPV, subjecting them to more stringent criteria emissions targets and GHG targets, and changing their averaging sets. The mechanism as proposed by EPA is so complex that EPA's own analysis for compliance pathways to meet Tier 4 multipollutant standards overlooked the applicability of MDPV for a significant portion of the ICE work truck fleet. [EPA-HQ-OAR-2022-0829-0701, p. 202]

- Manufacturers recommend EPA clarify in the final rule that the new MDPV definition measures bed length with tailgate and mid-gates up. Often battery electric trucks have the option of a mid-gate that can extend the usable bed length of the vehicle in some configurations with mid-gates or tailgates down. If EPA were to measure bed length with the mid-gate down, many BEV trucks, the very trucks EPA intended to include in the MDPV class with the new proposed definitions, would exceed the maximum bed length allowed for MDPVs and remain MDVs. [EPA-HQ-OAR-2022-0829-0701, p. 202]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

The proposed standards need to limit upsizing as the light-duty fleet electrifies

In the past decade the U.S. automotive market has seen a shift towards larger vehicles. The average footprint for all vehicle types has increased and more and more light trucks are being sold compared to cars. This has been a major factor for the recent stagnation in real- world fuel efficiency of the fleet.17 We applaud EPA for attempting to counter these trends with the proposed standards and for correcting conditions from past GHG rulemakings that have exacerbated the issue. Lowering the cutpoints on the light truck curve will reduce emissions by setting a more stringent standard for the largest trucks, as will the flattening of both the car and light truck curves and reducing the GHG grams per mile (gpm) gap between them. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

17 https://www.epa.gov/automotive-trends

EPA must correct the slope of its car curve to accurately reflect BEV penetration [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

ACEEE agrees that the slopes of the car and light truck curves that demonstrate the relationship between vehicle footprint and the relevant emissions targets should reflect rising BEV penetration over the period of the standards, and that the appropriate slope for ZEVs should be zero. Tailpipe-only accounting combined with steep curves means that the production of large ZEVs can generate a considerable number of credits for a given manufacturer, which will incentivize vehicle companies to upsize their ZEV offerings and ignore improvements to ICEV options. For an ICEV car curve, EPA has determined that the appropriate slope to avoid incentivizing vehicle upsizing or downsizing is 0.8 gpm/ft2 and contends that the curve should be adjusted over time based on the ZEV share of sales. However, the car curve slopes for both the proposed standards and Alternative 1 are inconsistent with this finding, as explained below. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

Table 1. Car curve slope unadjusted and adjusted for BEV penetration

Model Year	Proposed Standard Car Curve Slope (gpm/sq-ft)	Expected Car BEV Penetration	Adjusted Slope (gpm/sq- ft)	Alternative 1 Car Curve Slope	Expected Car BEV Penetration	Adjusted Slope (gpm/sq-ft)
2027	0.64	43%	1.12	0.59	44%	1.05
2028	0.56	51%	1.14	0.51	50%	1.02
2029	0.47	59%	1.15	0.42	58%	1.00
2030	0.43	65%	1.23	0.38	67%	1.15
2031	0.39	69%	1.26	0.34	72%	1.21
2032	0.35	73%	1.30	0.30	74%	1.15

[EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

ACEEE calculated the adjusted slopes in Table 1 based on EPA's description of their methodology in the Draft Regulatory Impact Analysis (DRIA) where a slope of 0.8 is scaled to 0.4 to reflect 50% ZEV penetration (p.1-7). The adjusted slopes shown in Table 1 are far higher than 0.8 and rise over time with increases in BEV penetration. If 0.8 is the slope that minimizes the incentive to upsize or downsize vehicles, then anything higher than that would encourage the manufacture of larger vehicles and lead to higher emissions. Given that the light truck curve is based on EPA's car curve but has added offsets, the light truck curve would be similarly affected. EPA projects that average footprints will rise as a result of the proposed standard, further evidence that the curves as proposed are too steep (DRIA p.1- 14). We strongly recommend that EPA flatten both curves to accurately reflect expected BEV penetration in accordance with its own analysis. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

Offsets for the light truck curve should be decreased to reflect real-world conditions

EPA constructs the light truck curve for the proposed standards by adding offsets (in the form of higher levels of emissions for a given footprint) to the car curve then similarly adjusting it for light truck BEV penetration. The first offset is for all-wheel drive (AWD) capability. EPA assumes that crossover vehicles need additional emissions allowances to allow for AWD capability, which would effectively classify them as truck crossovers (DRIA p.1-8). This offset is set at 10 grams per mile (gpm) and is applied uniformly across the entire ICEV-only light truck curve. However, not all light trucks have AWD and EPA's adjustment to the emissions allowance is based on an analysis of what is needed to add AWD to a model (DRIA p.1-8 – 1-9). Therefore, applying this offset to all light trucks, regardless of whether they have AWD, unnecessarily increases the allowable emissions level. In 2021, 78% of pickups and 87% of truck SUVs had AWD while almost 20% of car SUVs and sedans had AWD capabilities.18 The 10 gpm offset should be reduced to account for this and not further incentivize the shift of cars to trucks. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

18 https://www.epa.gov/automotive-trends

The second adjustment that EPA makes to the car curve to create the light truck curve is for towing and hauling capability. To accommodate towing and hauling, EPA increases towing allowance linearly from 0-63 gpm for light trucks with footprints between 45 and 70 square feet on an all-ICEV curve. However, EPA assumes that all light trucks need to be able to haul and tow and therefore applies the allowance across the board . Not every vehicle classified as a light truck needs to tow or haul significant amounts of cargo. The vehicles that do need to tow or haul may only do so occasionally, and some may never need to.19 The 63 gpm offset for the all-ICEV light truck curve should be lowered to reflect the data on usage of towing and hauling capabilities by light truck owners. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

19 https://www.thedrive.com/news/26907/you-dont-need-a-full-size-pickup-truck-you-need-a-cowboy-costume

Complementary elements of EPA's LDV program should be extended to MDVs

Two other areas in which MDVs could benefit from being folded into the LDV program are compliance reporting requirements and consumer labeling. EPA's compliance report for heavy-duty vehicles24 does not include heavy-duty pickups and vans, and we are not aware of any other source for this data. This situation has hampered our ability to make informed judgments on the current proposal for MDV standards, as data on matters such as compliance credit balances and rates of ICEV technology adoption are not currently available for these vehicles. These vehicles should be incorporated into EPA's Trends report no later than MY 2027. [EPA-HQ-OAR-2022-0829-0642, p. 11]

24 https://www.epa.gov/system/files/documents/2023-05/420r22028A.pdf

MDVs also should have a consumer label, and the label should provide a basis for comparison with LDVs. This could be an important element, along with the reclassification of vehicles for purposes of the standards, of EPA's effort to discourage the upward creep in size and performance attributes of light-duty trucks. California began labeling MDVs on January 1, 2021.25 While the MDV scores are not directly comparable to California's LDV scores, CARB provides a comparison table with LDV GHG scores. We urge EPA to create a meaningful consumer label for MDVs in time for MY 2027. [EPA-HQ-OAR-2022-0829-0642, p. 11]

25 https://ww2.arb.ca.gov/our-work/programs/greenhouse-gas-standards-medium-and-heavy-duty-engines-and-vehicles/ep-label

Organization: American Fuel & Petrochemical Manufacturers

Moreover, EPA's Proposal further conflicts with the Clean Air Act by establishing a new class of medium duty vehicles that conflicts with the plain language of the CAA defining heavy-duty vehicles. Congress created specific lead time requirements for heavy-duty vehicles to ensure technological feasibility: "Any standard promulgated or revised under this paragraph and applicable to classes or categories of heavy-duty vehicles or engines shall apply for a period of no less than 3 model years beginning no earlier than the model year commencing 4 years after such revised standard is promulgated."98 In the Proposed Rule, EPA lumps a newly-defined category of Class 2b and 3 "medium-duty vehicles" (with a gross vehicle weight rating between 8,501 and 14,000 pounds) in with light-duty vehicles. But medium-duty vehicles are actually "heavy-duty vehicles" under the Clean Air Act, which defines "heavy-duty vehicle" as "a truck, bus, or other vehicle manufactured primarily for use on the public streets, roads, and highways (not including any vehicle operated exclusively on a rail or rails) which has a gross vehicle weight (as determined under regulations promulgated by the Administrator) in excess of six thousand pounds."99 Presuming the Proposed Rule results in a final rule promulgated in 2024, any new standards for Class 2b or 3 vehicles cannot apply until model year 2028.100 Furthermore, EPA is ignoring Congressional direction to issue separate standards for heavy-duty and light-duty vehicles by comingling them into the same fleet averaging, banking, and trading program (which is also unlawful, see Section III.A.1).101 [EPA-HQ-OAR-2022-0829-0733, p. 24]

98 Id., § 7521(a)(3)(C).

99 Id., § 7521(b)(3)(C) (emphasis added).

100 EPA's promulgation of standards for medium duty vehicles and light duty trucks along with other light duty vehicles is arbitrary and capricious as EPA itself recognizes that its approach – "for regulatory purposes" – differs from the statutory definition of heavy-duty vehicles in the Clean Air Act. See 88 Fed. Reg. at 29226, n. 382.

101 See 42 U.S.C. § 7521(a)(3)(B) (recognizing additional requirements for heavy-duty vehicles).

EPA recognized the need to treat different motor vehicle technologies differently. In previous rulemakings, EPA distinguished between Otto-cycle (primarily gasoline-fueled vehicles) and diesel heavy-duty vehicles.115 EPA also differentiated between gasoline- and diesel-fueled vehicles and those operated on natural gas.116 And more than 30 years ago, EPA promulgated specific standards for methanol-fueled vehicles.117 The regulations varied emission-control requirements based on fuel type.118 For example, in promulgating regulations for methanol-fueled vehicles, EPA explained that "because the design and function of methanol vehicles is very much like that of their petroleum counterparts, the methanol emission control requirements are comparable (in most cases identical) to those already in existence."119 At the same time, within the methanol vehicle rule, EPA noted that "in some future cases, this criterion may not be sufficient to adequately determine the classification of a vehicle . . . [EPA] may need to take into account other relevant factors, such as compression ratio, combustion characteristics, characteristics of the engine's operating thermodynamics, or intended in-use duty cycle."120 In other words, EPA recognized the varying methods of converting energy into motive power could require different criterion (classification) for regulating different vehicles. And the agency did so in circumstances where the drivetrain technologies were substantially more similar to ZEV than to ICEV. To remain consistent in its regulatory approach, were EPA to have the authority to set emissions standards for ZEVs, it must promulgate separate emission standards that apply solely to ZEVs. [EPA-HQ-OAR-2022-0829-0733, pp. 26-27]

115 See e.g., 40 C.F.R. §§86.098-10, 86.099-11.

116 59 Fed. Reg. 48472 (Sept. 21, 1994).

117 54 Fed. Reg. 14426 (April 11, 1989).

117 Id. at 14428.

118 See, e.g., 40 C.F.R. §80-090-8(a)(1)(A)-(B), differentiating as between hydrocarbon standards for petroleum-fueled vehicles and organic material hydrocarbon equivalent for methanol-fueled vehicles;

§86.090-11, imposing different standards for 1990 and later MY Otto-cycle heavy-duty vehicles from same weight methanol-fueled vehicles. [EPA-HQ-OAR-2022-0829-0733, pp. 26-27]

119 Id. at 14428.

120 Id. at 14429.

Organization: American Petroleum Institute (API)

c. Both this Proposal and the Heavy-Duty Vehicle Proposal Miss the Mark.

i. EPA is missing millions of vehicles that will contribute to emissions.

API is concerned that this proposal, as well as EPA's Heavy-Duty proposed11 GHG rule, seriously miss the mark with respect to reducing emissions from the transportation sector. The proposals focus heavily on ZEV technologies, and specifically BEVs, for reductions in the 2027 to 2032 timeframe. Yet, EPA is leaving emissions reductions on the table for existing LMDVs, given the lifespan of these vehicles, as well as new ICE vehicles that will be sold between now and 2032. According to Oak Ridge National Lab (ORNL)12 there were over 105 million cars and 148 million light trucks in the U.S. in 2020. In 2021, over 3.3 million new cars and over 11.2 million new light trucks were sold. The average age of a light-duty vehicle (LDV) is over 12 years. The U.S. Department of Energy's Energy Information Administration (EIA)13 projects the stocks of light-duty internal combustion engines will exceed 247 million vehicles in 2050. EPA's overly limited focus on ZEVs, and specifically BEV solutions, ignores options that could better accomplish the agency's objectives to achieve greater transportation sector-related emission reductions at lower cost to society. [EPA-HQ-OAR-2022-0829-0641, pp. 7-8]

11 88 Fed. Reg. 25,926 (April 27, 2023).

12 "Transportation Energy Data Book: Edition 40", Oak Ridge National Laboratory. ORNL/TM-2022/2376. https://tedb.ornl.gov/.

13 U.S. Energy Information Administration. "Annual Energy Outlook 2023." March 2023. https://www.eia.gov/outlooks/aeo/.

EPA's proposal extends to "medium-duty vehicles" (MDVs), previously referred to as "heavy-duty class 2b and 3 vehicles or heavy-duty pickups and vans."14 Vehicles in this class may include large SUVs, heavy-duty pickups, utility vans, mini-buses, step vans, delivery vans, and light dump trucks (i.e., GVWR up to 14,000 pounds) which have different and diverse usage applications 15 compared to lighter LDVs and medium-duty passenger vehicles (MDPVs), which fall into EPA's LDV classifications of light-duty passenger cars and light-duty trucks. The MDV market (i.e., class 2b and 3 vehicles) is made up of purchasers that want to get "the right tool for the job" and often include service providers such as plumbers, landscapers, and utility company fleets.16 Although there is little published regarding makeup, usage, and environmental impact of class 2b and class 3 vehicles, there are approximately 13 million class 2b and 3 million class 3 vehicles in the U.S. fleet and these vehicles may remain in fleets up to 15 years.17 Purchasing decisions and usage of class 2b and class 3 vehicles are driven by demands of meeting commercial, business, and personal use and these vehicles are likely used in distinctly different applications compared to lighter LDVs covered by EPA's proposal. Accordingly, these vehicles should not be included in the LMDV program. Further, as discussed in Section h below, EPA exceeded its authority in changing the definitions. [EPA-HQ-OAR-2022-0829-0641, pp. 7-8]

14 88 Fed. Reg. 29196 (May 5, 2023).

15 Oak Ridge National Laboratory. "Electrification Beyond Light Duty: Class 2b-3 Commercial Vehicles." ORNL/TM- 2017/744. 2017. https://info.ornl.gov/sites/publications/Files/Pub106416.pdf.

16 Ibid.

17 Ibid.

EPA explains in the Proposed Rule that "[l]ight-duty trucks (LDTs) that have gross vehicle weight ratings above 6,000 pounds and all MDVs are considered ''heavy-duty vehicles'' under the CAA." 88 Fed. Reg. at 29226 n. 382. This comports with CAA § 202(b)(3)(C), which defines the term "heavy duty vehicle" to mean "a truck, bus, or other vehicle manufactured primarily for use on the public streets, roads, and highways (not including any vehicle operated exclusively on a rail or rails) which has a gross vehicle weight (as determined under regulations promulgated by the Administrator) in excess of six thousand pounds." This definition communicates Congress's clear intent that heavy-duty vehicles should be regulated as a distinct class of vehicles, separate from light-duty vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 29-30]

The Proposed Rule violates this obligation by regulating certain heavy-duty vehicles as light-duty vehicles and by commingling these two classes in the same averaging, banking, and trading program (which, as addressed in subsection iii, above, is unlawfully considered in formulating the proposed emissions standards). [EPA-HQ-OAR-2022-0829-0641, pp. 29-30]

The problem here involves "medium duty vehicles" ("MDV"), which EPA defines to mean Class 2b and 3 vehicles. 88 Fed. Reg. at 29226. EPA explains that it "has not previously used the MDV nomenclature, referring to these larger vehicles in prior rules as either heavy-duty Class 2b and 3 vehicles or heavy-duty pickups and vans." EPA further explains that it previously "addressed medium-duty vehicle emissions as part of regulatory programs for GHG emissions along with the heavy-duty sector." Id. at 29227. The exception was "medium duty passenger vehicles" ("MDPV") which EPA previously has defined as "vehicles between 8,501 and 10,000 pounds GVWR designed primarily for the transportation of persons." Id. at 29226 n. 382. According to EPA, "[w]hen [it] established its GHG standards in 2010, EPA included MDPVs in the light-duty vehicle GHG program as well," such that "[e]ssentially, MDPVs are heavy-duty vehicles that are included in light-duty vehicle programs." Id. at 29278. [EPA-HQ-OAR-2022-0829-0641, pp. 29-30]

EPA here proposes to expand the definition of MDPV in two ways: (1) "EPA is proposing to include in the MDPV definition any passenger vehicles at or below 14,000 pounds GVWR with a work factor at or below 5,000 pounds except for pickups with an open bed interior length of eight feet or larger which would continue to be excluded from the MDPV category"; and (2) EPA proposes "to include in the MDPV category any pickups with a GVWR below 9,900 pounds and an interior bed length less than eight feet regardless of whether the vehicle work factor is above 5,000 pounds. Pickups at or above 9,900 pounds up to 14,000 pounds GVWR with a work factor above 5,000 pounds would be included as MDPVs only if their interior bed length is less than six feet." Id. EPA proposed these changes out of concern that "potential market changes [] could move passenger vehicles out of the LD regulatory class." Id. [EPA-HQ-OAR-2022-0829-0641, pp. 29-30]

The inclusion of heavy-duty vehicles (i.e., "a truck, bus, or other vehicle manufactured primarily for use on the public streets, roads, and highways … which has a gross vehicle weight … in excess of six thousand pounds," CAA § 202(b(3)(C)) in the same class as light-duty vehicles for purposes of setting emissions standards violates EPA's obligation to regulate heavy-duty vehicles and light-duty vehicles as separate classes under CAA § 202. This fundamental error is magnified by the current proposal to expand the category of MDPVs to include both heavier vehicles and an expanded range of lighter vehicles. [EPA-HQ-OAR-2022-0829-0641, pp. 29-30]

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Organization: Arconic Corporation (ARCO)

5. Arconic agrees with the proposed modifications to the medium duty passenger vehicle definition. The previous definition is that any vehicle with a GVWR over 8500 pounds is a medium duty vehicle. This change would prevent vehicles that are used as light duty vehicles to be moved into the "medium duty" category by higher vehicle weights and minor capacity improvements and thus qualify for higher emission targets. [EPA-HQ-OAR-2022-0829-0741, p. 3]

Organization: Electrification Coalition (EC)

We suggest the EPA address the topic of vehicle right-sizing in the future in the context of reducing the overall impact of emissions from the transportation sector, and to more widely enable the benefits of transportation electrification. [EPA-HQ-OAR-2022-0829-0588, p. 3]

The EC agrees with the EPA’s projection that a future fleet will be characterized by a greatly increased projection of EVs. It is also reasonable to project that the future light duty fleet will, in the absence of regulatory action on vehicle size, continue to be dominated by large and heavy vehicles such as trucks and SUV EVs. An increasing number of larger EVs are appearing on the consumer market, whilst there has not been similar growth in the variety of smaller EVs. [EPA-HQ-OAR-2022-0829-0588, p. 3]

The EC believes that the approach by the EPA in this proposal is understandable and appropriate given the structure of the existing regulatory framework and we appreciate the work EPA has done to broaden he definition of medium duty passenger vehicles (MDPVs) to ensure that auto manufacturers will not upsize vehicles to avoid emissions controls. However, the question of vehicle size and cost must continue be thoughtfully considered by the EPA and other regulators going forward in the context of reducing the emissions impact of the transportation sector and helping to expand the benefits of electrified transportation more widely. To help accelerate and optimize the electrification transition, in future rulemakings, emissions standards for internal combustion engine vehicles should be paired with policy that incentivizes the production of a wider range of EV choices for all consumers and transportation needs. [EPA-HQ-OAR-2022-0829-0588, p. 3]

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Organization: Environmental Defense Fund (EDF) (1of 2)

IV. EPA should finalize medium-duty standards that deliver needed pollution reductions from Class 2b and 3 vehicles.

EPA reasonably included Class 2b and 3 vehicles, referred to in the proposal as medium-duty vehicles (MDVs), in the same rule as the light-duty vehicles. The medium-duty large vans and pick-up trucks included in this proposal are more similar to LDVs in their use patterns and configurations than HDVs. Indeed, many 2b trucks are simply larger versions of 2a trucks with engines and transmissions that are nearly identical in configuration. Like LDVs, Class 2b and 3 vehicles are chassis certified rather than engine certified. Including MDVs in this proposal also aligns the treatment of these vehicles with previous criteria pollutant standards where chassis certified vehicles are considered separately from engine certified vehicles. [EPA-HQ-OAR-2022-0829-0786, p. 45]

Organization: Lucid Group, Inc.

Lucid Supports the Medium-Duty Passenger Vehicle Definition

Lucid supports EPA's proposed new medium-duty passenger vehicle (MDPV) classification, which closes a loophole for larger passenger vehicles. In recognizing the actual uses of certain larger and heavier vehicles as passenger vehicles, EPA's proposed MDPV classification would subject these heavier passenger vehicles to the same standards as all other passenger vehicles, i.e., light duty passenger vehicles. Without this change, larger SUVs and passenger vans would be regulated as heavy-duty vehicles with less stringent emissions standards despite available technology to allow these vehicles to meet the same standards as light duty vehicles. Further, in the absence of the classification change proposed by EPA, automakers would be perversely incentivized to continue making and selling larger, potentially more dangerous vehicles with higher emissions. [EPA-HQ-OAR-2022-0829-0664, p. 5]

Organization: Mercedes-Benz AG

We would like to emphasize the importance of setting feasible and achievable standards for Class 2b and Class 3 vehicles. Similar to light-duty vehicles (“LDVs”), there remain many uncertainties in customer uptake and acceptance of medium-duty electric vehicles. Moreover, electrification in this segment lags that of light-duty, as production of these vehicles is only just beginning. As a result, there are currently limited options available to consumers, and medium-duty charging infrastructure requires additional attention, funding, and considerations appropriate for medium-duty vehicle usage. Medium-duty vans are being increasingly swept into pick-up truck focused regulations, as well as EPA’s intent to treat medium-duty more like light-duty. Yet, medium-duty vans remain fundamentally different than either pick-ups or light-duty, and therefore warrant specific consideration of their technologies, customer uses, and corresponding regulatory requirements. [EPA-HQ-OAR-2022-0829-0623, pp. 2-3]

Section V: MDVs (Vans)

Use-Cases

In the MDV segment, there are typically two kinds of vehicles included, pickup trucks and vans. These two vehicle types are fundamentally different. [EPA-HQ-OAR-2022-0829-0623, pp. 16-17]

For vans, there are use cases with high potential for rapid electrification, but also segments with long-distance driving, high payload requirements and thus lower potential for rapid electrification. As shown in 2021 sales data, although last mile delivery applications form a portion of Sprinter van sales, they are used for a wide variety of other applications as well– construction vehicles, small businesses such as plumbers and electricians, people movers, and recreational vehicles. These applications are not typically fulfilled by pick-up trucks, but the EPA NPRM makes no differentiation between the diversity of use cases within the MDV segment. Further, EPA increasingly treats MDVs as light-duty vehicles. Yet traditionally they were aligned with the heavy-duty segment. The MDV segment provides unique functionality separate from light-duty or heavy-duty vehicles. As such, standard setting for MDVs should be differentiated. [EPA-HQ-OAR-2022-0829-0623, pp. 16-17]

[See original for diagram for 2021 sales data] [EPA-HQ-OAR-2022-0829-0623, pp. 16-17]

When standard setting, EPA should consider the unique use cases that MDV vans fulfill in the market and reflect that in standards proposed. It is unreasonable for the agency to set one standard for pickup trucks with towing capacities approaching 50,000lb that also includes vans that are used as people movers and recreational vehicles. EPA should also not tie MDV emissions standards to the same expectations as light-duty. [EPA-HQ-OAR-2022-0829-0623, pp. 16-17]

Organization: Rivian Automotive, LLC

Rivian Supports Proposed Technical Changes to Ensure Strict Standards Govern Larger Vehicles [EPA-HQ-OAR-2022-0829-0653, p. 12]

Rivian commends EPA for its thoughtfully proposed modifications to certain vehicle classifications and the car and truck standards. As the agency notes, the regulatory structure of the GHG standards could “inadvertently provide an incentive for manufacturers to change the size or regulatory class of vehicles as a compliance strategy”—an increasingly important concern in light of sustained fleet mix changes in the market in favor of truck-classified passenger vehicles and the use of larger high-utility vehicles like pickups.34 This set of concerns predates the current proposal, and we welcome the actions proposed by EPA in response—namely commonsense modifications to expand the MDPV definition and valuable changes to the car and truck curves. As a manufacturer of MDPVs, Rivian understands the importance of vehicle classification for ensuring that the full universe of passenger vehicles adheres to the appropriate emissions standards and consumer assurance measures. Similarly, adjusting the slopes of the standards curves and narrowing the difference in stringency between the car and truck standards should moderate any perverse incentives for manufacturers to upsize and/or reclassify vehicles. EPA should finalize the proposed vehicle classification changes. [EPA-HQ-OAR-2022-0829-0653, p. 12]

34 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 87 (May 5, 2023) (revising 40 C.F.R. Parts 85, 86, 600, 1036, 1037, and 1066), 29,196.

Organization: Stellantis

Implicit / Explicit MDV GHG Standards are Infeasible

The EPA is proposing a very challenging set of regulatory changes for the medium-duty vehicles that are infeasible. This includes direct core stringency changes along with four other actions that further increase stringency: [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

- Medium-duty Passenger Vehicle (MDPV) – Changes the MDPV definition which negatively impacts both light-duty and medium-duty greenhouse gas stringency [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

Medium-Duty Passenger Vehicle Classification Changes Hurt Medium-Duty Pickup Trucks

Revisions to the MDPV definition are proposed by EPA. EPA notes that the Work Factor threshold of 5,000 lb. was set to avoid capturing a significant number of work vans or trucks. [redacted text.] [EPA-HQ-OAR-2022-0829-0678, pp. 20-22]

In summary, the MDPV proposed revised definition needs to be changed because it:

-- Reclassifies some GHG reducing BEVs back to LDT fleet, effectively harming MD GHG fleet

-- [redacted text.] [EPA-HQ-OAR-2022-0829-0678, pp. 20-22]

Stellantis recommends that EPA should:

GHG Standards

-Fix incorrect MDV adjustments that mistakenly force medium-duty vehicles into light-duty standards and double stringency of high capability products arbitrarily [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Tesla, Inc.

Tesla Supports EPA’s Proposed Changes to the Medium Duty Definition

Tesla supports the agency’s proposed definitional changes around medium-duty passenger vehicles.166 As more electrification takes place across the passenger vehicle fleet, the definitional changes will allow the agency to recognize the increased weight associated with such electrification while ensuring that passenger vehicles are appropriately subject to more stringent passenger-vehicle emissions standards. [EPA-HQ-OAR-2022-0829-0792, p. 26]

166 Id., at 29278-79.

Organization: Zero Emission Transportation Association (ZETA)

7. ZETA Comments on the Additional Proposed Regulatory Changes

Beyond the overall stringency of EPA's proposed GHG and multipollutant emissions standards for LMDVs, ZETA is providing the following comments on the various regulatory changes proposed in the rule. [EPA-HQ-OAR-2022-0829-0638, p. 28]

ZETA supports EPA's proposed changes to the medium-duty passenger vehicle (MDPV) definition. As MDPVs become increasingly electrified, EPA regulations should reflect the increased weight associated with the onboard battery. MDPVs are predominantly used to transport people, rather than goods, and therefore should be subject to emissions standards whose stringency is consistent with non-work based applications. [EPA-HQ-OAR-2022-0829-0638, p. 28]

<u>EPA Summary and Response</u>

<u>Summary:</u>

EPA received a variety of comments regarding proposed vehicle regulatory class changes. Comments ranged from highly supportive to strong opposition, with some comments either being out of scope or more nuanced.

EPA received supportive comments from Arconic Corporation (ARCO), the Electrification Coalition, Lucid Group, Rivian, Tesla and the Zero Emissions Transportation Association (ZETA). Referring to the proposed expansion of the Medium Duty Passenger Vehicle Definition (MDPV), Rivian commented that EPA's proposed change to the MDPV definition was a "common sense modification" and agreed with EPA that retaining the existing MDPV definition could inadvertently provide an incentive for manufacturers to change the size or regulatory class of vehicles as a compliance strategy.

The Alliance for Automotive Innovation (AAI) provided a significant number of comments regarding potential changes to regulatory classifications. AAI noted that the MDPV definition change may result in misalignment with NHTSA's regulatory classifications, and they suggested the definition change might not result in the intended outcome. They further noted that moving heavy BEVs out of the medium-duty averaging set would result in the cleanest vehicles not contributing to medium-duty vehicle compliance. AAI also expressed concerns with the consistency of the revised MDPV definition and the proposed 22,000-pound GCWR limit for engine certification. AAI went on to make several recommendations: 1. Allow the revised MDPV definition to be adopted early in MY 2027 as an option but delay mandatory adoption until MY 2030. 2. Preferred option is to retain the existing MDPV definition and allow Class 3 BEV/FCEV/PHEV vehicles the option to contribute to either Medium-Duty or Light-Duty GHG compliance, but not both. 3. If the MDPV definition is adopted, the GVRW threshold should be lowered to 9,500 pounds and the work factor threshold should be lowered to 4,500 pounds. AAI also recommended clarification in the revised MDPV definition for the measured bed length.

AFPM objected to the classification of some vehicles as medium duty vehicles, on the ground that the Clean Air Act defines these vehicles as heavy-duty vehicles, which triggers certain statutory provisions such as lead time and stability.

API stated that the inclusion of heavy-duty vehicles in the same class as light-duty vehicles for purposes of setting emissions standards, and commingling the vehicles for the ABT program violates EPA's obligation to regulate heavy-duty vehicles and light-duty vehicles as separate classes under CAA § 202.

EPA also received Confidential Business Information (CBI) from several vehicle manufacturers which provided specific feedback on the proposed MDPV definition change which are largely reflected in the AAI comments above.

Response:

EPA appreciates the comments received regarding changes to regulatory classifications. Upon review of the public comments, EPA has decided to finalize changes to the MDPV definition, but with several specific modifications from the proposal. EPA is adopting AAI's recommended changes to the thresholds for the MDPV definition, with 9,500 pounds and 4,500 pounds being the final thresholds for GVWR and work factor, respectively because the agency agrees with the commenters that these thresholds more appropriately encompass the range of vehicle weights and utility that the agency was attempting to address. In addition, EPA agrees with AAI that we should allow vehicle manufacturers the option of adopting the revised MDPV definition prior to MY 2027, but the Agency has decided against delaying the requirement until MY 2030 because the agency believes that there is risk of manufacturers moving light-duty vehicles into the medium duty category to gain less stringent standards; the revised MDPV definition will be required starting in MY 2027. Because there are little to no ICE-based vehicles that fall under the MDPV definition as a result of the changes in this rule, the Agency does not believe that there are any lead time issues associated with adopting the revised definition at the start of the program.

EPA has collaborated extensively with the National Highway Traffic Safety Administration (NHTSA) during the development of this rulemaking and have consulted with NHTSA about our intent to revise the MDPV definition for GHG and criteria pollutant emissions. EPA understands that NHTSA does not have the same flexibility under the CAFE statute to follow suit with EPA's revised MDPV definition change. We have accordingly amended 40 CFR part 600 to maintain consistency with NHTSA's MDPV definition for regulatory provisions related to fuel economy standards and labeling. However, EPA does not view the differences in program structure for applying emission standards as being significantly different than other programmatic and statutory differences between the two agencies. Differences already exist, such as the CAFE program's limitation on car/truck credit trading that require vehicle manufacturers to manage two different averaging sets. We do not believe that this difference in MDPV definition will cause difficulties with or be disruptive to manufacturers' strategies to simultaneously comply with both the CAFE standards and these GHG standards.

Regarding AFPM's objections to the medium duty class, EPA recognizes that these vehicles are heavy duty vehicles for purposes of Clean Air Act section 202(a)(3). In fact, the regulation defines "Medium-duty vehicle" at 40 CFR 86.1803-01 to be a subset of heavy-duty vehicles. As such, we use the term medium-duty vehicles only to more clearly establish how the regulation applies for that collection of heavy-duty vehicles. It is precisely because these are heavy-duty vehicles that EPA has adopted a default compliance schedule, consistent with the lead time and stability requirements of CAA section 202(a)(3)(C), as well as an optional compliance schedule for these vehicles. In addition, in setting the standards, EPA identified criteria pollutant standards for the greatest degree of emissions reduction achievable pursuant to CAA section 202(a)(3)(A). However, EPA does not see any basis for concluding that the Clean Air Act prohibits EPA from grouping these vehicles together (or to allow very limited credit transfers for ABT purposes) for purposes of these emissions standards. To the contrary, CAA section 202(a)(3)(A)(ii) authorizes EPA to establish classes or categories of vehicles based on gross vehicle weight or other appropriate factors.

With respect to API's objection that heavy duty vehicles should be regulated in the same class as light duty vehicles, EPA notes, as previously stated, that it is regulating heavy duty vehicles pursuant to section 202(a)(3), as appropriate. To the extent API objects to vehicles above 6,000 lbs GVWR being subject to the same standards as vehicles below 6,000 lbs GVWR, EPA disagrees that there is anything that makes such an outcome impermissible under the CAA, provided EPA promulgates standards under the relevant statutory provision. Moreover, EPA has a longstanding practice of adopting standards for certain light trucks with GVWR somewhat above 6,000 lbs GVWR consistently with light trucks at or below 6,000 lbs GVWR, in recognition of the fact that these trucks generally serve similar purposes and have similar control strategies available. EPA considers it beneficial for the environment, the public, and manufacturers to avoid creating sharp divides in regulatory treatment that do not reflect real-world differences in vehicles. This approach prevents situations where disparate regulatory treatment shapes the market, rather than reflecting differences in vehicles and market demand. EPA allows exchanging emission credits across vehicle types when doing so is consistent with the rationale of the ABT program, providing flexibility and incentives to manufacturers to identify efficient areas for pollution reduction, within comparable segments of the market.

In response to comments received from AAI regarding the GCWR cap in the WF equation, please see Section 3.2.2 of this RTC.

3.1.2 - Averaging, banking, and trading

<u>Comments by Organizations</u>

Organization: Alliance for Automotive Innovation

Averaging, Banking, and Trading

Auto Innovators supports EPA's greenhouse gas averaging, baking, and trading (ABT) program. This flexibility helps manufacturers plan more cost-effective compliance. We agree with EPA's proposal to not change ABT provisions at this time. [EPA-HQ-OAR-2022-0829-0701, p. 108]

O_2 Credits for Advanced Technology Vehicles

EPA proposes changes to the method for calculating MY 2022-2024 caps on multiplier-based advanced technology vehicle credits in the proposed 40 C.F.R. § 86.1866-12.195 Given the limited comment period and the denial of our request to extend it, Auto Innovators did not have sufficient time to evaluate the proposed change. Additionally, we were unable to locate a description of the proposed change in the preamble of the NPRM, so it is difficult to know what the intent of the proposed change is. Following the formal comment period, we may revisit this issue and request a meeting with EPA staff if there is a concern. [EPA-HQ-OAR-2022-0829-0701, pp. 108-109]

195 NPRM at 29438.

E. Structure and Development of GHG Standards

1. Authority to Set Fleet Average Standards

Auto Innovators reaffirms its previously expressed support for the fleetwide averaging, banking, and trading approach used by EPA in the Proposed Rule, including for EVs. EPA has repeatedly employed this approach in prior section 202 rulemakings, including in the GHG context, and this approach is amply supported by statute. [EPA-HQ-OAR-2022-0829-0701, pp. 109-110]

EPA and automakers have long relied on averaging, credits, and banking, and these features are now integral to many manufacturers' business strategies. Indeed, fleetwide averaging has been essential to the auto industry's efforts to meet EPA's GHG reduction goals in past rulemakings. Fleetwide averaging, credits, and banking provides manufacturers with flexibility, and reflects the realities of product life cycles, while still ensuring that the manufacturer's overall fleet meets emissions reduction standards. Thus, averaging permits the imposition of tough emissions standards on manufacturers, while reducing compliance costs and encouraging the development and marketing of emissions reduction technologies. [EPA-HQ-OAR-2022-0829-0701, pp. 109-110]

Fleetwide averaging is fully supported by the text of section 202, which requires EPA to "prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines." As the D.C. Circuit has recognized, "[n]nothing" in this language precludes EPA's consideration "of a manufacturer's ability to meet emissions standards by averaging different engine families." [EPA-HQ-OAR-2022-0829-0701, pp. 109-110]

Consistent with this statutory text, EPA has employed fleetwide averaging in its section 202 standards for decades. EPA first adopted an averaging program for certain light-duty vehicles in 1983, followed by an averaging program for certain types of emissions from heavy-duty engines and light-duty trucks in 1985. This program was unanimously upheld by a panel of the D.C. Circuit in Thomas. A few years later, EPA extended the averaging approach to include banking and trading. Each of EPA's GHG emissions standards, since the agency began regulating GHG emissions under section , has employed fleetwide averaging, banking, and trading. And EPA has long recognized that EVs may be accounted for in complying with fleet- average emissions regulations, dating back to EPA's approval in 1990 of California's Low Emission Vehicle Program—which effectively employed a fleet average standard including EVs— as "consistent with section 202(a)."202 [EPA-HQ-OAR-2022-0829-0701, pp. 109-110]

We endorse EPA's continued use of fleetwide averaging, banking, and trading, which is well-supported by statute and essential to comply with any GHG emissions standards. [EPA-HQ-OAR-2022-0829-0701, pp. 109-110]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

Credit issues should be addressed further in the final rule

EPA states that MDVs are a separate averaging set and credits are not allowed to be transferred between MDVs and LDVs due to differences in the structure of the standards for these two vehicle categories and manufacturer competitiveness issues (FR 29245). ACEEE strongly supports this decision and believes that keeping the categories separate will help to avoid unintended consequences. [EPA-HQ-OAR-2022-0829-0642, pp. 10-11]

ACEEE also supports EPA's proposal to remove the BEV, PHEV, and FCEV multipliers for MY 2027 (FR 29244), especially in view of the changing environment for the electrification of MDVs, including availability of federal purchase incentives. However, leaving in place advanced technology multipliers through MY 2026 could severely erode the real-world emissions reductions of the proposed standards. In particular, we find that if advanced technology credits were to retain the 5-year life assigned under the Phase 2 rule, credits generated by BEV vans sold in MY 2024-2026 would eliminate the need for manufacturers to produce any of the BEV pickup sales that EPA has projected for MY 2027-2031. Alternatively, these credits could be used to offset the modest medium-duty ICE pickup efficiency gains EPA projects for MY 2027-2031. We recommend that EPA eliminate advanced technology multipliers for MY 2024-2026 in the final rule. [EPA-HQ-OAR-2022-0829-0642, pp. 10-11]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

That fleetwide-averaging approach is at the heart of EPA's proposed rule at issue—which sets stringent new GHG and criteria-pollutant emission stand- ards for light- and medium-duty vehicles (broad categories that together encompass sedans, pickup trucks and SUVs, vans, and more) for model years 2027 and beyond, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,184 (May 5, 2023)—and its parallel proposed rule for heavy-duty vehicles, Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 88 Fed. Reg. 25,926 (Apr. 27, 2023). Although prior EPA rules issued under Section 202 have employed fleetwide averaging—including a light-duty motor-vehicle rule for earlier model years, currently being litigated, see Texas v. EPA, No. 22-1031 (D.C. Cir.)—EPA's proposed Light- and Medium-Duty and Heavy-Duty rules do so in a fundamentally different way to achieve a different end. Previously, averaging was presented as merely a flexibility. Now, prompted by an Executive Order calling for a massive shift to "zero-emission vehicles" by 2030 and directing EPA to undertake rulemakings on these issues with that goal in mind, Exec. Order 14,037, 86 Fed. Reg. 43,583 (Aug. 5, 2021); see 88 Fed. Reg. at 29,186, EPA openly seeks in both rules to shift a substantial portion of motor-vehicle production toward vehicles that emit zero GHG emissions in operation. Fleetwide averaging is the linchpin of that ambition—it is this that allows EPA to reverse engineer its preferred outcomes. [EPA-HQ-OAR-2022-0829-0683, p. 7]

Organization: American Fuel & Petrochemical Manufacturers

The structure of the Clean Air Act and its regulatory provisions for standard setting, certification, compliance enforcement, warranties, and penalties also directly conflict with a fleet- wide averaging regulatory regime. Notably, under Section 202(a), EPA "shall test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer" and issue a certificate of conformity "if such vehicle or engine" complies with the standards. And EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such a system enables such vehicle or engine to conform to the standards required to be prescribe under [Section 202(b)]" of the Act. EPA's use of a fleetwide averaging regulatory regime directly conflicts with the statutory provisions that Congress already included to provide manufacturers with compliance flexibility. For example, section 202(b)(3) provided compliance flexibilities for NOx, but only for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater." This provision would be nonsensical under a fleetwide-averaging regime where, if applied, an OEM could give itself a waiver for large swaths of its fleet by over-complying for certain product lines well beyond its 5 percent or 50,000 vehicle allotment. Together, the Clean Air Act regulatory framework contemplates EPA regulating vehicles individually. But this cannot be accomplished if there is not a clear emission standard applicable to a single vehicle at the start of a model year. [EPA-HQ-OAR-2022-0829-0733, pp. 23-24]

Organization: American Petroleum Institute (API)

iv. EPA exceeded its authority by ignoring the distinctions Congress made between heavy duty vehicles and light-duty vehicles and commingling them in the same averaging, banking, and trading (ABT) program with smaller vehicles.

The Proposed Rule violates this obligation by regulating certain heavy-duty vehicles as light-duty vehicles and by commingling these two classes in the same averaging, banking, and trading program (which, as addressed in subsection iii, above, is unlawfully considered in formulating the proposed emissions standards). [EPA-HQ-OAR-2022-0829-0641, pp. 29-30]

Organization: Aston Martin Lagonda (AML)

SVMs cannot effectively fleet average

One assumption supporting the NPRM which is not applicable to SVMs is that all OEMs have the ability to average the emissions of their various test groups in order to meet a fleet standard. SVMs have long maintained that with only one or two high-performance test groups, they cannot use "averaging" as a compliance strategy and have therefore needed, and still need, the long-standing EPA policy affording extra leadtime and flexibility to SVMs. In the absence of such flexibility, a fleet average standard becomes in effect a required (BIN) standard for these SVMs. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

This point further underlines the simple reality that large car makers can achieve lower averages, whereas an SVM with a narrow or niche offering of products simple does not have this ability to comply with the regulation. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

It is improper to set a standard so stringent that it requires an SVM to rely entirely on credits from another manufacturer to maintain compliance

EPA projects that SVM fleets on average, and individually, will exceed the proposed standards, requiring purchased credits to continue selling vehicles in the US. EPA therefore relies on credit trading flexibility as a key means by which SVMs will maintain compliance with standards. We disagree with this approach. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

It is counterproductive to set a standard so stringent that it requires a manufacturer to rely entirely on credits from another manufacturer to maintain compliance. The decision to sell credits, who to sell them to, at what price to sell them, and when to sell them (or to keep them for drafted later use or future value} is a business decision. There is nothing that requires a manufacturer to sell its credits, or to sell them to a particular party. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

This approach would prevent SVMs from focusing valuable resources on investment in the development and production of zero emission cars and instead divert resources to buy credits or pay financial penalties. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

On the one hand, EPA justifies its standard setting on the basis that credits can be bought, but on the other hand, EPA steadfastly maintains that it will not get involved in credit trading and leaves it to the free market. As a result, the availability and cost of credits is inherently risky, including the risk that credit-generating manufacturers may strategically withhold credits to limit SVMs' market access. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

And finally, compliance with EPA's proposed standards is largely premised on very high levels of electrification. If EPA's projections are incorrect, and sales of electric vehicles are not as high as expected, many manufacturers will likely need to hold onto credits to maintain their own compliance. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

Organization: Clean Fuels Development Coalition et al.

C. Even if EPA could use fleetwide averaging, this cannot be used to force electrification.

Part of the reason EPA has traditionally been granted deference in its averaging schemes is because the agency has historically used averaging as an accommodation to regulated parties, allowing them additional flexibility that the statute does not in fact authorize. In prior rules, the use of fleet-wide averaging meant that a vehicle manufacturer could comply by making some vehicles that emitted more and others that emitted less. Thus, while some commentors have pointed out the illegality of this scheme, vehicle manufacturers have not opposed EPA’s averaging approach because it provided them with the flexibility necessary to achieve in a more cost-effective way otherwise impractical standards. [EPA-HQ-OAR-2022-0829-0712, pp. 10-11]

Thus, when considering EPA’s authority to use averaging, the D.C. Circuit has always noted that it was critical that the averaging serve as merely a flexibility. See NRDC v. Thomas, 805 F.2d 410, 425 (D.C. Cir. 1986) (“EPA’s argument that averaging will allow manufacturers more flexibility in cost allocation while ensuring that a manufacturer’s overall fleet still meets the emissions reduction standards makes sense.”) (emphasis added); cf. White Stallion Energy Ctr., LLC v. EPA, 748 F.3d 1222, 1253 (D.C. Cir. 2014) (permitting averaging across multiple utility units under 42 U.S.C. § 7412(d) because averaging is a “‘more flexible, and less costly alternative.’”). [EPA-HQ-OAR-2022-0829-0712, pp. 10-11]

But in this new proposal EPA is not offering an extra statutory accommodation to a regulated party, but is instead taking an additional step away from the statutory text by using fleetwide averaging to mandate electrification. The proposal would set emissions standards in such a way that no fleet of internal combustion engine vehicles can meet the standards. This means that averaging no longer provides flexibility about which kinds of internal-combustion vehicles a manufacturer may sell, but instead amounts to a de facto mandate to incorporate electric vehicles to comply with its proposed standards. Much as in the Clean Power Plan, crediting is deployed as a tool for reverse engineering a share of preferred technologies by setting targets that cannot be achieved by disfavored technologies. Thus, even if the agency was properly entitled to deference in its previous averaging schemes, this deference evaporates when the scheme is used coercively, rather than permissively. [EPA-HQ-OAR-2022-0829-0712, pp. 10-11]

Organization: Environmental and Public Health Organizations

D. The averaging, banking, and trading program continues to be an important way for manufacturers to maintain flexibility in meeting EPA's vehicle emission standards.

Like its previous GHG emission standards for light- and heavy-duty vehicles, and standards for certain vehicle criteria pollutant emissions dating back to 1983, EPA's Proposed Standards rely on an averaging, banking, and trading (ABT) approach allowing manufacturers to meet the standards by averaging emissions across vehicles. Given its longstanding use of this approach under Section 202, EPA's Proposal emphasizes that EPA is "not proposing any revisions to the [light-duty or medium-duty] GHG program ABT provisions or reopening them." 88 Fed. Reg. at 29246; id. at 29245; see also id. at 29277 (similar statement regarding ABT provisions for the proposed criteria pollutant program for NMOG+NOx standards). [EPA-HQ-OAR-2022-0829-0759, p. 85]

We agree with EPA's determination that there is no reason to reopen the question whether it is permissible to use an ABT approach under Section 202. EPA has not only repeatedly used ABT in Section 202 standards but also repeatedly explained that ABT is consistent with and gives full effect to the requirements of Section 202 as well as the Clean Air Act's compliance and enforcement provisions applicable to standards issued under Section 202. Under such circumstances, it is eminently reasonable for EPA not to reconsider a question that has been settled for decades. See Growth Energy v. EPA, 5 F.4th 1, 13 (D.C. Cir. 2021). In promulgating its final standards, EPA should refrain from "substantive reconsideration," id. at 21, of whether ABT is a permissible approach under Section 202, which might inadvertently suggest, notwithstanding the statements in the Proposal, that EPA has reopened the issue. EPA may, of course, express its continued adherence to its previously settled view that Section 202 permits standards using ABT without reopening the issue, and it may respond to any unsolicited comments it may receive on the issue. See Banner Health v. Price, 867 F.3d 1323, 1341 (D.C. Cir. 2017) (quoting Kennecott Utah Copper Corp. v. U.S. Dep't of Interior, 88 F.3d 1191, 1213 (D.C. Cir. 1996)). But reexamination and reconsideration of whether ABT is consistent with the Clean Air Act is unnecessary and uncalled-for. [EPA-HQ-OAR-2022-0829-0759, pp. 85-86]

EPA first promulgated a Section 202 standard that used averaging when it issued its particulate standards for light-duty diesel vehicles in 1983. See 43 Fed. Reg. 33456 (July 21, 1983). EPA explained at that time that standards employing averaging fell within its "broad authority" under Section 202 and were "consistent with the [Clean Air Act's] certification scheme." Id. at 33458. Specifically, the 1983 standard required EPA to certify the conformity of a manufacturer's vehicles with a standard that was established based on a combination of testing of the families of vehicles making up their fleets and planned production volumes. This process would yield a fleet whose average emissions complied with the standard; the certificate would be conditioned on the manufacturer actually "maintain[ing] family production volumes such that the production-weighted average of the manufacturer's family limits indeed meets the standards at year's end." Id. at 33459. As EPA explained, averaging thus accords with the Act's prohibition on the sale of vehicles not covered by a certificate of conformity and allows imposition of appropriate penalties for any violations. [EPA-HQ-OAR-2022-0829-0759, p. 86]

EPA's 1985 standard for NOx emissions from light-duty trucks, as well as for NOx and particulates from HD engines, similarly employed an averaging approach. See 50 Fed. Reg. 10606 (Mar. 15, 1985). EPA's final rulemaking notice again explained that its averaging approach was consistent with the statutory requirement that compliance be certified before vehicles were sold, and that certification was subject to the condition that the certificate would be voided if the manufacturer's production-weighted average emissions did not meet the standard at the end of the model year. See id. at 10633, 10636-37. EPA found that "the averaging concept" was "fully consistent with the technology-forcing mandate of the Act," id. at 10634, while at the same time "eas[ing] the compliance burden" for manufacturers, id. at 10635. [EPA-HQ-OAR-2022-0829-0759, p. 86]

The D.C. Circuit rejected arguments that the 1985 standard's averaging approach was unauthorized under the Clean Air Act in NRDC v. Thomas, 805 F.2d 410 (D.C. Cir. 1986). The court observed that "EPA's agreement that averaging will allow manufacturers more flexibility in cost allocation while ensuring that a manufacturer's overall fleet still meets the emissions reduction standards makes sense." Id. at 425. [EPA-HQ-OAR-2022-0829-0759, pp. 86-87]

Thomas noted that there were potential arguments against averaging that it did not address because they had not been raised before the Agency, including an argument that an averaging approach might not be consistent with the Act's testing and certification provision, Section 206. Id. at 425 n.24. The court suggested that EPA consider this question in future proceedings and provide a further explanation of how averaging conformed to statutory requirements. Id. [EPA-HQ-OAR-2022-0829-0759, p. 87]

EPA took the court up on that invitation in its subsequent 1990 rulemaking proceeding establishing certification programs for banking and trading of NOx and particulate emission credits for HD engines. That rulemaking resulted in an expanded averaging regime, with the addition of provisions for banking and trading of credits generated if manufacturers production-weighted average emissions were below the requirements of the NOx and particulate standards. See 55 Fed. Reg. 30584, 30584-86 (July 26, 1990). Both in the final rulemaking notice and the proposal for those standards, EPA addressed the issues flagged in Thomas and explained at length how the ABT program conformed with the Clean Air Act's certification requirements. See id. at 30593-94 (final rule); 54 Fed. Reg. 22652, 22665-67 (May 25, 1989) (proposed rule). EPA articulated in detail how its ABT approach entails presale certification of the conformity of each engine or vehicle with the applicable standards based on testing of emissions generated by engine families and projected production estimates, with certification conditioned on a final end-of-model-year determination that a manufacturer's actual production-weighted average emissions comply with the standard. See 55 Fed. Reg. at 30585, 30594, 30600-04. These features of the ABT program, EPA explained, facilitate application of the Act's enforcement and penalty provisions. See id. at 30594, 30603-04. EPA similarly used ABT in its Tier 2 light-duty NOx standards promulgated in 2000. See 65 Fed. Reg. at 6744. [EPA-HQ-OAR-2022-0829-0759, p. 87]

Having determined in these earlier rules that ABT standards are consistent with Section 202, EPA employed the ABT approach pioneered in the 1990 HD standards when it first adopted GHG standards for LDVs in 2010 and HD engines and vehicles in 2011. See 75 Fed. Reg. 25324, 25405 (May 7, 2010); 76 Fed. Reg. 57106, 57127-28 (Sept. 15, 2011). In each case, EPA explained at length how, in implementing ABT standards, it fulfills its statutory obligations to certify conformity of vehicles or engines with the standards before they are introduced into commerce, to require warranties of compliance, and to test for in-use compliance. See 75 Fed. Reg. at 25468-77; 76 Fed. Reg. at 57254-92. EPA also explained how, under an ABT approach, it would give full effect to the statute's provision for calculation of penalties for each nonconforming vehicle in the event of a violation of the standards. See 75 Fed. Reg. at 25482; 76 Fed. Reg. at 57257. [EPA-HQ-OAR-2022-0829-0759, p. 87]

Subsequent iterations of GHG and other motor-vehicle emission standards under Section 202 for both LD and HD vehicles and engines have likewise used an ABT approach consistent with that used in the 2010 and 2011 GHG standards. See 77 Fed. Reg. 62624, 62788 (Oct. 15, 2012) (LD GHG standards); U.S. EPA, Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards; Final rule, 79 Fed. Reg. 23414, 23419 (LD and HD Tier 3 NOx standards); 81 Fed. Reg. 73478, 73495 (Oct. 25, 2016) (HD Phase 2 GHG standards); 85 Fed. Reg. 24174, 25103-04, 25114 (Apr. 30, 2020) (LD GHG standards); 86 Fed. Reg. 74434, 74441 (Dec. 30, 2021) (LD GHG standards). In none of those rulemaking proceedings did EPA reopen the issue whether Section 202 permits use of ABT in standard-setting; the Agency treated the option to use ABT under Section 202 as a settled matter. [EPA-HQ-OAR-2022-0829-0759, p. 88]

The Agency's settled practice of using ABT in Section 202 standards from 1990 onward did not generate further legal challenges until the most recent set of light-duty GHG standards. As to the latter standards, however, petitioners challenging the standards have argued in review proceedings pending in the U.S. Court of Appeals for the D.C. Circuit that Section 202 permits only the use of standards that specify emissions limits on an individual-vehicle basis, and that standards employing averaging render the Clean Air Act's compliance and enforcement provisions meaningless. See Final Br. for Priv. Petitioners, Texas v. EPA, Case No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF No. 1996915, at 36-50. EPA rejected those arguments when it considered them in the 1990 rulemaking, and they run counter to the settled construction of the statute on the basis of which EPA has issued standards since that time. EPA's brief in the D.C. Circuit and the brief of the state and nongovernmental organizations supporting EPA explain that challenges to ABT are untimely attempts to challenge determinations made decades ago, but also detail the reasons ABT is consistent with the language and structure of Section 202 and the applicable enforcement and compliance provisions of the Act. See EPA Br. 34-39, 62-75; State & Pub. Int. Br. at 3-6, 9-17. [EPA-HQ-OAR-2022-0829-0759, p. 88]

In sum, the Proposal's statements that "EPA has included ABT in many programs across a wide range of mobile sources," 88 Fed. Reg. at 29245, and that the "ABT provisions are an integral part of the vehicle GHG program," id. at 29246, are unquestionably accurate. Given that EPA long ago addressed and resolved the lawfulness of ABT under Section 202, that EPA's use of ABT is consistent with the D.C. Circuit's precedent in Thomas, that EPA has repeatedly explained how the statute's certification, warranty, testing, and enforcement provisions function effectively in the context of ABT, and that the arguments against the use of ABT are essentially the same as those discussed in Thomas and revisited in the round of rulemaking that followed, there is no reason for the Agency to reopen these settled questions by reexamining them substantively in this rulemaking (or appearing to do so). The Agency should adhere to its statement in the Proposal that it is not reopening these issues. [EPA-HQ-OAR-2022-0829-0759, p. 88]

To foster understanding of how the Act's testing, certification, warranty, in-use compliance, and penalty provisions operate in the context of a standard using ABT, it may be useful to include in the final rule's preamble a clear description of how EPA uses testing and manufacturers' production plans to issue certificates of conformity before vehicles or engines are marketed; how manufacturers warrant compliance; how EPA determines in-use compliance; how EPA determines whether a manufacturer's vehicles and engines have met the conditions imposed on their initial certification by ultimately complying with the production-weighted emission standards to which they are subject; and, in the event of noncompliance, how EPA would identify noncompliant vehicles and impose penalties or other remedies. If it does so, EPA should make clear that it is describing the operation of the statute and the ABT rules, not reexamining EPA's settled view that its ABT standards and their implementation conform to the Act's requirements. [EPA-HQ-OAR-2022-0829-0759, p. 89]

Although the Agency need not, and should not, reconsider the lawfulness of ABT standards under Section 202, EPA's analysis more than adequately explains the benefits of continuing to use the ABT approach for this latest set of emission standards. EPA's analysis of the benefits ABT provides in this context, see 88 Fed. Reg. at 29342-43, amply justifies the Agency's choice of retaining the ABT approach for this set of standards. As EPA has indicated, the ABT structure allows EPA to require the reductions in vehicle pollutant emissions that are essential to addressing the endangerment of public health and welfare attributable to those emissions in a manner that best balances the need for significant cuts in emissions with the requirement that standards be feasible and achievable within the time allowed for compliance. The ABT approach "recognize[s] that automakers typically have compliance opportunities and strategies that differ across their fleet, as well a multi-year redesign cycle, so not every vehicle will be redesigned every year to add emissions-reducing technology;" ABT allows manufacturers to keep pace with required improvements by overcomplying with newly designed or redesigned vehicles while other vehicles whose designs are already locked in undercomply. 88 Fed. Reg. at 29342. Thus, "performance-based standards with ABT provisions give manufacturers a degree of flexibility in the design of specific vehicles and their fleet offerings, while allowing industry overall to meet the standards and thus achieve the health and environmental benefits projected for this rulemaking at a lower cost." Id. at 29343. These benefits of the ABT approach are recognized by regulators, environmental advocates, and industry alike. See Final Answering Br. for Intervenor Alliance for Automotive Innovation, Texas v. EPA, Case No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF No. 1996757, at 8-9 (stating that ABT has "been essential to the auto industry's efforts to meet EPA's increasingly ambitious goals for greenhouse gas reduction" and that "the automotive industry has relied for more than a generation" on ABT "to enable cost-effective emissions reductions"). These considerations more than justify EPA's continued use of this approach for purposes of these standards. [EPA-HQ-OAR-2022-0829-0759, p. 89]

Organization: Environmental Defense Fund (EDF)

B. EPA properly decided not to reopen its longstanding use of averaging, banking, and trading.

EPA has used an ABT approach in standards for light- and heavy-duty vehicles since the 1980s, including each of its previous light-duty GHG rules upon which this proposal builds. Within this decades-long history, EPA has repeatedly explained why such an approach is reasonable and consistent with the text of Section 202. Based on EPA's settled and longstanding use of ABT in its Section 202 rules and ABT's well-established basis in the statute, the agency's decision not to reopen "the basic structure of the ABT program" is reasonable. [EPA-HQ-OAR-2022-0829-0786, p. 12]

Organization: Jaguar Land Rover NA, LLC (JLR)

We particularly support the EPA's continuation of the existing regulation in two areas:

Credit Banking and Trading Flexibilities [EPA-HQ-OAR-2022-0829-0744, pp. 3-4]

JLR fully supports EPA's decision to make no changes to averaging, banking, and trading provisions. We commend the agency for the continued inclusion of the flexibility to carry backwards and forwards the overcompliance in a given calendar year to offset any shortfalls in another year. As a lower volume manufacturer, JLR relies on this flexibility due to our limited product line up with typically less than half the opportunities to introduce new models and technologies to the market compared to larger manufacturers. We believe flexibilities are a fundamental part of any GHG or ZEV regulation. They allow for car manufacturers' different plans and launch cadences, allowing each manufacturer to develop their own path for compliance. [EPA-HQ-OAR-2022-0829-0744, pp. 3-4]

Credit Trading between Manufacturers

JLR disagrees with the conclusion that EPA has come to with regards to calculating the feasibility of the regulation including the purchase of credits as a viable compliance option as referenced in the NPRM. "…EPA has included the ability of manufacturers to trade credits as part of our central case compliance modeling for this proposal, rather than as a sensitivity analysis as we did in the modeling for the 2021 rule." [EPA-HQ-OAR-2022-0829-0744, p. 9]

As there is no option to resolve non-compliance through a fine payment, EPA should not determine the feasibility of a regulation that includes a pathway where an OEM potentially has to rely on a competitor to achieve compliance, especially as there is no requirement that an OEM must sell the credits they have generated. [EPA-HQ-OAR-2022-0829-0744, p. 9]

The GHG regulation should be designed to ensure there are sufficient flexibilities in the regulation for the manufacturer to achieve compliance on its own. This ensures that a car manufacturer's budget is spent on funding its transition to an EV future. JLR does not view fine payment as an appropriate compliance route or as a flexibility in the regulation, but we would like to highlight one benefit of a fine is to help set an appropriate price of credits. As it is absent in this regulation, there is no limit on credit price, which further compounds the significant planning uncertainty. [EPA-HQ-OAR-2022-0829-0744, p. 9]

From the 2022 EPA Automotive Trends Report as detailed in Table 5.15, the balance of credit/debit generation by industry resulted in a credit deficit across 2016-2021MY, with only historical banked credits bridging the gap. If this trend continues, we can expect less availability of credits in the market. Even for those companies producing electric vehicles only, the number of credits they will have available to sell will reduce over time as the stringency of the regulation increases which could lead to increases in credit prices. [EPA-HQ-OAR-2022-0829-0744, p. 9]

In response to EPA's suggestion of alternative routes to compliance if an OEM chooses not to partake in credit trading. "…manufacturers also could elect to shift market segments and sales volumes as a strategy for increasing the proportion of credit-generating vehicles relative to debit-generating vehicles." This is correct, however JLR disagrees that it is a viable option within the regulation time period due to the lead time involved with such a drastic restructure of a manufacturer's product plans. [EPA-HQ-OAR-2022-0829-0744, p. 9]

JLR requests that EPA excludes the ability of manufacturers to trade credits from the central case compliance model. [EPA-HQ-OAR-2022-0829-0744, p. 9]

Organization: Kia Corporation

Kia strongly supports the ABT credit program remaining unchanged. The ABT program is critical for automakers to plan and strategize product planning with long-term compliance. Kia agrees that the ABT program encourages technological innovations and helps increase fleetwide emissions. Kia emphasizes that keeping the ABT program does not resolve all potential lead time and cost challenges. [EPA-HQ-OAR-2022-0829-0555, pp. 12-13]

Organization: MECA Clean Mobility

Advanced technology credit multipliers for PHEV, BEV and FCEV should end before MY 2027. [EPA-HQ-OAR-2022-0829-0564, pp. 35-36]

Analyses by ICCT and researchers at Carnegie Mellon have shown that extended use of super credits in the light-duty sector has resulted in the unintended consequence of increased emissions from the non-ZEV fleet as it is allowed to emit more under a fleet average regulatory structure that includes averaging, banking and trading provisions. Given the considerable incentives created by the Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL) and other federal and state programs supporting the production, sale and operation of medium-duty zero tailpipe emitting vehicles, MECA agrees that Advanced Technology Multipliers for PHEVs, BEVs and FCEVs are no longer needed for medium-duty vehicles beyond MY 2026. Similar to the light-duty sector, an over-incentivized credit scheme for medium-duty ZEVs is likely to result in market distortions that will reduce the broader deployment of electric and hydrogen fuel cell powertrains and thus decrease the benefits anticipated by the standards. [EPA-HQ-OAR-2022-0829-0564, pp. 35-36]

Organization: Porsche Cars North America (PCNA)

Credits will help leverage the averaging, banking, and trading (ABT) portion of the CO2 regulation that EPA notes in the NPRM as being an important and successful part of the regulation. The extent to which electric vehicles can earn additional credits through flexibilities will further enhance the benefits of ABT by providing additional credit liquidity to be traded by manufacturers. ABT is a successful incentive for manufacturers to over comply and an important flexibility for manufacturers who may fall short in a single year. Porsche does not see the programmatic value in reducing liquidity within the ABT market, especially given the ambition of the future proposed standards. [EPA-HQ-OAR-2022-0829-0637, p. 20]

Organization: Southern Environmental Law Center (SELC)

EPA should continue to tailor compliance flexibilities to close loopholes. [EPA-HQ-OAR-2022-0829-0591, pp. 9-10]

The credit system is a longstanding component of federal tailpipe emissions standards. [EPA-HQ-OAR-2022-0829-0591, pp. 9-10]

Credits issued for overcompliance with the standards can be averaged, banked, or traded, allowing vehicle manufacturers to design compliance strategies that best suit their unique fleet composition. It is critical, however, that EPA carefully construct these credit systems in a way that balances compliance flexibility and incentivization of innovation with the inevitable loss of stringency of the standards that result from the use of credits. [EPA-HQ-OAR-2022-0829-0591, pp. 9-10]

We therefore support EPA's proposal to not restore the advanced technology credit multipliers for light-duty vehicles that currently end in model year 2024, and to end advanced technology credit multipliers for medium-duty vehicles in model year 2027. Two of the three advanced technologies currently provided favorable treatment through the application of credit multipliers—BEVs and PHEVs—are common technologies in today's marketplace. The use of credit multipliers for these technologies would create a compliance loophole that allows manufacturers to continue making and selling dirtier vehicles and could result in backsliding on emissions reductions. For these same reasons, we also urge EPA to consider phasing out credit multipliers for medium-duty vehicles prior to model year 2027. [EPA-HQ-OAR-2022-0829-0591, pp. 9-10]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

EPA, in the final rule or future rule, should include a true-up system for automaker's FUF where debits or credits are provided based on actual data from on-board diagnostics and reporting by automakers of a fairly large sample. In other words, under this proposal, an automaker would lose or gain credits after-the-fact based on actual data on how consumers drive both new and older PHEVs. If EPA opts not to do this, we request that EPA should, at minimum, require manufacturers in this rulemaking to share anonymized actual data from PHEVs so that in future years, the EPA can make informed decisions about the FUF based upon real world data. [EPA-HQ-OAR-2022-0829-0646, p. 7]

Our coalition is supportive of continuing averaging, banking and trading (ABT) provisions as long as it is technology neutral, and performance based and does not favor engine-based technology for either current or future vehicles. Specifically, an ABT program should reward automakers who are making PHEVs, BEVs and FCEVs today by allowing these credits to carry forward into the new MY 2027 program. We also support including the ability to trade the CO2 reduction benefits of PHEVs, BEVs and FCEVs between different sizes and types of vehicles until at least MY 2032. We believe this is a modest way to help encourage the most advanced clean technologies in this regulation. [EPA-HQ-OAR-2022-0829-0646, p. 10]

Organization: Valero Energy Corporation

a) The statutory structure confirms EPA lacks statutory authority to use fleetwide averaging to mandate ZEVs.

EPA's proposal would require electrification by setting average emission standards for manufacturers' nationwide fleets and "averaging" in more and more zeros to represent the electric vehicles it wants to see in future years. Manufacturers that exceed the standards may bank credits and trade them to other manufacturers that fall short. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

EPA relies on NRDC v. Thomas, 805 F.2d 410 (D.C. Cir. 1986), for the proposition that it is authorized to average vehicles. That case found EPA could average a manufacturer's different engine families. Id. at 425. It did so, however, with some caveats. First, its reasoning was based on a deference to EPA's interpretation of the statute "in the absence of clear evidence Congress meant to prohibit averaging." This standard, of course, is directly contrary to the standard applicable in this case in which EPA is proposing regulations that affect a major question—clear Congressional authority to permit averaging to mandate electric vehicles. Second, the parties failed to raise a textual argument against averaging. Id. at n.24 ("Although it was not raised by any party before the agency, and accordingly cannot be dispositive here … there is an additional argument against emissions averaging. The Act's testing and certification provision, 42 U.S.C. § 7525 [Link: https://1.next.westlaw.com/Link/Document/FullText?findType=L&pubNum=1000546&cite=42USCAS7525&originatingDoc=I80714eef94d311d9a707f4371c9c34f0&refType=LQ&originationContext=document&transitionType=DocumentItem&ppcid=0591cc222593448083058c4608d3c583&contextData=(sc.UserEnteredCitation)], speaks of 'any,' 'a,' or 'such' motor vehicle or engine being tested and certified. With averaging, some vehicles or engines would not be required to comply with the standards and would not be subject to NCPs for failing to so comply. This practice appears inconsistent with the requirement that 'any,' 'a,' or 'such' vehicle or engine be tested and required to comply with emissions standards."). [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

On the other hand, EPA has previously acknowledged that the Act is silent on the mechanisms of averaging, banking, and trading (ABT). When EPA first adopted fleetwide averaging, it recognized that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act." 48 Fed. Reg. 33,456, 33,458 (July 21, 1983). And "[j]ust as the statute does not explicitly address EPA's authority to allow averaging, it does not address the Agency's authority to permit banking and trading." 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same). By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading to electrify the Nation's vehicle fleet. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

That should be the end of the analysis. Section 202 of the Clean Air Act does not itself "direct [conventional vehicles] to effectively cease to exist." West Virginia, 142 S. Ct. at 2612 n.3. EPA has instead relied on mechanisms that are not themselves spelled out in the statute and that have never before been used to mandate LD and MD electric vehicles. Just as in West Virginia, EPA has nothing "close to the sort of clear authorization" necessary for such a transformational policy shift. 142 S. Ct. at 2614. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

But in truth, the problem is far worse for EPA than that. As explained below, the Act unambiguously precludes fleetwide-average emission standards under Section 202(a). And even if the statute permitted some fleetwide averaging, it does not allow EPA to take the additional step of incorporating non-emitting vehicles into emission averages and thus forcing the market toward electric vehicles. The proposal is not merely stretching vague statutory language. It is defying clear statutory text. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

The text and structure of Section 202, and of Title II more broadly, unambiguously require that emission standards under Section 202(a) apply to individual vehicles, not manufacturers' fleets on average. EPA claims to find authority for fleetwide averaging in Section 202(a), which authorizes EPA to issue "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles ... which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a). [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

On its face, that provision authorizes EPA to set standards for vehicles that emit harmful air pollutants. It says nothing about averaging across fleets. As noted, when EPA first adopted fleetwide averaging, it acknowledged that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act." 48 Fed. Reg. at 33,458. EPA claimed to have the authority because the Act "does not explicitly preclude standards" based on averaging. 54 Fed. Reg. at 22,666 (emphasis added). EPA was wrong. "[T]he broader context of the statute as a whole," Robinson v. Shell Oil Co., 519 U.S. 337, 341 (1997), makes clear that Section 202(a) does not permit fleetwide averaging. And, even if EPA could somehow show that the statute tacitly or implicitly allows (or does not expressly preclude) averaging, that would still be insufficient to meet the necessary clear congressional authority to use fleetwide averaging as a means to force a transition from internal-combustion engines to ZEVs. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

a. Other provisions in Section 202 demonstrate that emission standards may not be based on averaging.

Title II is replete with provisions that necessarily apply to vehicles individually, not to fleets on average. That is evident first in the emission standards prescribed by Section 202 itself. For example, in Section 202(b), the Act sets forth specific light-duty vehicle emission standards that EPA must promulgate in "regulations under" Section 202(a). 42 U.S.C. § 7521(b). For vehicles in model years 1977 to 1979, the standards must provide that "emissions from such vehicles and engines may not exceed 1.5 grams per vehicle mile of hydrocarbons and 15.0 grams per vehicle mile of carbon monoxide." Id. § 7521(b)(l)(A). [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Those provisions require that the "regulations under [Section 202(a)]" apply to "vehicles and engines," not "vehicles and engines on an average basis across a fleet." Construing those provisions to allow averaging would, in effect, add words to the statute that change its meaning. Neither courts nor agencies may "supply words ... that have been omitted." Antonin Scalia & Bryan Garner, Reading Law: The Interpretation of Legal Texts 93 (2012); accord Rotkiske.v. Klemm, 140 S. Ct. 355, 360-361 (2019). And supplying the extra words "on average" would have a significant substantive effect: "roller coaster riders must be 48 inches tall" means something very different from "roller coaster riders must be 48 inches tall on average." [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

The testing requirements accompanying the Section 202(b) standards confirm that those standards apply to all vehicles. In particular, EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine ... to determine whether such system enables such vehicle or engine to conform to the standards required to be prescribed under [Section 202(b) of the Act]." 42 U.S.C. § 7525(a)(2). If the system complies, EPA must issue a "verification of compliance with emission standards for such system." Id. Those requirements plainly contemplate standards that apply to individual vehicles and their emission-control systems. Not only does the statutory text frame the inquiry as whether an individual "vehicle" or "engine" conforms to the emission standards, but the provision's foundational premise-that an emission-control system can enable a vehicle to meet emission standards depends on individually applied standards. [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Other parts of Section 202 further demonstrate that emission standards under Section 202(a) cannot rely on averaging. Section 202(b)(3), for example, authorizes EPA to grant waivers from certain nitrogen-oxide emission standards—which, again, are standards "under" Section 202(a), see 42 U.S.C. § 7521(b)(l)(B)—for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater." Id. § 7521(b)(3). This provision would be nonsensical under a fleetwide-averaging regime. It contemplates a default under which every vehicle meets a standard, then gives manufacturers a waiver from that default for up to 5% of the fleet. But under fleetwide averaging, no waiver is needed. Instead, a vast proportion of a manufacturer's fleet—perhaps 50% or more— effectively has a "waiver" so long as a sufficient number of vehicles outperform the standard. Likewise, Section 202(g), which specifies an increasing "percentage of each manufacturer's sales volume" of each model year's vehicles that must comply with specified emission standards, is fundamentally incompatible with averaging. Id. § 7521(g)(l). [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Similarly, under Section 202(m), EPA must require manufacturers to install on "all" new light-duty vehicles and trucks "diagnostic systems" capable of identifying malfunctions that "could cause or result in failure of the vehicles to comply with emission standards established under this section." Id. § 7521(m)(l). As this requirement makes clear, individual vehicles must "comply with emissions standards established under [Section 202]." Id. Otherwise, requiring diagnostic equipment on "all" vehicles makes no sense. In a fleetwide-averaging regime, this requirement would be pointless, as the deterioration or malfunction of an individual vehicle's emission-related systems would provide virtually no information about whether the fleet as a whole is compliant. [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

b. Title II’s compliance and enforcement provisions for emission standards confirm that EPA cannot use fleetwide averaging.

Fleetwide averaging also clashes with "the design and structure of [Title II] as a whole." Utility Air, 573 U.S. at 321 (citation omitted). Title II sets forth a comprehensive, interlocking scheme for enforcing emission standards through testing, certification, warranties, remediation, and penalties. Fleetwide-average standards are incompatible with these provisions, which are "designed to apply to" individual vehicles and "cannot rationally be extended" to fleets. Id. at 322. [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

Testing and Certification. Under Title II, EPA must "test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer to determine whether such vehicle or engine conforms with the regulations prescribed under [Section 202]." 42 U.S.C. § 7525(a)(l). If the "vehicle or engine conforms to such regulations," EPA must issue the manufacturer a "certificate of conformity." Id. EPA may later test a manufacturer's vehicles and engines, and if "such vehicle or engine does not conform with such regulations and requirements, [EPA] may suspend or revoke such certificate insofar as it applies to such vehicle or engine." Id. § 7525(b)(2)(A)(ii). A manufacturer may not sell a vehicle or engine not "covered by a certificate of conformity." Id. § 7522(a)(l). [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

Fleetwide averaging is incompatible with these requirements in at least two respects. First, by using the singular terms "vehicle" and "engine," along with "any" and "such," the statute contemplates that individual vehicles may be tested, determined to "not conform" with the standards, and have their certificates of conformity suspended or revoked. In a fleetwide-averaging regime, testing an individual vehicle or engine does not enable EPA to determine whether it "conforms with the regulations prescribed under [Section 202]," 42 U.S.C. § 7525(a)(l), because conformity turns not on an individual vehicle's emissions but on the fleet's average performance overall. Second, fleetwide averaging also makes it impossible to determine compliance with applicable emission standards before a vehicle is sold, as required to obtain the certificate of conformity needed for a sale. See 42 U.S.C. § 7522(a)(l). Under fleetwide-average standards, a vehicle's "conform[ity] with the regulations prescribed under [Section 202]" cannot be determined until the manufacturer calculates its production-weighted average at "the end of each model year," when the manufacturer knows the quantity and model of "vehicles produced and delivered for sale." 40 C.F.R. §§ 86.1818-12(c)(2)(2), 86.1865-12(i)(l), (j)(3). [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

For similar reasons, fleetwide averaging is inconsistent with the statutory definition of an "emission standard," which "limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis." 42 U.S.C. § 7602(k). It is impossible to know on a "continuous basis" whether a manufacturer's fleet complies with EPA's proposed average standards, because a manufacturer cannot calculate its production-weighted average until the end of the year. Simply put, an after-the-fact compliance regime is incompatible with the Act's testing and certification scheme. [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

Warranties and Remediation. Fleetwide-average standards similarly clash with Title II's warranty provisions. Under Section 207, a manufacturer must "warrant to the ultimate purchaser and each subsequent purchaser" "at the time of sale" that each new vehicle complies with applicable regulations under [Section 202]. 42 U.S.C. § 7541(a)(l) (emphasis added). Yet, as with certificates of conformity, manufacturers cannot warrant conformity with fleetwide-average emission standards at the time of sale, because compliance can be determined only at the end of the year. See 40 C.F.R. § 86.1865-12(i)(l) (requiring manufacturers to compute their "production weighted fleet average" by "using actual production [data]" for the year in question). [EPA-HQ-OAR-2022-0829-0707, pp. 82-83]

Fleetwide-average emission standards are also inconsistent with Title II's remediation and notification provisions. Those provisions state that if EPA "determines that a substantial number of any class or category of vehicles or engines ... do not conform to the regulations prescribed under [Section 202]," the manufacturer must remedy "the nonconformity of any such vehicles or engines." 42 U.S.C. § 7541(c)(l). If "a motor vehicle fails to conform," the manufacturer bears the cost. Id. § 7541(h)(l). Further, "dealers, ultimate purchasers, and subsequent purchasers" must be given notice of any nonconformity, id. § 7541(c)(2), which requires identification of specific nonconforming vehicles. None of this is possible where the nonconformity is tied to a fleet on average. [EPA-HQ-OAR-2022-0829-0707, pp. 82-83]

c. The broader text and history of Title II confirm that the rule exceeds EPA's authority through fleetwide averaging.

Other indicia of statutory meaning demonstrate that the proposed rule exceeds EPA's statutory authority under Section 202(a). Elsewhere in Title II, Congress showed that it knew how to legislate with respect to "average annual aggregate emissions." 42 U.S.C. § 7545(k)(l)(B)(v)(II) (directing EPA to take certain actions if "the reduction of the average annual aggregate emissions of toxic air pollutants in a [designated district] fails to meet" certain standards). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

Thus, "if Congress had wanted to adopt an [averaging] approach" for motor vehicle standards under Section 202(a), "it knew how to do so." SAS Inst., Inc. v. Iancu, 138 S. Ct. 1348, 1351 (2018); see Rotkiske, 140 S. Ct. at 360-361 ("Atextual judicial supplementation is particularly inappropriate when, as here, Congress has shown that it knows how to adopt the omitted language or provision."). It did not choose that approach in Section 202(a). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

The Energy Policy Conservation Act, enacted just two years before the 1977 Clean Air Act amendments, reinforces that conclusion. There, Congress directed the Secretary of Transportation to issue regulations setting "average fuel economy standards for automobiles manufactured by a manufacturer" in a given model year. 49 U.S.C. § 32902(a). That Congress has not used similar language in Section 202(a) of the Clean Air Act is a "telling clue" that the Act does not permit fleetwide averaging. Epic Sys. Corp. v. Lewis, 138 S. Ct. 1612, 1626 (2018). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

The Clean Air Act's history also reflects Congress's understanding that emission standards would apply to all vehicles individually. Congress was so focused on reducing emissions at the level of the individual vehicle that, in the 1970 amendments, Congress permitted EPA to test any individual vehicle as it comes off the assembly line. See Pub. L. No. 91-601, § 8, 84 Stat. 1676, 1694-1696. Such a vehicle-by-vehicle test was meant to supplement the pre-1970 testing of prototypes. Congress explained that while testing of prototypes "will continue," "tests should require each prototype rather than the average of prototypes to comply with regulations establishing emission standards." H.R. Rep. No. 91-1146, at 6 (1970). And if Congress forbade averaging across prototypes, it certainly did not permit averaging across entire fleets. [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

d. Related provisions confirm that Section 202(a) does not authorize averaging of non-emitting electric vehicles.

Other provisions of the Clean Air Act drive home the lack of statutory authorization to mandate electrification as well. In the Clean Air Act Amendments of 1990, Congress spoke directly to the phase-in of electric vehicles on America's roads. Congress instructed EPA to establish standards for "clean-fuel vehicles" operating on "clean alternative fuel," including "electricity." Pub. L. No. 101-549, § 229, 104 Stat. 2399, 2513 (codified at 42 U.S.C. §§ 7581(2), (7), 7582(a)). Congress required that certain areas of the country with the worst pollution would have to "phase-in" a "specified percentage" of "clean-fuel vehicles" using "clean alternative fuels" (defined to include "electricity") in certain fleets. 42 U.S.C. § 7586; see id. § 758l(a). The 1990 amendments highlight that Congress knows how to clearly establish standards that apply to electric vehicles, and to directly require that such vehicles be phased into a particular fleet. But Congress chose to do so only on a targeted, regional basis. The contrast between the 1990 amendments and Section 202(a) highlights the absence of any statutory authority for EPA's rule. [EPA-HQ-OAR-2022-0829-0707, p. 84]

Other related statutes also suggest the same. In the Energy Policy Act of 1992, Congress directed NHTSA to set fuel-economy standards based on averages, but prohibited NHTSA from setting fuel-economy standards that average in the fuel economy of electric vehicles. See Pub. L. No. 102-486 §§ 302, 403, 106 Stat. 2776, 2870-2871, 2876 (later codified at 49 U.S.C. § 32902(h)). This prohibition bars NHTSA from doing exactly what EPA is doing here: misusing its regulatory authority to force a transition from conventional vehicles to electric vehicles by artificially tightening the "average" standard a fleet must meet. Of course, when Congress finalized the language of Section 202(a)(l) in 1977, it had no need to explicitly block EPA from considering electric vehicles, because it did not contemplate that EPA would set emission standards using averaging in the first place (or that EPA would be setting standards for greenhouse gases). The prohibition on NHTSA nevertheless underscores just how far EPA is reaching here: it is straining statutory language to seize a power that Congress expressly denied to a sister agency that actually has authority to promulgate fleetwide-average standards. [EPA-HQ-OAR-2022-0829-0707, p. 84]

e. EPA’s lack of authority for a credit-trading scheme further confirms its lack of authority to set fleetwide averages.

The proposal’s credit banking and trading program is critical to EPA's electrification mandate. But the agency also lacks authority under Title II to establish a credit scheme as part of its emission standards under Section 202(a). [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

As with fleetwide averaging, EPA has previously acknowledged that Title II says nothing about banking and trading credits in connection with motor-vehicle emission standards. See 54 Fed. Reg. at 22,665. What EPA has ignored, however, is that Title II is not silent regarding banking and trading in other contexts. Indeed, in multiple other provisions under Title II, Congress expressly authorized the use of bankable and tradable credits. See, e.g., 42 U.S.C. § 7545(k)(7) (reformulated gasoline credits); § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(i) (renewable fuel credits); id. § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(ii) (biodiesel credits); id. § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(iii) (small refineries credits); id. § 7586(f) (clean- fuel fleet-operator credits); id. § 7589(d) (California pilot test program's clean-fuel vehicle manufacturer credit). [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Under EPA's proposed approach, those provisions would all be superfluous, because EPA already had the discretion to adopt a credit-trading regime for any program. If Congress had wanted to permit credits in connection with emission standards under Section 202(a), it knew how to and would have done so expressly. See SAS Inst., 138 S. Ct. at 1351. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

For all these reasons, courts have cast substantial doubt on EPA's authority to set fleetwide-average emission standards. As the D.C. Circuit Court of Appeals explained in NRDC v. Thomas, 805 F.2d 410 (D.C. Cir. 1986), the "engine specific thrust" of Title II's "testing and compliance provisions" is evident both in Congress's choice to "spea[k] of 'any,' 'a,' or 'such' motor vehicle or engine" in the text of the statute and in the "troubling" legislative history recounted above. Id. at 425 n.24. The arguments were not dispositive in Thomas only because the parties there had failed to present them. Id. But the Court nevertheless recognized that the arguments were relevant to "future proceedings." Id.. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

f. At a minimum, EPA may not use fleetwide averaging to require electrification.

Despite the absence of statutory authorization for fleetwide averaging, EPA has long employed that mechanism without significant industry pushback. That is likely because fleetwide averaging has generally been offered as an accommodation to regulated parties, allowing them flexibility that the statute does not in fact permit. In its current proposal, however, EPA is not offering an extra statutory accommodation. It is taking an additional step away from the statutory text by using fleetwide averaging to mandate electrification. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

To be clear, in prior rules EPA set an average emission standard and allowed manufacturers to make some vehicles that emitted more and some that emitted less. Here, EPA has set tailpipe emission standards at a level so stringent that manufacturers must incorporate an increasing percentage of LD and MD electric vehicles—which EPA treats as zero-emission vehicles—into their averages in order to comply with the "standards." See p. 13, supra. Put differently, the agency is proposing an emission standard that is artificially low because it incorporates electric vehicles, which EPA treats as emitting zero pollutants for averaging purposes. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Whatever the permissibility of fleetwide averaging, the text and structure of Title II make plain that EPA cannot manipulate averaging as a means to force production of an increasing market share of electric vehicles. Section 202 does not grant EPA the power to make the internal-combustion engine go the way of the horse and carriage. At the very least, Section 202 is hardly clear in granting that awesome power—which is what matters under West Virginia. For automobiles as for power plants, EPA has purported to discover in the Clean Air Act the authority to "force" manufacturers to "cease making" a particular type of energy "altogether." 142 S. Ct. at 2612. We have seen that play recently before, and it should end the same way. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Organization: Zero Emission Transportation Association (ZETA)

EPA’s own compliance trends show that significant emissions reductions are being left on the table in the form of banked credits. While credit banking and trading provisions are a key component of these emissions standards, the size of the OEMs’ collective credit bank–as shown in Figure 3–highlights the need for EPA to set stringent standards that turn these theoretical CO_2 reductions into real-world, on-road reductions. [EPA-HQ-OAR-2022-0829-0638, pp. 17-18]

The pressing need to reduce GHG and criteria pollutant emissions from the light- and medium-duty transportation sectors justifies EPA finalizing stringent emissions standards. While the standards are technology neutral, the auto industry has chosen electrification as the preferred option for reducing emissions and the standards should support the considerable investments being made to continue bringing these technologies to market. [EPA-HQ-OAR-2022-0829-0638, pp. 17-18]

ZETA supports the proposed accelerated phaseout of MDEV credit multipliers by MY 2027. EPA has recognized that multipliers present a tradeoff between driving emissions reductions and incentivizing new technology. Based on the technology available today, multipliers are no longer required to incentivize MDEV technology investments, and a more stringent GHG standard would most effectively drive MDEV adoption and, in turn, emissions reductions. As such, we encourage the agency to finalize the phaseout of MDEV credit multipliers as proposed and encourage EPA to consider the benefits of sunsetting multipliers for advanced technology vehicles in the MD category starting in MY 2025. [EPA-HQ-OAR-2022-0829-0638, p. 29]

EPA Summary and Response

Summary:

Alliance for Automotive Innovation, American Council for an Energy-Efficient Economy, American Free Enterprise Chamber of Commerce, Environmental and Public Health Organizations, Environmental Defense Fund, Jaguar Land Rover NA, Kia Corporation, MECA Clean Mobility, Porsche Cars North America, Strong Plug-in Hybrid Electric Vehicle, and Zero Emission Transportation Association have expressed support for the Averaging, Banking, and Trading provisions of this final rulemaking.

Response:

EPA appreciates the comments in support of the Averaging, Banking, and Trading (ABT) provisions in this rulemaking. EPA has not reopened the ABT provisions in this rule (except for the carry-forward of criteria pollutant Tier 3 credits during the phase-in of the Tier 4 standards as described in section 4.1.7 of this RTC). EPA agrees with commenters that these provisions continue to allow manufacturers flexibility in planning compliance with the standards at potentially lower costs.

Summary:

Clean Fuels Development Coalition and Valero Energy Corporation commented concern that the proposed rule is forcing electrification for compliance.

Response:

The final standards do not require any specific compliance path. Manufacturers are free to utilize any combination of technologies as pathways for compliance, as well as utilization of the program's Averaging, Banking, and Trading provisions.

Summary:

Aston Martin raised concerns about whether the standards are so stringent that they can only be complied with using credits.

Response:

EPA does not consider the standards to be so stringent as to require credit trading among firms. EPA has undertaken a sensitivity analysis which models the absence of credit trading (even for small volume manufacturers such as Aston Martin) and finds the standards are feasible, with sufficient lead time and at reasonable costs even under that limiting assumption, an assumption which EPA considers unrealistic. EPA recognizes that decisions about trading credits are business decisions for individual firms, but EPA sees no evidence that the market is not available to firms seeking credits. To the contrary firms appear to be actively trading credits and increasing sales volumes of EV-only manufacturers (who likely view credits as a potential revenue source, particularly given the limited lifespan and compliance benefits of credits for those manufacturers) suggest the market will continue to be a viable and economically efficient compliance tool in the future. Additional discussion of SVM-specific concerns is found below in RTC 3.1.7.

Summary:

Jaguar Land Rover NA commented that only credits are available for compliance and would like to see fines added as a compliance option.

Response:

EPA does not have the statutory authority under the Clean Air Act to use fines as a routine compliance option. The Averaging, Banking, and Trading provisions of the final rule provide multiple flexibilities for compliance. As discussed in section 3.3.1 and 3.3.2, EPA has made several changes to reduce the stringency of the standards and provide additional lead time compared to the proposal, which we believe address manufacturers' comments about concerns for compliance.

3.1.3 - Vehicle air conditioning system related provisions

Comments by Organizations

Organization: Ad Hoc Tier 4 Light-Duty Small Manufacturer Group

- The Small OEM GHG situation is exacerbated by the following:

-EPA proposes to eliminate AC leakage credits (we do not fully understand why the goal of fighting climate change demands this)

Organization: Alliance for Automotive Innovation

D. Light-Duty GHG Program Flexibilities

Flexibilities have been an important part of EPA's light-duty vehicle GHG program since its inception in 2012. Features such as the averaging, banking, and trading program have helped smooth product planning and investment cycles. Other flexibilities like off-cycle technology and air conditioning credits have encouraged the development of new technologies and have resulted in real-world emissions improvements beyond those that would have been achieved on laboratory test cycles. [EPA-HQ-OAR-2022-0829-0701, p. 95]

Auto Innovators believes that such flexibilities still play an important role moving forward. They are a potential lever for addressing uncertainties in the transition to electric vehicles, particularly in the early years of the proposed 2027-2032 program. While manufacturers would prefer that the core footprint-based standards reflect achievable emission reductions, flexibilities could also serve to ensure that desired emission targets are met. [EPA-HQ-OAR-2022-0829-0701, p. 95]

Instead, EPA proposes to eliminate and/or phase down many existing flexibilities, including paring back the off-cycle credit menu and limiting GHG improving technologies to the ICE fleet. The result of this will be abandonment of GHG benefits from prior rulemakings. [EPA-HQ-OAR-2022-0829-0701, p. 95]

The existing refrigerant, AC efficiency, and off-cycle credits are balanced to produce a verifiable real-world result. EPA's proposal to change the credit system will unbalance those results, leaving unprecedented rates of electrification as the main flexibility left to meet fleetwide stringency targets. [EPA-HQ-OAR-2022-0829-0701, p. 95]

1. Air Conditioning Refrigerant Leakage Credits

EPA encouraged the auto industry's move from R134a refrigerant to R1234yf with a credit program that recognized both improvements to minimize leakage of refrigerant and the use of low global warming potential (GWP) refrigerants. The credit program is responsible for the quick adoption of R1234yf in U.S. light-duty vehicles since it became commercially available in 2013. Already, 95% of the light-duty vehicle fleet has moved from R134a with GWP of 1,430 to R1234yf with a GWP of 4.176 [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

176 EPA Trends Report at 91.

EPA has proposed a rule for phasing down HFC refrigerants sooner than anticipated or required by the AIM Act.177 The proposed HFC phase down would eliminate R134a from light-duty vehicles, effectively leaving one refrigerant, R1234yf, to serve current and future heating, ventilation, and air conditioning (HVAC) system designs.178 Auto Innovators can see why EPA believes this is a good time to eliminate the air conditioning refrigerant leakage credit program, but there are a number of good reasons to continue the program that EPA has not considered. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

177 Phasedown of Hydrofluorocarbons: Restrictions on the Use of Certain Hydrofluorocarbons Under Section (i) the American Innovation and Manufacturing Act of 2020, Notice of Proposed Rulemaking and Advance Notice of Proposed Rulemaking, 87 Fed. Reg. 76738 (Dec. 15, 2022).

178 Although other low-GWP refrigerants exist, they have not come into common use in the U.S. Therefore, new HVAC system designs are under development for electric vehicles.

a) HVAC Systems for Electric Vehicles

Current electrified HVAC systems are not up to the challenge of an electrified future. High voltage positive temperature coefficient ("PTC") system heaters that indirectly heat the cabin using glycol as a heat transfer fluid are inefficient. Energy that otherwise would be used to extend driving range is instead diverted to defrosting cabin glass, warming the battery, and passenger comfort. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

Electric range may be reduced by 30% or more in a -10 °F setting which is common in winter around much of the country. Consistently colder climates can reduce range even more. Even in variable climates, the thermal mass of the battery must be conditioned to enable fast charging. The variable nature of diurnal temperature excursions means battery conditioning will continue to be a large consumer of stored energy at the expense of vehicle range, customer comfort and acceptance of electric vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

Similarly, today's common HVAC systems have significant power requirements when used in a cooling mode. Cabin occupants and battery cooling systems are the beneficiaries of the AC system in an electrified vehicle where up to 10 kW or more of power may be expended to keep the battery at proper operating temperatures and occupants comfortable. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

b) Future HVAC Systems Need Costly Technology to Minimize Refrigerant Leakage

The conditions that exacerbate the shortcomings of today's HVAC systems are expected to be overcome by heat pump systems currently under development.179 Heat pump systems extract energy from the atmosphere, collect and concentrate that energy through onboard heat exchangers, then transfer it to where it is needed. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

179 We recognize that certain manufacturers already use a heat pump HVAC system, but this technology has yet to become commonplace across the industry.

Heat pumps use a refrigerant to transfer heat. Heat pump systems resemble AC systems, but are modified to heat and cool the cabin and battery. Heat pump systems also have additional complexity over today's AC systems. They need to be designed for assembly, adding additional connections and hose length to reach distant components. The additional valving to make a heat pump system operate flawlessly results in potential additional leak paths. Heat pump systems also have one or more additional heat exchangers, adding another potential leak path to the system. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

Though much of the leakage concern may be solved, the credit recognizing reduced AC refrigerant leakage technology is still needed and would still recognize real-world benefits. In the drive to electrify vehicles, all costs will be scrutinized, and history shows that better sealing systems were only implemented following the availability of low-leak system credits. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

c) New Refrigerants in Heat Pump Systems Benefit from Low-Leak Technology

Refrigerant R1234yf is suitable for heat pump applications, but is performance limited at high and low temperature extremes. Other refrigerants are better suited to heat pump applications. SAE International has several subcommittees investigating seven diffierent refrigerants. Each of these refrigerants have performance benefits, but come with tradeoffs. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

Many of these refrigerants are blended using R1234yf or CO_2 as the base. Other refrigerants in different concentrations are added to the base refrigerant to address performance needs at temperature extremes. Different suppliers have unique formulations. It is expected that each of these refrigerants will be brought to market and be available for heat pump applications, though none have SNAP approval at this time. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

Each of the refrigerant blends being considered are zeotropic, i.e., they have constituents whose boiling points differ. Other molecular properties will differ with the refrigerant blend including permeation rates. Permeation in turn can be selective and the refrigerant component that permeates fastest may be the component that gives the blend its low or high temperature performance. What permeates or leaks selectively may also have undesirable properties that EPA will address during the SNAP approval process. These are additional reasons for EPA to continue the leakage credit program. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

The semi-hermetic nature of heat pump systems is still largely undefined and not understood enough to place a meaningful limit on leakage. SAE International is developing an updated J2727 standard to address heat pumps and new refrigerant blends. The credit formula using the SAE J2727 leak score, in being revised for the new refrigerants, will yield the correct values in terms of leakage and GWP and therefore inform a refrigerant leakage program credit level. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

Auto Innovators believes that leaving the credit program in place is in the best interest of EPA, industry, and the environment. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

d) Impact of the AC Leakage Credit Program on Leak Rates

Over 200 million vehicles on the road today were produced prior to the EPA low leak/low GWP program’s implementation. Assessing the HVAC systems of these vehicles with the SAE J2727 methodology demonstrates that they have a wide range of leakage and well over the amount observed in vehicles with HVAC systems designed to minimize refrigerant leakage. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

Lifetime AC system service needs are proportional to refrigerant leakage rates. Low-leak technology drastically lowers the service levels needed. Manufacturers should be encouraged to minimize the refrigerant leakage from electric vehicles given their larger charge sizes and chemically active refrigerant components. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

In summary, electrification is driving new HVAC system architecture and using new refrigerants in greater quantities than in ICE vehicles. These new refrigerants are likely to have higher-GWP components than R1234yf and selectively leak at different rates. Encouraging the use of the lowest GWP blends possible and minimizing leakage is still an important environmental consideration. EV heat pumps systems are expensive,180 as are the improved components and fittings that minimize leakage.   Recognition of efforts to reduce leakage and to minimize its environmental impact when leakage occurs will provide additional incentives to manufacturers to include best-in-class low-leak technology in HVAC system designs. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

180 The electric compressor of a heat pump system alone may cost up to eight times that of a comparable electronic carriable displacement compressor in an ICE application.

e) Recommendations

-Maintain CO2 credits for reducing leakage of air conditioning refrigerant and limiting the environmental impact of leakage. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

-If EPA decides to eliminate leakage credits, implement a phase-down instead of an immediate elimination as a potential lever to reduce concerns with and to provide flexibility for meeting the stringency of the proposed GHG standards. [EPA-HQ-OAR-2022-0829-0701, pp. 96-99]

2. Air Conditioning Efficiency and Off-Cycle Credits on Electric Vehicles

EPA's concern of negative emissions on individual vehicles is misplaced. EPA's regulations calculate air conditioning efficiency and off-cycle credits on a fleet average basis, which are then combined with fleet average tailpipe emissions and other adjustments.181 However, we acknowledge the concern that, once combined with fleet average tailpipe emissions, air conditioning and off-cycle credits may result in a fleet that implies a negative emission rate. [EPA-HQ-OAR-2022-0829-0701, p. 99]

181 In actual practice, greenhouse gas credits and tailpipe emissions (relative to target) are first converted to megagrams (metric tons) of carbon emissions and then combined. (See 40 CFR 86.1865-12.) Air conditioning and off-cycle credits are always positive megagrams. Tailpipe fleet average emissions may result in either a positive (credit generating) or negative (credit needed) megagram balance. In short, EPA's regulations never result in negative emissions for an individual vehicle, nor negative emissions for an overall fleet, although such a result might be implied.

Our recommendation is to handle this situation at the fleet average level. If the summed fleet average tailpipe emissions, credits, and other adjustments would result in a negative value, total fleet megagrams of credit for the model year would be truncated at the level equivalent to that which would have been achieved by a fleet at zero g/mile fleet average emissions before credits and other adjustments. Such an approach would address EPA's concern of "negative" emissions while still providing an incentive for and recognition of air conditioning and -cycle improvements on electric vehicles during the remaining time when many manufacturers' fleets have net positive emission rates. [EPA-HQ-OAR-2022-0829-0701, p. 99]

3. Air Conditioning efficiency Credits

Auto Innovators disagrees with EPA's proposal to eliminate AC efficiency credits for electrified vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

The AC efficiency credit program has been a success, resulting in verified emission reductions and conservative credit values. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

The SAE Interior Climate Control Committee has helped, having developed the testing and specifications for hardware technologies on the AC efficiency credit menu. The hardware specifications taken together with the AC17 test procedure improvements ensure a robust and verifiable greenhouse gas benefit. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

We agree with EPA that the program has been valuable. Many automakers have utilized the program. EPA calls the air conditioning efficiency and refrigerant leakage credit programs voluntary, but they have been relied upon by manufacturers to meet GHG standards. EPA itself has assumed the benefits of the AC efficiency and leakage credit programs in setting GHG targets. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

a) AC efficiency Improvements Benefit Both ICE Vehicles and BEVs

The AC efficiency credit menu has been successful in recognizing and encouraging AC system improvements. Due to their expense, the technologies on the AC efficiency menu were not widely deployed in the fleet prior to the creation of the AC efficiency credit program. The AC efficiency menu provided the needed business justification to widely deploy the included technologies in light-duty vehicles. The EPA Trends Report demonstrates the dramatic year over year growth of AC efficiency credits. Twenty automakers have deployed high levels of AC efficiency technology in mass market vehicles, including in PHEVs and BEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

Although it may be appropriate to limit eligibility for AC efficiency credits to ICE vehicles in the future, we do not believe that time is now. Removing BEVs from participation in the credit program now may undermine the system efficiency improvements made to date. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

b) AC efficiency Credit Values

The AC efficiency credit values developed for the menu were based on ICE vehicles but also apply to BEVs. The technology benefits between ICE vehicles and BEVs are similar in that they lower the amount of energy needed to condition the cabin. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

The AC efficiency credits related to the reduced reheat, automatic recirculation algorithms, and PWM controlled blowers are dependent on system operation. They do not depend on the powertrain type. Their energy-savings benefit is equivalent between BEV and ICE vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

Oil separator technology is deployed in both BEV electric compressors and ICE vehicle compressors. The efficiency benefit is proportional to the refrigerant flow exiting the compressor and that in turn is based on the vehicle cabin thermal load. The differences in efficiency between BEV and ICE vehicles is similar under the same conditions. The way that BEV compressors are decoupled from an engine’s accessory drive means they are operated at a more consistent speed that yields a greater oil separator benefit. The BEV version of an oil separator may be underrepresented in terms of menu credit. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

The credit values for internal heat exchanger technology in ICE vehicles are not usually applied to a BEV. BEVs generally have efficiency improvements incorporated into the heat exchanger designs. Both heat exchange technology improvements are quantified by bench testing per SAE specifications. The additional benefit that a BEV provides is underrepresented in terms of menu credit. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

Compressor efficiency depends on how the compressor is driven. Isentropic and volumetric efficiency improve as the compressor is driven at greater speeds. Belt driven compressors such as the fixed displacement or internally controlled variable displacement compressors are least efficient among the compressor types since they are controlled by engine speed. Electronically controlled variable compressors are also belt driven and suffer from the same engine speed issues but are more efficient since they can vary their output and tailor it more directly to cabin load. The most efficient variable displacement compressor is the electric scroll variant that is independent of engine operation and used on EVs. The compressor is driven to the most efficient operating point for the given cabin thermal load. In this case, the electric scroll type of variable displacement compressor is more efficient than those on ICE vehicles. The benefit of this technology is underrepresented relative to the menu credits. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

Evidence of this conservative nature of the menu credits exists with the Denso ESB compressor off-cycle applications that were approved by EPA. Credit levels for this compressor are above those of the menu and apply exclusively to BEVs and PHEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

The AC efficiency menu credits, while developed for ICE vehicles, remain conservative for EVs. Industry will continue to work with EPA if a new credit menu that correctly recognizes these technologies in BEVs is deemed necessary. Measuring the efficiency benefits in a BEV is straightforward based as measured energy consumption during an operating cycle. Eliminating the credit for BEVs due to the credits' basis on ICE vehicles is not the appropriate solution. [EPA-HQ-OAR-2022-0829-0701, pp. 99-101]

c) AC efficiency Credit Menu Adjustments

Several air conditioning efficiency technologies have been approved for credit under the alternative method off-cycle credit program. These technologies provide on-road greenhouse gas emission and energy consumption improvements. We recommend that EPA add any air conditioning efficiency technologies approved under the off-cycle program's alternative methodology to the air conditioning efficiency credit menu, and that the credit caps be adjusted accordingly. [EPA-HQ-OAR-2022-0829-0701, pp. 101-102]

d) Solar Thermal Control Technologies

Auto Innovators believes that technologies on the AC efficiency credit interact with technologies on the solar-thermal control submenu of the off-cycle credit menu and need to be considered. Given that EPA has proposed the phaseout of menu-based off-cycle credits, we recommend that EPA move the solar thermal control technologies to the AC efficiency credit menu and adjust the caps accordingly. These technologies reduce air conditioning system load, thereby reducing energy consumption and related GHG emissions from operation of the HVAC system. [EPA-HQ-OAR-2022-0829-0701, pp. 101-102]

e) Conclusion

The current AC efficiency credits should remain available to both the ICE and BEV fleetss during the transition from ICE to BEV vehicles. Keeping the credits (and therefore the technologies that they encourage) improve range, preserve customer comfort, and ensure lower energy consumption regardless of source. Continuing the AC credit program ensures the continued application of existing technologies and ensure future innovation in this area. Auto Innovators believes that: [EPA-HQ-OAR-2022-0829-0701, pp. 101-102]

-Limiting eligibility for AC efficiency credits to only ICE vehicles makes sense only once the transition to BEV mass volumes is more robust. [EPA-HQ-OAR-2022-0829-0701, pp. 101-102]

-That a subsequent rulemaking is the appropriate time to revisit this issue once BEV AC system architecture is better developed and mature. [EPA-HQ-OAR-2022-0829-0701, pp. 101-102]

-That AC credits applied to BEV vehicles is at an acceptably conservative level. The ICE values are conservative and verifiable. [EPA-HQ-OAR-2022-0829-0701, pp. 101-102]

-The solar thermal control technologies on the off-cycle menu are synergistic with the technologies on the AC efficiency credit menu and should be combined if the off-cycle credit menu is phased out. The resulting credit menu should have the caps adjusted to accommodate the solar thermal control technologies. [EPA-HQ-OAR-2022-0829-0701, pp. 101-102]

Organization: Arconic Corporation (ARCO)

3. Arconic agrees with the proposed phase out of the air conditioning (AC) system related credits. [EPA-HQ-OAR-2022-0829-0741, p. 3]

Organization: BorgWarner, Inc.

We also agree with EPA's decision to discontinue air conditioning credits under the new standard. [EPA-HQ-OAR-2022-0829-0640, pp. 4-5]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Greenhouse Gas Standards

U.S. EPA is proposing more stringent GHG emission standards for the 2027 through 2032 MYs, along with several modifications to the existing GHG program. Generally, CARB supports U.S. EPA's proposal, but offers several recommendations to further strengthen the proposed standards to achieve the greatest degree of emission reductions available, considering costs and technology readiness, to further protect public health and combat climate change. As described in detail below, CARB recommends that U.S. EPA adopt more stringent light-duty GHG emission standards; include provisions to ensure manufacturers do not allow emissions to increase from conventional vehicles and instead continue to apply all available cost-effective emission control technologies; estimate real-world PHEV emissions based on the best available data and collect additional data to inform future updates; and update elements of the comprehensive regulatory program, including retiring elements of the off-cycle and air conditioning credits programs as proposed, establishing explicit requirements to eliminate leaks from air conditioning systems, eliminating credit multipliers for medium-duty ZEVs as proposed, and requiring small-volume manufacturers to comply with the proposed standards as proposed. [EPA-HQ-OAR-2022-0829-0780, p. 12]

Motor Vehicle Air Conditioning

U.S. EPA is proposing several GHG program modifications that would impact motor vehicle air conditioning (AC). Controlling emissions from AC systems is an important climate stabilization strategy as traditional refrigerants used in AC systems are short-lived climate pollutants with high global warming potential (GWP). Acting now to reduce emissions of these powerful climate forcers can have an immediate beneficial impact. [EPA-HQ-OAR-2022-0829-0780, p. 24]

Air Conditioning Efficiency Credit Eligibility

U.S. EPA requested comments on its proposal to limit eligibility of AC efficiency credits to internal combustion engine vehicles starting in MY 2027. CARB supports this proposed change. CARB agrees with U.S. EPA that with an increasing ZEV market share, retaining AC efficiency credit eligibility for ZEVs would generate large negative calculated GHG emissions, which would not be representative of the vehicles' actual emissions. [EPA-HQ-OAR-2022-0829-0780, p. 24]

Air Conditioning Leakage Credit Elimination for Light-Duty Vehicles

U.S. EPA requested comments on its proposal to end the existing AC leakage credit for light-duty vehicles starting in the 2027 MY. CARB agrees with U.S. EPA's proposal to eliminate the AC leakage credit but recommends that U.S. EPA establish a leakage standard for light-duty vehicles. [EPA-HQ-OAR-2022-0829-0780, pp. 24-25]

CARB agrees with U.S. EPA that the GHG benefits of the AC leakage credit program are being achieved primarily through industry-wide adoption (around 95 percent of 2021 MY light-duty vehicles) of HFO-1234yf, a low-GWP refrigerant. 26 CARB further agrees that the GWP limit of 150 for light-duty vehicles starting with the 2025 MY in the newly proposed U.S. EPA "Technology Transitions" regulation would—if finalized as proposed—provide a backstop for any reversion back to high-GWP refrigerants. 27 [EPA-HQ-OAR-2022-0829-0780, pp. 24-25]

26 U.S. EPA. 2022 EPA Automotive Trends Report. EPA-420-R-22-029. (2022). https://www.epa.gov/automotive- trends/download-automotive-trends-report.

27 U.S. EPA. Phasedown of Hydrofluorocarbons: Restrictions on the Use of Certain Hydrofluorocarbons Under Subsection (i) the American Innovation and Manufacturing Act of 2022. Federal Register 87, no. 240 (December 15, 2022). Docket ID: EPA–HQ–OAR–2021–0643. Available at: https://www.govinfo.gov/content/pkg/FR-2022- 12-15/pdf/2022-26981.pdf and U.S. EPA. "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles - Phase 2." Federal Register 81, No. 206 (October 25, 2016). Docket ID: EPA–HQ–OAR–2014–0827. Available at: https://www.govinfo.gov/content/pkg/FR-2016-10- 25/pdf/2016-21203.pdf.

However, CARB notes that there are secondary benefits—including GHG benefits—for having low-leak AC systems regardless of refrigerant type, including: helping to maintain AC system efficiency; 28 reducing the generation of trifluoroacetic acid (TFA), an atmospheric degradation byproduct of fluorinated gases such as HFO-1234yf; 29 and reducing the need for AC recharge and therefore the associated cost to consumers. [EPA-HQ-OAR-2022-0829-0780, pp. 24-25]

28 Prölss, K., G. Schmitz, D. Limperich, and M. Braun. "Influence of Refrigerant Charge Variation on the Performance of an Automotive Refrigeration System." Proceedings of the 2006 International Refrigeration and Air Conditioning Conference at Purdue. July 17-20, 2006, Purdue University, West Lafayette, Indiana.

29 Luecken, D.J., R.L. Waterland, S. Papasavva, K.N. Taddonio, W.T. Hutzell, J.P. Rugh, and S.O. Andersen. Ozone and TFA Impacts in North America from Degradation of 2,3,3,3-Tetrafluoropropene (HFO-1234yf), A Potential Greenhouse Gas Replacement. Environmental Science and Technology, 44(1), 343-348. Published December 8, 2009. http://dx.doi.org/10.1021/es902481f.

Given the benefits associated with low-leak AC systems and the risk that manufacturers may not pursue this technology in the absence of the leakage credit, CARB recommends that U.S. EPA establish an AC leakage standard for light-duty vehicles, similar to the AC leakage standard for heavy-duty vehicles in the current U.S. EPA Heavy-Duty Vehicle GHG regulations. 30 CARB notes that one data source that U.S. EPA could analyze to establish the appropriate leakage threshold for light-duty vehicles is the AC leakage data reported by auto manufacturers to the State of Minnesota's Mobile Air Conditioning Leakage Reporting Requirements. 31 The same data source was used in U.S. EPA's analysis to establish the leakage threshold for the AC leakage standard in its Heavy-Duty Vehicle GHG regulations. 32 [EPA-HQ-OAR-2022-0829-0780, pp. 24-25]

30 U.S. EPA. "Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles." Federal Register 76, No. 179 (September 15, 2011). Docket ID: EPA–HQ–OAR–2010– 0162. Available at: https://www.govinfo.gov/content/pkg/FR-2011-09-15/pdf/2011-20740.pdf.

31 Minnesota Pollution Control Agency. "High Global Warming Potential Greenhouse Gases - Leakage from Vehicle Air Conditioners." Available at: https://www.pca.state.mn.us/business-with-us/high-global-warming- potential-greenhouse-gases. Accessed June 15, 2023.

32 U.S. EPA. "Final Rulemaking to Establish Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles - Regulatory Impact Analysis". Docket ID: EPA–HQ–OAR– 2010–0162. Available at: https://downloads.regulations.gov/EPA-HQ-OAR-2010-0162-3634/content.pdf.

Elimination of Air Conditioning Leakage Standard for Medium-Duty Vehicles

U.S. EPA requested comments on the proposed ending of the AC leakage standard for medium-duty vehicles starting in the 2027 MY. As noted above for light-duty vehicles, while CARB agrees with U.S. EPA that the majority of the GHG emissions from medium-duty vehicle AC refrigerants can be reduced with the proposal to require low-GWP alternative refrigerants, CARB recommends continuing to subject medium-duty vehicles to the existing AC leakage standard. [EPA-HQ-OAR-2022-0829-0780, p. 26]

Again, as noted above for light-duty vehicles, there are secondary benefits—including GHG benefits—associated with low-leak AC systems regardless of the refrigerant type, including: helping to maintain AC system efficiency; reducing the generation of TFA; and reducing the need for AC recharge and therefore the associated cost to consumers. CARB notes that in the existing U.S. EPA Heavy-Duty Vehicle GHG standards for the 2021 through 2027 MYs (also known as the GHG “Phase 2” regulation), which currently applies to these medium-duty vehicles, the same AC leakage standard applies to all refrigerant types. For these reasons, CARB recommends that U.S. EPA retain the existing AC leakage standard for medium-duty vehicles regardless of refrigerant type. [EPA-HQ-OAR-2022-0829-0780, p. 26]

Organization: California Attorney General's Office, et al.

However, we urge EPA to consider retaining a smaller-value air conditioning credit for refrigerant leakage, id. at 29,247-48, or other, similar measures to continue preventing leakage of air conditioning refrigerants. Although the use of refrigerants with low global warming potential (“GWP”) indicates refrigerant leaks will contribute less to climate change, even low-GWP refrigerant leaks continue to be harmful in the aggregate. Id. at 29,246 (low-GWP refrigerant HFO-1234yf has a GWP of 4, compared to HFC134(a)’s GWP of 1430). Continuing to incentivize the prevention of refrigerant leaks still appears beneficial, even if the credit itself should be reduced to reflect the lower GWP of the predominant refrigerant. See CARB Comment at 35-37. [EPA-HQ-OAR-2022-0829-0746, pp. 37-38]

Organization: Chemours Company FC, LLC

The Chemours Company FC, LLC ("Chemours") appreciates the opportunity to comment on the Environmental Protection Agency's ("EPA" or "Agency") proposed rule. We support the Agency's proposal to revise the air conditioning (AC) credits program to remove the refrigerant-based AC provision. We agree that statutory requirements under the American Innovation and Manufacturing (AIM) act will continue to drive adoption of lower GWP refrigerants in vehicles. Because this proposal, in part, relies upon a pending rule under Subsection (i) of the AIM Act, the Agency must remain cognizant of any changes to the final AIM regulation and what, if any, impacts those changes could have on this proposed rule. To avoid such discrepancy, it would be prudent to finalize this rule after the Technology Transition final rule under Subsection (i) of the AIM Act for auto AC is published and effective. [EPA-HQ-OAR-2022-0829-3644, p. 1]

Organization: DENSO Corporation

4) A/C Efficiency Credit Program

DENSO supports the A/C efficiency credit program and appreciates EPA continuing the program.2

2 Ibid.

If EPA sunsets the alternative method off-cycle credit program, then interactions with the A/C efficiency credit program need to be considered. For example, several A/C efficiency technologies have been approved for credit under the alternative method off-cycle credit program. These technologies provide on-road greenhouse gas emission and energy consumption improvements. Therefore, we request EPA consider adding any A/C efficiency technologies approved under the off-cycle program's alternative methodology to the A/C efficiency credit menu, and that the credit caps be adjusted accordingly. [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

Also similar to our comments on off-cycle, concerning the 5-Cycle and Alternative Method pathways, EPA should follow through under the current regulation and complete action on all submitted applications, even if it requires additional discussions. [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

In addition, and as shared in previous comments to EPA, DENSO requests the agency consider expanding the AC efficiency credit cap based on the National Renewable Energy Laboratory (NREL) study showing greater A/C improvement possibilities.3 [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

3 NREL Presentation 17TMSS-0056 at SAE Thermal Management Systems Symposium 2017 (October 2017).

NREL Study 17TMSS-0056 estimates the latest A/C energy consumption at 23.5 g/mile based on a series of simulations were performed to three vehicle platforms using various US driving patterns. This is compared to 11.9 g/mile for passenger car and 17.2 g/mile for light truck, which were baseline A/C emissions impacts previously used by the agencies to determine A/C efficiency credit cap, new baseline A/C emission impact is calculated to 20.3 g/mile for passenger car and 29.3 g/mile for light truck by using the latest A/C energy consumption (23.5 g/mile). [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

Based on the new baseline emission impact and A/C improvement possibility, 42% of which were previously used by the agencies, the increased A/C credit cap would be 8.5 g/mile for passenger car and 12.3 g/mile for light truck. Therefore, DENSO would request EPA to consider increasing A/C efficiency credit cap as supported by this study. [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

These recommendations are explained in more detail here:

A/C Impact on Vehicle CO2 Emissions: New NREL Research4

- 30 gal/yr=23.5 g/mi where individual traveling 11,246 miles/yr
- 8887 grams CO2 per gallon of gasoline
- 2012MY LD Vehicle Production5: Car (64%), Truck (36%)
- Baseline A/C Emissions Impact: Car: 11.9 g/mi, Truck: 17.2 g/mil
- Split NREL results into car/truck based on EPA ratios:

Car: 11.9/13.8*23.5 = 20.3 g/mi

Truck: 17.2/13.8*23.5 = 29.3 g/mil [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

4 EPA-NHTSA Joint Technical Support Document for Final Rulemaking for 2017-2025 Light-Duty Vehicle GHG & CAFE Standards: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100F1E5.PDF?Dockey=P1000F1E5.PDF.

5 EPA Light-Duty Automotive Technology, Carbon Dioxide Emissions and Fuel Economy Trends: 1975 through 2017.

A/C Credit Cap Revisions

- New Baseline A/C Emissions Impact (based on new research by NREL) Car: 20.3 g/mi, Truck: 29.3 g/mi
- A/C Credit Cap

Improvement possibility = 42% (current assumption in Joint TSD 6)

Car: Current 11.9 g/mi x 42% = 5.0 g/mi; New: 20.3 g/mi x 42% = 8.5 g/mil Truck: Current: 17.2g/mi x 42% = 7.2 g/mi; New: 29.3 g/mi x 42% = 12.3 g/mi [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

6 Ibid, 4.

The A/C efficiency credit program is robust and verifiable; however, the current cap constraints can create situations where an A/C technology that reduces GHG emissions may not be applied on a vehicle’s system. For example, a technology may be left on the shelf if it will not be accounted for through direct contribution to achieving the standard, nor recognized through a credit recognizing the technology contribution to emissions reduction. Therefore, we again ask EPA to consider increasing the credit cap for this program. [EPA-HQ-OAR-2022-0829-0651, pp. 4-6]

5) Technologies Supporting ZEV Energy Consumption Reduction

DENSO requests EPA to reconsider its proposal to eliminate A/C efficiency and off- cycle credits for electrified vehicles. Off-cycle and AC efficiency credits for technologies applied across all powertrain types encourage their continued use with commensurate benefits to consumers and the environment. The elimination of off- cycle and air conditioning efficiency credits on electric vehicles would have an unfortunate effect on the application of existing technologies and further innovation in this area. [EPA-HQ-OAR-2022-0829-0651, p. 6]

DENSO also encourages EPA to explore how energy reductions from thermal technologies could be rewarded when used on BEVs, PHEVs and FCEVs. All technologies and all powertrains should continue to improve their performance. Consequently, technologies that reduce use of the vehicle battery (and reduce the amount of battery charging needed) and therefore the electricity used to power the vehicle should be recognized in MYs 2027 and beyond. [EPA-HQ-OAR-2022-0829-0651, p. 6]

Beyond the off-cycle and A/C efficiency credit programs, DENSO would welcome the opportunity to discuss the possibility of credits to further incentivize BEV energy consumption reduction directly and further support the industry during this critical technology transition period.7 A credit or incentive for technologies that support BEV energy consumption reduction from a consumer comfort and battery comfort perspective, as well as to encourage responsible critical mineral usage and grid management, would also contribute to US climate goals generally. Similar to the off- cycle and A/C efficiency program, a similar ZEV-focused technology credit would help to support industry investment in innovative and forward-looking technologies that provide additional environmental benefits. [EPA-HQ-OAR-2022-0829-0651, p. 6]

7 Please see Appendix 2 for a partial list of DENSO technologies that support ZEV energy consumption reduction.

6) Air Conditioning Refrigerant Leakage Credits

As a supplier committed to the environment, we support maintaining the low Global Warming Potential (low GWP) refrigerant credits. This credit program advances technological leadership and recognizes significant technological investments. The credits also provide an important incentive to voluntarily transition to next- generation refrigerants with low GWP. Therefore, we request EPA to consider continuation of the air conditioning refrigerant leakage credits. If EPA decides to eliminate the leakage credits, we request EPA to consider a phase-down instead of an immediate elimination. [EPA-HQ-OAR-2022-0829-0651, p. 6]

Appendix 1

DENSO GREEN Technology Examples:

Off-Cycle Credit/AC Efficiency Credit Technologies for ICE and ZEV Powertrains [EPA-HQ-OAR-2022-0829-0651, p. 8]

1. SAS Compressor w/CS Valve: Technology has improved pressure drop through the cylinders and a crankcase suction valve that minimizes internal compressor losses at conditions other than maximum capacity. [EPA-HQ-OAR-2022-0829-0651, p. 8]

2. Electric Scroll Air Conditioning Compressor Variation B (ESB) with pressure adjusting valve technology: This technology improves the efficiency of the electric scroll compressor using a pressure adjusting valve to optimize back pressure on the fixed scroll and reduce mechanical losses. [EPA-HQ-OAR-2022-0829-0651, p. 8]

3. S-Flow System: Reduces the thermal load on the air conditioning system through targeted cooling of only the occupied cabin areas, and for a pulse width modulated brushless motor power controller used in the HVAC system, which improves the efficiency of the HVAC system. [EPA-HQ-OAR-2022-0829-0651, p. 8]

4. High-Efficiency Alternator: High efficiency alternators use new technologies to reduce the overall load on the engine yet continue to meet the electrical demands of the vehicle systems, resulting in lower fuel consumption and lower CO2 emissions. [EPA-HQ-OAR-2022-0829-0651, p. 8]

5. Compressor Oil Separator: Technology removes at least 50% of the oil entrained in the oil/refrigerant mixture exiting the compressor and returns it to the compressor housing or compressor inlet, or a compressor design, which does not rely on the circulation of an oil/refrigerant mixture for lubrication. [EPA-HQ-OAR-2022-0829-0651, p. 8]

6. Internal Heat Exchanger (SCX): An Internal Heat Exchanger reduces load on the compressor by transferring heat from the high-pressure liquid entering the expansion valve (TXV) to the low- pressure gas exiting the evaporator. [EPA-HQ-OAR-2022-0829-0651, p. 8]

7. 2-Layer HVAC: Full technology explanation is below (from SAE Paper 2018-01-1368). Short explanation: In cold ambient conditions, two-layer HVAC recirculates already warmed air in the lower part of the HVAC unit and distributes it to the lower part of the vehicle cabin, while using air from outside the vehicle in the upper part of the HVAC unit, distributing it to the upper part of the vehicle cabin. Outside air is necessary to keep windows fog-free. Recirculated air requires less energy to re-heat. Two-layer HVAC allows both, minimizing energy needed to keep the cabin warm and fog-free. In an ICE vehicle, this results in an energy savings by enabling faster engine warm-up (since less heat is needed for cabin heating), while in a BEV the energy savings impact is even greater, since the energy used for heating the vehicle cabin needs to come from the vehicle battery. [EPA-HQ-OAR-2022-0829-0651, p. 8]

8. LE40: This technology allows for reduced power consumption during compressor operation through improved and more efficient clutch technology. [EPA-HQ-OAR-2022-0829-0651, p. 8]

9. Cold-Storage Evaporator: (Off-Cycle Alt-Method/Off-Cycle Cap): This technology utilizes phase change material in the HVAC evaporator of vehicles equipped with engine Start & Stop technology to extend the time that cold air can be delivered to the cabin with the engine and compressor off. This reduces the amount of time the engine would otherwise operate solely for the purpose of cooling the cabin. [EPA-HQ-OAR-2022-0829-0651, p. 8]

Organization: Environmental. and Public Health Organizations

A. Air conditioning credits

For light-duty vehicles,215 EPA proposes to renew credits for manufacturers that install technology that improves the efficiency of air conditioning ("AC") systems, but to exclude BEVs from eligibility, while retaining current 5-cycle testing protocols that confirm the systems actually reduce emissions as anticipated. 88 Fed. Reg. at 29246. EPA also proposes not to renew light-duty vehicles' hydrofluorocarbon ("HFC") refrigerant leakage control credits and to sunset current refrigerant standards for medium-duty vehicles, because another rulemaking under a different statute is addressing HFCs. Id. We generally support EPA's proposals. [EPA-HQ-OAR-2022-0829-0759, p. 79]

215 The medium-duty vehicle fleet does not include air conditioning efficiency-related credits or requirements, and EPA is not taking comments on that matter. 88 Fed. Reg. at 29246; 81 Fed. Reg. at 73742; 76 Fed. Reg. at 57196.

1.Background

AC systems create tailpipe emissions by using additional power generated through the combustion of gasoline. 88 Fed. Reg. at 29246. Since 2012 EPA has granted credits for AC systems that reduce this extra fuel usage by means of installing more efficient components and air recirculation settings, both measures that reduce engine loads. EPA states it has consistently increased the stringency of the light-duty CO2 footprint curves in the amount of the anticipated AC credits by shifting the footprint curves downwards. Thus, according to EPA, manufacturers who opt not to install the more efficient systems must meet the increased stringency by means of other technology. AC efficiency credits are capped at 5.0 g/mile for passenger cars and 7.2 g/mile for light trucks, and all vehicles in these classes have been eligible for the credits. EPA deems the credits to be effective in reducing emissions and reports increased usage. In MY 2021, 17 of 20 manufacturers reported efficiency credits resulting in an average credit of 5.7 g/mile. 88 Fed. Reg. at 29246. [EPA-HQ-OAR-2022-0829-0759, p. 79]

2.Proposal to renew AC efficiency credits for vehicles with combustion engines only

EPA now proposes to renew AC efficiency credit eligibility only for vehicles equipped with internal combustion engines. EPA reasons that such credits for BEVs are no longer required because BEVs running AC systems do not combust gasoline; AC efficiency credits are not representative of their emission reductions; and BEVs are already counted as 0 g/mile, so that adding AC efficiency credits to the calculation has led to reporting of BEV emissions at less than zero (in the case of Tesla, a fleet average of negative 126 g/mile, including 18.8 g/mile of AC credits). 88 Fed. Reg. at 29247. The credits, EPA explains, were adopted when BEV sales were low and incentivized BEVs, but are no longer needed. EPA next proposes to renew AC efficiency credits for combustion vehicles while increasing the standards' stringency to reflect use of those credits. EPA states it will continue to condition credit approval on mandatory 5-cycle testing216 of certain grouped vehicles to confirm that the projected emission reductions are occurring in the real world (the "AC17" test). [EPA-HQ-OAR-2022-0829-0759, pp. 79-80]

216 The test includes a highway cycle, a high temperature condition cycle, a preconditioning cycle, and a cycle at solar peak periods of four hours. Where test results do not support full menu credits, proportional credits may be allowed. Tests are performed on one vehicle model for each platform, starting with the highest sales volume vehicles, and moving to the next-highest sales volume vehicle annually thereafter, until all vehicle models have been tested or the platform undergoes redesign. EPA is not taking comments on the testing procedures. 88 Fed. Reg. at 29247.

We fully support EPA's proposal not to grant any AC credits to vehicles without a combustion engine. BEVs should no longer be credited with fictitious tailpipe emission reductions, in this case or otherwise. BEVs do not combust gasoline, regardless of whether they use AC systems. We also agree that the current credits are not representative of BEV upstream emissions and are no longer justified to incentivize BEVs, and that BEVs should not be accounted for as if they produce less than zero grams per mile. [EPA-HQ-OAR-2022-0829-0759, p. 80]

We generally support the proposal to retain AC efficiency credits for vehicles with internal combustion engines, with some caveats. Historically, credits have allowed manufacturers to significantly delay compliance with EPA's standards, leading to near-term emission increases, as EPA has often acknowledged. E.g., 86 Fed. Reg. at 43756; 77 Fed. Reg. 62812. That problem is exacerbated when vehicles do not have to undergo testing to confirm the technologies for which credits are awarded do in fact reduce emissions by an equivalent amount, and where the stringency of the standards has not been increased to reflect the anticipated credit use. Here, the latter concern is addressed if EPA does in fact increase stringency by lowering the footprint curve to reflect the available credits, and the AC17 test is vigorous. We would, however, oppose these AC efficiency credits should EPA relax any of the current AC17 test procedures, as their real-world effectiveness could no longer be assured. We also ask EPA to fully explain exactly how it ensures that the standards' stringency is in fact increased by an amount equivalent to the credits it grants. [EPA-HQ-OAR-2022-0829-0759, p. 80]

We also support renewed AC efficiency system credits (for combustion vehicles only) for an additional reason. In light of the astonishingly rapid and dangerous temperature increases all across the country produced by the climate crisis, more frequent and more energy-intensive use of air conditioning is inevitable. Assuring that these systems are as efficient as possible is therefore of great importance. For that reason, we urge EPA to adopt an AC efficiency standard rather than a voluntary credit, as it has done for the medium-duty fleet in the case of refrigerant credits or, at a minimum, in its post-MY 2023 rulemaking. [EPA-HQ-OAR-2022-0829-0759, p. 80]

B.Proposal not to renew air conditioning leakage credits

1.Background

When EPA established the current refrigerant leakage credits in 2012, the most common HFC refrigerant used in mobile air conditioners was HFC-134a, carrying a global warming potential ("GWP") of 1430 times that of CO2. 88 Fed. Reg. at 29246. The most emission-reducing alternative at that time was HFO-1234yf, with a GWP of 4. To encourage the shift from HFC-134a, the 2012 standards allowed manufacturers to earn refrigerant credits for light duty vehicles and trucks, respectively, that are capped at 13.8 and 17.2 g/mile when an alternative refrigerant is used, and at 6.3 and 7.8 g/mile for employing leak-tight components. For the medium-duty fleet, EPA adopted a refrigerant leakage standard rather than a voluntary credit. Id. EPA describes the program as successful and reports that as of MY 2021, 95% of new vehicles use the refrigerant HFO-1234yf, 88 Fed. Reg. at 29247, which has a GWP of 4. 88 Fed. Reg. at 29246. [EPA-HQ-OAR-2022-0829-0759, p. 81]

2.Proposal to eliminate refrigerant credits

EPA now proposes not to renew refrigerant credits beginning in MY 2027 for the light-duty fleet, and to sunset the refrigerant standards for medium-duty vehicles, largely because of the passage of the American Innovation and Manufacturing ("AIM") Act, 42 U.S.C. § 7675, in December 2020. Two years later, EPA issued a Notice of Proposed Rulemaking under the AIM Act (the "AIM Proposal") to restrict the HFCs used in light- and medium-vehicles to those not exceeding a GWP of 150, with effective dates, respectively, of MY 2025 for the light-duty fleet and MY 2026 for the heavy-duty fleet.217 EPA states that there is no reason to believe manufacturers would use higher GWP refrigerants in the absence of EPA vehicle-based credits, and that not renewing the credits would avoid duplicative programs, simplify this rule, and reduce manufacturer credit reporting burdens. [EPA-HQ-OAR-2022-0829-0759, p. 81]

217 Phasedown of Hydrofluorocarbons: Restrictions on the Use of Certain Hydrofluorocarbons Under Subsection (i) of the American Innovation and Manufacturing Act of 2020, 87 Fed. Reg. 76738 (Dec. 15, 2022).

EPA requests comments on whether there is any value in retaining the refrigerant credits. In our view, the answer is no. The AIM Proposal is expected to be finalized this summer or early fall, before EPA completes this rulemaking. If the current refrigerant credits are eliminated, there is no reason to believe manufacturers would use refrigerants other than HFC-1234yf (with its GWP of 4). Two possible alternative refrigerants with GWP values under 150 exist (HFC-152a and carbon dioxide), but adopting either would require a significant redesign of mobile air conditioners. We are not aware of any manufacturers currently planning to use HFC-152a, and while a few companies that import vehicles have investigated CO2-based systems in northern Europe, it is our understanding that those systems would not work well in the temperature ranges experienced in the U.S. market. Thus, we concur with EPA's judgment that neither the majority of manufacturers already using HFO-1234yf nor the minority of manufacturers still using HFC-134a are likely to switch to either of the other two alternatives with GWPs under 150. Thus, while the AIM Proposal could be tightened to bar refrigerants with GWP greater than 4, the potential for backsliding under that proposal appears minimal. Thus, we agree that if the AIM Proposal is finalized as proposed, and considering that HFO-1234yf is already used in 95% of vehicles, there is no reason to renew a refrigerant credit program dating from 2012. [EPA-HQ-OAR-2022-0829-0759, pp. 81-82]

As a backstop, however, any remaining concerns can be resolved if either the AIM Proposal or this rule, once finalized, adopts a standard requiring refrigerants with no more than GWP values of 4, effective for MY 2026 and 2027, respectively. [EPA-HQ-OAR-2022-0829-0759, p. 82]

Organization: Ford Motor Company

Likewise, Ford recommends that EPA establish a phase-out for refrigerant credits, rather than discontinue them all at once. Ford understands EPA's rationale for discontinuing these credits in the long-term given the American Innovation and Manufacturing (AIM) Act program, but we encourage EPA to coordinate these separate actions to allow a phase-out over time. This would help mitigate the stringency increases early in the GHG program, and make the final program more feasible. [EPA-HQ-OAR-2022-0829-0605, p. 8]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG requests ZEVs to remain eligible for both Off-Cycle Credits and indirect A/C (efficiency) credits [EPA-HQ-OAR-2022-0829-0554, p. 7]

Under the Proposed Rule, from MY 2027, ZEVs will no longer be eligible for A/C efficiency credits. HMG believes the same argument can be made here as related to the OCC proposal. A/C technology improvements will lead to reduced energy use in ZEVs and thus reduced emissions associated with such vehicles. Therefore, when considering overall emissions reductions and EPA' s broader goals to improve human health and the environment by such emissions reductions, there is considerable value in incentivizing energy-saving ZEVs, particularly while challenges to developing and deploying ZEV technology remain. HMG therefore opposes the Proposed Rule's elimination of indirect A/C efficiency credits for ZEVs. [EPA-HQ-OAR-2022-0829-0554, p. 7]

HMG believes direct A/C (leakage) credits should not be eliminated [EPA-HQ-OAR-2022-0829-0554, p. 7]

EPA also proposes to remove direct A/C leakage credits from MY 2027 for all vehicles. HMG again opposes the removal of this important incentive. If retained , the majority of auto manufacturers would receive these credits because great efforts were made over the past few years to switch to a low global warming potential (GWP) refrigerant. Removing this credit opportunity places a greater burden on manufacturers already undergoing substantial challenges associated with the push to electrification. [EPA-HQ-OAR-2022-0829-0554, p. 7]

For this reason, HMG believes the A/C leakage credits should exist beyond MY 2027. Auto manufacturers made large investments to make the switch to their entire fleet with the expectation that earned credits would offset some of these costs. HMG suggests slowly phasing out A/C leakage credits over 5 years instead of eliminating them completely in MY 2027. A/C leakage credits are also a large percentage of credits currently earned, and with the reduction of these credits, it will be much more difficult to meet the more stringent GHG emissions standards than it ap pears. [EPA-HQ-OAR-2022-0829-0554, p. 7]

Organization: Hyundai Motor America

The Final Rule Should Delay the Start of Off-Cycle Credit Phase Down Until MY 2031. [EPA-HQ-OAR-2022-0829-0599, pp. 7-8]

The final rule should enable compliance pathways by offering a real choice of clean technology innovation or greater PEV penetration. However, the fundamental stripping away of technology- earning credit flexibilities, in effect, creates an EV mandate. The result will cause an industrywide race to simply “buy” compliance through credit trading provisions. In this way, the Proposed Alternative’s restructured off-cycle and air conditioning credit provisions incentivize the wrong behavior by industry. [EPA-HQ-OAR-2022-0829-0599, pp. 7-8]

Organization: Kia Corporation

- Kia strongly supports preserving many of the current program flexibilities – a phase- down of the A/C refrigerant leakage credits and preserving the off-cycle technology credits. These flexibilities should still play an important role as these credits could help ease the uncertainties in the transition to EVs. [EPA-HQ-OAR-2022-0829-0555, p. 3]

Kia Supports Continuation of the A/C Efficiency Credit Program

EPA proposes to continue the A/C efficiency credit program, but limit the eligibility for the A/C efficiency credits to only ICE vehicles starting in MY2027. Starting with MY2027, BEVs are no longer eligible for A/C efficiency credits. Kia supports the continuation of the A/C efficiency credit program. These efficiency technologies result in real-world GHG emissions reductions. Therefore, they should not be eliminated or viewed as cutting into the effective stringency of the program. [EPA-HQ-OAR-2022-0829-0555, pp. 14-15]

Kia Supports a Phase Down of the A/C Refrigerant Leakage Credit Program

EPA proposes to remove the A/C refrigerant leakage credits for both light and medium duty vehicles and trucks because of the separate law disallowing the use of high global warming potential refrigerants under the American Innovation and Manufacturing (AIM) Act of 2020. [EPA-HQ-OAR-2022-0829-0555, pp. 14-15]

Because of the mandate in the AIM Act and because the transition to low global warming refrigerant is in effect, Kia recommends, instead of immediate elimination, a phase-down of credits before eventually discontinuing the A/C leakage credit. [EPA-HQ-OAR-2022-0829-0555, pp. 14-15]

Kia urges EPA to accurately reflect the transition of the credit in the stringency curve. While this transition has been reflected in the stringency curve for passenger vehicles from MYs 2027 - 2032, it is less clear how the stringency curve for light trucks reflects this change. We recommend EPA further adjust the stringency curves for light trucks to better reflect the transition to low global warming refrigerants from MYs 2027 - 2032. Both of these recommended adjustments will provide flexibility for meeting the extremely stringent and front-loaded GHG standards. [EPA-HQ-OAR-2022-0829-0555, pp. 14-15]

Organization: Lucid Group, Inc.

Lucid Supports Eliminating AC Leakage and Off-Cycle Menu Credits

EPA proposes removing the air conditioning (AC) refrigerant leakage control credit starting with MY27. Lucid supports the agency’s decision to remove the leakage control credit; the credit has led to the reduction of leakage of hydrofluorocarbon (HFC) 134a refrigerant by manufacturers transitioning to leak-tight components in the AC system or to refrigerants with a lower global warming potential. [EPA-HQ-OAR-2022-0829-0664, p. 7]

Lucid Encourages EPA to Consider Parity with AC Efficiency Credits

Lucid agrees with EPA that AC efficiency credits have been effective in incentivizing AC efficiency improvements since the program’s inception, and the usage of these credits by manufacturers has increased over time. AC efficiency improvements have a direct impact on tailpipe emissions for ICE vehicles. As a corollary, improvements to AC efficiency in EVs yields benefits such as better vehicle range, increased vehicle efficiency, and less demand on the grid. These benefits directly impact EV usage, vehicle miles traveled, and consumer sentiment toward the adoption of EVs. [EPA-HQ-OAR-2022-0829-0664, p. 7]

Lucid encourages EPA to consider parity in treatment of ICE vehicles and EVs under the AC efficiency credit program. The benefits in increased efficiency should be recognized in both or neither. [EPA-HQ-OAR-2022-0829-0664, p. 7]

Organization: MEMA, The Vehicle Suppliers Associated

Continue Off-Cycle Technologies Credit & A/C Efficiency Technology Credit Programs

MEMA urges EPA to continue to provide the off-cycle technology credit program and the A/C efficiency credit program. The supplier community, working independently and in collaboration with OEMs, develop and engineer innovative technologies that contribute to vehicle manufacturers' strategies for real-world GHG and fuel consumption reductions often beyond those measured with standard test procedures. The off-cycle credit program and A/C efficiency credit program have helped to support industry investment in innovative and forward-looking technologies that provide environmental benefits. These technologies offer measurable, demonstrable, and verifiable real-world benefits that improve efficiencies and reduce GHG emissions. They also provide an important cost-effective option for OEMs to achieve fuel economy and GHG targets. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

These credit programs are not loopholes and do not distort the market but instead recognize technologies that are not measured accurately on the existing test-cycles. These technologies are often more cost effective than other available technologies to reduce pollutant emissions. It is important that the MY27+ program allows a variety of regulatory tools to broaden compliance pathways for vehicles to manage their product mix during this transition period. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

The continuation of the off-cycle credit program is critical in encouraging technologies that allow greater innovation which can provide a cost-efficient range of technology options that ultimately lower compliance costs and increase consumer choice. These technologies will continue to promote consumer choice, spur technology development, and minimize compliance costs while achieving significant pollutant emissions and oil reductions. Importantly, continuation of the off-cycle technology credit program will help maintain market certainty for these technologies. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

Similarly, MEMA encourages EPA to explore how emissions reductions from off-cycle technologies and A/C efficiency technologies could be rewarded when used on BEVS, PHEVs, FCEVS, and other ZEVs. Many off-cycle and A/C efficiency technologies, along with emerging ZEV technologies, could help reduce battery energy use and therefore lower the amount of electricity used to power the vehicle overall. Consequently, technologies that reduce the amount of battery charging needed and, therefore, the electricity used to power the vehicle should be recognized in MY2027 and beyond. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

MEMA urges:

- EPA to maintain off-cycle credits and A/C credits programs at full value through 2032 for all vehicle types, including ZEV, and consider additional ways emerging technologies that reduce ZEV energy consumption can be rewarded. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

Organization: Minnesota Pollution Control Agency (MPCA)

- Phase out air conditioning and off-cycle credits

The MPCA agrees with EPA's proposal to phase out air conditioning and off-cycle credits. While useful to encourage manufacturers to invest in improved technology in earlier phases of EPA's greenhouse gas vehicle emissions standards, they no longer provide substantive benefit, and it is appropriate to sunset these programs. [EPA-HQ-OAR-2022-0829-0557, p. 5]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

Mitsubishi participated in the development of - and supports - the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0682, p. 2]

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators:

1. Closely align the multi-pollutant emissions standards with President Biden's 2030 goal by assuming no more than 40-50% PHEVs and FCEVs by 2030, even though our experience leads us to caution that this itself is very ambitious, and is predicated on the assumption that the necessary supportive policies will be effectively implemented. [EPA-HQ-OAR-2022-0829-0682, p. 2]

2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping- stone to full BEV acceptance. [EPA-HQ-OAR-2022-0829-0682, p. 2]

3. Maintain the current PHEV Utility Factor (UF) and work with industry to identify opportunities to increase PHEV electric operation. This is the ideal stepping-stone technology to encourage long-term BEV acceptance and utilization. [EPA-HQ-OAR-2022-0829-0682, p. 2]

4. Keep the proposed approach to determine the passenger car curves, and consider adjusting the cutpoint and stringency levels of the light-duty trucks during the early years of the program. [EPA-HQ-OAR-2022-0829-0682, p. 2]

5. Maintain the existing GHG program flexibilities, such as Air Conditioning and Off-Cycle technologies credits (including the alternative method to apply off-cycle credits), and allow previously approved technologies to continue receiving credits. [EPA-HQ-OAR-2022-0829-0682, p. 2]

6. Align the Tier-4 (criteria pollutants) with CARB's LEV-IV criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 2]

7. Consider the impact that very aggressive GHG standards will have on vehicle affordability, and especially the detrimental impact to low-to-moderate income families. Regardless of the vehicles that regulation may require us to produce, it is critical that regulators always keep the accessibility of consumers in mind. [EPA-HQ-OAR-2022-0829-0682, p. 2]

The rationale for each one of these recommendations is further explained below. [EPA-HQ-OAR-2022-0829-0682, p. 2]

5. GHG Program Flexibilities

At the onset of GHG regulations in MY2012, EPA developed a set of program flexibilities designed to provide credits for technologies that provide real-world GHG emissions benefits but are unable to be measured under the required test procedures. Specifically, credits are available for refrigerant systems which use low global warming potential refrigerants and reduce leakage, improvements to air conditioning efficiency, and “off-cycle” technologies which improve emissions but are not fully measured during 2-cycle testing. This proposed regulation intends to phase out and eliminate several of these credits as well as limit their application for electric vehicles. Mitsubishi supports the position of Auto Innovators to maintain these program flexibilities as these technologies provide real-world environmental benefits. Mitsubishi also supports Auto Innovators’ position that any vehicles with previously approved alternative method off-cycle technology continue to receive credits for MY27 and later. In addition, Mitsubishi believes that the alternative method to apply for off-cycle credits should remain as an option for MY27 and later. [EPA-HQ-OAR-2022-0829-0682, pp. 8-9]

It is important to note that NHTSA’s CAFE program in the past has mirrored EPA’s GHG approach to these flexibilities. Since it is not possible to comment on a proposed CAFE regulation that has not yet been published, it is only reasonable to assume that NHTSA will follow previous precedent regarding flexibilities and adopt the same structure as EPA. However, there is a significant deviation with regard to the treatment of EV compliance under the CAFE and GHG programs. Where EVs are rightly considered zero g/mi under the GHG program, the CAFE program requires EVs to be assign a mile per gallon equivalent compliance value based on the PEF. Increasing this discrepancy in the GHG and CAFE programs, DOE has proposed reducing the PEF by 72% compared to the current value. The PEF reduction will lead to a substantial decrease in the CAFE compliance value of BEVs and PHEVs. The elimination of air conditioning and off- cycle credits for EVs combined with changes to the PEF, and UF within the CAFE program could put BEVs and PHEVs at a distinctive compliance disadvantage relative to some Strong Hybrid-Electric Vehicles (SHEVs). Keeping these flexibilities in the GHG program for electric vehicles should reduce potential harmonization issues between the GHG and CAFE regulations. For this reason and the reasons stated by Auto Innovators, Mitsubishi supports Auto Innovators proposed approach to apply all available credits at the vehicle level regardless of propulsion, but ensure fleet-wide average emissions are not allowed to go below a value equivalent to zero g/mi. [EPA-HQ-OAR-2022-0829-0682, pp. 8-9]

Organization: National Association of Clean Air Agencies (NACAA)

We also support the proposed elimination of air conditioning (AC) leakage credits and recommend that EPA include in the final rule a leakage design standard to serve as a backstop against the impact of any leakage. In the December 2020 American Innovation and Manufacturing (AIM) Act Congress authorized EPA to phase down production and consumption of hydrofluorocarbons (HFCs) in various sectors and subsectors, including vehicle AC systems. As EPA explains in the proposal, "The AIM Act has sent a strong signal to all vehicle manufacturers that there is no future for using high GWP [Global Warming Potential] refrigerants in new vehicles. In December 2022, in response to the AIM Act, EPA proposed to restrict the use of high GWP refrigerants such as HFCs in vehicle applications. The new restriction on refrigerant use, if finalized as proposed, would be effective in MY 2025 for light-duty vehicles and MY 2026 for MDVs, well ahead of the start of the new CO2 vehicle standards EPA is proposing."28 [EPA-HQ-OAR-2022-0829-0559, p. 8]

28 Supra note 1, at 29,247.

Organization: National Automobile Dealers Association (NADA)

It would also revise the air conditioning credit program by limiting credit eligibility to light-duty internal combustion engine (ICE) vehicles for tailpipe CO2 emissions control beginning in MY 2027, and remove refrigerant- based air conditioning provisions for both light- and medium-duty vehicles to maintain consistency with a separate proposal to disallow their use.10 [EPA-HQ-OAR-2022-0829-0656, p. 3]

10 88 Fed. Reg. 29196, 29246-48.

NADA generally supports retention of all compliance flexibilities that will afford OEMs a greater ability to cost-efficiently deliver compliant vehicles, and to help incentivize the acceptance of new technology and alternative fuel vehicles in the marketplace. Hence, NADA opposes EPA's proposals to (i) eliminate or reduce the incentive multiplier for medium-duty vehicles prior to MY 2027, (ii) limit eligibility for the air conditioning credit to light-duty internal combustion engine (ICE) vehicles, (iii) eliminate refrigerant-based air conditioning credit provisions for both light-duty and medium-duty vehicles, and (iv) to sunset the off-cycle credits program for both light-duty and medium-duty vehicles. NADA shares the concerns expressed by AAI in its comments regarding the changes EPA proposes on these matters. [EPA-HQ-OAR-2022-0829-0656, p. 16]

Organization: Nissan North America, Inc.

As a member of the Alliance for Automotive Innovation ("the Alliance"), Nissan fully endorses the comments on the Proposed Multi-Pollutant Rule submitted separately by the Alliance. In particular, Nissan highlights several points from the Alliance's comments, including: [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Request continuing AC and off-cycle credit eligibility for EVs that are part of mixed fleets [EPA-HQ-OAR-2022-0829-0594, p. 9]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

We also support EPA's air conditioning credit programs and its proposal to sunset the off-cycle credits program for both LDVs and MDVs and suggest EPA consider whether shorter timeframes are appropriate. [EPA-HQ-OAR-2022-0829-0584, p. 9]

Organization: Porsche Cars North America (PCNA)

2. Porsche supports continued availability of flexibilities for electrified vehicles.

Porsche supports the continued allowance for electric vehicles to participate in the off-cycle and air conditioning related GHG flexibilities. Porsche does not support the proposal from EPA to remove both for electric vehicles beginning in model year 2027. Off-cycle technology and air conditioning credits have been a pragmatic and supportive pillar within the suite of flexibilities in EPA's GHG regulation for many years and Porsche believes that these flexibilities can continue to provide value within the overall construct of the GHG fleet regulation, even for fully electrified vehicles. [EPA-HQ-OAR-2022-0829-0637, pp. 19-20]

Electric vehicles operate as a supportive element within a manufacturers GHG fleet and should provide a compliance incentivize intended to increase production of EVs. Electric vehicles like any other vehicle should have the opportunity to leverage additional off-cycle or air conditioning technologies that further contribute to CO2 reduction goals and for those credits to be equally available for use within a manufacturers fleet. These types of credits act as an internal flexibility for the manufacturer to manage their overall annual compliance. [EPA-HQ-OAR-2022-0829-0637, p. 20]

3. Porsche supports continued availability of GHG credits for newer, low-GWP air conditioning systems.

Specific to air conditioning leakage credits, Porsche recommends EPA retain the provision for new, low GWP refrigerants such as R-744 that offer even lower global warming potential (GWP) values that the commonly used 1234-YF refrigerant. Porsche recommends that a credit be provided that reflects the GWP of 1.0 for R744 versus the 4.0 of 1234-YF. Furthermore, Porsche recommends EPA revisit the HiLeakDis equation and associated values as defined in 86.1867-12 to establish an appropriate set of values HiLeakDis equation for R-744 systems. R-744 is a smaller molecule than 1234-yf and R-744 systems operate at a much higher pressure. As such, the values reflected in the current HiLeakDis do not provide a benchmark system leakage rate appropriate to benchmark R-744 systems. The current values reduce the overall credit available for R-744 systems even though the R-744 has a lower GWP than 1234-YF. The values within the current HiLeakDis were established to reflect average system leakage rates for 1234- YF in order to prevent backsliding in system leakage control. A similar HiLeakDis may be appropriate to ensure quality R-744 systems but would need to be established to set a benchmark for reasonable leak control specific to R-744. [EPA-HQ-OAR-2022-0829-0637, p. 21]

Organization: Rivian Automotive, LLC

Consider the Tradeoffs in Ending Air Conditioning ("AC") Efficiency Credits for BEVs

EPA proposes two actions related to AC credits. First, EPA proposes to end credits for use of AC refrigerants with a lower global warming potential ("GWP"). Rivian supports this change. Pursuant to the American Innovation and Manufacturing Act of 2020, EPA has proposed to disallow high-GWP refrigerants, obviating the need for the existing incentives in the vehicle emissions rules.27 Second, EPA proposes to make BEVs ineligible for AC system efficiency credits beginning in MY27. Rivian appreciates the agency's rationale for making BEVs ineligible for AC efficiency credits but encourages consideration of the tradeoffs. As in the off-cycle program, Rivian believes EPA should maintain parity in its treatment of BEVs and ICEs for AC credit purposes. While AC efficiency directly affects an ICE's tailpipe emissions, efficiency credits for BEVs incentivize manufacturers to maintain maximally efficient AC systems in those vehicles—a contributing factor in a BEV's overall energy efficiency and a feature the agency acknowledges in the NPRM.28 Energy efficiency is an important value even without a tailpipe impact. While direct regulation of BEV efficiency would be premature at this stage, EPA should consider the benefits of regulatory provisions that indirectly incentivize efficiency improvements as the BEV fleet grows. To address potential concerns about AC efficiency credits for BEVs—and the resulting "negative" emissions credited to BEV manufacturers—eroding the stringency of the regulation, the agency could increase stringency of the standards as needed. [EPA-HQ-OAR-2022-0829-0653, pp. 9-10]

27 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 87 (May 5, 2023) (revising 40 C.F.R. Parts 85, 86, 600, 1036, 1037, and 1066), 29,196.

28 Id. at 29,246-29,247.

Unlike advanced technology multipliers that do not represent real-world emissions improvements, AC efficiency credits for BEVs do link to a real-world reduction in energy demand. Rivian understands the agency's argument for eliminating efficiency credits for BEVs but believes this would come at a cost. EPA should consider the tradeoffs involved and reexamine this proposal by treating BEV and ICE vehicle AC efficiency similarly. [EPA-HQ-OAR-2022-0829-0653, pp. 9-10]

Organization: Southern Environmental Law Center (SELC)

EPA is proposing several modifications to other credit systems that are part of the tailpipe emissions standards in order to ensure these systems actually result in emissions reductions. We support EPA's proposal to eliminate the air conditioning (AC) system credits for AC refrigerant leakage control. Since the phase out of high global warming potential (GWP) refrigerants is required under other laws and regulations, manufacturers should not be rewarded under the tailpipe emissions standards for actions they are already required to take. Vehicles, however, will continue to use low GWP refrigerants, and EPA should implement a leakage design standard to protect against potential system leaks. [EPA-HQ-OAR-2022-0829-0591, p. 10]

EPA is also proposing to close loopholes that allow for emissions reductions provided by ZEVs to be claimed more than once. We support EPA's modification to the AC efficiency credit so that it applies only to internal combustion engine vehicles starting in model year 2027. This makes sense because AC efficiency credits are earned solely by improving internal combustion engine vehicles. Under the current tailpipe emissions standards, however, some manufacturers were reporting ZEV emissions of less than zero when implementing AC efficiency technology in those vehicles. For similar reasons, we also support EPA's proposal to modify the off-cycle credit system to only include eligible vehicles (i.e., internal combustion engine vehicles) in calculating the cap used for these types of credits until they are phased out. [EPA-HQ-OAR-2022-0829-0591, p. 10]

Organization: Stellantis

EPA's Discounting of Technology Benefits Increases Implicit GHG Stringency

EPA has proposed AC, off-cycle and PHEV technology actions that would increase the implicit GHG stringency, making it even more difficult to achieve the explicit aggressive GHG targets. These EPA proposed actions are summarized below:

- Remove the Direct AC refrigerant and leak credit in a single model year (2027MY) [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- Impose an artificial phase down of off-cycle credits, disregarding the real-world benefits of GHG saving technology [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- Exclude PHEV technology from modeling and discount highly capable PHEV technology that would provide a bridge to a fully electrified future [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

These long-standing flexibilities have incentivized significant investment in GHG saving technology that now proliferates across the light-duty fleet. The Direct AC credit incentive has been a very successful program that industry has moved to implement at a very high rate. The investment and piece costs incurred to develop and introduce the lower Global Warming Potential (GWP) refrigerants and their systems are partially offset by the GHG credits received. In addition, the lower leak technologies and materials, now deployed across the ICE fleet, continue to achieve real-world GHG savings. This GHG benefit of low AC leak rates does not go away as we transition the fleet to higher rates of electrified product. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

Similarly, the ongoing and already incurred investment and costs of GHG saving off-cycle technologies in the fleet have led to real world benefits. These benefits also do not go away as the fleet adds more EVs and PHEVs. While there may be less available menu credits for EVs versus ICE products, this naturally achieves what the EPA is now proposing in this rule via a forced phase-down of the allowed credit cap. That is, the menu of available technologies will naturally decrease as fleet mix shifts to EVs. EPA's effort to drastically reduce the cap will immediately call into question the ongoing development and deployment of these GHG saving technologies. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

These combined actions significantly increase the stringency of the proposed rule by making the extremely aggressive fleet targets more difficult to achieve while at the same time incentivizing OEMs to remove this GHG saving technology from products. ICE vehicles and EVs both benefit from many of these technologies and therefore their GHG compliance and real-world benefits should not be removed. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- The Direct AC credit and off-cycle credit programs need to be retained for continued GHG benefits on both ICE and EV products. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- The implicit stringency impact in the early years of this rulemaking is drastically increased by the additional burden experienced if the proposed flexibilities are removed. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

Stellantis recommends that EPA should:

-Retain GHG saving technology flexibilities recognizing the GHG benefit that continues to be present on electric vehicles and that will naturally decrease as EV penetration increases [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Tesla, Inc.

Tesla supports the proposed Alternative 1 with added stringency so that the final performance standards achieves a fleet BEV penetration rate greater than 69% in MY 2032.2 Alternative 1 is estimated to provide greater CO2 emissions reduction of -51% from no action by 2050 compared to -46% under EPA's proposal, and the additional stringency will result in even greater emission reductions.3 Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

- Eliminate off-cycle crediting for all types of vehicles; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Revisit the plug-in hybrid electric vehicle (PHEV) utility factor to accurately reflect real world emissions; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Amend the proposal to create parity in promoting motor vehicle air conditioning (MVAC) efficiency adoption; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Maintain the existing zero emissions upstream approach for BEVs; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Eliminate credit multipliers for all vehicles; and [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Ensure BEVs continue to be accounted for, and participate in, the NMOG + NOx reduction standard. [EPA-HQ-OAR-2022-0829-0792, p. 2]

Reducing short-lived climate pollutant emissions, such as HFC-134a, is a critical step toward mitigating climate change. Accordingly, Tesla supports EPA's actions to prohibit high GWP (>## 150) refrigerants such as HFC 134a in new light-duty A/C systems post MY-2025.158 As the proposal recognizes, the transition to lower GWP refrigerants is rapidly underway and all manufacturers can be compliant before the implementation of the proposed standards go into effect. Accordingly, the agency has correctly eliminated the A/C leakage credit. [EPA-HQ-OAR-2022-0829-0792, p. 25]

158 88 Fed. Reg. at 29247.

EPA Should Create Parity on A/C Efficiency Crediting

The EPA's decision to limit voluntary A/C efficiency credits to only ICE vehicles is bad policy.159 In proposing this limitation, the agency runs the risk of creating a disincentive for manufacturers of BEVs to continue to improve and deploy the most efficient cooling systems. The agency instead should consider a technology neutral approach allowing the crediting of all vehicles and increasing the stringency of the overall standard consistent with the additional level of credit generation that will accumulate with BEV A/C efficiency credit generation eligibility. [EPA-HQ-OAR-2022-0829-0792, p. 25]

159 88 Fed. Reg. at 29239.

Organization: Volkswagen Group of America, Inc.

A/C Efficiency Credits – Proposed Vehicle Air Conditioning System Related Provisions (Section III.B.5.)

Beginning with MY 2027, EPA is proposing to retain A/C efficiency credits but with eligibility limited to vehicles equipped with only IC engines. Volkswagen recommends keeping the current A/C efficiency credits approach for PEVs within the compliance calculation. The A/C credits considered as a part of an incentive program for manufacturers to include efficient A/C technologies since the A/C is continuously running while the vehicle is driven. [EPA-HQ-OAR-2022-0829-0669, p. 5]

The electrical energy consumption of BEVs should be incentivized. Real world efficiency of BEVs can be improved year-round, e.g., through efficient air-conditioning systems. Efficient A/C gives the customer a greater driving range and contributes to feasibility of the GHG stringency as the overall energy demand of the vehicle is reduced. A/C credits allow a quantifiable internal positive business case to offset the expense of more expensive technologies as part of vehicle development. In addition to efficient air conditioning systems, the current method of evaluating A/C efficiency should be applied to heat pumps. The use of heat pumps should also be considered to be rewarded with A/C efficiency credits. [EPA-HQ-OAR-2022-0829-0669, p. 5]

It should not be an advantage for manufactures with a higher ICE fleet share to claim A/C efficiency credits and contrarily a disadvantage for manufacturers with a higher fleet PEV share. A PEV is always “0 g/mi” and not negative. The credit value by itself is part of the fleet compliance calculation and not truly a discrete negative GHG score for a given PEV. [EPA-HQ-OAR-2022-0829-0669, p. 5]

A/C Leakage Credits (Section III.B.5.ii)

EPA proposes sun setting the voluntary refrigerant-related credits in MY 2027 in its vehicles GHG program as appropriate and reasonable due to the American Innovation and Manufacturing (AIM) Act of 2020 (42 U.S.C. § 7675). Yet, there is no incentive provided to use refrigerants with even lower global warming potential (GWP) and in addition to the current standard refrigerant R1234yf (GWP = 4), the refrigerant R744 (GWP = 1) has an even lower GWP. Continuation or further development of A/C leakage credits for refrigerants with GWP <= 4 would provide an incentive to increase installation rates of low GWP refrigerants such as R744 and help to further improve the A/C system leakage effects. Volkswagen suggests continuation of leakage credits as an incentive to motivate the automotive industry to continue application or development of these improved A/C systems. [EPA-HQ-OAR-2022-0829-0669, p. 5]

Organization: Volvo Car Corporation (VCC)

VCC believes it is important to continue flexibilities (air conditioning credits for ZEVs and off- cycle credits for ICE vehicles) because low AC emissions and AC efficiency are environmental improvements. EPA should continue these programs and develop a new process so that pure ZEV companies receive these credits without resulting in an overall negative C02 result. [EPA-HQ-OAR-2022-0829-0624, p. 4]

Organization: Zero Emission Transportation Association (ZETA)

While we appreciate EPA's intent behind making BEVs ineligible to generate AC efficiency credits, we would note that AC efficiency does affect the overall vehicle efficiency, regardless of the fuel type of the vehicle. As such, EPA should maintain parity between ICE and BEVs in regards to AC efficiency credits in the final rule. [EPA-HQ-OAR-2022-0829-0638, pp. 28-29]

<u>EPA Summary and Response</u>

A/C leakage credit: general comments:

<u>Summary:</u>

The following organizations and companies recommend maintaining A/C leakage credits.

- Alliance for Automotive Innovation, Ad Hoc Tier 4 Light-Duty Small Manufacturer Group, DENSO, Hyundai America Technical Center, Inc. (HATCI), Mitsubishi Motors North America, Inc. (MMNA), National Automobile Dealers Association (NADA), Nissan North America, Inc., Porsche Cars North America (PCNA), Stellantis, Volkswagen Group of America, Inc., Zero Emission Transportation Association (ZETA)

The following organizations and companies support a phase-out over time if EPA decides to eliminate leakage credits given provisions of the American Innovation and Manufacturing (AIM) Act.

- Ford Motor Company, Kia Corporation

The following organizations and companies support phase-out and the elimination of air conditioning (A/C) leakage credits and some commenters recommend that EPA include in the final rule a leakage design standard to serve as a backstop against the impact of any leakage.

- Arconic Corporation (ARCO), California Air Resources Board (CARB), Chemours Company FC, LLC, Environmental. and Public Health Organizations, Lucid Group, Inc., Minnesota Pollution Control Agency (MPCA), National Association of Clean Air Agencies (NACAA), Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC), Rivian Automotive, LLC, Southern Environmental Law Center (SELC), Tesla, Inc.

- CARB recommends that U.S. EPA retain the existing AC leakage standard for medium-duty vehicles regardless of refrigerant type and establish an AC leakage standard for light-duty vehicles.

- California Attorney General's Office, et al. recommend retaining a smaller value A/C leakage credit to continuously incentivize the prevention of refrigerant leaks for the lowest GWP refrigerant.

- NACAA recommends that EPA include in the final rule a leakage design standard to serve as a backstop against the impact of any leakage.

- NESCAUM recommends EPA consider whether shorter timeframes for sunsetting the leakage credits are appropriate.

Response:

As discussed in preamble Section III.C.5, EPA agrees with commenters who expressed support for retaining some credits and regulatory support for reducing leakage. We agree with commenters (e.g., California Attorney General's office) that it would be environmentally beneficial to continue a small credit for the cleanest A/C refrigerants under the GWP threshold of EPA's Technology Transitions rule established pursuant to the AIM Act. For MY 2031 and later, EPA is establishing A/C leakage credits of 1.6 g/mile cars and 2.0 g/mile trucks A/C leakage credits to incentivize using the lowest-GWP refrigerants and the use of low leak systems. The A/C credits have been very successful in encouraging the adoption of low leak systems and lower GWP refrigerants and EPA finds it is appropriate to continue the credits, but at a lower level to reflect more recent developments, including the AIM Act. We also recognize that the proposed elimination of A/C leakage credits in MY 2027 would pose challenges for manufacturers with respect to lead time and feasibility. We recognize that a phase-out of these credits would provide for a more orderly transition and also provide necessary additional lead time in meeting the stringency of standards in the early years of the program. Therefore, in this final rule, EPA is phasing down the existing A/C leakage credits from 2027 through MY 2030.

We agree with commenters supporting the existing MDV refrigerant leakage standard. EPA is retaining the existing MDV refrigerant leakage standard that was established under the Phase 2 program. The current MDV leakage standard requires that loss of refrigerant from A/C systems may not exceed a total leakage rate of 11.0 grams per year or a percent leakage rate of 1.50 percent per year, whichever is greater. This leakage standard applies regardless of the refrigerant used in the A/C system.

In the Phase 2 rule, EPA revised the refrigerant leakage standard to be refrigerant neutral, meaning that regardless of the type of refrigerant used, the loss of refrigerant cannot exceed the standard of 11 g/year or a percentage leakage rate greater than 1.5 percent per year for maximum leakage credits. The MDV program does not include A/C efficiency related credits or requirements.

A/C maximum leakage credits (MaxCredit) available to manufacturers, final program (CO_2 g/mile).

MY	Car	Truck
2026	13.8	17.2
2027	11.0	13.8
2028	8.3	10.3
2029	5.5	6.9
2030	2.8	3.4
2031	1.6	2.0
2032 and later	1.6	2.0

Leakage: use of heat pumps and alternative refrigerants in future HVAC systems

Summary

Alliance for Automotive Innovation (AAI), Porsche Cars North America (PCNA) and Volkswagen Group of America, Inc. made the following comments:

AAI commented that the use of heat pumps is expected to become more prevalent in HVAC systems, particularly in BEVs. These systems resemble AC systems but are modified to heat and cool the cabin and battery. Thus, they have additional connections, valving, and heat exchangers that represent additional leak paths in the system. For these systems in particular, the credit recognizing reduced AC refrigerant leakage technology is still needed and would still recognize real-world benefits.

AAI further commented that refrigerant R1234yf is suitable for heat pump applications, but is performance limited at high and low temperature extremes. Other refrigerants are better suited to heat pump applications. Electrification is driving new HVAC system architecture and using new refrigerants in greater quantities than in ICE vehicles. These new refrigerants are likely to have higher-GWP components than R1234yf and selectively leak at different rates. Encouraging the use of the lowest GWP blends possible and minimizing leakage is still an important environmental consideration.

Volkswagen commented that there is no incentive provided to use refrigerants with even lower global warming potential (GWP) than the current standard refrigerant R1234yf (GWP = 4), such as the refrigerant R744 (GWP = 1). Volkswagen recommended further A/C leakage credits for refrigerants with GWP <= 4 to provide an incentive to increase installation rates of low GWP refrigerants such as R744 and help to further improve the A/C system leakage effects.

PCNA: Porsche recommended EPA retain the provision for new, low GWP refrigerants such as R-744 that offer even lower global warming potential (GWP) values that the commonly used 1234-YF refrigerant. Porsche recommends that a credit be provided that reflects the GWP of 1.0 for R744 versus the 4.0 of 1234-YF. Porsche also recommended EPA revisit the HiLeakDis equation to establish a different set of values in the HiLeakDis equation for R-744 systems.

Response:

EPA agrees with commenters that it would be environmentally beneficial to continue a small credit for the cleanest A/C refrigerants under the GWP threshold of EPA's Technology Transitions rule established pursuant to the AIM Act.

As discussed above, EPA is phasing down the A/C leakage credits from MY 2027 through 2030; the A/C leakage credits will be available but for a reduced credit value when using higher GWP refrigerants. For A/C leakage credits for MY 2031 and later, A/C leakage credits in the vehicle program are only available for those refrigerants with GWPs at or below 150 (the threshold established by EPA's Technology Transitions rule).

In response to Porsche's comment on the GWP of 1.0 for R-744 versus the 4.0 of HFO-1234yf refrigerant, EPA has previously revised the GWP value of HFO-1234yf refrigerant to 1. Therefore, the leakage credits of both HFO-1234yf and R-744 refrigerants are identical when using the same HiLeakDis values. EPA believes the current values in the HiLeakDis equation remain appropriate for all refrigerants.

EPA agrees with the comment that an A/C leakage credit could incentivize refrigerants cleaner than the EPA Technology Transitions rule's threshold. For model year 2031 and later, EPA has established A/C leakage credit values of up to 1.6 g/mile for cars and 2.0 g/mile for trucks, dependent on the GWP of the refrigerant used, to incentivize using the lowest GWP refrigerant. EPA notes that the most recent GWP value of R1234yf refrigerant is 1; thus, manufacturers' use of this or other refrigerants less than 150 GWP are eligible to earn the available optional A/C credits.

A/C efficiency credit for electric vehicles: general comments

<u>Summary:</u>

The following organizations and companies oppose limiting A/C efficiency credits to ICE vehicles and urged EPA to continue allowing A/C efficiency credits for BEVs:

- Alliance for Automotive Innovation, DENSO, Ford Motor Company, Hyundai America Technical Center, Inc. (HATCI), Hyundai Motor America, Kia Corporation, Lucid Group, Inc., MEMA (The Vehicle Suppliers Associated), Mitsubishi Motors North America, Inc. (MMNA), National Automobile Dealers Association (NADA), Nissan North America, Inc., Porsche Cars North America (PCNA), Rivian Automotive, LLC , Stellantis, Tesla, Inc., Volkswagen Group of America, Inc., Volvo Car Corporation (VCC)
- Alliance for Automotive Innovation comments that eliminating eligibility for AC efficiency credits for BEV vehicles makes sense only once the transition to BEV mass volumes is more robust.
- Many of the organizations and companies commented that maintaining A/C efficiency credits for both ICE vehicles and BEVs would maintain "parity" between the two types of powertrains.

The following organizations and companies support excluding BEV air conditioning (A/C) efficiency credits, while retaining current 5-cycle testing protocols that confirm the systems actually reduce emissions.

- Arconic Corporation (ARCO), BorgWarner, Inc., California Air Resources Board (CARB), Environmental. and Public Health Organizations, Minnesota Pollution Control Agency (MPCA), National Association of Clean Air Agencies (NACAA), Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC), Southern Environmental Law Center (SELC)

<u>Response:</u>

EPA disagrees with commenters who urged us to continue allowing A/C efficiency credits for BEVs. EPA is finalizing its proposal to limit A/C efficiency credits to vehicles equipped with IC engines beginning in MY2027, which is responsive to the many commenters who supported this provision. The A/C efficiency credits are based on emissions reductions from ICE vehicles. They correspond to motor vehicle emissions reductions that occur when the A/C systems on ICE vehicles are operated more efficiently, which in turn reduces their use of electricity produced by the alternator and engine, and which in turn reduces pollution emitted by the motor vehicle engine. The credits provide an incentive for manufacturers to increase the efficiency of their A/C systems and in turn reduce the pollution emitted by the vehicle engine. The amount of the credits was determined based on our technical analysis of the emissions produced by an ICE engine and how A/C efficiency improvements could reduce such emissions.

As explained in the preamble Section III.C.5.ii., currently, BEVs are generating credits even though the credits are based solely on improvements to ICE vehicles, and not representative of emissions reductions for BEVs. That is, BEVs completely prevent engine emissions. Thus, improving A/C efficiency does not and is not needed to further decrease vehicle engine emissions. Moreover, the amount of the credits EPA previously determined based on ICE vehicle emissions has no real-world correlation to BEVs. Allowing BEVs to generate A/C efficiency credits is therefore not technically sound. It also means they are receiving a windfall of credits that fails to correspond to any real-world reduction in vehicle emissions, a problem which increases in significance as the manufacturers choose to produce an increasing number of BEVs.

As described for off-cycle credits in preamble Section III.C.6.i, the final rule also restricts the applicability of A/C efficiency credits for PHEVs to the portion of vehicle operation when the engine is running, based on the vehicle's utility factor. Similar to the preceding discussion of BEVs and A/C efficiency credits, this calculation adjustment is appropriate to associate A/C efficiency credits only with ICE operation beginning in MY 2027.

Efficiency: testing for A/C efficiency credits

Summary:

Environmental. and Public Health Organizations and Volkswagen Group of America, Inc. made the following comments.

Environmental. and Public Health Organizations: We would, however, oppose these AC efficiency credits should EPA relax any of the current AC17 test procedures, as their real-world effectiveness could no longer be assured. We also ask EPA to fully explain exactly how it ensures that the standards' stringency is in fact increased by an amount equivalent to the credits it grants.

Volkswagen commented that the current method of evaluating A/C efficiency should be applied to heat pumps used for cabin heating in BEVs, and heat pumps should also be rewarded with A/C efficiency credits.

Response:

EPA agrees with Environmental and Public Health Organizations that the existing AC17 test procedures for A/C efficiency credits should not be relaxed and remain an important means of verifying A/C efficiency credits. EPA did not reopen the AC17 testing procedures in this rulemaking, and thus the existing AC17 test procedures remain in effect. Additionally, in response to Volkswagen's comment on heat pumps, for the reasons described above, EPA is finalizing its proposal to limit A/C efficiency credits to vehicles equipped with IC engines beginning in MY2027, and thus BEVs will not be eligible for A/C efficiency credits.

In response to the comment from Environmental. and Public Health Organizations, we understand the commenter was concerned about impacts on overall stringency of the program if we were to relax the existing AC17 testing provisions, as those tests are critical in ensuring that GHG reductions are in fact achieved in the real-world commensurate with the AC efficiency credits. EPA has not reopened the AC17 testing provisions as part of this rulemaking, and thus the existing AC17 testing requirements remain in effect. EPA agrees with the commenter that these testing provisions are a vital part of the program to ensure the validity of the AC efficiency credits.

Efficiency: A/C efficiency and off cycle credit interactions

Summary:

Alliance for Automotive Innovation (AAI) and DENSO Corporation made the following comments.

AAI: Auto Innovators believes that technologies affecting the AC efficiency credit interact with technologies on the solar-thermal control submenu of the off-cycle credit menu that reduce AC load. AAI recommended that EPA move the solar thermal control technologies to the AC efficiency credit menu and adjust the caps accordingly.

DENSO: DENSO recommended that EPA consider adding any A/C efficiency technologies approved under the off-cycle program's alternative methodology to the A/C efficiency credit menu, and that the credit caps be adjusted accordingly.

Response:

EPA does not agree with the commenters' suggestion of moving the off-cycle menu's thermal control technologies to the A/C efficiency credits menu. As discussed in Section III.C.6, EPA is phasing out off-cycle credits for a number of reasons, including shifts in the vehicle marketplace, the scale of credits relative to the standards, and continued concerns about how to verify whether off-cycle technologies provide emissions reductions in use commensurate with the level of the credits the menu provides.

For those technologies on the off-cycle credit menu including solar-thermal control, reliable efficiency data cannot be measured repeatedly, e.g., using AC17 test. For example, the efficiency of solar panels is dependent on many unpredictable factors such as daylight, clear sunny days, clouds, etc. Therefore, for the reasons discussed in the preamble for phasing out off-cycle credits, GHG credits for A/C technologies previously on the off-cycle menu are being phased out.

However, EPA is finalizing a phase-out of the off-cycle credits that is slower than proposed. Specifically, EPA is phasing down the off-cycle menu cap from MYs 2030 through MY 2032; beginning in MY 2033 off-cycle credits will no longer be available. See Section 3.1.4 of this RTC for additional discussion.

As discussed in Section III.C.6 of the preamble, while EPA is phasing out the off-cycle credits entirely after MY 2032, EPA is not phasing out A/C efficiency credits for ICE vehicles because the A/C efficiency credits program is more robust as it includes a check of vehicle emissions performance through AC17 testing.

Efficiency: increase of A/C efficiency credit cap

Summary:

DENSO Corporation made the following comment:

DENSO: DENSO requests the agency consider expanding the AC efficiency credit cap based on the National Renewable Energy Laboratory (NREL) study showing greater A/C improvement possibilities. NREL Study 17TMSS-0056 estimates the latest A/C energy consumption at 23.5 g/mile based on a series of simulations were performed to three vehicle platforms using various US driving patterns. This is compared to 11.9 g/mile for passenger car and 17.2 g/mile for light truck, which were baseline A/C emissions impacts previously used by the agencies to determine A/C efficiency credit cap). The current cap constraints can create situations where an A/C technology that reduces GHG emissions may not be applied on a vehicle's system.

Response:

As discussed in Section III.C.5.ii of the preamble, EPA is not changing the requirement that A/C efficiency credits for ICE vehicles be based on emissions performance through AC17 testing. EPA established the AC17 testing requirements as part of the 2012 rule to provide an assurance that the A/C systems earning credits were providing anticipated emissions reductions. As established in the 2012 rule, the AC17 test is mandatory for MYs 2017 and later (with the exception that manufacturers are not required to test BEVs). The off-cycle credits program includes no such mechanism to check performance. EPA did not reopen the existing AC17 testing provisions as part of this rule; therefore, the AC17 testing requirements for manufacturers earning A/C efficiency credits will remain in effect under the MY 2027 and later program. The AC17 test is mandatory for MYs 2017 and later. A series of simulations cannot be accepted to replace AC17 tests on A/C efficiency credits for ICE vehicles.

Efficiency: adoption of an A/C efficiency standard rather than credit

Summary:

Environmental. and Public Health Organizations commented that more frequent and more energy-intensive use of air conditioning is inevitable, and therefore recommended EPA adopt an AC efficiency standard rather than a voluntary credit, as it has done for the medium-duty fleet in the case of refrigerant credits.

Response:

EPA disagrees that AC efficiency should be a standard rather than a voluntary credit. We conclude that the availability of the AC credit, together with sufficiently stringent tailpipe standards, appropriately incentivizes manufacturers to identify GHG reductions from AC efficiency improvements and concentrate efforts to reduce GHGs in the areas they feel are most cost-effective, thus producing the greatest environmental impact for the least cost.

Efficiency: CAFE program harmonization

Summary:

Mitsubishi Motors North America, Inc. (MMNA) recommends keeping AC efficiency credits for BEVs to reduce potential harmonization issues between the GHG and CAFE regulations. In support they note that NHTSA's CAFE program in the past has mirrored EPA's GHG approach to flexibilities, and they therefore assume that NHTSA will follow previous precedent regarding flexibilities and adopt the same structure as EPA. However, they further note that while EVs are considered zero g/mi under the GHG program, the CAFE program requires EVs to be assigned a mile per gallon equivalent compliance value based on the PEF, which DOT has proposed to reduce. The PEF reduction will lead to a substantial decrease in the CAFE compliance value of

BEVs and PHEVs, and thus could put BEVs and PHEVs at a distinctive compliance disadvantage relative to some strong HEVs.

Response:

As explained in the preamble Section III.C.5.ii., currently, BEVs are generating air conditioning efficiency credits even though the credits are based solely on improvements to ICE vehicles, and not representative of emissions reductions for BEVs. That is, BEVs completely prevent engine emissions. Thus, improving A/C efficiency does not and is not needed to further decrease vehicle engine emissions. Allowing BEVs to generate A/C efficiency credits under the GHG program is therefore not technically sound. Regarding the comment about NHTSA's CAFE program and the PEF, we respond to these comments in section 26 of this RTC.

3.1.4 - LDV off-cycle technology credits

Comments by Organizations

Organization: Alliance for Automotive Innovation

D. Light-Duty GHG Program Flexibilities

Flexibilities have been an important part of EPA's light-duty vehicle GHG program since its inception in 2012. Features such as the averaging, banking, and trading program have helped smooth product planning and investment cycles. Other flexibilities like off-cycle technology and air conditioning credits have encouraged the development of new technologies and have resulted in real-world emissions improvements beyond those that would have been achieved on laboratory test cycles. [EPA-HQ-OAR-2022-0829-0701, p. 95]

Auto Innovators believes that such flexibilities still play an important role moving forward. They are a potential lever for addressing uncertainties in the transition to electric vehicles, particularly in the early years of the proposed 2027-2032 program. While manufacturers would prefer that the core footprint-based standards reflect achievable emission reductions, flexibilities could also serve to ensure that desired emission targets are met. [EPA-HQ-OAR-2022-0829-0701, p. 95]

Instead, EPA proposes to eliminate and/or phase down many existing flexibilities, including paring back the off-cycle credit menu and limiting GHG improving technologies to the ICE fleet. The result of this will be abandonment of GHG benefits from prior rulemakings. [EPA-HQ-OAR-2022-0829-0701, p. 95]

The existing refrigerant, AC efficiency, and off-cycle credits are balanced to produce a verifiable real-world result. EPA's proposal to change the credit system will unbalance those results, leaving unprecedented rates of electrification as the main flexibility left to meet fleetwide stringency targets. [EPA-HQ-OAR-2022-0829-0701, p. 95]

2. Air Conditioning Efficiency and Off-Cycle Credits on Electric Vehicles

EPA's concern of negative emissions on individual vehicles is misplaced. EPA's regulations calculate air conditioning efficiency and off-cycle credits on a fleet average basis, which are then combined with fleet average tailpipe emissions and other adjustments.181 However, we acknowledge the concern that, once combined with fleet average tailpipe emissions, air conditioning and off-cycle credits may result in a fleet that implies a negative emission rate. [EPA-HQ-OAR-2022-0829-0701, p. 99]

181 In actual practice, greenhouse gas credits and tailpipe emissions (relative to target) are first converted to megagrams (metric tons) of carbon emissions and then combined. (See 40 CFR 86.1865-12.) Air conditioning and off-cycle credits are always positive megagrams. Tailpipe fleet average emissions may result in either a positive (credit generating) or negative (credit needed) megagram balance. In short, EPA's regulations never result in negative emissions for an individual vehicle, nor negative emissions for an overall fleet, although such a result might be implied.

Our recommendation is to handle this situation at the fleet average level. If the summed fleet average tailpipe emissions, credits, and other adjustments would result in a negative value, total fleet megagrams of credit for the model year would be truncated at the level equivalent to that which would have been achieved by a fleet at zero g/mile fleet average emissions before credits and other adjustments. Such an approach would address EPA's concern of "negative" emissions while still providing an incentive for and recognition of air conditioning and -cycle improvements on electric vehicles during the remaining time when many manufacturers' fleets have net positive emission rates. [EPA-HQ-OAR-2022-0829-0701, p. 99]

4. Off-Cycle Technology Credits

EPA is proposing to sunset the off-cycle credit program by eliminating 5-cycle and alternative method credits in MY 2027 and by lowering the menu credit caps over several years with an elimination of menu credit in MY 2031. EPA's proposed actions will not only increase the stringency of the rulemaking, but also disincentivize and disregard the proven real-world GHG savings that this technology provides. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

As documented in previous rulemakings, peer-reviewed research, national laboratory studies, and public applications for credits, off-cycle technologies provide direct GHG benefits. They can continue to provide actual emission reductions in MY 2027 and beyond and should remain a part of EPA's GHG emissions program. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

Automobile manufacturers and suppliers have invested significant resources to develop these technologies, manufacturers have included them as part of their compliance plans, and the technologies will continue to provide real-world benefits. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

Off-cycle credits should be continued. If some total reduction is deemed necessary besides the natural occurrence from increased BEV volumes, the proposed phasedown should not be as rapid as proposed, nor occur prior to MY 2032, thereby encouraging continued investment in off-cycle emission improvements. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

a) Menu-Based Credits

EPA proposes a phase-out of menu-based off-cycle credits for vehicles equipped with internal combustion engines, and eliminating these credits after MY 2030.182 [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

182 NPRM at 29249.

The menu-based off-cycle technologies still provide real-world benefits beyond those observed in GHG certification testing. There is no reason to eliminate them entirely. This is particularly true for ICE vehicles. The average emissions of non-EVs were approximately 275 g/mile in MY 2022.183 Off-cycle technologies can still provide meaningful emission improvements for these vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

183 S&P Global Mobility, MYs 2012-2022 Baseline Study for Auto Innovators.

Auto Innovators recommends that EPA maintain menu-based off-cycle credits. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

i) Credit Cap Phase Down

EPA notes that with increasing volumes of electric vehicles, fewer ICE vehicles will be on the road to justify continued credit levels. In general, a phase-down of the off-cycle credit cap is unnecessary if the goal is to simply reduce fleet average credits. Many of the off-cycle technologies on the credit menu are not available to BEVs, such as engine oil heaters, transmission oil heaters, engine stop-start systems, and high efficiency alternators. As the production and market share of BEVs increase, the lower availability of off-cycle credits applicable to BEVs will result in lower fleet average credits. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

As discussed elsewhere, Auto Innovators opposes EPA's proposal to limit off-cycle credits to vehicles equipped with internal combustion engines. However, we note that that proposal in combination with the EV market share that would be required to meet the GHG targets under consideration also effectively phases out menu-based off-cycle credits. Thus, EPA's proposal to set a separate, declining cap on menu-based credits is duplicative and unnecessary. If EPA decides to finalize its proposal to limit off-cycle credits to only vehicles equipped with internal combustion engines, it should discard the proposal to set a declining cap on menu-based off-cycle credits. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

Nevertheless, if EPA decides to proceed with a phasedown in the off-cycle menu credit cap, the proposed phasedown is too rapid and should not phaseout before MY 2032, at which time at least 30% ICEVs will continue to be sold in the fleet and who will continue to benefit from these off-cycle technologies. EPA's proposal includes a reduction in the menu credit cap from 15 g/mi to 10 g/mi in the first year. The NPRM fails to consider this difference between MYs 2026 and 2027 in its "normalization" of the MY 2026 standards for the purposes of estimating the MY 2027 stringency increase.184 EPA estimates that roughly 41 million ICE vehicles will be sold in MYs 2027-2032.185 To disincentivize continued or potentially new off-cycle credit technologies so early in a phasedown would severely impact decisions on investment and implementation of them. If the credit cap was not reduced so quickly early in the MYs 2027-2032 program, additional costs and investments might still be justified by automakers. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

184 See NPRM at 29237. (Table 28. EPA's analysis assumes only 10 g/mile off-cycle credit in MY 2026, when the cap on off-cycle credits is 15 g/mile in 2026. See 40 C.F.R. § 86.1869-12 prior to proposed amendments.)

185 Calculation by Auto Innovators based on data in EPA's central analysis OMEGA output file 2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv.

In the previous GHG rulemaking, the cap on off-cycle credits was recognized by the agency as important enough to increase the allowed amount from 10 g/mile to 15 g/mile beginning MY 2023. In response to this increased incentive, OEMs potentially invested in additional off-cycle technologies, but due to the development time to implement and fund some of this technology, production would not necessarily occur that soon. Now, because of the proposed rapid phase-down, the development and application of some off-cycle technologies may no longer be worthwhile, stranding investments and foregoing potential benefits both before and during the proposed MY 2027-2032 program. [EPA-HQ-OAR-2022-0829-0701, pp. 102-104]

ii) Menu Credit Values

Auto Innovators continues to see the GHG benefit of off-cycle technology and agrees with previous assessments that many technologies are achieving higher on-road benefit amounts than credited. However, EPA is concerned that newer vehicles would not see as much benefit from off-cycle technologies.186 While some of both arguments may be warranted, as understood in the original GHG rulemaking, the average credit amounts continue to be applicable for most vehicles. To the extent that the absolute emission benefits of such technologies may have changed over time, it would be more reasonable for EPA to estimate new absolute benefits or to convert the menu to a percentage improvement basis using tools such as EPA's ALPHA model instead of simply dismissing the benefits of such technologies entirely. If EPA wishes to reduce the amount allowed, a gradual decrease in credit values is preferable to avoid stranding the investments OEMs have made in response to the last GHG rulemaking. Slightly steeper cuts to the desired allowed credit amount only make some sense at the end of the rulemaking, and credits should not be reduced to zero. [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

186 NPRM at 29250.

EPA also expresses concerns that other equipment such as roof racks or remote start systems might increase real-world emissions.187 To the extent such equipment is added by dealerships, customers, or other aftermarket equipment suppliers, EPA's certification and compliance program is based on vehicles as delivered for sale (i.e., what the regulated manufacturers can reasonably control), those concerns are out of scope. In the case of equipment included on the vehicle when delivered for sale, consideration should be given to the extent such equipment is likely to be used. Technologies that are granted menu-based credit are generally used on a regular or continuous basis. [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

187 NPRM at 29250.

b) 5-Cycle Method Credits

EPA notes that there have been few 5-cycle demonstrations of off-cycle technologies, and proposes to eliminate the 5-cycle pathway, effective MY 2027.188 [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

188 NPRM at 29249.

Automakers have reviewed with EPA their 5-cycle testing plans for off-cycle technologies. This path is being pursued according to the current regulation but is a difficult path to follow. This method has not been used to a great extent since allowed under the original GHG rulemaking, because the auto industry and EPA concurred that the original formula to calculate credits under the 5-cycle method was in error. [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

Errors in the formula were finally corrected in 2020. Since then, automakers report that testing has begun to evaluate certain technologies. At the same time, automakers report that the threshold to prove emissions impacts has been very challenging to meet. Therefore, we believe that even the corrected 5-cycle formula has not addressed the problem. [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

Under the current formula in 40 C.F.R. § 86.1869.12(c)(3), the unadjusted 2-cycle benefit is subtracted from the adjusted 5-cycle benefit of the off-cycle technology. This unadjusted 2- cycle value often masks the adjusted 5-cycle benefit within the test-to-test variability and makes this very hard to statistically quantify. We believe the formula should be amended again to compare the adjusted 5-cycle results without the off-cycle technology to the adjusted 5-cycle results with the technology. [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

Auto Innovators recommends that EPA retain the 5-cycle method and improve upon the formula to reduce unnecessary burden of proof by making the revisions noted above. [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

If EPA decides to eliminate the 5-cycle method, we ask EPA to consider the following.

-Retain the 5-cycle method for the same period of time as the menu-based credits.

-For vehicles that have 5-cycle method credits approved prior to MY 2027 that remain in production in MY 2027 and later, Auto Innovators recommends that credit continue to be granted (i.e., carry-over). If this is EPA's intent (or final decision), clarifying text should be added to the regulation. Alternatively, EPA should consider adding previously approved technologies to the off-cycle credit menu and adjusting the caps as appropriate for the additional technologies. [EPA-HQ-OAR-2022-0829-0701, pp. 104-106]

c) Alternative Method Credits

EPA is also proposing to eliminate the alternative method process for off-cycle credits. EPA has rationalized this credit elimination proposal by stating that very few OEMs are utilizing the alternative analysis application method. The proper context should be that the agency has actioned very few of the proposed credit submissions. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

Auto Innovators is aware that there are multiple alternative applications that have been submitted by OEMs in 2020 to 2023 that are awaiting a decision by EPA, or even published for public comment, even after multiple technical reviews with the agency to answer questions and supply additional analysis. Even after agency assurances that the technology is understood, and proper explanation has been provided for the public review process, no action has occurred for many months. While we agree that this alternative analysis process is not effective, EPA should follow through under the current regulation and complete action on all submitted applications, even if it requires additional back-and-forth with the manufacturer. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

For vehicles that have had alternative method off-cycle credits approved prior to MY 2027 that remain in production in MY 2027 and later, Auto Innovators recommends that credit continue to be granted. If this is EPA's intent (or final decision), clarifying text should be added to the regulation. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

Alternatively, EPA should consider adding previously approved technologies to the off-cycle credit menu and adjusting the caps as appropriate for the additional technologies. Automobile manufacturers and suppliers have invested significant resources to develop these technologies, manufacturers have included them as part of their compliance plans, and the technologies will continue to provide real-world benefits. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

d) Adjustments to Off-Cycle Credits for Electric Operation of PHEVs

As described above, Auto Innovators opposes EPA's proposal to limit off-cycle credits to only ICE-equipped vehicles. In the same vein, we believe that off-cycle credits should not be adjusted for PHEVs to address electric vs. ICE operation. Notwithstanding those positions, Auto Innovators provides the following comment in response to EPA's request on how to handle PHEVs if it decides to limit off-cycle credits to only the ICE portion of their operation. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

As a threshold consideration, making such adjustments adds significant complexity to calculating credit values and/or compliance with credit caps. EPA should consider whether the difference resulting from those adjustments in overall emissions is worth the complexity added for regulated stakeholders, EPA compliance staff, and EPA staff preparing public reports to describe the use of such provisions. This is particularly true if EPA finalizes related proposals to reduce credit applicability to only vehicles equipped with internal combustion engines and to phase-out menu-based off-cycle credits relatively quickly. Given these considerations, we recommend that EPA simply afford PHEVs the same credits as other ICE-equipped vehicles and to assess compliance to applicable credit caps without further adjustments. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

EPA describes in the preamble that "manufacturers would apply the utility factor to the total off-cycle credits generated by the PHEVs to properly account for the value of the off-cycle credit corresponding to expected engine operation."189 This concept does not appear to be captured in the regulatory text. The only place PHEVs and utility factors are Specifically mentioned in the proposed regulatory text is at 40 C.F.R. § 86.1869-12(b)(2)(v).190 Based on the first sentence of this paragraph, this appears to be instructions for ensuring average credit values do not exceed applicable limits. We also note that, in this paragraph, there is a conspicuous absence of any instruction for how to calculate off-cycle credits in the case that such limits are not exceeded. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

189 NPRM at 29251.

190 NPRM at 29440.

Therefore, we conclude that, as drafted, 40 C.F.R. § 86.1869-12(b)(2)(v) does not address applying the utility factor to off-cycle credits generated by PHEVs as long as the credit cap is not exceeded. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

EPA also describes scaling "the menu cap for PHEVs by the vehicle's assigned utility factor" and that "the menu credit cap for each manufacturer's eligible vehicles would be the production-weighted average of ICE vehicles counting at the full cap amount and PHEVs at their maximum credit allowance."191 This approach seems to be captured in the regulatory text at the proposed 40 C.F.R. § 86.1869-12(b)(2)(v).192 The first sentence of the proposed regulatory text discusses the need to assess whether the "fleet average CO2 emissions attributable to use of the default credit values193 in (b)(1)" exceed the specified values in (b)(2)(v). However, even that is not entirely clear. Unlike (b)(2)(iii) and (b)(2)(iv), which both refer to comparing values determined in (b)(2)(i) to the cap at (b)(2)(v), the text at (b)(2)(v) doesn't describe how to derive the "fleet average" value that should be compared to values in (b)(2)(v). For example, one could just as easily interpret the instruction in the context of individual car and truck fleets as opposed to the combined car and truck fleets as is clearer in (b)(2)(i). [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

191 NPRM at 29251.

192 NPRM at 29440.

193 EPA should consider adding "credit" after "fleet average CO2 emissions" in the term "fleet average CO2 emissions attributable to use of the default credit values" to avoid confusion between calculated fleet average emission values and off-cycle credits if this term continues to be used in a final rule.

Setting aside whether PHEV adjustments should be made to off-cycle credits, and if so, where adjustments should be made, the adjustment in (b)(2)(v) of the proposed regulatory text has a technical error. The proposed regulatory text describes as an example: "if a PHEV has a utility factor of 0.3 and an off-cycle credit of 3.0, count it as having a credit value of 10 (3/0.3) for calculating the fleet average value." A utility factor of 0.3 implies 30% operation on electricity and 70% operation on conventional fuel. Therefore, if the credit is for improved emissions during ICE operation, it should be 70% of the menu credit, i.e., credit x (1 – UF). [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

e) Calculation of the Off-Cycle Credit Cap

As described elsewhere, we oppose EPA's proposal to exclude ZEVs from off-cycle credits. However, if EPA decides to finalize that proposal, we note that EPA has not proposed regulatory text that would exclude zero-emission vehicles in model years 2027 and later from the assessment of whether a credit cap has been exceeded as described in the preamble.194 [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

194 NPRM at 29250.

Also, the proposed paragraphs (b)(2)(iii) and (b)(2)(iv) discuss comparing a calculated value from (b)(2)(ii) to a given value in (b)(2)(v). However, the value derived in (b)(2)(ii) is in megagrams, and the values in (b)(2)(v) are in grams per mile. We would agree that a conversion can be calculated, but the text should be modified such that any comparison is made in consistent units without the need to rely on otherwise undefined calculations. [EPA-HQ-OAR-2022-0829-0701, pp. 106-108]

Organization: American Honda Motor Co., Inc.

Off-Cycle Credits

Over the years, Honda has remained supportive of the off-cycle technology program, recognizing the real emissions reductions these technologies deliver. The program provides a practical rationale to apply GHG reduction measures to new and/or existing technologies and systems that might not otherwise occur, given that the benefits are (by definition) not captured through standard test procedures. [EPA-HQ-OAR-2022-0829-0652, pp. 29-30]

That said, we recognize that uncertainty associated with agency approvals, among other things, remain core impediments to the pursuit of these technologies. Over the years, we have expressed support for periodic updating of the off-cycle menu, to reflect better understanding of off-cycle technologies, as well as a recognition of an industry shifting toward greater levels of electrification. [EPA-HQ-OAR-2022-0829-0652, pp. 29-30]

As we have noted in the past, "changes should be data driven, include opportunity for stakeholder input, and provide sufficient lead time to ensure continuity of compliance plans."49 In the proposed rule, the agency suggests sunsetting the off-cycle credit program as follows:

49 American Honda Motor Co., Inc. comments on Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions. September 27, 2021. Docket ID No. EPA–HQ–OAR–2021–0208.

First, EPA proposes to phase out menu-based credits by reducing the menu credit cap year-over- year until it is fully phased out in MY 2031. Specifically, EPA is proposing a declining menu cap of 10/8/6/3/0 g/mile over MYs 2027-2031 such that MY 2030 would be the last year manufacturers could generate optional off-cycle credits. Second, EPA proposes to eliminate the 5-cycle and public process pathways starting in MY 2027. Third, EPA proposes to limit eligibility for off-cycle credits only to vehicles with tailpipe emissions greater than zero (i.e., vehicle equipped with IC engines) starting in MY 2027.50 [EPA-HQ-OAR-2022-0829-0652, pp. 29-30]

50 88 Fed. Reg. 29196 (May 5, 2023)

Honda understands the agency's motivation for sunsetting the program. Ironically, however, by pairing stringent GHG standards that dictate aggressive EV adoption with a sunsetting off-cycle program, the agency is forcing the use of technologies that reside high on the technology cost curve, while prohibiting the use of more cost-effective technologies that reside on the low end of the curve. [EPA-HQ-OAR-2022-0829-0652, pp. 29-30]

All else being equal, ending the program does not necessarily impact stringency, so long as modifications to top-line stringency are adjusted in accordance with the phase-out. Unfortunately, evidence of this is obfuscated in the proposed rule. The agency appears to have upward-adjusted (relaxed) topline stringency in the first year of the program by approximately 20 g/mi (presumably to account for the changing off-cycle and A/C programs), but beyond that Honda was unable to track whether stringencies in subsequent years were similarly adjusted. Given the exceedingly challenging GHG standards, and the fact that off-cycle technologies are among the lowest-cost means to reduce emissions, Honda recommends the agency continue the existing off-cycle program at least throughout MY2032. [EPA-HQ-OAR-2022-0829-0652, pp. 29-30]

Finally, Honda respectfully requests that the agency approach its handling of the off-cycle (and A/C) programs with greater transparency in the Final Rule. We believe off-cycle technology can continue to play an important role in decarbonizing the fleet, but only if the program meaningfully allows a manufacturer to apply the technology and earn credit in a streamlined fashion. [EPA-HQ-OAR-2022-0829-0652, pp. 29-30]

Recommendation: Honda respectfully requests that the agency continue the existing off-cycle program at least throughout MY2032 and, in order to ensure its role as a compliance flexibility, provide sufficient transparency that its inclusion is not offset by a corresponding stringency increase. [EPA-HQ-OAR-2022-0829-0652, pp. 29-30]

Organization: Betsy Cooper

Aaron Barkhouse is a Rhodes Scholar material scientist and Technology Strategy Manager at Maxeon Technologies. Betsy Cooper is the Director of the Aspen Institute's Tech Policy Hub, and a founder of the Aspen Institute's Climate Cohort, a training program teaching climate scientists to influence policy (including by submitting public comments). We also happen to be a married couple who own a plug-in hybrid vehicle (PHEV). [EPA-HQ-OAR-2022-0829-0654, p. 1]

Together, we write to propose that the EPA reconsider its approach to PHEVs in its recent draft regulations, particularly to incentivize car manufacturers to develop longer range PHEVs. In particular, we recommend you give full off-cycle credits to manufacturers who develop PHEVs with a range of 50 or more miles. [EPA-HQ-OAR-2022-0829-0654, p. 1]

In recent years, the electric range capacity of PHEVs has dropped precipitously. We own a Chevy Volt, which before it was discontinued in 2019 advertised up to 53 miles of electric range.1 [Link: https://www.recurrentauto.com/guides/chevrolet-volt] Today even the best PHEVs on the market have approximately 40 or less miles of range [Link: https://www.autoguide.com/auto-news/2022/03/the-plug-in-hybrid-with-the-longest-range-top-10-list.html]. The only exceptions, the Land Rover Plug-In Hybrid [Link: https://www.edmunds.com/land-rover/range-rover/2023/plug-in-hybrid/] and the Land Rover Range Rover Sport [Link: https://www.edmunds.com/land-rover/range-rover-sport/2023/plug-in-hybrid/], retail for more than $100,000 apiece. [EPA-HQ-OAR-2022-0829-0654, p. 1]

1 And we use the electric range most of the time; we have maintained a 112 mile-per-gallon average over 4 years.

Off-cycle credits give manufacturers credit for using technologies that decrease greenhouse gas emissions and fuel consumption but are not detectable using EPA's existing city and highway test cycles (otherwise known as the two-cycle test). (Federal Register (FR) at 29248.) The EPA's rule proposes to lower the amount that PHEVs are driven using electric power for the purposes of off-cycle credits. “While PHEVs would remain eligible for off-cycle credits under EPA's proposed eligibility criteria, EPA proposes, as a reasonable approach for addressing off-cycle credits for PHEVs, to scale the menu credit cap for PHEVs by the vehicle's assigned utility factor.” (FR at 29251.) [EPA-HQ-OAR-2022-0829-0654, p. 1]

Discussion

The EPA should give full off-cycle credit to PHEVs with adequate distance to enable commuters to cover their daily driving needs without charging, even after degradation: those with more than 50 miles of range. By downgrading all PHEVs with no differentiation by miles of range, the EPA is missing an opportunity to incentivize manufacturers to build PHEVs that work for consumers and allow them to feel the full benefits of electric power without the range anxiety that plagues current consumers. [EPA-HQ-OAR-2022-0829-0654, p. 2]

Together, we write to propose that the EPA reconsider its approach to PHEVs in its recent draft regulations, particularly to incentivize car manufacturers to develop longer range PHEVs.

In particular, we recommend you give full off-cycle credits to manufacturers who develop PHEVs with a range of 50 or more miles. EPA's current plan will disincentivize all PHEVs, ignoring the real market benefits to keeping long-range versions of these cars in the market. Intentional or not, the effects of the EPA's current policy will be to push vehicle manufacturers further towards full EVs—before the charging infrastructure is ready to support them. In the meantime, consumers not ready to adopt full EVs – including for the same reasons we are not yet able to do so – will continue to buy gas cars instead. [EPA-HQ-OAR-2022-0829-0654, pp. 1-4]

With more long-range PHEVs on the market, more Americans will be able to drive their full commute on electricity and charge overnight at home (with reduced demand on the grid relatively to fast-charging of full EVs). Moreover, as longer range PHEV cars grow more popular, there will be greater incentives for individuals and communities to invest in improving charging infrastructure, thus reducing the friction facing current consumers. [EPA-HQ-OAR-2022-0829-0654, pp. 1-4]

We propose a 50+ mile PHEV range requirement for full off-cycle credit. There is already momentum in favor of this standard; California is planning to require 50+ mile range PHEVs by 2035 [Link: https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035]. Moreover, even with battery degradation, a PHEV rated for 50+ miles at the point of sale will still cover the average American commute many years later. [EPA-HQ-OAR-2022-0829-0654, p. 4]

The EPA may respond that its scaled utility factor already takes into account miles of range in its calculation. Even if true, by penalizing all PHEVs across the board, the EPA is incentivizing manufacturers to make fewer plug-in hybrid vehicles, period. Especially until charging infrastructure resembles the gas station infrastructure of today, long-range PHEV cars remain an important consumer option. By rewarding manufacturers for making PHEVs with a 50+ mile range, EPA will help bring an important class of climate-friendly vehicles back to market. [EPA-HQ-OAR-2022-0829-0654, p. 4]

Organization: BMW of North America, LLC (BMW NA)

BMW NA opposes the proposal to phase out the OCT credit cap for the full fleet based on the assumption that a changing fleet mix from ICE to BEV removes the benefit of an OCT credit provision. The menu credit technologies and alternative pathway technologies already approved by the EPA still provide a real-world CO2 benefit on ICE vehicles and phase-out of the OCT credit cap could lead manufacturers to reconsider implementation of certain CO2-reducing technologies. [EPA-HQ-OAR-2022-0829-0677, p. 3]

As an alternative, BMW proposes that rather than phase-out the OCT cap from 10 g/mi in 2027MY to 0 g/mi in 2031, EPA should maintain a 10 g/mi cap which applies only to the ICE vehicle portion of the fleet (including PHEV). Manufacturers would continue to receive credit for innovative CO2 reducing technologies listed in the menu and for alternative and 5-cycle pathway technologies which are approved prior to 2027MY for those ICE vehicles. This would still allow manufacturers to receive credits for technologies with a real-world CO2 benefit. Based on the anticipated electric vehicle percentages in EPA's standard proposal, the effective whole-fleet OCT g/mi cap would stifl reduce significantly compared to the current cap (for example, a 50% BEV fleet would create an effective OCT cap of 5 g/mi), in line with the agencies intent to change the approach to accommodate a changing fleet mix. [EPA-HQ-OAR-2022-0829-0677, p. 3]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Greenhouse Gas Standards

U.S. EPA is proposing more stringent GHG emission standards for the 2027 through 2032 MYs, along with several modifications to the existing GHG program. Generally, CARB supports U.S. EPA's proposal, but offers several recommendations to further strengthen the proposed standards to achieve the greatest degree of emission reductions available, considering costs and technology readiness, to further protect public health and combat climate change. As described in detail below, CARB recommends that U.S. EPA adopt more stringent light-duty GHG emission standards; include provisions to ensure manufacturers do not allow emissions to increase from conventional vehicles and instead continue to apply all available cost-effective emission control technologies; estimate real-world PHEV emissions based on the best available data and collect additional data to inform future updates; and update elements of the comprehensive regulatory program, including retiring elements of the off-cycle and air conditioning credits programs as proposed, establishing explicit requirements to eliminate leaks from air conditioning systems, eliminating credit multipliers for medium-duty ZEVs as proposed, and requiring small-volume manufacturers to comply with the proposed standards as proposed. [EPA-HQ-OAR-2022-0829-0780, p. 12]

Off-Cycle Credits Program

U.S. EPA's GHG emission standards allow manufacturers to receive credit for technologies that reduce GHG emissions but whose reductions may not be measured on the "2-cycle" city and highway tests (or Federal Test Procedure [FTP] and Highway Fuel Economy Test [HFET]) for determining compliance with the standards. Credit may be obtained under three approaches: (1) from a "menu" of technologies, (2) testing emissions under five different specified test cycles to better estimate real-world performance, or (3) approval of a specific technology. U.S. EPA requested comment on its approach for phasing out the off-cycle program, including the number of years over which the menu phase out would occur as well as the proposed menu credit caps in those years. 24 [EPA-HQ-OAR-2022-0829-0780, pp. 22-23]

24 87 Fed. Reg. at 29,248 - 250.

CARB supports U.S. EPA's proposal to phase out the off-cycle program. As U.S. EPA acknowledges, the current off-cycle program credits are based on the projected impact the technologies would have when paired with 2008 MY vintage engine and vehicle baseline technologies (assessed during the 2012 rule). In the 11 years since the rule was adopted, new vehicles have lower GHG emissions and have incorporated technologies that target similar areas of emission reductions thereby reducing the opportunities for some of the off-cycle technologies. The credit levels are therefore becoming increasingly less representative of the actual emission reductions provided by the off-cycle technologies. [EPA-HQ-OAR-2022-0829-0780, pp. 22-23]

With its comments, CARB submits additional evidence supporting U.S. EPA's claim that the credit levels are less representative of the emission reductions provided by off-cycle technologies. Specifically, CARB has acquired BAR data that confirm at least one of the off-cycle credit technologies, idle stop-start, is not being used in a manner reflected by the original assumptions described in the Joint Technical Support Document (TSD): Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards. 25 CARB arrived at this conclusion by analyzing SmogCheck data for over 40,000 vehicles (2019 through 2023 MYs) in the BAR data set. For each idle start-stop-equipped vehicle within the data set, CARB staff assessed the total idle time (seconds) and total idle stop-start timer duration (seconds). Using these data points, staff divided total idle time by idle stop-start timer duration for each vehicle to derive the total percentage of idle time with the engine off. This value, 9.38 percent, was significantly lower than the value used under the original assumptions of the TSD (87.75 percent). When this fraction is applied to the total idle fraction (25.8 percent), the idle fraction eligible for engine-off is only 2.42 percent. This is also substantially lower than the fraction assumed in the TSD (12.07 percent). Table 2 summarizes these findings. [EPA-HQ-OAR-2022-0829-0780, pp. 23-24]

25 U.S. EPA and the U.S. Department of Transportation. Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards. August 2012. Docket ID EPA-HQ-OAR-2010-0799-12013. Available at: https://www.nhtsa.gov/sites/nhtsa.gov/files/joint_final_tsd.pdf or https://www.regulations.gov/document/EPA- HQ-OAR-2010-0799-12013.

Table 2. CARB Analysis of Idle Stop-Start Emissions.

Cycle: Projected by U.S. EPA (2012 TSD)

Idle Fraction: 13.8%

Percentage of Idle with Engine-off: 87.75%

Resultant Idle Fraction Eligible for engine-Off: 12.07%

Cycle: Real-World (2019-2023 MY BAR)

Idle Fraction: 25.8%

Percentage of Idle with Engine-off: 9.38%

Resultant Idle Fraction Eligible for engine-Off: 2.42% [EPA-HQ-OAR-2022-0829-0780, pp. 23-24]

CARB believes these results further support U.S. EPA’s contention that off-cycle credits, for idle stop-start in this case, are not representative of emission reductions originally assumed in the TSD. In this case, the credits for idle stop-start significantly overestimate the reductions achieved in the real world and further supports the case for a phase out of such credits during the regulatory timeframe. [EPA-HQ-OAR-2022-0829-0780, pp. 23-24]

U.S. EPA requested comments on ways of addressing off-cycle credits for PHEVs. As proposed, the off-cycle credit cap for PHEVs would be scaled by the vehicle’s assigned utility factor. CARB believes this approach is appropriate given that off-cycle credits would only apply to vehicles with internal combustion engines under the proposal. As a result, this is a reasonable way to attribute off-cycle credits to PHEVs in a manner that is consistent with the limited application of off-cycle credits to conventional vehicles. CARB has also provided comments on

U.S. EPA's proposed FUF and supports lowering the values to better reflect real-world PHEV emissions. [EPA-HQ-OAR-2022-0829-0780, pp. 23-24]

Finally, U.S. EPA requested comment on its proposal to eliminate the 5-cycle and public process pathways for OEMs to obtain off-cycle credits starting in the 2027 MY. CARB supports this proposal as stated. Given the rarity with which manufacturers chose these pathways, CARB believes they no longer need to be made available as compliance options in the future. [EPA-HQ-OAR-2022-0829-0780, p. 24]

Organization: California Attorney General's Office, et al.

D. EPA's Proposal to Retire or Limit Credits Is Consistent with Section 202(a)'s Focus on Real-World Emission Reductions

Finally, the States and Cities support EPA's Proposal to retire certain compliance flexibilities associated with the light- and medium-duty vehicle emissions program. In particular, EPA's rationales for limiting air-conditioning efficiency credits, 88 Fed. Reg. at 29,246-48, and for phasing out off-cycle credits and the MDV multipliers, id. at 29,243-45, 29,249-52, are consistent with the agency's responsibility to ensure the emissions program's environmental integrity by tying credits and other flexibilities to real-world emission reductions as closely as possible. [EPA-HQ-OAR-2022-0829-0746, p. 37]

Organization: Consumer Reports (CR)

6.5. Elimination of Additional Credits for EVs

CR supports EPA eliminating credits for EVs that could allow vehicles to achieve compliance values below 0g/mi. These credit provisions were in place to capture real-world emissions benefits that were not captured by EPA's test cycle. They are not appropriate when applied to vehicles that already have eliminated all tailpipe emissions. [EPA-HQ-OAR-2022-0829-0728, p. 23]

Organization: Dana Incorporated

Off-cycle Credit

Dana supports continuing an off-cycle technology credit program based on the success of this program in encouraging the adoption of technologies such as those identified in Tables 34 and 35 of the NPRM. As noted in the NPRM, the off-cycle credit program has helped support industry investment in innovative and forward-looking technologies that provide environmental benefits and reduce GHG emissions. [EPA-HQ-OAR-2022-0829-0538, p. 3]

Dana does not have a firm opinion on EPA's proposals to phase-out the current off-cycle credit program. Dana does propose that EPA continue to offer off-cycle credits, however, for new technologies for BEVS, PHEVS, FEVs, and other ZEVs. Such off-cycle technologies could help reduce battery use and therefore lower the amount of electricity used to power ZEVs. Off-cycle technologies that reduce the amount of ZEV battery charging should be recognized in MY 2027 and beyond. Potential examples of efficiency and sustainability enablers specific to ZEVs include magnet-free motors, technology improvements in continuous power relative to peak power, use of carbon-free eFluids, etc. Incentivizing the use of these technologies could also help address some of the sustainability concerns raised above. [EPA-HQ-OAR-2022-0829-0538, p. 3]

Dana thus proposes that EPA consider ways to provide credits to emerging technologies that reduce ZEV energy consumption, such as those listed above. [EPA-HQ-OAR-2022-0829-0538, p. 3]

Organization: DENSO Corporation

2) DENSO Green Technologies

DENSO is committed to supporting our customers in their application of technology to improve fuel economy performance and reduce the greenhouse gas emissions of their products to in line with consumer preferences, while meeting regulatory requirements. In this work, there are challenges and sometimes trade-offs to allowing multiple pathways to compliance, but we believe there can be a balance in achieving a successful regulatory program between stringency and real-world achievement of the standards. [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

Around the world, successful fuel economy and emissions programs offer credit programs to support the deployment of technologies, which may otherwise take multiple years to penetrate the market. DENSO encourages the agency to continue to offer flexible options supporting emerging technologies for both ICE and ZEV powertrains. [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

3) Off-Cycle Technology Credit Program

DENSO supports the continuation of the off-cycle technology credit program at its full value through at least MY 2032. It also encourages both EPA and NHTSA to recognize the important contribution the off-cycle program makes to the overall goals of the regulations, especially during this technological transition period. [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

DENSO, along with others in the supplier community working independently and in collaboration with OEMs, develop and engineer innovative technologies that contribute to vehicle manufacturers' strategies for real-world GHG and fuel consumption reductions often beyond those measured with standard test procedures. The off-cycle credit program has helped to support industry investment in innovative and forward-looking technologies that provide environmental benefits, while improving the consumer experience. These technologies offer measurable, demonstrable, and verifiable real-world benefits that improve efficiencies and reduce GHG emissions. They also provide an important cost-effective option for OEMs to achieve fuel economy and GHG targets. Therefore, DENSO has a vested interest in making sure innovative technologies continue to be deployed and utilized by OEMS to ensure these benefits are realized.1 [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

1 Please see Appendix 1 for a partial list of DENSO GREEN Technologies supporting GHG reductions via the Off- Cycle and AC Efficiency programs.

Off-cycle credits should be continued, and if some total reduction is necessary besides the natural occurrence from increased BEV volumes, the proposed phasedown should not be as rapid as proposed, thereby encouraging continued investment in off-cycle emission improvements. [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

Concerning the 5-Cycle and Alternative Method pathways, EPA should follow through under the current regulation and complete action on all submitted applications, even if it requires additional discussions. [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

It is also critically important that vehicles with alternative method off-cycle credits approved prior to MY 2027 and that remain in production in MY 2027 and later continue to be granted credits during the timeframe of this regulation. If this is EPA's intent (or final decision), clarifying text should be added to the regulation. [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

Alternatively, EPA could consider adding previously approved technologies to the off- cycle credit menu and adjusting the caps as appropriate for the additional technologies. Automobile manufacturers and suppliers have invested significant resources to develop these technologies, manufacturers have included them as part of their compliance plans, and the technologies will continue to provide real-world benefits. [EPA-HQ-OAR-2022-0829-0651, pp. 3-4]

5) Technologies Supporting ZEV Energy Consumption Reduction

DENSO requests EPA to reconsider its proposal to eliminate A/C efficiency and off- cycle credits for electrified vehicles. Off-cycle and AC efficiency credits for technologies applied across all powertrain types encourage their continued use with commensurate benefits to consumers and the environment. The elimination of off- cycle and air conditioning efficiency credits on electric vehicles would have an unfortunate effect on the application of existing technologies and further innovation in this area. [EPA-HQ-OAR-2022-0829-0651, p. 6]

DENSO also encourages EPA to explore how energy reductions from thermal technologies could be rewarded when used on BEVs, PHEVs and FCEVs. All technologies and all powertrains should continue to improve their performance. Consequently, technologies that reduce use of the vehicle battery (and reduce the amount of battery charging needed) and therefore the electricity used to power the vehicle should be recognized in MYs 2027 and beyond. [EPA-HQ-OAR-2022-0829-0651, p. 6]

Beyond the off-cycle and A/C efficiency credit programs, DENSO would welcome the opportunity to discuss the possibility of credits to further incentivize BEV energy consumption reduction directly and further support the industry during this critical technology transition period.7 A credit or incentive for technologies that support BEV energy consumption reduction from a consumer comfort and battery comfort perspective, as well as to encourage responsible critical mineral usage and grid management, would also contribute to US climate goals generally. Similar to the off- cycle and A/C efficiency program, a similar ZEV-focused technology credit would help to support industry investment in innovative and forward-looking technologies that provide additional environmental benefits. [EPA-HQ-OAR-2022-0829-0651, p. 6]

7 Please see Appendix 2 for a partial list of DENSO technologies that support ZEV energy consumption reduction.

Appendix 1

DENSO GREEN Technology Examples:

Off-Cycle Credit/AC Efficiency Credit Technologies for ICE and ZEV Powertrains

1. SAS Compressor w/CS Valve: Technology has improved pressure drop through the cylinders and a crankcase suction valve that minimizes internal compressor losses at conditions other than maximum capacity. [EPA-HQ-OAR-2022-0829-0651, p. 8]

2. Electric Scroll Air Conditioning Compressor Variation B (ESB) with pressure adjusting valve technology: This technology improves the efficiency of the electric scroll compressor using a pressure adjusting valve to optimize back pressure on the fixed scroll and reduce mechanical losses. [EPA-HQ-OAR-2022-0829-0651, p. 8]

3. S-Flow System: Reduces the thermal load on the air conditioning system through targeted cooling of only the occupied cabin areas, and for a pulse width modulated brushless motor power controller used in the HVAC system, which improves the efficiency of the HVAC system. [EPA-HQ-OAR-2022-0829-0651, p. 8]

4. High-Efficiency Alternator: High efficiency alternators use new technologies to reduce the overall load on the engine yet continue to meet the electrical demands of the vehicle systems, resulting in lower fuel consumption and lower CO2 emissions. [EPA-HQ-OAR-2022-0829-0651, p. 8]

5. Compressor Oil Separator: Technology removes at least 50% of the oil entrained in the oil/refrigerant mixture exiting the compressor and returns it to the compressor housing or compressor inlet, or a compressor design, which does not rely on the circulation of an oil/refrigerant mixture for lubrication. [EPA-HQ-OAR-2022-0829-0651, p. 8]

6. Internal Heat Exchanger (SCX): An Internal Heat Exchanger reduces load on the compressor by transferring heat from the high-pressure liquid entering the expansion valve (TXV) to the low- pressure gas exiting the evaporator. [EPA-HQ-OAR-2022-0829-0651, p. 8]

7. 2-Layer HVAC: Full technology explanation is below (from SAE Paper 2018-01-1368). Short explanation: In cold ambient conditions, two-layer HVAC recirculates already warmed air in the lower part of the HVAC unit and distributes it to the lower part of the vehicle cabin, while using air from outside the vehicle in the upper part of the HVAC unit, distributing it to the upper part of the vehicle cabin. Outside air is necessary to keep windows fog-free. Recirculated air requires less energy to re-heat. Two-layer HVAC allows both, minimizing energy needed to keep the cabin warm and fog-free. In an ICE vehicle, this results in an energy savings by enabling faster engine warm-up (since less heat is needed for cabin heating), while in a BEV the energy savings impact is even greater, since the energy used for heating the vehicle cabin needs to come from the vehicle battery. [EPA-HQ-OAR-2022-0829-0651, p. 8]

8. LE40: This technology allows for reduced power consumption during compressor operation through improved and more efficient clutch technology. [EPA-HQ-OAR-2022-0829-0651, p. 8]

9. Cold-Storage Evaporator: (Off-Cycle Alt-Method/Off-Cycle Cap): This technology utilizes phase change material in the HVAC evaporator of vehicles equipped with engine Start & Stop technology to extend the time that cold air can be delivered to the cabin with the engine and compressor off. This reduces the amount of time the engine would otherwise operate solely for the purpose of cooling the cabin. [EPA-HQ-OAR-2022-0829-0651, p. 8]

Organization: Environmental. and Public Health Organizations

IX.EPA Should Finalize the Proposed Changes to the Credit Program, but Should Not Renew Off-Cycle Menu Credits.

Below, we address EPA's proposal to renew the existing credit program with the following changes: (1) exclude all BEVs from eligibility for any off-cycle credits; (2) allow off-cycle credit eligibility for PHEVs based only on a ratio called the "utility factor"; (3) eliminate two of the three ways to obtain off-cycle menu credits (undergoing a 5-cycle testing procedure and documenting the efficacy of new technology via public notice and comment), while retaining only the third way (menu credits); and (4) renew but phase out the off-cycle menu credits for the remainder of the light- and medium-duty fleets over four years, in 10/8/6/3/0 gram/mile annual steps between MY 2028-2031. We support most of EPA's proposals but strongly urge EPA not to renew any off-cycle menu credits in this rulemaking. [EPA-HQ-OAR-2022-0829-0759, p. 78]

We support EPA's continued use of an averaging, banking, and trading (ABT) compliance credit program for light- and medium-duty vehicle emissions, as it has for decades. We agree with EPA's determination that there is no reason to reopen those program provisions in this rulemaking. [EPA-HQ-OAR-2022-0829-0759, p. 78]

We also note that the current compliance credit program includes multipliers for vehicles equipped with batteries, creating negative grams per mile values, and that EPA does not propose to renew those multipliers. We strongly support the sunsetting of all PEV multipliers and any other measures that create fictitious emission reductions. [EPA-HQ-OAR-2022-0829-0759, pp. 78-79]

B. Off-cycle credits

We strongly urge EPA not to renew any part of the off-cycle credit program after MY 2026. As explained below, EPA concedes that the program will cause significant fleet emissions increases even though it no longer achieves any of its purposes. There is no reasonable basis for carrying any part of the program forward beyond 2026, and doing so would be arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0759, p. 82]

1.Excluding BEVs from off-cycle credit eligibility

We concur with EPA's determination that off-cycle credits are inappropriate for BEVs for each of the reasons EPA states. 88 Fed. Reg. at 29251-52. Because EPA does not adjust the footprint curves downward to compensate for off-cycle credits, fleet emissions increase. Awarding credits is particularly inappropriate for BEVs because they have no tailpipe emissions and are already counted as emitting zero grams per mile, meaning that any credit awards tip their emission values into fictional negative territory. This in turn creates phantom benefits that further reduce the rule's average stringency. Because off-cycle credits are intended to stimulate the development of new combustion vehicle technologies, awarding them to BEVs also cannot, by definition, incentivize the development or application of new technology. Off-cycle credit values are also not representative of upstream emissions. These reasons for not awarding any off-cycle credits to BEVs become even more pertinent as the number of BEVs increases. Id. We urge EPA to finalize its proposal to exclude BEVs from off-cycle credit eligibility. [EPA-HQ-OAR-2022-0829-0759, p. 82]

2. Renewing PHEV off-cycle credits based on the utility factor only.

We also concur with EPA that off-cycle credits for PHEVs exceeding their utility factor is inappropriate. 88 Fed. Reg. at 29251. Granting credits for any portion of time when PHEVs do not run on electricity is inappropriate for the reasons discussed in connection with BEVs. We agree with EPA that the current utility factor is inaccurate, as PHEVs run on electricity far less often than estimated. 88 Fed. Reg. at 29252, and see detailed discussion in Section XII, infra.218 That is an additional reason why, as discussed below, off-cycle credits should not be renewed for PHEVs at all, regardless of whether they run on electricity or gasoline. [EPA-HQ-OAR-2022-0829-0759, pp. 82-83]

218 See also the numerous studies EPA cites at 88 Fed. Reg. 29252 n.274-475.

3. Eliminating the 5-cycle test procedures and the public notice and comment pathway

EPA justifies not renewing these two pathways for claiming off-cycle credits mainly because manufacturers have little or no interest in them. EPA points out that since 2021, the 5-cycle process has led to no new credits, and only one manufacturer has used it since 2012. As to the notice-and-comment pathway, EPA states that it has resulted in the award of only a few small credits since 2021. 88 Fed. Reg. at 20251. We agree that these programs should not be renewed, but we note that under EPA's Proposal, aside from air conditioning credits, the only off-cycle credits remaining would be menu credits, which require neither testing nor public comment, and as such are the least reliable and least defensible credits of all. Yet, as EPA reports, the use of menu credits has only grown over the years, and now constitutes a whopping 95% of credit use. 88 Fed. Reg. at 29249. Eliminating pathways that automakers eschew because they impose the burden of demonstrating their effectiveness thus does very little indeed to address the fundamental flaws. [EPA-HQ-OAR-2022-0829-0759, p. 83]

Because EPA's prior rules limited medium-duty fleet off-cycle credits to those approved under the 5-cycle test procedures or the notice-and-comment pathway and contained no menu credits, 88 Fed. Reg. at 29249, EPA's proposal not to renew those two pathways effectively terminates the credit program for that fleet, a decision we fully support. [EPA-HQ-OAR-2022-0829-0759, p. 83]

4. Phasing out menu credits through MY 2030

EPA proffers numerous reasons for "phasing out" the menu credits program—for vehicles with internal combustion engines only—through 2030. But those reasons all demonstrate that retaining the program in any form has no verifiable benefits even as it significantly increases the fleet's emissions. Renewal of menu credits thus would be arbitrary and capricious, and we strongly urge EPA to abandon the proposal and not to renew the program at the end of MY 2026. [EPA-HQ-OAR-2022-0829-0759, p. 83]

First, the Agency states that menu credits were designed "to provide an incentive for new and innovative technologies that reduce real world CO2 emissions primarily outside of the 2-cycle test procedures." 88 Fed. Reg. at 29249. But EPA now concedes the program no longer accomplishes this purpose. It notes that industry is rapidly shifting its research and development resources and vehicle mix away from combustion vehicles to electrification, and is not likely to continue to "invest resources on off-cycle technology in the future for their ICE vehicle fleet." 88 Fed. Reg. at 29250. Moreover, industry has fewer and fewer opportunities of "recouping" its investments as “ICE vehicle production declines.” Id. In other words, chances of menu credits stimulating any new technologies at all are slim to none. [EPA-HQ-OAR-2022-0829-0759, pp. 83-84]

Since 2012, EPA has also assured the public in its rulemakings that the increased emissions driven by credits are intended to be short-term and of a temporary nature only.219 But EPA proposes to renew the program once again, even as it acknowledges the voluminous record evidence demonstrating its shortcomings and failures.220 Reinstating the program through 2030 (for a total of 20 years) is in no way temporary and cannot be supported, as it is not delivering the hope for technical innovations that initially may have justified it. [EPA-HQ-OAR-2022-0829-0759, p. 84]

219 E.g., 88 Fed. Reg. at 29246, 29248; 86 Fed. Reg. at 74441; 75 Fed. Reg. at 25331.

220 See generally EPA, Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emission Standards: Response to Comments, EPA-420-R-21-027, at 6-51 (Dec. 2021).

221 The fleet average-modeled sum of off-cycle and air conditioning menu credits for MYs 2027-2032 represents about 3% of the MYs 2027-2032 Proposed Standards. We calculated this number by first sales-weighted averaging the direct off-cycle credits (i.e. air-conditioning plus off-cycle credits) in the modeled Proposal output file. We then compared these values to the Proposed Standards for the combined fleet. 88 Fed. Reg. at 29202, Table 10.

Eliminating menu credits for MYs 2027-2055 improves the cumulative CO_2 emissions reductions of the Proposal by 275 million metric tons (roughly 3% of the total 8,000MMT shown in DRIA table 9-21). We calculated this number by first assuming manufacturers would achieve the same combustion vehicle emissions levels as they do in the modeled Proposal output file with only on-cycle technologies. We used this file because the on-cycle emissions values in a no-off-cycle scenario are equal to the currently-modeled certified emissions values (used for compliance calculations). These on-cycle values are then converted to on-road (i.e. real-world) emissions using conversion factors calculated from the output file. Finally, total fleetwide lifetime emissions are estimated by multiplying on-road CO_2e by lifetime vehicle-miles traveled and annual sales. For the detailed calculations, see the Excel Workbook attachment to this comment letter titled “No Off-Cycle Credits 2027-2055.”. [EPA-HQ-OAR-2022-0829-0759, p. 84]

EPA also concedes that menu credits meet neither of the guardrails that justify continuation of air conditioning credits. Menu credits undergo no or at most minimal testing to ascertain what, if any, emission reductions they may yield, and EPA once again is not proposing to increase the standards’ stringency to account for the increased emissions. In 2021, EPA calculated the impact of the off-cycle credits it allowed under the MY 2023-2026 rulemaking as the loss of 42 g/mile. 88 Fed. Reg. at 29249 n.453, citing Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis,” EPA-420-R-21-028 (Dec. 2021). For MY 2016-2025, the impact of all off-cycle credits amounted to a stringency loss of 4-6%. 88 Fed. Reg. at 29249. EPA also notes that for this Proposal, emission increases caused by all off-cycle credits (i.e., under a full renewal of the program) would be even larger by 2032, when they would “become an outsized portion (e.g., up to 12 percent) of the program.” 88 Fed. Reg. at 29250. We note, however, that under EPA’s proposal to retain menu credits through the proposed phase-out schedule, these compliance giveaways would still amount to some 3%

reduction in stringency and a 3% increase in MY 2027-2055 cumulative CO_2e emissions.221. [EPA-HQ-OAR-2022-0829-0759, p. 84]

Next, EPA discusses that the synergistic effects and overlap among menu technologies—which reduce effectiveness—become more pronounced as credits represent a larger portion of emissions reductions and the standards become more stringent. Further, “the menu credits are based on MY 2008 vintage engine and vehicle baseline technologies . . . and therefore the credit levels are potentially becoming less representative of the emissions reductions.” Id. And crucially, the Agency frankly admits that there is “not currently a mechanism to check that off-cycle technologies provide emissions reductions in use commensurate with the level of the credits the menu provides.” 88 Fed. Reg. at 29250 (emphasis added). That the program simply cannot be fixed is all by itself sufficient reason not to carry it on. . [EPA-HQ-OAR-2022-0829-0759, p. 85]

The single reason proffered to justify a step-wise phase-out through MY 2030 as a “reasonable way to bring the program to an end” is the creation of “a transition period to help manufacturers who have made substantial use of the program in their product planning.” 88 Fed. Reg. at 29250. But nothing backs up the need for a lead time of six or seven years (from the expected rule finalization in 2023 or 2024 through MY 2030). To the contrary, no lead time beyond MY 2026 is warranted, particularly in an industry racing toward zero-emission technologies. In any event, the menu program does not have to be “brought to an end” through this new rulemaking: it expires on its own after MY 2026. In its 2023-2026 rule (as before), EPA characterized the program as “temporary” and gave no indication that it would be extended, 86 Fed. Reg. at 74441, and commenters have implored EPA to jettison it for more than a decade. If a manufacturer has nonetheless made menu credits part of its post-MY 2026 product planning, it did so at its own risk. There is no need for a “transition period” for a program that ends in MY 2026. [EPA-HQ-OAR-2022-0829-0759, p. 85]

Organization: Ford Motor Company

Off-cycle Credits

Ford believes that the EPA off-cycle credit program encourages adoption of technologies that reduce on-road CO_2 emissions. We also believe that the program can serve an important function during this transition period, and we encourage EPA to consider continuing targeted off- cycle credits for both ICE and EV technologies. If EPA discontinues certain off-cycle credits, the agency should phase-out them out over time, much like the phase-out proposal for the menu- based credits. [EPA-HQ-OAR-2022-0829-0605, p. 8]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG requests all technologies approved to earn credit through the alternative or 5- cycle pathway be moved to the menu from 2027 model year [EPA-HQ-OAR-2022-0829-0554, p. 6]

HMG appreciates EPA' s inclusion of off-cycle credits (OCC), which incentivize the application of technologies that provide real word greenhouse gas (GHG) emissions improvements, but whose improvements are not fully reflected on the 2-cycle test. HMG currently claims credits from all three available pathways: menu technologies, 5-cycle testing, and the public process. [EPA-HQ-OAR-2022-0829-0554, p. 6]

Many challenges remain on the path to ZEVs, and HMG believes incentives will continue to be key to encouraging swift adoption of ZEV technologies. Given such challenges, now is not the time for EPA to reduce OCC incentives as part of the transition to ZEVs. Accordingly, HMG provides the below comments regarding the Proposed Rule's changes to the OCC program. [EPA-HQ-OAR-2022-0829-0554, p. 6]

EPA proposes to phase out the menu pathway by decreasing the menu credit cap from MY 2027-2031 (10, 8, 6, 3, 0 g/mi) and prohibiting battery electric vehicles (BEVs) from earning OCC from MY 2027. HMG believes the cap should remain at its current level (15 g/mi) or should be phased out at a slower rate. EPA may believe that with the shift to electrified technology, OCC are not going to be a key area of focus for manufacturers, but this is not the case. GHG-reducing technologies, such as high efficiency lighting, are used in both ICE and ZEVs. Keeping the menu cap at its current level will support EPA's original goal for the OCC program to encourage and develop new and innovative technologies that lead to significant GHG reductions. Reducing and eventually eliminating OCC technology credits will likely disincentivize future ICE technologies that further contribute to GHG reductions. HMG also believes ZEVs should remain a part of the OCC program. Although ZEVs have no tailpipe emissions, if an off cycle technology improves electrical energy efficiency of the EV, that technology is providing a reduction in overall emissions. ZEV market penetration is also not yet high enough, nor is it likely to be by MY 2027, to justify eliminating these incentives. The ultimate goal of a 100% ZEV fleet continues to require substantial support in these early stages. [EPA-HQ-OAR-2022-0829-0554, p. 6]

EPA further proposes to eliminate the 5-cycle and the alternative credit pathways by MY 2027. HMG opposes this proposal and believes the non-menu pathways offer valuable GHG reductions. As stated previously, overall emissions reductions can be achieved through both ZEV and ICE improvements . Without the credit incentives for innovative GHG technologies, manufacturers may be less inclined to develop and invest in OCC technologies, leading to increased ICE emissions , particularly in the early stages of consumer ZEV adoption when ICE vehicles are still dominant. [EPA-HQ-OAR-2022-0829-0554, p. 6]

If EPA decides to eliminate the 5-cycle and alternative credit pathways, HMG suggests all credits approved through these pathways prior to the start of the new rule be transferred to the menu from MY 2027 and the menu cap be adjusted accordingly. Between development and the application process, HMG has spent considerable time and resources on OCC technologies that would seek approval through the alternative pathway. [EPA-HQ-OAR-2022-0829-0554, p. 6]

HMG believes EPA should encourage every GHG reducing effort, including non menu off-cycle technologies . There is precedent for moving technologies from the alternative pathway to the menu as mentioned in the Proposed Rule: "[t]he public process pathway was used successfully by several manufacturers for high efficiency alternators, resulting in EPA adding them to the off-cycle menu beginning in MY 2021."HMG believes the EPA should review and approve/reject all pending alternative pathway applications by June 1, 2025, and from MY 2027 move those technologies and the corresponding credit values to the menu. [EPA-HQ-OAR-2022-0829-0554, p. 7]

Organization: Hyundai Motor America

The Final Rule Should Delay the Start of Off-Cycle Credit Phase Down Until MY 2031.

The final rule should enable compliance pathways by offering a real choice of clean technology innovation or greater PEV penetration. However, the fundamental stripping away of technology- earning credit flexibilities, in effect, creates an EV mandate. The result will cause an industrywide race to simply "buy" compliance through credit trading provisions. In this way, the Proposed Alternative's restructured off-cycle and air conditioning credit provisions incentivize the wrong behavior by industry. [EPA-HQ-OAR-2022-0829-0599, pp. 7-8]

Historically, Hyundai has earned credits from its light duty innovations under the off-cycle credit provision and we remain interested in continuing to do so. However, the proposed phasedown creates a deterrent effect. Real world considerations include the reduced credit value compared to the time and resources required to develop qualifying technologies. While we agree that a phase- out will eventually be appropriate, we urge the EPA to retain existing off-cycle credits through at least MY 2030. [EPA-HQ-OAR-2022-0829-0599, pp. 7-8]

Retaining existing off-cycle credits for BEVs through MY 2030 allows time for industry to make gains in BEV technology, such as efficiency and price. In this way, off-cycle credit opportunities will serve as a bridge to support compliance during this time. We would support a phasedown of off-cycle credits for both ICE and PEVs beginning at 80% in MY 2031 and 60% in MY 2032. [EPA-HQ-OAR-2022-0829-0599, pp. 7-8]

Recommendations

In summary, we support AFAI's proposal as it aligns with Executive Order 14037. In addition, the final rule should include a:

- Revised No Action case to more adequately account for infrastructure and grid capacity constraints, challenges related to IRA-related supply chain restructuring, and significantly reduced consumer access to EV tax incentives in the near and medium term, [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Confidential and aggregated industry survey to understand real costs associated with supply chain and manufacturing changes caused by the 30D tax credit requirements, [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Off-cycle credit provision consistent with current rules through MY 2030, with a phasedown beginning MY 2031 [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Credit incentive for automakers to reduce tailpipe emissions within in disadvantaged communities, and [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Federal Advisory Committee to, by July 1, 2030, assess and issue recommendations regarding the status of key enablers necessary to support the final rule's BEV penetration requirements [EPA-HQ-OAR-2022-0829-0599, p. 9]

Organization: International Council on Clean Transportation (ICCT)

ICCT supports EPA's proposed improvements on a number of technical design elements that will strengthen the overall rule. ICCT strongly supports EPA's proposal to phase out additional credits given to automakers for technologies that are not captured in the test cycle (off-cycle credits; OC) and that previously were considered novel but now are fully commercialized. In particular, ICCT supports EPA's proposal to sunset or eliminate off-cycle (OC) credits for air-conditioning (AC), to phaseout off-cycle (OC) credits by MY2031, to eliminate the off-menu OC credit option starting MY2027, and to limit OC credits to ICE vehicles. [EPA-HQ-OAR-2022-0829-0569, p. 5]

OFF-CYCLE CREDITS

ICCT strongly supports EPA's proposal to sunset or eliminate air-conditioning (AC) and off-cycle (OC) credits. [EPA-HQ-OAR-2022-0829-0569, pp. 43-44]

Eliminating the AC leakage credit is reasonable, since at least 95% of new LD vehicles now use HFO-1234yf,109 which is a low-GWP refrigerant. Since virtually all vehicles have this low-GWP refrigerant, this low-GWP status is now the baseline and there is no need to grant further AC leakage credits. Regarding AC efficiency credits, ICCT supports EPA limiting these credits to ICEVs, as the credits are based on ICE tailpipe emissions reductions for AC-system improvements. While BEVs also benefit from improved AC system efficiency, BEVs do not require the additional incentive provided by AC credits. BEVs already are granted compliance emissions values of 0 g/mi, and advances in AC efficiency are inherent to BEV development, as passenger and battery heating/cooling loads can significantly impact BEV range and battery size requirements. [EPA-HQ-OAR-2022-0829-0569, pp. 43-44]

> 109 EPA. (2022). Automotive Trends Report. https://www.epa.gov/automotive-trends/download-automotive-trends- report#Full%20Report

ICCT supports the proposal to phaseout OC credits by MY2031, to eliminate the off-menu OC credit option starting MY2027, and to limit OC credits to ICE vehicles. As with AC credits, a large portion of the fleet already incorporates the technologies that are granted OC credits. According to the 2022 Automotive Trends Report data, MY2021 cars averaged 5.1 g/mi in OC credits (51% of the 10 g/mi cap) and trucks averaged 10.2 g/mi in OC credits (102% of the 10 g/mi cap).110 With these averages as a proxy for the share of the car and truck fleets with OC technology, this technology is already widespread in the baseline and requires no further incentivization. Evidence suggests that the menu OC credit values (such as solar and thermal load control) overestimate the real-world impact of OC technologies.111 Moreover, the menu credits are defined in terms of absolute g/mi reductions, rather than relative or percentage- based reductions, as virtually all on-cycle technologies are defined. Because of this inappropriate definition, as vehicles become increasingly efficient, these absolute credit values represent unrealistically large shares of vehicles' overall emissions improvement. Additionally, as OC credits are based on reduced tailpipe emissions from ICE vehicles, they are not applicable to BEVs. As with AC efficiency improvements, any innovation that reduces real world energy consumption in BEVs is inherently incentivized by the reduced battery capacity requirements of incorporating such innovations. Relatedly, ICCT supports the proposal to scale PHEV OC credits by the (newly proposed) utility factor. [EPA-HQ-OAR-2022-0829-0569, pp. 43-44]

110 EPA. (2022). Automotive Trends Report [data]. https://www.epa.gov/automotive-trends/explore-automotive-trends- data

111 Lutsey, N., Isenstadt, A. (2018). How will off-cycle credits impact U.S. 2025 efficiency standards? International Council on Clean Transportation. https://theicct.org/publication/how-will-off-cycle-credits-impact-u-s-2025- efficiency-standards/

ICCT recommends EPA adjust its modeling of OC credits to more accurately reflect the trend of the car and truck fleets taking full advantage of the OC credit cap. As currently modeled, both the car and truck fleets use the full value of their respective AC efficiency credit cap.112 The OC credits, however, are not modeled as reaching their cap for either car or truck fleet in any model year. As evidenced in the 2022 Automotive Trends Report data discussed above, the car fleet is currently receiving at least 50% of the full OC credit cap, while the truck fleet is receiving at least 100% of the full OC credit cap. ICCT suggests EPA modify its inputs to OMEGA to capture the real-world trend of manufacturers taking full advantage of the off-cycle credit cap. (The AC efficiency credits are appropriately modeled at the full value of the cap, which accurately represents the trend of the fleet receiving nearly 90% of the AC credit cap in MY2021.) If EPA incorporates the maximal use of OC credits during years that the OC cap is nonzero, then the standards could be made more stringent to offset this higher OC credit usage and maintain the same GHG emissions impacts. [EPA-HQ-OAR-2022-0829-0569, pp. 43-44]

112 Based on analysis of column BV of output file 2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv as well as inspection of input file offcycle_credits_20230206.csv

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

Given the potential barriers to compliance, it is also crucial that the system of credits and multipliers for advanced powertrain technology, over-compliance, and off-cycle technologies provide automakers for multiple-pathways to reach compliance. No two automakers are the same when it comes to technologies or markets. Any adjustments to the regulatory credit system should prioritize promoting advanced technology production domestically and recognizing the economic, social, and environmental benefits of a resilient domestic supply chain. [EPA-HQ-OAR-2022-0829-0614, p. 8]

Organization: Kia Corporation

- Kia strongly supports preserving many of the current program flexibilities – a phase- down of the A/C refrigerant leakage credits and preserving the off-cycle technology credits. These flexibilities should still play an important role as these credits could help ease the uncertainties in the transition to EVs. [EPA-HQ-OAR-2022-0829-0555, p. 3]

Kia Supports Preserving Off-cycle Technology Credits

EPA proposes to phase out the off-cycle technology credit program as follows: (1) credit eligibility is limited to ICE vehicles; (2) a phase out of menu-based credits by reducing the menu credit cap year over-year until it is fully phased out in MY 2031 (10 g/mile cap in MY 2027 then 8.0/6.0/ 3.0/0, with MY 2030 being the last year manufacturers could generate credits); (3) EPA proposes to eliminate the 5-cycle and alternative method process pathways starting in MY

2027.22 EPA proposes that PHEVs would remain eligible for off-cycle credits but off-cycle credit would scale the menu credit cap for PHEVs by the vehicles' utility factor.23 [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

22 88 Fed. Reg. 29,249.

23 88 Fed. Reg. 29,251.

Kia opposes EPA's proposal to phase out and eventually eliminate off-cycle technology credits by MY2031. While Kia agrees that a phase-out of off-cycle credits will eventually be appropriate, we urge the EPA to retain existing off-cycle menu-based credits through at least 2032. Off-cycle credits should be continued. Any eventual phasedown should be much slower than proposed. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

Historically, Kia has invested significant resources to develop these off-cycle technologies and has used all three pathways to obtain off-cycle credits. Kia remains interested in earning off-cycle credits as we have invested in these technologies, included them in our compliance plans, and know these technologies continue to provide real-world emissions reductions. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

In EPA's most recent vehicle GHG emissions standards rule, finalized in December 2021, EPA increased the off-cycle credit cap obtained from the off-cycle menu from 10 g/mi to 15 g/mi for MYs 2023-2026.24 The increased menu cap signaled to industry that EPA would continue to encourage and account for these off-cycle technologies. Consequently, Kia made investments in these technologies and would appreciate the opportunity to earn a return on investment (ROI). EPA's proposed immediate phase down in MY2027 will hurt our ROI, stranding investments and potentially foregoing potential emissions benefits both before and throughout the MYs 2027 - 2032 program. While EPA is proposing automakers make new investments in ICE vehicles, Kia is urging EPA to allow automakers to benefit from off-cycle technology investments that have already been made. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

24 86 Fed. Reg. 74,446.

These program flexibilities, particularly the off-cycle menu, still play an important role for automakers in compliance. Retaining the existing off-cycle credits, particularly the off-cycle menu, is critical as this allows time for automakers to make gains in EV penetration and allows for industry to earn credits for investments already made in ICE technologies. These credits could help ease the uncertainties in the transition to EVs, particularly early in the MYs 2027 - 2032 program. Kia strongly supports preserving current program flexibilities. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

Kia also recommends that EPA keep the 5-cycle and alternative method process off-cycle pathways through MY2032. While these pathways are not used as often as the menu, it is important that these pathways are still allowed. These pathways will encourage new, innovative, emissions-reducing technologies that are a cost-efficient range of technology options that ultimately lower compliance costs and increase consumer choice. By eliminating the credits and pathways, there will be no incentive or benefit to invest in these GHG reducing technologies. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

However, if EPA does eliminate the 5-cycle and alternative method process off-cycle pathways starting in MY2027, we recommend that EPA consider the following: [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

- EPA should follow through under the current regulation and complete action on all submitted applications, no later than June 1, 2025. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

- EPA should add technologies approved through the 5-cycle and alternative off-cycle pathways to the off-cycle credit menu. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

- If an automaker has off-cycle credits approved through the alternative or 5-cycle method prior to MY2027 and that vehicle remains in production after MY2027, the credit continues to be granted. [EPA-HQ-OAR-2022-0829-0555, pp. 13-14]

Organization: Lucid Group, Inc.

Lucid Supports Eliminating AC Leakage and Off-Cycle Menu Credits

The intent behind the off-cycle program was to incentivize innovations that would reduce real world CO2 emissions outside of the 2-cycle test procedures. However, transportation technologies and the makeup of the vehicles on U.S. roads has drastically changed since the program's launch in 2014. In part, EPA proposes limiting the off-cycle program to vehicles with tailpipe emissions greater than zero starting in MY27 and sunsetting the program entirely by MY31. The accelerated transition to EVs, spurred by both government and industry commitments/investment as well as the exacerbation of the climate crisis, provides the opportunity for EPA to narrow the allowance of credits for vehicles that emit tailpipe emissions. Lucid urges the agency to eliminate the off-cycle program as proposed, or on an accelerated timeline ending with 0g/mile prior to MY31, and to eliminate the 5-cycle and public process pathways starting in MY27. [EPA-HQ-OAR-2022-0829-0664, p. 7]

Organization: MECA Clean Mobility

Off-cycle credits provide real-world emission benefits and should continue to be offered.

We continue to support EPA's off-cycle credit program for recognizing the breadth of engineering ingenuity to reduce real-world CO2 through a verifiable credit process. This program has offered a method for vehicle manufacturers to apply for off-cycle CO2 credits through three pathways with increasing levels of complexity. We agree that the five-cycle approval process is complex and thus has had limited subscribership. The program requires that off-cycle technologies be fully integrated into vehicles, and thus suppliers have had a difficult time generating enough evidence to convince their customers to commit resources to demonstrate the technology across a fleet of vehicles without any indication of the amount of credits the technology may deliver. Furthermore, suppliers have found it difficult to take advantage of the 5-cycle pathway to generating data toward demonstrating the CO2 reduction benefits of a technology to their customers without access to the methodology the agency uses for calculating the final credit value. [EPA-HQ-OAR-2022-0829-0564, p. 36]

However, light-duty super credits were recently sunset in 2022 and advanced technology multiplier credits for medium- and heavy-duty vehicles are phasing out by 2027, and we believe this could lead to increased interest and use of the current off-cycle credit program. While we understand EPA's rationale in its decision to simplify and eliminate the off-cycle credit process by removing the 5-cycle pathway and phasing out the credits, we request: (1) that the agency retain the five-cycle pathway; and (2) that the agency continue off-cycle menu credits at the 10 g/mile cap rather than phasing credit caps down to zero. [EPA-HQ-OAR-2022-0829-0564, p. 36]

Organization: MEMA, The Vehicle Suppliers Associated

Continue Off-Cycle Technologies Credit & A/C Efficiency Technology Credit Programs

MEMA urges EPA to continue to provide the off-cycle technology credit program and the A/C efficiency credit program. The supplier community, working independently and in collaboration with OEMs, develop and engineer innovative technologies that contribute to vehicle manufacturers' strategies for real-world GHG and fuel consumption reductions often beyond those measured with standard test procedures. The off-cycle credit program and A/C efficiency credit program have helped to support industry investment in innovative and forward-looking technologies that provide environmental benefits. These technologies offer measurable, demonstrable, and verifiable real-world benefits that improve efficiencies and reduce GHG emissions. They also provide an important cost-effective option for OEMs to achieve fuel economy and GHG targets. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

These credit programs are not loopholes and do not distort the market but instead recognize technologies that are not measured accurately on the existing test-cycles. These technologies are often more cost effective than other available technologies to reduce pollutant emissions. It is important that the MY27+ program allows a variety of regulatory tools to broaden compliance pathways for vehicles to manage their product mix during this transition period. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

The continuation of the off-cycle credit program is critical in encouraging technologies that allow greater innovation which can provide a cost-efficient range of technology options that ultimately lower compliance costs and increase consumer choice. These technologies will continue to promote consumer choice, spur technology development, and minimize compliance costs while achieving significant pollutant emissions and oil reductions. Importantly, continuation of the off-cycle technology credit program will help maintain market certainty for these technologies. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

Similarly, MEMA encourages EPA to explore how emissions reductions from off-cycle technologies and A/C efficiency technologies could be rewarded when used on BEVS, PHEVs, FCEVS, and other ZEVs. Many off-cycle and A/C efficiency technologies, along with emerging ZEV technologies, could help reduce battery energy use and therefore lower the amount of electricity used to power the vehicle overall. Consequently, technologies that reduce the amount of battery charging needed and, therefore, the electricity used to power the vehicle should be recognized in MY2027 and beyond. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

MEMA urges:

- EPA to maintain off-cycle credits and A/C credits programs at full value through 2032 for all vehicle types, including ZEV, and consider additional ways emerging technologies that reduce ZEV energy consumption can be rewarded. [EPA-HQ-OAR-2022-0829-0644, pp. 9-10]

Organization: Minnesota Pollution Control Agency (MPCA)

- Phase out air conditioning and off-cycle credits

The MPCA agrees with EPA's proposal to phase out air conditioning and off-cycle credits. While useful to encourage manufacturers to invest in improved technology in earlier phases of EPA's greenhouse gas vehicle emissions standards, they no longer provide substantive benefit, and it is appropriate to sunset these programs. [EPA-HQ-OAR-2022-0829-0557, p. 5]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

Mitsubishi participated in the development of - and supports - the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0682, p. 2]

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators: [EPA-HQ-OAR-2022-0829-0682, p. 2]

1. Closely align the multi-pollutant emissions standards with President Biden's 2030 goal by assuming no more than 40-50% PHEVs and FCEVs by 2030, even though our experience leads us to caution that this itself is very ambitious, and is predicated on the assumption that the necessary supportive policies will be effectively implemented. [EPA-HQ-OAR-2022-0829-0682, p. 2]

2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping- stone to full BEV acceptance. [EPA-HQ-OAR-2022-0829-0682, p. 2]

3. Maintain the current PHEV Utility Factor (UF) and work with industry to identify opportunities to increase PHEV electric operation. This is the ideal stepping-stone technology to encourage long-term BEV acceptance and utilization. [EPA-HQ-OAR-2022-0829-0682, p. 2]

4. Keep the proposed approach to determine the passenger car curves, and consider adjusting the cutpoint and stringency levels of the light-duty trucks during the early years of the program. [EPA-HQ-OAR-2022-0829-0682, p. 2]

5. Maintain the existing GHG program flexibilities, such as Air Conditioning and Off-Cycle technologies credits (including the alternative method to apply off-cycle credits), and allow previously approved technologies to continue receiving credits. [EPA-HQ-OAR-2022-0829-0682, p. 2]

6. Align the Tier-4 (criteria pollutants) with CARB's LEV-IV criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 2]

7. Consider the impact that very aggressive GHG standards will have on vehicle affordability, and especially the detrimental impact to low-to-moderate income families. Regardless of the vehicles that regulation may require us to produce, it is critical that regulators always keep the accessibility of consumers in mind. [EPA-HQ-OAR-2022-0829-0682, p. 2]

The rationale for each one of these recommendations is further explained below. [EPA-HQ-OAR-2022-0829-0682, p. 2]

5. GHG Program Flexibilities

At the onset of GHG regulations in MY2012, EPA developed a set of program flexibilities designed to provide credits for technologies that provide real-world GHG emissions benefits but are unable to be measured under the required test procedures. Specifically, credits are available for refrigerant systems which use low global warming potential refrigerants and reduce leakage, improvements to air conditioning efficiency, and "off-cycle" technologies which improve emissions but are not fully measured during 2-cycle testing. This proposed regulation intends to phase out and eliminate several of these credits as well as limit their application for electric vehicles. Mitsubishi supports the position of Auto Innovators to maintain these program flexibilities as these technologies provide real-world environmental benefits. Mitsubishi also supports Auto Innovators' position that any vehicles with previously approved alternative method off-cycle technology continue to receive credits for MY27 and later. In addition, Mitsubishi believes that the alternative method to apply for off-cycle credits should remain as an option for MY27 and later. [EPA-HQ-OAR-2022-0829-0682, pp. 8-9]

It is important to note that NHTSA's CAFE program in the past has mirrored EPA's GHG approach to these flexibilities. Since it is not possible to comment on a proposed CAFE regulation that has not yet been published, it is only reasonable to assume that NHTSA will follow previous precedent regarding flexibilities and adopt the same structure as EPA. However, there is a significant deviation with regard to the treatment of EV compliance under the CAFE and GHG programs. Where EVs are rightly considered zero g/mi under the GHG program, the CAFE program requires EVs to be assign a mile per gallon equivalent compliance value based on the PEF. Increasing this discrepancy in the GHG and CAFE programs, DOE has proposed reducing the PEF by 72% compared to the current value. The PEF reduction will lead to a substantial decrease in the CAFE compliance value of BEVs and PHEVs. The elimination of air conditioning and off- cycle credits for EVs combined with changes to the PEF, and UF within the CAFE program could put BEVs and PHEVs at a distinctive compliance disadvantage relative to some Strong Hybrid-Electric Vehicles (SHEVs). Keeping these flexibilities in the GHG program for electric vehicles should reduce potential harmonization issues between the GHG and CAFE regulations. For this reason and the reasons stated by Auto Innovators, Mitsubishi supports Auto Innovators proposed approach to apply all available credits at the vehicle level regardless of propulsion, but ensure fleet-wide average emissions are not allowed to go below a value equivalent to zero g/mi. [EPA-HQ-OAR-2022-0829-0682, pp. 8-9]

Organization: National Association of Clean Air Agencies (NACAA)

NACAA agrees with EPA's assessment that the off-cycle credit program – originally created over a decade ago to provide flexibility to automakers and incentives for the development of new and innovative technologies – has successfully served its purpose. We therefore support the agency's proposal to phase out, between 2027 and 2030, the off-cycle credit program for LDVs and MDVs. [EPA-HQ-OAR-2022-0829-0559, p. 8]

Organization: National Automobile Dealers Association (NADA)

EPA also proposes to sunset the off-cycle credits program for both light- and medium-duty vehicles by: (i) reducing the menu credit cap annually until its unavailable in MY 2031; (ii) eliminating the 5-cycle and public process pathways starting in MY 2027; and (iii) limiting eligibility for off-cycle credits to vehicles with tailpipe emissions greater than zero starting in MY 2027.11 [EPA-HQ-OAR-2022-0829-0656, p. 3]

11 88 Fed. Reg. 29196, 29249-52.

NADA generally supports retention of all compliance flexibilities that will afford OEMs a greater ability to cost-efficiently deliver compliant vehicles, and to help incentivize the acceptance of new technology and alternative fuel vehicles in the marketplace. Hence, NADA opposes EPA's proposals to (i) eliminate or reduce the incentive multiplier for medium-duty vehicles prior to MY 2027, (ii) limit eligibility for the air conditioning credit to light-duty internal combustion engine (ICE) vehicles, (iii) eliminate refrigerant-based air conditioning credit provisions for both light-duty and medium-duty vehicles, and (iv) to sunset the off-cycle credits program for both light-duty and medium-duty vehicles. NADA shares the concerns expressed by AAI in its comments regarding the changes EPA proposes on these matters. [EPA-HQ-OAR-2022-0829-0656, p. 16]

Organization: Nissan North America, Inc.

Additionally, Nissan requests that EPA re-consider the proposed changes to its AC system efficiency credits and off-cycle credit programs. Nissan agrees with the comments of the Alliance for Automotive Innovation on these topics as described in more detail in Section VII below. [EPA-HQ-OAR-2022-0829-0594, p. 6]

VII. Endorsement of Comments from the Alliance for Automotive Innovation

As a member of the Alliance for Automotive Innovation ("the Alliance"), Nissan fully endorses the comments on the Proposed Multi-Pollutant Rule submitted separately by the Alliance. In particular, Nissan highlights several points from the Alliance's comments, including: [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support realigning the GHG standard stringency ramp up rates with market reality and uncertainties. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support realigning the Federal criteria emission standards with California's program. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Emphasis regarding the industry's commitment to work towards electrification as quickly as practicable, while also taking into consideration resource availability, technological capabilities, market challenges and limitations, and consumer adoption hurdles. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support continuation of tailpipe-based program and treatment of 0 g/mi for EVs [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Request reconsideration of the proposed changes in the AC and off-cycle credit programs: [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Request continuing AC and off-cycle credit eligibility for EVs that are part of mixed fleets [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Oppose phase-out of off-cycle credits and request the off-cycle credit cap be maintained at 15 g/mi [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support coordination and harmonization between EPA, NHTSA, and CARB. One fleet should meet all programs with a common goal. [EPA-HQ-OAR-2022-0829-0594, p. 9]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

We also support EPA's air conditioning credit programs and its proposal to sunset the off-cycle credits program for both LDVs and MDVs and suggest EPA consider whether shorter timeframes are appropriate. [EPA-HQ-OAR-2022-0829-0584, p. 9]

Organization: Porsche Cars North America (PCNA)

2. Porsche supports continued availability of flexibilities for electrified vehicles.

Porsche supports the continued allowance for electric vehicles to participate in the off-cycle and air conditioning related GHG flexibilities. Porsche does not support the proposal from EPA to remove both for electric vehicles beginning in model year 2027. Off-cycle technology and air conditioning credits have been a pragmatic and supportive pillar within the suite of flexibilities in EPA's GHG regulation for many years and Porsche believes that these flexibilities can continue to provide value within the overall construct of the GHG fleet regulation, even for fully electrified vehicles. [EPA-HQ-OAR-2022-0829-0637, pp. 19-20]

Electric vehicles operate as a supportive element within a manufacturers GHG fleet and should provide a compliance incentivize intended to increase production of EVs. Electric vehicles like any other vehicle should have the opportunity to leverage additional off-cycle or air conditioning technologies that further contribute to CO2 reduction goals and for those credits to be equally available for use within a manufacturers fleet. These types of credits act as an internal flexibility for the manufacturer to manage their overall annual compliance. [EPA-HQ-OAR-2022-0829-0637, p. 20]

Porsche recognizes that the current menu-based credit system may not be appropriate for electric vehicles. As such, Porsche thinks it would be reasonable for manufacturers to continue to be able to leverage the application type pathway to seek off-cycle credits for EVs on a case-by-case basis. Efforts could be made to establish a revised menu-based credit system in the future, like what was envisioned in the California Framework Agreement. [EPA-HQ-OAR-2022-0829-0637, pp. 20-21]

The GHG program leverages other broad assumptions that are equally applied to all vehicles that are also not representative of real-world usage. For example, many Porsche vehicles have very low annual vehicle miles traveled. As such, the assumed lifetime miles used within the GHG regulation to determine debits or credits (i.e., 195k for LDV and 225k for LDT) are nowhere near reflective of the miles that an average Porsche will likely ever see in its lifetime. A Porsche model type that underperforms relative to gram/mile CO2 footprint target would have to purchase credits in megatons that are likely far in excess of the actual potential overage of megatons emitted by the vehicle over its lifetime. [EPA-HQ-OAR-2022-0829-0637, pp. 20-21]

Nevertheless, these common accounting methods are embedded within the regulation to give consistent calculations for all OEMs. [EPA-HQ-OAR-2022-0829-0637, pp. 20-21]

Organization: Rivian Automotive, LLC

Phase Out the Off-Cycle Program Expeditiously

Rivian welcomes the proposal to phase out the off-cycle program but encourages EPA to end off-cycle crediting for all vehicles in MY27—both ICEs and BEVs. [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

We have submitted comments to previous rulemaking dockets expressing fundamental concerns with off- cycle credits and their effect on the environmental integrity of the GHG regulations. As ICCT has noted, one of the "most disconcerting findings" of its examination of off-cycle crediting is that the credited technologies "are still largely without validated real-world benefits."25 In fact, evidence suggests that not only are the real-world benefits of many off-cycle technologies less significant than claimed since the inception of the off-cycle program, but the provision has failed to ensure additionality, often creating windfalls by awarding credits to automakers for technologies that were already installed.26 Moreover, the off-cycle provisions do not account for technologies that could increase emissions in a manner not captured by test procedures, creating in essence an off-cycle debit. Consider remote-start technology that turns on a car engine before a driver arrives at the vehicle, often for the purpose of heating or cooling the cabin. The resulting emissions offset the benefits of an off-cycle technology like stop-start. For all these reasons, and with rapidly increasing electrification of the fleet largely obviating the need for an off-cycle program in the first place, Rivian believes that evidence supports an end to off-cycle crediting for all vehicles in MY27. We call on the agency to pursue and maintain parity between BEVs and ICEs in the elimination of all off-cycle credits. [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

25 Nic Lutsey and Aaron Isenstadt, The International Council on Clean Transportation, How Will Off-Cycle Credits Impact U.S. 2025 Efficiency Standards? (2018), available at https://theicct.org/sites/default/files/publications/Off- Cycle-Credits_ICCT-White-Paper_vF_20180327.pdf.

26 Dave Cooke, Union of Concerned Scientists, "EPA Can't Let 'Off-Cycle' Credits Become an Off-Ramp for Automakers," July 28, 2021, available at www.blog.ucsusa.org/dave-cooke/epa-cant-let-off-cycle-credits-become-an-off-ramp-for-automakers/.

However, if the agency elects to finalize a bifurcated approach and maintain the off-cycle provisions for ICEs only, at a minimum we urge EPA to accelerate the proposed phaseout by reducing the menu cap as suggested below. [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

MY: 2026; EPA's Proposed Menu Cap(g/mi): 10; EPA's Proposed Cap as Share of Overall GHG Standard: 5.4%; Rivian's Proposed Menu Cap (g/mi): 10; Rivian's Proposed Cap as Share of Overall GHG Standard: 5.4% [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

MY: 2027; EPA's Proposed Menu Cap(g/mi): 10; EPA's Proposed Cap as Share of Overall GHG Standard: 6.6%; Rivian's Proposed Menu Cap (g/mi): 8; Rivian's Proposed Cap as Share of Overall GHG Standard: 5.3% [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

MY: 2028; EPA's Proposed Menu Cap(g/mi): 8; EPA's Proposed Cap as Share of Overall GHG Standard: 6.1%; Rivian's Proposed Menu Cap (g/mi): 6; Rivian's Proposed Cap as Share of Overall GHG Standard: 4.6% [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

MY: 2029; EPA's Proposed Menu Cap(g/mi): 6; EPA's Proposed Cap as Share of Overall GHG Standard: 5.4%; Rivian's Proposed Menu Cap (g/mi): 3; Rivian's Proposed Cap as Share of Overall GHG Standard: 2.7% [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

MY: 2030; EPA's Proposed Menu Cap(g/mi): 3; EPA's Proposed Cap as Share of Overall GHG Standard: 2.9%; Rivian's Proposed Menu Cap (g/mi): 0; Rivian's Proposed Cap as Share of Overall GHG Standard: 0.0% [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

MY: 2031; EPA's Proposed Menu Cap(g/mi): 0; EPA's Proposed Cap as Share of Overall GHG Standard: 0.0%; Rivian's Proposed Menu Cap (g/mi): 0; Rivian's Proposed Cap as Share of Overall GHG Standard: 0.0% [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

Table 1. At a minimum, Rivian proposes decreasing the menu cap beginning in MY27 as opposed to MY28. [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

Under Rivian's alternative proposal, which begins decreasing the menu cap in MY27 as opposed to MY28, off-cycle credits—if claimed up to the menu cap—represent a declining share of total compliance toward the overall standard. In contrast, under EPA's proposal off-cycle credits would increase in their contribution to overall compliance, from 5.4 percent in MY26 to 6.6 percent in MY27. We believe that Rivian's proposal delivers more effectively on the intent of the agency to phase out off-cycle credits. [EPA-HQ-OAR-2022-0829-0653, pp. 8-9]

Organization: Southern Environmental Law Center (SELC)

EPA is proposing several modifications to other credit systems that are part of the tailpipe emissions standards in order to ensure these systems actually result in emissions reductions. We support EPA's proposal to eliminate the air conditioning (AC) system credits for AC refrigerant leakage control. Since the phase out of high global warming potential (GWP) refrigerants is required under other laws and regulations, manufacturers should not be rewarded under the tailpipe emissions standards for actions they are already required to take. Vehicles, however, will continue to use low GWP refrigerants, and EPA should implement a leakage design standard to protect against potential system leaks. We also support EPA's proposal to phase out off-cycle credits. It is often difficult to verify that off-cycle technologies provide the emissions reductions claimed, and this becomes more of a concern as vehicles become less polluting overall. [EPA-HQ-OAR-2022-0829-0591, p. 10]

EPA is also proposing to close loopholes that allow for emissions reductions provided by ZEVs to be claimed more than once. We support EPA's modification to the AC efficiency credit so that it applies only to internal combustion engine vehicles starting in model year 2027. This makes sense because AC efficiency credits are earned solely by improving internal combustion engine vehicles. Under the current tailpipe emissions standards, however, some manufacturers were reporting ZEV emissions of less than zero when implementing AC efficiency technology in those vehicles. For similar reasons, we also support EPA's proposal to modify the off-cycle credit system to only include eligible vehicles (i.e., internal combustion engine vehicles) in calculating the cap used for these types of credits until they are phased out. [EPA-HQ-OAR-2022-0829-0591, p. 10]

Organization: Stellantis

EPA's Discounting of Technology Benefits Increases Implicit GHG Stringency [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

EPA has proposed AC, off-cycle and PHEV technology actions that would increase the implicit GHG stringency, making it even more difficult to achieve the explicit aggressive GHG targets. These EPA proposed actions are summarized below: [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- Remove the Direct AC refrigerant and leak credit in a single model year (2027MY) [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- Impose an artificial phase down of off-cycle credits, disregarding the real-world benefits of GHG saving technology [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- Exclude PHEV technology from modeling and discount highly capable PHEV technology that would provide a bridge to a fully electrified future [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

These long-standing flexibilities have incentivized significant investment in GHG saving technology that now proliferates across the light-duty fleet. The Direct AC credit incentive has been a very successful program that industry has moved to implement at a very high rate. The investment and piece costs incurred to develop and introduce the lower Global Warming Potential (GWP) refrigerants and their systems are partially offset by the GHG credits received. In addition, the lower leak technologies and materials, now deployed across the ICE fleet, continue to achieve real-world GHG savings. This GHG benefit of low AC leak rates does not go away as we transition the fleet to higher rates of electrified product. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

Similarly, the ongoing and already incurred investment and costs of GHG saving off-cycle technologies in the fleet have led to real world benefits. These benefits also do not go away as the fleet adds more EVs and PHEVs. While there may be less available menu credits for EVs versus ICE products, this naturally achieves what the EPA is now proposing in this rule via a forced phase-down of the allowed credit cap. That is, the menu of available technologies will naturally decrease as fleet mix shifts to EVs. EPA's effort to drastically reduce the cap will immediately call into question the ongoing development and deployment of these GHG saving technologies. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

These combined actions significantly increase the stringency of the proposed rule by making the extremely aggressive fleet targets more difficult to achieve while at the same time incentivizing OEMs to remove this GHG saving technology from products. ICE vehicles and EVs both benefit from many of these technologies and therefore their GHG compliance and real-world benefits should not be removed. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- The Direct AC credit and off-cycle credit programs need to be retained for continued GHG benefits on both ICE and EV products. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

- The implicit stringency impact in the early years of this rulemaking is drastically increased by the additional burden experienced if the proposed flexibilities are removed. [EPA-HQ-OAR-2022-0829-0678, pp. 11-12]

Third, EPA should retain credit for off-cycle GHG technologies that will continue to reduce real-world GHG emissions on ICE and EV product without artificially ramping down credit prematurely. Similarly, EPA should retain today's PHEV Utility Factor to motivate sales of even more capable PHEVs. These technologies remain important in reducing the GHG emissions of a combined ICE/EV fleet, and the overall influence of the credit mechanisms in place to incentivize technology proliferation will scale down naturally as BEV technology proliferates. [EPA-HQ-OAR-2022-0829-0678, pp. 14-15]

In addition to these three pieces, and as a separate matter to setting feasible standards, EPA should consider implementing transparent and objective mechanisms that monitor key market enablers (infrastructure, battery costs, and raw material availability) and create adjustments if these essential enablers fall short of projections. These mechanisms are not a substitute for appropriately set targets, but rather a compliment to address uncertainties that are beyond the control of both industry and EPA. [EPA-HQ-OAR-2022-0829-0678, pp. 14-15]

Stellantis recommends that EPA should:

-Retain GHG saving technology flexibilities recognizing the GHG benefit that continues to be present on electric vehicles and that will naturally decrease as EV penetration increases [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Tesla, Inc.

Tesla supports the proposed Alternative 1 with added stringency so that the final performance standards achieves a fleet BEV penetration rate greater than 69% in MY 2032.2 Alternative 1 is estimated to provide greater CO2 emissions reduction of -51% from no action by 2050 compared to -46% under EPA's proposal, and the additional stringency will result in even greater emission reductions.3 Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

- Eliminate off-cycle crediting for all types of vehicles; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Revisit the plug-in hybrid electric vehicle (PHEV) utility factor to accurately reflect real world emissions; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Amend the proposal to create parity in promoting motor vehicle air conditioning (MVAC) efficiency adoption; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Maintain the existing zero emissions upstream approach for BEVs; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Eliminate credit multipliers for all vehicles; and [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Ensure BEVs continue to be accounted for, and participate in, the NMOG + NOx reduction standard. [EPA-HQ-OAR-2022-0829-0792, p. 2]

Accordingly, to meet strictures and pathway established under section 202, in addition to adopting Alternative 1 with increased stringency, Tesla also asserts that the following amendments to the proposal will result in a more "forward-looking" performance standard providing greater protection to the public health and welfare. [EPA-HQ-OAR-2022-0829-0792, p. 24]

A. EPA Should Fully Eliminate Off-Cycle Credits Staring in Model Year 2027

In the proposal, EPA takes steps to phasedown the amount of allowed off-cycle credits with a declining cap on such credits from MY 2027 through MY 2030, reducing the menu of eligible credits, eliminating the five-cycle pathway, and allowing only ICE vehicles to generate off-cycle credits.148 While sunsetting off-cycle credits is directionally positive, the agency should instead eliminate all off-cycle credit generation starting in MY 2027. [EPA-HQ-OAR-2022-0829-0792, p. 24]

148 Id., at 29248-929252.

While reduced, continuing off-cycle crediting creates asymmetry in the regulation favoring ICE vehicles, diverts research and development investment away from the best emissions reduction technology of electrification, and unnecessarily weakens the stringency of the standard. [EPA-HQ-OAR-2022-0829-0792, p. 24]

Ongoing utilization of off-cycle credit in only ICE and PHEV vehicles creates a disparity in the type of vehicles that are rewarded for deploying efficiency technology. Originally created in 2010, the off-cycle menu credits consisted almost entirely of technologies (i.e., Active Engine Warmup, Active Transmission Warmup, Engine Stop Start) applicable only for use on ICE vehicles. Subsequently, in its 2012 rules, EPA moved forward the timeline for generating these credits from a proposed MY 2017 to MY 2014. As a result, the off-cycle program has its origins in technologies now over thirteen years old. Despite being an antiquated part of the standard, EPA now proposes extending crediting rewards to manufacturers for deploying these technologies for what amounts to another eight model years. This means ongoing off-cycle credits will reduce the stringency of the proposed standard by rewarding many now commonly deployed efficiency technologies that provide, at best, negligible real-world emissions, or technology advancement benefits. [EPA-HQ-OAR-2022-0829-0792, p. 24]

Moreover, previous analysis has shown that manufacturers reliance on off-cycle credits diverts investment and deployment away from the most efficient vehicle technologies. Continuing these credit rewards old technology and, to the extent new technologies are deployed to generate off-cycle credits, focuses critical research and development budgets on tweaking legacy ICE and PHEV platforms rather than directing these budgets to full electrification and greater emissions reductions. In extending the off-cycle program and limiting it to ICE and PHEV vehicles, EPA's proposal half-heartedly confronts this built-in bias toward legacy technology. Especially at a time when manufacturers should be further developing next generation BEV technology and eliminating legacy technology, the agency should not maintain such perverse incentives and should eliminate all off-cycle crediting starting in MY 2027.149 [EPA-HQ-OAR-2022-0829-0792, p. 24]

149 See generally, Bloomberg Hyperdrive, Carmakers Start to Starve Combustion Models Out of Existence (July 11, 2022) available at h ttps://www.bloomberg.com/news/articles/2022-07-08/carmakers-start-to-starve-combustion-models-out-of-existence?cmpid=BBD070822_hyperdrive&utm_medium=email&utm_source=newsletter&utm_term=220708&utm_campa i gn=hyperdrive.

Organization: Toyota Motor North America, Inc.

7 Off-Cycle Technology Credits

From the start of the GHG program effective with 2012 model year vehicles, off-cycles credits35 have collectively motivated the introduction of technologies that would not been launched otherwise because they often provide no perceivable benefit for customers. However, these technologies net immediate real-world emissions reductions and should be viewed no differently than emissions reductions achieved over the Federal Test Procedure. Off-cycle credits encourage the continued use of these technologies with commensurate benefits to consumers, the environment and further innovation. [EPA-HQ-OAR-2022-0829-0620, pp. 45-46]

35 Which includes A/C refrigerant leakage credits and A/C efficiency credits for these comments.

Toyota has invested billions of dollars in off-cycle technologies which have saved over approximately 100 million tons of CO2 emissions from our products and avoided high GWP refrigerants from entering the environment. Off-cycle credits have become pivotal in Toyota's compliance planning and longer-term technology strategy affecting future products over the next several years that could potentially include PEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 45-46]

The proposal:

- Eliminates AC refrigerant credits as well as the 5-cycle and alternative credit methods [EPA-HQ-OAR-2022-0829-0620, pp. 45-46]

- Phases out the off-cycle credit menu, and [EPA-HQ-OAR-2022-0829-0620, pp. 45-46]

- Excludes BEV and the electric operation of PHEVs from the remaining available credits. [EPA-HQ-OAR-2022-0829-0620, pp. 45-46]

Toyota has invested in and will deploy technologies that have been approved under the 5-cycle and Alternative test methods. We request all previously approved credits be added to the off-cycle credit menu and the cap increased by the amount of those added credits. [EPA-HQ-OAR-2022-0829-0620, pp. 45-46]

Toyota also requests BEVs and PHEVs be fully eligible for the remainder of the off-cycle credit program. The efficiency of PEVs can be improved with off-cycle technologies. For example, solar panels and solar thermal control technologies conserve battery energy improving PEV driving range and reducing electricity consumption. Improved PEV HVAC system efficiency can produce similar benefits. In a March 2022 meeting with AAI that explored potential approaches for 2027 model year and later GHG standards, EPA mentioned the possibility of incentivizing increased PEV efficiency and range. Market factors alone will motivate improved efficiency and range over time, but off-cycle credits could help accelerate advancements as PEV technologies continue to evolve and mature. EPA and the auto industry could collaborate on appropriate credit values and how to avoid negative fleet emissions if PEV penetration eventually were to reach such a threshold market share. [EPA-HQ-OAR-2022-0829-0620, pp. 45-46]

Organization: Valero Energy Corporation

C. EPA should retain the off-cycle credits program for ICEV and should modify the program to recognize vehicle fuel-based carbon intensity reduction measures such as low-carbon fuels and fuel sequestration.

EPA requests comment on its proposal to phase out the off-cycle credits program that currently allows auto manufacturers to realize credit for CO2 reduction technologies for which the emission reduction benefits are not adequately reflected in the Federal Test Procedure and/or the Highway Fuel Economy Test.349 EPA acknowledges in the preamble that this program has been successful in encouraging a variety of technologies that otherwise would not have been implemented, such as engine start-stop, active aerodynamics, high efficiency alternators, and others. Nevertheless, and notwithstanding EPA's claims regarding the urgent need for GHG reduction measures, EPA now proposes to eliminate this option based on a self-fulfilling prophecy: Now that EPA is forcing manufacturers to abandon ICE technology, "EPA believes it is not likely that manufacturers would invest resources on off-cycle technology in the future for their ICE vehicle fleet that is likely to become a smaller part of their overall vehicle mix over the next several years… manufacturers would be recouping any investment in off-cycle technologies, with relatively small emission reductions, over a decreasing number of vehicles as ICE vehicle production declines."350 [EPA-HQ-OAR-2022-0829-0707, pp. 64-65]

349 40 CFR 86.1869-12.

350 Proposed Rule at 29250.

It is true that manufacturers will not use this option to reduce GHG emissions from ICE vehicles if EPA takes it away. This statement belies EPA's disclaimers in the introductory passages of the preamble denying that EPA seeks to force transition of the domestic fleet to EVs. If EPA is correct that OEMs will not invest in further innovation to improve GHG emission performance of ICE vehicles, then what harm is there in leaving this option available? The rationale that "off-cycle applications take time for us to review" is both weak and nonsensical – if OEMs in fact do not apply for off-cycle credits, then no EPA resources will be needed to review their applications. EPA's proposal to eliminate this option for EVs on the basis that the program was intended to encourage reductions in CO2 emissions for ICE that have tailpipe emissions makes sense. But the only logical reason for removing this option from the rule for the ICE vehicles for which it was intended – and for which it has been successful – is because EPA is afraid that OEMs will use this option to reduce their ICE vehicles' GHG emissions instead of discontinuing them in favor of EVs. [EPA-HQ-OAR-2022-0829-0707, pp. 64-65]

Therefore, to the extent the purpose of the proposed rules is to reduce GHG emissions from the transportation fleet, EPA should retain the off-cycle credits program, at least for the ICE vehicles for which this was intended. Moreover, EPA should consider expanding the program to provide for recognition of lifecycle emissions reductions based on use of fuel-related measures such as low-carbon renewable fuels and carbon sequestration. In much the same manner as EPA has suggested EV manufacturers could generate “e-RINS” on the basis of entering contractual agreements with biogas suppliers, EPA should consider expanding the off-cycle credit calculation methodology to allow OEMs to realize credits for GHG reductions on the basis of agreements with fuel producers to reduce the carbon intensity of fuels. Such a measure would be consistent with EPA’s GHG reduction goals as well as with Congressional mandates under the Renewable Fuel Standard and with Congressional support for carbon sequestration under the Bipartisan Infrastructure Law. [EPA-HQ-OAR-2022-0829-0707, pp. 64-65]

Organization: Volkswagen Group of America, Inc.

Off-Cycle Credit Program

EPA is proposing to sunset the off-cycle credit program fully by MY 2031. [EPA-HQ-OAR-2022-0829-0669, p. 5]

Volkswagen has invested in off-cycle technologies. The EPA had recognized the value of off-cycle technologies recently by increasing the cap from 10 g/mi to 15 g/mi. This NPRM now abruptly reverses this previous indication of the importance of developing innovative energy saving technologies. Volkswagen advocates for keeping the off- cycle credit program and its cap of 15 g/mi. If the EPA’s intent is to simplify the methodologies to approve new technologies, EPA should consider adding previously proven technologies to the off-cycle credit menu and adjusting the caps as appropriate for the additional technologies. [EPA-HQ-OAR-2022-0829-0669, p. 5]

Organization: Volvo Car Corporation (VCC)

VCC believes it is important to continue flexibilities (air conditioning credits for ZEVs and off- cycle credits for ICE vehicles) because low AC emissions and AC efficiency are environmental improvements. EPA should continue these programs and develop a new process so that pure ZEV companies receive these credits without resulting in an overall negative C02 result. [EPA-HQ-OAR-2022-0829-0624, p. 4]

Organization: Zero Emission Transportation Association (ZETA)

The following comments relate to the proposed changes to credit generation:

- ZETA supports the phaseout of off cycle credit generation by MY 2031. While a useful policy tool to promote marginal technological improvements to vehicle efficiency, the urgency in needing to reduce emissions from LMDVs warrants removing such programs that enable more tailpipe emissions. We believe the urgent need to reduce GHG emissions and prevent the worst effects of climate change warrants EPA accelerating the timeline to end offcycle credit generation by MY 2027. [EPA-HQ-OAR-2022-0829-0638, p. 29]

EPA Summary and Response

Off-cycle menu credits - general:

Summary:

The following organizations and companies recommend retaining existing off-cycle credits through at least MY 2030 or MY 2032, with some suggesting a phase-out starting in MY 2031 or MY 2033.

Alliance for Automotive Innovation (AAI), American Honda Motor Co., Inc (Honda), Dana Incorporated, DENSO Corporation, Ford Motor Company, Hyundai America Technical Center, Inc. (HATCI), Hyundai Motor America (HMA), International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW), Kia Corporation, MECA Clean Mobility, MEMA (The Vehicle Suppliers Associated), MEMA (The Vehicle Suppliers Associated), Mitsubishi Motors North America, Inc. (MMNA), Mitsubishi Motors North America, Inc. (MMNA), National Automobile Dealers Association (NADA), Nissan North America, Inc, Stellantis, Toyota Motor North America, Inc., Valero Energy Corporation, Volkswagen Group of America, Inc., and Volvo Car Corporation (VCC)

- **AAI**: AAI recommends that EPA maintain menu-based off-cycle credits and continue off-cycle credits for both ICE vehicles and BEVs. AAI suggested that off-cycle credits should not phaseout before MY 2032, at which time they project that at least 30% ICEVs will continue to be sold in the fleet.
- **BMW** proposes that rather than phase-out the off-cycle menu cap from 10 g/mile in MY 2027 to 0 g/mile in 2031, EPA should maintain a 10 g/mile cap which applies only to the ICE vehicle portion of the fleet (including PHEVs).
- **Dana** supports continuing an off-cycle technology credit program based on the success of this program in encouraging the adoption of new technologies.
- **DENSO** supports the continuation of the off-cycle technology credit program at its full value through at least MY 2032.
- **Ford**: Ford encourages EPA to consider continuing targeted off-cycle credits for both ICE and EV technologies. If EPA discontinues certain off-cycle credits, the agency should phase them out over time, much like the phase-out proposal for the menu- based credits.
- **HATCI:** recommends that the off-cycle cap should remain at its current level (15 g/mile) or should be phased out at a slower rate.

  HMA: HMA agrees that a phase- out will eventually be appropriate but urges the EPA to retain existing off-cycle credits through at least MY 2030. They would support a phasedown of off-cycle credits for both ICE and PEVs beginning at 80% in MY 2031 and 60% in MY 2032.
- **Honda**: Honda requests that the agency continue the existing off-cycle program at least throughout MY 2032 and additionally requests EPA provide sufficient transparency that its inclusion is not offset by a corresponding stringency increase.

- **UAW**: Any adjustments to the regulatory credit system should prioritize promoting advanced technology production domestically and recognizing the economic, social, and environmental benefits of a resilient domestic supply chain.
- **Kia**: Kia opposes EPA's proposal to phase out and eventually eliminate off-cycle technology credits by MY 2031. While Kia agrees that a phase-out of off-cycle credits will eventually be appropriate, they urge the EPA to retain existing off-cycle menu-based credits through at least 2032. Kia made investments in these technologies and would appreciate the opportunity to earn a return on investment (ROI). EPA's proposed immediate phase down in MY2027 will hurt their ROI, stranding investments and potentially foregoing potential emissions benefits. Kia recommends off-cycle credits be continued and any eventual phasedown should be much slower than proposed.
- **MECA**: Off-cycle credits provide real-world emission benefits and should continue to be offered.
- **MEMA**: MEMA recommends EPA maintain off-cycle credits at full value through 2032 for all vehicle types, including ZEV, and consider additional ways emerging technologies that reduce ZEV energy consumption can be rewarded.
- **MMNA**: Maintain the existing GHG program flexibilities, such as Off-Cycle technologies credits (including the alternative method to apply off-cycle credits) and allow previously approved technologies to continue receiving credits.
- **NADA**: NADA opposes EPA's proposals to sunset the off-cycle credits program
- **Nissan**: Nissan opposes phase-out of off-cycle credits and requests the off-cycle credit cap be maintained at 15 g/mile.
- **Stellantis**: Stellantis recommends that EPA retain the credit for off-cycle GHG technologies that will continue to reduce real-world GHG emissions on ICE and EV product without artificially ramping down credit prematurely. The ongoing and already incurred investment and costs of GHG saving off-cycle technologies in the fleet have led to real world benefits.
- **Toyota**: Off-cycle credits encourage the continued use of these technologies with commensurate benefits to consumers, the environment and further innovation. Toyota has invested billions of dollars in off-cycle technologies which have saved over approximately 100 million tons of CO_2 emissions from our products.
- **Valero**: Valero recommends that EPA retain the off-cycle credits program, at least for the ICE vehicles for which this was intended. Moreover, EPA should consider expanding the program to provide for recognition of lifecycle emissions reductions based on use of fuel-related measures such as low-carbon renewable fuels and carbon sequestration.
- **Volkswagen:** Volkswagen has invested in off-cycle technologies, and advocates for keeping the off- cycle credit program and its cap of 15 g/mile. If the EPA's intent is to simplify the methodologies to approve new technologies, EPA should consider adding previously proven technologies to the off-cycle credit menu and adjusting the caps as appropriate for the additional technologies.

- **VCC:** VCC believes it is important to continue flexibilities (air conditioning credits for ZEVs and off- cycle credits for ICE vehicles) because low AC emissions and AC efficiency are environmental improvements.

The following organizations and companies support removing off-cycle credits on an accelerated timeline ending with 0 g/mile prior to MY 2031, with some organizations and companies recommending an earlier phase-out of off-cycle credits.

California Air Resources Board (CARB), California Attorney General's Office, et al., Environmental. and Public Health Organizations, International Council on Clean Transportation (ICCT), Lucid Group, Inc., Minnesota Pollution Control Agency (MPCA), National Association of Clean Air Agencies (NACAA), Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC), Rivian Automotive, LLC, Southern Environmental Law Center (SELC), Tesla, Inc., and Zero Emission Transportation Association (ZETA)

- **CARB** supports U.S. EPA's proposal to phase out the off-cycle program. New vehicles have lower GHG emissions and have incorporated technologies that target similar areas of emission reductions thereby reducing the opportunities for some of the off-cycle technologies, and therefore credit levels are becoming increasingly less representative of the actual emission reductions provided by the off-cycle technologies.

  CARB additionally submitted evidence the credit levels are less representative of the emission reductions provided by off-cycle technologies. Specifically, CARB assessed vehicles equipped with idle start-stop, finding that the total percentage of idle time with the engine off was 9.38 percent, which was significantly lower than the value used under the original assumptions of the TSD (87.75 percent).

- **California Attorney General's Office, et al.**: The States and Cities support EPA's Proposal to phase out off-cycle credits.

- **Environmental. and Public Health Organizations** strongly urge EPA not to renew any part of the off-cycle credit program after MY 2026. They state that the program will cause significant fleet emissions increases even though it no longer achieves any of its purposes. There is no reasonable basis for carrying any part of the program forward beyond 2026, and doing so would be arbitrary and capricious.

- **ICCT**: ICCT strongly supports EPA's proposal to phase out off-cycle credits given to automakers for technologies that are not captured in the test cycle and that previously were considered novel but now are fully commercialized. In particular, ICCT supports EPA's proposal to phaseout off-cycle credits by MY 2031. Evidence suggests that the menu credit values of these technologies (such as solar and thermal load control) overestimate the real-world impact of these technologies.

- **Lucid** urges the agency to eliminate the off-cycle program as proposed, or on an accelerated timeline ending with 0g/mile prior to MY 2031, and to eliminate the 5-cycle and public process pathways starting in MY 2027.

- **MPCA:** The MPCA agrees with EPA's proposal to phase out off-cycle credits. While useful to encourage manufacturers to invest in improved technology in earlier phases of

EPA's greenhouse gas vehicle emissions standards, they no longer provide substantive benefit, and it is appropriate to sunset these programs.

- **NACAA:** NACAA supports the agency's proposal to phase out, between 2027 and 2030, the off-cycle credit program for LDVs and MDVs.
- **NESCAUM:** supports EPA's proposal to sunset the off-cycle credits program for both LDVs and MDVs and suggest EPA consider whether shorter timeframes are appropriate.
- **Rivian** welcomes the proposal to phase out the off-cycle program but encourages EPA to end off-cycle crediting for all vehicles in MY 2027—both ICEs and BEVs. Rivian believes that evidence supports an end to off-cycle crediting for all vehicles in MY 2027. Further, Rivian encourages the agency to pursue and maintain parity between BEVs and ICEs in the elimination of all off-cycle credits.
- **SELC**: supports EPA's proposal to phase out off-cycle credits. It is often difficult to verify that off-cycle technologies provide the emissions reductions claimed, and this becomes more of a concern as vehicles become less polluting overall.
- **Tesla**: Tesla recommends eliminating off-cycle crediting for all types of vehicles starting in Model Year 2027.
- **ZETA**: ZETA supports the phaseout of off cycle credit generation by MY 2031. While a useful policy tool to promote marginal technological improvements to vehicle efficiency, the urgency in needing to reduce emissions from LMDVs warrants removing such programs that enable more tailpipe emissions.

Response:

EPA has considered the wide range of comments on off-cycle credits. After further considering the off-cycle credits program in the context of our final light-duty GHG standards, EPA agrees with the auto industry commenters who raised the concern that the proposed phase-down of the off-cycle credits would contribute to a challenging transition in meeting the standards especially in the early years of the program. We also understand the auto manufacturers points that they have invested in off-cycle technologies and these credits represent an additional option to reduce CO2 emissions under the standards for the early years of the program.

At the same time, EPA also agrees with commenters who raised concerns that the off-cycle credit values may be too generous, especially for vehicles in the MY 2032 and later time frame when the standards are the lowest CO_2 grams per mile level. In recognition of both of these concerns, EPA is finalizing an extension of the phase-out of the off-cycle credits menu cap, as follows (and further described in preamble Section III.C.6). EPA is finalizing a phase-out of menu credits over the MY 2030-2033 timeframe as a reasonable way to bring the program to an end. After considering the public comments, EPA is extending the phase-out of off-cycle menu credits, compared to our proposal, to provide a longer transition period. EPA believes the slower phase-out schedule will provide additional pathways for reducing CO_2 emissions for manufacturers who have made substantial use off cycle credits in their product planning. The extended phase-out schedule also will address lead time in the early years of the program. We believe this phase-out schedule is an appropriate way to address concerns that the off-cycle credits may not be reflective of the real-world emissions impact of the off-cycle technologies, by scaling back the menu cap in MYs 2031-2032, and eliminating off-cycle credits altogether in MY 2033 and beyond. Specifically, instead of the proposed menu cap phase-out of 10/8/6/3/0 g/mile in MYs 2027-2031, EPA is finalizing provisions that retain the 10 g/mile menu cap through MY 2030, with a phase-out of 8/6/0 g/mile in MYs 2031-2033. The final phase-out of the menu cap is shown in the following Table:

Off-cycle menu credit cap phase down, final program, expressed in CO_2 g/mile

MY	Off-cycle Menu Credit Cap
2027	10.0
2028	10.0
2029	10.0
2030	10.0
2031	8.0
2032	6.0
2033 and later	0.0

5-cycle and public process pathway off-cycle credits:

<u>Summary:</u>

The following organizations and companies recommend retaining the existing 5-cycle and public process pathway methodologies:

Alliance for Automotive Innovation (AAI), BMW of North America, LLC (BMW NA), DENSO, Hyundai America Technical Center, Inc. (HATCI), Hyundai Motor America (HMG), Kia, MECA Clean Mobility, Mitsubishi Motors North America, Inc. (MMNA), and Toyota.

- **AAI**: AAI recommends that EPA retain the 5-cycle method for the same period of time as the menu-based credits. For vehicles that have 5-cycle and alternative method off-cycle credits approved prior to MY 2027 that remain in production in MY 2027 and later, Auto Innovators recommends that off-cycle credit continue to be granted (i.e., carry-over). If this is EPA's intent (or final decision), clarifying text should be added to the regulation. Alternatively, EPA should consider adding previously approved technologies to the off-cycle credit menu and adjusting the caps as appropriate for the additional technologies. Furthermore, AAI recommends that EPA should follow through under the current regulation and complete action on all submitted applications for alternative method credits.

- **BMW** suggests that EPA continue to allow credits for those vehicles with alternative pathway credits approved prior to MY 2027.

- **DENSO** urges EPA to follow through to complete action on all submitted applications for 5-cycle and alternative pathway applications. Denso also suggests that EPA consider adding previously approved technologies to the off- cycle credit menu and adjusting the caps as appropriate for the additional technologies.

- **HATCI**: HATCI opposes the proposal to eliminate the 5-cycle and the alternative credit pathways by MY 2027 and believes the non-menu pathways offer valuable GHG reductions. Without the credit incentives for innovative GHG technologies, manufacturers may be less inclined to develop and invest in off-cycle credits (OCC) technologies, leading to increased ICE emissions, particularly in the early stages of consumer ZEV adoption when ICE vehicles are still dominant.

If EPA decides to eliminate the 5-cycle and alternative credit pathways, HATCI suggests all credits approved through these pathways prior to the start of the new rule be transferred to the menu from MY 2027 and the menu cap be adjusted accordingly. Furthermore, EPA should review and approve/reject all pending alternative pathway applications by June 1, 2025, and from MY 2027 move those technologies and the corresponding credit values to the menu.

- **Kia**: Kia recommends that EPA keep the 5-cycle and alternative method process off-cycle pathways through MY 2032. If EPA does eliminate the 5-cycle and alternative method process off-cycle pathways starting in MY 2027, they further recommend that EPA (a) follow through under the current regulation and complete action on all submitted applications, no later than June 1, 2025, (b) add technologies approved through the 5-cycle and alternative off-cycle pathways to the off-cycle credit menu, and (c) if an automaker has off-cycle credits approved through the alternative or 5-cycle method prior to MY 2027 and that vehicle remains in production after MY 2027, the credit continues to be granted.

- **MECA**: MECA understands EPA's rationale in its decision to simplify and eliminate the off-cycle credit process by removing the 5-cycle pathway and phasing out the credits, but requests that the agency retain the five-cycle pathway.

- **MMNA**: Maintain the existing GHG program flexibilities, such as Off-Cycle technologies credits (including the alternative method to apply off-cycle credits).

- **Toyota**: Toyota recommends that all previously approved 5-cycle and alternative method credits be added to the menu, and that the cap be increased.

The following organizations and companies recommend eliminating the existing 5-cycle and public process pathways starting in MY 2027.:

California Air Resources Board (CARB) and Environmental. and Public Health Organizations.

- **CARB**: CARB supports U.S. EPA's proposal to eliminate the 5-cycle and public process pathways for OEMs to obtain off-cycle credits starting in the 2027 MY.

- **Environmental. and Public Health Organizations**: EPA points out that since 2021, the 5-cycle process has led to no new credits, and only one manufacturer has used it since 2012. As to the notice-and-comment pathway, EPA states that it has resulted in the award of only a few small credits since 2021. We agree that these programs should not be renewed.

Response

EPA disagrees with commenters who suggested that we should retain the additional two pathways to generate off-cycle credits (i.e., the 5-cycle and public process pathways). In EPA's experience in implementing the off-cycle credits program, there have been few 5-cycle credit demonstrations, and the public process pathway has been challenging due to the complexity of demonstrating real-world emissions reductions for technologies not listed on the menu. The public process pathway was used successfully by several manufacturers for high efficiency alternators, resulting in EPA adding this technology to the off-cycle menu in a prior rulemaking, beginning in MY 2021. The public process pathway program has resulted in a number of concepts for potential off-cycle technologies over the years, but few have been implemented, at least partly due to the difficulty in demonstrating the quantifiable real-world emissions reductions associated with using the technology. Many credits sought by manufacturers have been relatively small (less than 1 g/mile). Manufacturers have commented that the process takes too long, but the length of time is often associated with the need for additional data and information or issues regarding whether a technology is eligible for credits. Therefore, EPA is finalizing its proposal to eliminate the 5-cycle and the public process pathways for off-cycle credits beginning in MY 2027.

With regard to comments that EPA should add to the off-cycle credits menu all previously approved 5-cycle and public process pathway credits with an associated increase in the cap, EPA disagrees. Likewise, EPA disagrees that further action on other submitted applications is warranted. The few credits that have been approved under the 5-cycle and public process pathways have been specific to individual vehicle models and EPA does not have sufficient data on the real-world emissions impact of these technologies across a wide range of vehicle segments which would be necessary to assess an appropriate menu credit for these technologies. Further, EPA notes that commenters did not provide such data.

Applicability to BEV and PHEVs:

Summary:

The following companies and organizations recommend the full availability of off-cycle credits be retained for BEVs and/or PHEVs:

Alliance for Automotive Innovation (AAI), Betsy Cooper, Dana Incorporated, DENSO, Ford, Hyundai America Technical Center, Inc. (HATCI), MEMA (The Vehicle Suppliers Associated), Porsche Cars North America (PCNA), Stellantis, and Toyota.

- **AAI**: Auto Innovators opposes EPA’s proposal to limit off-cycle credits to only ICE-equipped vehicles and believes that off-cycle credits should not be adjusted for PHEVs to address electric vs. ICE operation. For BEVs, AAI further recommends that negative emissions of individual BEV electric vehicle should be handled at the fleet average level rather than the individual model. For PHEVs, AAI questions whether making adjustments in emissions using the vehicle’s utility factor is worth the complexity added for regulated stakeholders, EPA compliance staff, and EPA staff preparing public reports to describe the use of such provisions.

  AAI also notes that the proposed regulatory text does not properly describe the procedure for applying the adjustment for PHEVs.

- **Betsy Cooper**: The EPA should give full off-cycle credit to PHEVs with adequate range, particularly to incentivize car manufacturers to develop longer range PHEVs.

- **Dana** recommends EPA continue to offer off-cycle credits for BEVS, PHEVS, FEVs, and other ZEVs. Such off-cycle technologies could help reduce battery use and therefore lower the amount of electricity used to power ZEVs.

- **DENSO** requests EPA to reconsider its proposal to eliminate off- cycle credits for electrified vehicles. Off-cycle credits for technologies applied across all powertrain types encourage their continued use with commensurate benefits to consumers and the environment.

- **Ford**: Ford encourages EPA to consider continuing targeted off- cycle credits for both ICE and EV technologies.

- **HATCI:** HATCI recommends that ZEVs remain a part of the OCC program. Although ZEVs have no tailpipe emissions, if an off cycle technology improves electrical energy efficiency of the EV, that technology is providing a reduction in overall emissions.

- **HMA**: Retaining existing off-cycle credits for BEVs through MY 2030 allows time for industry to make gains in BEV technology, such as efficiency and price. In this way, off-cycle credit opportunities will serve as a bridge to support compliance during this time.

- **MEMA**: MEMA recommends EPA maintain off-cycle credits at full value through 2032 for all vehicle types, including ZEV, and consider additional ways emerging technologies that reduce ZEV energy consumption can be rewarded.

- **PCNA**: Porsche supports the continued allowance for electric vehicles to participate in the off-cycle program and does not support the proposal from EPA to remove electric vehicles beginning in model year 2027. Porsche recognizes that the current menu-based credit system may not be appropriate for electric vehicles. As such, Porsche thinks it would be reasonable for manufacturers to continue to be able to leverage the application type pathway to seek off-cycle credits for EVs on a case-by-case basis.

- **Stellantis**: EPA should retain credit for off-cycle GHG technologies that will continue to reduce real-world GHG emissions on both ICE and EV products.

- **Toyota**: Toyota recommends that BEVs and PHEVs be eligible for the off-cycle program, as the efficiency of these vehicles can be improved through off-cycle technologies (e.g. solar panels and solar thermal control technologies that improve efficiency and range).

The following companies and organizations recommend eliminating off-cycle credits for BEVs and/or and PHEVs:

California Air Resources Board (CARB), Consumer Reports (CR), International Council on Clean Transportation (ICCT), Rivian, Southern Environmental Law Center (SELC), and Tesla.

- **CARB**: CARB believes scaling the off-cycle credit cap for PHEVs by the vehicle’s assigned utility factor is an appropriate approach.

- **CR** supports EPA eliminating credits for EVs that could allow vehicles to achieve compliance values below 0 g/mile, as they are not appropriate.

- **Environmental. and Public Health Organizations** concur with EPA’s determination that off-cycle credits are inappropriate for BEVs for each of the reasons EPA states. They also concur with EPA that providing off-cycle credits for PHEVs exceeding their utility factor is inappropriate.

- **ICCT:** ICCT supports EPA's proposal to limit off-cycle credits to ICE vehicles. Off-cycle credits are based on reduced tailpipe emissions from ICE vehicles, they are not applicable to BEVs. Relatedly, ICCT supports the proposal to scale PHEV OC credits by the (newly proposed) utility factor.
- **Rivian** recommends EPA maintain parity between BEVs and ICEs in the elimination of all off-cycle credits.
- **Southern Environmental Law Center (SELC)**: SELC supports EPA's proposal to modify the off-cycle credit system to only include eligible vehicles (i.e., internal combustion engine vehicles) in calculating the cap used for these types of credits until they are phased out.
- **Tesla**: Eliminate off-cycle crediting for all types of vehicles starting in MY 2027.

Response

EPA agrees with commenters who suggested that off-cycle credits should not apply to BEVs. EPA is finalizing its proposal to limit eligibility of off-cycle credits to vehicles equipped with an IC engine beginning in MY 2027; thus, BEVs will no longer be eligible for off-cycle credits beginning in MY 2027. In response to automaker and automotive supplier comments that off-cycle credits should continue to apply to BEVs, EPA disagrees. The off-cycle menu credits were established based on potential emissions reductions from ICE vehicles and are not representative of emissions reductions from BEVs. Further, EPA notes that it is concluding in this rule that it is appropriate and consistent with the CAA to determine compliance with emissions standards adopted under section 202 by reference to emissions from vehicles and engines. For these reasons, we are also finalizing our proposal that manufacturers use a zero g/mile tailpipe emissions compliance value for BEVs, as discussed in preamble Section III.C.7 and Section 3.1.5 of this RTC. Since off-cycle credits for BEVs do not reflect reductions in emissions from the vehicles, we believe it is appropriate to end off-cycle credits for BEVs beginning in MYs 2027.

With regard to comments regarding the application of off-cycle credits to PHEVs, EPA is, for similar reasons, finalizing its proposal to restrict the applicability of off-cycle credits for PHEVs to the portion of vehicle operation when the engine is running, based on the vehicle's utility factor. This calculation adjustment is appropriate to associate off-cycle credits only with ICE operation beginning in MY 2027. See preamble Section III.C.6. The final rule includes a corrected approach for applying the adjustment for PHEVs. Rather than applying the adjustment to the maximum credit value that applies for a manufacturer's fleet, the final rule includes a per-vehicle adjustment to reduce off-cycle credit quantities based on a PHEV's utility factor.

In addition, one commenter (Betsy Cooper) suggested that PHEVs should have a 50+ mile PHEV range to qualify for full off-cycle credit. In response, EPA does not specify a PHEV range requirement to qualify for any applicable off-cycle credits. Off-cycle credits for PHEVs would be calculated as described in the paragraph above. However, we note that our finalized PHEV utility factor curve (Section III.C.8 of the preamble) provides a natural incentive for more capable PHEVs, with continuously higher utility factor values for vehicles with greater range, which reflects that such vehicles can be expected to be driven greater distances in charge depleting mode.

Comments on regulatory text:

Summary:

Alliance for Automotive Innovation (AAI) made the following comments:

We oppose EPA's proposal to exclude ZEVs from off-cycle credits. However, if EPA decides to finalize that proposal, we note that EPA has not proposed regulatory text that would exclude zero-emission vehicles in MYs 2027 and later from the assessment of whether a credit cap has been exceeded as described in the preamble.

Also, the proposed paragraphs (b)(2)(iii) and (b)(2)(iv) discuss comparing a calculated value from (b)(2)(ii) to a given value in (b)(2)(v). However, the value derived in (b)(2)(ii) is in megagrams, and the values in (b)(2)(v) are in grams per mile. We would agree that a conversion can be calculated, but the text should be modified such that any comparison is made in consistent units without the need to rely on otherwise undefined calculations.

Response

In response to the comment that EPA did not propose regulatory text to exclude zero emission vehicles in MY 2027 and later, EPA notes that the proposed rule at 40 CFR 86.1869-12 included the following statement in the introductory text: "Manufacturers may no longer generate credits under this section starting in model year 2027 for vehicles deemed to have zero tailpipe emissions and in model year 2031 for all other vehicles." For the final rule, we are delaying the final implementation date from 2031 to 2033, and thus have updated this regulatory text, but we are finalizing as proposed the phase-out of off-cycle credits for electric vehicles in MY 2027.

In response to AAI's comment on the regulatory text, 40 CFR 86.1869-12(b)(2)(iii) and (iv) give an instruction to compare g/mile values between paragraphs (b)(2)(i) and (v), without reference to the megagram value in (b)(2)(ii). The instruction further explains that the megagram cap in (b)(2)(ii) applies if the calculated g/mile fleet value exceeds the maximum allowable credit value in g/mile. There is no conversion.

3.1.5 - 0 g/mi tailpipe emissions for ZEVs

Comments by Organizations

Organization: Alliance for Automotive Innovation

F. Treatment of PEVs and FCEVs in the GHG Fleet Average

1. ZEV Emissions

The Proposed Rule continues EPA's practice of assigning a compliance value of zero grams per mile of carbon-related exhaust emissions for BEVs and fuel cell electric vehicles, as well for the electric portion of PHEVs, and makes this approach—which was originally scheduled to expire in MY 2026—permanent.224 Auto Innovators reaffirms its support for basing compliance only on tailpipe emissions, rather than considering upstream emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 123-124]

224 See NPRM at 29252.

This approach is required by statute. Section 202(a) authorizes EPA to regulate the "emission of any air pollutant from any class or classes of new motor vehicles."225 By definition, "upstream emissions" from electricity-generating units do not originate "from" a class of vehicles. Such upstream air pollutants thus cannot be included in emission standards. Nor does section 202 permit EPA to impose any regulations on upstream emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 123-124]

225 42 U.S.C. §7521(a).

The recognition of zero tailpipe emissions from operation on electricity is also consistent with the treatment of vehicle operation on all other fuels—emissions are measured at the tailpipe no mater what fuel the vehicle is operating on, and upstream emissions are addressed at their upstream sources. EPA has been regulating motor-vehicle emissions under section 202(a) since 1975, and in that time, has never included in its compliance standards any emissions occurring during the production or transport of liquid fuels. Electricity should be treated no differently than gasoline, ethanol, natural gas, or other fuels used in motor vehicles. We continue to support EPA's approach in this regard. [EPA-HQ-OAR-2022-0829-0701, pp. 123-124]

To be clear, the fact that EPA cannot—and should not—include upstream emissions in its vehicle compliance calculations does not mean that the Agency cannot or should not consider upstream emissions when evaluating the costs and benefits of the Proposed Rule more generally. Indeed, consideration of upstream emissions and power generation effects is a crucial part of determining whether the Proposed Rule is technologically feasible, reasonable, and supported by the record evidence. As an "important aspect[s] of the problem,"226 EPA must consider these issues to ensure that any final rule does not run afoul of the reasoned decision- making standard. And indeed, EPA itself recognizes that it is appropriate to consider upstream emissions impacts as a general mater.227 It is also common practice as a general mater for EPA to consider the effects of a regulatory action even for topics that EPA cannot regulate via the proposed action.228 The situation is no different here. [EPA-HQ-OAR-2022-0829-0701, pp. 123-124]

226 Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983).

227 See, e.g., NPRM at 29252, 29298, 29303-07, 29353-58, 29379-82.

228 As just one example, EPA regularly considers air quality-related impacts of its Steam Electric Power Generating Effluent Guidelines issued under the Clean Water Act, even though EPA cannot directly regulate air quality under that program. See, e.g., Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 88 Fed. Reg. 18824, 18874-76 (Mar. 29, 2023).

Organization: Alliance for Vehicle Efficiency (AVE)

AVE requests that EPA account for upstream emissions for all technologies. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

AVE urges EPA to include upstream emissions in ZEV calculations. The decision to omit this from compliance calculations contradicts earlier assertions by the Agency and undermines efforts by the automotive sector to plan appropriately. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

In 2010, EPA saw the need to limit the zero grams/mile accounting for BEVs. The Agency not only foresaw the need to limit doing so in the future, but also capped the number of vehicles for which each manufacturer could obtain a 0/grams/mile credit.11 EPA also noted that although regulatory programs existed to account for upstream emissions with the production and distribution of fuels, [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

11 Federal Register / Vol. 75, No. 88 / Friday, May 7, 2010 / at 25341

"[a]t this time, however, there is no such comprehensive program addressing upstream emissions of GHGs, and the upstream GHG emissions associated with production and distribution of electricity are higher than the corresponding upstream GHG emissions of gasoline or other petroleum based fuels."12 [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

12 Ibid.

EPA went on to promise that "EPA will reassess the issue of how to address EVs, PHEVs, and fuel cell electric vehicles (FCVs) in rulemakings for model years 2017 and beyond, based on the status of advanced vehicle technology commercialization, the status of upstream GHG control programs, and other relevant factors."13 [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

13 Ibid.

In 2012, EPA reasserted a compliance value of 0 g/mile designation for EVs, FCVs, PHEVs and extended the sales caps on manufacturers. Similarly, in 2010, EPA again saw the need to address upstream emissions in the future for all these vehicles, but only for the sales that exceeded the maximum sales caps. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

"Starting with MY 2022, the compliance value for EVs, FCVs, and the electric portion of PHEVs in excess of individual automaker cumulative production caps must be based on net upstream accounting.14 [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

14 Federal Register / Vol. 77, No. 199 / Monday, October 15, 2012 / at 62651

Despite acknowledging the need to account for the upstream emissions, EPA has never incorporated upstream emissions from electricity generation as a compliance factor for these vehicles. Now, with little explanation, EPA is proposing to ignore upstream emissions for BEVs in perpetuity. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

"EPA is also proposing that the requirement for upstream emissions accounting for BEVs and PHEVs as part of a manufacturer's compliance calculation, which under the current regulations would begin in MY 2027, would be removed under the proposed program; thus, BEVs would continue to be counted as zero grams/mile in a manufacturer's compliance calculation as has been the case since the beginning of the light-duty GHG program in MY 2012."15 [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

15 Federal Register / Vol. 88, No. 87 / Friday, May 5, 2023 / at 29197

Congress has repeatedly seen the need to employ lifecycle assessments for future compliance standards and has asked EPA to look beyond a vehicle's tailpipe when analyzing GHG emissions. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

"Vehicle Emissions Lifecycle Analysis. -- The Committee encourages the Agency to build upon its efforts to develop standardized modeling to evaluate the full lifecycle of all vehicle technologies and transportation fuels by integrating full lifecycle analysis accounting into new vehicle standards aimed at reducing greenhouse gas emissions. The Agency is also encouraged to coordinate with other federal agencies that are conducting similar lifecycle models for vehicles to best understand the full impact of standards seeking to reduce greenhouse gas emissions." 16 [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

16 H. Rept. 117-400 - Department Of The Interior, Environment, & Related Agencies Appropriations Bill, 2023 at P.86

Continuing to focus solely on tailpipe emissions for future standards also disregards President Biden's January 25, 2021, Executive Order, in which he stressed the need for environmental standards to account for all GHG. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

"Sec. 5. Accounting for the Benefits of Reducing Climate Pollution. (a) It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account. Doing so facilitates sound decision- making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues." 17 [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

17 7040 Federal Register / Vol. 86, No. 14 / Monday, January 25, 2021 / Presidential Documents

Accounting for upstream emissions is consistent with our environmental goals, technology neutrality, and global carbon neutrality goals. More importantly, by including upstream emissions for compliance purposes, EPA will avoid unintentionally promoting inefficiencies with ZEVs. Counting upstream emissions will promote cleaner and more efficient components for all vehicle technologies. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

ZEVs will continue to require efficiency improvements away from the tailpipe that reduce CO2 production and energy intensity. If BEVs do indeed become the predominant vehicle technology on U.S. roads, even small efficiency gains could have a large impact. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

We support a transition from a tailpipe-based standard to a more complete life-cycle assessment. This approach is consistent with technology neutrality and will allow the U.S. to truly reach its environmental goals by promoting cleaner and more efficient technologies. [EPA-HQ-OAR-2022-0829-0631, pp. 4-6]

AVE requests that EPA finalize a rule that is genuinely technology neutral. [EPA-HQ-OAR-2022-0829-0631, p. 6]

The Proposal sets out to incentivize specific technologies, including BEVs and FCVs. AVE supports the development of these important technologies and all relevant technologies to address the urgent need to decarbonize the transportation sector. An incentive for one technology can disincentivize other technologies and stifle innovation. [EPA-HQ-OAR-2022-0829-0631, p. 6]

An example of the unintended consequences of earlier incentives is that they led to the upsizing of the U.S. fleet and saw the manufacturing of vehicles with larger footprints. Prior to 2010, passenger car sales were above or close to 50% of all vehicle sales. Today, passenger cars are less than 25% of all new sales. Clearly, this was not the intent of EPA and NHTSA when they set standards in 2012. [EPA-HQ-OAR-2022-0829-0631, p. 6]

The environmental group American Council for an Energy-Efficient Economy recently echoed this obvious concern: [EPA-HQ-OAR-2022-0829-0631, p. 6]

The Environmental Protection Agency should explore ways to factor EV efficiency into fuel-efficiency and greenhouse gas standards, starting with accounting for EVs' upstream emissions. At the moment, regulators calculate the emissions from gasoline vehicles and set requirements for automakers, but EVs are counted as causing no CO2 emissions. This means the sale of an EV Hummer can offset the sale of a highly polluting gasoline vehicle and increase emissions overall. Accounting for upstream emissions would mean that the sale of a more efficient EV would be more advantageous for automakers to meet their regulatory requirements. All EVs do not have the same impact on the environment, and our vehicle regulations should reflect that.18 [EPA-HQ-OAR-2022-0829-0631, p. 6]

18 https://www.aceee.org/blog-post/2022/06/9000-pound-electric-hummer-shows-we-cant-ignore-efficiency-evs

Instead of crediting specific technologies, EPA should create a credit program that promotes cleaner and more efficient vehicles and the development of components that can reduce CO2 emissions in all vehicles. Such a strategy will encourage technology investments in ALL vehicle platforms that significantly reduce CO2. [EPA-HQ-OAR-2022-0829-0631, p. 6]

Suppliers have invested heavily in developing technologies that will significantly improve efficiency and lower the emissions of LD and MD vehicles; gasoline direct injection, cylinder deactivation, and advanced turbo charging are just a few of the technologies that can greatly reduce the emissions footprint of the U.S. fleet. [EPA-HQ-OAR-2022-0829-0631, p. 6]

These options, along with other technologies like mild hybrid systems, advanced aftertreatment, and emission control systems, could bring further significant improvements to internal combustion engines (ICE) vehicles if GHG regulations were more results driven. Without support for engine improvements, manufacturers are less likely to deploy these technologies in future ICE offerings. As a result, we will miss the opportunity to make sizable CO2 and criteria pollutant reductions today. [EPA-HQ-OAR-2022-0829-0631, p. 6]

Compliance pathways that incentivize increased use of renewable fuels, advanced emission control technologies, and new internal combustion platforms will lead to greater adoption of cost-effective technologies that are available today, not eight to ten-years from now. [EPA-HQ-OAR-2022-0829-0631, p. 6]

Organization: American Coalition for Ethanol (ACE)

What's more, EPA lacks the authority to ignore upstream emissions for BEVs. The Agency has authority under 42 U.S.C. § 7521(a)(1) to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in its judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” If BEVs are not “vehicles” “which cause, or contribute to, air pollution,” then EPA may not set standards for them. If BEVs are “vehicles” “which cause, or contribute to, air pollution,” then EPA must account for those emissions, which in the case of BEVs come from upstream electricity generating units. [EPA-HQ-OAR-2022-0829-0613, p. 3]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

EPA should implement upstream accounting to encourage BEV Efficiency

EPA proposes to continue, and make permanent, the treatment of electric vehicles as entirely zero emission vehicles (ZEVs)(FR 29252). While it is true that BEVs generate no emissions at the tailpipe, charging these vehicles does create emissions upstream. The major flaw with ignoring refueling emissions is that EPA loses the opportunity to influence the efficiency of a growing component of the vehicle market. EPA is both empowered and required to regulate the emissions from on-road light duty vehicles. Given that BEVs are expected to reach the majority of new sales within this decade,13 it is imperative we address their emissions. Using the rule to improve BEV efficiency will accomplish this. Upstream accounting in compliance is a simple and effective way to promote efficiency. It recognizes that different BEVs, by virtue of their wide range of efficiencies, are responsible for different levels of emissions from our still fossil fuel-based electricity grid. EPA’s GHG standards for LDVs have historically led to innovations in emissions reduction technology and design for ICEVs and the same should be true in an all-electric future. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

13 https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/

Our own analysis shows that even among BEVs of the same vehicle type and weight there can be considerable differences in efficiency and, therefore, upstream emissions, as shown in Figure 1.14 Not all BEVs are created equal and there is still plenty of room for innovation and emissions improvements in the BEV market. The fact that BEVs with curb weights of 5,000 pounds can have efficiencies varying from under 2.5 mi/kWh to over 4 mi/kWh demonstrates how important it is that these standards continue their historical role in advancing automotive innovation as we electrify. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

14 https://www.aceee.org/blog-post/2023/04/boosting-ev-efficiency-would-cut-emissions-and-reduce-strain-grid

[See original for graph titled “Figure 1. Efficiency versus weight in model year 2023 BEVs”] [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

By our calculations, if upstream accounting, or another mechanism, led to a 3% annual growth in BEV efficiency over the life of the standards, lifetime emissions from MY 2027- 2032 vehicles would be reduced by over 170 million metric tons under both the proposed standards and Alternative 1. This does not include the benefits from vehicles sold from model year 2033 onwards that would take advantage of advancements in efficiency technologies and designs potentially spurred by this standard. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

Greater BEV efficiency has a number of benefits beyond just reducing upstream emissions. Greater BEV efficiency can allow a vehicle to go the same distance with a smaller battery, effectively reducing the use of high-demand minerals and the emissions generated from vehicle production (the calculations discussed above do not account for these emissions reductions impacts from improved BEV efficiency). While BEVs are certainly still better from an emissions perspective than their equivalent ICEV when looking at the entire life-cycle, it is still important to reduce their environmental impact. Mineral supply and battery manufacturing capacity also have the potential to be limiting factors for rapid electrification, so reducing battery needs per vehicle by increasing efficiency can facilitate achievement of the MY 2027-2032 standards. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

Greater BEV efficiency also means a smaller impact on our electricity grid and drivers' wallets, as less electricity is needed to drive the same distance.15 If all LDVs on the road were electric and had an average efficiency equivalent to the highest-efficiency vehicle on the market today, we could save enough electricity annually to power 21 million homes. Full on- road fleetwide electrification is not expected for decades so this improvement in BEV efficiency is feasible and could even be surpassed if incentivized by the standards.16 [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

15 https://www.aceee.org/blog-post/2022/09/evs-surge-utilities-need-transparent-equitable-comprehensive-plans-support-them

16 https://www.aceee.org/blog-post/2023/04/boosting-ev-efficiency-would-cut-emissions-and-reduce-strain-grid

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA exacerbates that arbitrarily selective approach in the proposed rule's method for measuring compliance. EPA proposes to determine whether manufacturers' fleets meet the new standards based solely on their tailpipe emissions—disregarding the other downstream and all upstream emissions caused by producing and operating vehicles. EPA's proposal thus would skew producers' and purchasers' incentives toward electric vehicles even though they may increase emissions overall. [EPA-HQ-OAR-2022-0829-0683, p. 5]

Given those serious problems, EPA would not be justified in adopting the proposed rule even if it would substantially benefit the environment. But EPA has not even shown that the new standards would achieve that goal. In evaluating the proposed rule's impact on net emissions, EPA understates emissions from producing and powering electric vehicles ("upstream" emissions). It counts only emissions from producing electricity or fuel—failing to consider the substantially greater emissions incurred producing electric vehicles and their components compared to conventional vehicles—and improperly discounts the emissions it does consider. [EPA-HQ-OAR-2022-0829-0683, p. 5]

EPA's Analysis Of Net Emissions Is Flawed

EPA estimates that the proposed rule will result in a net reduction of GHG, criteria air pollutant, and air toxic emissions in 2055. See 88 Fed. Reg. at 29,198. That estimate is dubious. In numerous ways, EPA has underestimated the up- stream emissions—i.e., those that do not come from the vehicle itself but can still be attributed to its manufacture and operation—that will result from a widespread shift to electric vehicles. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

First, EPA improperly cabins its upstream analysis to only those emissions caused by electricity generating units ("EGUs") and refineries. See 88 Fed. Reg. at 29,198, 29,347, 29,353, 29,355; Draft RIA at 9-32–33. But the emissions associated with powering a vehicle—whether by electricity from an EGU or fuel from a refinery—are far from the only ones reasonably attributed to its operation. Depending on the vehicle, there are also emissions associated with producing, recycling, and disposing of batteries; operating charging infrastructure; and extracting, refining, transporting, and storing petroleum fuels. These emissions can be substantial and, when considered together, may undermine EPA's assumption that swapping internal-combustion-engine vehicles for electric ones will necessarily result in an environmental good. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

The International Energy Agency's discussion of emissions from mining illustrates this point. According to the IEA, "the production and processing of energy transition minerals are energy-intensive" and involve "relatively high emission[s]." Role of Critical Minerals at 15, 130; see also Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet, Am. Transp. Rsch. Inst., https://tinyurl.com/3ktjd85v ("Mining and processing produce considerable CO2 and pollution issues."). For this reason, producing an electric vehicle is a more carbon-intensive process than producing a conventional one. Role of Critical Minerals at 194. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

EPA never explains why emissions from EGUs and refineries are the only ones relevant to the analysis. Instead, it acknowledges that "[t]he upstream emissions inventory does not account for all upstream sources related to vehicles, fuels, and electricity generation, such as charging infrastructure, storage of petroleum fuels, battery manufacture, etc." Draft RIA at 8-14. But EPA makes no attempt to justify that selective, incomplete approach. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

Moreover, EPA's current position marks a change from settled agency practice. In earlier GHG and criteria-pollutant rulemakings, the agency did consider additional upstream sources in assessing net emissions. See SAFE Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, 85 Fed. Reg. 24,174, 24,872 (Apr. 30, 2020) (noting that emissions "model accounts for upstream emissions" from "extraction, transportation, refining, and distribution of . . . fuel"); Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57,106, 57,301 (Sept. 15, 2011) ("To project these impacts, EPA estimated the impact of reduced petroleum volumes on the extraction and transportation of crude oil as well as the production and distribution of finished gasoline and diesel."); Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, 81 Fed. Reg. 73,478, 73,852 (Oct. 25, 2016) ("To project these impacts, Method B estimated the impact of reduced petroleum volumes on the extraction and transportation of crude oil as well as the production and distribution of finished gasoline and diesel."). The agency has not acknowledged its change in position here, let alone explained "why the new approach" of ignoring these upstream emissions "better comports with . . . the provisions that Congress enacted." Am. Fed'n of Gov't Emps. v. FLRA, 25 F.4th 1, 12 (D.C. Cir. 2022). That is reason enough to conclude that "the [agency] has not, in fact, engaged in reasoned decision-making." Id. (internal quotation marks and brackets omitted). Nor could EPA offer a valid explanation for its change. Upstream emissions are more important in the current rulemaking than they were in previous regulations given that EPA, for the first time, intends to effectively mandate widespread adoption of electric vehicles, which (as explained above) produce emissions primarily through upstream sources. [EPA-HQ-OAR-2022-0829-0683, p. 56]

The Method For Measuring Compliance Is Irrational

Under existing rules, beginning in model year 2027, manufacturers are required to account for upstream emissions as part of their compliance calculation. See 88 Fed. Reg. at 29,197. But under the proposed rule, EPA has explicitly changed course and would "remove[]" that requirement—meaning that electric vehicles, rather than fairly reflecting their actual total emissions, would "be counted as zero grams/mile in a manufacturer's compliance calculation." Id. In other words, EPA proposes that vehicle compliance with the new standards be measured solely by the grams of pollutants emitted from the tailpipe. Id. To survive arbitrary-and-capricious review, EPA must provide a reasoned explanation for this change and show that there are "good reasons" for its new policy. Encino Motorcars, LLC v. Navarro, 579 U.S. 211, 221 (2016) (internal quotation marks omitted). The proposed rule does not do so. [EPA-HQ-OAR-2022-0829-0683, p. 59]

First, EPA attempts to justify its change in position by explaining that it does not include upstream emissions when calculating the compliance of internal-combustion-engine vehicles, contending that the principle of equal treatment requires that it take the same approach for electric vehicles. See 88 Fed. Reg. at 29,252. But that compares apples to oranges. These vehicle technologies emit air pollutants in different ways. Internal-combustion-engine vehicles cause emissions mostly from the tailpipe, whereas electric vehicles cause emissions mostly by other means. The timing and manner of their respective emissions is thus fundamentally different. Granularly focusing on tailpipe emissions would mean that almost none of the emissions from electric vehicles are counted, while almost all of the emissions from vehicles with internal-combustion vehicles are. If equal treatment is the goal, EPA must account for both types of emissions when calculating compliance, rather than myopically focusing on tailpipe emissions, which prejudges any analysis in favor of electric vehicles. [EPA-HQ-OAR-2022-0829-0683, p. 59]

Second, EPA states that it originally proposed including upstream emissions in compliance calculations at a time when there was "little if any regulation" of those upstream sources for GHGs, noting that this approach was "a departure from its usual practice of relying on stationary source programs to address pollution risks from stationary sources." 88 Fed. Reg. at 29,252. Now that power-generation emissions are declining, EPA asserts that "manufacturers should not account for upstream utility emissions" any longer. Id. That circular explanation assumes that the only or principal reason to consider upstream emissions is to indirectly regulate the power-generation industry itself—to make each unit of power generated by that industry cleaner. But as EPA acknowledges elsewhere in the proposed rule, it designs vehicle-emissions standards to force vehicle manufacturers to adopt technology that reduces the harmful emissions it is charged with regulating. See, e.g., id. at 29,233. Thus, if a vehicle has no tailpipe emissions but massive upstream emissions—e.g., from producing vehicles and their components, and from generating increased amounts of electricity to operate them—incentivizing manufacturers to incorporate that vehicle into their fleets would be contrary to the agency's stated goal. The increased regulation of stationary sources will not solve this problem. Increased reliance on electric vehicles will increase demand for the electricity that the power-generation industry produces, and improvements in emissions per unit of power generated would not address the total increase in emissions. Moreover, regulation of stationery sources will not capture many of the upstream emissions associated with electric vehicles. As discussed above, operating charging infrastructure and producing, recycling, and disposing of batteries all result in emissions. If upstream emissions are not included in the compliance calculation, these emissions may not be accounted for at all. [EPA-HQ-OAR-2022-0829-0683, pp. 59-60]

EPA itself correctly recognized elsewhere in the proposed rule that upstream emissions are relevant to its overall effort to address the "well-documented buildup of GHGs due to human activities." 88 Fed. Reg. at 29,207. For instance, when estimating the proposed rule's impact on overall emissions, as well as the costs and benefits that it generates, EPA took into account at least some (though far from all) relevant upstream emissions. In doing so, EPA acknowledged that it would be irrational to adopt a rule that decreases downstream emissions but has the effect of increasing overall emissions. The same principle applies here: It would be irrational to find a manufacturer's fleet compliant if the vehicles within the fleet have lower tailpipe emissions but cause emission of harmful pollutants in other ways that exceeds the levels permitted for tailpipe emissions. EPA offers no explanation for this inconsistent approach to upstream emissions. [EPA-HQ-OAR-2022-0829-0683, pp. 59-60]

Moreover, factoring a broader set of emissions into the compliance calculation will not be difficult or unduly burden EPA. The agency has already developed a method for attributing some of these emissions to manufacturers. In its proposed rule, EPA explained that it initially planned to take emissions from electricity generation into account by "attributing a pro rata share of national CO2 emissions from electricity generation to each mile driven under electric power minus a pro rata share of upstream emissions associated with . . . gasoline production." 88 Fed. Reg. at 29,252. That method remains available now. And EPA could develop similarly simple and administrable techniques to account for other key sources of upstream emissions like battery production. [EPA-HQ-OAR-2022-0829-0683, pp. 60-61]

For all of these reasons, EPA's proposed method of calculating compliance is irrational. Any final rule must comprehensively account for the emissions generated by electric vehicles to ensure that EPA's solution (a widespread shift to electric vehicles) bears a rational connection to its regulatory goal of reducing harmful emissions. Cf. Am. Fed'n of Gov't Emps., 25 F.4th at 9 (faulting agency for failing to explain why the standard it adopted will address "the principal problem the new standard is designed to fix"). [EPA-HQ-OAR-2022-0829-0683, pp. 60-61]

Organization: American Fuel & Petrochemical Manufacturers

EPA both describes ZEVs as having "zero emissions"82 for purposes of compliance with its standards and is "proposing to make the 0 g/mile treatment of ZEV operation a permanent part of the program."83 If so, then EPA's proposed standards that apply to ZEVs do not apply "to the emission of any air pollutant from any class or classes vehicles … that cause, or contribute to, air pollution."84 In other words, EPA cannot have it both ways. It cannot claim to be regulating emissions from ZEVs while at the same time considering such vehicles to have no emissions. [EPA-HQ-OAR-2022-0829-0733, p. 22]

82 "As the term 'zero-emission vehicle' suggests, these cars and trucks have zero GHG and criteria pollutant emissions from their tailpipes." 88 Fed. Reg. at 29,187.

83 Id. at 29,251,

84 42 U.S.C. § 7521(a)(1).

C. In the Alternative, EPA Should Set Separate Emissions Standards for Each Vehicle Class.

The Clean Air Act authorizes EPA to establish and revise standards for the emissions of air pollutants from "any class or classes of new motor vehicles or new motor vehicle engines….that endanger public health or welfare"111 Assuming for sake of argument EPA has authority to set emissions standards for EVs, which we posit it does not,112 EPA should promulgate distinct emissions standards for each vehicle class on the basis of the vehicle's powertrain (e.g., diesel, gasoline, natural gas, electricity). At a minimum, this would obligate EPA to abandon its position that ZEVs are emission-less and account for upstream and other lifecycle emissions as the agency envisioned in its 2012 rule.113 This approach would ensure that EPA is regulating relevant pollutants from specific vehicle classes and would promote a level playing field for different vehicle technologies.114 [EPA-HQ-OAR-2022-0829-0733, p. 26]

111 42 U.S.C.§ 7521(a)(1).

112 As discussed in Section III.A., supra, the CAA sec. 202 does not authorize EPA to regulate ZEV emissions because EPA characterizes them as having "zero" emissions.

113 75 Fed. Reg. 25,324, 25,341 (May 7, 2010).

114 42 U.S.C. § 7521(a)(3)(A)(ii) ("In establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors."). Although this section of CAA Section 202 references "heavy-duty" vehicles, this applies to light-duty vehicles that weigh more than 6,000 lbs gross vehicle weight rating, such as light-duty heavy trucks, and if EPA has authority to set emissions standards for EVs, the Clean Air Act does not otherwise limit EPA's discretion to expand its classification of vehicles by fuel type.

ZEVs are entirely distinct from other classes of vehicles. Their powertrain design frontloads emissions, meaning the air pollutants associated with these vehicles are emitted before operation (i.e., during vehicle production and recharging). During operation, a ZEV experiences no direct drivetrain emissions. In contrast, most emissions from ICEVs generally occur during operation, not production and refueling. Such different emissions points require different regulatory standards. [EPA-HQ-OAR-2022-0829-0733, p. 26]

As discussed above, because EPA may only prescribe standards applicable to vehicles that "cause or contribute" to air pollution, its standards cannot account for ZEVs with no tailpipe emissions. However, if EPA is authorized to promulgate such standards, those standards must account for any upstream emissions from upstream electric generating units, the mining of battery materials, and the production of the vehicle.197 Without consideration of upstream and full life- cycle impacts (e.g., frequent battery replacements), EPA has failed to inform the public of the comparative costs of emission reductions, whether from ZEVs, ICEVs, energy efficiency, or other sectors. EPA's continued failure to address this "major aspect of the problem" is another example of EPA moving toward its predetermined outcome—the forced electrification of U.S. transportation.198 AFPM has continually put EPA on notice of the need to include a LCA to avoid an arbitrary comparison—the agency continues to ignore this issue of central relevance to EPA's benefit analysis. [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

197 Proposed Rule at 29,353–55.

198 See, e.g., Comments of the American Fuel & Petrochemical Manufacturers on EPA's Reconsideration of a Previous Withdrawal of a Waiver of Preemption 10 (July 6, 2021),

https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0257-0139, Comments of the American Fuel & Petrochemical Manufacturers on EPA's/NHTSA's Proposed The Safe Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks 68-73 (Aug. 24, 2018), https://www.regulations.gov/comment/EPA-HQ-OAR-2018-0283-5698; Comments of the American Fuel & Petrochemical Manufacturers on EPA's California State Motor Vehicle Pollution Control Standards; Advanced Clean Trucks; Zero Emission Airport Shuttle; Zero Emission Power Train Certification; Request for Waiver of Preemption 7-12 (Aug. 2, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2022- 0331-0088.

For instance, the fuel source of a PEV, like a ZEV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces emissions. The fact that emissions occur 100 percent upstream of the vehicle's operation and therefore fall outside of the tailpipe emissions calculation does not make these emissions any less significant. There is no logical basis for this omission because, as EPA is aware, concerns about GHG emissions relate to their longer-term global concentrations. Consequently, air pollutant emissions are an important consideration regardless of where such emissions occur. Without comparing lifecycle ZEV emissions to lifecycle emissions from ICEVs, EPA cannot know if or how much its standards are decreasing total emissions. Thus, while EPA is not required to solve all emissions problems in one rulemaking, EPA cannot claim to be solving part of the problem here without addressing upstream and downstream emissions. EPA's approach of mandating ZEVs cannot possibly be reasonable if it is merely shifting emissions from one source to another at the cost of hundreds of billions of dollars—trillions when costs to upgrade EV infrastructure are factored in— or could do so more cost-effectively by choosing a different approach.199 [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

199 5 U.S.C. § 706(2)(A); cf. Antonin Scalia, "Regulatory Review and Management," Regulation Magazine 19 (Jan./Feb. 1982) ("Is it conceivable that a rule would not be arbitrary or capricious if it concluded with a statement to the effect that 'we are taking the foregoing action despite the fact that it probably does more harm than good, and even though there are other less onerous means of achieving precisely the same desirable results'?").

The flaw in EPA's approach is illustrated by the fact that emissions standards easily become meaningless by changing the engine's location. The proposed rule would treat a ZEV charged by a diesel-powered generator as if it had zero tailpipe emissions, notwithstanding the fact that it remains "powered" by a diesel engine located outside the vehicle. A LDV directly powered by a diesel engine inside the vehicle, however, is credited with the emissions produced by that engine. EPA's inconsistent approach begs the question of how nascent technologies such as a vehicle propelled by compressed air would be evaluated. Thus, the energy source of the "fuel" matters and EPA arbitrarily ignores lifecycle emissions from ZEVs and also proposes to remove requirements for upstream emissions calculations.200 EPA admits "the program has now been in place for a decade, since MY 2012, with no upstream accounting and has functioned as intended, encouraging the continued development and introduction of electric vehicle technology."201 EPA's mandate is to establish feasible standards rooted in the statute, not to ignore real-world emissions to "encourage" the development of its favored technology. EPA requested comment on whether it should account for upstream emissions for all fuel and vehicles. If technologies are being treated equally, as they must, the answer is an unequivocal yes. [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

200 88 Fed. Reg. at 29,197.

201 Id. at 29,253.

EPA compounds this flaw by making unsupported assumptions regarding the total emissions impacts of its Proposal. While it claims that the overall analysis for combined downstream and upstream emissions “likely underestimates the net emissions reductions that may result” from the Proposed Rule, EPA fails to offer a data-based substantiation. The Proposed Rule failed to assess emissions from battery manufacturing or electricity production. EPA acknowledges that its standards will increase the demand for electricity and that demand will simultaneously increase emissions from the electric generating sector, but by making the unsupported assumption that low carbon electricity will be readily available, it makes no real attempt to quantify those emissions or compare them to alternative options for reducing emissions from this sector. EPA must provide a more comprehensive analysis to comply with its directive under the Clean Air Act and better assess the resulting impact of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

Organization: American Honda Motor Co., Inc.

G. Additional items

The agency solicited public comment on a wide array of topics included in the proposed rule. Below, Honda shares brief feedback on a few of these items. [EPA-HQ-OAR-2022-0829-0652, p. 29]

Upstream Emissions Accounting

In the proposed rule, the agency proposes to indefinitely exclude upstream emissions from BEV compliance calculations: [EPA-HQ-OAR-2022-0829-0652, p. 29]

EPA is also proposing that the requirement for upstream emissions accounting for BEVs and PHEVs as part of a manufacturer's compliance calculation, which under the current regulations would begin in MY 2027, would be removed under the proposed program; thus, BEVs would continue to be counted as zero grams/mile in a manufacturer's compliance calculation as has been the case since the beginning of the light-duty GHG program in MY 2012.48 [EPA-HQ-OAR-2022-0829-0652, p. 29]

48 88 Fed. Reg. 29197 (May 5, 2023)

Honda strongly concurs with this position. Although full lifecycle accounting is necessary to quantify emissions inventories, it is inappropriate to hold the auto industry accountable for emissions that are beyond its control. As such, Honda supports a clear division of regulatory responsibility between the auto and utility industries. Applying 0 g/mi upstream emissions accounting for BEVs, FCEVs and the electric-operation portion of PHEVs is not only logically appropriate but will encourage the transition toward greater levels of vehicle electrification. [EPA-HQ-OAR-2022-0829-0652, p. 29]

Recommendation: Honda strongly urges the agency to indefinitely apply 0 g/mi upstream emissions accounting for BEVs, FCEVs and the electric-operation portion of PHEVs. [EPA-HQ-OAR-2022-0829-0652, p. 29]

Organization: American Petroleum Institute (API)

ii. Zero emission vehicles also have emissions impacts.

As with ICEVs, ZEVs7 have carbon emissions impact associated both with their production and throughout their lifetime which EPA should incorporate in its analysis. While ZEVs can be an important part of a diverse transportation future to reduce emissions, they do produce GHG emissions. For instance, BEV production, use, and the disposal of BEV batteries, are not zero-emission activities. Further, all fuels – whether conventional fuels or electricity – have associated carbon emissions regardless of their source. A study conducted by Ricardo, which is included in a report by the Transportation Energy Institute,8 concludes that BEVs "have higher embedded GHG emissions" and therefore carbon intensity of the electricity mix also plays a vital role in defining the magnitude of carbon emissions in this phase. While meaningful reductions have historically been accomplished by focusing on tailpipe emissions from the vehicle, the growing market share of diffierent technologies that include significant upstream emissions warrant inclusion of those emissions in the standard. [EPA-HQ-OAR-2022-0829-0641, pp. 5-6]

7 In these comments, "ZEV" refers broadly to PHEVs, FCEVs and BEV refers specifically to battery electric vehicles.

8 Ricardo, Inc. "Life Cycle Analysis Comparison: Electric and Internal Combustion Engine Vehicles", study prepared for the Transportation Energy Institute (formerly known as the Fuels Institute). January 2022. https://www.transportationenergy.org/research/reports/life-cycle-analysis-comparison-electric-and-internlife- cycle-analysis-comparison-electric-and-intern.

We encourage the agency to not only acknowledge and address the emissions of ZEVs, but to also continue to study the impacts. Failure to do both would be arbitrary and capricious. As noted below in these comments, and in our comments on the Heavy-Duty GHG Phase 3 proposed rule,9 we strongly recommend that EPA include both a readiness assessment prior to program implementation as well as a program review once implementation begins. There will be CO2 emissions associated with the production and use of BEVs,10 and it is important to address these emissions to provide a full picture of the emissions impacts and mitigation needs. [EPA-HQ-OAR-2022-0829-0641, pp. 5-6]

9 API Comments on "Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3", Document ID EPA-HQ-OAR-2022-0985-1423.

10 Kelly, J. et al., "Cradle-to-grave lifecycle analysis of U.S. light-duty vehicle-fuel pathways: a greenhouse gas emissions and economic assessment of current (2020) and future (2030-2035) technologies", June 2022, ANL- 22/27. Figure B.8. https://greet.es.anl.gov/publication-c2g_lca_us_ldv.

Organization: Arconic Corporation (ARCO)

In general, Arconic urges EPA to consider a few key points as it moves to finalize this proposed rulemaking. [EPA-HQ-OAR-2022-0829-0741, p. 2]

Arconic recommends including the upstream power generation emissions for BEV vehicles. With that change, Arconic supports more stringent EPA standards in coordination with DOT CAFE standards beyond the 2027-2032 range covered in this proposed rule. [EPA-HQ-OAR-2022-0829-0741, p. 4]

EPA should include a fixed electric generation emission value per kWh in the standard for calculation of vehicle emissions for battery electric vehicles (BEVs) based upon their energy efficiency. This would provide an incentive for improved vehicle efficiency, and it would also allow the EPA rules to easily equate to the DOT CAFE standards. [EPA-HQ-OAR-2022-0829-0741, p. 2]

Emissions standards should correlate with passenger and pedestrian safety imperatives. If all BEVs are counted as zero emission, irrespective of their size and weight, there is no incentive for vehicle manufacturers to continue seeking weight reductions that clearly improve safety. [EPA-HQ-OAR-2022-0829-0741, p. 2]

Similarly, adding incentives for weight reduction for BEVs will correlate to reductions in electricity use, reduced embedded emissions and reduced use of critical minerals that can be difficult to produce in an environmentally friendly manner or recycle. [EPA-HQ-OAR-2022-0829-0741, p. 2]

Specifically, Arconic provides the following comments and recommendations:

1. In Section 7, EPA requests comments on the proposed treatment of electrified vehicles in manufacturers compliance calculations. The proposed rule states that CO2 emissions for a battery electric vehicle (BEV) are zero. Emissions from power generation are not included in BEV emissions. [EPA-HQ-OAR-2022-0829-0741, pp. 2-3]

This is quite different from the current DOT CAFE rule, which uses Miles Per Gallon equivalent (MPGe) to compare BEV efficiency with Internal Combustion Engine (ICE) and hybrid vehicle efficiency. When it comes to environmental impact, the size, weight and efficiency of the vehicle do matter: the most efficient BEV (Lucid Air) uses one third the energy per mile as compared to a Hummer EV according to the CAFE MPGe ratings. [EPA-HQ-OAR-2022-0829-0741, pp. 2-3]

EPA should include a fixed electric generation emission value per kWh for MY 2027- 2032 in the standard for calculation of vehicle emissions for BEV vehicles, based upon their efficiency. The emissions associated with generating 33.7 kWh of electricity (or 23.16 kWh/gal if 10 CFR Part 474 (EERE-2021-VT-0033) is enacted) could be used along with the MPGe values from vehicle testing to get the g/mile CO2 emissions for any BEV. This would provide an incentive for improved vehicle efficiency. It would also allow the EPA rules to easily equate to the DOT CAFE standards. [EPA-HQ-OAR-2022-0829-0741, pp. 2-3]

As currently formulated, the proposed policy would not encourage more energy efficient BEV vehicles. Larger, heavier, less aerodynamic vehicles require higher capacity batteries which consume more critical minerals, more electricity and its associated emissions. [EPA-HQ-OAR-2022-0829-0741, pp. 2-3]

We understand the argument that current ICE based standards do not include emissions for gasoline production. However, the bulk of the emissions for an ICE vehicle come from burning gasoline while the bulk of the emissions for an EV come from electricity generation - both of which are captured effectively in the MPG/MPGe rating. Therefore, utilizing MPG/MPGe ratings would provide a meaningful measure of efficiency that customers and manufacturers can act upon and would result in reduced emissions overall. [EPA-HQ-OAR-2022-0829-0741, pp. 2-3]

Arconic suggests revising the definition of emissions for BEVs to include the upstream power generation emissions. Revising this definition would likely require some modification to the yearly emissions targets. With targets modified in this manner, Arconic does not have a position on the trajectory (i.e., the levels of year-over-year stringency rates) in this rule making. [EPA-HQ-OAR-2022-0829-0741, pp. 3-4]

Organization: BorgWarner Inc.

BorgWarner urges EPA to consider new emission metrics for zero emission vehicles (ZEVs) that benefit and develop new efficiency improvements. [EPA-HQ-OAR-2022-0829-0640, pp. 6-7]

Defining vehicle emissions exclusively at the tailpipe creates a de facto technology mandate and excludes technologies that could make a timely real-world difference in CO2 emissions. [EPA-HQ-OAR-2022-0829-0640, pp. 6-7]

BorgWarner supports EPA moving beyond analyzing vehicle emissions only at the tailpipe and proposes that EPA incorporate accounting of upstream emissions for compliance purposes. [EPA-HQ-OAR-2022-0829-0640, pp. 6-7]

EPA should not ignore upstream emissions as it would be inconsistent with previous assertions that future compliance standards would look beyond a vehicle's tailpipe.6 As we invest in advanced technologies, it is critical to look at their overall environmental impact to determine broad pathways to achieve our emission reduction goals. This approach is consistent with technology neutrality, global carbon neutrality goals, and a holistic environmental impact assessment. [EPA-HQ-OAR-2022-0829-0640, pp. 6-7]

6 Federal Register: Volume 77, No. 199 - October 15, 2012, Page 62651

More importantly, by including upstream emissions for compliance purposes, EPA will address a vehicle's total embedded CO2 instead of unintentionally promoting inefficiencies. Counting upstream emissions promotes cleaner and more efficient components for all vehicle technologies. It is important to set metrics for all vehicles, including BEV, that continue to require efficiency improvements that reduce CO2 production and energy intensity – while small efficiency gains in electric vehicle operation seem to make no difference if measuring at the tailpipe, they would have an impact on the burden to the electricity grid when we have a future BEV vehicle parc in the tens of millions. [EPA-HQ-OAR-2022-0829-0640, pp. 6-7]

Organization: Clean Fuels Development Coalition et al.

D. EPA lacks the statutory authority to ignore upstream emissions for electric vehicles.

EPA has statutory authority to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(1). This presents an interpretive dilemma. On the one hand, if electric vehicles are not "vehicles" "which cause[ ] or contribute to" a given type of air pollution, then EPA may not set standards for them. Id. On the other, if electric vehicles are "vehicles" "which cause, or contribute to" a given type of air pollution, then EPA must set "standards applicable to the[ir] emissions." Id. [EPA-HQ-OAR-2022-0829-0712, p. 11]

The proposal tries to solve this problem by splitting the baby.8 EPA reasons that electric vehicles are vehicles that "cause or contribute to air pollution," but EPA just chooses to set their contribution to zero. This cannot be right. Cf. C.S. Lewis, That Hideous Strength 291 (Samizdat ed., 2015) ("Just imagine a man who was too dainty to eat with his fingers and yet wouldn't use forks!"). If electric vehicles truly emit no emissions, then they are not the sort of vehicle EPA can regulate. [EPA-HQ-OAR-2022-0829-0712, p. 11]

8 Of course, the point of the story about Solomon is that the baby wasn't split. See 1 Kings 3:16– 28 ("Give the living child to the first woman, and by no means put him to death; she is his mother.").

Of course, EPA freely admits that electric vehicles do produce upstream emissions, and that these upstream emissions matter. This is true and very important. And the proposal does consider upstream emissions when determining the rule's impact on total emissions. EPA's position is that this inconsistent approach to electric vehicles' upstream emissions is reasonable because it treats upstream emissions of all vehicles, electrified or not, the same way for compliance purposes. 88 Fed. Reg. 29,252 ("EPA proposes to include only emissions measured directly from the vehicle in the vehicle GHG program for MYs 2027 and later (or until EPA changes the regulations through future rulemaking) consistent with the treatment of all other vehicles. Electric vehicle operation would therefore continue to be counted as 0 g/mile, based on tailpipe emissions only.") [EPA-HQ-OAR-2022-0829-0712, pp. 11-12]

But this "consisten[cy]" is precisely what makes the rule unreasonable. Electric vehicles are not like "all other vehicles." EPA has previously recognized that "that for each EV that is sold, in reality the total emissions off-set relative to the typical gasoline or diesel powered vehicle is not zero, as there is a corresponding increase in up-stream CO2 emissions due to an increase in the requirements for electric utility generation." 74 Fed. Reg. 49,454, 49,533 (Sept. 28, 2009). EPA only chose the initial "zero grams/mile compliance value [a]s an incentive," Response to Comments, EPA-420-R- 10-012a at 5-237 (Apr. 2010),), and explained that in future standards it "would attribute a pro rata share of national CO2 emissions from electricity generation to each mile driven under electric power minus a pro rata share of upstream emissions associated with from gasoline production," 88 Fed. Reg. 29,252. [EPA-HQ-OAR-2022-0829-0712, pp. 11-12]

EPA never had authority to incentivize electric vehicles in this way. Section 202(a) requires the agency to "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles." Because it acknowledged that these emissions are "not zero," it is arbitrary to treat them as such. Indeed, as EPA previously acknowledged, treating upstream emissions of all vehicles, electrified or not, the same way puts a thumb on the scale against conventional vehicles in favor of electric vehicles. An agency's bare preference for one technology cannot satisfy the requirement that it "reasonably consider[] the relevant issues and reasonably explain[] the decision." FCC v. Prometheus Radio Project, 141 S. Ct. 1150, 1158 (2021). [EPA-HQ-OAR-2022-0829-0712, pp. 12-13]

At the very least, the agency is not permitted to change its position on the future inclusion of upstream emissions in compliance calculations without explanation. When an agency makes a decision, it must articulate a "satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'" Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). If the agency fails to "cogently explain why it has exercised its discretion in a given manner," its action will be held invalid. Id. at 48. In addition, the agency must "provide a more detailed justification than what would suffice for a new policy created on a blank slate . . . when, for example, its new policy rests upon factual findings that contradict those which underlay its prior policy." FCC v. Fox Television Stations, Inc., 556 U.S. 502, 515 (2009); see also Perez v. Mortg. Bankers Ass'n, 135 S. Ct. 1199, 1209 (2015). EPA previously thought that the zero grams-per-mile compliance value was only viable as a temporary incentive because "in reality" the total emissions were not zero. Failure to consider and adequately explain departure from this finding would render the entire rulemaking arbitrary and capricious. Fox Television Stations, 556 U.S. at 515. [EPA-HQ-OAR-2022-0829-0712, pp. 12-13]

F. EPA lacks authority to Misleads Consumers by Using the Term "Zero-emissions Vehicle."

While it is true that all-electric vehicles have no tailpipe emissions, it is completely false to claim that they are "zero-emissions vehicles." As already noted, EPA acknowledges that what it calls "ZEVs" have significant upstream emissions. 88 Fed. Reg. 29,303. Despite this, the proposal repeatedly describes these vehicles as having no emissions. This is per se unreasonable, and it enables illegal marketing by auto- manufacturers. Seizing on EPA's label, dozens of auto-manufacturers have described their electric vehicles as "zero-emissions." Making false claims in the marketing of products is prohibited by the Federal Trade Commission Act, which prohibits "unfair or deceptive acts or practices in or affecting commerce" 15 U.S.C. § 45. The agency lacks authority to facilitate these deceptive acts or to promote innumerable other false "zero emission" statements. [EPA-HQ-OAR-2022-0829-0712, pp. 14-15]

Organization: Coalition for Safe Autonomous Vehicles and Electrification (SAVE)

Introduction of this technology will yield substantial safety, environmental, accessibility, and equity benefits to the motoring public, as well as help keep the United States in a global technology leadership position. AV-EVs promote safer streets by reducing collisions caused by human error. They promote sustainability through shared zero-emission fleets that will reduce congestion and pollution in our cities. And AV-Evs hold the promise to increase equity and accessibility in transportation by providing affordable and accessible mobility options for those who are unable to drive. [EPA-HQ-OAR-2022-0829-0608, pp. 1-2]

The SAVE Coalition appreciates EPA's commitment to improving air quality, reducing emissions from the transportation sector, and encouraging further adoption of electric vehicles (EVs). We want to start by commending EPA's decision to treat EVs the same as non-EVs as it relates to tailpipe emissions, i.e., by not including upstream emissions in the calculation of tailpipe emissions. We agree that it is therefore reasonable and appropriate to assign EVs 0 grams of CO2 per mile for tailpipe emissions. [EPA-HQ-OAR-2022-0829-0608, pp. 1-2]

Organization: Delek US Holdings, Inc.

The flaw in EPA's approach is illustrated by the fact that emissions standards easily become meaningless by changing the engine's location. A BEV charged by the owner through the use of a diesel-powered generator has zero emissions, notwithstanding the fact that it remains "powered" by a diesel engine located outside the vehicle. A LDV or MDV directly powered by a diesel engine inside the vehicle, however, is credited with the emissions produced by that engine.

Thus, the source of the “fuel” matters. EPA’s myopic approach fails to account for such impacts. [EPA-HQ-OAR-2022-0829-0527, p. 5]

Finally, instead of sufficiently analyzing and quantifying upstream emissions, including those from battery manufacturing or electricity production, EPA proposes to instead extend ZEV manufacturers’ “free pass” and allow them to calculate upstream emissions of a BEV as 0 g/mi CO2.22 This compliance flexibility should have expired with MY27 and instead, as EPA concedes, manufacturers producing an all-BEV flight to comply with the new proposed standards will be able to claim their fleet “emit[s] 0 g/mi, regardless of their respective footprints.23 If EPA considers these upstream emissions in BEV compliance calculations, the proposed standards are likely unachievable so it appears EPA has instead cherry-picked data and calculation parameters to ensure a ZEV transition rather than comprehensively analyze a technology-neutral approach to the posited concerns. EPA should provide a more comprehensive analysis to comply with its directive under the Clean Air Act and better assess the resulting impact of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0527, p. 5]

22 Proposed Rule at 29,235, 29,251.

23 Id.

EPA’s reference to electric vehicles as “zero emission vehicles” is misleading. The fuel source of a BEV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces emissions. The fact such emissions occur 100% upstream of the vehicle’s operation and therefore fall outside of the tailpipe emissions calculation stacks the deck in favor of this technology. There is no logical basis for this omission because, as EPA is aware, GHG and other criteria pollutant emissions such as PM2.5 have a global impact. Consequently, controlling air pollutant emissions should be important regardless of where such emissions occur. [EPA-HQ-OAR-2022-0829-0527, p. 5]

Organization: Doug Peterson

The Environmental Protection Agency Should Include the Upstream Carbon Dioxide Emissions of Battery Electric Vehicles When Calculating Fleet Performance and Determining Compliance [EPA-HQ-OAR-2022-0829-0500, p. 1]

The EPA has solicited comments regarding its proposal to continue granting all light duty battery electric vehicles (BEVs) a carbon dioxide emissions value of zero grams per mile when averaging an automaker’s fleet performance. There are many strong arguments for maintaining the current approach, and it is important to acknowledge them before making the much stronger case for reforming the upstream emissions policy. [EPA-HQ-OAR-2022-0829-0500, p. 2]

Upstream carbon dioxide emissions have never been considered when determining fleet compliance, in accordance with statutory language directing the agency to regulate emissions that come “from” regulated vehicles. There are other life cycle emissions that are also set aside, and vehicles powered by gasoline have their own significant upstream emissions related to the production and distribution of gasoline that are not incorporated into the mathematical formulas that govern compliance. The overwhelming share of carbon dioxide emissions from light duty vehicles are generated by the combustion of gasoline and enter the troposphere through tailpipes. The primary objective of the regulatory framework is to curtail these emissions. [EPA-HQ-OAR-2022-0829-0500, p. 2]

The rules governing compliance have evolved through many rulemaking cycles, and the ongoing focus on tailpipe emissions is, in part, a manifestation of pragmatism. The agency's 2009 endangerment finding regarding carbon dioxide created an obligation to regulate this major tailpipe greenhouse gas, and it was no small task to determine how to go about it. The regulatory framework that was agreed to under President Obama was a remarkable achievement that has served the nation well. Fleet averaging, targets based on vehicles footprints, and the establishment of a cap-and-trade CO2 credit market were effective methodologies that continue to provide valuable flexibility to automakers and are reasonably fair. The framework was crafted when BEV market penetration was very low and there was little need to consider upstream emissions. The 2012 framework envisioned net upstream emissions accounting that would commence in 2022, but that approach was abandoned in 2020. [EPA-HQ-OAR-2022-0829-0500, pp. 2-3]

The mathematical formulas used to determine individual fleet standards and performance values are extremely complex, surpassing the mathematical reasoning skills of most people, but they work. Adding adjustments for upstream emissions would add another layer of complexity. It would be difficult to estimate upstream emissions accurately, but not impossible. Tailpipe carbon dioxide emissions are directly related to gasoline fuel economy, and the agency has reason to trust the CO2 values it assigns to the gas-powered vehicles it regulates. A high level of accuracy in the quantification of tailpipe emissions is a valuable attribute of the framework that enhances its effectiveness. [EPA-HQ-OAR-2022-0829-0500, pp. 2-3]

Quantifying upstream emissions would require the application of subjective assumptions, and broadening the scope of compliance determination beyond tailpipe emissions would likely increase differences of opinion among stakeholders. It might even lead to more litigation, though that hardly seems possible. Automakers need to design their vehicles years in advance and depend on a stable regulatory framework. They have invested billions of dollars in electrification and seem satisfied with the existing upstream emissions policy. Keeping things simple and consistent yields important benefits. [EPA-HQ-OAR-2022-0829-0500, pp. 3-4]

Most importantly, the current approach appears to accelerate the electrification of the national fleet. BEVs are currently our best hope for fully decarbonizing light duty transportation. Ending the use of gasoline will take decades, and the worthwhile effort must proceed with a sense of urgency. The EPA's current policy on upstream emissions leverages the extraordinary potential of BEVs, which are increasingly recognized as a feasible, scalable alternative to conventional vehicles. There are many challenges that come with widespread BEV adoption, and the EPA's obligation to reduce anthropogenic carbon dioxide is well served when it accelerates the electrification of ground transportation. The EPA is addressing upstream emissions by regulating the utilities that produce them and believes that this strategy is adequate and appropriate. The upstream emissions generated by BEVs will fall to zero when our grids are fully decarbonized, and they do not currently represent a large percentage of light duty emissions. [EPA-HQ-OAR-2022-0829-0500, pp. 3-4]

The EPA is to be commended for soliciting comments on its treatment of upstream emissions, which would remain the same under its proposal. BEVs that produce zero tailpipe emissions will proliferate dramatically between now and 2032, and this inevitable change in the future composition of the national fleet has important implications that the agency must acknowledge as it considers reforming its policy on upstream emissions. My arguments focus exclusively on the EPA's proposed upstream emissions policy for light duty vehicles, which I oppose. Accelerating electrification has always been and continues to be a very worthy goal, but the time has come for BEVs to be held accountable for their upstream emissions. [EPA-HQ-OAR-2022-0829-0500, pp. 4-5]

As the agency primarily responsible for the abatement of anthropogenic carbon dioxide, the EPA is obligated to enact policies that will maximize the fuel economy of the emerging electric fleet. The existing policy on upstream emissions fails to do this. When BEV technology was in its infancy, there was a sensible consensus that the regulatory framework should incentivize its growth. This was the rationale for multipliers, and the same reasonable rationale was applied to hydrogen fuel cell technology. Explaining its proposed decision on upstream emissions, the EPA argues that the current approach has incentivized electrification effectively for over a decade and should therefore continue. Given the considerable momentum that is now driving electrification forward, that argument is somewhat questionable. The decisions made today will have a major impact on the fuel economy of future BEVs, and this impact is arguably more consequential for the environment than the pace of the ongoing transition. It is time for the agency to begin fostering improvements in electric fuel economy, and it should do so by reforming its policy on upstream emissions [EPA-HQ-OAR-2022-0829-0500, pp. 4-5]

When all life cycle emissions are considered, BEVs generate far fewer carbon dioxide emissions than other powertrains, but there is currently wide efficiency variation among different BEV models. Fueleconomy.gov currently shows the Lordstown Endurance earning a combined MPGe rating of just 48. The 2023 Hyundai Ioniq 6 Long range RWD has a much higher combined MPGe rating of 140. The most efficient BEV is currently three times as frugal as the least efficient. When, for compliance purposes, the regulatory framework treats both vehicles as generating zero emissions, it systematically ignores this large disparity in fuel economy. Until our grids are fully decarbonized, the upstream emissions of the two vehicles will be proportional to their disparate MPGe ratings. Those upstream emissions need to be curtailed., and it is imperative that we moderate additional electricity demand while we struggle to produce it cleanly. There are also new challenges associated with the widespread distribution of electric auto fuel that are made more difficult by inefficient BEVs. The most straightforward way to optimize the fuel economy of BEVs is to hold them accountable for their upstream emissions when averaging fleet performance. [EPA-HQ-OAR-2022-0829-0500, p. 5]

The continuation of the existing policy through 2032 would have significant implications for the fuel economy of the emerging electric fleet. Assessing these implications requires a clear-headed view of the "favoritism" that is currently embedded in the regulatory framework. Misleading criticism of BEV favoritism is rooted in the erroneous view that electric fuel produces upstream emissions, but gasoline does not. Both fuels produce upstream emissions that represent a significant portion of their powertrain's life cycle emissions, and neither powertrain is currently held accountable for them. [EPA-HQ-OAR-2022-0829-0500, pp. 5-6]

A more compelling articulation of BEV favoritism argues that the existing regulatory framework forces automakers to improve the fuel economy of gas-powered vehicles but allows BEVs to squander as much electricity as they please. Conventional vehicles do produce upstream emissions that are not tallied for compliance purposes, but those emissions are subject to the considerable restraint that the framework imposes on gasoline fuel economy. The EPA's treatment of BEVs is fundamentally different, and it can only be seen as favorable treatment, ignoring electric fuel economy altogether. The framework does nothing to curtail the upstream emissions associated with the production of electric auto fuel. It also does nothing to conserve the electrical energy that powers our growing electric fleet. Energy is conserved when BEVs displace conventional vehicles, but more is conserved when those BEVs use their fuel efficiently. [EPA-HQ-OAR-2022-0829-0500, pp. 5-6]

Energy conservation is a fundamental goal of environmental stewardship, and this is especially true as we struggle to generate an adequate supply of clean electricity. Light duty vehicles are not the only machines running on fossil fuels that need to be electrified. A day will come when our grids are fully decarbonized, clean electricity is plentiful, and BEV fuel economy makes no difference, but that day is far off. Until then, the EPA is obligated to reduce upstream emissions and conserve energy by optimizing the fuel economy of BEVs. It shares this obligation with the National Highway Traffic Safety Administration, and the two agencies should harmonize their approaches to electric fuel economy, consistent with their overlapping statutory goals. The cleanest electricity on Earth is electricity that never has to be generated to begin with. [EPA-HQ-OAR-2022-0829-0500, pp. 6-7]

The upstream emissions generated by BEVs are proportional to their fuel economy, and the agency cannot skirt its obligation to minimize them by arguing that it will control these emissions by regulating the power plants that produce them. The synergistic benefits of regulating power plants and BEVs simultaneously are obvious. Improving the fuel economy of BEVs reduces overall demand for electricity and the quantity of upstream emissions. The regulation of power plants reduces the carbon intensity of electric auto fuel. Both regulatory efforts reinforce one another as they work to reduce carbon dioxide accumulating in the troposphere. It makes little sense to regulate one but not the other, carelessly wasting electric auto fuel while investing billions to produce it cleanly. [EPA-HQ-OAR-2022-0829-0500, pp. 6-7]

The EPA appears to take the view that displacing the copious emissions associated with gasoline combustion justifies an incentivize now, economize later approach to the electric fleet. Before arguing further, I will pause to admit, with an appropriate level of humility, that assessing the efficacy of the current approach is a very tough judgement to make. Reasonable people will disagree, and the sophisticated computer models that the agency uses to project outcomes informs its view beyond my level of expertise. When this rulemaking process is completed, I believe that the EPA will make a sound decision regarding its treatment of upstream emissions. I intend to exercise my right to comment, at length, laying out the very strong case for upstream emissions accountability. [EPA-HQ-OAR-2022-0829-0500, p. 7]

The EPA's current policy on upstream emissions frees automakers from any legal obligation to optimize electric fuel economy. The framework regulates the fuel economy of conventional vehicles, but it does not regulate the fuel economy of BEVs. When averaging fleet performance, each BEV model is arbitrarily assumed to have perfect fuel economy that produces zero emissions. Its MPGe rating is immaterial. Absent any regulatory limits on electric fuel consumption, consumer desire for additional vehicle size, horsepower, and range will decrease the fuel economy of the emerging electric fleet. (It is worth noting here that the federal tax incentive provided by the Inflation Reduction Act also does nothing to optimize electric fuel economy. Plug-in hybrids with very poor fuel economy will qualify for the same $7,500 tax break as the most efficient BEVs.) If BEVs are going to begin replacing conventional vehicles in large numbers, they need to be as efficient as possible. [EPA-HQ-OAR-2022-0829-0500, pp. 7-8]

The increasingly stringent standards will force automakers to continue moderating the desirable attributes of their conventional vehicles, but the corresponding attributes of BEVs will not be subject to similar restraint. This will give BEVs a significant marketing advantage in the 2027-2032 time frame as automakers strive to sell enough electric vehicles to achieve compliance. Ample size and horsepower will help offset convenience drawbacks that discourage consumers from purchasing BEVs. Conventional muscle cars, jumbo SUVs, and overpowered pickups have difficulty meeting their footprint targets, and extremely inefficient BEVs are already being designed to compete against them. As important as it is to displace the dirtiest gas burners, the EPA should not give its blessing to the unbridled exploitation of inefficient BEV attributes. [EPA-HQ-OAR-2022-0829-0500, pp. 7-8]

BEVs will also square off against each other, with size and horsepower increasing in an inflationary cycle of one-upmanship. The observable attributes of the 2023 BEV fleet demonstrate that automakers intend to weaponize the marketing advantages that the EPA's generous upstream emissions policy confers. The ability of these advantages to accelerate BEV adoption does not justify the additional inefficiency that will be embedded in the emerging electric fleet to satisfy consumer demands. [EPA-HQ-OAR-2022-0829-0500, pp. 8-9]

There is already evidence that automakers are upsizing their BEV offerings, and there appears to be a very strong reluctance to market small models that might deliver outstanding fuel economy. Volkswagen decided not to sell its small id.3 in the United States, replacing the electric Golf with the id.4. General Motors recently announced that it will discontinue production of the efficient Chevy Bolt. There is a lot of competition emerging to capture market share in electrified pickup trucks and luxury SUVs, and nobody appears overly concerned about their abysmal MPGe ratings. An unrestrained upsizing trend will thwart efforts to reduce the average price of BEVs, strengthening the public perception that BEVs are toys that only rich people play with. The notable absence of BEVs in the more affordable compact and subcompact segments does not bode well for widespread BEV adoption, and the regulatory framework does little to encourage their availability. [EPA-HQ-OAR-2022-0829-0500, pp. 8-9]

In fact, the existing policy on upstream emissions has an unintentional mathematical quirk with great potential to upsize the emerging electric fleet. Compliance is ultimately achieved by maintaining an adequate supply of credits, and the number of credits that an efficient model generates is determined by its production volume and the degree to which it outperforms its footprint target. All BEVs generate copious credits because the rules allow them to beat their footprint targets by 100 percent. A BEV with a larger footprint generates more credits than a smaller BEV because there is a greater disparity between its larger footprint target and its arbitrary zero emissions value. The entire rationale for the footprint model is nonsensical when applied to BEVs, and the credits they generate exceed the emission reductions they deliver in the real world. It is extremely troubling that these disingenuous windfall credits are used to offset the shortcomings of the worst gas guzzlers. Holding BEVs accountable for their upstream emissions would allow them to compete against their footprint targets in a conventional way. The credits BEVs generate would more accurately reflect their actual environmental benefits, and the unintended incentive to upsize BEVs would be neutralized. [EPA-HQ-OAR-2022-0829-0500, pp. 9-10]

Efficiency losses associated with upsizing will be compounded by increasingly excessive BEV horsepower. Consumer thirst for horsepower appears to be unquenchable, and BEVs are well suited for serving it up. Many BEV models have high performance variants that earn lower MPGe ratings than their standard counterparts. Many models offer a variety of driving modes that allow the motorist to boost performance by sacrificing fuel economy. Automakers know that additional horsepower will win market share far more than fuel economy. Consumers have shown that they will tolerate a considerable increase in the cost of gasoline to obtain a vehicle that delivers brisk acceleration or outstanding towing capacity, and it is unlikely that a different fuel will alter their priorities. The inherent athleticism of BEVs will be optimized to outperform conventional vehicles that are forced to take fuel economy into account, and BEVs in all segments will compete against each other for market share by prioritizing acceleration. We are already seeing the emergence of an overpowered electric fleet that is far less efficient than it could be. If the regulatory framework is not modified, electric fuel economy will continue to be a low priority for automakers. [EPA-HQ-OAR-2022-0829-0500, pp. 9-10]

Consumer desire for additional range may also put downward pressure on fuel economy. Conventional vehicles have the upper hand with this critical vehicle attribute. Gasoline tanks are sized to provide adequate range. Inadequate range is currently a major convenience drawback for BEVs, and they will not sell in large numbers until range figures increase substantially. Poor range also compounds the convenience drawback of slow refueling because it increases the frequency of charging station visits when travelling far from home. When battery packs are enlarged to provide additional range, fuel economy often suffers. [EPA-HQ-OAR-2022-0829-0500, pp. 10-11]

The relationship between range and electric fuel economy is complex. Higher fuel economy increases range, but automakers can achieve the same result by increasing the size of the battery pack. This approach adds considerable weight to the vehicle and tends to reduce fuel economy. The tradeoff between range and efficiency will shift as engineers improve the gravimetric energy density of battery cells, and impressive breakthroughs appear to be just around the corner. It is also worth noting that some automakers are producing BEV models that deliver impressive range along with outstanding fuel economy. Still, the EPA should be very concerned that its failure to regulate BEV fuel economy will result in the unrestrained upsizing of battery packs. The trend will increase demand for limited supplies of resources like lithium which will also be needed for batteries that store intermittent renewable energy. In the near term, the inability to secure an adequate supply of battery materials will slow BEV proliferation. [EPA-HQ-OAR-2022-0829-0500, pp. 10-11]

Incorporating upstream emissions accountability into the regulatory framework would be consistent with the phasing out of multipliers that have been used to incentivize the early growth of BEVs. The EPA is to be commended for agreeing to end the generous incentive in the latter half of the 2023-2026 time frame. As BEVs began to sell in larger numbers, the multipliers had growing potential to undermine the integrity of the cap-and-trade credit market, which resulted in the EPA capping the benefit, then eliminating it altogether. The rationale for multipliers was rooted in their power to catalyze BEV manufacturing, and the fact that they were finally phased out reflects the agency's wise judgement that they had accomplished their mission and were no longer necessary. Introducing upstream emissions accountability in the 2027-2032 time frame would be consistent with this same judgement, adjusting the framework in response to projected increases in BEV proliferation. If BEVs are going to make up 67% of car sales in 2032, we should not wait until then to begin optimizing electric fuel economy. The EPA's rationale for continuing the current upstream emissions policy echoes the original rationale for multipliers. That obsolete rationale becomes less and less compelling as BEVs reach higher levels of market penetration all around the globe. [EPA-HQ-OAR-2022-0829-0500, pp. 13-14]

The 2027 model year appears to be a very appropriate time to begin regulating the efficiency of the emerging electric fleet, but automakers would likely prefer more lead time to adjust to such a major change. Fortunately, the agency has the ingenuity to craft regulations that phase in upstream emission accountability, just as it phased out multipliers. It also has the necessary expertise to adjust the overall stringency and slope of the footprint curves to compensate for an evolving upstream emissions policy. If upstream emissions accountability were to be phased in between 2028 and 2032, automakers would have five years to prepare. If accountability were to commence in 2029, they would have six. The impact of the change could also be softened by making a generous calculation of upstream BEV emissions that averages the projected carbon intensity of the national grid across the expected operational life of the BEV. [EPA-HQ-OAR-2022-0829-0500, pp. 13-14]

The upstream emissions associated with gasoline production could be phased in during the same time frame, with similar adjustments to keep the overall stringency of the framework reasonable. This might be seen by some as negating the new policy regarding the upstream emissions of electric fuel. Such an argument would fail to persuade. Gasoline and electricity both come with significant upstream emissions that can be estimated with reasonable accuracy, and an effective, equitable framework would treat them roughly the same way. (There are currently not enough fuel cell vehicles in operation to worry about the upstream emissions of hydrogen fuel.) If both gasoline and electricity were held accountable for their upstream emissions and stringency was adjusted accordingly, the obligation to improve the fuel economy of gasoline powered vehicles would remain about the same, and there would now be an appropriate regulatory incentive to optimize the fuel economy of BEVs. [EPA-HQ-OAR-2022-0829-0500, pp. 14-15]

The agency should not refrain from implementing such a change based on the legal argument that it is only authorized to regulate tailpipe emissions that come "from" the vehicles themselves. The statute does not confine the agency to emissions that come "directly from" vehicle tailpipes, and a broader interpretation of the word "from" is well within the agency's discretion. In 2012, net upstream emissions accountability was scheduled to commence in 2022. The EPA is responsible for multiple approaches to carbon dioxide abatement, and it is entirely appropriate for the agency to recognize the synergistic benefits of increasing the fuel economy of the emerging electric fleet while decreasing the carbon intensity of the grid. The fact that upstream emissions have not been regulated in the past is also a poor excuse to maintain the current approach. BEVs are going to proliferate on a much larger scale, and the old policy needs to give way to this new reality. Compromising the agency's longstanding commitment to energy conservation is a much larger break from precedent than a reinterpretation of the word "from". [EPA-HQ-OAR-2022-0829-0500, pp. 14-15]

The EPA must ultimately strike a balance between two fundamental goals that contribute to carbon dioxide abatement. First, it must accelerate the adoption of BEVs, displacing conventional vehicles that are creating the lion's share of light duty vehicle emissions. Second, it must conserve energy by maximizing the efficiency of the emerging electric fleet, reducing aggregate demand for electric auto fuel. The current upstream emission policy fails to strike this balance because it places far too much weight on accomplishing the first goal. Both goals are very important, and they do not undermine one another nearly as much as it may appear. In many ways mentioned above, increasing electric fuel economy supports rapid BEV adoption. I urge the agency to initiate efforts to achieve the second goal by phasing in upstream emissions accountability. The battle against climate change will only be won if we make the very best use of our most promising mitigation strategies. If BEVs are to deliver the full measure of their enormous potential, they can no longer be allowed to squander electricity. Thank you for soliciting comments on this very important issue. [EPA-HQ-OAR-2022-0829-0500, p. 15]

Organization: East Kansas Agri-Energy (EKAE)

EKAE appreciates the Biden administration's goals of increasing vehicle efficiency and reducing carbon emissions. However, we firmly oppose regulatory approaches that arbitrarily favor certain technologies over others, which regrettably seems to be the case with this proposed rule. EPA's proposal would force automakers to produce more battery electric vehicles and discourage them from pursuing other technologies that could achieve the same, or even better, environmental performance at a lower cost to American consumers. [EPA-HQ-OAR-2022-0829-0734, p. 1]

The Agency's decision to assign a Zero grams/mile compliance value to EVs unfairly favors electric vehicle manufacture, while falsely assuming EVs have no carbon impact whatsoever. In this case the Agency is only following the science when it's convenient and nowhere near being consistent with fact. [EPA-HQ-OAR-2022-0829-0734, p. 1]

Organization: Environmental. and Public Health Organizations

C. EPA should not foreclose the possibility of including upstream emissions in compliance accounting.

The Agency’s 2012 rule included net compliance accounting for PEVs’ upstream emissions from electricity generation beginning with MYs 2022-2025. 88 Fed. Reg. at 29252; 77 Fed. Reg. at 62816. Under that rule, net upstream emissions were to be determined by “attribut[ing] a pro rata share of national CO2 emissions from electricity generation to each mile driven under electric power minus a pro rata share of upstream emissions” from gasoline production. 88 Fed. Reg. at 29252. EPA justified leaving these emissions unaccounted for through MY 2023 as a then-necessary incentive for EV technology adoption. However, EPA’s 2020 rule, effective before MY 2023, removed net upstream accounting requirements through MY 2026. 85 Fed. Reg. at 25208. EPA now proposes to eliminate upstream emissions accounting permanently, reasoning that upstream CO2 accounting has consistently been absent from the vehicle program since its inception; that Section 202 regulates only tailpipe emissions; and that power plant emissions, regulated under separate statutory programs, are on the decline. EPA also notes that it does account for upstream emissions in its separate analysis of overall estimated vehicle emissions impacts and the projected benefits of its rules, and that any EV upstream accounting for compliance purposes, were it to take place, would have to be accompanied by a calculation of upstream emission impacts of combustion vehicles from refineries. 88 Fed. Reg. at 29252.168[EPA-HQ-OAR-2022-0829-0759, pp. 62-63]

168 On a "lifecycle" basis, ZEVs offer superior emissions reductions compared to combustion vehicles. See generally Adrian O'Connell et al., Int'l Council on Clean Transp. (ICCT), A Comparison of the Life-Cycle Greenhouse Gas Emissions of European Heavy-Duty Vehicles and Fuels (2023), https://theicct.org/wp-content/uploads/2023/02/lca-ghg-emissions-hdv-fuels-europe-feb23.pdf; Lu Xu, Life Cycle Greenhouse Gas Emissions of Conventional and Alternative Heavy-duty Trucks: Literature Review and Harmonization (Thesis), at chs. 3-4 (2021), https://hdl.handle.net/1807/108920; Dora Burul & David Algesten, Scania, Life cycle assessment of distribution vehicles: Battery electric vs diesel driven (undated), https://www.scania.com/content/dam/group/press-and-media/press-releases/documents/Scania-Life-cycle-assessmen t-of-distribution-vehicles.pdf; Georg Bieker, ICCT, A Global Comparison of the Life-cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars (2021), https://theicct.org/wp-content/uploads/2021/07/Global-Vehicle-LCA-White-Paper-A4-revised-v2.pdf; Jarod C. Kelly et al., Argonne National Laboratory, Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies, at ch. 8 & app. B, (2022), https://publications.anl.gov/anlpubs/2022/07/176270.pdf; Fuels Institute, Life Cycle Analysis Comparison, (2022), https://www.transportationenergy.org/wp-content/uploads/2022/10/FI_Report_Lifecycle_FINAL.pdf; Maxwell Woody et al., Corrigendum: The role of pickup truck electrification in the decarbonization of light-duty vehicles, Env't Rsch. Letters, July 15, 2022, https://iopscience.iop.org/article/10.1088/1748-9326/ac7cfc/pdf; David Reichmuth et al., Union of Concerned Scientists, Driving Cleaner: Electric Cars and Pickups Beat Gasoline on Lifetime Global Warming Emissions (2022), https://www.ucsusa.org/sites/default/files/2022-09/driving-cleaner-report.pdf; Florian Knobloch et al., Net emission reductions from electric cars and heat pumps in 59 world regions over time (Dec. 1, 2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7308170/pdf/EMS85812.pdf (author manuscript; published in final edited form at 3 Natural Sustainability 437 (2020)).

If EPA proceeds as proposed, it must undertake a full and comprehensive upstream emissions analysis for all vehicles as part of its cost-benefit analysis. However, as noted above, EPA itself previously (and reasonably) interpreted the statute as granting it discretion to include upstream emissions and has set standards that do so. 88 Fed. Reg. at 29252; 77 Fed. Reg. at 62816. We believe the better option is to include upstream emissions of all vehicles in compliance accounting, particularly as EVs are becoming a larger part of the new vehicle fleet and the proliferation of ever larger and heavier EVs increases their upstream emissions. In either case, as EPA states, any accounting of upstream emissions—whether for compliance purposes or cost-benefit analysis—must be consistent for all vehicles. If the Agency proceeds as proposed, we strongly urge it not to characterize its decision as "permanent." Both the vehicle and power generation industries are currently undergoing rapid changes. Though power generation emissions have been declining, the need for electricity is increasing, and the reduction of EV energy use will become more important as the fleet becomes more electrified. Any decision now to permanently omit fleet upstream emissions compliance accounting would be premature. [EPA-HQ-OAR-2022-0829-0759, pp. 63-64]

Organization: Exxon Mobil Corporation

EPA should also consider complementary GHG emission standards for new vehicles based on a well-to-wheels (WTW) lifecycle emissions accounting methodology. Such standards would encourage lower CO2e emissions per mile driven (gCO2e/mile) complementing the above-mentioned carbon-intensity based standards for the energy used by the vehicles. Current vehicle GHG standards account only for fuel combustion or tank- to-wheels emissions. A WTW approach, which accounts for lifecycle GHG emissions, allows for a more transparent comparison between the lifecycle emissions associated with vehicle types. In the case of BEVs or plug-in hybrid electric vehicles, such a standard would allow consumers to see the emissions associated with the electricity used to power these vehicles. Moreover, it enables consistent GHG accounting, and thus provides a more holistic approach toward encouraging advancement in vehicle technologies that can reduce GHG emissions. [EPA-HQ-OAR-2022-0829-0632, pp. 3-4]

Organization: Ford Motor Company

Upstream emissions

Ford fully supports EPA's proposal to continue to exclude upstream emission accounting from manufacturer's compliance calculations for PHEVs and EVs, and we encourage CARB and NHTSA to align with EPA's approach when developing future standards. [EPA-HQ-OAR-2022-0829-0605, p. 9]

Organization: General Motors, LLC (GM)

We support continued treatment of EVs as zero gram per mile in the GHG and Tier 4 regulations. This is appropriate due to EVs emitting zero emissions, and due to EV upstream emissions being outside the control of regulated auto companies [EPA-HQ-OAR-2022-0829-0700, p. 5]

Organization: Growth Energy

Yet the Proposed Rule almost entirely ignores the GHG-reduction and other benefits of ethanol and other biofuels. Most significantly, it fails even to consider the upstream carbon sink that results from growing crops used in biofuels while simultaneously dismissing the upstream carbon emissions of building and powering EVs. EPA assesses the emissions lifecycles of two complex vehicle systems—EVs and internal combustion engine ("ICE") vehicles—in a way that heavily puts the thumb on the scale in favor in EVs. First, although both EVs and ICE vehicles generate "upstream" emissions from vehicle and engine production and power generation, EPA dismisses this reality. Second, although ICE vehicles can run on a diverse range of fuels with vastly different GHG emissions profiles, EPA fails to consider this diversity when assessing "downstream" emissions from petroleum-based and biofuels-based vehicle systems. The result is a proposal that inaccurately treats EVs as if they generate zero grams per mile of carbon and just as inaccurately treats emissions from the use of biofuels the same as emissions from combusting petroleum fuels. [EPA-HQ-OAR-2022-0829-0580, p. 3]

The Proposed Rule is different in kind than EPA's prior tailpipe rules. For one, it makes permanent EPA's disregard of the upstream emissions of EVs, which prior rules promised would be temporary. [EPA-HQ-OAR-2022-0829-0580, p. 4]

The zero grams/mile compliance value for EVs … does not reflect the increase in upstream GHG emissions associated with the electricity used by EVs compared to the upstream GHG emissions associated with the gasoline or diesel fuel used by conventional vehicles. For example, based on GHG emissions from today's national average electricity generation (including GHG emissions associated with feedstock extraction, processing, and transportation) and other key assumptions related to vehicle electricity consumption, vehicle charging losses, and grid transmission losses, a midsize EV might have an upstream GHG emissions of about 180 grams/mile, compared to the upstream GHG emissions of a typical midsize gasoline car of about 60 grams/mile. Thus, the EV would cause a net upstream GHG emissions increase of about 120 grams/mile (in general, the net upstream GHG increase would be less for a smaller EV and more for a larger EV). [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

75 Fed. Reg. 25,324.

And that estimate of 120 grams/mile for EVs' upstream emissions does not even account for emissions associated with production of batteries. Recent research has increasingly revealed that there are significant GHG emissions associated with the mining of materials for production of batteries used in EVs.6 For example, mining nickel alone requires both significant fossil energy expenditures and GHG emissions associated with land use, including the clear-cutting of rainforest in Indonesia.7 When compared to production of an ICE vehicle on a cradle-to-grave basis, those emissions represent another source of emissions from EVs that are not addressed in EPA's assumption that EVs produce zero grams per mile of GHGs. [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

6 See, e.g., Catherine Early, The new 'gold rush' for green lithium, BBC News (Nov. 24, 2020) https://www.bbc.com/future/article/20201124-how-geothermal-lithium-could-revolutionise-green-energy.

7 Jon Emont, EV Makers Confront the 'Nickel Pickle', Wall Street Journal, June 4, 2023.

Indeed, a recent National Academy of Sciences ("NAS") assessment explained that an approach like EPA's fails to "fully capture" emissions from "the total light-duty vehicle system."8 NAS noted that one issue of that type of non-system-based analysis is that it would lead to inaccurate comparisons between vehicles using different fuels.9 And NAS further opined that: [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

8 National Academy of Sciences (NAS), Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035 at 13-416 (2021).

9 Id.

[I]f deep GHG emissions reduction is a goal, then there will need to be consideration of not only onboard vehicle emissions, but also the emissions from related sectors, like electricity (for vehicle charging), and manufacturing (of vehicles and their materials and components). This motivates the need for life cycle thinking.10 [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

10 Id.

Moreover, EPA has not acknowledged the inaccuracy of failing to account for the carbon absorbed by biofuel feedstocks when they are grown. Because all of the carbon emitted from a tailpipe is sequestered by crops while they grow, EPA's emissions values assigned to ICE vehicles using biofuels misses dramatically in the other direction. [EPA-HQ-OAR-2022-0829-0580, pp. 7-8]

The fundamental scientific reality that emissions from combusting biofuels is offset by crops' absorption of carbon is reflected in other EPA programs like the Renewable Fuel Standard program. There, emissions from combustion of biofuels in a vehicle are excluded in lifecycle analyses because "[o]ver the full lifecycle of the fuel, the CO2 emitted from biomass-based fuels combustion does not increase atmospheric CO2 concentrations, assuming the biogenic carbon emitted is offset by the uptake of CO2 resulting from the growth of new biomass." 74 Fed. Reg. 24,904, 25040 (May 26, 2009). Similarly, the IPCC excludes emissions from combustion of fuels from biogenic sources when assessing national or sectoral carbon emissions. See 2006 IPCC

Guidelines for National Greenhouse Gas Inventories Vol. 2 at 2.3.3.4. [EPA-HQ-OAR-2022-0829-0580, pp. 7-8]

EPA's failure to recognize biofuels' upstream carbon benefits leads to absurd results in the context of the Proposed Rule. For example, a 2019 MIT study found that, when accounting for emissions from all aspects of a vehicle's manufacturing, fueling, and use, EVs emitted about 200 grams/mile over their lifetimes, compared to about 350 grams per mile for gasoline powered cars, for an emissions reduction of about 43 percent.11 That emissions reduction is very similar to the 46 percent reduction of 100 percent ethanol compared to petroleum.12 Yet, the Proposed Rule would treat an EV as emitting zero GHGs while treating an ICE vehicle running on 100 percent ethanol as having the same lifecycle GHG emissions as petroleum. [EPA-HQ-OAR-2022-0829-0580, pp. 7-8]

11 Massachusetts Institute of Technology, Insights into Future Mobility (2019), available at https://energy.mit.edu/wp-content/uploads/2019/11/Insights-into-Future-Mobility.pdf.

12 Scully, et. al., Carbon intensity of corn ethanol in the United States: state of the science 16 Environ. Res. Lett. 043001 (2021).

Indeed, EPA has already created a methodology for accounting for upstream emissions from EVs; prior light-duty vehicle rules committed to begin accounting for upstream emissions above a certain cap in future years. See, e.g., 77 Fed. Reg. 62624. [EPA-HQ-OAR-2022-0829-0580, p. 10]

EPA provided the following example of how that emissions accounting would work for a Nissan Leaf: [EPA-HQ-OAR-2022-0829-0580, p. 10]

-A measured 2-cycle vehicle electricity consumption of 238 watt-hours/mile over the EPA city and highway tests [EPA-HQ-OAR-2022-0829-0580, p. 10]

-Adjusting this watt-hours/mile value upward to account for electricity losses during electricity transmission (dividing 238 watt-hours/mile by 0.935 to account for grid/transmission losses yields a value of 255 watt-hours/mile) [EPA-HQ-OAR-2022-0829-0580, p. 10]

-Multiplying the adjusted watt-hours/mile value by a 2030 EV/PHEV electricity upstream GHG emissions rate of 0.534 grams/watt-hour at the power plant (255 watt-hours/mile multiplied by 0.534 grams GHG/watt-hour yields 136 grams/mile) [EPA-HQ-OAR-2022-0829-0580, p. 10]

-Subtracting the upstream GHG emissions of a comparable midsize gasoline vehicle of 41 grams/mile to reflect a full net increase in upstream GHG emissions (136 grams/mile for the EV minus 41 grams/mile for the gasoline vehicle yields a net increase and EV compliance value of 95 grams/mile). [EPA-HQ-OAR-2022-0829-0580, p. 10]

Id. at 82,822. While that methodology is a simplification of the upstream emissions to a certain extent, it is an easily workable estimate for the upstream emissions from EVs. EPA could and should, at a minimum, use that approach or a similar one to account for EV emissions for 2027 and later years in this rule. [EPA-HQ-OAR-2022-0829-0580, p. 10]

Yet, EPA backed away from its promise to account for upstream emissions in the 2020 rule, and it has now proposed to make the continued lack of any such accounting "permanent." 88 Fed. Reg. at 29,252. EPA articulated two purported reasons for doing so: (1) that its regulations have “functioned as intended” without any upstream accounting by “encouraging the continued development and introduction of electric vehicle technology,” and (2) that upstream emissions are “addressed by separate stationary source programs.” Id. [EPA-HQ-OAR-2022-0829-0580, p. 10]

Neither of those justifications is a rational reason to continue deliberately underestimating the emissions from EVs. To begin with, while it is true that systematic underestimates of emissions incentivize EV development, this ignores the fact that they disincentivize development in other promising GHG-reduction technologies like biofuels. By incentivizing one technology to the exclusion of others, EPA is reducing an opportunity to develop different technologies that will be appropriate for more applications across the country. [EPA-HQ-OAR-2022-0829-0580, p. 10]

And the fact that upstream emissions are addressed by stationary source permitting programs is no justification at all. Those programs help reduce emissions but do not eliminate them—EPA’s rule still fails to estimate the true lifecycle emissions from EVs even when considering that power plants must get Title V, PSD, and NSPS permits. [EPA-HQ-OAR-2022-0829-0580, p. 10]

EPA also points out that, if it estimated upstream emissions from EVs, “it would appear appropriate to do so for all vehicles, including gasoline-fueled vehicles.” 88 Fed. Reg. at 29,252. [EPA-HQ-OAR-2022-0829-0580, p. 10]

That’s right—EPA should compare apples to apples. But that additional burden of estimating another set of upstream emissions is no reason not to do it. By comparing the lifecycle emissions of EVs and the lifecycle emissions of ICE vehicles, EPA could much better align the incentives provided by its tailpipe rules with the real world. [EPA-HQ-OAR-2022-0829-0580, p. 10]

EPA should ensure that its tailpipe rule maximizes emissions reductions and minimize costs. Appropriately accounting for the lifecycle GHG emissions of vehicles would eliminate unintended consequences like incentivizing fossil hydrogen over low-carbon biofuels. And it would align the incentives provided by EPA’s tailpipe rule with an accurate calculation of lifecycle GHG emissions so that the market can achieve the greatest emissions reductions in the most efficient way. For some vehicle needs and local markets, that may be investing in EVs, but in others it may be investing in vehicles with efficient ICE engines that can and do use higher biofuel blends. [EPA-HQ-OAR-2022-0829-0580, pp. 11-12]

V. The Proposed Rule’s Permanence and Stringency Make its Disparate Treatment of Biofuels and EVs More Problematic.

A. The Impacts of the Proposed Rule are Much More Dramatic than in Previous Tailpipe Rules.

While previous tailpipe rules have made similar mistakes in failing to properly estimate emissions from biofuels and EVs, the impacts of the Proposed Rule are much greater, for two reasons. [EPA-HQ-OAR-2022-0829-0580, pp. 13-14]

First, EPA’s decisions in prior rules not to account for the upstream emissions of EVs were characterized as temporary. In 2012, EPA committed to accounting for upstream emissions above a certain cap for each automaker starting in model years 2022 through 2025. 77 Fed. Reg. at 62,822. EPA later extended the time period of not accounting for upstream emissions through

2026, but it still indicated that such treatment would be temporary. See 86 Fed. Reg. at 74,446. In contrast, the proposed rule is clear that EVs would be considered to emit zero grams per mile permanently. 88 Fed. Reg. at 29,252. Permanence changes the nature of and basis for that decision. [EPA-HQ-OAR-2022-0829-0580, pp. 13-14]

There may have been some justification for previously treating EVs as emitting zero grams per mile on a temporary basis. When EVs were in their relative infancy and needed some assistance to become better established, EPA could credibly assert that it was rational to give EVs an additional boost relative to other vehicles by conducting a skewed assessment of their emissions. Similarly, it would have been understandable if EPA had needed some time after EVs were introduced into commerce on a wider scale to best determine how to calculate their upstream emissions. But both of those excuses are now gone. EPA has already had over a decade since it promised in 2012 to account for upstream emissions of EVs in the future, and manufacturers have had that same amount of time with a thumb on the scale in their favor to ramp up their production. [EPA-HQ-OAR-2022-0829-0580, pp. 13-14]

Second, the proposed rule's stringency makes the impact of EPA's failure to consider both the upstream carbon sinks of biofuels and the upstream carbon emissions of EVs much greater. To date, EPA's tailpipe rules have incentivized EVs at the expense of other technologies, but they have done so in a manner that left room for other vehicles and fuels to play an important part in meeting the country's transportation needs. Today, EPA is putting all of its eggs in the EV basket. The only compliance scenario EPA discusses in the proposal would require more than two-thirds of all new vehicles to be EVs by 2032 (and, if it continues on its current trajectory, the percentage will presumably climb from there). That dramatic shift to EVs is fundamentally different than in prior rules. It disincentivizes biofuel use, even where biofuels could help reduce GHG emissions and be more suited to certain applications, like providing a low-carbon option in areas without sufficient charging infrastructure or with a carbon-intensive electric grid. [EPA-HQ-OAR-2022-0829-0580, p. 14]

Organization: HF Sinclair Corporation

By mandating the rapid electrification of the U.S. LD and MD passenger fleet, EPA's Proposed Rule exceeds its statutory and Congressional authority and severely constrains consumer choice. In so doing, EPA fails to fully account for the total carbon footprint of PEVs. [EPA-HQ-OAR-2022-0829-0579, p. 2]

Notably, EPA's assumption that PEVs produce zero GHGs – coupled with its failure to account for the overall carbon intensity associated with not only powering PEVs but also the emissions tied to mining, processing, and manufacturing of critical minerals necessary for PEV batteries – impedes the agency's ability to conduct a complete comparison of the GHG emissions resulting from different vehicle technologies. [EPA-HQ-OAR-2022-0829-0579, p. 2]

III. The Proposed Rule is Arbitrary and Capricious

a. EPA Fails to Properly Account for All GHG Emissions from PEVs

In an attempt to hinder consumer choice and penalize specific forms of technology, EPA's proposed rule fails fully account for the lifecycle GHG emissions that come from PEVs, creating a disparity between how ICE and PEV vehicle emissions are treated. While EPA purports to have considered the GHG emissions attributed to upstream emissions impacts from fuel production at refineries and electricity generating units,27 EPA assumes – without any factual basis – that the power sector will become cleaner over time through the increased use of wind and solar generation and electricity storage (i.e., more batteries). This in turn will purportedly mitigate EPA's recognized concern that, as a result of the proposed rule, "increases in emissions from [Electric Generating Units] . . . would lead to changes in exposure for people living in communities near these facilities."28 But, EPA glosses over this analysis, and instead only focuses on tailpipe emissions. And even if EPA's assumptions on a cleaner electric grid are correct, EPA fails to account for the increased GHG emissions that will come from an increasing effort to mine, process, and manufacture the critical minerals that will be required to both deliver batteries to power an all- electric future fleet as well as deliver "zero-emission" power to the grid. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

27 Proposed Rule at 29,252.

28 Proposed Rule at 29,327.

Moreover, EPA's proposal to remove upstream emissions from vehicle compliance determinations will incentivize vehicle manufacturers to produce PEVs without having to account for any of the associated emissions impact while ignoring labor and environmental standards of other nations. Preferentially accounting for certain air pollutant emissions over others within the same regulated vehicle class flies in the face of both EPA's statutory authority to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles…"29 and its purported regulatory objective to reduce GHG emissions. If PEVs are vehicles which cause or contribute to air pollution, then all associated pollution must be accounted for. If not, EPA may not include PEVs in the regulated "class" of motor vehicles along with comparable ICE vehicles. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

29 42 U.S.C. § 7521(a)(1).

For instance, the power source of a PEV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces emissions. The fact such emissions occur 100% upstream of the vehicle's operation and therefore fall outside of the tailpipe emissions calculation stacks the deck in favor of this technology. In fact, according to the International Energy Association, PEVs require six times the raw materials as a traditional ICE vehicle.30 There is no logical basis for this omission because, as EPA is aware, concerns about GHG emissions relate to their longer term global concentrations. Consequently, air pollutant emissions should be an important consideration regardless of where such emissions occur and, by myopically prioritizing PEVs, EPA fails to look at all technologically feasible options that may provide commensurate GHG reductions in a more cost-efficient manner. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

30 IEA, "In the transition to clean energy, critical minerals bring new challenges to energy security," (June 2023), available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive- summary.

The flaw in EPA's approach is illustrated by the fact that emissions standards easily become meaningless by changing the engine's location. The proposed rule would treat a PEV charged by a diesel-powered generator as if it had zero tailpipe emissions, notwithstanding the fact that it remains "powered" by a diesel engine located outside the vehicle. A light-duty vehicle directly powered by a diesel engine inside the vehicle, however, is credited with the emissions produced by that engine. Thus, the source of the "fuel" matters. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

For instance, the power source of a PEV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces emissions. The fact such emissions occur 100% upstream of the vehicle's operation and therefore fall outside of the tailpipe emissions calculation stacks the deck in favor of this technology. In fact, according to the International Energy Association, PEVs require six times the raw materials as a traditional ICE vehicle.30 There is no logical basis for this omission because, as EPA is aware, concerns about GHG emissions relate to their longer term global concentrations. Consequently, air pollutant emissions should be an important consideration regardless of where such emissions occur and, by myopically prioritizing PEVs, EPA fails to look at all technologically feasible options that may provide commensurate GHG reductions in a more cost-efficient manner. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

30 IEA, "In the transition to clean energy, critical minerals bring new challenges to energy security," (June 2023), available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive- summary.

Finally, EPA has not considered the foreseeable, indirect impacts the Proposed Rule will have on ambient air quality. First, with the high purchase price of new PEVs, consumers will likely hold on to their older, higher-emitting ICE vehicles to avoid the increased purchase price of a PEV. Second, PEVs are heavier, and will increase particulate matter emissions through increased brake, tire, and road wear. Ultimately, EPA arbitrarily ignores the full scope of emissions that will come from PEVs, and a full lifecycle analysis of all potential vehicle technologies must be conducted to fully understand the environmental impacts of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

Organization: Jaguar Land Rover NA, LLC (JLR)

0 g/mile of ZEVs

JLR supports the EPA's proposal to only include direct vehicle tailpipe emissions for a vehicle, thereby maintaining the 0 g/mile accounting of ZEV in the regulation. In the case of battery electric vehicles (BEVs), it is entirely true that they emit zero tailpipe CO_2 emissions, so they should be treated in the regulation as such. To expand or change this definition would be a fundamental change to the regulation. JLR opposes such a drastic change, especially while the technology is still scaling up. [EPA-HQ-OAR-2022-0829-0744, p. 4]

Organization: John Graham

The Preamble states on page 29342:

"At the same time, we note that the proposed standards are performance-based and do not mandate any specific technology for any manufacturer or any vehicle. Moreover, the overall industry does not necessarily need to reach this level of BEVs in order to comply—the projection in our analysis is one of many possible compliance pathways that manufacturers could choose to take under the performance-based standards. For example, manufacturers that choose to increase their sales of HEV and PHEV technologies or apply more advanced technology to non-hybrid

ICE vehicles would require a smaller number of BEVs than we have projected in our assessment to comply with the proposed standards. [EPA-HQ-OAR-2022-0829-0585, p. 37]

While EPA is correct that specific technologies are not actually mandated and manufacturers can choose to increase their sales of HEV and PHEV technologies, EPA is NOT correct that the "proposed standards are performance-based". As illustrated in Table 1, EPA has put its thumb on the scale and given BEVs approximately a $4,500 ($3,000 DMC) advantage – in addition to the temporary advantages that Congress gave BEVs in the Inflation Reduction Act of 2022. Given that the incremental cost (DMC) of a HEV is only about $2,000, this is a huge artificial disadvantage to HEVs. Had EPA used a lifecycle metric in the CO2 performance standards (rather than the tailpipe metric), the deployment rates of BEVs and hybrids would be more evenly distributed and the overall impact of the standards on total CO2 emissions and total costs would have been more favorable. The agency should run the OMEGA modeling using our suggested assumptions in the final rule. [EPA-HQ-OAR-2022-0829-0585, p. 37]

When EPA first decided, in the 2012 rulemaking (for 2017-2025 models), to use the 0 gram/mile tailpipe assumption for BEVs, it was defended as a temporary provision to spur additional BEV offerings at a time when few BEVs were available for consumers. The circumstances are totally different today. The number of new BEV offerings has proliferated, as ably documented in the NPRM, and Congress has provided a special set of subsidies (in the Inflation Reduction Act) to spur BEV deployment. EPA has no basis for using its discretionary authority to weaken environmental protection by giving a special compliance advantage for BEVs relative to HEVs. [EPA-HQ-OAR-2022-0829-0585, p. 38]

Organization: KALA Engineering Consultants

Comments

1. If I was not an engineer deeply steeped in the subtleties of transportation emission issues and I read your Federal Register (FedReg) text or news reports written by reporters unfamiliar with the actual science basis for your proposed rulemaking for Docket EPA–HQ–OAR– 2022–0829 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, I might come away from certain descriptions of vehicles discussed in such text as describing transportation vehicles that have absolutely no emissions coming from them or attributable to them at all. Repeated use by the EPA of the terms Zero Emission and Zero Emission Vehicle (ZEV) could lead some to believe there actually is such a thing, when all of EPA's emission scientists and engineers know this is not the case. We hesitate to charge EPA with putting out deliberately misleading characterizations of Battery Electric Vehicles (BEV) as true ZERO emission vehicles, but it seems that way. Examples from the FedReg text below: [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

From Section I. A. 2, i: "These industry advancements in the production and sales of zero- and near-zero emission vehicles are already occurring both domestically and globally,… [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

As the term ''zero-emission vehicle'' suggests, these cars and trucks have zero GHG and criteria pollutant emissions from their tailpipes, which can represent significant reductions over current emissions (particularly for GHG). [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

[I]t is important to recognize that, despite this anticipated growth in zero-emission vehicles, many internal combustion engine (ICE) vehicles will continue to be sold during the time frame of the rule and will remain on the road for many years afterward." [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

KALA strenuously objects to what seems to be un-scientific and cavalier use of the "zero emission" terminology when referring to all-electric rechargeable vehicles when all of you know that there may well be fossil-fueled electric generating units (EGU), emitting lots of GHG, supplying the electric power to recharge those vehicle batteries. We implore the EPA to be more scientifically precise in its terminology for BEVs as Zero Operating Emission vehicles and use acronyms of (ZOE and ZOEV). Such proper terminology gives the uninformed reader the idea that there may be no emissions from operation of BEVs, but there might be emissions associated with the electrical refueling, ie, recharging, of those vehicles. Yes, we know that the ZEV terminology used by EPA fits into what we believe is misguided regulatory consideration of ONLY the operating emissions or lack thereof from ZOEVs while entirely ignoring the "Upstream" GHG emissions associated with battery recharge. EPA cannot have this situation represent realistic GHG considerations if you cling to that artifice. We could give you several dandy analogies, but we won't waste your time. [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

EPA waxes poetic about all the upcoming public and private BEV recharging facilities that have been and are being installed or planned to be installed. It seems odd to us that the GHG emissions associated with all those charging facilities are simply being ignored in any calculations of attributable GHG emissions that could arguably be linked to BEV expansion in the US fleet. [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

Charging facilities are NOT zero emission when all of the associated GHG emissions are considered. These recharging facilities would not be being installed if there were no BEVs. Therefore, all of these recharging stations and facilities are new to the status quo situation and therefore have GHG emissions directly relatable to the presence of BEVs. All of the copper used in these facilities has GHG emissions associated with mining, haulage, transport, smelting, wire drawing and reeling. The plastic used in these facilities and as wire insulation almost certainly comes from petroleum stocks with GHG emissions associated with the creation of the plastics. Concrete and reinforcing steel used to support the facilities and provide driveways and parking areas have GHG emissions directly associated with the construction of these facilities, plus the fossil fuels used by construction machinery and vehicles doing that construction. We could go on, but it seems that EPA staff is conveniently ignoring the GHG emissions associated with what will become the millions of recharging facilities and stations needed to support the advancement of electric vehicles promulgated under these proposed regulatory rules. Such willful dismissal or ignoring of these types of issues when it comes to GHG emissions associated with rule making that essentially requires vehicle manufacturers to move to BEV adoption as virtually their sole option for compliance smacks of the work of zealots – in this case electrification zealots within the EPA. [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

Comment

3. The EPA appears to be using a very "special" consideration of emissions that are to be counted as regulated emission from Battery Electric Vehicles (BEV). In unbelievable statements of contorted logic, the EPA has set forth what we describe as a complete artifice designed to promote and "force" a major change to vehicle propulsion starting in model year 2027. While it

is true that during operation BEVs produce no criteria pollutants and emit no GHG gasses, the same cannot be said for the probable sources of the electric power used to recharge the batteries of BEVs. We wish this were not so, but we must deal factually with emissions associated with BEV recharging. If the EPA is serious about GHG reductions, they MUST include and consider the GHG emissions of grid-connected Electric Generating Units (EGU). Much like the water that comes from our faucets, several water sources could be being used to provide that water. So it is with electricity. No one can distinguish or filter out clean electrons coming from wind and solar sources and “dirty” electrons coming from GHG-intensive electric generation. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Power that comes into homes and businesses may well be a mix of so-called clean energy and emission-laden dirty energy produced by burning fossil fuels. In fact, the mix of electricity generation varies greatly by state or region, depending on what the “serving utility” chooses to use for generation. Some regions rely almost entirely on fossil fuel and nuclear generation methods, while others have added or switched to renewable energy production methods, such as wind and solar as part of their generation mix. There are few if any regions of the United States that are completely powered by renewable or GHG-free energy. There are GHG implications for most of the so-called renewable generation methods. Solar panels are often produced with high Global Warming Potential (GWP) chemicals being released and there are GHG emissions associated with the steel, carbon fibers, plastics and copper conductors used in wind turbines. All this is to say there are GHG emissions associated with virtually all forms of electric generation that cannot be ignored when considering whether or not the introduction of a new form of vehicle propulsion that relies on recharging batteries will have associated GHG emissions. The latest figures from the Energy Information Agency for 2022, show the mix of energy production for the US: [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

[See original attachment for U.S. utility-scale electricity generation by source, amount, and share of total in 20221 Data as of February 2023] [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

As you can see, 60.2% of overall US electricity generation was still produced by burning fossil fuels with their associated GHG and other pollutant emissions. When we aggregate how much GHG emissions might be attributable to recharging Battery Electric Vehicles we normally do so on a nation-wide scale using the latest available information. Since regional electric power generation is so varied, we cannot say a BEV in Southern California will have lower associated GHG emissions than one recharging in St. Paul, Minnesota. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Therefore, as of 2022, we can say in aggregate, there is a 60% chance that the electrons used to recharge BEVs over the next few years will be from fossil CO2 emitting fossil fuel generating plants. That is why, any scientific calculations made for the GHG contributions that a BEV makes must consider how the recharging power delivered to the BEV was generated. A BEV may have zero operating emissions but they do NOT have zero GHG emissions associated with their use. It is our considered engineering opinion that much of the so-called “low-hanging fruit” for renewable generation in the US has already been implemented and is now on-line or soon will be. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Think about an Electric Utility company that has literally made billions of dollars of investments in coal and/or natural gas fired power plants. In their board room minds, they are doing just fine making electricity in the same old way as they did 50 years ago and feel no compunction at all about charging their customers more for electricity when the cost of the fossil fuels they burn go up. Why would such a business feel compelled to create “stranded assets” of their fossil-fired generating facilities long before their estimated useful life expires and switch over to renewable forms of electricity generation? Might it be because the board of directors and the management suddenly “feel” like it is the “right” thing to do for the planet. Really?? Seriously, businesses have built-in inertia when they have made large investments in what brings in revenue for the business and for their stock holders. They might agree that new generating capacity should be renewable, but there is great impetus to expand their existing fossil fuel-fired facilities with a new generator unit. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

So, the 60% fossil fuel number may stubbornly stay close to that figure for some time. The EPA attempted to control both pollutant and GHG emissions from power plants when the “Clean Power Plan” was part of policy thrusts, but they were less than successful in courts and countering the Utility and Fossil Fuel lobbies in Congress. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

https://www.nationofchange.org/2022/07/05/the-supreme-court-has-curtailed-epas-power-to-regulate- carbon-pollution-and-sent-a-warning-to-other-regulators/ [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Given that background, let us look at how EPA proposes to treat and count emissions from BEV vehicles from excerpts from the Federal Register publication: [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

From Section III. B. 7. “Treatment of PEVs and FCEVs in the Fleet Average: As originally envisioned in the 2012 rule, starting with MY 2022, the compliance value for BEVs, FCEVs, and the electric portion of PHEVs in excess of individual automaker cumulative production caps would be based on net upstream emissions accounting (i.e., EPA would attribute a pro rata share of national CO2 emissions from electricity generation to each mile driven under electric power…). The 2012 rule would have required net upstream emissions accounting for all MY 2022 and later electrified vehicles. However, in the 2020 rule, prior to upstream accounting taking effect, EPA revised its regulations to extend the use of 0 g/mile compliance value through MY 2026 with no production cap, effectively continuing the practice of basing compliance only on tailpipe emissions for all vehicle and fuel types.” [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

Let’s stop here and parse out this set of statements. Prior to the cited text, EPA gave some history on how they were thinking about applying regulations for BOTH criteria pollutants and GHG emissions. Ostensibly because the number of BEVs was so small, auto makers were given credit for emission reductions, particularly GHG reductions, up to a company-wide vehicle production cap (a maximum value over which the company would not receive any emission credits). That is why the “individual automaker cumulative production caps” is part of the cited statements above. EPA states that their original thinking on GHG emissions from BEVs would be “based on net upstream emissions accounting,” which they further explain would be a “pro-rata share of national CO2 emissions from electricity generation to each mile driven under electric power.” As we discussed above, a nation-wide aggregation of the share of recharging GHG emissions attributable to fossil fueled generation would be about 60% as of 2022. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

However, for some reason the EPA made a decision prior to doing any actual “upstream” CO2 accounting in their 2020 rulemaking that they would NOT do any upstream (meaning emissions attributable to activities that produced either the fuel in a gas tank or electricity to recharge a battery) accounting specifically for GHG emissions AND for criteria pollutants. EPA seems to justify its astonishing position on not accounting for GHG emissions related to battery recharge by saying they are treating all vehicles the same by not trying to account for all upstream emissions for BOTH liquid petroleum fuels and recharge electricity. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

Let us state for the record that we agree with EPA for regulatory treatment of criteria pollutants from BEVs as zero grams per mile. We don’t see any other way of accounting for both upstream and operations-attributable emissions, even though there were emissions related to the production of the materials used in the BEV, those emissions are virtually the same as those for producing a conventional gasoline vehicle. The only emission exceptions would be for battery production and electric motor components that would have different emission profiles than gas engine parts. We think these are minor differences and the upstream emissions for both the gasoline and BEV vehicles themselves are a wash. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

However, KALA, in the most strenuous way possible, disagrees that upstream GHG emissions for battery recharge should treated the same way as zero grams per mile. The justification that you are treating each vehicle type the same is simply not tenable in any stretch of the imagination. We think that the EPA may have been incorrectly influenced by electrification zealots within the agency who when discussing how BEV GHG emissions should be handled argued something like this: [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

Hey guys we all know that we want to electrify the fleet as much as possible, after all we know that electrification is the only way to truly get GHG emissions under control in a big way, don’t we? So, hey, let’s figure out a way to justify treating the emissions from BEVs as zero all the way around even though we know there are upstream GHG emissions for battery recharge. Maybe if we say that we will treat emissions the same as “tail pipe’ emissions while operating the vehicles, we can get away with counting BEV emissions as zero and really push the auto makers away from gasoline into making predominantly BEVs. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

Now, we don’t know how the decision was made to treat BEV GHG emissions as zero without any regard for how different BEVs are. The method used for regulating tail pipe emissions from gasoline vehicles requires fuel to be stored in the gas tank and that fuel is used to power the internal combustion engine, which emits both GHG and other air pollutants. That is no different than filling a battery up with “electric fuel” and then accounting for the emissions that made the BEV go down the road. It just so happens that the emissions to fill up the BEV’s “tank” occur before the stored energy is used, but that is because the mode of propulsion and the way in which energy is stored and “refilled” is so different in a BEV. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

No matter how the EPA moved from the “correct” way to treat BEV emissions by accounting for net upstream GHG emissions as a pro-rata share of national CO2 emissions from electric generation to the “insane” way of completely ignoring them, the initial way of treating GHG emissions from BEVs was the correct first impulse. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

Otherwise we have no way of comparing GHG emissions from gasoline and diesel powered vehicles and BEVs. It could be that the EPA attempted to make calculations for that pro-rata share of national electric generation CO2 emissions (as an engineer that is what I would do) and found the results not to their liking. That could well be because of the abysmal final efficiency of converting the energy in fossil fuels into rolling motion of a BEV. We offer an info graphic way of showing that terrible efficiency below: [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

[See original attachment for graphics of electric vehicle issues] [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

The science and engineering behind the GHG emission figures associated with BEVs has principally to do with efficiencies of conversion of fossil fuels (remember we still have 60.2% of all electricity being generated by fossil fuels) to electricity and the losses that are seen in transmission, recharge of batteries and conversion of electric charge stored in batteries to rolling motion of the vehicle. The GHG impact of this horrendously low final efficiency is that far more GHG is produced to propel a BEV one mile than a comparable gasoline-powered vehicle. We believe it is entirely possible that the EPA understood the implications of such poor efficiencies, decided that it was in the national interest of the country to electrify the US fleet anyway regardless of the true GHG emission aspects of BEVs and found a way to drive or "Steer" fleet change over by ignoring upstream GHG emissions associated with BEV battery recharge in the regulatory scheme. We hope that is not the case, but it sure looks and feels that way. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

EPA further continues to justify the compliance treatment of BEVs in Section III. B. 7. "EPA is proposing to make the current treatment of PEVs and FCEVs through MY 2026 permanent. EPA proposes to include only emissions measured directly from the vehicle in the vehicle GHG program for MYs 2027 and later (or until EPA changes the regulations through future rulemaking) consistent with the treatment of all other vehicles. Electric vehicle operation would therefore continue to be counted as 0 g/ mile, based on tailpipe emissions only…. The program has now been in place for a decade, since MY 2012, with no upstream accounting and has functioned as intended, encouraging the continued development and introduction of electric vehicle technology." [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

What did the EPA just say? They brazenly state that no matter what, GHG emissions from BEVs would continue to be counted as zero grams per mile. The program that counts emissions that way has "functioned as intended" to encourage BEV development and introduction into the vehicle fleet. Did they really just say that? Yes, EPA seems to be saying that it doesn't matter how illogical their counting method is for BEVs for GHGs, they are going to continue to do it that way and their motives to encourage or even force BEV transition and displacement through regulation becomes clear. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

EPA further tries to justify their zero GHG emissions policy by again stating in Section III. B. 7. the following: "This approach of looking only at tailpipe emissions and letting stationary source GHG emissions be addressed by separate stationary source programs is consistent with how every other light duty vehicle calculates its compliance value. If EPA deviated from this tailpipe emissions approach by including upstream accounting, it would appear appropriate to do so for all vehicles, including gasoline- fueled vehicles." [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

We applaud the EPA for attempting, once again, to reduce stationary source (Electric Generating Units are considered to be stationary emissions sources) emissions. But, we are questioning the motives of the EPA for counting emissions from BEVs. As explained above, the equivalence way of looking at attributable GHG emissions is the "Filled Tank" approach suggested in this comment. How it was filled and whether or not the tank has associated emissions either from burning the stored contents of the tank in the case of liquid fuels or consuming the energy stored in a battery should make no difference in attributing GHG emissions to either situation. The only difference is when the related emissions occurred, before the stored energy was used or after the stored energy was used. This minor temporal difference cannot be ignored unless the EPA has an ulterior motive of forcing the change over of vehicle types in the US fleet through regulation. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

The excuse in the cited FedReg text above that if EPA somehow deviated from the tail pipe emissions approach by including upstream [emissions] accounting they might have to do so for gasoline-fueled vehicles. Our response to that "terrible burden" on the EPA to account for upstream petroleum emissions is that such an argument is specious at best and just another vacuous justification. So what if the EPA had to account for upstream petroleum emissions. That might give us a higher resolution picture of the entirety of the vehicle GHG problem in a larger context. If the EPA considers the issue of accounting for upstream petroleum emissions too great a burden, the good news is that others have actually done this accounting. The group that we believe had the best methodology for accounting GHG emissions at stages of petroleum production and refining is the Renewable and Appropriate Energy Laboratory (RAEL) at UC Berkeley In a paper by the late Alex Farrell, GHG emissions at production stages provided total upstream emissions leading up to gasoline burned in ICEs. That group had a uniquely legible way to portray those upstream emissions graphically as shown below. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

[See original attachment for alternative metrics for evaluating ethanol] [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

http://rael.berkeley.edu/old_drupal/sites/default/files/EBAMM/FarrellEthanolScience012706.pdf [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

Overall Comment #3 Conclusions:

A. Despite EPA's published protestations that their new rulemaking will provide leeway for multiple methods of vehicle propulsion to continue and that they have no wish to direct which propulsion method is the one they prefer, the evidence from statements made in describing the unreasonable "regulatory trick" of counting ONLY BEV tail pipe emissions for GHGs, has and will "Steer" automakers decisions toward BEVs as THE compliance solution. When EPA essentially says: "BEVs would be counted as 0 g/ mile in compliance calculations. The program has now been in place for a decade with no upstream accounting and has functioned as intended, encouraging the continued development and introduction of electric vehicle technology.," there is no doubt left in our minds as to the intentions of the EPA to change out ICE vehicles for BEVs through regulatory fiat. [EPA-HQ-OAR-2022-0829-0617, p. 15]

Organization: Kentucky Office of the Attorney General et al.

A. Treating EVs as zero-emitting vehicles is inaccurate.

EPA's claim that EVs should be counted as emitting zero tailpipe emissions is arbitrary. Electricity fuels battery-powered vehicles, and CO2-emitting sources create most electricity. What is U.S. electricity generation by energy source? U.S. Energy Information Administration (Feb. 2023), https://www.eia.gov/tools/faqs/faq.php?id=427&t=3 (In 2022, "[a]bout 60% of . . . electricity generation was from fossil fuels"). This is important because "[t]ailpipe emissions from an [internal combustion engine] vehicle can be comparable to . . . upstream electricity generation emissions." Vehicle criteria pollutant (PM, NOx, CO, HCs) emissions: how low should we go? NPJ Climate and Atmospheric Science (Nov. 5, 2018), https://www.nature.com/articles/s41612-018-0037-5. Yet EPA ignores these "upstream emissions" when determining compliance with the Proposed Rule. 88 Fed. Reg. at 29,252 ("EPA proposes to include only emissions measured directly from [EVs]   consistent with the treatment of all other vehicles."). [EPA-HQ-OAR-2022-0829-0649, p. 8]

EPA argues that refusing to account for upstream emissions furthers its mission to develop EVs. Id. ("The program has now been in place for a decade, since MY 2012, with no upstream accounting and has functioned as intended, encouraging the continued development and introduction of electric vehicle technology."). Congress has never authorized such a mission. To the contrary, the CAA states that "A primary goal of this chapter is to encourage or otherwise promote reasonable Federal, State, and local governmental actions, consistent with the provisions of this chapter, for pollution prevention." 42 U.S.C. § 7401(c). Thus, EPA's sanctioned mission here is pollution prevention, not EV development. Because the CAA announces no policy for special treatment of EVs, the Proposed Rule is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0649, p. 8]

Organization: Kia Corporation

Kia Supports Limiting Accounting of Upstream Emissions

Kia supports EPA's proposed treatment of limiting emission scope for vehicle programs to tailpipe only. This policy is consistent with previous rulemakings.16 The agency currently has a separate comment period to reduce thermal power stationary source GHG emissions to address concerns of upstream emissions to generate electricity. EPA's analysis of overall estimated emissions impact and projected benefits includes upstream emissions from fuel production and electricity generation. Accordingly, EPA's use of assumptions to limit emission scope for vehicles is appropriate. [EPA-HQ-OAR-2022-0829-0555, p. 9]

16 88 Fed. Reg. 29,288.

Organization: Letter Campaign, Ethanol Producers (7)

[The following letter was submitted by seven commenters; it is reproduced only once. The other commenters are: Highwater Ethanol, LLC (EPA-HQ-OAR-2022-0829-0552), Heartland Corn Products (EPA-HQ-OAR-2022-0829-0622), Absolute Energy, LLC (EPA-HQ-OAR-2022-0829-0716), Trenton Agri Products LLC (EPA-HQ-OAR-2022-0829-0755), Western New York Energy LLC (EPA-HQ-OAR-2022-0829-0753), Southwest Iowa Renewable Energy LLC (EPA-HQ-OAR-2022-0829-0582)]

The Agency's decision to assign a zero grams/mile compliance value to EVs unfairly favors electric vehicle manufacturers, while falsely assuming EVs have no carbon impacts whatsoever.

This approach fails to acknowledge the carbon impacts associated with electricity generation, as well as the immense emissions involved in battery mineral extraction and vehicle construction. Therefore, we strongly disagree with the EPA's proposal to exclude upstream emissions from greenhouse gas accounting. [EPA-HQ-OAR-2022-0829-0739, p. 1]

Organization: Marathon Petroleum Corporation (MPC)

EPA’s tailpipe-only approach also ignores the potential increase in upstream CO2 emissions that will result from manufacturing and fueling of electric vehicles. [EPA-HQ-OAR-2022-0829-0593, p. 2]

Alignment of EPA’s tailpipe emissions standards with other programs that promote domestic renewable liquid fuels, such as the RFS is needed. Mandating the blending and use of renewable liquid fuels in vehicles in one program while simultaneously ignoring the positive impacts of their use in another results in rules that are at cross purposes. Renewable liquid fuels can be a part of a multifaceted solution for reducing carbon emissions and similar treatment of their benefits from program to program would be a significant step forward for the EPA. This change would lead to significantly more investments in renewable liquid fuels, providing an option for meeting EPA’s goals that is compatible with ICE vehicles and does not require a wholesale shift in vehicle manufacturing and infrastructure, with its concomitant effects on U.S. drivers who would bear the costs. [EPA-HQ-OAR-2022-0829-0593, p. 4]

A continued push from the Agency to further narrow regulations in regard to renewable liquid fuels results in lost opportunities for investments and places additional burden on the transportation and fuels industry, as well as consumers. In addition, these lost opportunities for decarbonization are impactful, as renewable liquid fuels can be deployed quickly, at a large scale, and with significant carbon reductions in the transportation fuel sector. The renewable liquid fuel industry is well-positioned to produce the fuels needed to contribute to the EPA’s goals because renewable liquid fuels are widely accepted throughout the country. [EPA-HQ-OAR-2022-0829-0593, p. 4]

Organization: MECA Clean Mobility

Rather than permanently removing the requirement for BEV certification to account for upstream electricity generation, EPA should require upstream emission accounting for the generation of energy to power electric vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 30-31]

MECA supports EPA’s continued use of lifecycle analysis to analyze the regulatory impacts of its vehicle regulations. However, to drive future U.S. technology leadership and incentivize efficiency improvements in all vehicles, EPA should recognize the need to include life cycle analysis in the design of standards and compliance. When EPA began regulating GHG emissions from light-duty vehicles starting with MY 2012, the Agency decided to allow electric vehicles and fuel cell vehicles to claim 0 g/mile GHG in order to encourage the initial commercialization of these promising technologies.40,41 However, the Agency also finalized requirements for upstream emissions to be factored into electric and fuel cell vehicle certification levels as penetration of these vehicles increased. The justification given by EPA was that “upstream GHG emission values associated with electric vehicles are generally higher than the upstream GHG emission values associated with gasoline vehicles, and that there is currently no national program in place to reduce GHG emissions from electric powerplants." [EPA-HQ-OAR-2022-0829-0564, pp. 30-31]

40 https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-model-year-2012- 2016-light-duty-vehicle

41 https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-model-year-2017- and-later-light-duty-vehicle

EPA is now proposing to make the 0 g/mile GHG treatment of battery and fuel cell vehicles permanent. The Agency's rationale is that "the program has now been in place for a decade, with no upstream accounting and has encouraged the continued development and introduction of electric vehicle technology." EPA further reasons that "these emission reduction technologies are now coming into the mainstream and can serve as the primary technologies upon which EPA can base more stringent standards" and that "power sector emissions are declining and the trend is projected to continue." Finally, EPA concludes that the "approach of looking only at tailpipe emissions and letting stationary source GHG emissions be addressed by separate stationary source programs is consistent with how every other light duty vehicle calculates its compliance value." [EPA-HQ-OAR-2022-0829-0564, pp. 30-31]

Regarding the first two points, while the program has indeed been in place for a decade, the sales volumes of electric and fuel cell vehicles remain in the minority of new vehicle sales (<10%). As sales increase, there is a potential for erosion of benefits if the pace of grid decarbonization and charging infrastructure build-out do not meet projections. Regarding EPA's final point, the agency previously recognized the inconsistency in treatment of upstream emissions of the power sector versus the oil and gas sectors. The Agency's justification then, and still valid today, is that upstream emissions related to power production to propel battery electric vehicles is higher than the upstream GHG emissions associated with gasoline vehicles, and there remains no final federal regulation to reduce GHG emissions from electric power plants. [EPA-HQ-OAR-2022-0829-0564, pp. 30-31]

For these reasons, MECA suggests that EPA maintain an upstream accounting mechanism for the GHG emissions from electricity generation to charge electric vehicles in its requirements. Rather than removing the upstream accounting provision entirely, MECA suggests that the Agency postpone it to a future year as has been the Agency's practice in previous light-duty GHG regulations. It is important to consider the emissions generated from the energy used for propulsion of all vehicles. Currently, this is well established for ICE vehicles since the emissions from fuel combustion are measured at the tailpipe. However, the electricity used to power electric vehicles comes from a mix of sources that includes combustion of fuel, and those emissions could reasonably estimated and reported during certification. It should be noted that we are not suggesting a full life cycle certification method at this time due to the complexity of such an approach. Our suggestion is to exclude the upstream emissions associated with the fuel production (mining, drilling, refining) and delivery that would affect both the fuels supplied to ICE power plants and the fuels used by ICE vehicles. We believe that a simplified approach could be applied while the Agency works with stakeholders to assess the potential of a full life cycle method that could be implemented in a future regulation. [EPA-HQ-OAR-2022-0829-0564, pp. 30-31]

For a simplified approach, EPA could include in the final rule an annual U.S. average grid carbon intensity based on the one used to determine the upstream GHG emissions impacts of this rule in the Agency's Regulatory Impact Analysis. This lookup table could be used by all manufacturers to certify their electric vehicles with the same grid carbon intensity values such that all manufacturers are treated equally. The manufacturer would then use a test determined electric vehicle efficiency value multiplied by the grid carbon intensity averaged over the useful life of the vehicle to report a gram per mile CO2 value for an electric vehicle at certification. By assigning realistic "non-zero" emission values to electric and fuel cell vehicles, EPA will provide a regulatory incentive to further improve the electric efficiency of components and powertrain technologies that will further reduce vehicle related environmental impacts. [EPA-HQ-OAR-2022-0829-0564, pp. 30-31]

Efficiency incentives and regulations have historically driven vehicle manufacturers and technology suppliers to continue to innovate and develop better materials, components, and vehicle systems to reduce energy demand, operating costs and related emissions of vehicles. Electric vehicle efficiency does not provide large benefits at today's EV sales penetration rates. However, if the goals of this rule are met by 2032, electric vehicle sales will be over 60% and EVs will make up a much larger fraction of the in-use passenger car fleet. Therefore, small improvements in efficiency will result in large reductions in grid demand. MECA suggest that EPA consider a range of both incentives and requirements to advance the efficiency of technologies that reduce the emissions footprint of all mobile sources, regardless of the source of propulsion energy. As noted above, setting non-zero certification values for battery electric and fuel cell vehicles will continue to motivate vehicle manufacturers to work with suppliers to improve vehicle efficiency. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

Organization: MEMA, The Vehicle Suppliers Associated

- Technology Neutrality and BEV Emissions. EPA should ensure that battery electric vehicles (BEV) are included in metrics for vehicle-to-vehicle comparison by assigning a metric that captures the pollutant emissions related to BEV operation, aligned with national electricity generation figures. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

The proposed rule states that emissions for an electric vehicle are zero. This position leaves no regulatory incentive to maximize efficiency or reduce weight within electrified vehicles and could result in larger amounts of critical elements consumed by larger batteries, as well as greater emissions from electric power sources needed to propel these vehicles than would otherwise be needed. This disregard for vehicle efficiency distinction across BEVs conflicts and does not align with the existing and historic approaches of the Corporate Average Fuel Economy (CAFE) program and is a potential disruption to harmonization. [EPA-HQ-OAR-2022-0829-0644, pp. 6-7]

Consistent with its current authority to regulate power plant emissions, EPA should specify a value for electric generation emissions for each year 2027-2032 and include this in BEV emissions calculations, based on vehicle energy use. [EPA-HQ-OAR-2022-0829-0644, pp. 6-7]

The assignment of an emission value per kWh of battery capacity in BEV would assure that public incentives for larger BEVS provide the environmental benefits promised and other advanced clean transportation alternatives also improve their propulsion system efficiencies. [EPA-HQ-OAR-2022-0829-0644, pp. 6-7]

This approach will also ensure more accurate assessments of BEV emissions. EPA could use the readily known and available national electricity generation data paired with miles per gallon equivalent (MPGe) to serve as a BEV emissions value for comparison. It is important this metric be aligned with NHTSA Corporate Average Fuel Economy (CAFE) standards. This metric is justified in the directions of 49 USC 39204 (a)(2)(B)(i), which require the Administrator of the EPA to consider net upstream emissions of electric vehicles when calculating fleet average fuel economy.4 [EPA-HQ-OAR-2022-0829-0644, pp. 6-7]

4 49 USC 39204 (a)(2)(B) "(B) If a manufacturer manufactures an electric vehicle, the Administrator shall include in the calculation of average fuel economy under paragraph (1) of this subsection equivalent petroleum based fuel economy values determined by the Secretary of Energy for various classes of electric vehicles. The Secretary shall review those values each year and determine and propose necessary revisions based on the following factors: (i) the approximate electrical energy efficiency of the vehicle, considering the kind of vehicle and the mission and weight of the vehicle."

A well-constructed rule will be technology-neutral and provide added regulatory certainty by fairly assessing carbon content of vehicle's technologies, their production and where vehicle charging electricity comes from. At this time, there is no review of carbon content of components or vehicles in the draft regulatory impact analysis. We understand the complexity of this endeavor, but EPA overlooks broad environmental impacts through a selectively narrow focus on tailpipe emissions. Electric vehicles have no tailpipe, and thus no tailpipe emissions. If EPA is determined to regulate zero-emissions vehicles, EPA should address lifecycle carbon content of vehicles in scope of this rule to better balance technology vs. tailpipe. [EPA-HQ-OAR-2022-0829-0644, pp. 6-7]

Organization: Minnesota Biofuels Association

Secondly, the proposed rule falsely assumes that electric vehicles have a zero grams per mile compliance value. Under a proper lifecycle evaluation, the upstream carbon emissions associated with using an electric vehicle would include electricity generated from coal or natural gas, high-energy and land use changes from critical mineral extraction, and vehicle construction and assembly. Ignoring the upstream emissions related to electricity generation and critical mineral extraction for electric vehicles creates an uneven playing field and risks undermining efforts to achieve our net-zero climate goals. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

Before finalizing the rule, we urge EPA to consider the role of American-made biofuels in achieving enhanced vehicle efficiency and emissions reductions. A technology-neutral final rule can be achieved by equally incentivizing technologies like Flex Fuel Vehicles and Plug-in Hybrid Flex Fuel Vehicles and subjecting all vehicle and fuel options to similar carbon accounting treatment through a full lifecycle analysis that considers upstream emissions. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

Thank you for considering our comments and we look forward to working with you on meaningful and achievable solutions to reduce greenhouse gas emissions from transportation. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

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Organization: Minnesota Corn Growers Association (MCGA)

PERFOMANCE BASED/TECHNOLOGY NEUTRAL RULEMAKING NEEDED

The EPA is proposing that upstream emissions accounting for BEVs, which under the current regulations would begin in MY 2027, would be removed under the proposed program; thus, BEVs would continue to be counted as zero grams/mile in a manufacturer's compliance calculation. This is clearly not a performance-based or technology-neutral proposal, and it would have dire consequences for all other technologies which could potentially reduce emissions at lower cost, more quickly, with fewer geopolitical implications (such as critical minerals), and with greater consumer acceptance. [EPA-HQ-OAR-2022-0829-0612, pp. 4-5]

A recent study4 by Argonne National Lab, in cooperation with coauthors from the automotive and energy industries, shows a BEV with 400-mile range (BEV400) has lifecycle GHG emissions of about 250 g/mi. This is an improvement from a conventional internal combustion engine vehicle (ICEV) which is about 430 g/mi. However, the lifecycle GHG emissions of a BEV are far from zero. In fact, lifecycle GHG emissions of a BEV400 are comparable to other low-emission options such as E85 or PHEV. Regulations based only on tailpipe emissions are clearly inadequate for comparing BEVs to other pathways for reducing GHG emissions. [EPA-HQ-OAR-2022-0829-0612, pp. 4-5]

4 Kelly et al., "Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies", report ANL-22/27, June 2022.

The Argonne report demonstrates that other "vehicle-fuel pathways" can compete with BEVs. For example, a conventional gasoline hybrid (HEV) achieves about 310 g/mi and E85 in a non-HEV FFV achieves 260 g/mi. The future potential of HEVs combined with FFV technology, utilizing E85, is comparable to future BEVs with wind and solar power. [EPA-HQ-OAR-2022-0829-0612, pp. 4-5]

The proposed rulemaking does not allow other vehicle-fuel pathways to compete with BEVs. By regulating only tailpipe emissions, and ignoring the rich literature of lifecycle analysis, EPA would create artificial incentives for auto manufacturers to pursue only BEVs. This could have disastrous impacts on both the cost and the GHG emissions of future vehicles. The same Argonne report found the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with 400-mile range is dramatically more expensive than one with 200-mile range, and its lifetime GHG emissions are substantially worse. In fact, a BEV with 400-mile range has only a slight GHG benefit compared to a HEV or an E85 FFV. But the proposed rule counts all BEVs as zero GHG emissions, regardless of battery size – and regardless of vehicle size and weight. [EPA-HQ-OAR-2022-0829-0612, pp. 4-5]

UPSTREAM EMISSIONS

EPA's proposal continues to treat EVs as carbon neutral, without regard to the source of electricity powering the vehicles. Depending on the sources of electricity – whether coal, natural gas, wind or nuclear and the mix of those sources - full lifecycle emissions of EVs vary widely, masking the true GHG emissions from these vehicles. Without accounting for upstream emissions from these vehicles, full lifecycle emissions are not considered. Furthermore, EPA notes in the proposal that increases in electricity demand will result in increased non-GHG emissions for some upstream pollutants. EPA does a disservice to emissions reduction goals by accounting for upstream emissions from some fuels and vehicle technologies but not others, providing an advantage to the sources for which "wells-to- wheels" upstream emissions are excluded and concealing emissions from coal power generation, mineral extraction, and other high-carbon sources. [EPA-HQ-OAR-2022-0829-0612, p. 6]

Organization: National Association of Convenience Stores (NACS) et al.

III. The Proposed Rule Fails to Account for the Lifecycle Emissions of Electric Vehicles.

Under the Proposal, electric vehicles effectively serve as the only means of compliance with the standards in part because the Agency focuses solely on tailpipe emissions rather than the full lifecycle emissions of light- and medium-duty EVs. This is a flawed approach. To ensure an accurate accounting of the lifecycle carbon intensity associated with each technology, EPA should incorporate lifecycle emissions into its analysis. This will facilitate continued investment in all decarbonization technologies alongside deployment of electric vehicles. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

Though EVs do not directly have tailpipe emissions, other segments along the lifecycle of the EV do. The fuel source of an EV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces meaningful emissions to which the Proposal turns a blind eye. Addressing the impact of climate change, however, requires mitigating emissions irrespective of whether they originate from a tailpipe, a mining operation, a power plant, or a battery plant. Consequently, emissions standards should account for the entire lifecycle emissions. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

EPA's analysis examines only logistical challenges to EV manufacturing and does not account for carbon impacts of critical mineral mining, the use of natural resources for refining and processing, engine and battery manufacturing, and other confounding variables such as prolonged ICE turnover rates and vehicle end-of-life consequences. Importantly, a lifecycle analysis of EV emissions impacts will better equip EPA to understand the varying costs and emissions reductions associated with all technologies and best inform manufacturers and consumers of their options. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

EPA also makes flawed assumptions regarding the total emissions impacts of the Proposal. Despite claiming that "upstream emissions impacts from fuel production at refineries and electricity generating units are considered in EPA's analysis of overall estimated emissions impacts and project benefits," 31 this analysis uses overgeneralizations and assumes cleaner and less expensive generation over time—incorrectly assuming as a certainty that the power sector will become cleaner through the increased use of wind and solar generation as well as electricity storage (e.g., batteries) despite opposition from the power sector.32 Although the Agency concedes these assumptions will still result in "some increases in ambient pollutant concentrations" and that "the specific locations of increased air pollution are uncertain," EPA fails to meaningfully engage with the consequences of even its own flawed analysis.33 [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

31 Proposed Rule at 29,252.

32 See, e.g., David Pomerantz, The New York Times, "Guess Who's Been Paying to Block Green Energy? You Have." (Jul. 5, 2023) available at https://www.nytimes.com/2023/07/05/opinion/utility-bills-clean-

energy.html; Susan Cosier, "Why Electric Utilities Are Resorting to Dark Money and Bribes to Resist Renewables," Audubon, March 16, 2021, available at https://www.audubon.org/news/why-electric-utilities-are-resorting-dark-money-and-bribes-resist- renewables ("Many utility companies cling to old business models and dirty fuels rather than go through the tough energy transition that climate change demands.") Comment from Southern Company on EPA Proposed Rule, Docket No. EPA-HQ-OAR-2022-0723, Comment ID EPA-HQ-OAR-2022-0723-0029 (Dec. 21, 2022) available at https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0723-0029 (advocating for continued construction of new EGU infrastructure for fossil fuels and cautioning against unattainable limits for existing coal and natural gas EGUs); Valerie Volcovici and Nichola Groom, Reuters, "U.S. utilities want protection from Biden's tight timeline in clean energy mandate" (Apr. 14, 2021) available at https://www.reuters.com/business/sustainable-business/us- utilities-want-protection-bidens-tight-timeline-clean-energy-mandate-2021-04-14/.

33 Proposed Rule at 29,361.

The Proposed Rule fails to adequately evaluate local ambient air quality impacts from increased power generation. Though EPA modeled changes to power generation anticipated by the Proposed Rule as part of its upstream analysis, the Agency does not consider the potential degradation of air quality in areas in the direct vicinity of existing or new power plants.34 This is further complicated by the fact that emissions associated with electricity generation are not consistent across the U.S. In contrast to EPA's generalized emissions benefits, the emissions advantages of EVs are much lower in states with relatively high carbon profiles for electricity generation than those states with relatively low carbon profiles. Indeed, the Fuels Institute analyzed these differences and concluded that in states with high-carbon intensity electric generation, such as West Virginia, ICE vehicles produced decidedly less carbon emissions relative to EVs over the entire 200,000-mile life of the vehicles.35 Of course, the Report recognizes emissions advantages to EVs in those low-carbon states as well, but these differences further illustrate the importance of accurately accounting for full lifecycle emissions. Instead of comprehensively accounting for these emissions in compliance calculations, the Agency proposes to continue providing EVs with a discounted emissions rate by allowing these vehicles to be counted as producing 0 g/mile of CO2, and solidifying preferential treatment of one mode of technology: electric vehicles. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

34 Proposed Rule at 29,361.

35 Ricardo Inc., FUELS INSTITUTE, "Lifecycle Analysis Comparison" (Jan. 2022) available https://transportationenergy.org/wp-content/uploads/2022/10/FI_Report_Lifecycle_FINAL.pdf.

While ICE-powered vehicles generally emit more carbon dioxide during operation, the emissions associated with the manufacturing of ICE-powered vehicles are significantly lower than those emitted from battery-electric vehicles.36 There is no climate rationale for EPA to pursue this rulemaking from a state of willful blindness over these distinctions. A recent examination conducted by Volvo provides a directly applicable case study. Volvo concluded that the "accumulated emissions from the [m]aterials production and refining, [Lithium-ion] battery modules and Volvo Cars manufacturing phases of C40 Recharge are nearly 70 percent higher than for XC40 ICE."37 Volvo explains, "[e]lectrification of cars causes a shift of focus from the use phase to the materials production and refining phase."38 [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

36 See IEA, "The Role of Critical Minerals in Clean Energy Transition" (May 2021) available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions; see also David Biello, SCIENTIFIC AMERICAN, "Electric Cars Are Not Necessarily Clean,"(May 11, 2016) available at

https://www.scientificamerican.com/article/electric-cars-are-not-necessarily-clean/ ("Your battery-powered vehicle is only as green as your electricity supplier"); see also Nina Lakhani, THE GUARDIAN, "Revealed: How US Transition to Electric Cars Threatens Environmental Havoc," the Guardian, (January 24, 2023) available at https://www.theguardian.com/us-news/2023/jan/24/us-electric-vehicles-lithium-consequences-research. ("The US's transition to electric vehicles could require three times as much lithium as is currently produced for the entire global market, causing needless water shortages, Indigenous land grabs, and ecosystem destruction.").

37 Elisabeth Evrard, et al., VOLVO, "Carbon footprint report – Volvo C40 Recharge," (2021), pg. 24, available at https://www.volvocars.com/images/v/-/media/Market-Assets/INTL/Applications/DotCom/PDF/C40/Volvo-C40- Recharge-LCA-report.pdf.

38 Id. at pg. 5.

Further, the Proposed Rule overlooks the emissions impacts from the substantial expansion of the electrical grid. While EPA credits emissions reductions from assuming the power sector will become cleaner over time using renewable generation and electricity storage (e.g., batteries), it ignores the impacts of building out that associated infrastructure. New power generation, renewable power generation, and energy storage require the same critical minerals necessary for manufacturing EV batteries. Increased electricity demand will only further compound the stress on critical minerals. Indeed, copper and aluminum—both needed for EVs—are also the two main materials in wires and cables. Battery storage equipment for solar and other renewable energy sources rely on similar battery chemistries as EVs.39 Again, EVs may be the most environmentally compelling solution, but it does neither the climate nor American consumers any favors for the Agency to pretend the solution is more compelling or achievable than it actually is. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

39 And, as described above, higher prices on these materials could have a major impact on future grid investments. INTERNATIONAL ENERGY AGENCY, The Role of Critical Minerals in Clean Energy Transitions (Mar. 2022), 77–80, available at https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

The simultaneous spike in demand for materials such as copper and aluminum for both the grid and EV manufacturing will increase extraction and refining efforts globally, potentially exacerbating consequences on a regional level.40 By failing to consider geographic electricity generation differences and the potential benefits of a non-homogenized vehicle population, the Proposal misses the opportunity to most effectively respond to emissions concerns and, more importantly, could indirectly lead to increased emissions in certain regions. A full accounting of the relative advantages and disadvantages of the different vehicle technologies is necessary to ensure the Proposal harnesses the benefits of competition among different current and potential future vehicle technologies. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

40 The U.S. is almost entirely dependent on other countries, especially China, for materials essential to manufacturing EVs, meaning the Proposal may potentially raise national security concerns.

Organization: National Corn Growers Association (NCGA)

The EPA is proposing that upstream emissions accounting for BEVs, which under the current regulations would begin in MY 2027, would be removed under the proposed program; thus, BEVs would continue to be counted as zero grams/mile in a manufacturer's compliance calculation. This is clearly not a performance-based or technology-neutral proposal, and it would have dire consequences for all other technologies which could potentially reduce emissions at lower cost, more quickly, with fewer geopolitical implications (such as critical minerals), and with greater consumer acceptance. [EPA-HQ-OAR-2022-0829-0643, p. 3]

A recent study 4 by Argonne National Lab, in cooperation with coauthors from the automotive and energy industries, shows a BEV with 400-mile range (BEV400) has lifecycle GHG emissions of about 250 g/mi. This is an improvement from a conventional internal combustion engine vehicle (ICEV) which is about 430 g/mi. However, the lifecycle GHG emissions of a BEV are far from zero. In fact, lifecycle GHG emissions of a BEV400 are comparable to other low-emission options such as E85 or PHEV. Regulations based only on tailpipe emissions are clearly inadequate for comparing BEVs to other pathways for reducing GHG emissions. [EPA-HQ-OAR-2022-0829-0643, p. 3]

4 Kelly et al., "Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies", report ANL-22/27, June 2022

The Argonne report demonstrates that other “vehicle-fuel pathways” can compete with BEVs. For example, a conventional gasoline hybrid (HEV) achieves about 310 g/mi and E85 in a non-HEV FFV achieves 260 g/mi. The future potential of HEVs combined with FFV technology, utilizing E85, is comparable to future BEVs with wind and solar power. [EPA-HQ-OAR-2022-0829-0643, pp. 3-4]

The proposed rulemaking does not allow other vehicle-fuel pathways to compete with BEVs. By regulating only tailpipe emissions, and ignoring the rich literature of lifecycle analysis, EPA would create artificial incentives for auto manufacturers to pursue only BEVs. This could have disastrous impacts on both the cost and the GHG emissions of future vehicles. The same Argonne report found the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with 400-mile range is dramatically more expensive than one with 200-mile range, and its lifetime GHG emissions are substantially worse. In fact, a BEV with 400-mile range has only a slight GHG benefit compared to a HEV or an E85 FFV. But the proposed rule counts all BEVs as zero GHG emissions, regardless of battery size – and regardless of vehicle size and weight. [EPA-HQ-OAR-2022-0829-0643, pp. 3-4]

EPA’s proposal continues to treat EVs as carbon neutral, without regard to the source of electricity powering the vehicles. Depending on the sources of electricity – whether coal, natural gas, wind or nuclear and the mix of those sources - full lifecycle emissions of EVs vary widely, masking the true GHG emissions from these vehicles. Without accounting for upstream emissions from these vehicles, full lifecycle emissions are not considered. Furthermore, EPA notes in the proposal that increases in electricity demand will result in increased non-GHG emissions for some upstream pollutants. EPA does a disservice to emissions reduction goals by accounting for upstream emissions from some fuels and vehicle technologies but not others, providing an advantage to the sources for which “wells-to-wheels” upstream emissions are excluded and concealing emissions from coal power generation, mineral extraction, and other high-carbon sources. [EPA-HQ-OAR-2022-0829-0643, p. 4]

Organization: National Farmers Union (NFU)

IV. Regulatory Bias in Favor of Battery Electric Vehicles

EPA is proposing that upstream emissions accounting for battery electric vehicles (BEVs) as part of a manufacturer's compliance calculation, which under the current regulations would begin in MY 2027, be removed; "thus, BEVs would continue to be counted as zero grams/mile in a manufacturer's compliance calculation." 88 Fed. Reg. at 29,197. We do not believe such an approach is appropriate for a performance-based or technology-neutral proposal, as this approach would disadvantage and have negative consequences for all other technologies even if those technologies can reduce emissions at a lower cost, more quickly, with fewer geopolitical implications (such as those related to the need for critical minerals), and with less obstacles to gain increasing consumer acceptance that is critical to expand electric vehicle use. [EPA-HQ-OAR-2022-0829-0581, p. 6]

Numerous studies have used lifecycle analysis to quantify GHG benefits of BEVs compared to other options including hybrid electric vehicles (HEVs) and renewable fuels. As these studies show, BEVs are not zero emissions. Further, they are not the most cost-effective way to reduce GHG emissions. [EPA-HQ-OAR-2022-0829-0581, p. 6]

The proposed rulemaking would not allow other vehicle-fuel pathways to compete with BEVs. By regulating only tailpipe emissions, EPA would create artificial incentives for only BEVs. This could have disastrous effects on both the cost and the GHG emissions of future vehicles. As shown in Figure 37 from the same Argonne report (reproduced below),14 the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with a 400-mile range is dramatically more expensive than one with a 200-mile range, and its lifetime GHG emissions are substantially worse. A 400-mile-range BEV has only a slight GHG benefit compared to a HEV or an E85 internal combustion engine vehicle (ICEV). But the proposed rule would count all BEVs as zero GHG emissions, regardless of battery size, vehicle size, or weight—all of which can have an impact on lifecycle GHG emissions and costs. [EPA-HQ-OAR-2022-0829-0581, p. 8]

14 Id. at 114.

[See original comment for graph of Lifetime Cost vs. GHGs, Current Tech] [EPA-HQ-OAR-2022-0829-0581, p. 8]

But the proposed emissions standards fail to address the large and growing problem of particulate emissions from tires, and instead focus on more stringent tailpipe particulate standards which will add cost without necessarily improving air quality. EPA should not artificially incentivize heavy BEVs by counting them as "zero emissions," when lighter weight solutions can provide similar GHG emissions benefits and better safety. EPA needs to look beyond the tailpipe and create holistic standards which incentivize real improvements. [EPA-HQ-OAR-2022-0829-0581, p. 12]

Organization: Natural Gas Vehicles for America

EPA Must Amend its Proposal to Account for Benefits of Biofuels

NGVAmerica is not alone in making the case that EPA must amend its proposal. Other organizations including the refinery industry, independent fuel retailers, and the ethanol industry have argued that EPA must make a course correction and following through on its prior commitment to do so. [EPA-HQ-OAR-2022-0829-0597, pp. 9-10]

In 2012, EPA10 committed to sunset the use of the 0 g/mi allowance for electric vehicles as explained below:

10 2012-21972.pdf (govinfo.gov)

EPA is finalizing the full net upstream GHG emissions approach for the compliance treatment for EV/PHEV/ FCVs beyond the per-company vehicle production threshold caps in MYs 2022–2025. EPA is not adopting any type of ‘‘phase-in’’, i.e., the compliance value will change from 0 g/mi to the full net upstream GHG emissions value once a manufacturer exceeds the cap. EPA believes that the levels of the per company vehicle production caps in MYs 2017–2025 are high enough to provide a sufficient incentive such that any production beyond those caps should use the full net upstream GHG emissions accounting. [EPA-HQ-OAR-2022-0829-0597, pp. 9-10]

The preamble to that rule included the following discussion aptly summarizing the opposition to the use of the 0 g/mi standard. [EPA-HQ-OAR-2022-0829-0597, pp. 9-10]

Two automakers opposed the use of 0 g/mi. Honda ‘‘believes that EPA should separate incentives and credits from the measurement of emissions. Honda believes that without accounting for the upstream emissions of all fuels, inaccurate comparisons between technologies will take place * * *. EPA’s regulations need to be comprehensive and transparent. By zeroing out the upstream emissions, EPA is conflating incentives and credits with proper emissions accounting.’’ EcoMotors International ‘‘encourages EPA to drop the 0 g/mile tailpipe compliance value.’’ Environmental advocacy groups also opposed the 0 g/ mi compliance treatment. The Natural Resources Defense Council claimed that 0 g/mi ‘‘undermines’’ the pollution and technology benefits of the program. Along with other environmental groups, the American Council for an Energy Efficient Economy also opposed 0 g/mi, but added that ‘‘[m]ost important, however, is that a zero-upstream treatment of plug-in vehicles not be continued indefinitely, and that full upstream accounting be applied to these vehicles by a date certain. EPA’s proposed treatment of EVs largely accomplishes this, so we strongly support that aspect of the proposal.’’ The American Petroleum Institute argued that ‘‘[i]gnoring the significant contribution of (and extensive compilation of published literature on) upstream CO_2 emissions from electricity generation, defies principles of transparency and sound science and distorts the market for developing transportation fuel alternatives. It incentivizes the electrification of the vehicle fleet with a pre- defined specific and costly set of technologies whose future potential is not measured with the same well-to-wheels methodology against that of advanced biofuels or other carbon mitigation strategies.’’ Organizations advocating fuels other than electricity also opposed the use of 0 g/mi. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

Despite the expressed views, EPA nevertheless retained the 0 g/mi standard. In defense of continuing to retain the 0 g/mi treatment and providing multiplier credits, EPA stated that: [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

EPA believes that it is both reasonable and appropriate to accept some short- term loss of emissions benefits in the short run to increase the potential for far- greater game-changing benefits in the longer run. The agency believes that these multipliers may help bring some technologies to market more quickly than in the absence of incentives. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

The European Biogas Association eloquently explained why the EU Commissions rules should account for well-to-wheel emissions and their explanation is worth including here: [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

The current “tank-to-wheel” approach does not compare the different technologies appropriately because it ignores emissions associated with the production of the fuel. It does not recognise the positive contribution of renewable fuels such as biomethane to climate protection, and thus biases one technology over others without a climate protection rationale. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

The revised CO2 regulation should propose technology-neutral solutions to reduce emissions in an accelerated and cost-effective way. It should avoid one-size-fits-all options that could prove insufficient in the long-term and may lead to a slow, unfair and costly emissions reduction process. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

The CO2 regulation should be amended to ensure an integrated transition that picks no single green technology over others and leaves no-one behind. All alternative fuels are necessary if transport decarbonisation is to be delivered at pace.11 [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

11 SMART CO2 STANDARDS FOR LEAN MOBILITY (europeanbiogas.eu)

Organization: Nebraska Corn Board (NCB) and Nebraska Corn Growers Association

This proposal gives EVs an unfair advantage when the EPA upstream emissions. [EPA-HQ-OAR-2022-0829-0583, p. 1]

Organization: Nissan North America, Inc.

In addition to an adjusted assumed EV phase-in schedule that accounts for market and societal challenges, the program should account for appropriate tailpipe emission benefits. [EPA-HQ-OAR-2022-0829-0594, pp. 5-6]

- Nissan supports EPA’s proposal to extend its policy of measuring GHG emissions for all vehicles, including EVs, based on tailpipe emissions, and not including upstream emissions associated with the electricity that powers these vehicles. Nissan supports the proposal to permanently apply a 0 g/mi CO2 measure for EV operation without any quantity cap. This is consistent with EPA’s long-term goal of increasing the EV market share and with the fact that automobile manufacturers only control tailpipe emissions and have no control over the fuel source for electric power. [EPA-HQ-OAR-2022-0829-0594, pp. 5-6]

VII. Endorsement of Comments from the Alliance for Automotive Innovation

As a member of the Alliance for Automotive Innovation (“the Alliance”), Nissan fully endorses the comments on the Proposed Multi-Pollutant Rule submitted separately by the Alliance. In particular, Nissan highlights several points from the Alliance’s comments, including: [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support continuation of tailpipe-based program and treatment of 0 g/mi for EVs [EPA-HQ-OAR-2022-0829-0594, p. 9]

Organization: North Dakota Farmers Union (NDFU)

Regulatory Bias in Proposed Rule

EPA is proposing that upstream emissions accounting for BEVs as part of a manufacturer's compliance calculation, which under the current regulations would begin in MY 2027, be removed; "thus, BEVs would continue to be counted as zero grams per mile in a manufacturer's compliance calculation." This is not an appropriate approach for a performance-based or technology-neutral proposal, because it would disadvantage all other technologies, regardless of whether those technologies can reduce emissions at a lower cost and more quickly. [EPA-HQ-OAR-2022-0829-0586, p. 5]

The proposed rulemaking would not allow other vehicle-fuel pathways to compete with BEVs. By regulating only tailpipe emissions, EPA would create artificial incentives for only BEVs. This could have disastrous effects on both the cost and the GHG emissions of future vehicles. [EPA-HQ-OAR-2022-0829-0586, p. 5]

Organization: Plains All American Pipeline, L.P.

In addition, the Proposal fails to fully consider all the implications and costs of effectively mandating EVs.8 It is contrary to a robust energy policy where all forms of energy are utilized to maintain and improve quality of life and promote economic growth. By effectively mandating a particular consumer product (i.e., EVs), the Proposal is favoring one technology, while dismissing the potential benefits of a more holistic approach to emission reduction, and additional conservation activities / mandates. It also omits from the discussion advances in technologies including lower carbon fuels, hybrid EVs and fuel cells, which are moving us towards a lower-emission future while also offering consumers multiple options to meet their needs. [EPA-HQ-OAR-2022-0829-0713, p. 2]

8 https://consumerenergyalliance.org/cms/wp-content/uploads/2023/06/CEA_EV_REPORT_2023.pdf

For all the above these reasons, Plains strongly urges the EPA to withdraw the Proposal, or in the alternative, modify the Proposal so that it employs a technology-neutral approach that accounts for the lifecycle emissions of all fuels and vehicles, not just tailpipe emissions. [EPA-HQ-OAR-2022-0829-0713, p. 2]

Organization: Plug In America

3. EPA requests comments on its proposed treatment of electrified vehicles in manufacturer compliance calculations. [EPA-HQ-OAR-2022-0829-0625, pp. 2-3]

Plug In America agrees with the EPA that manufacturers of either EVs or fossil-fuel vehicles should not account for upstream utility emissions in compliance calculations. EPA regulates fossil-fuel-fired power plants under separate authority and expects declining GHG emissions in the future. EPA should continue to focus on tailpipe emissions and count any vehicle with zero tailpipe emissions as 0g/mi as its compliance value. Consistent with other light-duty vehicles, compliance calculations should only include tailpipe emissions. [EPA-HQ-OAR-2022-0829-0625, pp. 2-3]

Organization: POET, LLC

OnLocation also finds that if BEV upstream emissions are considered, "real-world" emissions to the atmosphere from covered vehicles would be at levels significantly higher than the proposed compliance standards. More specifically, if upstream fuel production emissions are accounted for regarding BEVs, the Proposed Rule's 86 gram per mile target in 2032 cannot be met when using electric grid GHG emission intensities from EIA, the leading U.S. governmental source for independent energy statistics and analysis.116 Note that OnLocation's analysis does not seek to account for battery manufacturing lifecycle emissions, which is addressed in Trinity's report, as described above. As Trinity has shown, "actual BEV lifecycle emissions would be even higher if battery manufacturing impacts are considered."117 [EPA-HQ-OAR-2022-0829-0609, pp. 26-27]

116 Id. at 1, 10.

117 Id. at 10.

OnLocation further finds that "using only tailpipe emissions provides inconsistent incentives between BEV and ICE vehicles, while optimistic projections for the grid carbon intensity and BEV penetration could reduce the effectiveness of the Proposed Rule in reducing carbon."118 Regarding electric grid intensity, OnLocation finds that EPA's Draft Regulatory Impact Analysis (DRIA) using its model shows a 70% reduction of power sector-related CO2 emissions from current levels by 2055, while EIA's reference case "shows closer to a 50% reduction from current levels and substantially less CO2 reduction if renewable costs do not decline as quickly as in the Reference scenario."119 While ICE vehicles have incentives under the proposal to reduce their tailpipe GHG emissions, BEVs and the electric grid lack GHG reduction incentives since the Proposed Rule effectively assumes that all electricity used by BEVs is zero carbon.120 [EPA-HQ-OAR-2022-0829-0609, pp. 26-27]

118 Id. at 14.

119 Id.

120 Id. at 16.

Scenario 6: Adding Low Carbon Fuel and Upstream Emissions [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

[See original attachment for Figure 11 Compliance Path with Low Carbon Fuel and Upstream Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

[See original attachment for Figure 12 Market Shares with Low Carbon Fuel and Upstream Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

Scenario 6 presents a 75% reduction in fuel carbon intensity for gasoline, though including upstream emissions including those for BEVs. Figure 11 and Figure 12 show that using the model compliance with the Proposed Rule's targets still could be achievable, though outside of 2027 – 2032 timeframe when considering both upstream emissions and the impact if biofuels reduce ICE vehicle carbon intensity by 75%. In this scenario, the market share of BEVs only changes slightly from the Proposed Rule, however in the model greater total emission reductions (i.e., those that consider upstream emissions) are achieved by deploying low-carbon ICE vehicles. This scenario shows that with lower-carbon ICE fuels (such as low carbon bioethanol), and considering upstream emissions, compliance within the range of EPA's proposed target is possible. [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

Ignoring Upstream Emissions is Inconsistent with Incentivizing GHG Emission Reductions

The following section demonstrates that using only tailpipe emissions provides inconsistent incentives between BEV and ICE vehicles, while optimistic projections for the grid carbon intensity and BEV penetration could reduce the effectiveness of the Proposed Rule in reducing carbon. [EPA-HQ-OAR-2022-0829-0609, p. 48]

Upstream Emissions are Uncertain

While EPA's Draft Regulatory Impact Analysis (DRIA) using its model shows a 70% reduction of power sector- related CO2 emissions from current levels by 2055. As shown in Figure 13, EIA's reference scenario shows closer to a 50% reduction from current levels and substantially less CO2 reduction if renewable costs do not decline as quickly as in the Reference scenario. If included in the CO2 targets, differences between grid emissions and projections used in the Proposed Rule could have a significant impact on the ability of manufacturers to achieve compliance. [EPA-HQ-OAR-2022-0829-0609, p. 48]

[See original attachment Figure 13. Grid Intensity] [EPA-HQ-OAR-2022-0829-0609, p. 48]

Source: AEO 2023 Reference, High Technology Cost Tables 8, 18 [EPA-HQ-OAR-2022-0829-0609, p. 48]

Manufacturing emissions differ between EV and ICE [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

[See original attachment for Figure 14. Vehicle Manufacturing Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Emissions for BEV200, BEV300, and BEV400 compared with midsize gasoline ICEV. Source: Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies, Argonne National Lab, 2022 [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

As shown in Figure 14, compared with a midsize gasoline ICEV, a BEV has higher emissions from vehicle manufacturing under current technologies, ranging from approximately 10 gCO2e/mi in a BEV200, to 25 gCO2e/mi in a BEV300, and 35 gCO2e/mi in BEV400, according to the lifecycle analysis by the Argonne National Lab (battery emissions are embedded in Figure 14 within "vehicle" emissions, and are most significant in the data in Figure 14 labelled "Current Tech"). [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Relative to the ~80 gCO2e/mi EPA proposed compliance value, where the alternatives are +-10 gCO2e/mi, these are substantial incremental emissions that are neglected when upstream emissions are ignored. [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Ignoring upstream emissions has other negative effects on incentivizing reductions of GHG emissions from LDVs, including disregarding the substantially greater GHG manufacturing footprint of BEVs over conventional vehicles and decreasing incentives for clean electricity (since EPA assumes, under the Proposed Rule's compliance scheme, that all electricity used in EVs is effectively zero carbon). This analysis also shows that a rulemaking that also considers low-carbon ICE vehicles (such as enabled by low-carbon bioethanol) can facilitate compliance with EPA standards while decreasing the larger system emissions (including upstream emissions) in the atmosphere. [EPA-HQ-OAR-2022-0829-0609, p. 50]

The first of these concerns is that U.S. EPA has ignored upstream sources of GHG emissions other than electricity generation. This is of particular concern given that there are significant upstream emissions associated with the manufacturer of batteries for BEVs that do not occur with conventional vehicles. A paper published by ICCT4 notes that estimates of these GHG emissions range from 56 to 494 kilograms of CO2eq emissions per kWh of battery pack capacity which translates to between about 5 and 50 metric tons of GHG emissions per 100 kWh battery pack. Using U.S. EPA's assumption that the Proposed Rule will result in an additional 80,000,000 BEVs on the road in the U.S. by 2055 relative to the no- action case, and these estimates of GHG emissions from battery production, the cumulative increase in GHG emissions by would be between 400 and 4000 metric tons. This value can be compared to U.S. EPA's 710 metric ton estimate of the cumulative GHG emissions increase due to electricity generation for BEVs and the 8,000 ton reduction from conventional vehicles (see DRIA Table 9-21) to show the importance of accounting for battery production emissions. U.S. EPA might respond by noting that they have not accounted for upstream GHG emissions associated with the production of gasoline and diesel, but those are small compared to the GHG emissions from fuel combustion and accounting for them would assume a net global reduction in the use of those fuels which would likely, even with the Proposed Rule, still be used in other parts of the developing world. [EPA-HQ-OAR-2022-0829-0609, p. 62]

4 https://theicct.org/sites/default/files/publications/EV-life-cycle-GHG_ICCT-Briefing_09022018_vF.pdf.

Organization: Porsche Cars North America (PCNA)

Porsche supports the zero upstream accounting of emissions for pure electric vehicles (and FCVs) and recognizes that stakeholders may view additional credit opportunities for these vehicles as resulting in vehicles with “negative CO2” values. Stakeholders may claim that the optics of having a vehicle with “negative CO2” appears nonsensical. However, Porsche contends that it is appropriate to step back and reconsider that the GHG fleet average regulations are not intended to be, and do not operate as, individual vehicle regulations. The program is not designed to reflect individual real-world performance of such vehicles. Rather, the CO2 regulation is a fleet level policy that operates in essence as an accounting program that utilizes a variety of calculations and credit mechanisms to drive down the overall annual CO2 emissions of a manufacturer's fleet. [EPA-HQ-OAR-2022-0829-0637, p. 20]

Organization: Renewable Fuels Association (RFA)

I. Executive Summary

EPA's proposed tailpipe emissions standards for 2027 and later years set extremely aggressive goals for reducing vehicular greenhouse gas (GHG) and criteria pollutant emissions. Achieving these goals would require dramatic changes not only in vehicle design, but also in the entire transportation energy supply chain. In addition, meeting the proposed emissions standards in the manner envisioned by EPA would require a massive and rapid shift in the vehicle purchasing and refueling behavior of American consumers. Indeed, if the rule is finalized as proposed, EPA projects that electric vehicles (EVs) “could account for 67% of new light-duty vehicle sales and 46% of new medium-duty vehicle sales in MY 2032.”1 By comparison, EVs accounted for just 5.8% of new light-duty vehicle sales in 2022 and accounted for just 1% of total registered light-duty vehicles.2 [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

1 U.S. Environmental Protection Agency. “Biden-Harris Administration Proposed Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future.” April 12, 2023. https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and.

2 Kelly Blue Book. “America Splits Into Thirds on Electric Cars.” (March 22, 2023). https://www.kbb.com/car- news/america-splits-into-thirds-on-electric-cars/.

While EVs are likely to play an important role in achieving emissions reductions goals, the growth in EVs projected by EPA would require enormous investment and rapid expansion in many global industrial sectors. Such a transition would require immediate and dramatic growth in the mining and processing of critical minerals, a massive increase in the generation and distribution of lower-carbon electricity, and the rapid buildout of a nationwide infrastructure network for recharging EVs. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

It would be naïve and unrealistic to believe that such extraordinary changes in the marketplace can be achieved smoothly and quickly. There are numerous obstacles involved in a transition of this scale, including geopolitical and national security concerns; long lead times in permitting, material supply, design, and manufacturing; substantial capital investments; safety considerations; and unprecedented changes in consumer behavior and purchasing habits. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

To achieve the Agency’s ambitious emissions reduction goals in the most robust, rapid, and affordable way, EPA should use this rulemaking to encourage multiple additional solutions that can decarbonize light- and medium duty transportation. EPA must also recognize that vehicles and fuels operate as integrated systems. Focusing only on emissions from the vehicle—while ignoring emissions related to the extraction and production of the fuel used to power the vehicle—will almost certainly result in falling far short of the administration’s overall climate goals. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

Low-carbon liquid fuels like ethanol have a unique and vital role to play in the administration’s efforts to combat climate change and reduce overall emissions from the transportation sector—both immediately and in the long term. Fuels such as E15 (15% ethanol) are compatible with nearly all vehicles on the road today, and thus offer immediate emissions benefits on a much larger scale than changes to only new vehicles. In addition, E85 (51-83% ethanol) used in flexible fuel vehicles (FFVs) can substantially reduce GHG emissions from the light-duty vehicle sector. More than 25 million FFVs are already on the road today and FFV production can be ramped up quickly by automakers at no additional cost to the consumer. In the longer term, low-carbon or zero-carbon liquid fuels used in FFVs or plug-in hybrid electric FFVs can offer emissions solutions for market segments and customers that may not be well served by battery electric vehicles (BEVs). [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

To foster a vibrant and competitive landscape of multiple low-carbon solutions, it is critical for EPA to set performance-based and technology-neutral emissions standards. Unfortunately, the proposed rule falls short of this ideal by focusing narrowly on one technology and only one segment of the GHG emissions lifecycle (i.e., tailpipe emissions). It is essential that EPA look beyond tailpipe emissions; the Agency should use a full lifecycle3 analysis to fairly and accurately compare the climate impacts of all current and future transportation options. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

3 Throughout these comments, the terms "full lifecycle analysis" refer to a complete "well-to-wheel" analysis as defined by Argonne National Laboratory.

II. The Proposed Rule Uses Inappropriate GHG Accounting Gimmicks to Create a De Facto Mandate for Battery Electric Vehicles

For light-duty vehicles, EPA is proposing an industry-wide average GHG emissions target of 82 grams CO2/mile (g/mile) in model year (MY) 2032. This represents a drastic 56% reduction from the MY 2026 target of 186 g/mile and a 63% reduction from the MY 2022 target of 224 g/mile. Notably, the estimated industrywide average GHG emissions rate has exceeded the annual standard each year since 2016, requiring automakers to use banked credits and other adjustments to comply.4 [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

4 Congressional Budget Office. "Emissions of Carbon Dioxide in the Transportation Sector." December 2022. https://www.cbo.gov/publication/58861.

For the purposes of calculating fleet-average GHG emissions, EPA is proposing to allow auto manufacturers to use a compliance value of 0 g/mile for BEVs, fuel cell electric vehicles (FCEVs), and the electric-only portion of operation for plug-in hybrid EVs (PHEVs). As EPA acknowledges, a compliance value of 0 g/mile for EVs ignores the upstream emissions associated with battery production and electricity generation (i.e., the "fuel" for EVs). [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

Given the stringency of the proposed standards (and the inability of most internal combustion engine (ICE) vehicles to meet them), EPA expects auto manufacturers will be strongly compelled to substantially increase EV production in order to benefit from the 0 g/mile assumption when calculating fleet-wide average emissions. According to EPA's own analysis, it is highly unlikely that automakers will be able to meet EPA's proposed emissions standards for 2027-2032 without dramatically increasing the production of EVs and reducing the production of ICE vehicles. The proposal's forced push toward EVs would be exacerbated by EPA's proposal to eliminate the "multiplier incentive" that allows automakers to count one BEV as more than one "zero emissions vehicle" in compliance calculations. In this way, EPA is essentially forcing auto manufacturers to increase production of EVs, and in turn forcing the entire transportation supply chain to undergo a massive shift toward electrification. [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

While significantly increasing the production of EVs may help automakers comply with the proposed future emissions standards, such a transition certainly does not guarantee that real-world GHG emissions associated with the full transportation supply chain will be meaningfully reduced. In fact, depending on the sources of electricity used to power EVs and the practices used for extraction and refining of critical battery minerals, EPA's proposal to force increased EV production could fall far short of accomplishing the administration's climate objectives. Thus, EPA's tailpipe emissions standards could perversely incentivize the production and sale of more expensive vehicles that, in reality, have little practical impact on reducing overall emissions. [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

a. BEVs are Not “Zero Emissions Vehicles.” Counting Only Tailpipe Emissions Results in a Flawed and Incomplete Assessment of the True Climate Impacts of BEVs

EPA’s proposal to assign a value of 0 g/mile to BEVs ignores the fact that significant CO2 emissions result from the extraction and processing of the critical minerals for EV batteries, as well as the production of electricity for BEVs. Some lifecycle analysis studies show that certain BEVs (using coal-generated electricity and battery minerals from intensive mining practices) may have a larger carbon footprint than conventional vehicles using liquid fuels in internal combustion engines.5,6 [EPA-HQ-OAR-2022-0829-0602, pp. 5-6]

5 See, for example, Paul Leinert. “Analysis: When do electric vehicles become cleaner than gasoline cars?” Reuters. July 7, 2021. https://www.reuters.com/business/autos-transportation/when-do-electric-vehicles-become-cleaner-than- gasoline-cars-2021-06-29/.

6 International Energy Agency. “The Role of Critical Minerals in Clean Energy Transitions.” May 2021. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions.

On average basis, a recent comprehensive analysis by Argonne National Laboratory (in cooperation with automotive and energy industry experts) found that the full lifecycle GHG emissions associated with a typical 400-mile range BEV are approximately 253 g/mile.7 This estimate takes into account the upstream emissions associated with the EV battery and production of the electricity used to power the vehicle. While the 253 g/mile figure represents a roughly 40% reduction in GHG emissions compared to a gasoline-powered ICE vehicle, it is far from “zero emissions.” At the same time, the Argonne study found that using today’s average E85 in an ICE FFV resulted in lifecycle GHG emissions of approximately 255 g/mile—generally the same as the 400-mile BEV. [EPA-HQ-OAR-2022-0829-0602, pp. 5-6]

7 Kelly et al., "Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies", report ANL-22/27, June 2022. https://www.osti.gov/biblio/1875764.

EPA’s proposed approach of assigning a 0 g/mile value to BEVs essentially assumes that the electricity and battery minerals powering the BEV are 100% renewable and free of any CO2 emissions impacts in every instance. Of course, we know this is not the case. Today, more than 60% of U.S. electricity generation comes from fossil fuels that contribute significant CO2 emissions (19.5% coal, 40% natural gas, 1% petroleum and other).8 Wind and solar provide only 13.6% of the nation’s electricity, with hydropower providing another 6.2%. Nuclear accounts for 18% of U.S. electric power generation. Overall, electric power generation is the second largest source of GHG emissions in the United States, accounting for 25% of total emissions (trailing only the transportation sector, which is responsible for 28% of U.S. emissions).9 [EPA-HQ-OAR-2022-0829-0602, pp. 5-6]

8 U.S. Energy Information Administration. “What is U.S. electricity generation by energy source?” March 2023. https://www.eia.gov/tools/faqs/faq.php?id=427&t=3.

9 U.S. Environmental Protection Agency. “Sources of Greenhouse Gas Emissions.” Accessed June 17, 2023. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

To ensure the final tailpipe standards have the desired effect of truly reducing GHG emissions from transportation, RFA strongly urges EPA to adopt a full lifecycle GHG accounting approach for all vehicles in the final rule. [EPA-HQ-OAR-2022-0829-0602, pp. 5-6]

III. EPA Admits its GHG Accounting Loophole for BEVs is Not Rooted in Science and is Instead Meant to Incentivize Production of BEVs

In the proposal, EPA readily acknowledges that operation of an EV is directly responsible for some amount of upstream GHG emissions related to electricity generation. Yet, the Agency proposes to ignore these emissions and continue the use of a scientifically dubious assumption that operation of an EV is entirely free of any GHG impacts. Indeed, EPA says it is proposing to continue the 0 g/mile compliance value for BEVs strictly as a means of "encouraging the continued development and introduction of electric vehicle technology."10 In other words, EPA proposes to use the 0 g/mile compliance value as a veiled subsidy to compel the production of a specific technology to the exclusion of other technologies that could deliver similar levels of emissions reduction. [EPA-HQ-OAR-2022-0829-0602, pp. 6-8]

10 88 Fed. Reg. 29252 (May 5, 2023).

The Agency's reasoning for maintaining the 0 g/mile compliance value for BEVs is highly questionable. EPA says it is continuing the 0 g/mile assumption because in 2020, "power sector emissions were declining and the trend was projected to continue."11 Yet, EPA also reports that "[i]n 2021, the electric power sector was the second largest source of U.S. greenhouse gas emissions, accounting for 25% of the U.S. total."12 EPA data show the electric power sector emitted nearly 1.6 billion metric tons of GHG emissions in 2021, yet the Agency's proposal effectively assumes those emissions don't exist and have no bearing on the climate impacts of EVs. [EPA-HQ-OAR-2022-0829-0602, pp. 6-8]

11 Id.

12 U.S. Environmental Protection Agency. "Sources of Greenhouse Gas Emissions." Accessed July 1, 2023. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#electricity (emphasis added).

Additionally, according to the U.S. Energy Information Administration (EIA), "CO2 emissions created in the U.S. electric power sector rose by 7% in 2021 (102 MMmt) as a result of changes in both electricity usage and fuel mix."13 The 7% increase in electric power sector emissions was more than double the 3% increase in electric power generation, as the use of coal and petroleum both increased in 2021. EIA reports that these changes "led to a 4% increase in the carbon intensity of electricity" in 2021.14 [EPA-HQ-OAR-2022-0829-0602, pp. 6-8]

13 U.S. Energy Information Administration. "U.S. Energy Related Carbon Dioxide Emissions 2021." Accessed May 20, 2023.https://www.eia.gov/environment/emissions/carbon/#:~:text=Commercial%20sector%20emissions%20increased%20by,in%20the%20electricity%20fuel%20mix. (emphasis added).

14 Id.

[See original comment for graph of electricity generation] [EPA-HQ-OAR-2022-0829-0602, pp. 6-8]

While the use of coal for electricity declined in 2022 versus 2021, the use of both petroleum and natural gas for electricity in 2022 increased over 2021 levels, meaning total fossil fuel use for electricity continued to increase in 2022.15 Clearly, it is not safe to simply assume that electric power sector emissions will steadily decline over time, especially as electricity demand increases as a result of expanded EV sales and other factors. [EPA-HQ-OAR-2022-0829-0602, pp. 6-8]

15 U.S. Energy Information Administration. “Monthly Energy Review.” Table 7.2a Electricity Net Generation. Accessed July 1, 2023. https://www.eia.gov/totalenergy/data/monthly/pdf/sec7_5.pdf.

Notwithstanding the fact that RFA favors a full lifecycle GHG analysis and recommends against the use of the 0 g/mile compliance value for EVs, if EPA intends to use g/mile compliance values as policy incentives to stimulate the production of lower-carbon vehicles, it should be equitable in doing so. If the Agency believes it has the authority to compel greater production of lower-carbon vehicle technologies using GHG compliance values that always assume the best-case technology and energy mix, then it should do so fairly across the full portfolio of lower-carbon fuel and vehicle options. [EPA-HQ-OAR-2022-0829-0602, pp. 6-8]

IV. EPA Should Discontinue the Use of its Zero Gram per Mile Emissions Assumption for BEVs

EPA’s proposal solicits comment on the “proposed treatment of electrified vehicles in manufacturer compliance calculations” (i.e., the use of a 0 g/mile compliance value).16 For the reasons described throughout these comments, RFA strongly recommends that EPA discontinue the use of its 0 g/mile compliance value for BEVs. The 0 g/mile value unfairly compels automakers to produce one specific technology type, while also providing an inaccurate and incomplete picture of the true climate impacts of EVs. [EPA-HQ-OAR-2022-0829-0602, pp. 8-9]

16 88 Fed. Reg. 29252 (May 5, 2023).

Importantly, the 0 g/mile measure was also meant to be temporary. EPA previously finalized regulations that would phase down and ultimately eliminate the 0 g/mile compliance value for EVs. In response to public comments on EPA’s 2012 proposed rule for MY 2017 and later light-duty vehicle GHG standards, the Agency finalized an approach that would have required automakers to account for upstream electricity emissions for all MY 2022 and later EVs. However, in the 2020 vehicle GHG emissions standards rule, EPA reversed this approach and instead extended the use of the 0 g/mile compliance value through MY2026, with no phasedown. Now, defying the original temporary intent of the 0 g/mile value, EPA proposes to make the 0 g/mile assumption permanent for EVs. [EPA-HQ-OAR-2022-0829-0602, pp. 8-9]

RFA believes the 0 g/mile compliance value for EVs should be discontinued with MY2026 or sooner, as this “incentive” results in inaccurate accounting of emissions related to BEVs and it is no longer necessary to spur production of EVs. As EPA acknowledges, the 0 g/mile “functioned as intended” to stimulate increased production in EVs, which are “now coming into the mainstream.”17 As stated by EPA, automakers have already committed enormous investments toward EVs, and increased production of EVs is strongly incentivized under state policies and other federal programs like the Inflation Reduction Act. Thus, no additional incentive is needed under the tailpipe emissions regulation. [EPA-HQ-OAR-2022-0829-0602, pp. 8-9]

17 Id.

It is time for EPA to eliminate the use of the 0 g/mile compliance value for EVs and adopt a full lifecycle approach for determining GHG values. [EPA-HQ-OAR-2022-0829-0602, pp. 8-9]

VI. EPA Should Adopt a Full Lifecycle Analysis Approach for All Vehicle Options that Includes Upstream GHG Emissions Associated with Vehicle Fuel/Energy Use

Vehicles and fuels operate together as integrated systems. This is true whether the system is a battery electric vehicle operating on electricity, or an ICE vehicle operating on liquid fuel. To effectively regulate emissions associated with the operation of light- and medium-duty vehicles, EPA must adopt approaches that most accurately assess the overall climate impacts of various transportation options. Specifically, EPA should examine the full scope of lifecycle GHG emissions associated with each vehicle/fuel system and allow automakers to use g/mile compliance values that reflect the overall GHG impacts of various vehicle/fuel options. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

In the proposal, EPA requests comments on its proposed treatment of electrified vehicles in manufacturer compliance calculations (i.e., the use of a 0 g/mile compliance value for EVs). As part of its rationale for proposing to maintain the 0 g/mile value for EVs, the Agency states that "[i]f EPA deviated from this tailpipe emissions approach [i.e., using 0 g/mile] by including upstream accounting, it would appear appropriate to do so for all vehicles, including gasoline-fueled vehicles."28 [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

28 88 Fed. Reg. 29252 (May 5, 2023).

RFA agrees with this statement by EPA and recommends that the Agency should indeed adopt an approach that accounts for full lifecycle emissions for all fuel and vehicle combinations. In fact, this is the only scientifically defensible approach for regulating emissions from light- and medium-duty vehicles. Implementing an approach that accounts for all lifecycle emissions would not only open the automotive market to greater competition and lower costs for consumers, but it would stimulate investment in lower- carbon technologies and practices across the entire fuel/vehicle supply chain. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

RFA believes the final rule should take a market-based approach that sets clear and predictable annual full lifecycle GHG reduction requirements for automakers (in g/mile values), then allows the marketplace to determine the most cost-effective means for achieving the reductions. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

Robust, peer-reviewed methodologies already exist for conducting full lifecycle emissions analysis for current and future vehicle and fuel options. Specifically, EPA should use the Department of Energy Argonne National Laboratory GREET model, which is accepted worldwide as the most robust and authoritative tool for lifecycle GHG accounting for a wide array of transportation fuels. The GREET model is also updated annually to incorporate the latest data. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

VII. If EPA Maintains its Zero Gram per Mile Incentive for EV Production, the Agency Should Allow for a Similar Incentive for FFV Production

For the reasons described in detail above, RFA objects to the continued use of a 0 g/mile compliance value for EVs for the purposes of calculating fleet averages. However, if EPA ultimately finalizes a permanent incentive of 0 g/mile for EVs, then it must consider applying a similar incentive for other low-carbon vehicle technologies, including FFVs that can operate on E85 and other higher ethanol blends. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

EPA's proposed approach for BEVs (i.e., using a value of 0 grams/mile) essentially assumes every BEV produced by automakers will only use zero-carbon renewable electricity over the entire lifespan of the vehicle. In other words, EPA's proposal credits all BEVs for their maximum potential CO_2 benefit, without requiring any evidence that such a benefit is actually achieved. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

In order to create an equitable opportunity for biofuels to contribute to the effort to decarbonize light-duty transportation, EPA should institute a CO_2 emissions compliance value that similarly recognizes the potential carbon benefits of light-duty vehicles designed to operate on liquid fuels containing high levels of renewable ethanol. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

EPA's final rule should adopt an assumption that FFVs operate on E85 all the time, just as the proposed 0 g/mile value effectively assumes BEVs operate on zero-carbon electricity all the time. Automakers who manufacture FFVs should be allowed to use a CO_2 emissions compliance value that reflects the lifecycle CO_2 savings from using E85. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

According to the latest Argonne National Laboratory GREET model results, E85 made with average corn ethanol reduces full lifecycle CO_2-equivalent GHG emissions by 31% per mile compared to gasoline.29 This estimate includes hypothetical/potential emissions from direct and indirect land use changes. Accordingly, for the purposes of calculating fleet averages, EPA should allow automakers to use a CO_2 compliance value for an FFV that is 31% lower than the compliance value for a corresponding non-FFV model. As an example, if a non-FFV car is determined by the automaker to have a CO_2 value of 181 g/mile, the automaker should be allowed to use a compliance value of 125 g/mile for an FFV version of that same car. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

29 The GREET2022 model shows that E0 gasoline results in fleet average full lifecycle GHG emissions of 421 g/mile, compared to fleet average emissions of 291 g/mile for the use of E85 in an FFV. Results verified via personal communication between RFA and Longwen Ou of Argonne National Laboratory.

This approach to incentivizing FFVs would be no different than the approach EPA has used historically, and is proposing to continue, for incentivizing EV production. This FFV mechanism would create a more level playing field for low-carbon liquid fuels and would provide a meaningful incentive for automakers to manufacture FFVs in addition to BEVs. Increased production of FFVs would unlock increased use of lower-carbon liquid fuel blends containing higher levels of ethanol, such as E85 and E30. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

Alternatively, EPA could allow auto manufacturers to use the same 0 g/mile compliance value for ethanol's portion of FFV operation, given that the ethanol-related "tailpipe" CO_2 emissions from an FFV are biogenic in nature and fully offset by atmospheric CO_2 removal by the biomass feedstock at the beginning of the lifecycle. That is, if EPA remains committed to focusing only on tailpipe emissions (and ignoring upstream fuel production and supply chain emissions), then biofuels like ethanol should be treated as "zero emissions" fuels because CO_2 emissions from the vehicle are fully offset by CO_2 uptake by the feedstock. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

Organization: Southern Environmental Law Center (SELC)

EPA must accurately account for tailpipe emissions and should not lose sight of upstream emissions. [EPA-HQ-OAR-2022-0829-0591, p. 9]

EPA is also proposing that BEVs and fuel cell electric vehicles (FCEVs)—i.e., vehicles with no internal combustion—retain a zero gram per mile (g/mi) compliance value and not be required to account for upstream emissions under the GHG standards.69 This aligns with the standards' treatment of other, fossil fuel-powered vehicles. Even though this regulatory regime deals specifically with tailpipe emissions, EPA should not lose sight of the upstream GHG or other emissions associated with light- and medium-duty vehicles—ZEVs or otherwise. We therefore support EPA's consideration of future gasoline fuel property standards that could provide additional meaningful reductions in PM emissions.70 However, even more could be done. Some states, for example, are leading the way by implementing low carbon fuel standards that consider lifecycle GHG emissions from energy used for fuel.71 [EPA-HQ-OAR-2022-0829-0591, p. 9]

69 Id.

70 See id. at 29197.

71 See, e.g., KELSI BRACMORT, CONG. RSCH. SERV., R46835, A LOW CARBON FUEL STANDARD: IN BRIEF 2 (2021), https://sgp.fas.org/crs/misc/R46835.pdf.

Organization: Specialty Equipment Market Association (SEMA)

Tailpipe Emissions vs. Lifecycle Emissions

SEMA is disappointed that this proposal exclusively looks at tailpipe emissions and not the full carbon footprint surrounding the manufacture of BEVs, including their batteries and components. The EPA's calculations should include the environmental impacts associated with mining for battery minerals, manufacturing batteries, and the resources from the power grid to power a full fleet of BEVs. Of note, the U.S. Energy Information Administration reported that fossil fuels are the largest sources of energy for electricity generation in the United States with an estimated 61% of all the electricity generated in 2021 coming from a combination of coal, natural gas, and petroleum.4 While BEVs do not have tailpipe emissions, it is naï ve to assume that they are carbon neutral given the fossil fuels that the U.S. and other countries around the world rely upon to produce the power to operate these vehicles. An analysis from S&P Global Mobility found that for the sixth consecutive year in a row the average age of a vehicle on the road today is 12.5 years old. Conversely, the "average age of battery electric vehicles in the U.S. fell to 3.6 years down slightly from 3.7 years in 2022."5 According to a 2022 EPA report on greenhouse gas emissions, new vehicle fuel economy has increased 32% since model year 2004.6 SEMA believes that tailpipe emissions can continue to be reduced without shifting to a zero-based tailpipe emissions model. A diverse approach to addressing GHG emissions through a multifaceted approach of cleaner fuels, alternative fuels and electrification provides consumers with a choice in how they reduce their carbon footprint. [EPA-HQ-OAR-2022-0829-0596, p. 4]

4 U.S. Energy Information Administration: Electricity in the United States (Link: https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php).

5 S&P Global Mobility: US consumers keep vehicles for a record 12.5 years on average (Link: https://www.reuters.com/business/autos-transportation/us-consumers-keep-vehicles-record-125-years-average-sp-2023-05-15/).

6 The 2022 EPA Automotive Trends Report (Link: https://www.epa.gov/system/files/documents/2022-12/420s22001.pdf).

Organization: Tesla, Inc.

Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

- Maintain the existing zero emissions upstream approach for BEVs; [EPA-HQ-OAR-2022-0829-0792, p. 2]

A number of studies show that the light-duty sector must rapidly decarbonize beginning this decade to meet the U.S. commitments. Further, the need for the rapid deployment of light-duty BEVs is even more critical given the lengthening time it takes to turn over the light-duty fleet. Currently, the average age of light-duty vehicles on the road in the U.S. is now at an all-time high of 12.5 years compared to two decades ago when the average age was 9.7 years.58 To meet the goal of limiting global warming for below 1.5 degrees C the passenger fleet must primarily be composed of BEVs by 2050.59 Given the aging vehicle fleet, this requires vehicles sales consisting of 100% BEVs in the early 2030s.60 Other studies have similarly highlighted BEV sales need to reach 95% by 2035 to meet the 1.5 degree C target.61 Still others have found that in order to meet net-zero emission by 2050 60% of vehicle sales must be BEVs in 2030 with no new ICE vehicle sales occurring after 2035.62 [EPA-HQ-OAR-2022-0829-0792, p. 9]

58 Axios, Gas-powered cars won't die off any time soon (May 15, 2023) available at h ttps://www.axios.com/2023/05/15/ev- e lectric-vehicles-gas-trucks-suvs-cars-a ging?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top .

59 Dimanchev, et al. T he 4Ds of Energy Transition: Decarbonization, Decentralization, Decreasing Use and Digitalization, E lectric Vehicle Adoption Dynamics on the Road to Deep Decarbonization (July 15, 2022) (highlighting that published pathways indicate that the passenger vehicle fleet must be primarily comprised of zero-emission vehicles by 2050, in a future consistent with keeping global warming below 2 or 1.5 °C. With the average lifetime of internal combustion cars in the U.S. is 16 years, achieving a ZEV share consistent with 1.5°C pathways would require a combination of a relatively early ban by around 2030 and an average non-ZEV lifetime shorter than 10 years.) available at h ttps://onlinelibrary.wiley.com/doi/10.1002/9783527831425.ch8 (last visited Sept 12, 2022).

60 Id.

61 Bloomberg New Energy Finance, Net-Zero Road Transport By 2050 Still Possible, As Electric Vehicles Set To Quintuple By 2025 (June 1, 2022) (finding that be on n track for a net-zero global fleet by 2050, zero-emission vehicles need to represent 61% of global new passenger vehicle sales by 2030, 93% by 2035, and the last ICE vehicle of any segment needs to be sold by 2038.) available at h ttps://about.bnef.com/blog/net-zero-road-transport-by-2050-still-possible-as-electric-vehicles-set- t o-quintuple-by-2 025/?utm_source=Email&utm_campaign=596500&utm_medium=Newsletter&utm_content=BNEFMonthI nReviewJune&t a ctic=596500&pchash=

62 International Energy Agency (IEA), World Energy Outlook 2022, An updated roadmap to Net Zero Emissions by 2050, How do we get to net zero emissions by 2050? (Oct. 27, 2022) available at h ttps://www.iea.org/reports/world-energy-outlook- 2 022/an-updated-roadmap-to-net-zero-emissions-by-2050#abstract; See generally, ICCT, Emissions reduction benefits of a faster, global transition to zero-emission vehicles (March 2022) available at h ttps://theicct.org/wp-c ontent/uploads/2022/03/Accelerated-

ZEV-transition-wp-f inal.pdf?utm_source=ICCT+mailing+list&utm_campaign=01b4a8f70d-l ately_from_feb2018_COPY_01&utm_medium=email&utm_term=0_ef73e76009-01b4a8f70d-510835924

EPA's Continuation of Its Zero Upstream Emissions Approach is Appropriate

Tesla agrees with the agency's decision to continue its approach of not requiring net upstream emissions accounting for BEVs in these standards.160 As described supra, BEVs represent the best emission reduction technology and have by far the lowest climate impact of any vehicle technology, and, in this regard, should not be treated differently than ICE vehicles. To date, EPA has not gone outside the tailpipe to account for upstream petroleum production or petroleum refinery emissions in setting ICE vehicles emission standards. Instead, the agency has historically sought to addresses these dangerous emissions through separate stationary source regulations.161 Similarly, in addressing electricity as a vehicle fuel, emissions from electric generating units are otherwise addressed through stationary source regulation.162 Accordingly, Tesla agrees that "If EPA deviated from this tailpipe emissions approach by including upstream accounting, it would appear appropriate to do so for all vehicles, including gasoline-fueled vehicles."163 [EPA-HQ-OAR-2022-0829-0792, pp. 25-26]

160 Id., at 29252.

161 See e.g. EPA, Petroleum Refinery Sector Rule (Risk and Technology Review and New Source Performance Standards) available at h ttps://www.epa.gov/stationary-sources-air-pollution/petroleum-refinery-sector-rule-risk-and-technology-r eview-and-new; EPA, Clean Air Act Standards and Guidelines for Petroleum Refineries and Distribution Industry available at h ttps://www.epa.gov/stationary-sources-air-pollution/clean-air-act-standards-and-guidelines-petroleum-refineries-and

162 EPA, Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants available at h ttps://www.epa.gov/stationary-sources-air-pollution/greenhouse-gas-standards-and-guidelines-fossil-fuel-fired-power

163 88 Fed. Reg. at 29252.

Organization: The Aluminum Association

The EPA's Proposal is Inconsistent With its Obligation to Account for Upstream Emissions and Does Not Take Into Account Important Factors that Support Assigning Carbon Emissions to BEVs

As referenced at 88 FR 29252, EPA requests comments on its proposed treatment of electrified vehicles in manufacturer compliance calculations. Its proposed treatment reflects that it plans to assign a permanent value of zero g/mile to BEV's and that this approach "has functioned as intended, encouraging the continued development and introduction of electric vehicle technology." While the Association agrees that this approach has incentivized the development and implementation of electric vehicle technology, it's permanent use is inconsistent with statutory requirements in addition to not fully considering incentives for vehicle efficiency improvements as has been the case in the past. The EPA's prior rulemakings showed that the agency recognizes a range of non-powertrain efficiency improvements, such as lowering aerodynamic coefficients, lower rolling resistance tires, more efficient air conditioning systems, and mass reduction as important components in helping automakers safely meet increasingly aggressive GHG reduction and fuel efficiency targets for their fleets2. The Association therefore encourages EPA to continue that focus in the current rulemaking. [EPA-HQ-OAR-2022-0829-0704, pp. 2-3]

2 86 FR 74485

Specifically, concerns regarding statutory requirements and incentives for vehicle efficiency improvements are further articulated below along with recommendations for addressing the concerns. [EPA-HQ-OAR-2022-0829-0704, pp. 3-4]

As expressed in prior rulemakings3, the alternative to the universal zero g/mile approach is to use net upstream GHG emissions accounting to consider the GHG emissions impact of BEV's and include them in sales fleet compliance calculations. This alternative is consistent with 49 USC 39204 (a)(2)(B)4 that requires the Administrator of the EPA to consider net upstream emissions of electric vehicles when calculating fleet average fuel economy: [EPA-HQ-OAR-2022-0829-0704, pp. 3-4]

3 77 FR 62651

4 49 USC 39204 - https://www.govinfo.gov/content/pkg/USCODE-2021-title49/pdf/USCODE-2021-title49-subtitleVI-partC-chap329-sec32904.pdf (Accessed June 23, 2023)

…..(B) If a manufacturer manufactures an electric vehicle, the Administrator shall include in the calculation of average fuel economy under paragraph (1) of this subsection equivalent petroleum based fuel economy values determined by the Secretary of Energy for various classes of electric vehicles. The Secretary shall review those values each year and determine and propose necessary revisions based on the following factors: (i) the approximate electrical energy efficiency of the vehicle, considering the kind of vehicle and the mission and weight of the vehicle, (ii) the national average electrical generation and transmission efficiencies… [EPA-HQ-OAR-2022-0829-0704, pp. 3-4]

The EPA is not free to disregard the statutory mandate to consider net upstream GHG emissions aligned with the Department of Energy's designation, albeit revising the process for its implementation. [EPA-HQ-OAR-2022-0829-0704, pp. 3-4]

EPA was set to properly implement this statutory requirement as of MY 2022, prior to subsequent factors that delayed its implementation. In the rulemaking for GHG emissions from light duty vehicles5 for the 2017-2025 Model Years, EPA determined that, while zero g/mile GHG emissions would initially be assigned to EV's in order to incentivize their production/sale, net upstream GHG emissions accounting would be applied to EV's once sales thresholds had been met, which ultimately was expected for MY 2022 as per 77 FR 62651): [EPA-HQ-OAR-2022-0829-0704, pp. 3-4]

5 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards; Final Rule (77 FR 63624)

For EVs, PHEVs and FCVs, EPA is also finalizing, as proposed, to set a value of 0 g/mile for the tailpipe CO2 emissions compliance value for EVs, PHEVs (electricity usage) and FCVs for MY 2017–2021, with no limit on the quantity of vehicles eligible for 0 g/mi tailpipe emissions accounting. For MY 2022–2025, EPA is finalizing, as proposed, that 0 g/mi only be allowed up to a per-company cumulative sales cap, tiered as follows: 1) 600,000 EV/ PHEV/FCVs for companies that sell 300,000 EV/PHEV/FCVs in MYs 2019– 2021; or 2) 200,000 EV/PHEV/FCVs for all other manufacturers. Starting with MY 2022, the compliance value for EVs, FCVs, and the electric portion of PHEVs in excess of individual automaker cumulative production caps must be based on net upstream accounting. [EPA-HQ-OAR-2022-0829-0704, pp. 4-5]

In rulemakings subsequent to the original 2017-2025 rulemaking, EPA has postponed implementing this provision and now suggests that it need not follow this path at all because the program has successfully achieved its goals of “encouraging the continued development and introduction of electric vehicle technology” without it. Yet EPA is losing sight of the fact that the long-term applicability of net upstream GHG emissions accounting to EV’s continues to be the most effective way to capture differences in EV efficiencies and therefore provide incentives for efficiency improvements chronologically across model years. [EPA-HQ-OAR-2022-0829-0704, pp. 4-5]

EPA also finds that zero grams/mile is appropriate because of expectations regarding power sector emissions, which may or may not be borne out by the future facts. EPA further relies on the notion that “if EPA deviated from this tailpipe emissions approach by including upstream accounting, it would appear appropriate to do so for all vehicles, including gasoline-fueled vehicles.” It is understood that current ICE based standards do not include emissions for gasoline production. However, nearly all the GHG emissions for an ICE vehicle come from burning gasoline while nearly all the GHG emissions for an EV come from electricity generation. Aligned with this reality, the Association believes that GHG emissions related to actual propulsion of the vehicle must be accounted for, regardless of the mechanism that provides that propulsion and that meaningful measures of efficiency must be provided for customers and manufacturers to act upon that would result in reduced GHG emissions overall. [EPA-HQ-OAR-2022-0829-0704, p. 5]

In order to comply with its statutory requirements and incentivize continued efficiency improvements in both the internal combustion and electrified vehicle fleets of the future in the most implementable way, EPA should utilize the existing metrics of miles per gallon (MPG) for internal combustion engine vehicles and miles per gallon equivalent (MPGe) for electrified vehicles as surrogates for GHG emissions. Using this metric, the GHG emissions related to actual propulsion of the vehicle are accounted for, regardless of the mechanism that provides that propulsion. [EPA-HQ-OAR-2022-0829-0704, p. 5]

Alternately, EPA can include a fixed electric generation emission value per kWh for MY 2027–2032 vehicles in the standard for calculation of vehicle emissions for BEV vehicles, based upon their efficiency. The emissions associated with generating 33.7 kWh of electricity (or 23.16 kWh/gal if the proposed revision to 10 CFR Part 474 (EERE-2021-VT- 0033) is enacted) can then be used along with the values obtained from vehicle dynamometer testing to get the g/mile CO2 emissions for any BEV. This would provide an incentive for improved vehicle efficiency and would also allow comparability between the EPA rules and the upcoming revised DOT/NHTSA CAFE standards. [EPA-HQ-OAR-2022-0829-0704, pp. 5-6]

In order to achieve the competitive offering that will attract wider consumer adoption, BEV’s will need to come down in cost and increase driving range. The major constraint that drives both overall vehicle cost and range is the size and weight of the battery pack required to achieve the desired performance. Based upon current production technology, lithium-ion battery specific energy density is between 150-200 wh/kg. Therefore, at an average consumption of ~0.30kwh/100 mi, for the average BEV to achieve a range of 300 miles, it will require a battery pack of 90-100 kwh, which can cost upwards of $15K dollars per car. Since the largest cost component of a BEV are the batteries, cost reductions are critical to reaching price parity with gas-powered vehicles.10 [EPA-HQ-OAR-2022-0829-0704, pp. 7-8]

10 According to Wright's Law, for every cumulative doubling of units produced, battery cell costs should fall by 28%.

A 100 kwh battery pack can add over 650 Kg of mass to the vehicle. Therefore, a BEV can save approximately $50 for every mile of range improvement by a reduction of the battery pack of 0.3 kwh or by a vehicle mass reduction of just 2kg. and, the lighter the vehicle, the smaller the battery pack needed, which further reduces mass and cost. As can be seen in Figure 1, BEV's with lower curb weight are significantly more efficient in their energy consumption. Therefore, mass reduction technology will remain a critical incentive beyond 2030 to ensure that the industry does not reverse the trend of improving vehicle efficiency in larger/heavier vehicles, thereby permitting the downsizing of IC engines to achieve significant improvements in emissions. In a similar fashion the EPA should not create the circumstance where there is no regulatory compliance difference between a large heavy BEV that requires an oversized battery to achieve the desired range performance and consumes significantly more energy per mile than a smaller lighter BEV. [EPA-HQ-OAR-2022-0829-0704, pp. 7-8]

[See original for graph titled "Figure 1: BEV Curb weight vs. Energy Consumption, Source: OEM Product Data Sheets"] [EPA-HQ-OAR-2022-0829-0704, pp. 7-8]

This disregard for vehicle efficiency distinction across BEV's in the proposed rule conflicts with the existing and historic approaches of the Corporate Average Fuel Economy (CAFE) program and is a potential disruption to harmonization. [EPA-HQ-OAR-2022-0829-0704, pp. 7-8]

Taken in totality, assigning GHG emissions to BEV's accounts for emissions differentials between vehicles which will incentivize the best technologies for all vehicles regardless of propulsion system. For EV's in particular, efficiency drives lower costs, which will assist with faster adoption. Efficiency also permits smaller batteries for the same range, which is essential for less critical mineral/material usage. Finally, efficiency promotes lighter weight vehicles in the larger vehicle classes, which enhances societal safety. [EPA-HQ-OAR-2022-0829-0704, pp. 8-10]

Organization: Toyota Motor North America, Inc.

Toyota supports EPA's proposal to permanently codify the zero g/mile treatment of tailpipe emissions for BEVs, FCEVs, and the all-electric driving portion of PHEVs. We have long opposed auto manufacturers being held responsible for upstream emissions beyond our control. That said, we do believe vehicle technology assessments supporting GHG rulemakings should account for life-cycle emissions under real-world operating conditions when evaluating the relative benefits of competing technologies. Limiting technology assessments to tailpipe emissions ignores factors such as geography, weather, and power sources which can mischaracterize the true relative performance and value of electrified powertrains, missing opportunities for further GHG emissions reductions. [EPA-HQ-OAR-2022-0829-0620, p. 32]

Organization: Valero Energy Corporation

B. EPA has inappropriately made the 0 g/mile upstream incentive permanent in the proposed rule.

EPA has proposed to "indefinitely exclude upstream emissions from BEV compliance calculations."332 EPA has long maintained that its decision to not count upstream emissions from BEVs was to provide a "temporary regulatory incentive."333 A temporary incentive was appropriate because while EVs do not have a tailpipe, the incentive did not "reflect the increase in upstream GHG emissions associated with electricity used by EVs."334 As EPA explained, in 2010 a midsize EV caused a net upstream GHG emissions increase of about 120 grams/mile compared to a midsize gasoline car.335 EPA's proposal to permanently extend this incentive is entirely unmerited. [EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

332 Proposed Rule at 29247.

333 See Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 25324, 25434–5 (May 7, 2010) (hereinafter 2010 rule); 2017 and Later model Year Light- Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62624, 62650–1 (Oct. 15, 2012) ("In order to provide temporary regulatory incentives . . . EPA is [] finalizing. . . a value of 0 g/mile."); see also, Proposed Rule at 185 ("[T]he 0 g/mile accounting was temporary.").

334 2010 Rule at 25435.

335 Id.

EV charging necessarily affects the grid, one such effect is a contribution to greater electricity demand during peak demand hours.336 While today's grid has seen some emissions reductions in annual total output emission rates since 2010,337 based on EPA's own prior analysis, upstream greenhouse gas emissions would have needed to fall by two-thirds (or ~66%) from 2010 to the present day before the upstream emissions increase caused by EVs is equivalent to the ICE's upstream emissions.338 But greenhouse emissions, from a pure generation-basis perspective, have not fallen by nearly the required amount based on EPA's most recently available data.339 [EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

336 See Siobhan Powell et al., Charging infrastructure access and operation to reduce the grid impacts of deep electric vehicle adoption, NATURE ENERGY 7, at 932 (Jan. 1, 2022).

337 Cf. eGRID 9th edition Version 1.0 Year 2010 GHG Annual Output Emission Rates, EPA (Feb. 2015), https://www.epa.gov/sites/default/files/2015-02/documents/egrid_9th_edition_v1-0_year_2010_ghg_rates.pdf , with eGRID Summary Tables 2021, EPA (Jan. 30, 2023), https://www.epa.gov/system/files/documents/2023- 01/eGRID2021_summary_tables.pdf

338 See 2010 Rule, 75 Fed. Reg. 25435.

339 In 2010, the U.S. average GHG emissions rate for electricity was 1,238.52 lbs/MWh CO2e (eGRID 9th edition Version 1.0 year 2010 GHG Annual Output Emission Rates, supra). But in 2021, the U.S. average GHG emissions rate was 857.0 lbs/MWh CO2e (eGRID Summary Tables 2021, supra , at 2), that means U.S. average GHG emissions have only fallen by approximately one-third.

Even worse, the emissions associated with power plants called upon to supply the grid at peak hours generally have higher emissions per generated MWh.340 A fact borne out in EPA's data that shows that non-baseload power, which reflects the power dispatched to the grid during peak demand,341 has not seen any major declines in CO2 emissions since 2010, and is worse than the emissions associated with baseload power in 2010.342 This data suggests that the impact of EVs on CO2 emissions might be, at best, nearly identical to the upstream emissions increase in 2010. Regardless of which emissions source is used to calculate an EV's true footprint. Indeed, the table below illustrates just how arbitrary and inappropriate it is for EPA's proposal to ignore the upstream emissions increase caused by electric vehicle in light of this reality. [EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

340 See DOE, Emission Reduction Calculation Roadmap (Jan. 2019), https://www.energy.gov/sites/default/files/2019/01/f58/Emission_Roadmap_FINAL.pdf

341 Susy S. Rothschild & Art Diem, Total, Non-baseload, EGRID Subregion, State? Guidance on the Use of eGRID Output Emission Rate, at 5 (last accessed May 2023), https://www3.epa.gov/ttn/chief/conference/ei18/session5/rothschild.pdf

342 In 2010, baseload power GHG emissions rate was 1,238.52 lbs/MWh CO2e (eGRID 9th edition Version 1.0 year 2010 GHG Annual Output Emission Rates, supra). In 2021, non-baseload GHG emissions rate was 1,417.3 lbs/MWh CO2e (eGRID Summary Tables 2021, supra , at 2). Despite the fact that "non-baseload values should not be used for assigning an emissions value for electricity," (Rothschild & Diem, supra) the non-baseload emissions rate reflects emissions for plants "that operate coincident with peak demand for electricity." (id.) Because EVs are expected to increase demand at peak hours (See Powell et al., supra) this may be the proper emissions rate to use when evaluating the upstream emissions associated with EVs.

	eGRID CO2e Emissions	EV Upstream CO2e Emissions343	ICEV Upstream CO2e Emissions344	Net Increase345
2010	1,238.52 lbs/MWh346	173.6 g/mile	60 g/mile	113.6 g/mile
2021	857.0 lbs/MWh347	120.1 g/mile	60 g/mile	60.1 g/mile
2021	1,417.3 lbs/MWh348	198.6 g/mile	60 g/mile	138.6 g/mile

[EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

343 Calculated based on 2022 Tesla Model 3 Long Range AWD with an efficiency of 0.26 kWh/mi (see https://www.fueleconomy.gov/feg/Find.do?action=sbs&id=45011). Calculation uses an EV charging efficiency of 90% and a transmission efficiency of 93.5% (EPA LMDV OMEGA GHG Compliance Modeling Runs, "onroad_fuels_20220325.csv," supra).

344 See 2010 Rule, 75 Fed. Reg. 25435. Refers to a "typical midsize gasoline car."

345 Calculated as (EV upstream CO2e emissions) – (ICEV upstream CO2e emissions).

346 EPA eGRID 9th edition Version 1.0 year 2010 GHG Annual Output Emission Rates.

347 EPA eGRID Summary Tables 2021.

348 Reflects non-baseload power emissions. (See eGRID Summary Tables 2021, supra , at 2.)

Organization: Volkswagen Group of America, Inc.

Upstream Emissions – Treatment of PEVs and FCEVs in the Fleet Average (Section III.B.7.)

Volkswagen supports EPA's proposal to make the current treatment of fully electrified vehicles (PEVs and FCEVs) through MY2026 permanent, accounting 0 g/mile toward emission compliance. Upstream emissions are emitted by power plants when producing electricity. Volkswagen supports the premise that upstream emissions linked to the production of electricity should not be accounted for in on-road vehicle regulations. Volkswagen has no control or influence on emissions from stationary source sectors and opposes tying emissions from stationary sources being tied to motor vehicle regulations. [EPA-HQ-OAR-2022-0829-0669, p. 4]

The transition to - 0 g/mile GHG for PEVs and FCEVs holds vehicle manufacturers accountable for our fleets in accordance with the standards. Energy suppliers have their own goals and regulations as we transition to increased "green" energy production. [EPA-HQ-OAR-2022-0829-0669, p. 4]

Organization: Western Energy Alliance

Congress did not give EPA authority to mandate the electrification of the vehicle fleet. The Energy Policy Act and Clean Air Act do not allow EPA to set standards that cannot be met with an internal combustion engine vehicles (ICEV). EPA does not have the authority to compel the transition to completely new vehicle types under the guise of setti ng tailpipe standards for ICEVs. Electric vehicles (EV) do not have a tailpipe, and although their emissions should be evaluated over the full lifecycle and not assumed to be zero as EPA does with this proposed rule, EPA only has authority to consider tailpipe emissions from ICEVs with this rule. EVs are technically not subject to the standards and thus ineligible for the fleet averaging scheme. [EPA-HQ-OAR-2022-0829-0679, p. 1]

Further, it is not at all clear that the proposed rule will reduce GHGs as planned. Pure plug-in battery- powered vehicles can create more emissions than hybrid EVs (HEV) and even more than some traditional ICEVs for a variety of reasons including the fuel mix of the electrical grid where the EV is being charged and the large GHG footprint for producing the battery. The manufacture of a battery can produce GHGs equivalent to driving 24,000 miles, in the case of a Nissan Leaf up to 60,000 miles in the case of a Tesla Model S.4 Those numbers are before a single mile is driven by the supposed ZEV with its associated GHGs from the electricity used. When CO2 emissions linked to the production of batteries and the energy mix are considered, a study in Germany found EVs emit 11% to 28% more than their diesel counterparts.5 Volvo reports that in comparing a gas-burning model with its fully electric equivalent, with both vehicles built in the same factory, on the same assembly line, and sharing a large number of components, it found the electric version results in 70% more emissions.6 [EPA-HQ-OAR-2022-0829-0679, p. 3]

4 "A Data-Driven Greenhouse Gas Emission Rate Analysis for Vehicle Comparisons," SAE International, Journal of Electrified Vehicles, V132-14EJ, April 13, 2022.

5 Kohlemotoren, Windmotoren und Dieselmotoren: Was zeigt die CO2-Bilanz?, Crhristoph Buchal et al., Ifo Institut, 2019.

6 "Building An EV Produces 70% More Emissions Than ICE, Says Volvo," InsideEVs, Andrei Nedelea, November 20, 2021.

EPA needs better analysis of the GHG reductions by EVs. The assumption that they are "zero emission" must be tested using a more comprehensive analysis of full lifecycle emissions sources from EVs. [EPA-HQ-OAR-2022-0829-0679, p. 3]

Organization: Zero Emission Transportation Association (ZETA)

ZETA supports the proposal to continue omitting upstream emissions from electricity generation for purposes of BEV CO2 g/mile calculations. As EPA notes, this is not currently done for ICE vehicles and there is a robust regulatory framework in place to reduce emissions from stationary sources. ZETA encourages EPA to finalize this policy of omitting upstream emissions from mobile source emissions control regulations. [EPA-HQ-OAR-2022-0829-0638, p. 29]

EPA Summary and Response

Summary:

In Section III.B.7 of the preamble in the NPRM, EPA proposed making the current treatment of PEVs and FCEVs through MY 2026 permanent; that is, EPA is including only emissions measured directly from the vehicle in the vehicle GHG program for MYs 2027 and later, consistent with the treatment of all other vehicles. Electric vehicle operation would continue to be counted as 0 g/mile, based on tailpipe emissions only; thus, vehicles with no IC engine (i.e., BEVs and FCEVs) would be counted as 0 g/mile in compliance calculations, while PHEVs would apply the 0 g/mile factor to electric-only vehicle operation (addressed in preamble Section III.C.7). EPA requested comments on its proposed treatment of electrified vehicles (i.e., ZEVs) in manufacturer compliance calculations.

We received comments from many stakeholders both supporting and opposing EPA's proposed compliance treatment of ZEVs. In Section III.B.7 of the preamble in the NPRM we discussed, at length, the justification for the decision to maintain a 0 g/mi tailpipe accounting for ZEVs. However, we reiterate some of those reasons in responses below.

The following summary addresses similar comments made by multiple commenters.

Auto manufacturers (and a few electric vehicle consortia) universally supported EPA's continued treatment of zero g/mi tailpipe emissions for BEVs, with some of them (GM, Honda) citing that it was inappropriate to hold the auto industry accountable for emissions that are beyond its control. EPA agrees with these comments. As we discuss in preamble Section III.C.7, this approach of only regulating vehicle emissions and letting stationary source GHG emissions be addressed by separate stationary source programs is consistent with how the compliance value for every other motor vehicle is calculated (and has been calculated). Emissions from stationary sources under CAA title I are regulated under an entirely different statutory scheme than mobile sources under CAA title II and the upstream adjustment EPA originally adopted (in the 2012 rule) would make the compliance test results of BEVs depend in part on factors entirely beyond the control of BEV manufacturers (i.e., the carbon emissions and transmission efficiency of the electricity grid, as compared to emissions of the refinery sector). We note that while upstream emissions are not included in vehicle compliance determinations, which are based on direct vehicle emissions, upstream emissions impacts from fuel production at refineries and electricity generating units are considered in EPA's analysis of overall estimated emissions impacts and projected benefits, as detailed in Sections VI and VII of the preamble.

Many commenters (including fuel suppliers and producers, renewable fuel producers, some environmental groups, automotive suppliers) voiced their opposition to the proposed treatment of ZEVs in compliance accounting and recommended that EPA include the upstream emissions from fuel production in the compliance calculations for ZEVs. (Alliance for Vehicle Efficiency, ACEEE, Arconic, BorgWarner, Clean Fuels Development, Commonwealth Agri-Energy, Delek US Holdings, Doug Peterson, East Kansas Agri-Energy, Environmental and Public Health Organizations, Exxon Mobil, John Graham, Kentucky AG, MECA, MEMA, Minnesota Corn Growers, National Corn Growers, National Farmers Union, Natural Gas Vehicles for America, Nebraska Corn Board, North Dakota Farmers Union, POET, Southern Environmental Law Center, The Aluminum Association, Valero).

Some commenters (AFP, Peterson) argued that the CAA gives EPA the authority to establish emissions of pollutants from “any class or classes of new motor vehicles or new motor vehicle engines… that endanger public health or welfare...” and that “this would obligate EPA to abandon its position that ZEVs are emission-less and would have to account for upstream and other lifecycle emissions.”

Similarly, several traditional and alternative fuel providers argued that EPA lacks the statutory authority to ignore upstream emissions for ZEVs (AVE, ACE, American Fuel and Petroleum Mfrs, Clean Fuels Development Coalition, HF Sinclair, Kentucky AG, Marathon, NGVA, POET, RFA, Valero).

Finally, some commenters claimed that our lack of upstream accounting for ZEVs renders the rule “arbitrary and capricious” (API, Clean Fuels Dev, Kentucky AG).

<u>Response:</u>

To these four groups of comments summarized above, EPA disagrees. In short, we already address those emissions under our stationary source provisions of Title I of the CAA; for further discussion, reference our discussion in the preamble and additional responses to comments in Sections 2 and 19 of the RTC.

In their comments, Arconic, the Aluminum Association, MECA and MEMA recommended a fixed electric generation emission value per kWh for BEVs. While this is a different approach than the prior upstream calculation in EPA’s regulations (that would have been applicable for future model years), it still adds an upstream component to the compliance calculation of vehicle emissions. EPA disagrees with this recommendation; as we discuss above and at length in Section III.C.7 of the preamble, we have provided a rationale for why we are only using tailpipe emissions in calculating GHG compliance from all vehicles.

Some commenters (fuel suppliers, fuel producers, automotive suppliers, non-governmental organizations, and a few environmental groups) advocated for EPA to adopt a full lifecycle analysis (LCA) approach in its treatment of BEVs, PHEVs and FCEVs, which would include the upstream emissions from fuel or electricity generation, including the mining and extraction of feedstocks, and production and disposal of the vehicles. EPA disagrees and is not adopting full lifecycle emissions in its regulation of motor vehicles. A majority of these commenters and similar comments are already represented in Section 19 of this RTC; likewise, responses for those comments also apply to the commenters in this section.

Some commenters (e.g., AVE, ACEEE) expressed the importance and the various benefits of more efficient BEVs and their belief that EPA has an obligation to regulate ZEV efficiency. While EPA recognizes the importance of more efficient ZEVs, we do not believe it is necessary or appropriate to adopt standards for efficiency. We believe there are strong market incentives for manufacturers to produce efficient electric vehicles, as doing so will improve driving range and reduce battery size and costs; in addition, the fuel economy and environment labels on new vehicles provide consumers with information on efficiency via the range and annual fuel cost metrics.

3.1.6 - PHEV utility factor

Comments by Organizations

Organization: Alliance for Automotive Innovation

2.PHEV Utility Factor

EPA is proposing a change to PHEV fleet utility factor (FUF), which will result in a calculated increase in GHG emissions of light- and medium-duty PHEVs. EPA claims "the real-world data available today clearly no longer supports the FUF established in SAE J2841 more than a decade ago."229 Auto Innovators disagrees and believes that the current published FUFs should remain in use for the purposes of GHG and CAFE compliance calculations. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

229 88 Federal Register 29253.

EPA's analysis is limited to multiple publications from the International Council on Clean Transportation (ICCT). The ICCT publications focus on the limited electric driving share of PHEVs in Europe. In Europe, some corporations purchased only PHEVs for their fleet to take advantage of government incentives/subsidies. The users of these company cars could typically fuel the vehicle for free, and unfortunately had no incentive to plug-in their vehicle. The situation in Europe with tax incentives encouraging PHEVs coupled with limited charging infrastructure available in predominantly multifamily dwellings is simply not comparable to the United States. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

We have also observed that the proposal excludes several relevant peer-reviewed publications, including papers by Toyota230 and UC Davis 231 that provide counter-balancing arguments to the claims that the SAE FUF is no longer appropriate. The lack of consideration of other studies, such as these, suggests that further consideration is required. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

230 Hamza, K., Laberteaux, K. and Chu, K.C. "On inferred real-world fuel consumption of past decade plug-in hybrid electric vehicles in the US," Environ. Res. Let. 17 (2022) 104053. htps://doi.org/10.1088/1748-9326/ac94e8

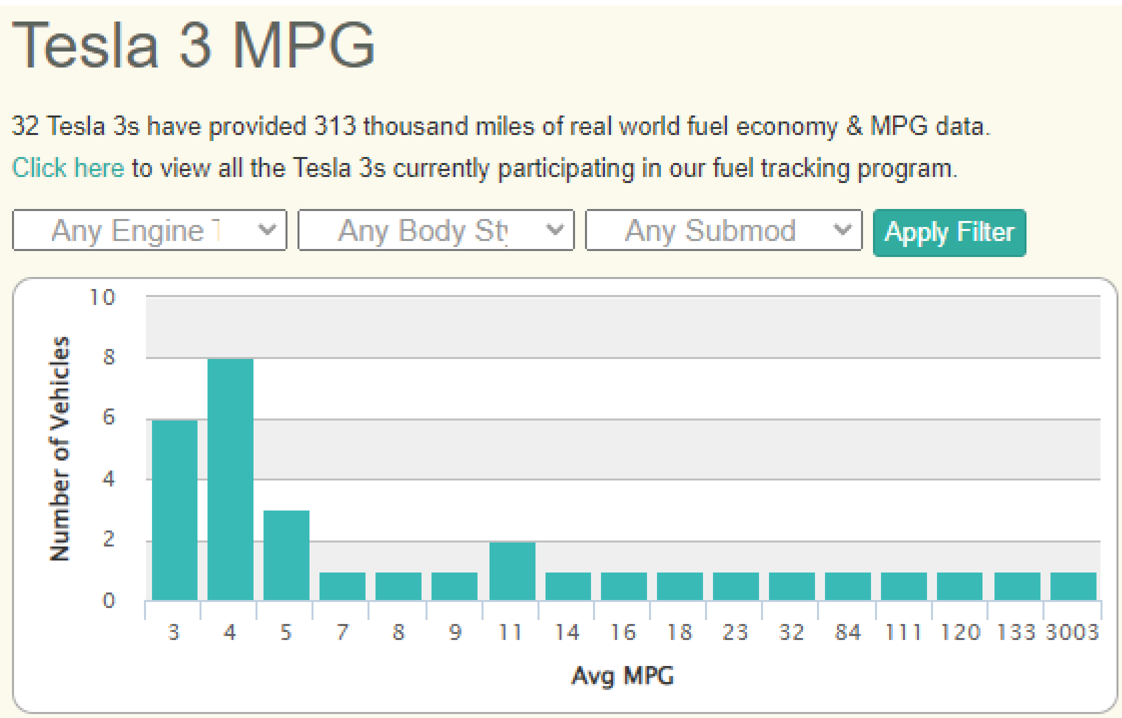
231 Raghavan, S. and Tal, G. "Plug-in hybrid electric vehicle observed utility factor: why the observed electrification performance differ from expectations." Int. J. Sustain. Transp. (2020) 16: 105-136

For its U.S. analysis ICCT, inspired by the European analysis, evaluated two data sources: user- reported data from Fuelly.com, and OBD data from the California Bureau of Automotive Repair (BAR). For the Proposed Rule, EPA has taken the ICCT datasets and performed their own analysis, which is essentially a copy of ICCT's work. The PHEV data analysis should include nationwide usage data and be peer-reviewed before it is used in rulemaking. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

a)Fuelly Dataset

The data from fuelly.com is user-reported and subject to data entry errors. There is also a potential for data bias in the self-selected participants. (For example, users are likely more interested in fuel economy than the average driver, and may also be those less satisfied by their fuel economy given their own unique driving habits.) It should not be relied upon. Further, the fuelly.com data entry is built around gasoline fuel use with a miles per gallon perspective. An example of the unsuitability of this data for regulatory analysis is shown in Figure 35, below. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

SEE ORIGINAL COMMENT FOR Figure 35: Fuelly.com data for Tesla Model 3.232 [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]



232 Tesla 3 MPG - Actual MPG from 32 Tesla 3 owners (fuelly.com)

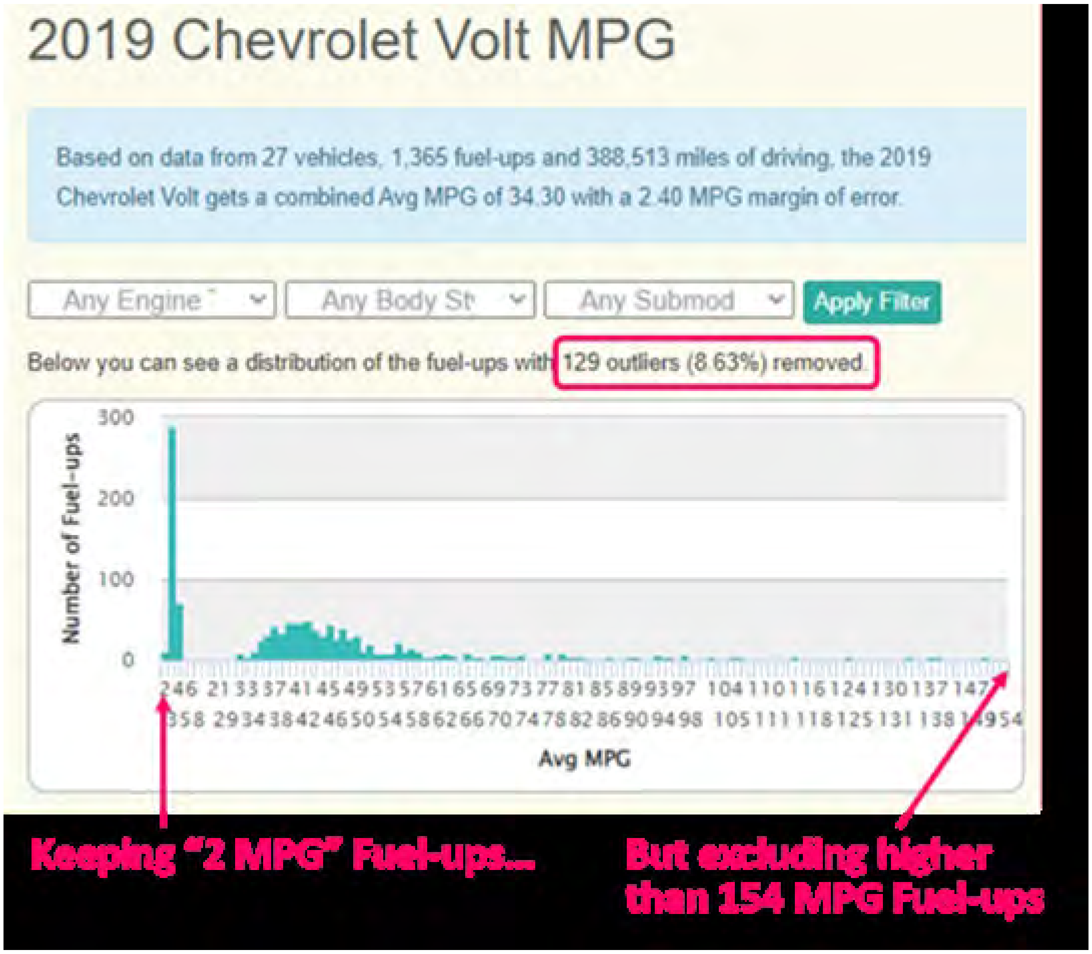
The Fuelly web app is primarily designed to track operating costs of gasoline vehicles and does not appear to be intended for electric or plug-in vehicles. The web-app has only one entry field for "fuel," which is intended to help users track their fuel costs. We have observed that most Tesla drivers appear to enter their electricity kWh values in the "fuel" data field of the Fuelly web app, where it is then treated as if it were gasoline. Although the graph shows "Avg MPG", the data suggests that it is actually "miles per kWh". [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

Most Tesla Model 3 users have entered between 3 to 4 miles/kW which converts to between 0.25 to 0.33 kWh/mile, the actual typical range of values for a Model 3. Vehicles entered as having very high "Fuel" numbers such 11 miles/kWh (converts to 0.09kWh/mile), let alone those entered as having 111 or 3,003 miles/kWh values (corresponds to between 0.009 kWh/mile to 0.0003 kWh/mile) are likely due to users forgetting to enter all of their charging events. It is possible these Model 3 users only counted charging at a Tesla supercharger but not the kWh from day-to-day charging at home. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

As seen from the example above, electricity consumption values for a Model 3 and other BEVs are mistaken for gasoline consumption, resulting in a distinguishable pattern of impossibly low efficiency refueling events alongside normal refueling events. Data entry errors like this would cause the Fuelly web application to severely over-estimate the fuel consumption of PHEVs, therefore severely under-estimating the derived utility factor. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

The refueling events for PHEVs having an accurately high charging frequency and utility factor have been excluded as outliers by the Fuelly application because their fuel economy is deemed too high. For example, a regularly charged Chevrolet Volt can attain 200+ MPG which can be filtered from the distribution of re-fuel events because the value lies beyond Fuelly's 3-sigma screening limit that is applied to fleet average MPG (see Figure 36 below). These omissions further mischaracterize PHEV real-world fleet performance. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

SEE ORIGINAL COMMENT FOR Figure 36: Fuelly.com data for 2019 Chevrolet Volt.



These errors can be readily identified and corrected through a tedious manual process, which neither ICCT nor EPA appear to have attempted to date. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

Given the web app is not designed for electric vehicles and the resulting plethora of uncorrected errors, Fuelly.com data should not be considered in rulemaking, even as a secondary source. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

b)BAR Dataset

EPA also uses the California BAR OBD data downloaded from vehicles. The OBD data is reliable and is certainly a valid source of information. Still, Auto Innovators has concerns with which data is selected and how the data is processed and used. The proposal notes limitations with data availability. The BAR smog test program did not begin tracking PHEV operation until the 2019 model year. Participation in the program is required by vehicle age,233 or if a vehicle has been registered in California after moving from another state. Given the dataset cited for the proposal was collected during the 2022 calendar year, the age criteria do not apply. Therefore, the data is predominantly from registered MY 2019-2022 PHEVs arriving from another state collected during the 2020 through 2022 calendar years. Long-distance moves between states can involve significant miles accumulated primarily in charge sustaining mode which skews the recorded OBD data, making it unrepresentative of normal PHEV operation. Given that EPA accepted PHEVs with as low as 1,865 lifetime miles from the BAR dataset, even a few hundred miles without charging can bias the data toward a lower utility factor. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

233 Any vehicle 8 years or older, or vehicles 4 model years or older that change ownership. See Frequently Asked Questions: Smog Check Program, CALIFORNIA BUREAU OF AUTOMOTIVE REPAIR, htps://www.bar.ca.gov/consumer/smog- check-program/faq.

In the DRIA, EPA notes, "As of October 2022, the BAR OBD dataset has around 8,400 PHEV vehicles, and over 233.2 million vehicle miles traveled. The filtered dataset has 30 PHEV models, and 2,060 individual vehicles that travelled 58.9 million miles."234 While some filtering of data to exclude outliers is expected, removing approximately 75% of the vehicles and vehicle mileage is not. As a result, many of the PHEV variants studied by EPA have a sample size of 30 vehicles, which is statistically insignificant to draw conclusions about real-world PHEV operation. Most PHEVs in the cited BAR dataset underwent the smog check during 2020 through 2022 calendar years, which includes the COVID pandemic, which significantly altered transportation trends. This period entailed unusual fluctuatioions in gasoline prices including a 10-year low in 2020 making for both unusual driving patterns and less motivation to charge. We expect that post- pandemic, real-world FUF trends will increase. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

234 DRIA at 3-73.

Unfiltered BAR data and an explanation of filtering methodology was not provided as part of the NPRM or with the DRIA. Following a request, EPA did share the raw data and an explanation of the filtering used. While the information is now posted to the docket, the lack of inclusion with the regulatory documents means most stakeholders will not have awareness of the availability during the short 60-day comment period. Due to the large dataset, late delivery of information, and limited comment period, Auto Innovators is providing an initial analysis, but may submit more information to the docket once available, and likely after the comment period closes. [EPA-HQ-OAR-2022-0829-0701, pp. 124-127]

c)The Proposed Utility Factor

Utility factors have been fitted to an exponential equation, as shown below. The C coefficients are used to fit the curve and normalized distance establishes the distance where the utility factor is 100%. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

UF = 1 – exp{ -[C1*(x/norm_dist) + C2*(x/norm_dist)2+ … + C10*(x/ norm_dist)10]}

ICCT did not properly fit the data, and that data was subsequently used to create EPA's proposal. As shown in Figure 37, instead of fitting the data properly, ICCT copied the 10 curve fitting coefficients from SAE J2841's multi-day independent utility factor (MDIUF) (developed from a different data set) and only changed the normalized distance to create their "curve fit". But normalized distance is the one variable in the equation that need not change. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

SEE ORIGINAL COMMENT FOR Figure 37: Comparison of J2841 and ICCT Utility Factor Coefficients [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

Because of this error, we are not confident that ICCTs curve appropriately fits the underlying data. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

EPA notes that they “created the proposed curve by averaging the SAE J2841 FUF curve and the ICCT–BAR curve.”235 While EPA used a least-squares regression method to create this average line, they changed only the normalized distance in this fit, otherwise copying the SAE J2841 FUF curve fitting coefficients that were also developed from a completely different dataset. Changing normalized distance doesn’t make sense unless overall driving distances have changed. In fact, EPA confirms that this isn’t the case, which is highlighted in their DRIA Footnote 35: “we used the latest NHTS data (2017) and executed the utility factor code that is in SAE J2841, Appendix C, and found that the latest NHTS data did not significantly change the utility factor curves.”236 This would indicate that the driving distances and overall distribution of driving has not changed. The normalized distance (Utility Factor=1) should remain unchanged. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

235 DRIA at 3-78.

236 DRIA at 3-74.

In Figure 38, the first two rows are the curve fitting data for the two inputs EPA used to generate their proposed fleet utility factor, which is shown in the 3rd row. This shows the six curve fitting coefficients that were copied from earlier work contained in SAE J2841 fleet utility factor. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

SEE ORIGINAL COMMENT FOR Figure 38: EPA Proposed Utility Factor Coefficients [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

Using this curve fitting technique, the result is that regardless of all-electric miles traveled on a certification test, only 68.5% of those miles count. This is equally true for PHEVs that travel 20 miles or 200 miles. This is not appropriate, and the proposed utility factor should not be included in the final regulation. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

d)differences Between Real-World and Laboratory

The normal method to address differences between real-world and laboratory results, especially when due to driving behaviors, has been through post-compliance adjustments aimed at consumer awareness and occasionally by expanding test cycle requirements, and not by revising calculations used to determine compliance with the standards. While some data may suggest PHEVs are not being plugged in as frequently as the assumptions underlying the SAE UF curve, this should not be a problem atributed to automakers, nor should it be grounds to adjust a compliance measurement. Charging equipment is supplied with the vehicles sold by automakers. Changing regulatory outcomes based on variable consumer charging behavior would be akin to forcing derated CO2 compliance on ICE applications because some drivers behave aggressively performing “jack rabbit” starts frequently, thereby consuming more fuel. Fuel economy labels show adjusted values for the laboratory fuel economy and CO2 emissions results. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

EPA recognizes that BEV technology is still maturing and needs support to build consumer acceptance. Appropriately, the proposal does not examine the advertised range, efficiency, and emissions performance of BEVs under real-world operation. PHEVs are in the same fragile stage of growth and should be treated no differently. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

The proposal notes BEV technology improvements and charging infrastructure expansion, which applies to PHEVs as well. Given the investments in charging infrastructure being made as part of the IIJA, it is expected that over time more public and multi-unit family dwelling charging will become available. Also, as more vehicles electrify, plugging in a vehicle to charge will become ubiquitous, which should help reduce unwillingness to charge, and resolve knowledge gaps in how to charge. Lack of charging, to the extent it exists, should be best solved by consumer education, not by a change to the utility factor. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

Efforts to address perceived concerns about real-world performance need to account for other solutions already in progress. The BAR dataset and more rigorous, peer-reviewed studies indicate some PHEVs have a lower ratio of EV driving versus ICE operation on-road versus certification, while other vehicles' performance is well-aligned to certification values.237 We believe this difference is due to the spread of performance capability of the electric machines in PHEVs. Lower capability electric machines demonstrate a greater difference in on-road versus on-cycle performance. EPA's proposed PHEV high power cold start requirement encourages more all-electric operation capability. Further, CARB requires a minimum 70-mile combined city/highway and minimum 40-mile US06 all-electric range starting with MY 2029. These requirements force all new PHEVs under development to be highly capable. EPA's linear curve fit is weighted toward vehicles with a range below 30 miles. Changing the utility factor based on such skewed data would discourage the introduction of new, higher-capability PHEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

237 Restate of FN 6 Hamza, K., Laberteaux, K. and Chu, K.C. "On inferred real-world fuel consumption of past decade plug-in hybrid electric vehicles in the US," Environ. Res. Let. 17 (2022) 104053. https://doi.org/10.1088/1748-9326/ac94e8.

Many current PHEVs already demonstrate good utility factor alignment between certification tests in the laboratory and real on-road driving. These vehicles would be unnecessarily punished by the proposed change in utility factor. Auto Innovators believes that growth in charging infrastructure coupled with higher capability PHEVs means that the current utility factor will be representative for future PHEVs and should remain unchanged. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

e)Next Steps

Auto Innovators supports PHEVs attaining their advertised range for charge depleting/all-electric operation. We do not believe EPA's proposed regulatory action will achieve this outcome. The poor quality of supporting data in the proposal would make such an action arbitrary and capricious. We propose that industry, EPA, SAE, DOT, and the national laboratories collaborate on a project to acquire and process a large sample of nationwide PHEV data. This collaboration can be used to better understand the sources of variation and agree on logical data processing or filtering. If proven necessary, adjustments to SAE J2841 or advertised all- electric range, and other potential solutions can be explored following appropriate deliberation and peer review of the collaborative effort. [EPA-HQ-OAR-2022-0829-0701, pp. 128-130]

Organization: Alliance for Vehicle Efficiency (AVE)

PHEV Utility Factor

AVE urges EPA to review its approach to the utility factor proposed for plug-in hybrid electric vehicles (PHEV) and provide more certainty for this vehicle segment. It appears that EPA has established the proposed Utility Factor by averaging earlier estimates for PHEV range and consumer driving habits. Recent analysis, however, indicates significant improvement in PHEV's electric range.9 Additionally, to comply with California's Advanced Clean Cars II regulations, automakers are already announcing PHEVs that will greatly exceed California's requirements.10 [EPA-HQ-OAR-2022-0829-0631, p. 4]

9 https://www.iea.org/reports/global-ev-outlook-2022/trends-in-electric-light-duty-vehicles

10 https://www.greencarreports.com/news/1139305_toyota-plans-to-push-plug-in-hybrid-ev-range-beyond-120-miles

EPA should account for current and expected improved range for future PHEV models to determine the utility factor curve that should apply. [EPA-HQ-OAR-2022-0829-0631, p. 4]

Organization: Betsy Cooper

PHEVs fill an important gap, providing a transition vehicle that allow consumers to experience the benefits of all-electric driving without some of the risks: [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- First, a gas backup can reduce range anxiety, especially in uncertain terrain or cold temperatures. While our family also owns a pure EV, we are not yet ready to commit to being a fully electric household. Not least, our PHEV is our vehicle of choice for any road trip in the snow or mountains, as we do not want to test our full range in a precarious, unpredictable location. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Second, PHEVs are more family friendly than EVs; as parents (like us) of small children will tell you, charging on a road trip is one thing. Charging on the road with an unhappy toddler – or heaven forbid, one who only sleeps when the car is moving – is quite another. Having the option to keep driving on gas once the electric range runs out is a blessing. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Third, and relatedly, this is particularly true because charging infrastructure has not yet caught up with EV demand. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Rural and disadvantaged communities disproportionately lack access to public charging infrastructure [Link: https://www.marketplace.org/shows/marketplace-tech/rural-communities-are-slow-to-adopt-evs-but-a-national-charging-network-depends-on-them/]. So long as charging infrastructure is not as ubiquitous as gas stations are, gas backups remain an important option for long haul driving. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Moreover, even in areas with well-developed charging infrastructure, such as in California where we live, it can be very difficult to find an available and working charger in a convenient location. Betsy's current commute has only two chargers within a mile, and both are broken. Aaron's work sponsors chargers, but even then demand is so high that employees require a complex interoffice notification system to ensure everyone gets a charge by the end of the day. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

Short-Range PHEVs Do Not Achieve EPA's Greenhouse Gas Emissions Goals

While PHEVs fill an important market need, manufacturers' move to short range PHEVs (those with less than 40 miles of range) has reduced these benefits significantly. Small electric batteries do less to reduce range anxiety. Shorter ranges require more frequent charging, and make it more likely that drivers will need to charge in inconvenient locations away from home. And these annoyances may make it more likely that new PHEVs will rely on gas. [EPA-HQ-OAR-2022-0829-0654, p. 3]

EPA may rightfully wish to disincentivize the use of gas cars for any reason. But doing so by disincentivizing all PHEVs, as the current regulation proposes, is a mistake. The fundamental problem here is not with PHEVs; it is with the small electric range on offer in those vehicles. Longer range PHEVs with smaller gas tanks will reduce reliance on gas, helping to get the first-time electric vehicle consumer more comfortable relying on electric power for their daily needs. [EPA-HQ-OAR-2022-0829-0654, p. 3]

EPA Should Use Its Regulatory Authority To Incentivize Long-Range PHEVs

The EPA thus should use its regulatory process to encourage PHEV manufacturers to return long-train PHEVs to the market: by providing full off-cycle credits to those who give 50 or more miles of electric range. EPA's current plan will disincentivize all PHEVs, ignoring the real market benefits to keeping long-range versions of these cars in the market. Intentional or not, the effects of the EPA's current policy will be to push vehicle manufacturers further towards full EVs—before the charging infrastructure is ready to support them. In the meantime, consumers not ready to adopt full EVs – including for the same reasons we are not yet able to do so – will continue to buy gas cars instead. [EPA-HQ-OAR-2022-0829-0654, pp. 3-4]

With more long-range PHEVs on the market, more Americans will be able to drive their full commute on electricity and charge overnight at home (with reduced demand on the grid relatively to fast-charging of full EVs). Moreover, as longer range PHEV cars grow more popular, there will be greater incentives for individuals and communities to invest in improving charging infrastructure, thus reducing the friction facing current consumers. [EPA-HQ-OAR-2022-0829-0654, pp. 3-4]

By encouraging both EVs and long-range PHEVs, the EPA will encourage manufacturers to offer more long-range PHEV models, and to make more of them. As demand for the 42-mile RAV4 PHEV shows, consumers crave these long-range PHEV options. There just aren't currently any affordable and available ones to choose from. [EPA-HQ-OAR-2022-0829-0654, pp. 3-4]

We propose a 50+ mile PHEV range requirement for full off-cycle credit. There is already momentum in favor of this standard; California is planning to require 50+ mile range PHEVs by 2035 [Link: https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035]. Moreover, even with battery degradation, a PHEV rated for 50+ miles at the point of sale will still cover the average American commute many years later. [EPA-HQ-OAR-2022-0829-0654, p. 4]

The EPA may respond that its scaled utility factor already takes into account miles of range in its calculation. Even if true, by penalizing all PHEVs across the board, the EPA is incentivizing manufacturers to make fewer plug-in hybrid vehicles, period. Especially until charging infrastructure resembles the gas station infrastructure of today, long-range PHEV cars remain an important consumer option. By rewarding manufacturers for making PHEVs with a 50+ mile range, EPA will help bring an important class of climate-friendly vehicles back to market. [EPA-HQ-OAR-2022-0829-0654, p. 4]

Organization: BorgWarner Inc.

BorgWarner supports the goals of EPA's proposal.

BorgWarner supports EPA's approach to decarbonize the light- and medium-duty vehicle sectors. However, the proposed pace for battery electric vehicle (BEV) adoption requires continued significant support and incentives from state and federal regulators. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

The demand for BEVs across all vehicles sectors is rising. Critical mineral supply will need to increase significantly to support the growth of the BEV market. Battery production, along with the necessary charging infrastructure, will ultimately depend on suppliers and manufacturers having access to increasingly domestically sourced and processed critical materials and minerals in sufficient quantities. Automotive suppliers operate in an integrated, complex worldwide supply chain and access to international markets is critical to our ability to meet production demands. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

The Infrastructure Investment and Jobs Act (IIJA), the Inflation Reduction Act (IRA), and CHIPS & Science Act were each important initial steps to enable industry, consumers, and communities to make the EV transition across the U.S. These significant investments are critical in supporting the continued growth of U.S. manufacturing and ensuring the initial transition results in affordable EVs for consumers and profitability for manufacturers. EPA should recognize that a majority of the programs needed to help achieve the EV transformation are still awaiting regulations and guidelines. In addition, the supplier industry, along with automakers and communities, will need time to implement the necessary investments in supply chains, infrastructure, and workforce to make the shift to electrification successful. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

To meet EPA's forecast for BEV penetration levels, there is little room for supply chain or production delays. Any setback could negatively impact the availability or purchase of new BEVs. EPA can reduce these risks to manufacturers by incentivizing vehicles with longer ranges and adjusting multipliers as better BEVs and plug-in hybrid electric vehicles (PHEVs) are introduced. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

BorgWarner asks EPA to reconsider the agency's approach to the proposed PHEV utility curve. As proposed, EPA is addressing its concern for PHEVs operating on a vehicle's engine mode, based on dated assumptions of average consumer usage of prior generation PHEV models. To meet many of the requirements set by both EPA in this proposal and California in its Advanced Clean Car II rulemaking, PHEVs would have significantly increased electric range that make them more capable of all-electric operation, and together with a much-improved charging infrastructure, will change the pattern of consumer use. In fact, average new PHEV driving range increased 8.5% in 2021 and is expected to continue increasing.3 As such, EPA should model future consumer usage based on the expected models on sale from MY 2027, and further improvements to charging availability, and use the model to determine the utility factor curve that should apply. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

3 https://www.iea.org/reports/global-ev-outlook-2022/trends-in-electric-light-duty-vehicles

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Plug-in Hybrid Electric Vehicles

California's ACC II program allows manufacturers to fulfill a portion of their ZEV sales requirements with PHEVs that meet certain standards, including certification to at least 70 miles of all-electric range (equivalent to approximately 50 miles of label range). While U.S. EPA's analysis of compliance pathways to meet the GHG standards does not rely on the use of PHEVs within the fleet to meet the proposed standards and most industry experts agree that PHEVs are a less cost-effective solution, CARB expects that PHEVs may have greater appeal to some consumers and comprise some share of the light-duty vehicle fleet in U.S. EPA's regulatory timeframe. [EPA-HQ-OAR-2022-0829-0780, p. 18]

The majority of emission benefits from a PHEV result from the vehicle's ability to travel on electric power, as opposed to combustion power. While PHEVs offer flexibility to consumers and can play an important role in broader ZEV adoption, emission benefits can vary widely. To determine how a PHEV's emission rate is counted toward meeting a manufacturer's GHG fleet average, U.S. EPA uses a fleet utility factor (FUF) to convert PHEV electric driving range into a weighting factor for 2-cycle GHG emission test results. Overvaluing PHEVs with an inflated FUF curve would be detrimental to the environment and overstate the emission reductions from the vehicles. [EPA-HQ-OAR-2022-0829-0780, p. 18]

The FUF curve U.S. EPA applies in its current regulation is the "SAE J2841 19 FUF" curve. Out of concerns that this curve overstates benefits, U.S. EPA is proposing to adopt a revised FUF curve that is less generous than the current curve in estimating GHG reductions from PHEVs. CARB has previously analyzed data that demonstrate that the SAE J2841 FUF curve may overestimate benefits, and CARB therefore supports U.S. EPA's proposal to revisit the FUF. However, based on a recent analysis of real-world PHEV data, CARB recommends that U.S. EPA adopt an even more conservative curve than it is currently proposing. U.S. EPA also presents—but does not propose to adopt—an additional curve, the "ICCT-BAR" curve, based on an analysis conducted by the International Council on Clean Transportation. The ICCT-BAR curve is even lower than the revised FUF curve U.S. EPA is proposing. CARB recommends that U.S. EPA adopt the ICCT-BAR curve, which is most representative of current data. [EPA-HQ-OAR-2022-0829-0780, p. 18]

19 SAE J2841 is an SAE Information Report that establishes a set of "Utility Factor" curves and the method for generating these curves.

Existing fleet utility factor

CARB agrees with U.S. EPA that the SAE J2841 FUF curve that U.S. EPA applies in its current regulation likely overstates emission benefits from PHEVs and points to two references to support this finding. [EPA-HQ-OAR-2022-0829-0780, pp. 19-20]

First, as part of its ACC I Midterm Review (MTR) completed in 2017, CARB analyzed millions of data points on thousands of ZEVs and PHEVs and found that the criteria pollutant and GHG emission benefits are highly driver dependent but generally increase with vehicle electric power capability and electric range. 20 CARB found that PHEVs were not driven the amount of electric vehicle miles traveled (eVMT) expected by the SAE J2841 FUF curve, particularly those with less range and more blended powertrains that turn on the internal combustion engine when a driver requires more vehicle power. [EPA-HQ-OAR-2022-0829-0780, pp. 19-20]

20 20 CARB. California Advanced Clean Cars Midterm Review. Appendix G: Plug-in Electric Vehicle In-Use and Charging Data Analysis. January 2017. https://ww2.arb.ca.gov/sites/default/files/2020-01/appendix_g_pev_in_use_and_charging_data_analysis_ac.pdf.

Second, as a separate data source, CARB contracted with the University of California, Davis (UC Davis) Institute of Transportation Studies to collect and analyze household-level travel and refueling behavior centered around BEVs, PHEVs, and FCEVs. 21 The study included installing data loggers on individual vehicles, including many different models of PHEVs. UC Davis found that all PHEVs, apart from the Chevrolet Volt, demonstrated lower utility factors than the SAE J2841-based FUF curve. The Chevrolet Volt had a much more capable electric powertrain that could keep its internal combustion engine from turning on before the battery depleted in almost all driving conditions, which made the Volt relatively unique amongst the other PHEVs in the logged data set. [EPA-HQ-OAR-2022-0829-0780, pp. 19-20]

21 Tal, Gil, Karanam, Vaishnavi Chaitanya, Favetti, Matthew P., et al. “Emerging Technology Zero Emission Vehicle Household Travel and Refueling Behavior.” April 2019. https://escholarship.org/uc/item/2v0853tp.

CARB analysis of updated real-world data

In its proposal, U.S. EPA proposes a revised FUF curve that is lower than the SAE J2841 FUF curve. Based on an analysis of additional real-world data, summarized below, CARB finds that the ICCT-BAR curve is even closer to what real-world data supports for eVMT. CARB therefore recommends that U.S. EPA adopt the ICCT-BAR curve. [EPA-HQ-OAR-2022-0829-0780, pp. 19-20]

In mid-May 2023, CARB staff acquired an updated dataset containing newer PHEV operational data from the California Bureau of Automotive Repair (BAR), which administers the State’s light-duty vehicle inspection and maintenance program known as SmogCheck. These data expand on the original dataset (acquired in October 2022) ICCT analyzed that U.S. EPA references in its proposal and contain various operational parameters related to PHEV operation. Among the relevant parameters in the dataset for this analysis were charge-depleting engine-off distance traveled and total distance traveled (i.e., odometer readings). Staff filtered the BAR dataset to remove low-mileage PHEVs (<## 3,000 miles), which may not provide sufficient data to be representative of the population. In addition, CARB staff ensured that all PHEV data were internally consistent by omitting those vehicles that had different readings for odometer distance and lifetime distance traveled as recorded by the vehicle’s on-board diagnostic system. Then, using the same calculations described in U.S. EPA’s proposal, CARB staff calculated utility factors for a wide range of 16 PHEV models from the 2019 through 2022 MYs. CARB included aggregated vehicle model data only for those vehicle models containing 30 or more individual vehicles. The final filtered dataset contained 3,454 vehicles. [EPA-HQ-OAR-2022-0829-0780, pp. 19-20]

There are certain inherent limitations to the BAR data, though. Vehicles are not required to participate in the SmogCheck program until they are eight years old unless they are undergoing a change of ownership or being newly imported into the State. As a result, the current sample of vehicles is only a fraction of the PHEVs in the State, and there may be some selection bias in those vehicles that are included. Therefore, until sufficient time has passed, and more PHEVs become subject to the SmogCheck program, this dataset will not have the necessary cross-section of PHEVs operating within California to be a truly representative sample. [EPA-HQ-OAR-2022-0829-0780, pp. 19-20]

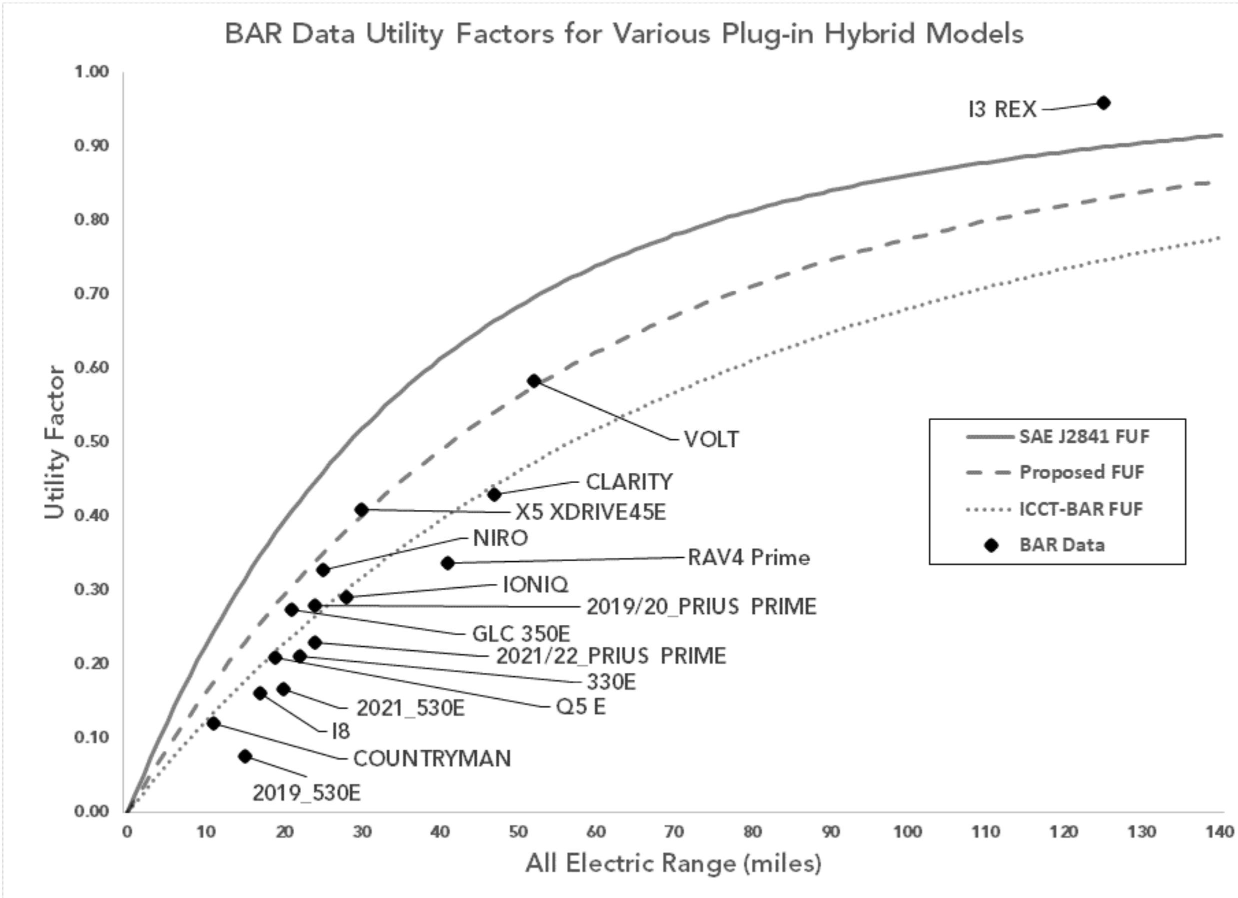
Analytical results

Figure 2 and Table 1 present CARB's results. As shown in Figure 2, most recent PHEV models fall below both the SAE J2841 22 curve and U.S. EPA's proposed FUF curve. Rather, the ICCT-BAR FUF curve that U.S. EPA's presents—but is not proposing to use—appears to be better correlated with actual real-world electric operation in these cases, and CARB's analysis reaffirms ICCT's original analysis. The notable exceptions are two vehicle models with unique architectures and higher all-electric ranges: the 2019 Chevrolet Volt (53-mile label range) and the 2019 BMW i3 REX (126-mile label range). 23 The 2019 Volt performed nearly identically to the U.S. EPA proposed FUF curve, and the i3 REX delivered more zero-emission miles than would be assigned under the SAE J2841 FUF. Notably, both of these models have been discontinued and used designs like a range-extender concept where the battery had to be depleted before the gasoline engine could be utilized. More recent models with similar all-electric capabilities like the Toyota RAV4 Prime and the Honda Clarity PHEV both averaged at or below even the lower ICCT-BAR FUF curve. [EPA-HQ-OAR-2022-0829-0780, pp. 20-22]

22 SAE J2841 is an SAE Information Report that establishes a set of "Utility Factor" curves and the method for generating these curves.

23 Data from prior MYs of these two vehicle models are not available as the necessary data parameters were not required until 2019 MY.

[See original for graph titled "Figure 2. Plug in Hybrid Electric Vehicle Utility Factors from Bureau of Automotive Repair Data."] [EPA-HQ-OAR-2022-0829-0780, pp. 20-22]



[See original attachment for "Table 1. Plug-in Hybrid Electric Vehicles Included in CARB's Analysis of Bureau of Automotive Repair (BAR) Data."] [EPA-HQ-OAR-2022-0829-0780, pp. 20-22]

Data collection and reporting

Given the variability in PHEV usage displayed to date, CARB recommends that U.S. EPA require auto manufacturers to collect and report in-use operational data at discrete intervals on PHEVs in future MYs. This would enable U.S. EPA to more accurately assess the GHG emissions associated with different PHEVs. Based on these data, EPA may then be better positioned to reassess the FUF curve for subsequent rulemakings. [EPA-HQ-OAR-2022-0829-0780, p. 22]

There are many factors that may alter the utility factor in the future that warrant ongoing data collection. For example, driver propensity to charge may change with time as the ZEV ecosystem evolves and drivers gain more access to home charging or other charging infrastructure, face varying differentials in cost for charging compared to gasoline refueling, or experience some battery degradation. Additionally, the types of PHEVs offered may also change in response to regulatory programs like ACC II or incentive funding. Finally, the everchanging dynamics of consumer awareness and market acceptance may influence the types of consumers who purchase PHEVs and how frequently they charge. [EPA-HQ-OAR-2022-0829-0780, p. 22]

Organization: Consumer Reports (CR)

6.4. Plug-in Hybrid Utility Factor Changes

CR generally supports EPA's proposed changes to the utility factor for plug-in hybrid electric vehicles (PHEVs). Real-world emissions from PHEVs are often significantly higher than the theoretical values estimated assuming optimum use conditions.46 CR agrees with EPA adjusting their approach to better match real-world use data. CR does not take a position on which of the proposed utility factor curves is the best option. However, CR does recommend that EPA periodically update their analysis of real world PHEV usage as more vehicles are sold, and more data becomes available. [EPA-HQ-OAR-2022-0829-0728, p. 23]

46 Real World Usage of Plug-In Hybrid Vehicles in the United States, The International Council on Clean Transportation, December 20, 2022, https://theicct.org/publication/real-world-phev-us-dec22/.

Organization: Electric Drive Transportation Association (EDTA)

We would also urge the agency to revisit modeling assumptions regarding the proposed plug-in hybrid (PHEV) utility curve to reflect next-generation PHEVs, whose electric range will be significantly larger than those modelled. New PHEVs' driving range increased 8.5% in 2021 and that trend is expected to continue. The increase in all-electric operation capability will change consumer use patterns over the regulated period and the rule for 2027-2032 should reflect that in an updated utility factor. [EPA-HQ-OAR-2022-0829-0589, p. 2]

Organization: Environmental. and Public Health Organizations

XII. EPA Should Improve Its Proposed Adjustment to the PHEV Fleet Utility Factor to More Accurately Capture the True Emissions from PHEVs. [EPA-HQ-OAR-2022-0829-0759, p. 93]

Below, we offer comment on EPA's proposed adjustment to the PHEV Fleet Utility Factor (FUF). EPA is correct to adjust the FUF to reflect real-world driving and recharging behavior, but the modification proposed is not sufficient to reflect the true emissions from PHEVs. Prior to the availability of PHEV models (and therefore in the absence of data on their actual usage), it was rational to use the Fleet Utility Factor as formulated in SAE 2841 in 2010 as the basis for estimating the percentage of operation without internal combustion engine use occurring in charge-depleting (CD) mode. However, there is now a significant body of real-world data that can be used to develop utility factors that more accurately reflect the actual tailpipe CO2 emissions from PHEV operation.227 Because EPA proposes to retain a zero gram per mile value for operation in CD mode, the choice of utility factor will play an important role in determining the compliance value for PHEVs. [EPA-HQ-OAR-2022-0829-0759, pp. 93-94]

227 Aaron Isenstadt et al., ICCT, Real World Usage of Plug-in Hybrid Vehicles in the United States (Dec. 2022), https://theicct.org/wp-content/uploads/2022/12/real-world-phev-us-dec22.pdf.

EPA has obtained California Bureau of Automotive Repair (BAR) data from onboard diagnostics devices (OBD) that show the real-world utilization of PHEVs in CD mode. The data show that all PHEV models in the dataset have actual utility factors lower than the current (SAE 2841) FUF. In some cases, the BAR data show real-world utility factors that are nearly 50% lower than the current FUF values. For example, the BAR data show the Honda Clarity PHEV as having a real-world utility factor of 0.359 while the SAE 2841 method gives the Clarity a FUF of 0.676.228 These results show that the SAE2841 method using travel survey data is a poor estimator of actual vehicle usage. The Agency proposes to reduce the FUF for compliance calculations by averaging the current FUF with a curve derived from the BAR real-world data. This averaging will lower the gap between actual emissions performance and the compliance value, but will still allow for compliance values for PHEVs that are higher than justified. Given that EPA now has clear real-world data showing that the current FUF is not reflective of actual emissions from PHEVs, it is inappropriate to use the original SAE J2841 FUF or to use it in an average with other data. EPA should instead use a FUF consistent with the actual in-use data from BAR and adopt the FUF labeled "ICCT-BAR" in the DRIA. [EPA-HQ-OAR-2022-0829-0759, p. 94]

228 The data is from EPA-HQ-OAR-2022-0829-0465_attachment_2.xlsx, and was processed using the method described in EPA-HQ-OAR-2022-0829-0465_attachment_1.pdf.

The decision to average real-world usage data with the SAE 2841 estimate is poorly justified. EPA states that "an overly low FUF curve could disincentivize manufacturers to apply this technology." 88 Fed. Reg. at 29254. However, both the current FUF curve and the proposed curve over-credit PHEVs. A curve that correctly credits PHEVs' reductions in emissions (such as the ICCT-BAR curve) will not disincentivize adoption of PHEVs, but instead will provide a lower incentive for the partial elimination of tailpipe emissions and a greater incentive for complete elimination via fully-electric powertrain options. Even with a lower FUF, the ability to reduce the compliance emissions values by use of zero grams per mile for the CD mode phase will provide a significant incentive for a manufacturer to choose a PHEV powertrain over a non-plug-in hybrid. Choice of a lower FUF curve will at the same time ensure that there is a sufficient incentive to encourage the continued development and deployment of zero-emission technologies. [EPA-HQ-OAR-2022-0829-0759, p. 94]

EPA also cites future models with longer electric range and greater all-electric performance as leading to future real-world performance that meets the proposed FUF curve. This is not supported by the available data. The longest electric range PHEV currently available is the Toyota RAV4 Prime. The RAV4 Prime data from the BAR dataset show a real-world utility factor of 0.35, significantly lower than the proposed FUF for a 42-mile all-electric range (AER) vehicle (0.52) and even lower than the ICCT-BAR curve (0.41). EPA states that "increased consumer technology familiarity" will also make future PHEV usage approach the proposed FUF curve. 88 Fed. Reg. at 29254. Increased consumer knowledge may make purchasers able to shift more driving to electric-only mode. However, it is also possible that purchasers (especially in the secondary market) may buy a PHEV without the ability to plug in or may choose a PHEV because of incentives that make the purchase more attractive relative to a non-plug-in vehicle. Existing research on the use of PHEVs shows that the largest factor leading to lower real-world observed utility factors is lack of charging, with 20-30% of some PHEV models starting their travel day on a nearly empty battery.229 [EPA-HQ-OAR-2022-0829-0759, pp. 94-95]

229 Seshadri Srinivasa Raghavan & Gil Tal, Plug-in hybrid electric vehicle observed utility factor: Why the observed electrification performance differ from expectations, 15 Int'l J. of Sustainable Transp. 105, 122 (2022), https://www.sciencedirect.com/org/science/article/pii/S1556831822004269.

The proposed FUF could lead to PHEVs with a large difference between real-world emissions and the compliance values for CO_2 emissions. The use of PHEV powertrains in larger vehicles such as SUVs and pickups will cause this gap to grow, due to the gap between the zero grams per mile CD operation and the high gram per mile operation when the internal combustion engine is running. Over-crediting PHEVs' purported electric driving would create a new and unjustified loophole that would likely slow down the path to greater deployment of zero-emission technologies within the fleet. For example, for a PHEV that has compliance CO_2 charge sustaining (CS) mode emissions of 250 g/mile and an electric range of greater than 28 miles, the proposed FUF would artificially reduce the combined mode PHEV emissions by over 25 g/mile when compared to the ICCT-BAR FUF. (Figure XII.1). The gap between the proposed FUF and the real-world data (ICCT-BAR) is highest for vehicles with a CD range between 42 and 62 miles. California's ZEV regulations for model year 2029 and subsequent vehicles require a minimum certification electric range of 70 miles to be eligible for credit values, which is approximately a 50-mile label range. Therefore, PHEVs designed to meet the minimum range for ZEV credit value eligibility are likely to have the largest deviations between real-world emissions and the compliance emissions calculated using the proposed FUF. [EPA-HQ-OAR-2022-0829-0759, p. 95]

Figure XII.1. Difference in Compliance CO_2 Between Proposed FUF and ICCT-BAR FUF for 250 g/mi CS Mode Vehicle [EPA-HQ-OAR-2022-0829-0759, p. 96]

[See original attachment for graph Figure XII.1.]. [EPA-HQ-OAR-2022-0829-0759, p. 96]

Organization: Environmental Defense Fund (EDF) (1of 2)

Using EPA's proposed formula for calculating a vehicle model's utility factor (UF)—the split of a PHEV's driving between gasoline and electricity—the UF for a PHEV50 is about 0.67. This means that 67% of a PHEV50's mileage is performed using electricity and 33% of its mileage uses gasoline. In terms of CO_2 emissions, a PHEV50 can be considered equivalent to two-thirds of a BEV and one-third of a strong hybrid ICEV. EDF further assumed that the GHG performance of a PHEV50 while operating on gasoline would be 205 g/mi, the same level as described in the ICEV control-focused run above.32 [EPA-HQ-OAR-2022-0829-0786, pp. 13-15]

32 Since PHEVs are required to meet the same criteria pollutant emission standards as ICEVs when operating on gasoline, substituting PHEVs for BEVs at equivalent fleetwide GHG levels has no impact on criteria pollutant emissions.

PHEVs cost more than BEVs due to requiring both electric and gasoline powertrains. Because the OMEGA 2 output did not project costs for complete PHEVs, we used the incremental cost difference between Roush's BEV and PHEV50 costs and applied that difference to EPA's BEV costs to derive projected PHEV costs.33 On a sales-weighted basis, considering the difference in electrification costs across vehicle segments and the types of vehicles that OMEGA2 is projecting to become electrified, we found that the average incremental PHEV50 cost, absent IRA vehicle tax credits, was $6,700 in MY 2032 relative to a BEV.34 Following EPA's methodology for applying the IRA vehicle tax credits, we included the credit for the additional number of BEV plus PHEV sales in each pathway, as EPA had already accounted for the tax credits available for BEVs projected in their analysis. [EPA-HQ-OAR-2022-0829-0786, pp. 13-15]

33 Roush's BEV costs are lower than EPA's, so we took this approach in lieu of substituting Roush's costs for both BEVs and PHEV50s.

34 Based on interpolation between costs in MY 2027 and MY 2035.

C. The PHEV utility factor should be conservative, with manufacturers given a voluntary alternative to use a utility factor based on real world data.

We likewise support EPA's proposal to amend its current approach to PHEV utility factors based on improved data about real world PHEV usage.178 However, we encourage EPA to rely fully on this more accurate data, rather than continuing to consider the UFs developed in SAE J2841, which are based on dated and inaccurate assumptions.179 The data compiled by ICCT from real- world sources represents the best estimate of actual PHEV utilization and should be the primary source for EPA's UF curves. [EPA-HQ-OAR-2022-0829-0786, p. 64]

178 88 Fed. Reg. 29254.

179 88 Fed. Reg. 29253.

EPA's current approach to assigning fuel economy to PHEVs was first adopted in a 2011 rulemaking supporting the 2010 GHG standards.180 Under that rulemaking, PHEVs are given a fuel economy that combines a 0 g/mi emissions value with their measured GHG emissions from operation on liquid fuel.181 The utility factor for weighting the two values is based on a PHEV's charge-depleting range for city and highway driving.182 These utility factor numbers were developed in SAE J2841"using data from the 2001 Department of Transportation 'National Household Travel Survey.'"183 Because PHEVs were just beginning to be introduced at that time,184 the utility factors were not based on real-world PHEV use. Instead, they assume that "[t]he first mode of operation is always electric assist or all electric drive, vehicles will be charged once per day, and future PHEV drivers will follow drive patterns exhibited by the drivers in the surveys used [in calculating the utility factors]."185 EPA acknowledged in promulgating these utility factors that "current understanding of the above assumptions and the data upon which UFs were developed may change" and that "therefore, EPA may change the application of UFs in light of new data."186 However, these utility factors have not been amended since the 2011 rule. [EPA-HQ-OAR-2022-0829-0786, p. 64]

180 See Revisions and Additions to Motor Vehicle Fuel Economy Label, 40 Fed. Reg. 39478 (Jul. 6, 2011), https://www.govinfo.gov/content/pkg/FR-2011-07-06/pdf/2011-14291.pdf; Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25436 (May 7, 2010) ("PHEV compliance values will be determined by combining zero grams/ mile for grid electricity operation with the GHG emissions from the 2-cycle test results during operation on liquid fuel, and weighting these values by the percentage of miles traveled that EPA believes will be performed on grid electricity and on liquid fuel, which will vary for different PHEVs. EPA is currently considering different approaches for determining the weighting factor to be used in calculating PHEV GHG emissions compliance values"), https://www.govinfo.gov/content/pkg/FR-2010-05- 07/pdf/2010-8159.pdf.

181 86 Fed. Reg. 74457 (Dec. 30, 2021), available at https://www.govinfo.gov/content/pkg/FR-2021-12-30/pdf/2021- 27854.pdf.

182 40 C.F.R. § 600.116-12 ("To determine CREE values to demonstrate compliance with GHG standards, calculate composite values representing combined operation during charge-depleting and charge-sustaining operation using the following utility factors . . . ").

183 40 Fed. Reg. 39478 (Jul. 6, 2011), https://www.govinfo.gov/content/pkg/FR-2011-07-06/pdf/2011-14291.pdf

184 88 Fed. Reg. 29253.

185 40 Fed. Reg. 39478 (Jul. 6, 2011), https://www.govinfo.gov/content/pkg/FR-2011-07-06/pdf/2011-14291.pdf

186 40 Fed. Reg. 39478 (Jul. 6, 2011), https://www.govinfo.gov/content/pkg/FR-2011-07-06/pdf/2011-14291.pdf

Meanwhile, California's treatment of PHEVs under the ACC II program is far more conservative, resulting in lower utility factors than EPA. ACC II allows PHEVs to "fulfill a portion of their total Annual ZEV Requirement" if they meet several qualifications.187 A PHEV must have a "minimum certification range value of greater than or equal to 70 miles," based on California's 2026 ZEV and PHEV test procedures,188 and have a minimum US06 all-electric range value greater than or equal to 40 miles to be considered a ZEV under the rules.189 PHEVs that don't meet these requirements can still be counted for partial credit if they have a minimum certification range value between 43 and 70 miles190 or have a US06 all-electric range of at least 10 miles.191 Additionally, PHEVs can only be used to meet 20 percent of a manufacturer's total ZEV requirement.192 [EPA-HQ-OAR-2022-0829-0786, pp. 64-65]

187 California Zero-Emission Vehicle Requirements for 2026 and Subsequent Model Year Passenger Cars and Light- Duty Trucks, 13 C.C.R. § 1962.4(c)(e)(1).

188 California Test Procedures for 2026 and Subsequent Model Year Zero-Emission Vehicles and Plug-In Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes, incorporated by reference in 13 C.C.R. § 1962.4, available at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/ACC II/ACC IIfro_zev_tp_2026%2B.pdf. Certification range value is defined as a "PHEV's calculated combined urban and highway all-electric range values," equal to ".55 x Urban-All Electric (or Driving for FCEV) Range Value + .45 x Highway All-Electric (or Driving for FCEV) Range Value." 13 C.C.R. §1962.4(l).

189 Id. at § 1962.4(c)(e)(1)(A)(8).

190 Id. at § 1962.4(c)(e)(1)(A)(9).

191 How much credit these PHEVS get is calculated based on an equation where the partial vehicle value is equal to Certification Range Value/100 + .20. Id. at § 1962.4(c)(e)(1)(B)(1).

192 Id. at § 1962.4(c)(e)(1)(B)(2)

It is imperative that EPA assign a utility factor for PHEVs that reflects real-world electric drive share. A recent ICCT study examined the current state of PHEV usage in the United States and found strong evidence that real-world electric drive share is far below EPA's current utility factor label rating.193 According to ICCT, "previous research and data from early adopters of PHEVs in the United States demonstrated that PHEVs achieved real-world electric drive share close to that expected by the U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA)." ICCT notes that EPA assumes that PHEVs achieve real-world electric drive share close to EPA's utility factor label rating in its treatment of PHEVs in the 2023-2026 light-duty GHG rule. [EPA-HQ-OAR-2022-0829-0786, pp. 64-65]

193 Isenstadt, A., Zifei, Y., Searle, S., German, J. 2022. Real World Usage of Plug-In Hybrid Vehicles in the United States, ICCT. https://theicct.org/publication/real-world-phev-us-dec22/ (Attachment Y).

ICCT's analysis uses more recent data from two previously unexplored sources: self-reported fuel consumption from Fuelly.com and engine-off distance traveled collected by the California Bureau of Automotive Repair (BAR), which cover a broader variety of PHEV models and newer model years than prior datasets. ICCT concludes that real-world electric drive share may be 26-

56% lower than assumed and real-world fuel consumption may be 42-67% higher than assumed within EPA's labeling program for light-duty vehicles. [EPA-HQ-OAR-2022-0829-0786, pp. 65-66]

ICCT also looked at studies in Europe that echoed their findings. "Recent studies with user data from over 20,000 European PHEVs have shown that, in real-world usage conditions, the [electric drive share] of PHEVs falls far short of the [utility factor] curve assumed in the [Worldwide Harmonized Light Vehicles Test Procedure (WLTP)]. For PHEVs owned by private individuals, the real-world fuel consumption is on average three times higher than the official WLTP values, while for company car PHEVs the fuel consumption is on average five times higher. Moreover, despite an increasing electric range and more public charging infrastructure, the deviation between real-world and official fuel consumption of PHEVs in Europe is observed to be growing."194 [EPA-HQ-OAR-2022-0829-0786, pp. 65-66]

194 Id.

EPA acknowledges in the proposal that its current approach "significantly underestimates PHEV CO2 emissions"195 and that the real-world data collected by ICCT from BAR is, in contrast, "a reasonable source for evaluating the real-world utility factors for recent PHEV usage."196 However, instead of relying fully on this new data for developing its UF curve, EPA proposes to average the two datasets, giving each an equal weight.197 Because, as discussed above, the ICCT- BAR UFs are a significantly better representation of real-world PHEV usage than EPA's current approach, EDF suggests that the agency rely solely on this data in setting its new UF curve. In addition to aligning EPA's default UF with the best available real-world data, we encourage the agency to provide manufacturers with an option to submit rigorous, real-world data to demonstrate their UFs are higher than these default values. An approach along these lines could allow for retrospective adjustment based on annual driving information submitted along with a manufacturer's compliance demonstration. An approach along these lines—a rigorous default UF combined with the option to certify better performance—would help to better reflect the actual emissions performance of PHEVs and provide incentives for manufacturers to develop and deploy PHEVs that operate more regularly on electricity. [EPA-HQ-OAR-2022-0829-0786, pp. 65-66]

195 88 Fed. Reg. 29252.

196 88 Fed. Reg. 29254

197 88 Fed. Reg. 29253.

Organization: Ford Motor Company

Plug-In Hybrid Vehicle Utility Factor

Ford does not support the proposed update to the Plug-In Hybrid (PHEV) utility factor (UF). We do not believe it is appropriate to recalibrate the PHEV compliance benefit at the same time the EPA is proposing other sweeping changes and historically stringent standards. Product planning lead time and uncertainty in EV market growth requires that all electrification options be available with stable and predictable compliance benefits. Ford would support an EPA program designed to gather additional data for use in a future rulemaking which would yield a robust basis for a UF update and prevent disruption to EV product compliance plans. [EPA-HQ-OAR-2022-0829-0605, p. 8]

Organization: International Council on Clean Transportation (ICCT)

On PHEVs, ICCT applauds EPA for and its proposal to adjust the PHEV utility factor (UF) curve to better fit real-world PHEV usage data. [EPA-HQ-OAR-2022-0829-0569, p. 5]

PLUG-IN HYBRID ELECTRIC VEHICLES

Utility factor

ICCT applauds EPA for adjusting the PHEV utility factor (UF) curve to better fit real-world PHEV usage data. As the PHEV models available for purchase today differ in operation and all-electric utility from when the original UF curve was developed, this update is direly need (ICCT 2022 PHEV).149 Due to the growing repository of public, real-world PHEV data, ICCT recommends EPA adjust the proposed fleet utility factor (FUF) curve to reflect the best-available data, while allowing for potential updates to the curve based on more real-world data as it accumulates. [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

149 Isenstadt, A., Yang, Z., Searle, S., German, J. (2022). Real world usage of plug-in hybrid vehicles in the United States. International Council on Clean Transportation. https://theicct.org/publication/real-world-phev-us-dec22/ (ICCT 2022 PHEV)

In DRIA figure 3-29, EPA's analysis of the California Bureau of Automotive Repair (BAR) PHEV data clearly shows that a reduced UF curve is a better fit of the real-world data. This fit matches ICCT's non-linear regression fit of the BAR data. Utilizing the same methodology described in ICCT 2022 PHEV but with EPA's proposed FUF coefficients (Preamble 29442), ICCT finds the appropriate normalized distance to be 802 miles (vs proposed 583 miles). This curve more accurately reflects the current state of PHEV usage. Thus, ICCT recommends that EPA adopt a normalized distance of 802 miles, instead of 583 miles as proposed. [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

Within the timeframe of the proposed rule EPA expects PHEVs with longer all-electric range to become available (in part due to California's ACCII PHEV performance requirements), and EPA seeks to avoid disincentivizing PHEVs with a too low FUF curve (Preamble 29254). For these reasons, EPA proposed a FUF curve higher than what the BAR data supports. This argument puts the expectation of future PHEV performance ahead of the data. However, because there is no guarantee that future PHEV models will achieve the assumed higher electric driving shares, the best practice is to let the data dictate the shape of the UF curve. EPA can establish a provision by which it can adjust the UF curve to better account for PHEVs with varying all-electric range, as additional data is collected. To simultaneously ensure PHEVs are not given too-high UF without disincentivizing longer all-electric range PHEVs, EPA can allow manufacturers to provide publicly available, real-world data with accurate UF measurements that support higher FUF for specific PHEV models. Alternatively, EPA could automatically apply the higher FUF curve (e.g., the current proposed curve, as opposed to the ICCT-BAR curve) for vehicles that meet minimum all-electric performance requirements, such as 70 miles all-electric 2-cycle range and 40 miles all-electric US06 range. This latter option would incentivize greater all-electric capability among PHEVs. [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

Organization: Jaguar Land Rover NA, LLC (JLR)

JLR would like to highlight our concerns over EPA's plans to incorporate PHEVs into their analysis for the final rule. If EPA proceeds with the planned changes to the certified PHEV CO2 value, namely through the adjustment of the utility factor, they must acknowledge the impact this will have on fleet compliance, greatly reducing their contribution to the fleet. As such, the baseline GHG target and projected ZEV share should also be adjusted by an equal amount, to avoid an increase in target stringency by stealth. [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

We would like to comment on the statement made by EPA that "this is a projection and represents one out of many possible compliance pathways for the industry. The proposed standards are performance-based and do not mandate any specific technology for any manufacturer or any vehicle type." Due to the multitude of changes including those to PHEVs and reduction in credit flexibilities, there is very little choice with regards to technologies that will meet the incredibly challenging standards set. [REDACTED]CBI [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

In addition, the goals set out in the E.O. 14037 and Blueprint refer to vehicles sales in 2030 Calendar Year (CY), whereas the ambitious target set by EPA refers to the 2030MY fleet, which will contain a combination of vehicles sold in 2029 and 2030CY, effectively bringing the target forward by six months. [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

Organization: Kia Corporation

- Kia supports EPA assuming PHEVs will see higher levels of electric operation and continue to see high penetration rates. Kia opposes EPA's assumptions for PHEVs including revising the Fleet Utility Factor (FUF) curve to reflect a PHEVs lower electric operation. [EPA-HQ-OAR-2022-0829-0555, p. 3]

Plug-in Hybrid Electric Vehicles Play Critical Role in the Transition

Kia does not support the assumptions on PHEVs outlined in the NPRM. EPA explains that its current PHEV compliance methodology significantly underestimates PHEV CO2 emissions. Consequently, EPA proposes to revise the light vehicle PHEV Fleet Utility Factor (FUF) curve downward to reflect as assumed PHEVs lower electric operation beginning in MY2027.13 EPA's proposal essentially lowers the benefits of PHEVs for compliance which will reduce consumer choice and make feasibility of the standards much more challenging. [EPA-HQ-OAR-2022-0829-0555, pp. 7-8]

13 88 Fed. Reg. 29,252.

EPA's analysis is limited to multiple publications from the International Council on Clean Transportation (ICCT). The EPA's use of the ICCT-BAR curve is inappropriate given the expansion of Level 2 charging occurring as EVs increase across the country. The ICCT publications focus on the limited electric driving share of PHEVs in Europe. ICCT's assumptions are skewed as they assume the same situation in Europe where there were unique PHEV tax incentives, coupled with limited charging infrastructure available in multifamily dwellings. All of which are not good comparisons to the United States. If EPA feels strongly that the real-world fleet utility factor is too low, Kia recommends that EPA work with industry to help incentivize reminders for consumers to plug in more often. [EPA-HQ-OAR-2022-0829-0555, pp. 7-8]

PHEVs play an integral role in facilitating the transition to higher vehicle electrification. Kia strongly supports EPA assuming PHEVs will continue to see high penetration rates and higher levels of electric drive. PHEVs will lower emissions, promote consumer acceptance of electrified powertrains, and reduce tension in the supply chain, workforce, and needed U.S. charging infrastructure. PHEVs are expected to represent at least 20 percent of ZEV sales for the next five years.14 Consequently, Kia continues to strongly support multiple ZEV technological pathways to meet the targets. [EPA-HQ-OAR-2022-0829-0555, pp. 7-8]

14 CARB ACC II Workshop, slide 38 (May 6, 2021).

Organization: MECA Clean Mobility

EPA should conduct a prospective analysis of appropriate PHEV utility factors based on more recent PHEV models with longer all electric range likely to result in a shift to greater electric operation. [EPA-HQ-OAR-2022-0829-0564, p. 29]

PHEVs will continue to be an important compliance strategy which can integrate and optimize the best of combustion and electric technologies to increase vehicle efficiency and facilitate the transition to fully zero tailpipe emissions vehicles. This will be particularly important as the charging infrastructure and supply chains develop that are necessary for battery electric vehicle adoption at the rates projected in the proposal. PHEVs also serve as a bridge technology that can provide consumers confidence in electric vehicle technology while alleviating range anxiety for those who drive long distances. [EPA-HQ-OAR-2022-0829-0564, p. 29]

Similar to previous EPA technology analyses prepared to support future rulemakings, MECA requests that EPA conduct a prospective analysis of utility factors of PHEVs based on the direction of the technologies being released into the market place today as well as announcements of future releases. Of particular note, EPA relied upon past data of older technology PHEVs with limited all electric ranges to justify the proposed reduction in the PHEV utility factors from today's acceptable values that are based on SAE J2841.38 [EPA-HQ-OAR-2022-0829-0564, p. 29]

38 https://www.sae.org/standards/content/j2841_201009/

While EPA is not proposing to adopt the minimum range requirements for PHEVs that are included in CARB ACC II, MECA believes that these requirements along with the market will drive PHEVs with longer all electric ranges. In fact, VW recently announced a PHEV Tiguan SUV available for MY 2025 with an all-electric range of 62 miles.39 This in combination with build out of charging infrastructure, especially from Inflation Reduction Act and Infrastructure Investment and Jobs Act funding sources, will provide consumers with easier access to charge PHEVs and enable them to drive more miles on electricity rather than petroleum. The result will be that future fleet utility factors will increase rather than decrease. MECA suggests that EPA consider these developments, including studying the correlation between fleet utility factor and workplace charger availability, and not base utility factors on older PHEV technology. Finally, MECA suggests that EPA allow PHEVs certifying with all electric range greater than 50 miles to claim higher fleet utility factors, and consider scaling utility factor with a vehicle's all electric range. [EPA-HQ-OAR-2022-0829-0564, p. 29]

39 https://www.caranddriver.com/volkswagen/tiguan

Organization: MEMA, The Vehicle Suppliers Associated

Plug-in Hybrid Electric Vehicle (PHEV) Utility Factor

The data relied upon to establish the proposed reduction in utility factor for PHEV is flawed for a number of reasons and we urge EPA to conduct its own, current and future, real-world U.S. measurement of PHEV usage prior to implementing a revised utility factor. Such an analysis will find greater utility in PHEV usage than is suggested by the data used in the current proposal. [EPA-HQ-OAR-2022-0829-0644, pp. 7-9]

The current data is inappropriate because it is primarily non-domestic, selective and ignores the significant changes already underway in infrastructure and vehicle design that enable greater PHEV utility. [EPA-HQ-OAR-2022-0829-0644, pp. 7-9]

Much of the current data leverages European Union (EU) use patterns in PHEV owners, which has several flaws. First, as the ICCT notes,5 there was a significant deviation between the utility factor for personally owned vs. company owned vehicles. Logic would suggest this makes sense - if drivers do not own their vehicles themselves, they are likely to be less-inclined to maximize their electric utility. That argument is compounded by the fact that many companies in Europe also provide gas cards to employees to support their transportation needs but provide no similar subsidization of charging needs. From this one may infer that EU employees used their "free" gas rather than pay for electricity, which would cause distortive bias in the data. [EPA-HQ-OAR-2022-0829-0644, pp. 7-9]

5 https://theicct.org/publication/real-world-phev-use-jun22/

The ICCT study additionally relied on prominently for EPA's U.S. utility factor analysis used data collected in California, where incentives for PHEV purchasing are more generous than in the rest of the country and may even make the purchase of a PHEV less costly than a traditional ICE vehicle. While California is an admirable leader in ZEV deployment, its incentive structure for PHEV purchases differs from the rest of the country; a large percentage of population resides in multi-unit dwellings (often without consistent overnight charging access), and it ranked (as of last year) behind at least 15 other U.S. states in terms of charging ports per EV, signifying a potential problem of constrained charging access that needs further examination.6 The ICCT itself stated that, "More data collection could provide greater precision and clarity regarding the deviation of real-world electric drive share and what is assumed in EPA labeling." There is no indication that this additional data collection has since occurred. [EPA-HQ-OAR-2022-0829-0644, pp. 7-9]

6 https://www.govtech.com/biz/data/which-states-have-the-most-chargers-per-electric-vehicle

Another distinction worth noting is that the PHEVs and charging infrastructure of the past five years (primarily in Europe, in the case of the data relied upon) have little resemblance to the vehicles and charging capacity projected by EPA in its forecast for the U.S. For example, CARB's ACC Il regulation compels PHEVS to have an electric range of at least 50 miles to meet its ZEV criteria for real-world conditions and 70 miles for minimum certification range.7 This will enable many drivers to complete all daily driving tasks on a single charge,8 and will likely promote greater utility in PHEVs. Furthermore, the need for a more comprehensive nationwide EV charging infrastructure has been recognized by Congress and the Administration several times in recent years, whether through billions of dollars in new EV charging infrastructure direct investment and billions more for incentives to support private and public charging. Those investments will enable greater accessibility for PHEV drivers to charging stations, but it has yet to be realized at this point in time or reflected in the studies on which EPA relies to propose this amended utility factor. [EPA-HQ-OAR-2022-0829-0644, pp. 7-9]

7 https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035 and Clause § 1962.4(e)(1)(a) in Title 13 CCR https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/2acciifro1962.4.pdf

8 US Average miles traveled per year. 13,476; per day: 36.92 - https://www.caranddriver.com/auto-loans/a32880477/average-mileage-per-year/

If further study indicates that a change in PHEV utility factor is warranted, it must be substantiated by real-world and forward-looking data collected by EPA under reliable and repeatable test conditions. Absent that needed analysis, we strongly urge EPA to reconsider its amendment to utility factor calculations. [EPA-HQ-OAR-2022-0829-0644, pp. 7-9]

MEMA urges:

• EPA to maintain previous PHEV utility factor or conduct U.S.-based study and forecast to replace current PHEV utilization data and recalculate PHEV utility factor. [EPA-HQ-OAR-2022-0829-0644, pp. 7-9]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

Mitsubishi participated in the development of - and supports - the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0682, p. 2]

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators: [EPA-HQ-OAR-2022-0829-0682, p. 2]

1. Closely align the multi-pollutant emissions standards with President Biden’s 2030 goal by assuming no more than 40-50% PHEVs and FCEVs by 2030, even though our experience leads us to caution that this itself is very ambitious, and is predicated on the assumption that the necessary supportive policies will be effectively implemented. [EPA-HQ-OAR-2022-0829-0682, p. 2]

2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping- stone to full BEV acceptance. [EPA-HQ-OAR-2022-0829-0682, p. 2]

3. Maintain the current PHEV Utility Factor (UF) and work with industry to identify opportunities to increase PHEV electric operation. This is the ideal stepping-stone technology to encourage long-term BEV acceptance and utilization. [EPA-HQ-OAR-2022-0829-0682, p. 2]

4. Keep the proposed approach to determine the passenger car curves, and consider adjusting the cutpoint and stringency levels of the light-duty trucks during the early years of the program. [EPA-HQ-OAR-2022-0829-0682, p. 2]

5. Maintain the existing GHG program flexibilities, such as Air Conditioning and Off-Cycle technologies credits (including the alternative method to apply off-cycle credits), and

allow previously approved technologies to continue receiving credits. [EPA-HQ-OAR-2022-0829-0682, p. 2]

6. Align the Tier-4 (criteria pollutants) with CARB's LEV-IV criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 2]

7. Consider the impact that very aggressive GHG standards will have on vehicle affordability, and especially the detrimental impact to low-to-moderate income families. Regardless of the vehicles that regulation may require us to produce, it is critical that regulators always keep the accessibility of consumers in mind.

The rationale for each one of these recommendations is further explained below. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Equally as importantly, we also ask EPA to consider our recommendations regarding the PHEV NMOG+NOx Contribution Factor and the PHEV Utility Factor (UF) as discussed in other sections of our comments. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

3. PHEV Utility Factor

Mitsubishi shares the views expressed by Auto Innovators regarding application of the PHEV Utility Factor (UF). In addition to Auto Innovators' comments, we also provide the following observations in support of retaining the existing UF. [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

A. PHEV Data Sources

In developing the proposed utility factor (UF), EPA relies primarily on the work conducted by the International Council on Clear Transportation (ICCT) and comparisons to its own analysis with PHEV data from the California Bureau of Automotive Repair (BAR). The BAR data is based on vehicle information retrieved from the vehicle On-board Diagnostic (OBD) system and includes total distance traveled and distance traveled during charge-depleting mode. Upon comparison of its results with ICCT's, EPA averaged the current SAE J2841 UF curve with the curve generated by ICCT based on the BAR data to generate the proposed UF equation. [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

The BAR data is a collection of PHEV data from MY19 through MY22 vehicles. The data was then filtered to remove any vehicles that show inconsistent data regarding distance traveled and grid energy utilization. While filtering of incomplete or inconsistent data is a typical operation in data analysis, the results of the analysis can be substantially altered based on the filters applied. We believe the filtering methods used by EPA filtered out too many vehicles. For example, the grid energy in/out filter completely removes one of the highest utility factor vehicle models4 from the entire data set. Whether such filtering was necessary for that vehicle is questionable. At the same time, it may be necessary to apply alternative filters. Due to the time constraints of this comment period, Mitsubishi was unable to fully evaluate the filtering methods EPA used in its analysis, but we may still provide feedback to EPA after the comment period. We ask EPA to provide additional information about the filters applied, and the effect those filters have on the overall utility factor analysis. [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

4 The BMW i3

B. Current PHEV Performance and Future PHEV Requirements

Mitsubishi appreciates the work conducted by EPA and ICCT to analyze recent PHEV performance to reevaluate the electric operation of plug-in electric hybrid vehicles. The data can be a powerful tool in understanding the habits of consumers and the levers needed for both current and future consumers to fully utilize the electric capability of PHEVs. However, with regard to applying the data to utility factor estimates, the BAR data does not represent PHEVs within the timeframe of the proposed rule as EV utility is likely to increase compared to today's PHEVs due to improved EV performance and increased availability of EV charging infrastructure. [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

PHEVs come in many forms due to the flexibility they offer in terms of internal combustion engine (ICE) and EV operation. The amount of EV range, charge time, and ICE operation during charge-depleting mode are just a few of the specifications that can vary between PHEV models. It is important to ensure the utility factor applied to MY27 and later vehicles is reflective of the specifications and performance for vehicles of that time period. In addition, the utilization of PHEV electric mode is dependent on the charging and driving behaviors of the vehicle owner. As with the vehicle, owner behavior today may be different than PHEV owners in the MY27 and later time frame. [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

California's MY26 and later Advanced Clean Car II (ACC II) regulation developed PHEV technical requirements "that functionally emphasize the ZEV capabilities of these vehicles." CARB estimates the minimum all-electric range required under ACC II will meet the daily needs of 74 to 84 percent of new car and truck buyers in California5. It is likely that most, if not all, MY27 and later PHEVs will be more ZEV- capable than the vehicles provided in the BAR data. Among requirements CARB included in the ACC II regulation are: [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

- Starting with MY26: Phase in of PHEVs capable of operating in all-electric mode at further distances, and under most driving conditions [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

- MY29 and later: All PHEVs must meet extended range (70-mile 2-cycle and 40-mile US06 EV range) and charging requirements to be eligible ZEVs under the ACC II regulation [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

- Enhanced battery durability requirements to ensure PHEV capabilities for the first owner as well as subsequent owners. [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

In addition to CARB's intention to increase ZEV capability through PHEV technical requirements, the approach vehicle owners take to PHEV operation may change. Consumer education and increased available of charging infrastructure will make it easier for PHEV owners to charge vehicles when convenient, and thus more likely that they will do so on a more regular basis. [EPA-HQ-OAR-2022-0829-0682, pp. 4-5]

C. Potential Effect of UF and PEF on CAFE Standard

The development of the proposed utility factor by EPA considers the impact of changes within the context of the light-duty GHG standard. However, the utility factor is also used in developing fuel economy compliance values for the NHTSA CAFE standard. There is little mention of the utility factor's influence on CAFE compliance, despite the direct effect it has on PHEV CAFE compliance values. Unlike the GHG standard, which correctly treats electric operation as zero emissions, the CAFE regulation assigns PHEVs and BEVs a petroleum-equivalent fuel economy. The disconnect between the GHG and CAFE programs results in different weighting of compliance benefits for PHEVs and BEVs relative to conventional ICE vehicles. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

Expanding on this issue, the Department of Energy (DOE) is proposing changes to the Petroleum Equivalency Factor (PEF) starting with MY27. The PEF is used to estimate the mile per gallon equivalent (MPGe) of BEV and PHEV electric mode operation. The DOE is proposing a 72% reduction of the PEF resulting in a significant reduction of the BEV and PHEV CAFE compliance value. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

The combined effect of the changes to the UF and PEF on the CAFE standard are difficult to assess considering the proposed CAFE standard for MY27 through MY32 has not been published. For now, we can only assume that the structure of the current CAFE standard will remain unchanged. Based on this assumption, the combined effect of the UF and PEF will result in certain PHEVs having less compliance benefit than comparable Strong Hybrid-Electric Vehicles (SHEVs). Figure 1 is an example of the effects the proposed UF and PEF would have on the CAFE compliance of small SUV PHEVs relative to comparable SHEVs. In Figure 1 (left), the current Utility Factor and PEF means most PHEVs correctly have fuel economy greater than all comparable SHEVs. For Figure 1 (center), the proposed PEF with current UF results in a CAFE compliance value reduction of all PHEVs, in addition, several PHEVs would have a CAFE compliance value less than many SHEVs. For Figure 1 (right), the proposed changes to the UF are added resulting in further reductions in PHEVs compliance values and additional reductions in performance relative to SHEVs. Despite the real-world petroleum reduction advantage of PHEVs, the reduced UF and PEF will result lower CAFE compliance values for several PHEVs relative to comparable SHEVs. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

[See original for graph titled “Figure 1. Comparison of PHEV and SHEV CAFE Compliance Value with Current and Proposed PEF and UF”] [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

D. PHEV Utility Factor Recommendations

For the reasons described above, Mitsubishi believes the PHEV data EPA used to derive its proposed UF is outdated and not representative of the ACC II compliant PHEVs that will be in the market for the timeframe covered by this rulemaking. Therefore, Mitsubishi recommends EPA maintain the utility factor as it is currently, and continue to collect PHEV data to develop programs that encourage customers to maximize the EV operation of PHEVs. In addition, Mitsubishi recommends EPA coordinate with DOE and NHTSA to ensure the combined effects of the proposed UF, PEF and structure of the NHTSA CAFE standard ensure CAFE compliance reflects the real-world petroleum reduction benefit of PHEVs. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

Organization: National Association of Clean Air Agencies (NACAA)

With respect to other issues, NACAA believes plug-in hybrid electric vehicles (PHEVs) have an important role to play in the LMDV GHG program provided their contribution toward the fleet average GHG requirements is limited strictly to the distance over which they operate fully on electricity. We concur with EPA’s conclusion that the current LDV PHEV compliance methodology overstates the operation of PHEVs on electricity thereby significantly underestimating PHEV CO2 gm/mi compliance results. Therefore, NACAA commends EPA for proposing to reduce the PHEV Fleet Utility Factor (FUF) curve used in the CO2 compliance calculation for PHEVs beginning in MY 2027 but recommends that the FUF curve be even lower than proposed. We also recommend that EPA require data collection and reporting or accessibility to better inform the methodology in the future. [EPA-HQ-OAR-2022-0829-0559, p. 8]

Organization: Porsche Cars North America (PCNA)

4. Porsche does not support the proposed reduction in the PHEV utility factor.

EPA's proposed reduction in the utility factor for PHEVs will reduce the weighting for electric operation which will negatively impact the GHG compliance value for PHEVs. This is an unfortunate proposal to undercut an incentive to deploy electrified vehicles especially in the context of the MPR that is premised on a fleet that in less than 10 years must have 2 out of every 3 new cars sold be electrified. Porsche recognizes that PHEVs may play a minority role in the overall composition of future electrified vehicles sales, but nevertheless continues to see an important market role for PHEVs. PHEVs expand the range of electrification choice for consumers, choice that provides access to the benefits of electrification in cases where a consumer may be unable or unwilling to adopt fully electrified vehicles. For a regulation as aggressive as this proposal, a regulation that seeks to transform the US light-duty market towards electrification, adopting this change would simply be counter to that effort. Worse yet, it's a change whose entire premise is based on looking backward on PHEV recharging, and not leveraging the anticipated future charging environment included within the assumptions of the MPR. A future that EPA projects will greatly expand the availability, reliability, and usage of electric vehicle charging. [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

EPA's proposal devalues future PHEV performance based on historic charging behavior of existing on-road PHEV drivers. Porsche has not reviewed the details of the California BAR or fuelly.com data but can understand if in some cases consumer use of electric drive has been lower than expected. This is not surprising given the well-documented challenges and complaints related to the general lack of public charging infrastructure in the past few years. Besides challenges within finding reliable public charging, many consumers have faced difficulties in installing home charging, especially for multifamily and rental dwellers, and have complained about the general lack of workplace charging. However, the entire foundation of this MPR and the dramatic shift towards electrification rests upon assumptions regarding improvements in electric vehicles and more specifically in the availability and reliability of public and private electric vehicle charging. Issues that past owners of PHEVs may have experienced that likely led to the examples of lower-than-expected usage of electric drive would be addressed according to EPA's assumptions on improved charging. As such, the decision to alter the utility factor for future PHEVs should not focus on decreasing the utility factor due to challenges customers experienced in the past, but rather should maintain the existing utility factor based on improved usage of charging in 2027 and later given EPA's projections for rapidly expanding charging infrastructure. [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

It is nonsensical that future PHEV drivers would continue to pass up on charging opportunities once charging is more ubiquitous in the public, at home and at work. In fact, this would be counter to EPA's assumed consumer valuation of fuel savings that has been consistently referred to in GHG rulemakings. If consumers value fuel savings, and if charging availability is no longer a barrier to usage, EPA would have to assume that PHEV drivers would naturally seek to maximize their usage of electric drive if the cost per mile to drive electric is less than that of gasoline. If for some reason drivers continued to avoid using electric operation, then EPA would have to reevaluate the entire premise of consumer demanded fuel savings. As charging resources increase, utility factor should increase along with it, not go down. [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

EPA acknowledges uncertainty regarding future charging usage by stating that the agency could revisit the utility factor once again in a future rulemaking if it appears that PHEVs are using more electric operation due to improved vehicle technology and greater charging infrastructure. However, undercutting PHEVs in this rulemaking, only to increase the value of PHEVs in a future rulemaking creates too much uncertainty. If EPA expects the charging environment to improve, why reduce the assumed driving usage now only to increase it again later? This back-and-forth uncertainty on utility factor would not be helpful since the current proposal would so undercut the incentive for PHEVs that manufacturers would have likely reconsidered continued support for the technology. If the agency is concerned about the actual real-world usage of PHEV electric operation, it seems that the approach would be to work with stakeholders to improve the charging experience today while the charging infrastructure is expanding over the next few years. “Fixing” the issue by undercutting the technology in regulation neither improves the technology, nor helps address charging challenges customers are facing. [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

Porsche anticipates that with improved electric ranges and greatly increased charging opportunities, PHEVs electric operation should increase in the future. The White House reported on June 27 that the goal to achieve 500,000 public chargers remains on track and the 2030 DOE report on nationwide charging supports the point that current public and private investment into charging also appears on track to support projected EV penetrations. Why would EPA undercut a class of electrified vehicles based on yesterday’s charging challenges, when other government entities are increasingly declaring charging challenges to be on track to being solved? [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

Porsche continues to offer PHEVs in the US market and has recently launched an upgraded version of a PHEV utility that features significantly increased electric range. Porsche recognizes that PHEVs can play a valuable role in helping our customers achieve the benefits that even partial electrification can provide in terms of improved efficiency, reduced petroleum consumption and dynamic performance. [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

Porsche notes that EPA’s proposed update to the PHEV utility factor will also influence CAFE compliance calculations due to the allowance within statute and regulation for manufacturers to optionally select weighted operation. EPA did not provide analysis as to how this change would affect CAFE compliance especially considering Department of Energy (DOE) recent NPRM to reduce the Petroleum Equivalence Factor (PEF) by 72% for electric vehicles. This dramatic proposal from DOE to undercut the incentive for electric vehicles within CAFE is premature given that proposed CAFE standards for model years 2027 and later have not yet been released by NHTSA. Porsche recommended in comments to DOE for their NPRM that DOE include the assessment of EPA’s proposed change in the utility factor to better understand the combined effect of lower PEF and lower utility factor. DOE did not acknowledge, or was unaware of, the proposed reduction in utility factor from EPA. The PEF statutory basis requires DOE, as it has done for over 40 years, to incentivize electrified vehicles in CAFE. This statute also requires DOE, NHTSA and EPA to consult on changes related to PEF and CAFE. Neither the EPA MPR NPRM nor the DOE PEF NPRM appear to discuss the mutual impacts that each other's proposed updates could have on future CAFE compliance. As NHTSA has yet to release their CAFE proposal, it is unclear if NHTSA will address both the EPA and DOE proposals and how both could impact CAFE compliance. To Porsche, it is unclear as to why these NPRMs appear disjointed and so far, have failed to discuss the impacts of each other's proposals on the other regulations. Porsche recommends EPA provide analysis of the impact of the reduced utility factor on the PEF and CAFE compliance in coordination with DOE and NHTSA. Ideally, all the proposals would have been released together to provide manufacturers with the ability to understand how each of the agency's actions would interact with each other and continue to support and incentivize technologies such as PHEV. This is especially relevant considering the overarching goal to achieve a dramatic increase in light-duty electrification. [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

Organization: Rivian Automotive, LLC

Additional Technical Comments

Modifications to the PHEV Fleet Utility Factor ("FUF")

Rivian applauds EPA's decision to revise the FUF for PHEVs. We agree with the agency that the current compliance methodology "significantly underestimates PHEV CO2 emissions."35 As the agency details in its analysis, and as Rivian has commented in the past, PHEVs exhibit significant variability in their environmental performance. Research from Europe shows that PHEVs deliver poorer environmental benefits in real-world usage than certified under test procedures, with troubling implications for the projected benefits of regulatory programs that encourage the development and sale of these vehicles.36 In the United States, PHEVs drive fewer electric miles than assumed for labeling purposes, with fuel consumption as much as two-thirds higher than nominally anticipated.37 Simply put, PHEV drivers often do not plug in their vehicles as much as was previously assumed. [EPA-HQ-OAR-2022-0829-0653, pp. 12-13]

35 Id. at 29,252.

36 Patrick Plotz et al., The International Council on Clean Transportation, Real-World Usage of Plug-In Hybrid Electric Vehicles in Europe: A 2022 Update on Fuel Consumption, Electric Driving and CO2 Emissions (June 2022), available at www.theicct.org/publication/real-world-phev-use-jun22/.

37 Aaron Isenstadt, Zifei Yang, Stephanie Searle, and John German, The International Council on Clean Transportation, Real-World Usage of Plug-In Hybrid Electric Vehicles in the United States (December 2022), available at www.theicct.org/publication/real-world-phev-us-dec22/.

The FUF remains important for calculating PHEV emissions for regulatory compliance, but the weight of the evidence clearly compels EPA to revise the curve. The initial proposal marks a significant improvement over the status quo, but onboard diagnostic data from California support an even lower FUF.38 EPA rightly acknowledges this in the Draft Regulatory Impact Analysis ("DRIA").39 Nonetheless, EPA proposes a higher curve. The agency's justification rests on speculation that future PHEVs could deliver greater all-electric performance as well as stated concerns that an accurate FUF would "disincentivize" PHEV development.40 If PHEVs fall short of their environmental promise, the technology does not merit an artificially inflated regulatory incentive regardless of its potential. Far from an unfair disincentive, an accurate FUF would ensure that the regulation works as intended—achieving reliable, real-world emissions reductions. To safeguard the regulation's environmental integrity, Rivian encourages EPA to finalize a FUF that accurately reflects the best available data from real-world driving behavior. [EPA-HQ-OAR-2022-0829-0653, pp. 12-13]

38 Stephanie Searle and Aaron Isenstadt, The International Council on Clean Transportation, "Don't Plug In Your Plug- In Hybrid? EPA Will Now Hold Automakers Responsible," June 1, 2023, available at www.theicct.org/us-phev-usage- regs-jun23/.

39 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 3-78.

40 Id.

Organization: Southern Environmental Law Center (SELC)

Under the GHG standards portion of the tailpipe emissions standards, a Fleet Utility Factor (FUF) is used to determine the portion of the electric operation of a plug-in hybrid electric vehicle (PHEV) that contributes to the fleet average. Studies have shown, however, that the current FUF overestimates the operation of PHEVs on electricity.67 As a result, "the current light- duty vehicle PHEV compliance methodology significantly underestimates PHEV CO2 emissions."68 We therefore support EPA's proposal to revise the FUF curve used in CO2 compliance calculations for PHEVs beginning in model year 2027 and urge EPA to consider a FUF curve that is even lower than the current proposal. It is essential that the GHG emissions from vehicles are properly accounted for in fleet averages to ensure the standards are resulting in the greatest emission reductions possible. [EPA-HQ-OAR-2022-0829-0591, p. 9]

67 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 83 Fed. Reg. 29252 (May 5, 2023).

68 Id.

Organization: Stellantis

Separately, EPA is discounting the benefit of a consumer facing technology that in the near-term addresses many of the concerns around pure BEV technology (e.g., range, infrastructure, etc.). Specifically, EPA is decreasing the GHG benefits of PHEV technology by proposing a change to PHEV Fleet Utility Factor (FUF) that will increase GHG emissions of light- and medium-duty PHEVs. EPA claims the published FUF used on test cycles to account for on-road electric operation is no longer appropriate. We have analyzed EPA's work and find shortcomings in the data sets (both the fuelly.com and CA-BAR), the filtering and analysis of the data, and the curve fitting techniques used. To address these problems, we propose that industry, EPA, SAE, DOT, and the national labs collaborate on an update to SAE J2841 that can be published following peer reviews. [EPA-HQ-OAR-2022-0829-0678, pp. 12-13]

The two issues that can lead to shortfalls in PHEV electric operation usage are (1) lack of charging and (2) differences in performance between regulated cycles and on-road operation. We believe charging rates will improve as more public infrastructure emerges and charging becomes ubiquitous. As for capability concerns, CARB is requiring a 70-mile combined cycle minimum range and a high-power cold start requirement (that EPA also proposes to adopt in this rule). These two requirements will force future PHEVs to have more range and power in all-electric operation, thus eliminating or minimizing any performance differences on-road versus regulated cycles. [EPA-HQ-OAR-2022-0829-0678, pp. 12-13]

EPA should be encouraging PHEV technology, not discouraging it. EPA clearly recognizes PHEVs could be an appropriate form of electrification for:

- Pickup trucks where BEVs struggle to deliver the needed range while towing

- Consumers who are not ready for BEVs, but could use a PHEV as a bridge [EPA-HQ-OAR-2022-0829-0678, pp. 12-13]

Improved capability PHEVs are coming and offer a battery mineral preserving bridge to full electrification (i.e., PHEVs can address consumer needs with smaller batteries than pure BEVs). EPA’s own analysis in the prior 2023-2026MY GHG emissions standards rulemaking5 found that PHEVs can play a significant role in meeting GHG emissions standards. [EPA-HQ-OAR-2022-0829-0678, pp. 12-13]

5 Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74493-94 (Dec. 30, 2021).

Stellantis agrees with the Auto Innovators’ recommendation that EPA should explicitly model PHEVs in the light-duty and MDV pickup applications in the final rule. However, the proposed Utility Factor will discourage PHEVs. Stellantis disagrees with the proposed Utility Factor changes and recommends that the current published Utility Factor remain in use. [EPA-HQ-OAR-2022-0829-0678, pp. 12-13]

The combined impact of the proposed changes described above compound the stringency of an already aggressive target makes the overall “net effect” of what EPA is proposing infeasible – especially in the initial year of the program. [redacted text.] [EPA-HQ-OAR-2022-0829-0678, pp. 12-13]

Third, EPA should retain credit for off-cycle GHG technologies that will continue to reduce real-world GHG emissions on ICE and EV product without artificially ramping down credit prematurely. Similarly, EPA should retain today’s PHEV Utility Factor to motivate sales of even more capable PHEVs. These technologies remain important in reducing the GHG emissions of a combined ICE/EV fleet, and the overall influence of the credit mechanisms in place to incentivize technology proliferation will scale down naturally as BEV technology proliferates. [EPA-HQ-OAR-2022-0829-0678, pp. 14-15]

In addition to these three pieces, and as a separate matter to setting feasible standards, EPA should consider implementing transparent and objective mechanisms that monitor key market enablers (infrastructure, battery costs, and raw material availability) and create adjustments if these essential enablers fall short of projections. These mechanisms are not a substitute for appropriately set targets, but rather a compliment to address uncertainties that are beyond the control of both industry and EPA. [EPA-HQ-OAR-2022-0829-0678, pp. 14-15]

Stellantis recommends that EPA should:

GHG Standards

- Revise standards that align to achievable EV adoption rates that do not force an overly optimistic technology transition for the market and industry: [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Revise stringency adopting an 'Alternative 3' profile removing front-loading of EV adoption, modified to ensure 2030MY standards can be met with a 40-50% BEV+PHEV+FCEV combined technology penetration [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Include PHEV technology as a critical transition technology to a fully electrified future – without incorrect discounting – particularly in highly capable vehicle segments [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Retain GHG saving technology flexibilities recognizing the GHG benefit that continues to be present on electric vehicles and that will naturally decrease as EV penetration increases [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Treat trucks and SUVs fairly by including PHEV technology as an important bridge to a BEV future, and ensure year-over-year required improvements are the same as cars [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Fix incorrect MDV adjustments that mistakenly force medium-duty vehicles into light-duty standards and double stringency of high capability products arbitrarily [EPA-HQ-OAR-2022-0829-0678, p. 24]

- Include a provision that compliance with EPA's GHG standards would constitute compliance with CAFE standards [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

Regarding the Fleet Utility Factor (FUF or UF) and the issue of PHEVs plugging in we have many recommendations. We recognize this is an important issue and a complicated one. We share EPA's desire to have PHEVs plug-in frequently in order to achieve needed emission reductions and make the averaging, banking and trading system work. We believe that a combination of regulatory requirements, incentives and disincentives discussed below will address the issues EPA raised and improve the FUF. [EPA-HQ-OAR-2022-0829-0646, p. 6]

a) We strongly recommend against using the California Bureau of Automotive Repair (BAR) data and Fuelly.com data as the basis for a new FUF for PHEVs. The Technical Committee of the Strong PHEV Coalition includes researchers who have been engaged with development and evaluation of UF calculations for more than 20 years. We are very familiar with the set of datasets that are available in the public and private domain for UF evaluation and have researched the datasets and authored many of the studies referenced in the Draft Regulatory Impact Analysis (DRIA). Our assessment and recommendations in response to the request for input on UF data in the DRIA is that the proposed changes to UF are based on a very poor dataset, poor analysis, and statistically indefensible methods. These datasets and methods are inadequate to inform policy of the importance and impact of EPA's emissions standards. See Appendix A for our critique of the BAR and Fuelly.com data sets. [EPA-HQ-OAR-2022-0829-0646, p. 6]

We strongly recommend keeping the SAE J2841 FUF curve for PHEVs in the final rule because the SAE standard FUF is an accepted, standardized, and well-understood model. The analyses that are presented by EPA and ICCT as evidence of the unrepresentativeness of J2841 are based on very poor data sources and analysis that is not statistically relevant or predictive. We agree that FUF and PHEV credits should be derived from operational data, but the proposed data sources and analyses are inadequate and reflect poorly on EPA's knowhow. EPA should engage with experts to derive a data-driven FUF using more representative datasets and methods including those of the CARB-funded UC Davis data logger study, or the EV Project analysis . See Appendix A for more explanation. Another factor that we request EPA informally consider is that PHEV batteries typically use five times or less lithium per all-electric mile than battery EVs, and as a result save substantial amounts of GHG from battery manufacturing. Strong PHEVs have the same GHG footprint as a 300-mile range BEV and Strong PHEVs have much higher all-electric range than PHEVs with a low all-electric range. (See Appendix B below.) We support EPA not considering battery manufacturing GHG emissions in this rulemaking, but request that EPA informally include this factor when developing the final FUF. While SAE J2841 is not perfect given the factors above it is more than adequate when combined with our package of recommendations below. [EPA-HQ-OAR-2022-0829-0646, pp. 6-7]

c) Further, we support EPA's desire to update the FUF in a future rulemaking when new data becomes available, and we commit to helping EPA acquire this data as we are a very data driven coalition that includes five universities (or similar research centers). Over time data derivable from CA BAR and other state's smog check programs will improve as more on-board diagnostic data becomes available which should be used in a future rulemaking with appropriate data quality testing, and improved methods. [EPA-HQ-OAR-2022-0829-0646, pp. 6-7]

EPA should extend the FUF to 130 miles in order to encourage automakers. For example, Toyota has announced that it is planning a PHEV with over 124-mile all- electric range.4 While we don't know which test cycle this range is based on, EPA should encourage this long all electric range.5 Another example is the BMW i3 REX which was designed to primarily drive all-electric miles but is now only sold as a used PHEV. [EPA-HQ-OAR-2022-0829-0646, p. 7]

EPA, in the final rule or future rule, should include a true-up system for automaker's FUF where debits or credits are provided based on actual data from on-board diagnostics and reporting by automakers of a fairly large sample. In other words, under this proposal, an automaker would lose or gain credits after-the-fact based on actual data on how consumers drive both new and older PHEVs. If EPA opts not to do this, we request that EPA should, at minimum, require manufacturers in this rulemaking to share anonymized actual data from PHEVs so that in future years, the EPA can make informed decisions about the FUF based upon real world data.

g) EPA should adopt a provision to discourage low-range PHEVs by requiring them to count as an HEV with no zero emission miles. We suggest a cut-off of 50 km (31 miles). Further we are not suggesting a ban on low-range PHEVs but rather a disincentive to produce them. Low-range PHEVs according to the UC Davis data logger project and the EV Project have greater likelihood of not plugging in and this could increase as PHEVs get older. PHEVs with a long all-electric range offer much greater benefits to consumers and show much higher levels of plugging in.

4 Toyota Planning Plug-In Hybrid Vehicles With Over 124 Miles Of Electric Range (motor1.com)

5 If this 124-mile range is based on the WLTP test (instead of EPA two cycle test) it is a very good all electric range for a PHEV.

Our assessment and recommendations in response to the request for input on UF data in the DRIA is that the proposed changes to UF are based on a very poor dataset, poor analysis, and statistically indefensible methods. These datasets and methods are inadequate to inform policy of the importance and impact of EPA's emissions standards. See our recommendations section above for what should be done instead. [EPA-HQ-OAR-2022-0829-0646, p. 12]

Critiques of the datasets that are input into the EPA UF calculations The BAR and Fuelly.com datasets that are referenced in the DRIA are both very poor datasets, methodologically and practically ill-suited to sample the population of PHEV owners. [EPA-HQ-OAR-2022-0829-0646, p. 12]

The Fuelly.com dataset is wholly inadequate to perform this function. It is a self-selected, self-reported online gasoline consumption log; Fuelly.com is not a survey, makes no claim to statistical representativeness, and does not have inputs or data to electric operation in any way. Methodologically, the means by which ICCT and EPA calculate UF from Fuelly.com data is to compare real-world fuel consumption to EPA rated CS fuel consumption, which is completely incoherent if one realizes that EPA rated fuel consumption and on-road fuel consumption are not the same thing. EPA researchers know better than any the many sources of variance between real-world fuel consumption and EPA -rated fuel consumption. In the ICCT calculation, the variance between these two fuel consumptions (which is strongly correlated with weather conditions, driving conditions, tire inflation, etc.) has entirely and indefensibly been allocated to a lower UF. In both the data and analysis of Fuelly.com fuel logs, EPA and ICCT are using unrepresentative data and deeply inadequate analysis to make policy. [EPA-HQ-OAR-2022-0829-0646, p. 12]

The BAR dataset is a relatively improved dataset, and we believe that in the future, a nationally representative dataset derived from many states who will be gathering this data will have value for measuring the real-world operation of PHEVs and will enable a data driven UF calculation in a future EPA rulemaking. At present, the BAR dataset has comprehensive data quality problems, and the naïve data filtering algorithms that ICCT and EPA used to wrangle and preprocess the data are inadequate to realize a coherent and representative analysis. [EPA-HQ-OAR-2022-0829-0646, p. 12]

Because our coalition has been systematically studying the operation of PHEVs, we have also seen that the FUFs of vehicle models in the BAR dataset are changing as a function of time. We asked for and received from ICCT and CA BAR both the datasets that ICCT used for their analyses (from ICCT), and an updated dataset of the same fields of data up to the present date (May 2023).These datasets show comprehensively different results in calculating PHEV operation. For example, BMW X5 XDRIVE45E vehicles (MY 2019-2022) that meet the ICCT/EPA filtering criteria tested before 17 May 2022 have an average individual UF of 30%. X5 XDRIVE45E vehicles (MY 2021-2023) that meet the ICCT/EPA filtering criteria tested after 17 May 2022 have an average individual UF of 68%. These types of problems with the BAR dataset seem to be unrecognized and not validated by the research community, and further strengthen the case for not using the BAR dataset for research or policy making. [EPA-HQ-OAR-2022-0829-0646, pp. 12-13]

There is evidence of systematic importing of used PHEVs into California, a type of data pollution that is not affecting most of the conventional vehicles. For example, a set of vehicles included in the ICCT dataset are six 2019-2020 Toyota Prius Primes. These six Prius Primes are all tested on a single day, they each have >#### 3000 mi, and five of six of them are present in the ICCT analysis (one has a technician-recorded odometer inconsistency). Whatever the history of these vehicles, the fact that 6 of them are being tested back-to-back on the same day is evidence that these vehicles are not under the operation and ownership of the general public, and that their operational history is not representative of the general public. These clusters of similar vehicles undergoing back-to-back testing are common and easily identifiable in the BAR data used for ICCT and EPA analysis. [EPA-HQ-OAR-2022-0829-0646, p. 13]

Prius Prime 1 tested on 02NOV2020:09:00:00.442000

Prius Prime 2 tested on 02NOV2020:10:34:51.141000

Prius Prime 3 tested on 02NOV2020:11:28:26.939000

Prius Prime 4 tested on 02NOV2020:12:14:16.189000

Prius Prime 5 tested on 02NOV2020:12:25:32.846000

Prius Prime 6 tested on 02NOV2020:13:36:16.952000

[EPA-HQ-OAR-2022-0829-0646, p. 13]

There is strong evidence that automakers (OEMs) are not implementing the data collection algorithms consistently. For example, all 2019 Chrysler Pacifica hybrid vehicles, transmitted the data required for these calculations from the HPCM-HybridPtCtrl control module, instead of from the ECM*-EngineControl control module which was used by all other OEMs. In reviewing and operating the ICCT's Data Import Algorithm (BAR Data Import.R, shared by A. Isenstadt 5/13/23), these vehicles are excluded from ICCT's analysis. Given that 2019 is the first year that on- board diagnostic technology allows data collection, and we anticipate better data reporting and processing in future years, but the handling of these types of inconsistencies is not in evidence in the ICCT/EPA data wrangling processes. [EPA-HQ-OAR-2022-0829-0646, pp. 13-14]

4. There is strong evidence of many significant inconsistencies between the technician and OEM-derived data that are present in the BAR data. For example, of the BMW 530e PHEVs in the ICCT dataset (ICCT_OBD_DATASET_MY2019, requested from BAR in April 2023), 585 (of a total 988) of them failed the odometer reading test (that the technician-entered odometer [in mi] is well-outside the OBD-reported odometer reading [converted to mi]). There is no reason why technicians are so comprehensively misreporting this very simple datum for a vehicle that is one of the most reported vehicles in this dataset (which has ~4000 PHEVs in total). [EPA-HQ-OAR-2022-0829-0646, pp. 13-14]

There are many more examples of these types of problems, none of which are identified or discussed in any of the ICCT/EPA literature or analyses. In summary, at this time, the BAR dataset is not a representative dataset to be able to assess the operation of PHEV in real world operation. In the future, as vehicles in CA (and in other states)10 age into annual emissions testing, the BAR datasets will have a more comprehensive sample of privately owned and operated vehicles and may be evaluated at that time for its suitability for research and policy making. [EPA-HQ-OAR-2022-0829-0646, pp. 13-14]

> 10 For example, in the state of Colorado, Colorado's Department of Public Health and the Environment will record and make available similar data when 2019 MY vehicles enter emissions inspections after they are 8 years old. This data will be available for researchers and policy makers.

We assert that the methods used to derive the proposed fleet utility factors (FUFs) from transportation datasets are not statistically defensible, and that the process of "averaging" FUF curves is inappropriate and does not improve predictive ability. [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

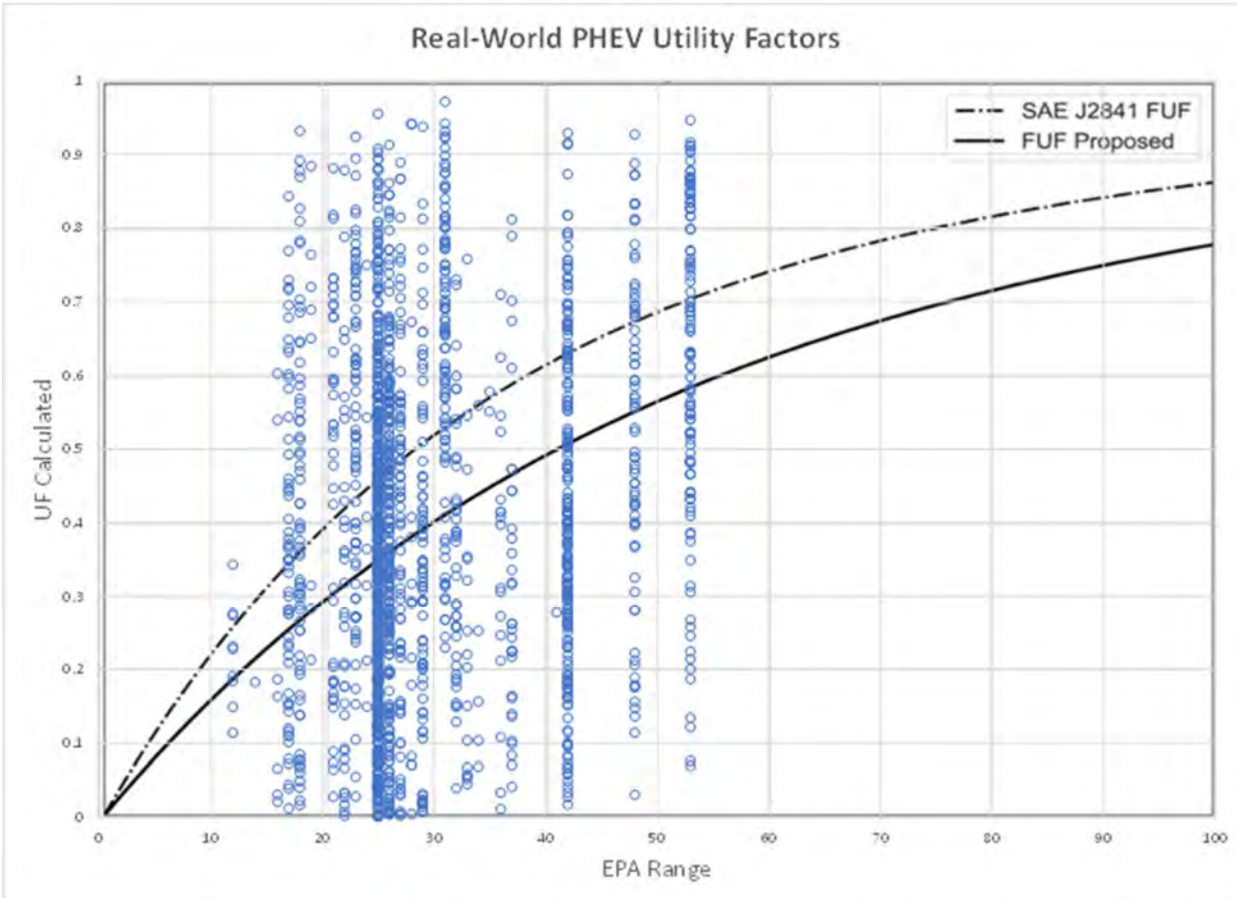
Apart from the inconsistencies described in the section above, policy makers and researchers must take caution in deriving findings from transportation data. [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

Figure 1 illustrates the set of individual vehicle-level UFs that are derived from an updated data pull from BAR. Of course, the data are extremely scattered and do not illustrate the validity of the UF curves for either the SAE J2841 FUF or the proposed FUF. When EPA or ICCT perform least-squares regression to derive a particular UF curve, they must calculate the confidence interval around the parameter estimates. When we perform that regression with vehicle models' pooled averages, we find that this dataset provides no evidence that the EPA FUF model is more representative than the SAEJ2841 model. [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

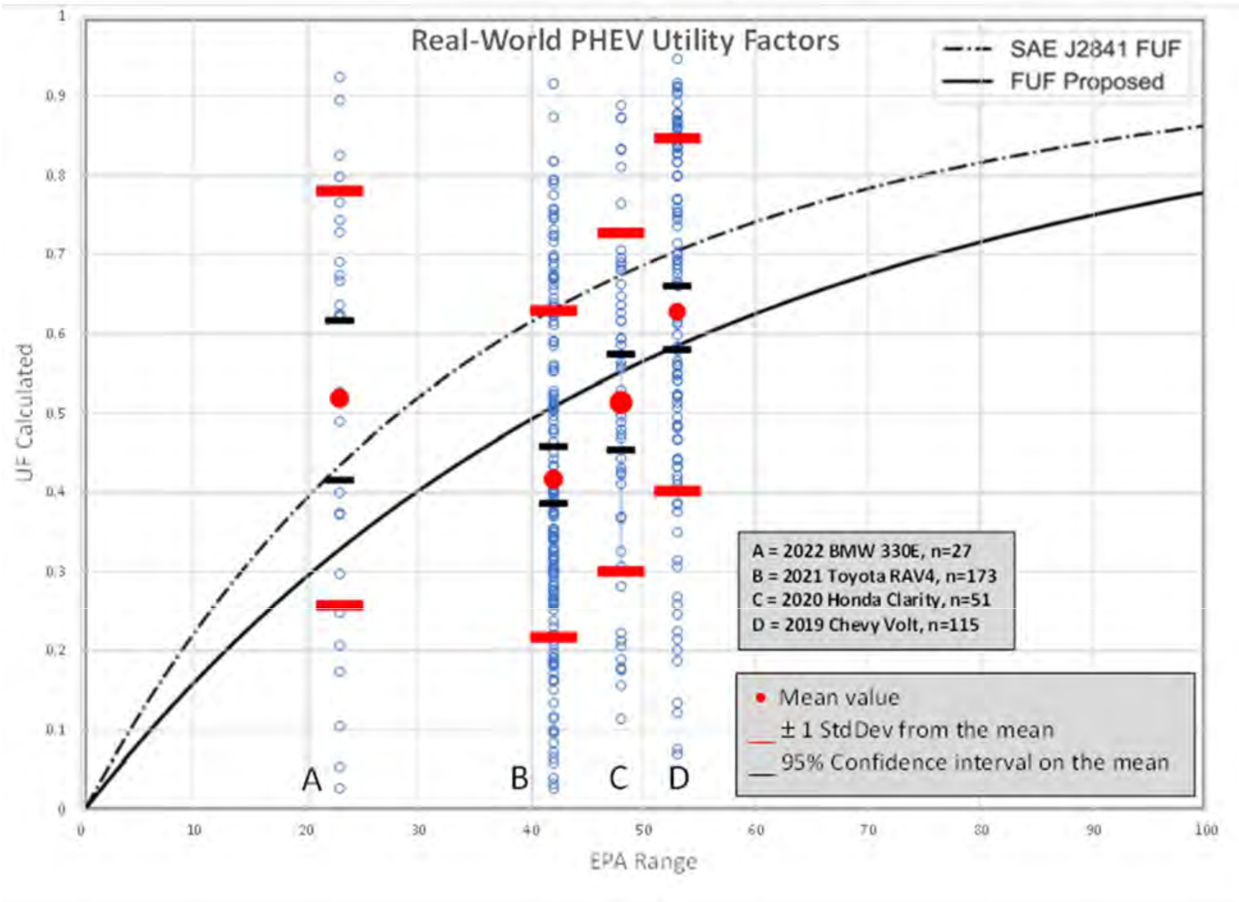
To illustrate this point more visually, Figure 2 provides additional statistical detail for some selected vehicle models. Figure 2 illustrates the wide dispersion of measured individual UFs and shows that the 95% confidence intervals on the mean value may or may not encompass any particular pre- derived response curve. [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

Finally, EPA's method of "averaging" of Fuelly/BAR/J2841 UF curves does not have any statistical/theoretical/practical power in achieving UF prediction and is inappropriate given the varied and disperse nature of these data. [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

A more data-driven approach that incorporates a number of driver and vehicle operating factors is needed to better characterize the real-world utility factors that are likely to arise over time. As the BAR database expands and becomes cleaner and more regularized, it can form the basis of a statistically relevant and more acceptable data-driven model. [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]



[See original for graph titled "Figure 1. Calculated real-world PHEV utility factors for all vehicle models in the data set compared to the SAE J2841 FUF and the proposed FUF. Values are displayed as a function of EPA range irrespective of vehicle model and model year (e.g., EPA CD range of 31 encompasses two versions of the 2022 Hyundai Santa Fe and three model years of the BMW X5 XDrive45E). Note the wide variation in calculated utility factors compared to the two FUF curves for all EPA ranges."] [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]



[See original for graph titled "Figure 2. Statistics of calculated real-world utility factors for four selected PHEV models compared to SAE J2841 FUF and proposed FUF. Model variations (e.g., Volt and Volt Premier) do not exhibit significantly different utility factors, on average, and are combined in this figure. Model year is constant for each model to minimize potential year-to-year differences."] [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

There are better data sets that support EPA using SAE J2741 for now. Regarding PHEVs not plugging in, there are many factors that impact plugging in and it is a complicated subject that needs more research.11 This August 2020 paper from UC Davis is one of the best analyses and uses data loggers from actual drivers and shows that PHEVs with longer AERs do not have a substantial issue with not plugging in (e.g., about 3-5%).12 See Table 1 below. Also, there are many factors that could see this decrease in the future. We make the case above that better data in the future will allow a new rulemaking on the FUF issue. [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

11 Four studies 1) Bucher, J.D. and Bradley, T.H. (2018). Modeling operating modes, energy consumptions, and infrastructure requirements of fuel cell plug-in hybrid electric vehicles using longitudinal geographical transportation data. International Journal of Hydrogen Energy 43, 12420-12427. 2) Raghavan, S. S. and Tal, G. (2022). Plug-in hybrid electric vehicle observed utility factor: Why the observed electrification performance differs from expectations. International Journal of Sustainable Transportation 16, 105-136. 3) Mandev, A., Plötz, P., Sprei, F., and Tal, G. (2022). Empirical charging behavior of plug-in hybrid electric vehicles. Applied Energy 321, 119293, https://doi.org/10.1016/j.apenergy.2022.119293. 4) [1] Smart, J., Bradley, T., and Salisbury, S. (2014).

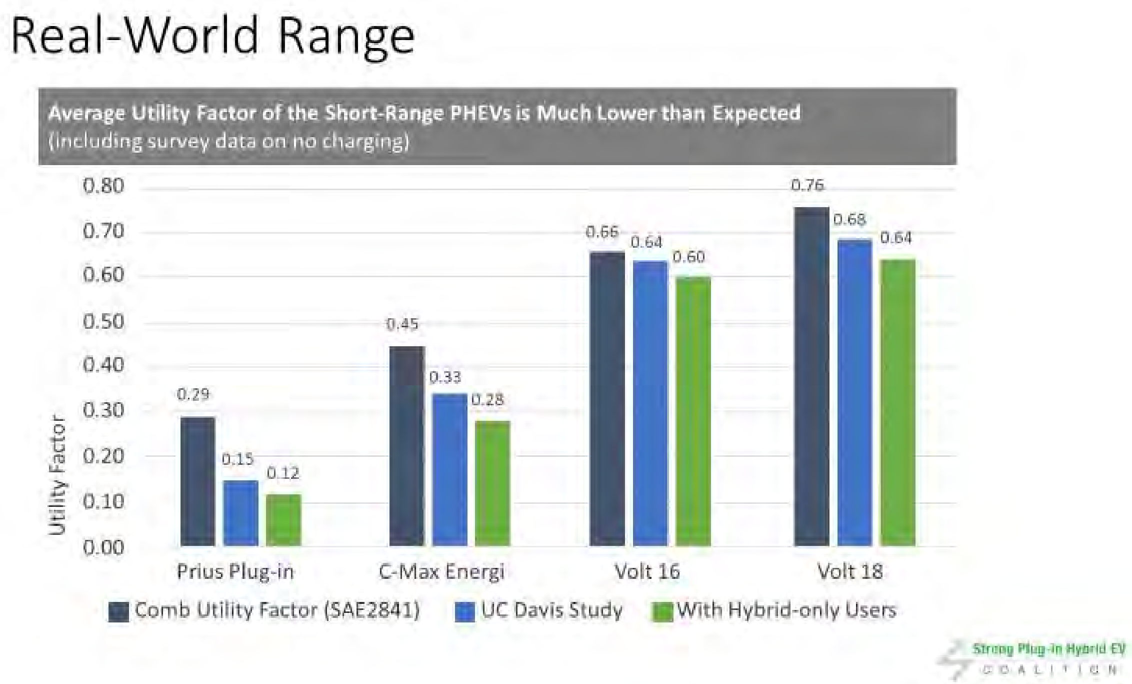
Actual versus estimated utility factor of a large set of privately owned Chevrolet Volts. SAE International Journal of Alternative Powertrains 3, 30-35.

12 https://iopscience.iop.org/article/10.1088/1748-9326/ab8ca5/meta

Table 1.

For short range PHEVs	AER EPA label	Percent not plugging in
Toyota Prius Gen 1	11 miles	17.6%
Ford Cmax and Ford Fusion	20 miles	12%
Audi e-tron	17 miles	9%
Toyota Prius Prime Gen 2	25 miles	9%
For longer-range PHEVs	AER EPA label	Percent not plugging in
Chrysler Pacifica	33 miles	4%
Chevy Volt Gen 2-	53 miles	5%
Chevy Volt Gen 1-	38 miles	3%
Honda Clarity	48 miles	4%
For very long-range PHEVs	AER EPA label	Percent not plugging in
BMW i3 rex	128 miles	no data
Karma Revero	60 miles	no data

[See original for graph on the Average Utility Factor of the Short-Range PHEVs] [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]



[See original for graphic on PHEV Mils Driven in Charge-Sustaining Mode (Using Gasoline) or Charge-Depleting Mode (Using Battery)] [EPA-HQ-OAR-2022-0829-0646, pp. 14-18]

While we understand the desire by EPA to simplify the regulation and reduce the use of bonus multiplier credits, we believe a small bonus credit in the final regulation for a few years is justified and needed to unlock this technology because of the large emission reduction benefits and other benefits enabled by bidirectional charging. [EPA-HQ-OAR-2022-0829-0646, p. 9]

EPA should provide small bonus credits (multipliers) in 2027 to 2030 for several advanced technologies including PHEVs with a long all-electric range that are not being produced today. While we understand the need to simplify the regulation and dramatically reduce the use of multipliers, we do support very limited continuation of multiplier to advance technologies that do not exist today or are in very limited numbers such as bidirectional charging vehicles (recommendation 4) and PHEVs with an all-electric range of 60 or more miles. These technologies need extra lead time to develop. Having multiple technologies helps in reaching many hard-to-reach customer segments, and PHEVs with over 60 mile all-electric range by legacy automakers are not offered today and have rarely been produced and sold. Also see our recommendation 8 below. [EPA-HQ-OAR-2022-0829-0646, p. 10]

Organization: Tesla, Inc.

Tesla supports the proposed Alternative 1 with added stringency so that the final performance standards achieves a fleet BEV penetration rate greater than 69% in MY 2032.2 Alternative 1 is estimated to provide greater CO2 emissions reduction of -51% from no action by 2050 compared to -46% under EPA’s proposal, and the additional stringency will result in even greater emission reductions.3 Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

- Eliminate off-cycle crediting for all types of vehicles; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Revisit the plug-in hybrid electric vehicle (PHEV) utility factor to accurately reflect real world emissions; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Amend the proposal to create parity in promoting motor vehicle air conditioning (MVAC) efficiency adoption; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Maintain the existing zero emissions upstream approach for BEVs; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Eliminate credit multipliers for all vehicles; and [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Ensure BEVs continue to be accounted for, and participate in, the NMOG + NOx reduction standard. [EPA-HQ-OAR-2022-0829-0792, p. 2]

While the agency proposes limiting the remaining off-cycle credit generation based on PHEVs fleet utility factor, as discussed above, this still would inequitably favor a legacy technology at the expense of full vehicle electrification.150 Nevertheless, EPA is appropriately revisiting the PHEV Fleet Utility Factor because PHEV compliance to date has significantly underestimated CO_2 emissions by overestimating their use of electricity.151 Reducing the PHEV utility factor is appropriate and overdue. [EPA-HQ-OAR-2022-0829-0792, pp. 24-25]

150 88 Fed. Reg. at 29251.

151 Id., at 29252.

PHEVs have consistently been overrewarded compared to their actual emissions reduction performance.152 In a 2020 study, the International Council on Clean Transportation (ICCT) found that real-world PHEV fuel consumption and emissions were about 2-4 times higher than certified levels.153 According to ICCT, one of the main reasons for this is that, “For private cars, the average utility factor (UF)—an expression for the portion of kilometers driven on electric motor versus kilometers driven on combustion engine—is 69% for New European Drive Cycle (NEDC) type approval but only around 37% for real-world driving. For company cars, an average UF of 63% for NEDC and approximately 20% for real-world driving was found.”154 Essentially, PHEV drivers utilize ICE engines for travel far more than electric drive when operated in real world conditions. Similarly, Transport and Environment found that emissions from three of the most popular PHEVs in the EU were 28-89% higher than certified levels even under ideal test conditions (e.g., fully charged battery).155 Other studies suggest hybrids offer little benefit compared to ICE vehicles.156 The California Air Resources Board (CARB) has also recognized these concerns by calling out excessive PHEV cold start emissions.157 In sum, Tesla supports the agency revisiting the PHEV Fleet Utility Factor. [EPA-HQ-OAR-2022-0829-0792, pp. 24-25]

152 See e.g., Guardian, Major plug-in hybrid cars pollute more than official measures suggest (Feb. 7, 2023) available at h ttps://www.theguardian.com/environment/2023/feb/08/major-plug-in-hybrid-cars-pollute-more-than-official-measures-suggest.

153 ICCT, Real-World Usage of Plug-In Hybrid Electric Vehicles: Fuel Consumption, Electric Driving, and CO2 Emissions (Sept. 27, 2020) available at https://theicct.org/publication/real-world-usage-of-plug-in-hybrid-electric-vehicles-fuel- c onsumption-electric-driving-and-co2-emissions/.

154 Id., at 1.

155 Transportation & Environment, Fixing the PHEV loophole (Dec. 2021) available at h ttps://www.transportenvironment.org/wp-content/uploads/2022/02/2022_TE_position_PHEV_UF_timeline.pdf;See also, CleanTechnica, Plugin Hybrid Cars Pollute 200–400% More Than Official Ratings (Feb. 13, 2022) available at https://cleantechnica.com/2022/02/11/phevs-pollute-2-4x-more-than-official-ratings-lets-fix-the-eu-loophole/

156 See e.g., Impact Living, Study on the consumption of plug-in hybrid vehicles in Valais topography (Jan. 11, 2022) available at https://impact-living.ch/wp-content/uploads/2022/01/Consommation-vehicules-hybrides-rapport-publie-IMPACT- L IVING-canton-Valais-11-01-22.pdf

157 CARB, Advanced Clean Cars (ACC) II Workshop Presentation at 27 (May 6, 2021) available at https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2_workshop_slides_may062021_ac.pdf

Organization: Toyota Motor North America, Inc.

4. The proposed rule discriminates against plug-in hybrid electric vehicles (PHEVs) based on flawed data and analysis from an environmental NGO to arbitrarily lower the “Utility Factor” (UF). EPA’s proposed UF slashes the compliance benefit of PHEVs by between 25% and 45% and discourages OEMs from pursuing this technology. EPA should retain the current Society of Automotive Engineers (SAE) method for assessing the UF. PHEVs should be encouraged by this regulation, not discouraged – they are an extremely efficient use of limited and expensive minerals, provide significant GHG reduction benefits, are more affordable than similar BEVs, and require less reliance on charging infrastructure. [EPA-HQ-OAR-2022-0829-0620, p. 2]

EPA requests any relevant performance or utility data that may help inform their analyses for the Final Rule. We appreciate the opportunity to share data which will help elevate the role PHEVs in the Final Rule to be an important part of a sustainable transition to electrification. We plan to share such PHEV data outside of the comment period, possibly, including confidential information. For now, we request EPA consider the data we have provided that suggests PHEVs should be considered be an important contributor in whatever assumed PEV sales mix. [EPA-HQ-OAR-2022-0829-0620, p. 32]

6.4. PHEV Utility Factor

The proposed revisions to the SAE vehicle Fleet Utility Factor (FUF) curve would significantly diminish PHEV compliance benefits and challenge the technology’s market viability at a time when consumers and the proposed standards need more plug-in electric vehicle (PEV) options available. Toyota believes the FUF should remain unchanged as the proposal offers insufficient evidence to support such a consequential test procedure change for which there has been minimal industry engagement. [EPA-HQ-OAR-2022-0829-0620, p. 33]

6.4.1. Supporting Studies Lack Peer Review

EPA contends available real-world data suggests the current PHEV compliance methodology which incorporates the SAE J2841 FUF curve significantly underestimates PHEV CO2 emissions. The proposal references the authors of several studies that have questioned the efficacy of the SAE UF for PHEVs in Europe. These studies are not relevant to PHEV operation in the U.S. It is well documented that the real-world data in Europe is skewed by less capable PHEVs that were provided by companies to employees with free gasoline as a perk, but not free electricity. Further, tax policy in Europe incentivizes PHEV purchases but charging opportunities are often limited for multifamily dwellings which are common. Not surprisingly, PHEVs in the Europe-focused studies were primarily driven as conventional hybrids on gasoline. Finally, the potential for discrepancies in label versus real-world all-electric PHEV range is greater in Europe where the values resulting from the labeling procedure are significantly more optimistic than those in the U.S. [EPA-HQ-OAR-2022-0829-0620, pp. 33-34]

As seen in Table 4, several studies or articles are referenced in support of the proposed revision to the SAE FUF, only one of which has been peer reviewed by a neutral third-party, i.e. not chosen by the authoring organization. The proposal excludes several relevant peer-reviewed publications, including papers by Toyota22 and UC Davis23 that provide counter-balancing arguments to the claims that the SAE UF is no longer appropriate. Toyota's paper was peer-reviewed using a double- blind process managed by the editors of the journal Environmental Research Letters. This paper directly rebuts the Fraunhofer/International Council on Clean Transportation (ICCT) paper and was published in the same journal as that Fraunhofer/ICCT paper, and after the Fraunhofer/ICCT appeared. [EPA-HQ-OAR-2022-0829-0620, pp. 33-34]

22 Hamza, K., Laberteaux, K. and Chu, K.C. "On inferred real-world fuel consumption of past decade plug-in hybrid electric vehicles in the US," Environ. Res. Lett. 17 (2022) 104053.

23 Raghavan, S. and Tal, G. "Plug-in hybrid electric vehicle observed utility factor: why the observed electrification performance differ from expectations." Int. J. Sustain. Transp. (2020) 16: 105-136.

[See original attachment for Table 4 Supporting References for Revision to J2841 FUF Curve

Reference Number in EPA NPRM | Primary Authorizing Organization | Type of Article | Geographic Area of Focus | Publication Year | Peer Reviewed?

472 | T&E | Report | Europe/World | 2020 | No

473 | ICCT | White Paper | World | 2020 | No

474 | ICCT | White Paper | Europe | 2022 | No

475 | Fraunhofer | Journal Paper | World | 2021 | Yes

481 | Fraunhofer | Report | Europe | 2021 | No

482 | T&E | Report | Europe | 2022 | No

483 | ICCT | White Paper | US | 2022 | No]

[EPA-HQ-OAR-2022-0829-0620, pp. 33-34]

Instead, the proposed FUF change relies on the analyses of two error-filled datasets to depict real- world PHEV operation in the U.S. ICCT first presented the Fuelly and California BAR datasets in a December 2022 whitepaper.24 Both the data and the analyses lack the scientific rigor required to support revising the SAE FUF curve. [EPA-HQ-OAR-2022-0829-0620, pp. 33-34]

24 “Real world usage of plug-in hybrid vehicles in the United States.” Aaron Isenstadt, Zifei Yang, Stephanie Searle, John German, ICCT Report, December 2022.

6.4.2. Fuelly Web Application Dataset

The Fuelly website application is designed for gasoline vehicle users to input miles driven, refuel amount, and fuel price to calculate fuel economy and the operating costs incurred.25 The input parameters do not allow charge-depleting (CD) and charge-sustaining (CS) driving miles to be calculated. The web application lacks separate inputs for electricity and gasoline consumption. Instead, there is a single input field labeled “Fuel” used to calculate the cost of fuel consumption which is the primary purpose of the web application. [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

25 Fuelly is also available as a mobile phone application.

Inspecting the data in the Fuelly application has confirmed the lack of a dedicated interface for electricity consumption leads to data input errors. For example, samples of certain Tesla battery electric vehicles have values labeled as “miles per gallon” (MPG) entered in the “Fuel” input field instead of the appropriate “miles per kilowatt-hour” (kWh) units. This results in extremely low mile-per-gallon numbers being reported, significantly lower than expected for comparable- class gasoline vehicles. We believe that when owners attempt to track their electricity cost with the Fuelly interface, the application’s back-end code treated the entered kilowatt-hour values as gasoline miles per gallon values, as suggested by Figure 11. This error significantly increases the inferred fleet-wide fuel usage and decreases the utility factor for PHEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

[See original for Graphic, Figure 11 Selected Fuelly Data Entries for Tesla Model S] [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

At the opposite end of the error spectrum, refueling events for PHEVs with an accurately high charging frequency and utility factor have been excluded as outliers by the Fuelly application solely because of their superior fuel economy. For example, it is not uncommon for a regularly charged Chevrolet Volt to attain 200+ MPG which can be filtered by from the distribution of re-fuel events because the value lies beyond Fuelly’s 3-sigma screening limit that is applied to fleet average MPG (see Figure 12 below). These omissions further mischaracterize PHEV real-world fleet performance. [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

[See original for graphic, Figure 12 Fuelly Results for 2019 Chevrolet Volt] [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

The left side of Figure 13 compares for selected PHEVs the UFs that ICCT inferred from the Fuelly data to both the SAE and EPA proposed UF curves. Though tedious, it is possible to correct or “clean” the Fuelly data for every refuel event of the selected PHEVs. The right side of Figure 13 shows that Toyota’s cleaning of those selected data points results in the corrected Fuelly data curve being much closer to the SAE curve.26 It is also important to note that, using the methodology ICCT used, and Toyota repeated (after appropriately cleaning the data), if the charge sustaining (CS) fuel-economy (in MPG) is lower than the EPA label CS fuel-economy (in

MPG), then the calculated values, shown below, only represent lower bounds of UF on the on-road.27 [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

26 No footnote text provided.

27 See Appendix B for a description of the data cleaning process.

[See original for graphs, Figure 13 Impact of Correcting Erroneous Data on Fleet Utility Factor (FUF)] [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

Prior to the proposal being issued, Toyota met with EPA to raise concerns about the efficacy of ICCT attempt to infer a real-world PHEV UF from the Fuelly web application. We reviewed a slide deck that deconstructed ICCT's methodology and identified examples of uncorrected data entry errors that directly impact the conclusions reached in ICCT's whitepaper.28 Our efforts to replicate the Fuelly-based calculations described by ICCT in the 2022 Whitepaper and this proposal strongly suggest such cleaning of the data errors still has not happened. [EPA-HQ-OAR-2022-0829-0620, pp. 34-37]

28 The slide deck from the March 13, 2023 meeting is included as Appendix C.

6.4.3 BAR OBD Dataset

The OBD data obtained from the California Bureau of Automotive Repair (BAR) program does provide the vehicle parameters necessary to calculate an in-situ Utility Factor such as charge- depleting distance, charge-sustaining distance, and total distance traveled. However, as the proposal notes, there are limitations with the available data which Toyota believes make it unfit for depicting normal PHEV usage patterns. The BAR Smog Check program, which periodically collects the abovementioned parameters, is required in California for vehicles:

- 8-years or older,

- 4 model-years or older that change ownership, or

- Registered in California after moving from another state. [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

The PHEV data tracking requirement in the BAR program started with 2019 model year but did not fully phase in until 2021 model year. The most recent vehicles in the cited BAR dataset used to support the proposal are from the 2022 model year, so none of the PHEVs in the sample were obligated to participate due to the age criteria referenced above. Considering a California Smog Test requires some effort and money from the vehicle owner, it is reasonable to conclude that few vehicle owners are going to pursue a test if it is not required. Therefore, the BAR OBD data evaluated for this proposal is dominated by recently registered 2019-2022 model year PHEVs that underwent the mandatory smog check, because they were recently registered in CA from another state. It is reasonable to assume that many of those moves to California involved a long-distance trip, and possibly relocation arrangements that at least temporarily limited access to charging. The recorded OBD data for vehicles that move between states is likely to include hundreds or thousands of recent miles accumulated primarily in CS mode, even if the owner regularly charges before and after the relocation. These unique circumstances suggest that cited BAR data will significantly underestimate typical, real-world FUF for PHEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

EPA's attempts to manage the rampant errors in the BAR dataset renders it statistically insignificant for an analysis of normal PHEV usage. The proposal explains that despite relaxing the data quality criteria to accept up to 20 percent mileage error29 and vehicles with as low as 1,865 lifetime miles, only 2,060 out of more than 8,000 vehicles were retained from the BAR dataset. As a result, many of the PHEV variants studied by EPA have a sample size of 30 vehicles or less as seen in the legend on the right in Figure 14 below. The cleaned BAR dataset Excel file shared by EPA in the docket also confirms the inadequate sample size.30 Because EPA accepted very low-mileage PHEVs for their supporting analysis, even a few hundred miles without charging can bias the results to a lower Utility Factor. [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

29 The mileage error is in the discrepancy between odometer reading and vehicle lifetime miles reported from the OBD system.

30 Docket Number EPA-HQ-OAR-2022-0829-0408.

As mentioned previously, most PHEVs in the cited BAR dataset underwent the smog check in 2020 through 2022 calendar years. The data collection through the 2020 calendar year includes the period when transportation was significantly impacted by the COVID-19 pandemic. Impacts included unusual fluctuations in gasoline prices including a 10-year low in 2020 making for both unusual driving patterns and less motivation to charge. We expect real-world FUF trends will increase post-pandemic. [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

During the March 2023 meeting with EPA, Toyota raised general concerns that the collection limitations and the necessary error filtering of the BAR dataset make it statistically insignificant and unrepresentative of typical PHEV usage patterns. We were unable to conduct a quantitative analysis of the data until it was placed in the docket after the proposal was issued. After evaluating the BAR dataset, our concerns are now bolstered by findings that long distance moving trips and the anomaly of COVID impacts bias the observed driving patterns and charging behaviors making the BAR data unfit for assessing the appropriateness of the SAE J2841 FUF curves. According to the proposal, EPA analyzed a filtered subset of the BAR OBD data results to address the data quality challenges and developed the "EPA BAR Linear Regression" curve listed in Figure 14 which also contains the two ICCT UF curves labeled as "ICCT-BAR" and "ICCT-FUELLY/EPA Proposal". EPA points out their linear regression fit of the BAR data subset lies on top of the "ICCT-BAR" curve fit from the full OBD dataset, implying good agreement between the two separate analyses of the BAR data. [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

Figure 14 PHEV Utility Factor Curves Considered in the Proposal.31 [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

31 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, DRIA, April 2023, Fig. 3-29, pg. 3-79.

[See original for graph, Figure 14 PHEV Utility Factor Curves Considered in the Proposal] [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

Just how EPA developed the linear regression fit from the BAR OBD data is unclear. Given the scatter in the data, an exponential regression seems more appropriate if the aim is to infer a Utility Factor curve. The linear regression happens to match the ICCT analysis but provides no scientifically significant information unless EPA intends to propose linear UF curves. [EPA-HQ-OAR-2022-0829-0620, pp. 37-40]

6.4.4 Proposed UF Based on EPA's Analysis

The proposed FUF curve that results from EPA's analysis is calculated as the average of the SAE J2841 FUF curve and the ICCT-BAR curve which happens to match the curve fit of the problematic Fuelly data. The proposed curve shares the same weighting coefficients as the SAE curve under scrutiny. As seen in Table 5, the only difference between the SAE curve and the proposed curve is the Normalized Distance (ND) increasing from 399.9 miles to 583 miles. All other terms in the proposed revised equation to the right of Table are the same. [EPA-HQ-OAR-2022-0829-0620, pp. 40-42]

[See original for table and equation, Table 5 Comparison of Proposed and Existing SAE FUF Terms] [EPA-HQ-OAR-2022-0829-0620, pp. 40-42]

The proposed ND adjustment amounts to discounting the advertised electric range of every PHEV by about 32 percent for compliance calculations because increasing the normalized distance has the same effect as lowering the CD range (see Figure 15). [EPA-HQ-OAR-2022-0829-0620, pp. 40-42]

Figure 15 Revised Normalized Distance Derates All-Electric Range for Compliance
[See original for graph, Figure 15 Revised Normalized Distance Derates All-Electric Range for Compliance] [EPA-HQ-OAR-2022-0829-0620, pp. 40-42]

The Draft Regulatory Impact Analysis explains that EPA "used the latest NHTS data (2017) and executed the utility factor code that is in SAE J2841, Appendix C, and found that the latest NHTS data did not significantly change the utility factor curves."32 We are therefore confused over the basis for revising the normalized distance if overall driving distances have not changed. EPA's analysis suggests the normalized distance should remain unchanged. Toyota opposes the normalized distance being changed based on the existing data. [EPA-HQ-OAR-2022-0829-0620, pp. 40-42]

32 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, DRIA, April 2023, Footnote 35, pg. 3-74.

6.4.5 EPA's Analysis and Conclusions Misaligned with Available Data

The previously mentioned Toyota and UC Davis work conclude that the real-world performance of previous-decade PHEVs in the US approximate the SAE UF curves reasonably well as seen in Figure 16. This is especially the case with more capable, longer-range PHEVs, a trend the problematic Fuelly and BAR datasets also support. However, EPA's linear curve fit that anchors the proposed UF curve revision is weighted toward vehicles with a range below 30 miles (see legend to right of Figure 14) whereas modern PHEVs with higher range and motor power outperform the vehicles used for EPA's analysis. [EPA-HQ-OAR-2022-0829-0620, p. 42]

[See original for graphs, Figure 16 Estimated Real World Utility Factor for U.S. Datasets Versus SAE J28] [EPA-HQ-OAR-2022-0829-0620, p. 42]

6.4.6 Treat Potential Discrepancies Between Real-World and Laboratory Evenly [EPA-HQ-OAR-2022-0829-0620, pp. 42-44]

Concerns over differences between real-world and laboratory performance, particularly those due to driving behaviors, have traditionally been resolved through post-compliance data adjustments aimed at consumer awareness and occasionally by expanding test cycle requirements. Not by revising the calculations used to determine compliance with the standards. The compliance benefit of internal combustion powertrains has never been penalized when studies have found on-road driving is more aggressive or fuel consuming than the test cycles indicate. Instead, lab results for CO2 emissions and fuel economy are adjusted on the fuel economy label to better reflect real- world performance, and consumers are educated on how their mileage may vary based on their driving conditions. [EPA-HQ-OAR-2022-0829-0620, pp. 42-44]

PHEVs should be treated no differently than BEVs. Both technologies are still evolving, maturing and need support towards mainstream market adoption. The proposal appropriately does not scrutinize the advertised range, efficiency, and emissions performance of BEVs under real-world conditions. A BEV not attaining its advertised range can result in more ICE miles driven. One recent vehicle usage study concluded the average BEV is driven 29% less than the average non- BEV.33 Figure 17 comes from another academic study that found that battery electric vehicles (BEVs) are driven on average 2,700 fewer miles annually compared to their conventional counterparts.34 [EPA-HQ-OAR-2022-0829-0620, pp. 42-44]

33 https://www.iseecars.com/most-driven-evs-study

34 A. Zhao, E. Costigliolo, J. Helveston, L. Roberson, E. Ottinger, L. Zhao, J. Dunckley, “Coming of Age: Understanding Electric Vehicle (EV) Use Over Time via Used Vehicle Market Data”, Electric Vehicles Symposium, 2023, Sacramento, CA)

Figure 17 Mileage Accumulation by Powertrain Type

[See original for graphs, Figure 17 Mileage Accumulation by Powertrain Type] [EPA-HQ-OAR-2022-0829-0620, pp. 42-44]

The proposal heavily relies on the BEV technology improvements and charging infrastructure expansion to justify the standards. Those same improvements will also benefit PHEVs, since home charging, consumers awareness, and technology advancements will drive PHEV utilization closer to that of pure BEVs as consumers place greater emphasis on achieving advertised range and have greater desire and means to achieve it. [EPA-HQ-OAR-2022-0829-0620, pp. 42-44]

Existing regulation will also help spread the deployment of more capable PHEV designs that perform closer to their advertised all-electric range. The California ACC2 provisions will drive more capable architectures by requiring PHEVs to have a minimum all-electric range of 40 miles over the aggressive US06 test cycle that eventually increases to 50 miles, and a minimum of 70 mile range over the combined city/highway test cycle. Further, EPA’s proposed PHEV high-power cold-start requirement will necessitate more all-electric capability. [EPA-HQ-OAR-2022-0829-0620, pp. 42-44]

6.4.7 Suggested Approach Moving Forward

Toyota is interested in ensuring PHEVs achieve their assumed emissions benefits. However, a proper science-based data collection and assessment of PHEV performance needs to inform real-world PHEV usage patterns and the resulting emissions. An analysis of a small sample of two error-filled datasets is not an appropriate basis from which to draw conclusions about PHEV all-electric range during real-world operation. An unprecedented revision of the Utility Factor curve based on the data in the proposal would be arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0620, pp. 44-45]

We recommend EPA request SAE establish a consortium of auto companies, DOE, DOT, and other stakeholders to evaluate PHEV usage trends by architecture and performance capability. A first order of business should be determining a consensus method for measuring real-world EV range. The output of this effort should be a report that EPA would use to consider adjustments to the UF curve, alternative metrics such as PHEV design criteria, and/or improved information for consumer purchase decisions. [EPA-HQ-OAR-2022-0829-0620, pp. 44-45]

If proven necessary, PHEV electric range on the consumer-facing label could be adjusted. In such a scenario, increased knowledge about all-electric range could stoke competition in a growing market and motivate continued investment to refine and improve PHEV performance. Penalizing PHEV compliance with the proposed revision to the Utility Factor curve would only stifle investment and hamper deployment of new PHEVs leaving consumers less choice to reduce CO2 emissions at a suitable price. [EPA-HQ-OAR-2022-0829-0620, pp. 44-45]

Appendix B – Procedure for (Partial) Cleaning of Fuelly Data for PHEVs

1 Overview of Errors in Using Fuelly Data

When examining Fuelly web site for some make-model (example in Figure 1 shows Chevrolet Volt), it shows multiple data cards, one for each model-year. Each data card shows some notable pieces of information including number of vehicles, total miles tracked and average MPG. [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

Figure 1 Screenshot From: https://www.fuelly.com/car/chevrolet/volt

[See original for graphic on Fuelly website for Chevrolet Volt] [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

One might be tempted to compare the average MPG to the EPA label for combined cycle MPG in charge sustaining (CS) mode to infer fleet utility factor (FUF). This is how it was done in the 2022 ICCT Whitepaper (which the EPA NPRM relied heavily on), and this is an incorrect approach that includes several errors stemming from limitations of Fuelly data, summarized as follows: [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

1.The average MPG for make/model/model-year reported on data cards (such as in Figure 1) excludes what Fuelly web site's back-end code considers to be "Outlier refueling" events. Spot-checking Fuelly data suggests that the criteria for being considered an outlier is the "standard" statistical criterion of being outside of 3-sigma (three standard deviations) bounds from the average value. Unfortunately, in case of PHEVs, the variation in "MPG numbers" can be very large, with some PHEVs that are charged regularly capable of attaining more than 200 MPG (as a single vehicle average). Thus, with a fleet that has an average of 100 MPG and standard deviation of 50 MPG is often, a refueling event at near- zero-MPG is still "within 3-sigma", while a refueling event at 300 MPG is "outside of 3- sigma" thus, large amounts of electric-miles can be missing from the make/model/model- year data card shown in Figure 1. [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

2. Since Fuelly data is self-report by users and the website (or phone App) has only one data field for the amount of “Fuel”, one observed recurring error is when a user mistakenly enters an amount of electricity as “fuel]”, which, for a typical electric driving at ~0.33 kWh per mile = 3 miles per kWh, can completely distort the average MPG if/when seen by the back end code of Fuelly as a “3 MPG” refueling event [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

3. Assumption that a PHEV is “exactly attaining” its EPA label for combined cycle CS mode fuel economy, when in fact, most vehicles (PHEVs being no exception) can be somewhat less efficient (within certain limits, 10% to 15% worse MPG than EPA label often considered “normal”) leads to under-estimation of the faction of miles driven on grid electricity. [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

In section 2 of this appendix, we show a procedure to correct error #1 and error #2, but Fuelly data, which does not show the split between charge sustaining and charge depletion, is insufficient for making corrections to error #3. As such, after conducting the data cleaning, the estimated utility factors are still only lower bounds for the true real-world utility factors. [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

2 Correction of Error #1 and Error #2

Clicking on an individual data card for make/model/model-year (such as the ones shown in Figure 1) opens a set of data card summaries for each individual vehicle sample, as shown in Figure 2. [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

[See original for graphic on Fuelly] [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

Next, one needs to click on the data card of each individual vehicle sample in order to open a detailed page for the individual vehicle sample, as shown in Figure 3 and Figure 4. Details included in these pages show the total miles tracked, as well as the average MPG of the vehicle (throughout its total miles tracked). These numbers should be noted separately for each vehicle (thereby bypassing Error #1). The detailed page also includes the log book of miles travelled and refueling events, which one needs to carefully inspect for entries that may have incorrectly reported electricity usage as gasoline (example in Figure 4), and if discovered, the affected vehicle sample is excluded. [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

Ones then needs to repeat the procedure for every individual vehicle sample. Next, would be to infer (lower bound of) each vehicle’s fraction of electric miles, and then lastly, one can estimate (lower bound of) overall fleet utility factor. [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

Figure 3 Screenshots From:https://www.fuelly.com/car/chevrolet/volt/2019/bbhagat/1155376

[See original for screenshot from Fuelly] [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

Figure 4 Screenshots From:https://www.fuelly.com/car/chevrolet/volt/2019/twoply/880546

[See original for screenshot from Fuelly] [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

[See original for Appendix C – Materials from EPA-Toyota Meeting on SAE Utility Factor for PHEVs] [EPA-HQ-OAR-2022-0829-0620, pp. 67-99]

Organization: Volkswagen Group of America, Inc.

PHEV Utility Factor – Proposed Approach for the PHEV Fleet Utility Factor (Section III.B.8.)

Based on the driving statistics from a 2001 national household travel survey and supplementary datasets as input for the utility factor in SAE J2841, EPA believes that the current fleet utility factory (FUF) underestimates the PHEV CO2 emissions in real world. Beginning MY2027, EPA has proposed a revised light-duty vehicle PHEV Fleet Utility Factor curve to be used in the PHEV CO2 compliance calculation. [EPA-HQ-OAR-2022-0829-0669, pp. 4-5]

In addition to AFAI's detailed comments regarding the lack of statistically based changes to EPA's proposed FUF, Volkswagen also requests no modifications to the current FUF at this time. Data quality to derive a FUF is highly dependent on assumptions that can be easily influenced by multiple variables. In additional to the conditions discussed by AFAI (e.g., charging infrastructure, driving behavior, customer use education, etc.), Volkswagen believes that PHEV ownership is influenced by current Federal and State purchasing incentives and the environmental benefits may be a secondary or tertiary reason for the purchase of a PHEV over the ICE vehicle alternative. The DoE Alternative Fuels Data Center shows 398 incentives for personal vehicle owner for PHEVs. In addition, the FUF should take into account future driving behavior where PHEVs attain a higher range for ZEV-qualifying PHEVs. [EPA-HQ-OAR-2022-0829-0669, pp. 4-5]

Volkswagen acknowledges there are ongoing discussions in the U.S. and Europe to modify the FUF. Both regions are comparing the current FUF with newly collected real world data. Europe is updating its FUF on 01/01/2028, where the methodology defined in the legislation and the factor will be dependent on data collected over next several years. Volkswagen suggests that this timing is appropriate and recommends that the current FUF remain in place until the new data is available. [EPA-HQ-OAR-2022-0829-0669, pp. 4-5]

Organization: Zero Emission Transportation Association (ZETA)

- ZETA supports the proposed changes to the PHEV fleet utility factor (FUF) to more accurately apportion the benefit of PHEVs' electric operation. Ensuring accurate compliance calculations is critical to preserving programmatic integrity and reducing emissions. As EPA notes, SAE J2841 was developed more than ten years ago during the early introduction of light-duty PHEVs and at the time was a reasonable approach. However, with the benefit of more real world data and information about actual vehicle operating characteristics, we support EPA revisiting the FUF curve at this time. [EPA-HQ-OAR-2022-0829-0638, p. 29]

EPA Summary and Response

Use of European publications and fuelly.com dataset

Summary:

Alliance for Automotive Innovation (AAI), Kia, MEMA (The Vehicle Suppliers Associated), Strong PHEV Coalition, and Toyota made the following comments:

AAI: In Europe, some corporations purchased only PHEVs for their fleet to take advantage of government incentives/subsidies. The users of these company cars could typically fuel the vehicle for free, and unfortunately had no incentive to plug-in their vehicle. The situation in Europe with tax incentives encouraging PHEVs coupled with limited charging infrastructure available in predominantly multifamily dwellings is simply not comparable to the United States.

For its U.S. analysis ICCT, inspired by the European analysis, evaluated two data sources: user- reported data from Fuelly.com, and OBD data from the California Bureau of Automotive Repair (BAR). For the Proposed Rule, EPA has taken the ICCT datasets and performed their own analysis, which is essentially a copy of ICCT's work. The PHEV data analysis should include nationwide usage data and be peer-reviewed before it is used in rulemaking.

The data from fuelly.com is user-reported and subject to data entry errors. There is also a potential for data bias in the self-selected participants.

Kia: EPA's analysis is limited to multiple publications from the International Council on Clean Transportation (ICCT). The EPA's use of the ICCT-BAR curve is inappropriate given the expansion of Level 2 charging occurring as EVs increase across the country. The ICCT publications focus on the limited electric driving share of PHEVs in Europe. ICCT's assumptions are skewed as they assume the same situation in Europe where there were unique PHEV tax incentives, coupled with limited charging infrastructure available in multifamily dwellings. All of which are not good comparisons to the United States.

MEMA: The current data is inappropriate because it is primarily non-domestic, selective and ignores the significant changes already underway in infrastructure and vehicle design that enable greater PHEV utility.

Strong PHEV Coalition: The Fuelly.com dataset is wholly inadequate to perform this function. It is a self-selected, self-reported online gasoline consumption log; Fuelly.com is not a survey, makes no claim to statistical representativeness, and does not have inputs or data to electric operation in any way. Methodologically, the means by which ICCT and EPA calculate UF from Fuelly.com data is to compare real-world fuel consumption to EPA rated CS fuel consumption, which is completely incoherent if one realizes that EPA rated fuel consumption and on-road fuel consumption are not the same thing. EPA researchers know better than any the many sources of variance between real-world fuel consumption and EPA -rated fuel consumption. In the ICCT calculation, the variance between these two fuel consumptions (which is strongly correlated with weather conditions, driving conditions, tire inflation, etc.) has entirely and indefensibly been allocated to a lower UF. In both the data and analysis of Fuelly.com fuel logs, EPA and ICCT are using unrepresentative data and deeply inadequate analysis to make policy.

Toyota: The data cited for lower Ufs lack peer review. The studies of PHEVs in Europe are not applicable to the US. Of the UF studies referenced, only Fraunhoffer/ICCT was peer reviewed by a neutral third-party. The proposed FUF relies on two error-filled datasets: Fuelly and CA BAR.

Response:

EPA did not use any European dataset or the fuelly.com dataset to calculate fleet utility factors. Therefore, the literature using European datasets, fuelly.com dataset or fuel consumption data are not applicable to EPA's revised FUF curve and data analysis. EPA provided references to some of the European studies as support that the Agency should review the current PHEV UF values as some researchers may have documented regional behavior which is not captured in their respective compliance procedures. In no way was EPA suggesting that US domestic PHEV operation and activity was identical to Europe or any other countries.

EPA did not use or depend on ICCT's analysis of the FUF curve. FUF data analysis at EPA was performed independently using the November 2023 CARB OBD PHEV dataset versus 2-cycle combined GHG emission-certified CD ranges while ICCT analyzed the 2022 version of CARB OBD dataset versus label CD ranges. Therefore, the two analyses use different data sets and have different data filtering criteria. As is common in any scientific assessment it is often useful and important to compare and contrast other related technical work. In this case, EPA was merely comparing other studies to its only conclusions.

The CARB BAR dataset used by EPA in its analysis is the best large public data set available at this time. Despite multiple stakeholders providing negative comments on the BAR data set, none of the commentors provided alternative datasets to be considered. Independent analyses by EPA, CARB and ICCT found very similar results of UF fitting curve using the real-world CARB OBD PHEV big dataset.

We carefully reviewed the peer-reviewed publications and the recent ICCT paper using U.S. PHEV dataset. All of the UF values in the literature are calculated using the labeled CD ranges which were multiplied by the "0.7" 5-cycle adjustment factors from 2-cycle combined GHG emission-certified CD ranges. There are significant discrepancies when translating the same UF values on 2-cycle combined GHG emission certified CD ranges, which were about 43 percent higher than the labeled CD ranges. When including OEM's voluntary labeled CD range reductions, the FUF values on 2-cycle combined GHG emission-certified CD ranges are not directly related to the MDIUF (Multi-Day Individual Utility Factor) on the labeled CD ranges. Therefore, the UF values on the labeled CD ranges in the literature cannot be directly compared to the FUF values on 2-cycle combined GHG emission-certified CD ranges.

Comments on other datasets

<u>Summary:</u>

Alliance for Automotive Innovation (AAI), California Air Resources Board (CARB), and Toyota made the following comments:

AAI: The proposal excludes several relevant peer-reviewed publications, including papers by Toyota and UC Davis that provide counter-balancing arguments to the claims that the SAE FUF (Fleet Utility Factor) is no longer appropriate. The lack of consideration of other studies, such as these, suggests that further consideration is required.

CARB: CARB contracted with the University of California, Davis (UC Davis) Institute of Transportation Studies to collect and analyze household-level travel and refueling behavior centered around BEVs, PHEVs, and FCEVs. The study included installing data loggers on individual vehicles, including many different models of PHEVs. UC Davis found that all PHEVs, apart from the Chevrolet Volt, demonstrated lower utility factors than the SAE J2841-based FUF curve. The Chevrolet Volt had a much more capable electric powertrain that could keep its internal combustion engine from turning on before the battery depleted in almost all driving conditions, which made the Volt relatively unique amongst the other PHEVs in the logged data set.

Toyota: The data cited for lower Ufs lack peer review. The Toyota/UC Davis paper was excluded.

EPA requests any relevant performance or utility data that may help inform their analyses for the Final Rule. We appreciate the opportunity to share data which will help elevate the role PHEVs in the Final Rule to be an important part of a sustainable transition to electrification. We plan to share such PHEV data outside of the comment period, possibly, including confidential information. For now, we request EPA consider the data we have provided that suggests PHEVs should be considered be an important contributor in whatever assumed PEV sales mix.

Response:

The BAR data is the best available public data set at this time. Despite multiple stakeholders providing negative comments on the BAR data set, none of the commentors provided any other new datasets for consideration and referred only to third party analyses. The BAR dataset comes directly from production vehicles being operated on public roads by private owners. The data is recorded in production vehicles using algorithms and storage techniques derived by the individual vehicle manufacturers. While the data did not come directly from vehicle manufacturers, the data is recorded in accordance with regulations established by the California Air Resources Board and the vehicle manufacturers are under a legal obligation to ensure the quality of the recorded data.

The filtered CARB OBD PHEV dataset has 42 PHEV models and 89 model variants, and approximately 8,600 individual vehicles that travelled approximately 163.2 million miles. This filtered dataset contains approximately 98 percent of the 43 PHEV models and about 8,800 PHEV vehicles from the unfiltered data in the November 2023 version of CARB OBD PHEV public dataset.

In contrast to the CARB OBD PHEV dataset, the UC Davis paper referenced by commenters used a small selection of volunteer vehicle owners to create the dataset used to develop UF values. The data consists of 3 PHEV models and four model variants of 153 PHEV owners (out of 19,000 recruited owners) in the USA. Likewise, the Toyota paper referenced by commenters combined datasets obtained with multiple methodologies. Some of these datasets included only one model; others were based on fuel consumption, from which all-electric mileage was inferred. As the UF is based on travel distance rather than energy usage, the additional steps required to extract a UF from fuel consumption data make the datasets less robust for this purpose.

As noted by CARB, UC Davis also found that all PHEVs, apart from the discontinued Chevrolet Volt, demonstrated lower utility factors than the SAE J2841-based UF curve.

After carefully considering alternative datasets, EPA believes that the CARB OBD PHEV dataset is the most robust dataset for UF analysis available at this time for use in setting the FUF curve. EPA, having reviewed the data in two consecutive years, also believes that the data is a valid representation of how PHEV's are being operated and an appropriate basis for a revised UF curve. In the event that vehicle manufacturers or other stakeholders come forward in the future with additional PHEV data that could be used to inform future evaluations of the FUF, EPA is committed to working with stakeholders in conducting a future evaluation. If such evaluation were to support a proposed revision to the FUF, EPA could initiate a rulemaking to revise the FUF.

EPA acknowledges receiving a presentation from Toyota evaluating the ICCT methodology for determining UF; however, EPA has not received new data pertaining to the FUF curve for consideration. EPA considered the points raised by Toyota in their evaluation of the ICCT methodology, and provides more detailed responses to individual points in other portions of this Chapter.

BAR dataset issues: out-of-state vehicles, low gasoline prices, back-to-back testing, data collection algorithms and technician-entered odometer readings

Summary:

Alliance for Automotive Innovation (AAI), Toyota, and Strong PHEV Coalition made the following comments:

AAI: The data is predominantly from registered MY 2019-2022 PHEVs arriving from another state collected during the 2020 through 2022 calendar years. Long-distance moves between states can involve significant miles accumulated primarily in charge sustaining mode which skews the recorded OBD data, making it unrepresentative of normal PHEV operation.

Most PHEVs in the cited BAR dataset underwent the smog check during 2020 through 2022 calendar years, which includes the COVID pandemic, which significantly altered transportation trends. This period entailed unusual fluctuations in gasoline prices including a 10-year low in 2020 making for both unusual driving patterns and less motivation to charge. We expect that post-pandemic, real-world FUF trends will increase.

Toyota: The BAR data is made up mostly of vehicles that came into CA from out of state, possibly traveling a long-distance with limited access to charging. Also, after reducing the data set to 2,060 from 8,000 many of the PHEV variants studied by EPA have a sample size of 30 or less. Finally, the time period sampled includes the pandemic, when there were low gas prices. Toyota expects UF trends will increase post-pandemic.

Strong PHEV Coalition: There is evidence of systematic importing of used PHEVs into California, a type of data pollution that is not affecting most of the conventional vehicles. For example, a set of vehicles included in the ICCT dataset are six 2019-2020 Toyota Prius Primes. These six Prius Primes are all tested on a single day, they each have 3000 miles, and five of six of them are present in the ICCT analysis (one has a technician-recorded odometer inconsistency). Whatever the history of these vehicles, the fact that 6 of them are being tested back-to-back on the same day is evidence that these vehicles are not under the operation and ownership of the general public, and that their operational history is not representative of the general public. These clusters of similar vehicles undergoing back-to-back testing are common and easily identifiable in the BAR data used for ICCT and EPA analysis. [EPA-HQ-OAR-2022-0829-0646, p. 13]

Prius Prime 1 tested on 02NOV2020:09:00:00.442000

Prius Prime 2 tested on 02NOV2020:10:34:51.141000

Prius Prime 3 tested on 02NOV2020:11:28:26.939000

Prius Prime 4 tested on 02NOV2020:12:14:16.189000

Prius Prime 5 tested on 02NOV2020:12:25:32.846000

Prius Prime 6 tested on 02NOV2020:13:36:16.952000

There is strong evidence that automakers (OEMs) are not implementing the data collection algorithms consistently. For example, all 2019 Chrysler Pacifica hybrid vehicles, transmitted the data required for these calculations from the HPCM-HybridPtCtrl control module, instead of from the ECM*-EngineControl control module which was used by all other OEMs. In reviewing and operating the ICCT's Data Import Algorithm (BAR Data Import.R, shared by A. Isenstadt 5/13/23), these vehicles are excluded from ICCT's analysis. Given that 2019 is the first year that on- board diagnostic technology allows data collection, and we anticipate better data reporting and processing in future years, but the handling of these types of inconsistencies is not in evidence in the ICCT/EPA data wrangling processes.

There is strong evidence of many significant inconsistencies between the technician and OEM-derived data that are present in the BAR data. For example, of the BMW 530e PHEVs in the ICCT dataset (ICCT_OBD_DATASET_MY2019, requested from BAR in April 2023), 585 (of a total 988) of them failed the odometer reading test (that the technician-entered odometer [in mi] is well-outside the OBD-reported odometer reading [converted to mi]). There is no reason why technicians are so comprehensively misreporting this very simple datum for a vehicle that is one of the most reported vehicles in this dataset (which has ~4000 PHEVs in total).

Response:

In response to comments on out-of-state registration, EPA notes that in the BAR dataset, about 79 percent of PHEV vehicles that traveled approximately 140.4 million miles are from in-state ownership transfers, and around 21 percent of PHEV vehicles that traveled around 23.1 million miles are from out-of-state vehicle registrations. The "BAR Regression Fit" in RIA Chapter 3.4.3.2.1 is more influenced by about a factor of six by in-state ownership transfer PHEV vehicles since the FUF values are calculated by a distance-weighted basis. Additionally, there is no reason to expect one-time long-distance moving miles to make up more than a small portion of the 23.1 million miles from out-of-state vehicle registration vehicles.

The averaged FUF values calculated by the regression fit curves of the in-state ownership transfers and out-of-state registrations are within 2.3 percent and -4.8 percent of the averaged FUF values represented by the "BAR Regression Fit" curve when using a minimum sample size of 2. When using larger sample sizes greater than or equal to 10, the averaged FUF values of in-state ownership transfers and out-of-state PHEV vehicle registrations in the filtered model data are within 1.5 percent. As shown in Figure 3-38 in RIA Chapter 3.4.3.2.1, the difference between averaged FUF values calculated using in-state ownership transfers and averaged FUF values calculated using out-of-state registrations are insignificant. In contrast, the averaged FUF values calculated by the "SAE J2841 FUF" fit curve are about 51.4 percent higher than those represented by the best-case regression fit curve of in-state ownership transfers.

In response to comments about low gasoline prices, EPA notes that about 4.7 percent of PHEV vehicles in the BAR dataset, which had traveled approximately 5.6 million miles, are from the period of low gasoline prices (the pandemic period from March 1, 2020, to March 30, 2021). Around 95.3 percent of PHEV vehicles that traveled around 157.6 million miles are from the normal gasoline price period (mostly pre- and post-pandemic). The distance weighted "BAR Regression Fit" curve in RIA Chapter 3.4.3.2.2 is more significantly affected by about a factor of

28 by the higher total distance travelled when gasoline prices (U.S. EIA 2023) were normal. Furthermore, the averaged FUF values calculated by the regression fit curves of the normal gasoline price period and the low gasoline price period are within 0.1 percent and -8.1 percent of the averaged FUF values represented by the "BAR Regression Fit" curve when using a minimum sample size of 2. When using larger sample sizes greater than or equal to 10, the averaged FUF values of the normal gasoline prices and the low gasoline prices in the filtered model data are within 1.6 percent. The averaged FUF values predicted by the "SAE J2841 FUF" curve are still approximately 54.7-percent higher than those represented by the best-case regression fit curve at normal gasoline prices.

In response to comments about back-to-back testing, EPA notes that the UF represents an average of all PHEV operation. There is no indication that the small number of vehicles referenced by the commenter are operated in a way that is being over-represented in the dataset. The six vehicles mentioned by the Coalition have an average FUF of 0.40, which is in fact somewhat higher than the approximately 0.25 average FUF of the Prius Prime PHEVs in the November 2023 version of CARB OBD PHEV dataset. The "Prius Prime 4" and "Prius Prime 6" mentioned by the Coalition were filtered out by 3000-km minimum ICCT filter. EPA believes that the CARB BAR dataset used by EPA in its analysis is the best large public data set available at this time.

In response to comments about data collection, EPA notes that CARB OBD requirements mandate that the vehicle, as a whole, supports and reports the required data. CARB does not dictate that a particular ECU has to have the data or that it all has to come from one ECU.

CARB filtered the updated the November 2023 version of CARB OBD dataset to include only PHEV vehicles, and to exclude vehicles with less than 3,000 miles of total lifetime distance traveled. Also, vehicles that CARB identified as having incorrectly logged data in the lifetime distance OBD data fields used for this analysis were excluded. Excluded vehicles included the Chrysler Pacifica referenced by the Strong PHEV Coalition. However, EPA calculated the FUF values of Pacifica using PHEV data from separated ECU in the October 2022 version of CARB OBD dataset.

In response to comments on odometer readings, EPA notes that the odometer reading data field was not used for filtering the updated November 2023 version of CARB OBD dataset. EPA concluded that a mismatch between the technician-recorded odometer reading and the OBD data was not indicative of any issue with our use of the OBD lifetime distance traveled data fields for calculating FUF.

BAR dataset: data filtering

<u>Summary:</u>

Alliance for Automotive Innovation (AAI), Mitsubishi Motors North America, Inc. (MMNA), and Toyota made the following comments:

AAI: Given that EPA accepted PHEVs with as low as 1,865 lifetime miles from the BAR dataset, even a few hundred miles without charging can bias the data toward a lower utility factor.

In the DRIA, EPA notes, "As of October 2022, the BAR OBD dataset has around 8,400 PHEV vehicles, and over 233.2 million vehicle miles traveled. The filtered dataset has 30 PHEV models, and 2,060 individual vehicles that travelled 58.9 million miles." While some filtering of data to exclude outliers is expected, removing approximately 75% of the vehicles and vehicle mileage is not.

MMNA: The BAR data is a collection of PHEV data from MY19 through MY22 vehicles. The data was then filtered to remove any vehicles that show inconsistent data regarding distance traveled and grid energy utilization. While filtering of incomplete or inconsistent data is a typical operation in data analysis, the results of the analysis can be substantially altered based on the filters applied. We believe the filtering methods used by EPA filtered out too many vehicles. For example, the grid energy in/out filter completely removes one of the highest utility factor vehicle models4 from the entire data set. Whether such filtering was necessary for that vehicle is questionable. At the same time, it may be necessary to apply alternative filters. Due to the time constraints of this comment period, Mitsubishi was unable to fully evaluate the filtering methods EPA used in its analysis, but we may still provide feedback to EPA after the comment period. We ask EPA to provide additional information about the filters applied, and the effect those filters have on the overall utility factor analysis.

Toyota: The proposal explains that despite relaxing the data quality criteria to accept up to 20 percent mileage error and vehicles with as low as 1,865 lifetime miles, only 2,060 out of more than 8,000 vehicles were retained from the BAR dataset. As a result, many of the PHEV variants studied by EPA have a sample size of 30 vehicles or less.

<u>Response:</u>

CARB filtered the November 2023 CARB BAR OBD dataset to include only PHEV vehicles, and to exclude vehicles with less than 3,000 miles of total lifetime distance traveled. Also, vehicles that CARB identified as having incorrectly logged data in the lifetime distance OBD data fields used for this analysis were excluded. Only a few data points like the "missing" and the "Z" rows in the "INSPECTIONREASON" data field were filtered out in EPA. The detailed "Descriptions of Data Source and Filtering Method" and the "Influence of Data Filtering" are presented in RIA Chapters 3.4.2 and 3.4.3.

The November 2023 "CARB BAR OBD PHEV" dataset used for the finalized FUF curve contains approximately 8,800 PHEV vehicles from 43 PHEV models with 90 PHEV model variants, and over 169.4 million vehicle miles traveled. The filtered dataset used in the RIA Chapter 3.4.2.1 removes only about 2 percent of the vehicles. This final filtered dataset contains approximately 8,600 individual vehicles from 42 PHEV models and 89 model variants, and approximately 163.2 million miles travelled.

Similar findings and conclusions are observed by independent studies from EPA, CARB and ICCT.

BAR dataset: statistical validity

<u>Summary:</u>

Alliance for Automotive Innovation (AAI), Strong PHEV Coalition, and Toyota made the following comments:

AAI: Many of the PHEV variants studied by EPA have a sample size of 30 vehicles, which is statistically insignificant to draw conclusions about real-world PHEV operation.

Strong PHEV Coalition: We strongly recommend against using the California Bureau of Automotive Repair (BAR) data and Fuelly.com data as the basis for a new FUF for PHEVs. The Technical Committee of the Strong PHEV Coalition includes researchers who have been engaged with development and evaluation of UF calculations for more than 20 years. We are very familiar with the set of datasets that are available in the public and private domain for UF evaluation and have researched the datasets and authored many of the studies referenced in the Draft Regulatory Impact Analysis (DRIA). Our assessment and recommendations in response to the request for input on UF data in the DRIA is that the proposed changes to UF are based on a very poor dataset, poor analysis, and statistically indefensible methods. These datasets and methods are inadequate to inform policy of the importance and impact of EPA's emissions standards. See Appendix A for our critique of the BAR and Fuelly.com data sets.

Our assessment and recommendations in response to the request for input on UF data in the DRIA is that the proposed changes to UF are based on a very poor dataset, poor analysis, and statistically indefensible methods. These datasets and methods are inadequate to inform policy of the importance and impact of EPA's emissions standards.

Individual vehicle-level UFs that are derived from an updated data pull from BAR are extremely scattered and do not illustrate the validity of the UF curves for either the SAE J2841 FUF or the proposed FUF. When EPA or ICCT perform least-squares regression to derive a particular UF curve, they must calculate the confidence interval around the parameter estimates. When we perform that regression with vehicle models' pooled averages, we find that this dataset provides no evidence that the EPA FUF model is more representative than the SAEJ2841 model.

An examination of four models illustrates the wide dispersion of measured individual UFs and shows that the 95% confidence intervals on the mean value may or may not encompass any particular pre- derived response curve.

Toyota: EPA's attempts to manage the rampant errors in the BAR dataset renders it statistically insignificant for an analysis of normal PHEV usage. The proposal explains that despite relaxing the data quality criteria to accept up to 20 percent mileage error29 and vehicles with as low as 1,865 lifetime miles, only 2,060 out of more than 8,000 vehicles were retained from the BAR dataset. As a result, many of the PHEV variants studied by EPA have a sample size of 30 vehicles or less as seen in the legend on the right in Figure 14 below. The cleaned BAR dataset Excel file shared by EPA in the docket also confirms the inadequate sample size.30 Because EPA accepted very low-mileage PHEVs for their supporting analysis, even a few hundred miles without charging can bias the results to a lower Utility Factor.

Response:

The November 2023 CARB BAR OBD PHEV dataset used for the finalized FUF curve contains approximately 8,800 PHEV vehicles from 43 PHEV models with 90 PHEV model variants, and over 169.4 million vehicle miles traveled. The filtered dataset used in the RIA Chapter 3.4.2.1 removes only about 2 percent of the vehicles. This final filtered dataset contains approximately 8,600 individual vehicles from 42 PHEV models and 89 model variants, and approximately 163.2 million miles travelled.

EPA disagrees with the commenters' assessment of the statistical validity of our FUF analysis. In particular, the FUF curve represents the average usage of the fleet as a whole rather than individual vehicles. A scattering of individual vehicle-level UFs is to be expected. EPA also disagrees with the comment that the "UF are based on a very poor dataset". The BAR dataset comes directly from production vehicles being operated on public roads by private owners. The data is recorded in production vehicles using algorithms and storage techniques derived by the individual vehicle manufacturers. While the data did not come directly from vehicle manufacturers, the data is recorded in accordance with regulations established by the California Air Resources Board and the vehicle manufacturers are under a legal obligation to ensure the quality of the recorded data.

EPA has expanded the statistical analysis of all of the available data to address some of the technical concerns raised in comments. EPA has done a statistical check on the November 2023 version of CARB OBD PHEV dataset EPA used and found it to be statically significant as shown in RIA Chapter 3.4.3.3. In their statistical analysis, the Strong PHEV Coalition appears to be using does vehicle-weighted individual UF (MDIUF) values, rather than the distance-weighted FUF values used for GHG emission certifications. The vehicle-weighted individual UF (MDIUF) values used by the Strong PHEV Coalition are used for CAFE (Corporate Average Fuel Economy) standards compliance and labeling the all-electric ranges and CD ranges of PHEV vehicle stickers and not for GHG emission certifications.

Curve Fitting Comments

<u>Summary:</u>

Alliance for Automotive Innovation (AAI) and Toyota made the following comments:

AAI: Utility factors have been fitted to an exponential equation. The C coefficients are used to fit the curve and normalized distance establishes the distance where the utility factor is 100%. But Normalized Distance (ND) is the one variable in the equation that need not change. Changing normalized distance doesn't make sense unless overall driving distances have changed.

Using this curve fitting technique, the result is that regardless of all-electric miles traveled on a certification test, only 68.5% of those miles count. This is equally true for PHEVs that travel 20 miles or 200 miles. This is not appropriate, and the proposed utility factor should not be included in the final regulation.

EPA's linear curve fit is weighted toward vehicles with a range below 30 miles. Changing the utility factor based on such skewed data would discourage the introduction of new, higher-capability PHEVs.

Toyota: EPA's linear curve fit is weighted towards vehicles with a range below 30miles.

The proposed FUF curve that results from EPA's analysis is calculated as the average of the SAE J2841 FUF curve and the ICCT-BAR curve. The only difference between the SAE curve and the proposed curve is the Normalized Distance (ND) increasing from 399.9 miles to 583 miles. All other terms in the proposed revised equation to the right of Table are the same.

The proposed ND adjustment amounts to discounting the advertised electric range of every PHEV by about 32 percent for compliance calculations because increasing the normalized distance has the same effect as lowering the CD range.

Response:

The "BAR Regression Fit" shown in Figure 3-46 of RIA Chapter 3.4.3.2.5, contains about 8,600 valid PHEV data points from the November 2023 BAR OBD dataset fitted using nonlinear 6-fitting coefficients. The dataset contains multiple vehicles with ranges above 30 miles to 180-miles. EPA believes the "BAR Regression Fit" line shown in the figure accurately represents performance of vehicles both above and below 30 miles range.

Five hundred eighty-three (583)-mile normalized distances in the "FUF Finalized (FRM)" of Table 3-23 in RIA Chapter 3.4.3.2.5 were calculated by the minimization of the sum of the squared residual norm in Equation 3-2 when using SAE J2841 FUF fitting coefficients. The "FUF Illustrative Final" curve, which is created using 6-new curve fitting coefficients and 399.9-mile normalized distances in the "FUF Illustrative Final, using SAE Normalized Distance" of Table 3-23, lies on top of the "FUF Finalized" curve in Figure 3-46 of RIA Chapter 3.4.3.2.5. Therefore, the same FUF fitting curve can be developed using either a new ND and current SAE J2841 FUF fitting coefficients or 399.9-mile SAE Normalized Distance and new 6-fitting coefficients.

With respect to the suggestion that the changes will discourage the introduction of new, higher-capability PHEVs, our goal with the finalized FUF curve is to appropriately characterize the actual charge depleting share of driving distance for PHEVs in the rulemaking timeframe, rather than incentivizing PHEVs with certain ranges. However, our finalized FUF curve already provides an incentive for more capable PHEVs, based on operational data, with continuously higher FUF values for vehicles with greater charge depleting range.

Comments on the Effect of Future Charging Availability, PHEV Capability, and Incentives on FUF

Summary:

Alliance for Automotive Innovation (AAI), BorgWarner, Stellantis, MECA Clean Mobility (MECA), MEMA, Mitsubishi Motors North America, Inc. (MMNA), Strong PHEV Coalition, Toyota, Porsche, VW, and Kia made the following comments:

AAI: The BAR dataset and more rigorous, peer-reviewed studies indicate some PHEVs have a lower ratio of EV driving versus ICE operation on-road versus certification, while other vehicles' performance is well-aligned to certification values. We believe this difference is due to the spread of performance capability of the electric machines in PHEVs. Lower capability electric machines demonstrate a greater difference in on-road versus on-cycle performance.

EPA's proposed PHEV high power cold start requirement encourages more all-electric operation capability. Further, CARB requires a minimum 70-mile combined city/highway and minimum 40-mile US06 all-electric range starting with MY 2029.

Lack of charging, to the extent it exists, should be best solved by consumer education, not by a change to the utility factor.

While some data may suggest PHEVs are not being plugged in as frequently as the assumptions underlying the SAE UF curve, this should not be a problem attributed to automakers, nor should it be grounds to adjust a compliance measurement. Charging equipment is supplied with the vehicles sold by automakers.

BorgWarner: To meet many of the requirements set by both EPA in this proposal and California in its Advanced Clean Car II rulemaking, PHEVs would have significantly increased electric range that make them more capable of all-electric operation, and together with a much-improved charging infrastructure, will change the pattern of consumer use. In fact, average new PHEV driving range increased 8.5% in 2021 and is expected to continue increasing. As such, EPA should model future consumer usage based on the expected models on sale from MY 2027, and further improvements to charging availability, and use the model to determine the utility factor curve that should apply.

Stellantis: The two issues that can lead to shortfalls in PHEV electric operation usage are (1) lack of charging and (2) differences in performance between regulated cycles and on-road operation. We believe charging rates will improve as more public infrastructure emerges and charging becomes ubiquitous. As for capability concerns, CARB is requiring a 70-mile combined cycle minimum range and a high-power cold start requirement (that EPA also proposes to adopt in this rule). These two requirements will force future PHEVs to have more range and power in all-electric operation, thus eliminating or minimizing any performance differences on-road versus regulated cycles.

MECA: This in combination with build out of charging infrastructure, especially from Inflation Reduction Act and Infrastructure Investment and Jobs Act funding sources, will provide consumers with easier access to charge PHEVs and enable them to drive more miles on electricity rather than petroleum. The result will be that future fleet utility factors will increase rather than decrease. MECA suggests that EPA consider these developments, including studying the correlation between fleet utility factor and workplace charger availability, and not base utility factors on older PHEV technology.

MEMA: While California is an admirable leader in ZEV deployment, its incentive structure for PHEV purchases differs from the rest of the country; a large percentage of population resides in multi-unit dwellings (often without consistent overnight charging access), and it ranked (as of last year) behind at least 15 other U.S. states in terms of charging ports per EV, signifying a potential problem of constrained charging access that needs further examination.

MMNA: In addition to CARB's intention to increase ZEV capability through PHEV technical requirements, the approach vehicle owners take to PHEV operation may change. Consumer education and increased available of charging infrastructure will make it easier for PHEV owners to charge vehicles when convenient, and thus more likely that they will do so on a more regular basis.

Strong PHEV Coalition: We have also seen that the FUFs of vehicle models in the BAR dataset are changing as a function of time. For example, BMW X5 XDRIVE45E vehicles (MY 2019-2022) that meet the ICCT/EPA filtering criteria tested before 17 May 2022 have an average individual UF of 30%. X5 XDRIVE45E vehicles (MY 2021-2023) that meet the ICCT/EPA filtering criteria tested after 17 May 2022 have an average individual UF of 68%. These types of problems with the BAR dataset seem to be unrecognized and not validated by the research community, and further strengthen the case for not using the BAR dataset for research or policy making.

Toyota: The proposal heavily relies on the BEV technology improvements and charging infrastructure expansion to justify the standards. Those same improvements will also benefit PHEVs, since home charging, consumers awareness, and technology advancements will drive PHEV utilization closer to that of pure BEVs as consumers place greater emphasis on achieving advertised range and have greater desire and means to achieve it.

Existing regulation will also help spread the deployment of more capable PHEV designs that perform closer to their advertised all-electric range. ACC2 and EPA's proposed high-power cold start requirement will result in more all-electric capability. Recommend that EPA request SAE establish a consortium to evaluate PHEV usage trends.

Porsche: Porsche does not support the proposed reduction in the PHEV utility factor. EPA's proposal devalues future PHEV performance based on historic charging behavior of existing on-road PHEV drivers. Porsche has not reviewed the details of the California BAR or fuelly.com data but can understand if in some cases consumer use of electric drive has been lower than expected. This is not surprising given the well-documented challenges and complaints related to the general lack of public charging infrastructure in the past few years. Besides challenges within finding reliable public charging, many consumers have faced difficulties in installing home charging, especially for multifamily and rental dwellers, and have complained about the general lack of workplace charging. However, the entire foundation of this MPR and the dramatic shift towards electrification rests upon assumptions regarding improvements in electric vehicles and more specifically in the availability and reliability of public and private electric vehicle charging. Issues that past owners of PHEVs may have experienced that likely led to the examples of lower-than-expected usage of electric drive would be addressed according to EPA's assumptions on improved charging. As such, the decision to alter the utility factor for future PHEVs should not focus on decreasing the utility factor due to challenges customers experienced in the past, but rather should maintain the existing utility factor based on improved usage of charging in 2027 and later given EPA's projections for rapidly expanding charging infrastructure.

It is nonsensical that future PHEV drivers would continue to pass up on charging opportunities once charging is more ubiquitous in the public, at home and at work. In fact, this would be counter to EPA's assumed consumer valuation of fuel savings that has been consistently referred to in GHG rulemakings. If consumers value fuel savings, and if charging availability is no longer a barrier to usage, EPA would have to assume that PHEV drivers would naturally seek to maximize their usage of electric drive if the cost per mile to drive electric is less than that of gasoline. If for some reason drivers continued to avoid using electric operation, then EPA would have to reevaluate the entire premise of consumer demanded fuel savings. As charging resources increase, utility factor should increase along with it, not go down.

VW: In addition to the conditions discussed by AFAI (e.g., charging infrastructure, driving behavior, customer use education, etc.), Volkswagen believes that PHEV ownership is influenced by current Federal and State purchasing incentives and the environmental benefits may be a secondary or tertiary reason for the purchase of a PHEV over the ICE vehicle alternative. The DoE Alternative Fuels Data Center shows 398 incentives for personal vehicle owner for PHEVs. In addition, the FUF should take into account future driving behavior where PHEVs attain a higher range for ZEV-qualifying PHEVs.

Kia: If EPA feels strongly that the real-world fleet utility factor is too low, Kia recommends that EPA work with industry to help incentivize reminders for consumers to plug in more often.

Response:

EPA's task in this rulemaking is to evaluate the expected use of the secondary fuel used on these dual fuel vehicles and properly give credit much like EPA does when assigning the F-factor for E85 Vehicles. After careful consideration of the available data, EPA finds that the SAE-based FUF is assigning lower CO_2 emissions for PHEV compliance calculations than are being realized in in-use data.

However, EPA recognizes that PHEV owners' propensity to recharge the battery may change in the future for multiple reasons, including those described by commenters. As discussed in the preamble Section III.C.8, we are delaying the application of the revised FUF until MY 2031 to provide additional lead time for manufacturers, including consideration of the availability of future charging infrastructure and vehicle manufacturers influence on improving PHEV owners' propensity to charge. We consider the final FUF to be a reasonable FUF for model years beginning 2031. As noted in the preamble and in RIA Chapter 3.4.1, if vehicle manufacturers or other stakeholders come forward in the future with additional PHEV data that could be used to inform future evaluations of the FUF, EPA is committed to working with stakeholders in conducting a future evaluation.

In response to comments on the FUFs of the BMW X5 XDRIVE45E vehicles, EPA calculated the FUFs for vehicles tested before and after 17 May 2022 as indicated by the Strong PHEV Coalition, using the November 2023 CARB OBD dataset. The calculated FUF values are 0.32 for vehicles tested before 17 May 2022 and 0.39 for vehicles tested after 17 May 2022. These are both substantially lower than 0.65 FUFs calculated by SAE J2841 standard certified at 2-cycle combined CD ranges.

EPA further notes that PHEV GHG emissions are certified using fleet utility factors (FUF) over 2-cycle combined CD ranges. Strong PHEV Coalition appears to be using the individual UFs (MDIUF) over the label CD range. These are used for CAFE (Corporate Average Fuel Economy) standards compliance and labeling the all-electric ranges and CD ranges of PHEV vehicle stickers, but not for GHG compliance purposes.

Comments recommending a lower FUF curve

Summary:

California Air Resources Board (CARB), Environmental Defense Fund (EDF), Environmental. And Public Health Organizations, International Council on Clean Transportation (ICCT), National Association of Clean Air Agencies (NACAA), Southern Environmental Law Center (SELC), Zero Emission Transportation Association (ZETA), Tesla, Inc and Rivian Automotive, LLC made the following comments.

CARB: In its proposal, U.S. EPA proposes a revised FUF curve that is lower than the SAE J2841 FUF curve. Based on an analysis of additional real-world data, summarized below, CARB finds that the ICCT-BAR curve is even closer to what real-world data supports for eVMT. CARB therefore recommends that U.S. EPA adopt the ICCT-BAR curve.

Environmental Defense Fund (EDF): The data compiled by ICCT from real- world sources represent the best estimate of actual PHEV utilization and should be the primary source for EPA's UF curves. Meanwhile, California's treatment of PHEVs under the ACC II program is far more conservative, resulting in lower utility factors than EPA. ACC II allows PHEVs to "fulfill a portion of their total Annual ZEV Requirement" if they meet several qualifications. A PHEV must have a "minimum certification range value of greater than or equal to 70 miles," based on California's 2026 ZEV and PHEV test procedures and have a minimum US06 all-electric range value greater than or equal to 40 miles to be considered a ZEV under the rules. PHEVs that don't meet these requirements can still be counted for partial credit if they have a minimum certification range value between 43 and 70 miles or have a US06 all-electric range of at least 10 miles. Additionally, PHEVs can only be used to meet 20 percent of a manufacturer's total ZEV requirement.

A recent ICCT study examined the current state of PHEV usage in the United States and found strong evidence that real-world electric drive share is far below EPA's current utility factor label rating. According to ICCT, "previous research and data from early adopters of PHEVs in the United States demonstrated that PHEVs achieved real-world electric drive share close to that expected by the U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA)." ICCT notes that EPA assumes that PHEVs achieve real-world electric drive share close to EPA's utility factor label rating in its treatment of PHEVs in the 2023-2026 light-duty GHG rule.

Environmental. And Public Health Organizations: The BAR data show the Honda Clarity PHEV as having a real-world utility factor of 0.359 while the SAE 2841 method gives the Clarity a FUF of 0.676. These results show that the SAE2841 method using travel survey data is a poor estimator of actual vehicle usage. The Agency proposes to reduce the FUF for compliance calculations by averaging the current FUF with a curve derived from the BAR real-world data. This averaging will lower the gap between actual emissions performance and the compliance value, but will still allow for compliance values for PHEVs that are higher than justified. Given that EPA now has clear real-world data showing that the current FUF is not reflective of actual emissions from PHEVs, it is inappropriate to use the original SAE J2841 FUF or to use it in an average with other data. EPA should instead use a FUF consistent with the actual in-use data from BAR and adopt the FUF labeled "ICCT-BAR" in the DRIA.

The decision to average real-world usage data with the SAE 2841 estimate is poorly justified. EPA states that "an overly low FUF curve could disincentivize manufacturers to apply this technology. However, both the current FUF curve and the proposed curve over-credit PHEVs. A curve that correctly credits PHEVs' reductions in emissions (such as the ICCT-BAR curve) will not disincentivize adoption of PHEVs, but instead will provide a lower incentive for the partial elimination of tailpipe emissions and a greater incentive for complete elimination via fully-electric powertrain options. Even with a lower FUF, the ability to reduce the compliance emissions values by use of zero grams per mile for the CD mode phase will provide a significant incentive for a manufacturer to choose a PHEV powertrain over a non-plug-in hybrid. Choice of a lower FUF curve will at the same time ensure that there is a sufficient incentive to encourage the continued development and deployment of zero-emission technologies.

EPA also cites future models with longer electric range and greater all-electric performance as leading to future real-world performance that meets the proposed FUF curve. This is not supported by the available data. The longest electric range PHEV currently available is the Toyota RAV4 Prime. The RAV4 Prime data from the BAR dataset show a real-world utility factor of 0.35, significantly lower than the proposed FUF for a 42-mile all-electric range (AER) vehicle (0.52) and even lower than the ICCT-BAR curve (0.41). EPA states that "increased consumer technology familiarity" will also make future PHEV usage approach the proposed FUF curve. 88 Fed. Reg. at 29254. Increased consumer knowledge may make purchasers able to shift more driving to electric-only mode. However, it is also possible that purchasers (especially in the secondary market) may buy a PHEV without the ability to plug in or may choose a PHEV because of incentives that make the purchase more attractive relative to a non-plug-in vehicle. Existing research on the use of PHEVs shows that the largest factor leading to lower real-world observed utility factors is lack of charging, with 20-30% of some PHEV models starting their travel day on a nearly empty battery.

The proposed FUF could lead to PHEVs with a large difference between real-world emissions and the compliance values for CO2 emissions. The use of PHEV powertrains in larger vehicles such as SUVs and pickups will cause this gap to grow, due to the gap between the zero grams per mile CD operation and the high gram per mile operation when the internal combustion engine is running. Over-crediting PHEVs' purported electric driving would create a new and unjustified loophole that would likely slow down the path to greater deployment of zero-emission technologies within the fleet. For example, for a PHEV that has compliance CO2 charge sustaining (CS) mode emissions of 250 g/mile and an electric range of greater than 28 miles, the proposed FUF would artificially reduce the combined mode PHEV emissions by over 25 g/mile when compared to the ICCT-BAR FUF. (Figure XII.1). The gap between the proposed FUF and the real-world data (ICCT-BAR) is highest for vehicles with a CD range between 42 and 62 miles. California's ZEV regulations for model year 2029 and subsequent vehicles require a minimum certification electric range of 70 miles to be eligible for credit values, which is approximately a 50-mile label range. Therefore, PHEVs designed to meet the minimum range for ZEV credit value eligibility are likely to have the largest deviations between real-world emissions and the compliance emissions calculated using the proposed FUF.

ICCT: ICCT applauds EPA for adjusting the PHEV utility factor (UF) curve to better fit real-world PHEV usage data. As the PHEV models available for purchase today differ in operation and all-electric utility from when the original UF curve was developed, this update is direly need (ICCT 2022 PHEV). Due to the growing repository of public, real-world PHEV data, ICCT recommends EPA adjust the proposed fleet utility factor (FUF) curve to reflect the best-available data, while allowing for potential updates to the curve based on more real-world data as it accumulates.

In DRIA figure 3-29, EPA's analysis of the California Bureau of Automotive Repair (BAR) PHEV data clearly shows that a reduced UF curve is a better fit of the real-world data. This fit matches ICCT's non-linear regression fit of the BAR data. Utilizing the same methodology described in ICCT 2022 PHEV but with EPA's proposed FUF coefficients (Preamble 29442), ICCT finds the appropriate normalized distance to be 802 miles (vs proposed 583 miles). This curve more accurately reflects the current state of PHEV usage. Thus, ICCT recommends that EPA adopt a normalized distance of 802 miles, instead of 583 miles as proposed.

Within the timeframe of the proposed rule EPA expects PHEVs with longer all-electric range to become available (in part due to California's ACCII PHEV performance requirements), and

EPA seeks to avoid disincentivizing PHEVs with a too low FUF curve (Preamble 29254). For these reasons, EPA proposed a FUF curve higher than what the BAR data supports. This argument puts the expectation of future PHEV performance ahead of the data.

NACAA: We concur with EPA's conclusion that the current LDV PHEV compliance methodology overstates the operation of PHEVs on electricity thereby significantly underestimating PHEV CO2 gm/mi compliance results. Therefore, NACAA commends EPA for proposing to reduce the PHEV Fleet Utility Factor (FUF) curve used in the CO2 compliance calculation for PHEVs beginning in MY 2027 but recommends that the FUF curve be even lower than proposed.

ZETA: supports the proposed changes to the PHEV fleet utility factor (FUF) to more accurately apportion the benefit of PHEVs' electric operation. Ensuring accurate compliance calculations is critical to preserving programmatic integrity and reducing emissions. As EPA notes, SAE J2841 was developed more than ten years ago during the early introduction of light-duty PHEVs and at the time was a reasonable approach. However, with the benefit of more real world data and information about actual vehicle operating characteristics, we support EPA revisiting the FUF curve at this time.

SELC: Studies have shown, however, that the current FUF overestimates the operation of PHEVs on electricity. As a result, "the current light- duty vehicle PHEV compliance methodology significantly underestimates PHEV CO2 emissions." We therefore support EPA's proposal to revise the FUF curve used in CO2 compliance calculations for PHEVs beginning in model year 2027 and urge EPA to consider a FUF curve that is even lower than the current proposal.

Tesla: Tesla asserts the EPA should revisit the plug-in hybrid electric vehicle (PHEV) utility factor to accurately reflect real world emissions.

Nevertheless, EPA is appropriately revisiting the PHEV Fleet Utility Factor because PHEV compliance to date has significantly underestimated CO2 emissions by overestimating their use of electricity. Reducing the PHEV utility factor is appropriate and overdue.

Rivian: Rivian applauds EPA's decision to revise the FUF for PHEVs. We agree with the agency that the current compliance methodology "significantly underestimates PHEV CO2 emissions." As the agency details in its analysis, and as Rivian has commented in the past, PHEVs exhibit significant variability in their environmental performance. In the United States, PHEVs drive fewer electric miles than assumed for labeling purposes, with fuel consumption as much as two-thirds higher than nominally anticipated. Simply put, PHEV drivers often do not plug in their vehicles as much as was previously assumed.

The FUF remains important for calculating PHEV emissions for regulatory compliance, but the weight of the evidence clearly compels EPA to revise the curve. The initial proposal marks a significant improvement over the status quo, but onboard diagnostic data from California support an even lower FUF. EPA rightly acknowledges this in the Draft Regulatory Impact Analysis ("DRIA"). Nonetheless, EPA proposes a higher curve. The agency's justification rests on speculation that future PHEVs could deliver greater all-electric performance as well as stated concerns that an accurate FUF would "disincentivize" PHEV development. If PHEVs fall short of their environmental promise, the technology does not merit an artificially inflated regulatory incentive regardless of its potential. Far from an unfair disincentive, an accurate FUF would ensure that the regulation works as intended—achieving reliable, real-world emissions reductions. To safeguard the regulation's environmental integrity, Rivian encourages EPA to finalize a FUF that accurately reflects the best available data from real-world driving behavior.

Response:

As discussed in preamble III.C.8, although we believe the data on current PHEV activity supports further revisions to the utility factor, EPA is setting a FUF for future model years based on our expectations about charging and PHEV performance that will occur in those future years. We are also taking into consideration the likelihood that the improvements automakers anticipate in product design (such as range), consumer education and awareness, and charging convenience with expanded infrastructure will result in PHEV activity that is similar to the finalized FUF. In light of manufacturer plans to improve PHEV technology and the potential for improved customer knowledge and infrastructure, EPA is finalizing the PHEV utility factor as proposed.

At the same time, EPA is committed to an ongoing evaluation of future PHEV FUF data to assess whether the revised FUF is in fact adequately representative of future PHEV operation, as a result of future PHEV designs and consumer charging behavior, or if there is merit in further adjusting the FUF. EPA encourages researchers and other stakeholders, including manufacturers, to supplement the publicly available data by providing data directly to EPA for inclusion in an updated analysis. EPA will engage with stakeholders to share results of our assessments, and to hear from stakeholders who may have their own data and analysis to share, for example, through public forums. If EPA determines that changes to the FUF are warranted, we will engage with stakeholders on technical details such as the shape of the FUF curve and the appropriate timing for its implementation. If such evaluation were to support a proposed revision to the FUF, EPA could initiate a future rulemaking to revise the FUF for MY 2031.

Comments recommending a higher FUF curve; timing and compliance effects

Summary:

Ford, Jaguar Land Rover NA, LLC (JLR), Kia Corporation, MECA Clean Mobility, MEMA, The Vehicle Suppliers Associated, Mitsubishi Motors North America, Inc. (MMNA), Stellantis, Toyota, Porsche Cars North America (PCNA), and Volkswagen Group of America, Inc (VW) made the following comments.

Ford: does not support the proposed update to the Plug-In Hybrid (PHEV) utility factor (UF). We do not believe it is appropriate to recalibrate the PHEV compliance benefit at the same time the EPA is proposing other sweeping changes and historically stringent standards. Product planning lead time and uncertainty in EV market growth requires that all electrification options be available with stable and predictable compliance benefits. Ford would support an EPA program designed to gather additional data for use in a future rulemaking which would yield a robust basis for a UF update and prevent disruption to EV product compliance plans.

JLR: JLR would like to highlight our concerns over EPA's plans to incorporate PHEVs into their analysis for the final rule. If EPA proceeds with the planned changes to the certified PHEV CO_2 value, namely through the adjustment of the utility factor, they must acknowledge the impact this will have on fleet compliance, greatly reducing their contribution to the fleet. As such, the baseline GHG target and projected ZEV share should also be adjusted by an equal amount, to avoid an increase in target stringency by stealth.

Kia: Kia does not support the assumptions on PHEVs outlined in the NPRM. EPA explains that its current PHEV compliance methodology significantly underestimates PHEV CO2 emissions. Consequently, EPA proposes to revise the light vehicle PHEV Fleet Utility Factor (FUF) curve downward to reflect as assumed PHEVs lower electric operation beginning in MY2027. EPA’s proposal essentially lowers the benefits of PHEVs for compliance which will reduce consumer choice and make feasibility of the standards much more challenging.

MECA: Similar to previous EPA technology analyses prepared to support future rulemakings, MECA requests that EPA conduct a prospective analysis of utility factors of PHEVs based on the direction of the technologies being released into the marketplace today as well as announcements of future releases. Of particular note, EPA relied upon past data of older technology PHEVs with limited all electric ranges to justify the proposed reduction in the PHEV utility factors from today’s acceptable values that are based on SAE J2841.

MEMA: EPA to maintain previous PHEV utility factor or conduct U.S.-based study and forecast to replace current PHEV utilization data and recalculate PHEV utility factor.

MMNA: Maintain the current PHEV Utility Factor (UF) and work with industry to identify opportunities to increase PHEV electric operation. This is the ideal stepping-stone technology to encourage long-term BEV acceptance and utilization.

Stellantis recommends keeping the current UF for the final rule. The combined impact of the proposed changes described above compound the stringency of an already aggressive target makes the overall “net effect” of what EPA is proposing infeasible – especially in the initial year of the program.

Toyota: EPA’s proposed UF discriminates against PHEVs based on flawed data and analysis from and environmental NGO. PHEVs should be encouraged, rather than discouraged by these regulations. Toyota plans to provide PHEV data outside of comment period. The data cited for lower Ufs lack peer review.

Porsche: EPA acknowledges uncertainty regarding future charging usage by stating that the agency could revisit the utility factor once again in a future rulemaking if it appears that PHEVs are using more electric operation due to improved vehicle technology and greater charging infrastructure. However, undercutting PHEVs in this rulemaking, only to increase the value of PHEVs in a future rulemaking creates too much uncertainty. If EPA expects the charging environment to improve, why reduce the assumed driving usage now only to increase it again later? This back-and-forth uncertainty on utility factor would not be helpful since the current proposal would so undercut the incentive for PHEVs that manufacturers would have likely reconsidered continued support for the technology. If the agency is concerned about the actual real-world usage of PHEV electric operation, it seems that the approach would be to work with stakeholders to improve the charging experience today while the charging infrastructure is expanding over the next few years. “Fixing” the issue by undercutting the technology in regulation neither improves the technology, nor helps address charging challenges customers are facing.

VW: Volkswagen acknowledges there are ongoing discussions in the U.S. and Europe to modify the FUF. Both regions are comparing the current FUF with newly collected real world data. Europe is updating its FUF on 01/01/2028, where the methodology defined in the legislation and the factor will be dependent on data collected over next several years. Volkswagen suggests that this timing is appropriate and recommends that the current FUF remain in place until the new data is available.

Response:

EPA carefully considered all of the comments we received in response to the proposed revised FUF. EPA agrees with commenters on the importance of PHEVs as a technology that might be best suited to meet the needs of some consumers, particularly over the timeframe of this rulemaking. PHEVs have the potential to reduce vehicle GHG emissions, but the degree to which that potential is realized depends on whether they are charged and operating on electricity. Based on our updated assessment of the latest and best available data in the public record, EPA finds that the SAE-based FUF is assigning lower CO_2 emissions for PHEV compliance calculations than are being realized in in-use data. In other words, PHEVs are currently over-credited for the amount of electric range and zero-emissions operation. Although the data could support an even lower FUF than that proposed, EPA has decided to finalize a moderate change to the FUF.

As discussed in preamble III.C.8, although we believe the data on current PHEV activity could support further revisions to the utility factor, EPA is setting a FUF for future model years based on our expectations about charging and PHEV performance that will occur in those future years. EPA disagrees that there is any compelling evidence that typical PHEVs in the future will reach the SAE J2841 level of charge depleting operation.

As shown in RIA Chapter 3.4.3, the "BAR Regression Fit" curve between 0 and 180-mile 2-cycle combined GHG emission-certified CD ranges using November 2023 CARB dataset are substantially lower than those by the SAE J2841 FUF curve. In addition, EPA conducted a statistical evaluation of the FUF based on real-world data (RIA Chapter 3.4.3.3). The confidence intervals for the vast majority of models do not span the SAE J2841UF trend, suggesting that the measured FUFs are lower than the trend.

The finalized FUF curve represents a modest change of about 11 percent from SAE J2841 FUF curve while the averages of the SAE J2841 FUF curve are approximately 55 percent higher than those calculated using the “BAR Regression Fit” curve between 0 and 180-mile 2-cycle combined GHG emission-certified CD ranges using November 2023 CARB dataset.

However, we do see evidence in the BAR data, such as the Chevy Volt, where PHEVs with higher charge depleting driving capability and power tend to have higher FUF than typical PHEVs in use today. The agency has built on comments received from the Strong PHEV Coalition, specifically their statistical analysis of several PHEVs and the range of charge depleting operation associated with these vehicles. EPA expanded on that analysis and applied a similar technique to the California BAR data. In performing this analysis, EPA noted that several vehicles are demonstrating utility at or near the proposed utility factor. In other words, EPA noted that there are “top runner” vehicles and behavior that supports the final utility factor.

At the time of this final rule, MY 2025 vehicle production has already commenced. This means that manufacturers have approximately two years of lead time to address the revised standards and provisions finalized in this final rule. While lead time is addressed in many ways throughout this rulemaking, such as the year over year change in emission standard stringency and extensions of the phase-down of off-cycle and air conditioning leakage credits, we recognize that a fundamental change to the compliance methodology for any single technology in as little as two years could be significantly disruptive to some vehicle manufacturers' current compliance plans. Several auto manufacturers commented that the proposed revised PHEV utility factor would impact product planning and the overall emission reductions projected for their fleets to meet the standards. We also understand that several vehicle manufacturers have already made significant investments in PHEV technology and are relying on PHEVs as an important portion of their GHG compliance strategy. Without adequate time to adjust their product plans to the revised compliance values for PHEVs under the revised utility factor, and to plan for additional GHG-reducing technologies to ensure adequate additional emissions reductions to meet the standards, the revised FUF may disproportionately impact those manufacturers planning large volumes of PHEVs as compared to manufacturers who are not relying as heavily on PHEV technology. To mitigate such a potential impact and to address concerns about adequacy of lead time for the early years of the program, we are delaying the application of the revised FUF until MY 2031. EPA believes that the revising the FUF in MY 2031 will provide vehicle manufacturers adequate lead time for product development and product plan adjustments, given that the average vehicle redesign cycle is approximately five years.

CAFE compliance calculations

Summary:

Porsche and Mitsubishi Motors North America, Inc. (MMNA) made the following comments:

Porsche notes that EPA's proposed update to the PHEV utility factor will also influence CAFE compliance calculations due to the allowance within statute and regulation for manufacturers to optionally select weighted operation. EPA did not provide analysis as to how this change would affect CAFE compliance especially considering Department of Energy (DOE) recent NPRM to reduce the Petroleum Equivalence Factor (PEF) by 72% for electric vehicles. This dramatic proposal from DOE to undercut the incentive for electric vehicles within CAFE is premature given that proposed CAFE standards for model years 2027 and later have not yet been released by NHTSA. Porsche recommended in comments to DOE for their NPRM that DOE include the assessment of EPA's proposed change in the utility factor to better understand the combined effect of lower PEF and lower utility factor. DOE did not acknowledge, or was unaware of, the proposed reduction in utility factor from EPA. The PEF statutory basis requires DOE, as it has done for over 40 years, to incentivize electrified vehicles in CAFE. This statute also requires DOE, NHTSA and EPA to consult on changes related to PEF and CAFE. Neither the EPA MPR NPRM nor the DOE PEF NPRM appear to discuss the mutual impacts that each other's proposed updates could have on future CAFE compliance. As NHTSA has yet to release their CAFE proposal, it is unclear if NHTSA will address both the EPA and DOE proposals and how both could impact CAFE compliance. To Porsche, it is unclear as to why these NPRMs appear disjointed and so far, have failed to discuss the impacts of each other's proposals on the other regulations. Porsche recommends EPA provide analysis of the impact of the reduced utility factor on the PEF and CAFE compliance in coordination with DOE and NHTSA. Ideally, all the proposals would have been released together to provide manufacturers with the ability to understand how each of the agency's actions would interact with each other and continue to support and incentivize technologies such as PHEV. This is especially relevant considering the overarching goal to achieve a dramatic increase in light-duty electrification. proposal is changing test fuel, which is broadly supported by industry).

MMNA: The development of the proposed utility factor by EPA considers the impact of changes within the context of the light-duty GHG standard. However, the utility factor is also used in developing fuel economy compliance values for the NHTSA CAFE standard. There is little mention of the utility factor's influence on CAFE compliance, despite the direct effect it has on PHEV CAFE compliance values.

Response:

CAFE compliance calculations will not be affected, as EPA is not revising the SAE J2841 MDIUF curve, which is used for CAFE standards compliance and labeling all electric range (AER), CD range, and electric energy consumption of PHEV vehicle stickers.

Real-world vs. laboratory performance

Summary:

Alliance for Automotive Innovation (AAI) and Toyota made the following comments:

AAI: The normal method to address differences between real-world and laboratory results, especially when due to driving behaviors, has been through post-compliance adjustments aimed at consumer awareness and occasionally by expanding test cycle requirements, and not by revising calculations used to determine compliance with the standards. While some data may suggest PHEVs are not being plugged in as frequently as the assumptions underlying the SAE UF curve, this should not be a problem attributed to automakers, nor should it be grounds to adjust a compliance measurement.

EPA recognizes that BEV technology is still maturing and needs support to build consumer acceptance. Appropriately, the proposal does not examine the advertised range, efficiency, and emissions performance of BEVs under real-world operation. PHEVs are in the same fragile stage of growth and should be treated no differently.

Toyota: Concerns over differences between real-world and laboratory performance, particularly those due to driving behaviors, have traditionally been resolved through post-compliance data adjustments aimed at consumer awareness and occasionally by expanding test cycle requirements. Not by revising the calculations used to determine compliance with the standards. The compliance benefit of internal combustion powertrains has never been penalized when studies have found on-road driving is more aggressive or fuel consuming than the test cycles indicate. Instead, lab results for CO2 emissions and fuel economy are adjusted on the fuel economy label to better reflect real- world performance, and consumers are educated on how their mileage may vary based on their driving conditions.

PHEVs should be treated no differently than BEVs. Both technologies are still evolving, maturing and need support towards mainstream market adoption. The proposal appropriately does not scrutinize the advertised range, efficiency, and emissions performance of BEVs under real-world conditions. A BEV not attaining its advertised range can result in more ICE miles driven. One recent vehicle usage study concluded the average BEV is driven 29% less than the average non- BEV. Another academic study found that battery electric vehicles (BEVs) are driven on average 2,700 fewer miles annually compared to their conventional counterparts.

Response:

The UF for a PHEV represents the proportion of electric miles driven by the vehicle, and is entirely dependent on how often the consumer is willing to recharge the vehicle. This charging frequency is not determined by a laboratory test, and thus a change in the FUF is not due to any differences between real-world and laboratory performance. Instead, it is due to differences between observed real-world behavior and assumed real-world behavior during in the development of the original SAE J2841 curve.

EPA disagrees that the issue is a discrepancy between laboratory results and the real world. For example, SAE J2841, which is based on real-world driving behavior, states explicitly that the UF represented in SAE standard assumes that a PHEV is fully charged at least once per day. However, there are about 3 percent of PHEVs which were charged less than 1-kwh and about 28 percent of PHEVs which were charged less than 200-kWh lifetime total grid energy into the battery packs, respectively, when filtering out vehicles with less than 3,000-mile total lifetime traveled distance. FUF values are significantly affected by charging frequencies.

EPA disagrees that this rule treats BEVs and PHEVs differently. In this rule, EPA is treating PHEVs, BEVs, and conventional vehicles in the same manner. Both BEVs and PHEVs are allocated zero g/mile CO2 in all-electric driving. Average annual VMT variations, while different for individual vehicle models, is not considered in compliance calculations for BEVs, PHEVs, or conventional vehicles.

Incentivizing PHEV range with a modified FUF

Summary:

ICCT, Strong PHEV Coalition, MECA Clean Mobility (MECA), Electric Drive Transportation Association (EDTA), Alliance for Vehicle Efficiency (AVE), and Betsy Cooper made the following comments:

ICCT: EPA could automatically apply the higher FUF curve (e.g., the current proposed curve, as opposed to the ICCT-BAR curve) for vehicles that meet minimum all-electric performance requirements, such as 70 miles all-electric 2-cycle range and 40 miles all-electric US06 range. This latter option would incentivize greater all-electric capability among PHEVs.

Strong PHEV Coalition: EPA should extend the FUF to 130 miles in order to encourage automakers. For example, Toyota has announced that it is planning a PHEV with over 124-mile all electric range.4 While we don’t know which test cycle this range is based on, EPA should encourage this long all electric range. Another example is the BMW i3 REX which was designed to primarily drive all-electric miles but is now only sold as a used PHEV.

EPA should adopt a provision to discourage low-range PHEVs by requiring them to count as an HEV with no zero emission miles. We suggest a cut-off of 50 km (31miles). Further we are not suggesting a ban on low-range PHEVs but rather a disincentive to produce them. Low-range PHEVs according to the UC Davis data logger project and the EV Project have greater likelihood of not plugging in and this could increase as PHEVs get older. PHEVs with a long all-electric range offer much greater benefits to consumers and show much higher levels of plugging in.

EPA should provide small bonus credits (multipliers) in 2027 to 2030 for several advanced technologies including PHEVs with a long all-electric range that are not being produced today.

While we understand the need to simplify the regulation and dramatically reduce the use of multipliers, we do support very limited continuation of multiplier to advance technologies that do not exist today or are in very limited numbers such as bidirectional charging vehicles (recommendation 4) and PHEVs with an all-electric range of 60 or more miles. These technologies need extra lead time to develop. Having multiple technologies helps in reaching many hard-to-reach customer segments, and PHEVs with over 60-mile all-electric range by legacy automakers are not offered today and have rarely been produced and sold. Also see our recommendation 8 below.

In a future rule, EPA should require automakers to only produce in the early 2030s PHEVs with 50 miles or greater all-electric range, along with BEVs and fuel cell EVs. Due to the climate catastrophe, even more electrification will be required. However, for all the reasons provided in this letter, we do not believe the approach taken by the European Union to ban PHEVs is appropriate. Further, this current rulemaking by adopting our recommendations above will help lead to a transition in the 2030s to requirements for Strong PHEVs, BEVs and FCEVs.

MECA: MECA Clean Mobility: Finally, MECA suggests that EPA allow PHEVs certifying with all electric range greater than 50 miles to claim higher fleet utility factors, and consider scaling utility factor with a vehicle’s all electric range.

EDTA: New PHEVs’ driving range increased 8.5% in 2021 and that trend is expected to continue. The increase in all-electric operation capability will change consumer use patterns over the regulated period and the rule for 2027-2032 should reflect that in an updated utility factor.

AVE: Additionally, to comply with California’s Advanced Clean Cars II regulations, automakers are already announcing PHEVs that will greatly exceed California’s requirements. EPA should account for current and expected improved range for future PHEV models to determine the utility factor curve that should apply.

Betsy Cooper: Shorter ranges require more frequent charging, and make it more likely that drivers will need to charge in inconvenient locations away from home. And these annoyances may make it more likely that new PHEVs will rely on gas.

EPA Should Use Its Regulatory Authority to Incentivize Long-Range PHEVs. The EPA thus should use its regulatory process to encourage PHEV manufacturers to return long-train PHEVs to the market: by providing full off-cycle credits to those who give 50 or more miles of electric range. We propose a 50+ mile PHEV range requirement for full off-cycle credit. There is already momentum in favor of this standard; California is planning to require 50+ mile range PHEVs by 2035 [Link: https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035]. Moreover, even with battery degradation, a PHEV rated for 50+ miles at the point of sale will still cover the average American commute many years later.

The EPA may respond that its scaled utility factor already takes into account miles of range in its calculation. Even if true, by penalizing all PHEVs across the board, the EPA is incentivizing manufacturers to make fewer plug-in hybrid vehicles, period.

<u>Response:</u>

Our goal with the finalized FUF curve is to appropriately characterize the actual charge depleting share of driving distance for PHEVs in the rulemaking timeframe, rather than incentivizing PHEVs with certain ranges. However, our finalized FUF curve already provides an incentive for more capable PHEVs, based on operational data, with continuously higher FUF values for vehicles with greater charge depleting range. We do not believe that appropriately accounting for CO2 emissions of PHEVs incentivizes of or penalizes PHEVs; instead, it treats these vehicles equally compared to other technologies.

We don't currently have any evidence or data that vehicles above and below a particular range value (e.g. 70 miles 2-cycle charge depleting range and 40 miles all-electric US06 range, or 50-mile all-electric labeled range) are used in dramatically different ways that would support a discontinuous FUF curve. However, in the event that vehicle manufacturers or other stakeholders come forward in the future with additional PHEV data that could be used to inform future evaluations of the FUF, EPA is committed to working with stakeholders in conducting a future evaluation. If such evaluation were to support a proposed revision to the FUF, EPA could initiate a rulemaking to revise the FUF.

Requiring or incentivizing in-use data collection and reporting:

Summary:

California Air Resources Board (CARB) and Environmental Defense Fund (EDF), NACAA, and Strong PHEV Coalition made the following comments:

CARB: Given the variability in PHEV usage displayed to date, CARB recommends that U.S. EPA require auto manufacturers to collect and report in-use operational data at discrete intervals on PHEVs in future MYs. This would enable U.S. EPA to more accurately assess the GHG emissions associated with different PHEVs. Based on these data, EPA may then be better positioned to reassess the FUF curve for subsequent rulemakings.

Environmental Defense Fund (EDF): However, instead of relying fully on this new data for developing its UF curve, EPA proposes to average the two datasets, giving each an equal weight. Because, as discussed above, the ICCT- BAR UFs are a significantly better representation of real-world PHEV usage than EPA's current approach, EDF suggests that the agency rely solely on this data in setting its new UF curve. In addition to aligning EPA's default UF with the best available real-world data, we encourage the agency to provide manufacturers with an option to submit rigorous, real-world data to demonstrate their UFs are higher than these default values. An approach along these lines could allow for retrospective adjustment based on annual driving information submitted along with a manufacturer's compliance demonstration. An approach along these lines—a rigorous default UF combined with the option to certify better performance—would help to better reflect the actual emissions performance of PHEVs and provide incentives for manufacturers to develop and deploy PHEVs that operate more regularly on electricity.

NACAA: We also recommend that EPA require data collection and reporting or accessibility to better inform the methodology in the future.

Strong PHEV Coalition: EPA, in the final rule or future rule, should include a true-up system for automaker's FUF where debits or credits are provided based on actual data from on-board diagnostics and reporting by automakers of a fairly large sample. If EPA opts not to do this, we request that EPA should, at minimum, require manufacturers in this rulemaking to share anonymized actual data from PHEVs so that in future years, the EPA can make informed decisions about the FUF based upon real world data.

Response:

Thank you for your suggestion to collect and report in-use PHEV operational data. After careful consideration, EPA is not requiring manufacturers to collect or report data in this final rulemaking. EPA may consider mandatory data submission in the future and/or allow vehicle manufacturers to submit data to inform their own UF calculation.

However, in the event that vehicle manufacturers or other stakeholders voluntarily come forward in the future with additional PHEV data that could be used to inform future evaluations of the FUF, EPA is committed to working with stakeholders in conducting a future evaluation. If such evaluation were to support a proposed revision to the FUF, EPA could initiate a rulemaking to revise the FUF. EPA will continue to monitor real-world data as new BAR OBD datasets become available, or an OEM dataset becomes available.

Data collection and analysis post-rulemaking:

Summary:

Alliance for Automotive Innovation (AAI), Strong PHEV Coalition, Toyota, Consumer Reports (CR), and ICCT made the following comments:

AAI: We propose that industry, EPA, SAE, DOT, and the national laboratories collaborate on a project to acquire and process a large sample of nationwide PHEV data. This collaboration can be used to better understand the sources of variation and agree on logical data processing or filtering. If proven necessary, adjustments to SAE J2841 or advertised all-electric range, and other potential solutions can be explored following appropriate deliberation and peer review of the collaborative effort.

Strong PHEV Coalition: Further, we support EPA's desire to update the FUF in a future rulemaking when new data becomes available, and we commit to helping EPA acquire this data as we are a very data driven coalition that includes five universities (or similar research centers). Over time data derivable from CA BAR and other state's smog check programs will improve as more on-board diagnostic data becomes available which should be used in a future rulemaking with appropriate data quality testing, and improved methods.

In the longer term, EPA, the DOE, or the national labs should conduct an analysis on the value of PHEVs as a platform for low-carbon alternative fuels including whether to allow PHEVs with 85% or more low carbon liquid biofuels blended with gasoline to be treated as zero emission vehicles (ZEVs) in future EPA regulations. The main issue to be studied is feedstock availability in the long run for both diesel and gasoline substitutes that could be used in PHEVs to make them have lower life cycle emissions. Related environmental issues could be studied.

EPA should engage with experts to derive a data-driven FUF using more representative datasets and methods including those of the CARB-funded UC Davis data logger study, or the EV Project analysis. Another factor that we request EPA informally consider is that PHEV batteries typically use five times or less lithium per all-electric mile than battery EVs, and as a result save substantial amounts of GHG from battery manufacturing. Strong PHEVs have the same GHG footprint as a 300-mile range BEV and Strong PHEVs have much higher all-electric range than PHEVs with a low all-electric range. We support EPA not considering battery manufacturing GHG emissions in this rulemaking, but request that EPA informally include this factor when developing the final FUF.

Toyota: EPA requests any relevant performance or utility data that may help inform their analyses for the Final Rule. We appreciate the opportunity to share data which will help elevate the role PHEVs in the Final Rule to be an important part of a sustainable transition to electrification. We plan to share such PHEV data outside of the comment period, possibly, including confidential information. For now, we request EPA consider the data we have provided that suggests PHEVs should be considered be an important contributor in whatever assumed PEV sales mix.

We recommend EPA request SAE establish a consortium of auto companies, DOE, DOT, and other stakeholders to evaluate PHEV usage trends by architecture and performance capability. A first order of business should be determining a consensus method for measuring real-world EV range. The output of this effort should be a report that EPA would use to consider adjustments to the UF curve.

Consumer Reports (CR) CR agrees with EPA adjusting their approach to better match real-world use data. CR does not take a position on which of the proposed utility factor curves is the best option. However, CR does recommend that EPA periodically update their analysis of real-world PHEV usage as more vehicles are sold, and more data becomes available.

ICCT: However, because there is no guarantee that future PHEV models will achieve the assumed higher electric driving shares, the best practice is to let the data dictate the shape of the UF curve. EPA can establish a provision by which it can adjust the UF curve to better account for PHEVs with varying all-electric range, as additional data is collected. To simultaneously ensure PHEVs are not given too-high UF without disincentivizing longer all-electric range PHEVs, EPA can allow manufacturers to provide publicly available, real-world data with accurate UF measurements that support higher FUF for specific PHEV models.

Response:

EPA appreciates commenters acknowledgement of the importance of data collection. As discussed in the preamble, EPA is committed to an ongoing evaluation of future PHEV UF data to assess whether the revised UF is in fact adequately representative of future PHEV operation, as a result of future PHEV designs and consumer charging behavior, or if there is merit in further adjusting the UF. EPA will continue to gather and monitor publicly available data such as that made available by California BAR. EPA will also collect, and monitor data extracted from available in-use PHEV testing and may further supplement the data set through other data gathering mechanisms, such as work done by the Department of Energy or independent contractors and researchers. Although vehicle manufacturers chose not to submit data as part of their public comments, EPA believes that with additional time it is reasonable to project that vehicle manufacturers can gather the same type of data, and in greater quantities, on their own PHEV models than available to EPA through the California BAR; we encourage auto manufacturers to share such data with EPA to inform this future assessment. Thus, second, EPA encourages researchers and other stakeholders, including manufacturers, to supplement the publicly available data by providing data directly to EPA for inclusion in an updated analysis. Stakeholders will also be encouraged to independently assess the publicly available data and provide individual conclusions.

EPA's task in this rulemaking is to evaluate the expected use of the secondary fuel used on these dual fuel vehicles and properly give credit much like EPA does when assigning the F-factor for E85 Vehicles. EPA may reevaluate the utility factor in the coming years as more data becomes available.

EPA appreciates the comments on including battery manufacturing GHG emissions in a future FUF rulemaking; however, this is beyond the scope of this current rulemaking.

3.1.7 - LDV small volume manufacturer standards

Comments by Organizations

Organization: Ad Hoc Small OEM Group

B. Overview

-The US sales of Small OEMs have a minuscule impact on US air pollution. [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-The US sales of Small OEMs represent a tiny fraction of the US automobile market [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Together the companies in the Ad Hoc Group accounted for about 4000 car sales in the US in CY 2022 [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-If we just look at the Small Businesses in the Ad Hoc Group, they collectively sold about 100 cars in the US in 2022. [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-In addition, Small OEM vehicles drive far fewer miles than the average car. Typical Small OEM vehicle lifetime mileage is around 60,000 miles. [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Lower lifetime Vehicle Miles Travelled (VMT) is typical for Small OEM vehicles because they are niche vehicles bought by enthusiasts and collectors, who typically own numerous cars used only for short, occasional rides. [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

The combination of low sales volumes plus low VMT means that the actual real world pollution impact of Small OEM vehicles is de minimis. This key fact supports granting Small OEMs extra lead-time and flexibility [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Small OEMs are distinct from large volume manufacturers [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

Small OEMs are different from large volume manufacturers because Small OEMs have: [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Limited product portfolios [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Limited number of drivetrains [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Limited financial and human resources, and [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Longer product development times and vehicle life cycles [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

The above facts: [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Restrict Small OEMs' ability to meet frequent and significant increases in the stringency of standards [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

-Make it unreasonable to expect Small OEMs to meet fleet average standards aimed at large OEMs [EPA-HQ-OAR-2022-0829-0563, pp. 1-2]

II. EPA'S NPRM FAILS TO PROVIDE SMALL OEMS WITH SUFFICIENT AND REASONABLE LEAD-TIME AND FLEXIBILITY

A. In General

EPA has recognized in prior criteria pollutant and GHG rulemakings that special flexibility rules for Small OEMs are appropriate. Historically, EPA has therefore had a policy for many years to allow SVMs to skip phase-ins and comply100% at the end of the phase-in period. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

The GHG rules and the Tier 3 rules provided even further SVM and Small Business flexibility. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

Tier 3 included a separate SVM-only compliance pathway for a period of 10 years with specific SVM-only fleet average requirements. This flexibility in 40 CFR 86.1811-17(h) -- specifically for SVMs -- was the result of extensive SVM discussions with EPA during the Tier 3 rulemaking. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

Similarly, the GHG rules to date have both afforded Small Businesses an exemption from GHG requirements as well as provided an SVM procedure for company-specific GHG standards. These flexibilities were also the result of extensive Small OEM input to EPA. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

In both the Tier 3 and GHG rulemakings, EPA promulgated these flexibilities after acknowledging that SVMs and Small Businesses are distinct from large volume manufacturers and special provisions for Small OEMs were necessary and proper. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

Significantly, California has very recently reaffirmed the appropriateness of special SVM provisions in promulgating the CARB 2022 Advanced Clean Cars II (ACCII) rulemaking. EPA should follow this approach. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

-The NPRM, does not sufficiently consider the proposal's effect on SVMs and Small Businesses [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

Unlike in past rulemakings, EPA's multi-pollutant NPRM, fails to adequately address SVM and Small Business issues -- and EPA does not explain why it did not do so.1 The proposal has no provision for Small OEM lead-time / flexibility with respect to criteria emissions. This omission is a significant, unreasonable and unexplained change of policy. The NPRM also proposes to revamp SVM alternative GHG standards by sweeping SVMs into the large volume rules. The manner in which EPA proposes to do this will result in significant hardship for SVMs without achieving meaningful air quality benefits. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

1 On the positive side, we do acknowledge that the NPRM

-SVMs may delay complying with the proposed new Tier 4 OBD requirements until model year 2030; [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

-OEMs can count BEVs in their Tier 4 fleet average calculations; [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

-Small entities have certain exemptions from the 86.1815 Battery-related requirements for electric vehicles and plug-in hybrid (but no special provisions for SVMs); [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

-Continues the current GHG exemption for small entity manufacturers. [EPA-HQ-OAR-2022-0829-0563, pp. 2-3]

Under the Clean Air Act, EPA must recognize and fully consider the impacts of its proposed standards on Small OEMs and must promulgate standards that are feasible for Small OEMs. [EPA-HQ-OAR-2022-0829-0563, pp. 3-4]

In the NPRM Preamble, EPA states as follows:

The Administrator finds that the standards proposed herein are consistent with EPA's responsibilities under the CAA and appropriate under CAA section 202(a). EPA has carefully considered the statutory factors, including technological feasibility and cost of the proposed standards and the available lead time for manufacturers to comply with them. Based on our analysis, it is our assessment that the proposed standards are appropriate and justified under section 202(a) of the CAA. Our analysis for this proposal supports the preliminary conclusion that the proposed standards are technologically feasible and that the costs of compliance for manufacturers would be reasonable. [EPA-HQ-OAR-2022-0829-0563, pp. 3-4]

As regards Small OEMs, we do not agree with the above EPA conclusions. First, Small OEMs are not mentioned in the above conclusion. Furthermore, the NPRM provides no support for the applying the above conclusions to Small OEMs. In this regard, the Preamble has an entire section (“V”) on “EPA's Basis That the Proposed Standards Are Feasible and Appropriate Under the Clean Air Act”, but nowhere in that section are the terms “Small Volume Manufacturer” or “Small Business” mentioned. [EPA-HQ-OAR-2022-0829-0563, pp. 3-4]

We further believe that the NPRM’s proposed Small OEM standards and trajectories do not meet the requirements of CAA § 202(a) that standards “take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such a period.” [EPA-HQ-OAR-2022-0829-0563, pp. 3-4]

EPA should reconsider its proposed provisions from a Small OEM impact viewpoint, determine what is feasible for Small OEMs, and finalize Small OEM rules that are consistent with what Small OEMs can achieve. Small OEM rules must have emissions levels and an incremental phase-in with periods of stability, all of which reflect both the limited resources of Small OEMs and the specialized nature and limited sales of their products. [EPA-HQ-OAR-2022-0829-0563, pp. 3-4]

-EPA’s apparent misunderstanding of what Small OEMs are selling in the US [EPA-HQ-OAR-2022-0829-0563, pp. 4-5]

And EPA’s apparent misunderstanding of who is selling what in the US may also extend beyond the Small Business segment of the industry to the larger SVM segment as well. All SVMs in the AD Hoc Group sell ICE vehicles. Nowhere in the Draft RIA does the term “small volume manufacturer” even appear, and the Draft RIA thus also fails to address the SVM segment of the industry. We question to what extent EPA has considered the NPRM’s impact on SVMs. [EPA-HQ-OAR-2022-0829-0563, pp. 4-5]

Small OEMs cannot effectively fleet average

Perhaps the absence of Small OEM extra lead-time and flexibility may also be the result of EPA’s incorrect assumptions. One assumption supporting the NPRM which is not applicable to Small OEMs is that all OEMs have the ability to average the emissions of their various test groups in order to meet a fleet standard. Small OEMs have long maintained – and do so again here -- that with only one or two high-performance test groups, they cannot use “fleet averaging” as a compliance strategy and therefore have needed, and still need, the long-standing EPA policy affording extra lead-time and flexibility to Small OEMs. In the absence of such flexibility, a fleet average standard becomes in effect a REQUIRED (BIN) STANDARD for these Small OEMs. [EPA-HQ-OAR-2022-0829-0563, p. 5]

Significantly, because Small OEMs cannot effectively utilize fleet averaging, without extra flexibility and lead-time, they are placed at a distinct competitive disadvantage in the marketplace. Why? Because Small OEMs must compete with niche products of large OEMs who CAN fleet average. [EPA-HQ-OAR-2022-0829-0563, p. 5]

-It is improper for EPA to justify the stringency of a standard on the theoretical availability of credits for sale – especially when EPA knows that a Small OEM would have to rely predominantly/entirely on credits from another manufacturer to maintain compliance [EPA-HQ-OAR-2022-0829-0563, p. 5]

EPA projects that SVM fleets on average, and individually, will exceed the proposed standards, thereby requiring purchased credits in order to continue selling vehicles in the US. EPA therefore justifies the standards it has proposed for Small OEMs on the assumption that credit purchasing will be the means for Small OEMs to achieve compliance. We strongly believe that this regulatory approach in fundamentally unfair. [EPA-HQ-OAR-2022-0829-0563, pp. 5-6]

Relying on credits from another manufacturer is an illusory compliance option without some impartial mechanism supporting the availability of credits. The decision to sell credits, who to sell them to, what price to sell them at, and when to sell them (or to keep them for later use or future value) is a business decision 9f the selling manufacturer. There is nothing that requires a manufacturer to sell its credits, or to sell them to a particular party. Realistically speaking, how can a reasonable Small OEM business plan be based on buying credits? [EPA-HQ-OAR-2022-0829-0563, pp. 5-6]

[Non-footnote statement at the bottom of page: Interestingly, the SBREFA processes for EPA’s Tier 2 and Tier 3 rulemakings DID include foreign Small Businesses. See Final Report of the Small Business Advocacy Review Panel on EPA's Planned Proposed Rule Control of Air Pollution from New Motor Vehicles: Tier 3 Emission and Fuel Standards (October 14, 2011) [EPA-HQ-OAR-2022-0829-0563, pp. 5-6]

Final Report of the SBREFA Small Business Advocacy Review Panel on EPA's Planned Proposed Rule for Tier 2 Light- Duty Vehicle and Light-Duty Truck Emission Standards, Heavy-Duty Gasoline Engine Standards, and Gasoline Sulfur Standards (October 26, 1998)] [EPA-HQ-OAR-2022-0829-0563, pp. 5-6]

It is interesting –and we have pointed this out in the past -- that on the one hand EPA justifies its standard setting on the basis that credits can be bought, but on the other hand, EPA steadfastly maintains that it will not get involved in credit trading and leaves it to the free market. As a result, the availability and cost of credits is inherently risky, including the risk that credit-generating manufacturers may strategically withhold credits to limit Small OEM market access. [EPA-HQ-OAR-2022-0829-0563, pp. 5-6]

And finally, compliance with EPA's proposed standards is largely premised on very high levels of electrification. If EPA's projections are incorrect, and sales of electric vehicles are not as high as expected, many manufacturers will likely need to hold onto credits to maintain their own compliance. [EPA-HQ-OAR-2022-0829-0563, p. 6]

-It is critical that EPA

-Acknowledge that for Small OEMs to achieve fleet electrification, they face challenges that can be particularly acute given their limited resources and the high-performance nature of Small OEM product lines, which necessitates lighter- weight, high-density batteries. Overcoming these challenges requires time. [EPA-HQ-OAR-2022-0829-0563, p. 6]

-Understand that given these technical challenges facing Small OEMs seeking to electrify their lightweight sports cars, it is not possible for them to reduce emissions to the level set for Large Volume Manufacturers on the timetable set for Large Volume Manufacturers. [EPA-HQ-OAR-2022-0829-0563, p. 6]

-Recognize that requiring Small OEMs to do so would be contrary to the Clean Air Act's mandate that EPA provide sufficient lead-time "to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within [the lead-time] period." [EPA-HQ-OAR-2022-0829-0563, p. 6]

-Adhere to past EPA precedent and established policy providing Small OEM flexibility and extra lead-time [EPA-HQ-OAR-2022-0829-0563, p. 6]

-Set the Small OEM standards and trajectory with step-downs whose frequency and degree reflect the realities facing Small OEMs as regards limited product lines, longer product development and life cycles [EPA-HQ-OAR-2022-0829-0563, p. 6]

-Seriously consider harmonizing as much as possible with the CARB 2022 [EPA-HQ-OAR-2022-0829-0563, p. 6]

Advanced Clean Cars II (ACCII) rulemaking with regard to special Small OEM provisions [EPA-HQ-OAR-2022-0829-0563, p. 6]

1. CRITERIA EMISSIONS

-EPA cannot "move the NMOG+NOx goalpost" for MY 27 and 28 [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

EPA proposes to abandon the MY 27 and 28 SVM NMOG+NOx standards set forth in Tier 3 (and on which SVMs have been rightfully relying), and to require SVMs to adhere to the Tier 4 large volume (and short) phase-in. [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

This inequitably conflicts with the already-established and in effect SVM phase-in set forth in 40 CFR 86.1811-17 (h)(1), as follows:

SVM Fleet Average NMOG+NOx Standard (mg/mile)

Model year: 2027 In effect Tier 3: 51 Proposed Tier 4: 22

Model year: 2028 In effect Tier 3: 30 Proposed Tier 4: 20

[EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

The NPRM's proposed change means that in MY 27, SVMs would have to meet a fleet average NMOG+NOx standard that is 57% more stringent than what they have been planning in reliance on 40 CFR 86.1811-17(h)(1). And then, for MY 28, they would have to meet a fleet average NMOG+NOx standard that is 33% lower than what they have been planning in reliance on 40 CFR 86.1811-17(h)(1). This would be an unjust and impermissible "moving the goalpost". [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

-The proposed NMOG+NOx requirements are excessively stringent for Small OEMs – too stringent, too soon [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

This is especially so considering the starting point of existing Tier 3 levels and how the CARB ACCII rulemaking appropriately maintained an SVM NMOG+NOx fleet standard of 51 mg/mi through MY 34, as shown shown in the graph below. [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

[See original attachment for graph titled "SVM FTP NMOG+NOx LIMIT 9g/mi] [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

EPA assumes that OEMs will move to electrification in order to meet the Tier 4 standards. As Small OEMs have explained, however, the batteries necessary to provide performance and range required by Small OEM sports cars is not yet available, and thus Small OEMs cannot move forward with EVs on the same timeline as Large Volume Manufacturers producing mass market vehicles. [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

The Proposed Tier 4 NMOG+NOx fleet average is unrealistic for companies that cannot make use of fleet averaging; Small OEMs should not have to rely on credit purchasing [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

There is no recognition in the NPRM that an SVM may have only one or two ICE test groups, neither of which meets the Tier 4 fleet NMOG+NOx average. The fleet average concept in such a situation offers no flexibility; having nothing to "average", such an SVM would simply fall into a deficit situation. It was precisely to address this type of scenario that the Tier 3 SVM flexibility provisions in 40 CFR 86.1811-17(h) were promulgated. The current rulemaking should follow suit and adopt comparable SVM flexibility. [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

As regards credit purchasing, we reiterate how it is unfair to force Small OEMs to rely on risky credit purchasing (at an unknown cost) in order to meet criteria emissions requirements. [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

-Bin 125 should remain available to Small OEMs [EPA-HQ-OAR-2022-0829-0563, pp. 6-8]

Moreover, the NPRM also proposes to eliminate Bin 125, a Bin currently relied upon by SVMs. Eliminating Bin 125 would bring about the severe result of preventing some hypercar manufacturers from certifying with EPA and from selling in the Federal US market. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

For other SVMs, the elimination of Bin 125 would be unfair and unreasonable because it would put them in the untenable position of having to, with limited resources, simultaneously implement EVs while also investing in an attempt to reengineer Bin 125 vehicles to a much more stringent standard. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

Bin 125 should be kept in place for the exclusive use of SVMs, as California has permitted. CARB ‘s ACCII rules allow SVMs to continue to use Bin 125 until 2035. EPA should follow suit. Retaining Bin 125 for SVMs is simply not contrary to the goal of cleaner air. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-The Proposed Interim Tier 4 provision does not provide flexibility to SVMs

We note that one general flexibility concession in the NPRM -- the category of “Interim Tier 4 vehicles” -- does not provide relief to SVMs. As proposed, the Interim Tier 4 provision leaves SVMs empty-handed because the benefits of Interim Tier 4 are restricted to OEMs who can otherwise meet the 40% and 80% phase-in percentages with their full Tier 4 test groups (and thus use the Interim Tier 4 category for the remaining 60% and 20% of their fleets during the phase in). Given that SVMs – particularly those with only one or two test groups -- cannot meet the phase-in percentages with full Tier 4 cars, EPA’s proposal unfairly denies SVMs the ability to make use of the benefits of the Interim Tier 4 category. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-In sum, as regards criteria emissions, EPA: [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-Should follow CARB’s ACCII rules and continue the availability of Bin 125 to SVMs through MY 2034. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-Must justify imposing on SVMs the proposed new cold NMOG+NOx standard; until EPA can establish that the environmental benefits outweigh the burdens on SVMs, SVMs should be exempted. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-With regard to NMOG+NOx FTP and US06 standards [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-In order to properly account for the problems facing SVMs with regard to “fleet averaging” and the risks of credit purchasing, as explained above, set [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-The degree and frequency of SVM step-downs to reflect SVM realities -- limited product lines, longer product development and life cycles [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-MY 2027 -- Maintain for all SVMs the already-in effect (86-1811-17(h) MY 27 Tier 3 SVM NMOG+NOx standard (51m g/mi) [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-MY 2028 -- Maintain for all SVMs the already-in effect MY 28 Tier 3 SVM NMOG+NOx standard (30 g/mi) [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-MY 2029-32 – continue the 30 mg/mi standard for SVMs given that the doubtful environmental benefits of a more stringent SVM standard are vastly outweighed by the burden on SVMs. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-Make the Interim Tier 4 category more flexible and available to Small OEMs [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

-Add a new paragraph (e) to proposed 40 CFR 86.1811-27 to read as follows:

(e) If meeting the standards set forth in this section 40 CFR 86.1811-27 would cause severe economic hardship, small-volume manufacturers may ask us to approve an extended compliance deadline under the provisions of 40 CFR 1068.250, except that the solvency criterion does not apply and there is no maximum duration of the hardship relief. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

This provision would mirror the SVM relief made available under Tier 3 in 40 CFR 86.1811-17. [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

The above steps are necessary to comply with the Clean Air Act's section 202(a) mandate that EPA provide sufficient lead-time "to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such [lead-time]." [EPA-HQ-OAR-2022-0829-0563, pp. 8-9]

2. GHG

-EPA's Small OEM GHG policy must be fair and equitable. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

As explained by the Alliance for Automotive Innovation, the NPRM's GHG standards are a bridge too far for large automakers. https://www.autosinnovate.org/posts/blog/epas-rules-are-out-of-whack-five-ways-to-fix-them . They are especially onerous for Small OEMs. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

As explained above, Small OEMs need extra time and flexibility for GHG compliance. The Ad Hoc Group's GHG position is therefore founded on two main points:

-Small Businesses should, as EPA has proposed, continue to be exempted from GHG requirements [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-The current system of setting company-by-company SVM alternative standards should be eliminated as unwieldly -- too time-consuming and burdensome for all parties – and replaced with reasonable and achievable separate GHG standards for all SVMs [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

The set of SVM GHG standards would be separate from the large volume standards and would reflect the challenges faced by SVMs, discussed above, while still requiring SVMs to make significant GHG improvement. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

Simply requiring Small OEMs to switch to the large volume standards over a short period of time would impose a dramatic increase in stringency of the GHG standard applicable to SVMs (from MY 24 to 25). In fact, the standard's level would drop precipitously, akin to falling off a cliff, and this is both unfair and unachievable. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-Small OEMs cannot rely on fleet averaging or GHG credits as a compliance strategy

As discussed above, SVMs cannot use averaging as a successful compliance strategy. In addition, forcing SVMs to use credits as a primary if not exclusive compliance strategy is both unfair and improper, and this is especially so as regards GHG since SVMs expect the open market availability of GHG credits to decline starting in 2026MY when the phase-in of changes to MPGe begins to affect the ability of manufacturers of PHEVs and BEVs to generate GHG credits.4 [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

4 The Small OEM GHG situation is also exacerbated by the following:
-EPA proposes to eliminate AC leakage credits (we do not fully understand why the goal of fighting climate change demands this) [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]
-The NPRM would maintain AC Efficiency Credits (which we support) but the NPRM test procedure unfairly penalizes SVMs who cannot provide suitable test samples to perform the test as proposed. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-In sum, as regards GHG, EPA should proceed as follows:

-For Small Businesses -- continue the existing GHG exemption for Small Businesses5

-For SVMs

-For MY 22, 23, 24 and 25 -- for SVMs that have been granted alternative bespoke standards in the 2020 notice Federal Register :: Determinations of Light-Duty Vehicle Alternative Greenhouse Gas Emissions Standards for Small Volume Manufacturers, continue for MY 22, 23, 24 and 25 the alternative standards for MY 21 set in the FR notice [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-For MY 2026 and later, eliminate company-by-company alternative SVM GHG standards [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-Instead, in order to properly account for the problems facing SVMs with regard to "fleet averaging" and the risks of credit purchasing (as discussed above), create a new regulatory provision applicable to all SVMs (using the definition of SVM in 40 CFR 86.1838-01) setting forth SVM standards and an SVM trajectory [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-The SVMs in the Ad Hoc Group who are not Small Businesses believe that [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-It is untenable that EPA's NPRM would require SVMs to have more than 50% BEVs in their fleet in MY2026 – a level far higher than that expected from Large Volume [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

Manufacturers under the Primary Standard phase-in starting in MY 2027. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-Reasonably achievable SVM CO2 levels and a feasible SVM trajectory are necessary to account for challenges and limitations specific to SVMs. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-An SVM-specific phase-in must understandably require a substantial GHG reduction by MY 2032, but it must also start with a period of stability in order to account for SVMs' limited product lines and limited availability/access to necessary technologies. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-EPA should therefore, in order to comply with the Clean Air Act's section 202(a) lead-time mandate:

-Set an SVM phase-in that requires in MY 2032 a 50% GHG reduction compared to MY 25 (e.g., compared to the average of the MY 25 alternative bespoke standards). [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-Establish a trajectory from MY 2026 to MY 2032 that has either a reasonable linear reduction or one or more reasonable stepped reductions. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

[See original attachment for graph titled "2022 + GHG Proposed Targets"] [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-Defer consideration of incorporating SVMs into the Primary Standard until a subsequent separate rulemaking. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

-Add a new paragraph to 40 CFR 86.1818-12 to read as follows:

(e) If meeting the standards set forth in this section 40 CFR 86.1818-12 would cause severe economic hardship, small- volume manufacturers may ask us to approve an extended-compliance deadline under the provisions of 40 CFR 1068.250, except that the solvency criterion does not apply and there is no maximum duration of the hardship relief. [EPA-HQ-OAR-2022-0829-0563, pp. 9-11]

5 EPA is requesting comment on the idea of imposing on Small Business manufacturers an annual production cap (e.g., 200-500 vehicles per year) on vehicles eligible for the Small Business GHG exemption. The Small Business members of the AD Hoc Group oppose any such cap on the grounds that setting a cap at a given level would be totally arbitrary, and the environmental benefits of any such cap are virtually nonexistent and are vastly outweighed by the potential burden.

Organization: Ad Hoc Tier 4 Light-Duty Small Manufacturer Group

II. EPA'S NPRM FAILS TO PROVIDE SMALL OEMS WITH SUFFICIENT AND REASONABLE LEADTIME AND FLEXIBILITY

A. IN GENERAL

EPA has recognized in prior criteria pollutant and GHG rulemakings that special flexibility rules for Small OEMs are appropriate. Historically, EPA has therefore had a policy for many years to allow SVMs to skip phase-ins and comply 100% at the end of the phase-in period. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

The GHG rules and the Tier 3 rules provided even further SVM and Small Business flexibility. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

Tier 3 included a separate SVM-only stepped increase in fleet average stringency over a designated period of time (apart from the large volume phase-in). This flexibility in 40 CFR 86.1811-17(h) -- specifically for SVMs -- was the result of extensive SVM discussions with EPA during the Tier 3 rulemaking. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

Similarly, the GHG rules to date have both afforded Small Businesses an exemption from GHG requirements as well as provided an SVM procedure for company-specific GHG standards. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

These flexibilities were also the result of extensive Small OEM input to EPA. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

In both the Tier 3 and GHG rulemakings, EPA promulgated these flexibilities after acknowledging that SVMs and Small Businesses are distinct from large volume manufactures and special provisions for them were necessary and proper. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

Significantly, California has very recently reaffirmed the appropriateness of special SVM provisions in promulgating its 2022 Advanced Clean Cars II (ACCII) rulemaking. EPA should follow this approach. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

- The NPRM, does not consider the proposal’s effect on SVM and Small Business [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

The problem here is that in EPA’s multi-pollutant NPRM, SVM and Small Business considerations have largely disappeared without explanation.[1] The proposal has no provision for Small OEM leadtime / flexibility with respect to criteria emissions. This omission is a significant and unreasonable change of policy. The NPRM also proposes to revamp SVM alternative GHG standards by sweeping SVMs into the large volume rules. The manner in which EPA proposes to do this will result in significant hardship for SVMs. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

1 On the positive side, we do acknowledge that the NPRM

- SVMs may delay complying with the proposed new Tier 4 OBD requirements until model year 2030; [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

- OEMs can count BEVs in their Tier 4 fleet average calculations; [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

- Small entities have certain exemptions from the 86.1815 Battery-related requirements for electric vehicles and plug-in hybrid (but no special provisions for SVMs); [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

- Continues the current GHG exemption for small entity manufacturers. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

Limited product portfolios and longer product development and life cycles restrict Small OEM ability to meet frequent and significant increases in stringency. [EPA-HQ-OAR-2022-0829-0509, pp. 2-3]

Simply put, EPA must recognize and fully consider the impacts of its proposed standards on Small OEMs, and must promulgate standards that are feasible as required by the Clean Air Act. We believe that the proposed Small OEM standards do not meet the requirements of CAA § 202(a) that standards "take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such a period." [EPA-HQ-OAR-2022-0829-0509, p. 3]

And EPA's apparent misunderstanding of who is selling what in the US may also extend beyond the Small Business segment to the larger SVM segment as well. All SVMs in the AD Hoc Group sell ICE vehicles. Nowhere in the Draft RIA does the term "small volume manufacturer" even appear, and the Draft RIA thus fails to address the SVM segment of the industry. Should we take this to mean that the NPRM's impact on SVMs was not thoroughly considered? [EPA-HQ-OAR-2022-0829-0509, pp. 3-4]

- Small OEMs cannot effectively fleet average [EPA-HQ-OAR-2022-0829-0509, pp. 3-4]

Perhaps the absence of Small OEM extra leadtime and flexibility may be the result of EPA's incorrect assumptions. One assumption supporting the NPRM which is not applicable to Small OEMs is that all OEMs have the ability to average the emissions of their various test groups in order to meet a fleet standard. Small OEMs have long maintained – and do so again here -- that with only one or two high-performance test groups, they cannot use "averaging" as a compliance strategy and have therefore needed, and still need, the long-standing EPA policy affording extra leadtime and flexibility to Small OEMs. [EPA-HQ-OAR-2022-0829-0509, pp. 3-4]

It is improper to set a standard so stringent that it requires a Small OEM to rely entirely on credits from another manufacturer to maintain compliance [EPA-HQ-OAR-2022-0829-0509, p. 4]

EPA projects that SVM fleets on average, and individually, will exceed the proposed standards, requiring purchased credits in order to continue selling vehicles in the US. EPA therefore relies on credit trading flexibility as a key means by which Small OEMs will maintain compliance with standards. We disagree with this approach. [EPA-HQ-OAR-2022-0829-0509, p. 4]

It is inappropriate to set a standard so stringent that it requires a manufacturer to rely entirely on credits from another manufacturer to maintain compliance. The decision to sell credits, who to sell them to, what price to sell them at, and when to sell them (or to keep them for later use or future value) is a business decision. There is nothing that requires a manufacturer to sell its credits, or to sell them to a particular party. [EPA-HQ-OAR-2022-0829-0509, p. 4]

It is interesting –and we have pointed this out in the past -- that on the one hand EPA justifies its standard setting on the basis that credits can be bought, but on the other hand, EPA steadfastly maintains that it will not get involved in credit trading and leaves it to the free market. As a result, the availability and cost of credits is inherently risky, including the risk that credit-generating manufacturers may strategically withhold credits to limit Small OEM market access. [EPA-HQ-OAR-2022-0829-0509, p. 4]

And finally, compliance with EPA's proposed standards is largely premised on very high levels of electrification. If EPA's projections are incorrect, and sales of electric vehicles are not as high as expected, many manufacturers will likely need to hold onto credits to maintain their own compliance. [EPA-HQ-OAR-2022-0829-0509, p. 4]

B. THERE ARE FOUR SPECIFIC TOPICS IN THE NPRM THAT ARE OF DEEP CONCERN TO SMALL OEMS

1. CRITERIA EMISSIONS

- You can't "move the goalpost" for MY 27 and 28 [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

EPA proposes to abandon the MY 27 and 28 SVM NMOG+NOx standards set forth in Tier 3 (AND ON WHICH SVMs HAVE BEEN RIGHTFULLY RELYING), and to require SVMs to adhere to the Tier 4 large volume (and short]) phase-in. [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

This inequitably conflicts with the already-established and in effect SVM phase-in set forth in 40 CFR 86.1811-17 (h)(1), as follows: [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

SVM Fleet Average NMOG+NOx Standard (mg/mile)

Model year: 2027; In effect Tier 3: 51; Proposed Tier 4: 22

Model year: 2028; In effect Tier 3: 30; Proposed Tier 4: 20 [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

The NPRM's proposed change means that in MY 27, SVMs would have to meet a fleet average NMOG+NOx standard that is 57% more stringent than what they have been planning in reliance on 40 CFR 86.1811-17(h)(1). And then, for MY 28, they would have to meet a fleet average NMOG+NOx standard that is 33% lower than what they have been planning in reliance on 40 CFR 86.1811-17(h)(1). This would be an unjust "moving the goalpost". [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

- The proposed NMOG+NOx requirements are excessively stringent – too stringent, too soon [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

This is especially so considering Tier 3 levels and that the CARB ACCII rulemaking appropriately maintained an SVM NMOG+NOx fleet standard of 51 mg/mi through MY 34, as shown shown in the graph below. [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

[See original attachment for "SVM FTP NMOG+NOx LIMIT [g/mi]"] [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

-The Proposed Tier 4 NMOG+NOx fleet average is unrealistic for companies that cannot make use of fleet averaging; Small OEMs should not have to rely on credit purchasing [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

There is no recognition in the NPRM that an SVM may have only one or two ICE test groups, neither of which meets the Tier 4 fleet NMOG+NOx average. The fleet average concept in such a situation offers no flexibility; having nothing to "average", such an SVM would simply fall into a deficit situation. It was precisely to address this type of scenario that the Tier 3 SVM flexibility provisions in 40 CFR 86.1811-17(h) were promulgated. The current rulemaking should follow suit and adopt comparable SVM flexibility. [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

As regards credit purchasing, we reiterate how it is unfair to force Small OEMs to rely on risky credit purchasing (at an unknown cost) in order to meet criteria emissions requirements. [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

- Bin 125 should remain available to Small OEMs [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

Moreover, the NPRM also proposes to eliminate Bin 125, a Bin currently relied upon by SVMs. EPA has not provided a reason why Bin 125 cannot be kept in place for the exclusive use of Small OEMs as California has permitted. CARB 's ACCII rules allow SVMs to continue to use Bin 125 until 2035. [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

The elimination of Bin125 is unfair and unreasonable as regards SVMs because it puts SVMs in the untenable position of having to, with limited resources, simultaneously implement EVs and also reengineer Bin125 vehicles to a much more stringent standard. [EPA-HQ-OAR-2022-0829-0509, pp. 4-6]

- The Proposed Interim Tier 4 provision does not provide flexibility to SVMs [EPA-HQ-OAR-2022-0829-0509, p. 6]

We note that one general flexibility concession in the NPRM -- the category of “Interim Tier 4 vehicles” -- does not provide relief to SVMs. As proposed, the Interim Tier 4 provision leaves SVMs empty-handed because – [EPA-HQ-OAR-2022-0829-0509, p. 6]

-The benefits of Interim Tier 4 are restricted to OEMs who can otherwise meet the 40% and 80% phase-in percentages with their full Tier 4 test groups (and thus use the Interim Tier 4 category for the remaining 60% and 20% of their fleets during the phase in). Given that SVMs – particularly those with only one or two test groups -- cannot meet the phase-in percentages with full Tier 4 cars, EPA’s proposal unfairly denies SVMs the ability to make use of the benefits of the Interim Tier 4 category. [EPA-HQ-OAR-2022-0829-0509, p. 6]

In sum, as regards criteria emissions, EPA should:

-Follow CARB’s ACCII rules and continue the availability of Bin 125 to SVMs through MY 2034 and not require NMOG+NOx limits for cold testing.[3] [EPA-HQ-OAR-2022-0829-0509, p. 6]

-With regard to NMOG+NOx FTP and US06 standards [EPA-HQ-OAR-2022-0829-0509, p. 6]

-In order to properly account for the problems facing SVMs with regard to “fleet averaging” and the risks of credit purchasing, as explained above, set the degree and frequency of SVM step-downs to reflect SVM realities -- [EPA-HQ-OAR-2022-0829-0509, p. 6]

limited product lines, longer product development and life cycles and limited access to technologies (particularly batteries). [EPA-HQ-OAR-2022-0829-0509, p. 6]

-MY 2027 -- Maintain for all SVMs the already-in effect (86-1811-17(h) MY 27 Tier 3 SVM NMOG+NOx standard (51m g/mi) [EPA-HQ-OAR-2022-0829-0509, p. 6]

-MY 2028 -- Maintain for all SVMs the already-in effect MY 28 Tier 3 SVM NMOG+NOx standard (30 g/mi) [EPA-HQ-OAR-2022-0829-0509, p. 6]

-MY 2029-32 – continue the 30 mg/mi standard for SVMs given that the environmental benefits of a more stringent standard have not been established and are vastly outweighed by the potential burden on SVMs. [EPA-HQ-OAR-2022-0829-0509, p. 6]

-Make the Interim Tier 4 category more flexible and available [EPA-HQ-OAR-2022-0829-0509, p. 6]

-Add a new paragraph (e) to proposed 40 CFR 86.1811-27 to read as follows:

(e) If meeting the standards set forth in this section 40 CFR 86.1811-27 would cause severe economic hardship, small-volume manufacturers may ask us to approve an extended compliance deadline under the provisions of 40 CFR 1068.250, except that the solvency criterion does not apply and there is no maximum duration of the hardship relief. [EPA-HQ-OAR-2022-0829-0509, p. 6]

This provision would mirror the SVM relief made available under Tier 3 in 40 CFR 86.1811-17. [EPA-HQ-OAR-2022-0829-0509, p. 6]

3 EPA must justify imposing on SVMs the proposed new cold NMOG+NOx standard. Until EPA can establish that the environmental benefits outweigh the burdens on SVMs, SVMs should be exempted.

2. GHG

- EPA's Small OEM GHG policy needs to be fair and equitable. [EPA-HQ-OAR-2022-0829-0509, p. 7]

As explained above, extra time and flexibility are very much needed by Small OEMs. Our GHG position is founded on two main points: [EPA-HQ-OAR-2022-0829-0509, p. 7]

-Small Businesses should, as EPA has proposed, continue to be exempted from GHG requirements [EPA-HQ-OAR-2022-0829-0509, p. 7]

-The current system of setting company-by-company SVM alternative standards should be eliminated as unwieldly -- too time-consuming and burdensome for all parties – and replaced [EPA-HQ-OAR-2022-0829-0509, p. 7]

We therefore propose that there be a separate GHG standard for all SVMs – separate from the large volume standard -- which requires significant GHG improvement, yet reflects the challenges faced by SVMs discussed above. [EPA-HQ-OAR-2022-0829-0509, p. 7]

Requiring a Small OEM to switch to large volume standards over a short period of time would impose a dramatic decrease in the GHG standard (from MY 24 to 25). Simply put, the standard would drop precipitously, akin to falling off a cliff. This is both unfair and unachievable. [EPA-HQ-OAR-2022-0829-0509, p. 7]

- Small OEMs cannot rely on fleet averaging or GHG credits as a compliance strategy [EPA-HQ-OAR-2022-0829-0509, p. 7]

As discussed above, SVMs cannot use averaging as a successful compliance strategy. In addition, forcing SVMs to use credits as a primary if not exclusive compliance strategy is both unfair and improper, and this is especially so as regards GHG since SVMs expect the open market availability of GHG credits to decline starting in 2026MY when the phase-in of changes to MPGe begins to affect the ability of manufacturers of PHEVs and BEVs to generate GHG credits. [EPA-HQ-OAR-2022-0829-0509, p. 7]

In sum, as regards GHG, EPA should

-Continue the existing GHG exemption for Small Businesses [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

-For MY 22, 23 and 24 -- for all SVMs that have been granted alternative bespoke standards in the 2020 notice Federal Register :: Determinations of Light-Duty Vehicle [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

Alternative Greenhouse Gas Emissions Standards for Small Volume Manufacturers, continue for MY 22, 23 and 24 the alternative standard for MY 21 set in the FR notice [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

- For MY 2025 and later, eliminate company-by-company alternative SVM GHG standards. [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

- Instead, in order to properly account for the problems facing SVMs with regard to “fleet averaging” and the risks of credit purchasing (as discussed above), create a new regulatory provision applicable to all SVMs (using the definition of SVM in 40 CFR 86.1838-01) setting forth [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

- SVM GHG targets (expressed as a multiple of the large volume GHG targets) and [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

- an SVM GHG trajectory. [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

-Recognize that given technical challenges in electrifying lightweight super cars it is not possible for SVMs to reduce GHG to level of set for large volume manufacturers by MY 2032. [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

-Set an SVM trajectory that has step-downs whose frequency and degree reflect the realities facing SVMs as regards limited product lines, longer product development and life cycles, and limited access to technologies (particularly batteries); [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

-Add a new paragraph to 40 CFR 86.1818-12 to read as follows: (e) e. If meeting the standards set forth in this section 40 CFR 86.1818-12 would cause severe economic hardship, small-volume manufacturers may ask us to approve an extended compliance deadline under the provisions of 40 CFR 1068.250, except that the solvency criterion does not apply and there is no maximum duration of the hardship relief]. [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

Organization: Alliance for Automotive Innovation

3.Allow Carry-Over Throughout the Duration of the Rule

The NPRM allows a three-year phase in from MY 2027 through MY 2029, but that phase-in is too quick of a transition. Auto Innovators recommends the use of carry-over throughout the duration of the rule. Requiring new data, for a vehicle that is carryover, for MY2030 and beyond adds unnecessary testing burden. [EPA-HQ-OAR-2022-0829-0701, p. 132]

VI. Small-Volume Manufacturer Provisions

Auto Innovators includes Ferrari and McLaren among its members. Both have U.S. sales of less than 5,000 units per model year and are considered small-volume manufacturers (SVM). Their low U.S. and global volumes result in lower access to suppliers and delayed access to supplier- provided technologies. They have limited, narrowly focused product lines that do not have significant redesigns every year, and that receive little flexibility from fleet emission averaging programs. [EPA-HQ-OAR-2022-0829-0701, p. 207]

The products of these small volume manufacturers are high-performance supercars and track cars that are nonetheless certified for on-road use. The purchasers of such vehicles expect high performance, including racetrack capability, even if most will not be used for racing and are constrained in on-road use by U.S. traffic laws and highway designs and conditions. [EPA-HQ-OAR-2022-0829-0701, p. 207]

Emissions from vehicles sold by small volume manufacturers are negligible. Despite generally having higher emission rates (grams per mile), their average lifetime mileage accumulation is extremely low – approximately 2,543 miles.313 EPA should consider the de minimis use of these vehicles when considering final standards under this rulemaking. [EPA-HQ-OAR-2022-0829-0701, p. 207]

313 U.S. Department of Transportation, National Highway Traffic Safety Administration, Exemptions From Average Fuel Economy Standards; Passenger Automobile Average Fuel Economy Standards (Proposed rule; proposed decision to grant exemption), 87 Fed. Reg. 39439, 39449 (Jul. 1, 2022).

Historically, EPA has recognized the unique design considerations and compliance challenges faced by SVMs. They have been provided with additional flexibilities such as alternative, less stringent standards and alternative phasedowns with periods of stability to address those challenges. [EPA-HQ-OAR-2022-0829-0701, p. 207]

These challenges and the need for additional flexibility remain pertinent for MY 2027 and later regulations. The customers of these companies will still demand high performance from any vehicle sold by these manufacturers. The challenges of limited, highly focused product lines will not be eased by vehicle electrification. Limited product portfolio and product development cycles mean the ability to make regular improvements is a challenge. Battery technology has not developed enough for application within high-performance supercars. Technology is developing and SVMs have plans to electrify further; however, time is needed. Supply chain access and lead-time challenges will continue and potentially grow given rapidly rising global demand for lithium-ion batteries and trends toward vertical integration by larger companies to secure critical mineral supplies. Furthermore, given low production volumes there is also limited ability to amortize expensive product development across a volume of products – R&D and investment payback is longer. This leads to SVMs having different investment cycles which will mean they will require additional time to comply with GHG and criteria pollutant regulations. [EPA-HQ-OAR-2022-0829-0701, pp. 207-208]

With this backdrop, we are concerned that EPA appears to now dismiss these challenges in general, proposing much reduced flexibility in MY 2027 and later. [EPA-HQ-OAR-2022-0829-0701, pp. 207-208]

A. SVM Greenhouse Gas Emissions Standards

EPA has proposed alternative greenhouse gas emission standards for SVMs. We appreciate that EPA has at least considered alternative standards. [EPA-HQ-OAR-2022-0829-0701, pp. 208-210]

1. Concerns with the Proposed SVM GHG Standards

a) Massive Increase in Stringency Without Lead-Time

Auto Innovators is concerned that EPA's proposal envisions a massive increase in stringency in MY 2025 SVM standards (a 53% average stringency increase314) with no lead-time. [EPA-HQ-OAR-2022-0829-0701, pp. 208-210]

314 Calculation by Auto Innovators based on the proposed targets for Ferrari and McLaren, assuming constant footprint and production.

EPA states, "SVM alternative standards established for MY 2021 would apply through MY 2024 to provide stability for SVMs so that SVMs have an opportunity to reduce their GHG emissions in future years." However, there is no lead-time provided. MY 2023 production has already begun, the start of MY 2024 production is imminent, and will certainly be underway by the time this proposal is finalized in early 2024, and MY 2025 could begin as early as January 2, 2024.315 Therefore, the lead-time provided by EPA's proposed MY 2025 alternative standards is at most approximately four months, and potentially less.316 [EPA-HQ-OAR-2022-0829-0701, pp. 208-210]

315 See 40 C.F.R. § 85.1502(a)(8).

316 Assuming a March 2024 final rule and a July 2024 start of MY 2024 production. EPA's proposal affects SVM GHG standards long before MY 2027. EPA has failed to provide any explanation of how circumstances for SVMs have changed so significantly that the revised requirements can be met in general and particularly without lead-time. The lack of lead-time may also raise reliance interest concerns.

b) Equitability of SVM GHG Standards

It is important for GHG policy to be fair and equitable. However, EPA's proposal would increase the stringency of SVM standards more rapidly than the primary standards with the goal of moving SVMs to the primary standard by 2032, another concern (Figure 76). [EPA-HQ-OAR-2022-0829-0701, pp. 208-210]

[See original comment for Figure 76: Cumulative GHG standard stringency increase relative to MY 2021, comparing the proposed SVM standards to the current and proposed primary standards.]317 [EPA-HQ-OAR-2022-0829-0701, pp. 208-210]

317 Calculation by Auto Innovators based on the current and proposed targets and assuming constant footprint and production mix.

c) Projected Technology Requirements of SVM GHG Standards

The technology requirements of EPA's proposal are also concerning. EPA estimates SVMs will be required to achieve a higher EV market share than the industry on average (Figure 77) [See original comment for Figure 77: EPA-Projected BEV Market Share for SVMs compared to other manufacturers.]318, while also rapidly improve remaining ICE vehicles (Figure 78). [See original comment for Figure 78: EPA-Projected ICE Improvement Rates for SVMS.]319 [EPA-HQ-OAR-2022-0829-0701, pp. 208-210]

318 Auto Innovators calculation based on data in EPA's proposal central analysis OMEGA […]vehicles.csv output file.

319 Auto Innovators calculation based on data in EPA's proposal central analysis OMEGA […]vehicles.csv output file.

d) EPA's Reliance on Credit Trading for SVMs to Meet the Proposed GHG Standards

Despite EPA's projections for rapid EV update and ICE improvement, EPA's modeling also suggests that SVMs will be required to heavily rely on credit trading flexibility to maintain compliance with GHG standards.320 We believe this is inappropriate for several reasons and demonstrates that the proposed alternative standards do not meet the requirements of CAA § 202(a) that standards "take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such a period." First, it is inappropriate to set a standard so stringent as to effectively require a manufacturer to entirely rely on another manufacturer to maintain compliance. Additionally, there is an inherent risk that even if a credit-generating manufacturer is willing to sell credits, the credits may be purchased by other parties before SVMs can access them. [EPA-HQ-OAR-2022-0829-0701, p. 211]

320 Credit purchase claim based on examination of EPA's proposal central analysis OMEGA output files for credit transactions, noting degree of credit balances listed as "PAST DUE". Such deficits would require credit purchases.

These proposed standards for SVMs do not meet the Clean Air Act's requirement to provide adequate time for the development and application of the necessary technologies (BEVs in the case of such rapid increases in stringency and overall stringency levels). They are also not equitable to those of other manufacturers given the significantly higher BEV market share required to meet them and the more rapid increases in stringency. [EPA-HQ-OAR-2022-0829-0701, p. 211]

2. Recommendations for SVM GHG Standards

Auto Innovators proposes the following approach to address these concerns:

We support EPA's proposal to sunset the individual application process for alternative standards. However, for the above reasons, we recommend that EPA maintain the approved MY 2021 individual standards through MY 2026. Such an approach would provide time to start implementing electrification-compatible technologies, help address lead-time concerns in general, and make the timing of later changes consistent with the model years EPA is focused on in this rulemaking. [EPA-HQ-OAR-2022-0829-0701, p. 211]

As described above, and related to overall industry concerns highlighted in Section I of these comments (EV Feasibility), SVMs are concerned with both the overall level of electrification likely required by EPA's proposed standards and the relatively greater improvements that EPA is proposing for SVMs relative to industry as a whole. For MY 2032 SVM alternative standards, we recommend that EPA address these concerns by requiring SVMs to improve their emissions levels by the same percentage as the primary standards require between MY 2026 (which would be based on MY 2021 for SVMs) and MY 2032. (E.g., 50% under the current proposal.) [EPA-HQ-OAR-2022-0829-0701, p. 211]

We suggest that the improvements be done as annual linear decreases. Figure 79 provides a generic demonstration of the above concepts. [See original attachment for Figure 79: Conceptual Illustration of Recommended SVM Alternative Standard Approach] [EPA-HQ-OAR-2022-0829-0701, p. 212]

EPA seeks to bring SVM targets into alignment with the primary 2032 targets. Given the unique challenges SVMs face as compared to full-line manufacturers, we believe it is too soon to propose a convergence of the alternative and primary standards. We respectfully suggest that EPA defer consideration of placing SVMs on the primary standards to a subsequent rulemaking. [EPA-HQ-OAR-2022-0829-0701, p. 212]

B. SVM Criteria Pollutant Standards

q) SVM Concerns with the Proposed Criteria Pollutant Standards

As described above, small-volume manufacturers face unique challenges in meeting very stringent emission regulations, particularly those premised largely on electrification. Such is also the case for criteria pollutant standards, particularly given that EPA has not proposed any additional flexibility for SVMs. [EPA-HQ-OAR-2022-0829-0701, pp. 212-213]

Under EPA's proposal, SVMs would need to meet the same criteria, air toxic, and particulate mater emission standards on the same schedule as large manufacturers with diverse product lines. EPA is also proposing to truncate a previously granted flexibility.321 [EPA-HQ-OAR-2022-0829-0701, pp. 212-213]

321 Under EPA's Tier 3 standards, small volume manufacturers were allowed to meet a 0.051 g/mile NMOG+NOx standard through MY 2027.

Historically, EPA has provided special provisions for meeting criteria pollutant emission standards, recognizing these manufacturers' challenges. Likewise, similar provisions are provided in CARB's ACC II LEV IV regulation. For this reason, Auto Innovators recommends that EPA align with the current California's emissions standards and related phase-in flexibilities for small volume manufacturers. This would be particularly helpful given the limited number of vehicle models in SVMs' portfolio and the additional time required to implement new technologies. [EPA-HQ-OAR-2022-0829-0701, pp. 212-213]

b) Recommendations for SVM Criteria Pollutant Standards

In particular we recommend that EPA include the following additional flexibilities for SVMs. These are largely based on the California ACC II approach. [EPA-HQ-OAR-2022-0829-0701, pp. 212-213]

- NMOG+NOx fleet average requirement of 0.051 g/mile (including BEVs). [EPA-HQ-OAR-2022-0829-0701, pp. 212-213]

- Availability of Bin 125 through MY 2034. [EPA-HQ-OAR-2022-0829-0701, pp. 212-213]

- SVM-specific phase-in provisions, allowing SVMs to defer compliance with new regulatory requirements until the end of the phase-in period granted under the primary regulations. (E.g., if the primary phase-in is 40/80/100, the SVM phase-in would be 0/0/100.) [EPA-HQ-OAR-2022-0829-0701, pp. 212-213]

Organization: Aston Martin Lagonda (AML)

Selling fewer than 5000 units per year in the US, AML qualifies as a small volume manufacturer (SVM) and has many specific dynamics and characteristics when it comes to design, manufacturing, sales, CO2 footprint and lifecycle of its vehicles compared to larger original equipment manufacturers (OEMs). The specific challenges of SVMs have long been recognised in US regulations, with the consistent provision of appropriate derogations. These flexibilities are especially important for an operationally independent SVM like AML because we are not part of a larger automotive group and therefore cannot access benefits from being part of a large manufacturer. [EPA-HQ-OAR-2022-0829-0566, pp. 1-2]

Furthermore, SVMs represent a tiny fraction of the US automobile market and have a minuscule impact on US air pollution. AML sold 977 cars in the US in 2022, which represents 0.03% of the total market. As SVMs contribute an extremely small fraction of CO2 emissions, EPA can offer levels of temporary but necessary flexibility, without compromising its overall policy ambition. [EPA-HQ-OAR-2022-0829-0566, pp. 1-2]

In addition, Aston Martin cars are typically not vehicles which are driven daily, but rather tend to be bought by enthusiasts and collectors, and are driven occasionally, mainly for shorter distances. As a result, the average annual mileage driven by these vehicles is likely to be drastically lower. Considering information from the EPA and the UK's Royal Automobile Club Foundation, we estimate due to this lower average usage, the CO2 emissions from an Aston Martin in the US per year amount to less than half that of the average US car. The combination of low sales volumes plus low vehicle miles travelled (VMT) means that the actual pollution impact of SVMs is de minimis. [EPA-HQ-OAR-2022-0829-0566, p. 2]

Limited product portfolios, fewer number of drivetrains, limited financial and human resources, and longer product development times and vehicle life cycles restrict SVMs' ability to meet frequent and significant increases in the stringency of standards and to meet fleet average standards aimed at large OEMs. [EPA-HQ-OAR-2022-0829-0566, p. 2]

The approach to provide flexibilities, as was done in the past, would enable AML to focus valuable resources on investment in the development and production of zero emission cars rather than diverting them to pay financial penalties imposed by any new regulation in the next few years. [EPA-HQ-OAR-2022-0829-0566, p. 2]

AML is committed to doing its fair share to introduce advanced technology at the earliest technically and commercially feasible opportunity. However special accommodation must be made for companies that took strategic decisions and made technological and financial commitments more than 5 years ago and are unable to make rapid adjustments to meet new regulations. [EPA-HQ-OAR-2022-0829-0566, p. 2]

We understand EPA's ambition and we share the goal of decarbonisation however we have some concerns regarding the proposed legislation. We outline our position and recommendations in the pages that follow. [EPA-HQ-OAR-2022-0829-0566, p. 2]

A. IN GENERAL: EPA'S NPRM FAILS TO PROVIDE SVMs WITH SUFFICIENT AND REASONABLE LEADTIME AND FLEXIBILITY

• EPA has recognized in prior criteria pollutant and GHG rulemakings that special flexibility rules for SVMs are essential. Historically, EPA has therefore had a policy for many years to allow SVMs to skip phase-ins and comply 100% at the end of the phase-in period. [EPA-HQ-OAR-2022-0829-0566, p. 3]

The GHG rules and the Tier 3 rules provided even further SVM flexibility. [EPA-HQ-OAR-2022-0829-0566, p. 3]

Tier 3 included a separate SVM-only compliance pathway for a period of 10 years with specific SVM only fleet average requirements. This flexibility is clearly articulated in 40 CFR 86.1811-17(h). [EPA-HQ-OAR-2022-0829-0566, p. 3]

Similarly, the GHG rules to date have both afforded Small Businesses an exemption from GHG requirements as well as providing a SVM procedure for company-specific GHG standards. [EPA-HQ-OAR-2022-0829-0566, p. 3]

In both the Tier 3 and GHG rulemakings, EPA promulgated these flexibilities after acknowledging that SVMs are distinct from large volume manufactures and special provisions for them were necessary and proper. [EPA-HQ-OAR-2022-0829-0566, p. 3]

California has very recently reaffirmed the appropriateness of special SVM provisions in promulgating the CARB 2022 Advanced Clean Cars II (ACCII) rulemaking. EPA should follow this approach. [EPA-HQ-OAR-2022-0829-0566, p. 3]

• The NPRM, does not sufficiently consider the proposal's effect on SVMs. [EPA-HQ-OAR-2022-0829-0566, p. 3]

Unlike in past rulemakings, EPA's multi-pollutant NPRM, fails to adequately address SVM issues - and EPA does not explain why it did not do so.1 The proposal has no provision for SVM lead-time/ flexibility with respect to criteria emissions. This omission is a significant, unreasonable and unexplained change of policy. The NPRM also proposes to revamp SVM alternative GHG standards by sweeping SVMs into the large volume rules. The manner in which EPA proposes to do this will result in significant hardship for SVMs without achieving meaningful air quality benefits. [EPA-HQ-OAR-2022-0829-0566, p. 3]

1 On the positive side, we do acknowledge that the NPRM

• SVMs may delay complying with the proposed new Tier 4 OBD requirements until model year 2030; [EPA-HQ-OAR-2022-0829-0566, p. 3]

• OEMs can count BEVs in their Tier 4 fleet average calculations; [EPA-HQ-OAR-2022-0829-0566, p. 3]

• Small business entities have certain exemptions from the 86.1815 Battery-related requirements for electric vehicles and plug-in hybrid (but no special provisions for SVMs); [EPA-HQ-OAR-2022-0829-0566, p. 3]

• Continues the current GHG exemption for small business entity manufacturers [EPA-HQ-OAR-2022-0829-0566, p. 3]

Due to their low volume, specialisms, and diversity, it is critical that the impact of regulations and standards for SVMs is fully understood when under development. Regulatory impact assessments catering to the different vehicle segments are required to ensure the impact is felt proportionately. Suitable lead times are required ahead of the introduction of new regulations. SVMs' products have much longer life cycles than mass market products, which is necessary to recover investment costs due to lower annual volumes of sales. Therefore limited product portfolios and longer product development and life cycles restrict SVMs' ability to meet frequent and significant increases in stringency. [EPA-HQ-OAR-2022-0829-0566, p. 3]

Under the Clean Air Act, EPA must recognize and fully consider the impacts of its proposed standards on SVMs and must promulgate standards that are feasible for SVMs. [EPA-HQ-OAR-2022-0829-0566, pp. 3-4]

In the NPRM Preamble, EPA states as follows:

The Administrator finds that the standards proposed herein are consistent with EPA's responsibilities under the CAA and appropriate under CAA section 202(a). EPA has carefully considered the statutory factors, including technological feasibility and cost of the proposed standards and the available lead time for manufacturers to comply with them. Based on our analysis, it is our assessment that the proposed standards are appropriate and justified under section 202(a) of the CAA. Our analysis for this proposal supports the preliminary conclusion that the proposed standards are technologically feasible and that the costs of compliance for manufacturers would be reasonable. [EPA-HQ-OAR-2022-0829-0566, pp. 3-4]

SVMs are not mentioned in the above conclusion and the NPRM provides no support for applying the above conclusions to SVMs. In this regard, the Preamble has an entire section ("V") on "EPA's Basis That the Proposed Standards Are Feasible and Appropriate Under the Clean Air Act", but nowhere in that section are the terms "Small Volume Manufacturer" or "Small Business" mentioned. [EPA-HQ-OAR-2022-0829-0566, pp. 3-4]

We believe that the NPRM's proposed SVM standards and trajectories do not meet the requirements of CAA§ 202(a) that standards "take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such a period." The reality is that SVMs do not have access to technology developed by larger OEMs or tier one suppliers and this difficulty has been recognised in prior EPA regulations. It is only fair that such derogations are provided for SVMs under these new rules. The ability of SVMs to make changes at the same rate as large companies has not changed, therefore appropriate legislative consideration is needed for SVMs. [EPA-HQ-OAR-2022-0829-0566, pp. 3-4]

EPA should reconsider its proposed provisions and finalize SVM rules that are consistent with the principles of an incremental phase-in with periods of stability, that are reflective of both the function and limited emissions contribution of SVM products, and without forcing SVMs to be overly-reliant on purchasing credits from other manufacturers. Note that compelling SVMs through a regulatory regime which forces credits to be purchased will limit the ability of SVMs to invest in EVs and other lower carbon technologies with R&D funds being allocated to pay for credits. This is not an effective way to enable technological progress by imposing a charge on a company which has no ability to make a rapid course correction. [EPA-HQ-OAR-2022-0829-0566, pp. 3-4]

- Understanding what SVMs are selling in the US

Neither with regard to criteria emissions nor GHG does EPA explain in the NPRM the paucity (verging on absence) of Small OEM flexibility or additional lead-time. A misstatement in the preamble may shed light on this: in the preamble (88 FR 29405) (May 5, 2023), EPA incorrectly states (as does the Draft Regulatory Impact Analysis) that the "proposed NMOG+NOx standards should have no impact on the existing Small Business manufacturers, which currently produce only electric vehicles." This is simply not so. There most certainly are SVMs that produce internal combustion engine (ICE) vehicles for the US market, AML being one of them. Nowhere in the draft RIA does the term "small volume manufacturer" even appear, and the draft RIA thus fails to address the SVM segment of the industry. Given that the EPA has consistently recognised the SVM category, it is unusual that it would bring forward punitive regulations at those companies less able to deal with heavy sanctions. [EPA-HQ-OAR-2022-0829-0566, p. 4]

- SVMs cannot effectively fleet average

One assumption supporting the NPRM which is not applicable to SVMs is that all OEMs have the ability to average the emissions of their various test groups in order to meet a fleet standard. SVMs have long maintained that with only one or two high-performance test groups, they cannot use "averaging" as a compliance strategy and have therefore needed, and still need, the long-standing EPA policy affording extra leadtime and flexibility to SVMs. In the absence of such flexibility, a fleet average standard becomes in effect a required (BIN) standard for these SVMs. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

This point further underlines the simple reality that large car makers can achieve lower averages, whereas an SVM with a narrow or niche offering of products simple does not have this ability to comply with the regulation. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

- It is improper to set a standard so stringent that it requires an SVM to rely entirely on credits from another manufacturer to maintain compliance

EPA projects that SVM fleets on average, and individually, will exceed the proposed standards, requiring purchased credits to continue selling vehicles in the US. EPA therefore relies on credit trading flexibility as a key means by which SVMs will maintain compliance with standards. We disagree with this approach. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

It is counterproductive to set a standard so stringent that it requires a manufacturer to rely entirely on credits from another manufacturer to maintain compliance. The decision to sell credits, who to sell them to, at what price to sell them, and when to sell them (or to keep them for later use or future value} is a business decision. There is nothing that requires a manufacturer to sell its credits, or to sell them to a particular party. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

This approach would prevent SVMs from focusing valuable resources on investment in the development and production of zero emission cars and instead divert resources to buy credits or pay financial penalties. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

On the one hand, EPA justifies its standard setting on the basis that credits can be bought, but on the other hand, EPA steadfastly maintains that it will not get involved in credit trading and leaves it to the free market. As a result, the availability and cost of credits is inherently risky, including the risk that credit-generating manufacturers may strategically withhold credits to limit SVMs' market access. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

And finally, compliance with EPA's proposed standards is largely premised on very high levels of electrification. If EPA's projections are incorrect, and sales of electric vehicles are not as high as expected, many manufacturers will likely need to hold onto credits to maintain their own compliance. [EPA-HQ-OAR-2022-0829-0566, pp. 4-5]

- It is critical that EPA:

- acknowledge that for SVMs to achieve fleet electrification, they face challenges that can be particularly acute given their limited resources and the high-performance nature of SVMs product lines, which necessitates lighterweight, high-density batteries. Overcoming these challenges requires time. [EPA-HQ-OAR-2022-0829-0566, pp. 5-6]

- understand that given these technical challenges facing SVMs seeking to electrify their lightweight sports cars, it is not possible for them to reduce emissions to the level set for Large Volume Manufacturers on the timetable set for Large Volume Manufacturers. [EPA-HQ-OAR-2022-0829-0566, pp. 5-6]

- recognize that requiring SVMs to do so would be contrary to the Clean Air Act's mandate that EPA provide sufficient lead-time "to permit the development and application of the requisite technologies, giving appropriate consideration to the cost of compliance within [the lead-time] period." [EPA-HQ-OAR-2022-0829-0566, pp. 5-6]

- adhere to past EPA precedent and established policy providing SVM flexibility and extra lead time set the SVM standards and trajectory with step-downs whose frequency and degree reflect the realities facing SVMs as regards limited product lines, longer product development and life cycles [EPA-HQ-OAR-2022-0829-0566, pp. 5-6]

- consider harmonizing as much as possible with the CARB 2022 Advanced Clean Cars II (ACCII) rulemaking with regard to special SVM provisions [EPA-HQ-OAR-2022-0829-0566, pp. 5-6]

B. THERE ARE FOUR SPECIFIC TOPICS IN THE NPRM THAT ARE OF DEEP CONCERN TO SVMs

1. CRITERIA EMISSIONS

- "Moving the goalpost" for MY 27 and 28 makes the trajectory exceptionally challenging for SVMs therefore appropriate derogations are essential. Special accommodation must be made for SVMs that took strategic decisions and made technological and financial commitments more than 5 years ago and are unable to make rapid adjustments to adapt to new regulation at pace. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

EPA proposes to abandon the MY 27 and 28 SVM NMOG+NOx standards set forth in Tier 3 (and on which SVMs have been rightfully relying), and to require SVMs to adhere to the Tier 4 large volume (and short) phase-in. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

This inequitably conflicts with the already established and in effect SVM phase-in set forth in 40 CFR 86.1811-17 (h)(l), as follows:

SVM Fleet Average NMOG+NOx Standard (mg/mile)

Model year: 2027: In effect Tier 3: 51; In effect Tier 4: 22

Model year: 2028: In effect Tier 3: 30; In effect Tier 4: 20 [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

The NPRM's proposed change means that in MY 27, SVMs would have to meet a fleet average NMOG+NOx standard that is 57% more stringent than what they have been planning in reliance on 40 CFR 86.1811-17(hl(l). And then, for MY 28, they would have to meet a fleet average NMOG+NOx standard that is 33% lower than what they have been planning in reliance on 40 CFR 86.1811-17(h)(l). This would be an unjust "moving the goalpost".[EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

- The proposed NMOG+NOx requirements are excessively stringent - too stringent, too soon This is especially so considering Tier 3 levels and that the CARB ACCII rulemaking appropriately maintained an SVM NMOG+NOx fleet standard of 51 mg/mi through MY 34, as shown in the graph below. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

[See original comment for bar graph of SVM FTP NMOG+NOx LIMIT [g/mi]]

- The Proposed Tier 4 NMOG+NOx fleet average is unrealistic for companies that cannot make use of fleet averaging; SVMs should not have to rely on credit purchasing. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

There is no recognition in the NPRM that an SVM may have only one or two ICE test groups, neither of which meets the Tier 4 fleet NMOG+NOx average. The fleet average concept in such a situation offers no flexibility; having nothing to "average", such an SVM would simply have no ability to comply and would fall into a deficit situation. It was precisely to address this type of scenario that the Tier 3 SVM flexibility provisions in 40 CFR 86.1811-17(h) were promulgated. The current rulemaking should follow suit and adopt comparable SVM flexibility. [EPA-HQ-OAR-2022-0829-0566, p. 7]

As regards credit purchasing, we reiterate how it is unfair to force SVMs to rely on risky credit purchasing (with unknown availability and at an unknown cost) to meet criteria emissions requirements. [EPA-HQ-OAR-2022-0829-0566, p. 7]

- Bin 125 should remain available to SVMs

Moreover, the NPRM also proposes to eliminate Bin 125, a Bin currently relied upon by SVMs. EPA has not provided a reason why Bin 125 cannot be kept in place for the exclusive use of SVMs as California has permitted. CARB 's ACCII rules allow SVMs to continue to use Bin 125 until 2035. [EPA-HQ-OAR-2022-0829-0566, p. 7]

The elimination of Bin 125 is unfair and unreasonable as regards SVMs because it puts SVMs in the untenable position of having to, with limited resources, simultaneously implement EVs and also reengineer Bin 125 vehicles to a much more stringent standard. [EPA-HQ-OAR-2022-0829-0566, p. 7]

Bin 125 should be kept in place for the exclusive use of SVMs, as California has permitted. CARB's ACCII rules allow SVMs to continue to use Bin 125 until 2035. EPA should follow suit. Retaining Bin 125 for SVMs is simply not contrary to the goal of cleaner air. [EPA-HQ-OAR-2022-0829-0566, p. 7]

- The Proposed Interim Tier 4 provision does not provide flexibility to SVMs [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

We note that one general flexibility concession in the NPRM -- the category of "Interim Tier 4 vehicles" -- does not provide relief to SVMs. As proposed, the Interim Tier 4 provision leaves SVMs empty-handed because the benefits of Interim Tier 4 are restricted to OEMs who can otherwise meet the 40% and 80% phase-in percentages with their full Tier 4 test groups (and thus use the Interim Tier 4 category for the remaining 60% and 20% of their fleets during the phase in}. Given that SVMs - particularly those with only one or two test groups -- cannot meet the phase-in percentages with full Tier 4 cars, EPA's proposal unfairly denies SVMs the ability to make use of the benefits of the Interim Tier 4 category. [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- In sum, as regards criteria emissions, EPA should:

- follow CARB's ACCII rules and continue the availability of Bin 125 to SVMs through MY 2034 and not require NMOG+NOx limits for cold testing.2 [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

2 EPA must justify imposing on SVMs the proposed new cold NMOG+NOx standard. Until EPA can establish that the environmental benefits outweigh the burdens on SVMs, SVMs should be exempted.

- with regard to NMOG+NOx FTP and US06 standards [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- In order to properly account for the problems facing SVMs with regard to "fleet averaging,, and the risks of credit purchasing, as explained above, set the degree and frequency of SVM step-downs to reflect SVM realities -- limited product lines, longer product development and life cycles [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- MY 2027 -- Maintain for all SVMs the already-in effect {86-1811-17{h} MY 27 Tier 3 SVM NMOG+NOx standard {51m g/mi} [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- MY 2028 -- Maintain for all SVMs the already-in effect MY 28 Tier 3 SVM NMOG+NOx standard (30 g/mi) [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- MY 2029-32 - continue the 30 mg/mi standard for SVMs given that the environmental benefits of a more stringent standard have not been established and are vastly outweighed by the potential burden on SVMs. [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- Make the Interim Tier 4 category more flexible and available [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- Add a new paragraph (e} to proposed 40 CFR 86.1811-27 to read as follows:

(e) If meeting the standards set forth in this section 40 CFR 86.1811-27 would cause severe economic hardship, small-volume manufacturers may ask us to approve an extended compliance deadline under the provisions of 40 CFR 1068.250, except that the solvency criterion does not apply and there is no maximum duration of the hardship relief [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

This provision would mirror the SVM relief made available under Tier 3 in 40 CFR 86.1811-17. [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

The above steps are necessary to comply with the Clean Air Act's section 202{a} mandate that EPA provide sufficient lead-time "to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such [lead-time].” [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

2. GHG

- EPA's SVM GHG policy needs to be fair and equitable.

The current system of setting company-by-company SVM alternative standards should be eliminated as unwieldly -- too time-consuming and burdensome for all parties - and be replaced. [EPA-HQ-OAR-2022-0829-0566, pp. 8-9]

We therefore propose that there be a separate GHG standard for all SVMs - separate from the large volume standard -- which still requires significant GHG improvement, yet reflects the challenges faced by SVMs discussed above. Requiring SVMs to switch to large volume standards over a short period of time would impose a dramatic decrease in the GHG standard (from MY 24 to 25). Simply put, the standard would drop precipitously, akin to falling off a cliff. This is both unfair and unachievable. [EPA-HQ-OAR-2022-0829-0566, pp. 8-9]

- SVMs cannot rely on fleet averaging or GHG credits as a compliance strategy

As discussed above, SVMs cannot use averaging as a successful compliance strategy. In addition, forcing SVMs to use credits as a primary if not exclusive compliance strategy is both unfair and improper, and this is especially so as regards GHG since SVMs expect the open market availability of GHG credits to decline starting in 2026MY when the phase-in of changes to MPGe begins to affect the ability of manufacturers of PHEVs and BEVs to generate GHG credits. [EPA-HQ-OAR-2022-0829-0566, pp. 8-9]

In sum, as regards GHG, EPA should:

For MY 22, 23, 24 and 25 -- for SVMs that have been granted alternative bespoke standards in the 2020 notice Federal Register :: Determinations of Light-Duty Vehicle Alternative Greenhouse Gas Emissions Standards for Small Volume Manufacturers, continue for MY 22, 23, 24 and 25 the alternative standard for MY 21 set in the FR notice [EPA-HQ-OAR-2022-0829-0566, pp. 8-9]

For MY 2026 and later, eliminate company-by-company alternative SVM GHG standards,

Instead, in order to properly account for the problems facing SVMs with regard to "fleet averaging" and the risks of credit purchasing (as discussed above), create a new regulatory provision applicable to all SVMs (using the definition of SVM in 40 CFR 86.1838-01) setting forth SVM standards and an SVM trajectory. [EPA-HQ-OAR-2022-0829-0566, pp. 9-10]

Reasonably achievable SVM CO2 levels and a feasible trajectory are needed to account for challenges and limitations specific to SVMs. EPA's NPRM proposal would require SVMs to have more than a 50% BEVs in their fleet in MY2026 - a level far higher than that expected from Large Volume Manufacturers under the Primary Standard phase-in starting in MY 2027. [EPA-HQ-OAR-2022-0829-0566, pp. 9-10]

There is a need for an SVM-specific phase-in requiring a substantial GHG reduction by MY 2032, but starting with a period of stability in order to account for SVMs' limited product lines and limited availability/access to necessary technologies. Therefore, EPA should: [EPA-HQ-OAR-2022-0829-0566, pp. 9-10]

Bring SVMs towards the Primary Standard via an SVM phased-in target reduction requiring a 50% GHG reduction in MY 2032 compared to MY 2025. [EPA-HQ-OAR-2022-0829-0566, pp. 9-10]

- Establish a trajectory from MY 2026 to MY 2032 that has either a linear reduction or one or more reasonable step changes. [EPA-HQ-OAR-2022-0829-0566, pp. 9-10]

- Defer consideration of incorporating SVMs into the Primary Standard until a subsequent separate rulemaking. [EPA-HQ-OAR-2022-0829-0566, pp. 9-10]

[See original attachment for 2022+ GHG Proposed Targets] [EPA-HQ-OAR-2022-0829-0566, pp. 9-10]

- Add a new paragraph to 40 CFR 86.1818-12 to read as follows: [EPA-HQ-OAR-2022-0829-0566, p. 10]

(e) If meeting the standards set forth in this section 40 CFR 86.1818-12 would cause severe economic hardship, small-volume manufacturers may ask us to approve an extended compliance deadline under the provisions of 40 CFR 1068.250, except that the solvency criterion does not apply and there is no maximum duration of the hardship relief. [EPA-HQ-OAR-2022-0829-0566, p. 10]

4. PARTICULATE MATTER

- EPA's proposed PM reduction to O.Smg/mi across the FTP and US06 and Cold Testing goes far beyond what SVMs are able to achieve in a short period of time [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

EPA's proposed PM reduction to 0.Smg/mi across the FTP and US06 and Cold Testing is an enormous increase in stringency over a short period of time. This is a regulatory combination that SVMs simply cannot meet. We recognize that the regulation of PM is headed towards necessitating the use of Gasoline Particulate Filters (GPF), but further research and development is needed with respect to GPF aging and monitoring for purposes of California OBD. This issue is not yet fully understood and requires more lead-time under the CAA section 202(a). [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

In addition, there are also technical issues and costs associated with measuring PM emissions below 1 mg/mile, and specialized, expensive test facilities may be needed to reliably measure PM at such a low level. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

It is thus unreasonable to impose the proposed PM standards and timetable on SVMs, especially considering the minimal environmental benefit obtained together with how drastic the proposed change is compared to existing Tier 3 levels and the CARB ACCII PM standards, as shown in the graph below. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

[See original attachment for bar graph of Tailpipe PM Limit [mg/mi]] [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

In sum, as regards SVMs and PM, EPA should harmonize with the CARB ACC/1 SVM PM approach as follows:

- FTP

-- For MY 2027-2028 -- 3 mg/mile.

-- For MY 2029 and later - 1 mg/mi. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

- SFTP

-- For MY 2027 - 2029 - 6 mg /mi

-- For MY 2030 and later - 3 mg/mi [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

- No Cold Testing for SVMs given that it is not yet fully understood what is needed to meet the 0.5mg standard at 20F with high-performance engines. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

We further note the above levels and timetable are consistent with the EU regulation of PM. GPFs will be necessary on all European engines in 2030 with the implementation of EU7's mandating PM measurement for both Port Fuel Injection Engines and Gasoline Direct Injection Engines. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Inclusion of Small Volume Manufacturers

U.S. EPA is proposing to include small volume manufacturers in its GHG program by MY 2032. CARB supports this proposal and finds that the lead time is appropriate. Under ACC II, CARB requires that small volume manufacturers comply with the annual ZEV sales requirement beginning with the 2035 MY and submit a compliance plan to CARB’s Executive Officer by 2032. The investments these small volume manufacturers make to comply with California’s policies will facilitate their compliance with U.S. EPA’s proposed standards. [EPA-HQ-OAR-2022-0829-0780, p. 26]

Organization: Environmental. and Public Health Organizations

XIV. EPA Should Finalize Its Proposed Changes for Small Volume Manufacturers.

We support EPA's proposal to transition small volume manufacturers ("SVMs") into the primary program standards by MY 2032.236 As illustrated in Table 37, the emissions standards presently applicable to SVMs are significantly less protective than those that apply to other manufacturers.237 For MY 2021, SVM standards ranged from 308-376 g/mile.238 By comparison, the revised footprint curve in SAFE 2 for passenger cars for MY 2021 was 161.8 to 220.9 g/mile.239 [EPA-HQ-OAR-2022-0829-0759, p. 98]

236 88 Fed. Reg. at 29197, 29255.

237 Id. at 29256.

238 Id.

239 84 Fed. Reg. 24174, 25268 (Apr. 30, 2020).

As EPA explains, there has been a significant shift in the vehicle market since EPA established the SVM alternative standards.240 For example, "[v]ehicle electrification technologies are currently being implemented across many vehicle types including both luxury and high-performance vehicles by larger manufacturers and EPA expects this trend to continue."241 In addition, as EPA notes, the credit trading market has become more robust since the SVM alternative standards were initially developed, expanding compliance options for SVMs. EPA concluded that "meeting the CO2 standards is becoming less a feasibility issue and more a lead time issue for SVMs."242 [EPA-HQ-OAR-2022-0829-0759, pp. 98-99]

240 88 Fed. Reg. at 29256.

241 Id.

242 Id.

EPA's conclusions that a transition of SVMs to the primary program coheres with the recent announcements and developments in the business model of the SVMs who have previously pursued less stringent standards. There are only four SVMs currently subject to less stringent standards: Ferrari, Aston Martin, Lotus, and McLaren. All are moving toward greater hybridization and electrification, which will facilitate compliance with the primary LDV GHG standards. [EPA-HQ-OAR-2022-0829-0759, p. 99]

Ferrari in 2022 announced plans to rapidly electrify its vehicle offerings, achieving 40% BEV sales by 2030 and 80% electrified (PHEV + BEV) vehicles.243 Ferrari already sells two PHEVs, the SF90 Stradale244 and the 296 GTB.245 Likewise, Aston Martin has committed to electrification. It will offer its first BEV in 2025 and has committed to having every model available with an electrified powertrain by 2026.246 It will begin delivering its first PHEV, the Valhalla, in 2024.247 Lotus is offering the all-electric Evija248 and Eletre SUV.249 The Eletre will be available in the United States beginning in 2024.250 And McLaren has recently developed its first hybrid vehicle, the Artura, and indicated that all its vehicles will eventually be gas-electric hybrids or electric-only.251 [EPA-HQ-OAR-2022-0829-0759, p. 99]

243 Michael Taylor, Ferrari to Go Electric in 2025, with 40% EV Sales by 2030, Forbes (June 16, 2022), https://www.forbes.com/sites/michaeltaylor/2022/06/16/ferrari-to-go-electric-in-2025-with-40-ev-sales-by-2030/?sh=7fd8646d66a2.

244 SF90 Stradale, Ferrari, https://www.ferrari.com/en-EN/auto/sf90-stradale (last visited June 29, 2023).

245 296 GTB, Ferrari, https://www.ferrari.com/en-US/auto/296-gtb (last visited June 29, 2023).

246 Eric Stafford, Aston Martin Is Going Electric, Launching Its First EV in 2025, Car and Driver (Apr. 22, 2022), https://www.caranddriver.com/news/a39798418/aston-martin-electric-lineup-reveal-first-ev-2025/.

247 Id.; see also Aston Martin Valhalla, Aston Martin, https://www.astonmartin.com/en-us/models/special-projects/valhalla (last visited June 29, 2023).

248 Evija, Lotus, https://www.lotuscars.com/en-US/evija (June 29, 2023).

249 Eletre, Lotus, https://www.lotuscars.com/en-US/eletre (last visited June 29, 2023).

250 Mike Duff, Lotus Moves to Float Its EV Division, Autoweek (Feb. 8, 2023), https://www.autoweek.com/news/green-cars/a42801104/lotus-moves-to-float-its-ev-division/.

251 Josh Max, McLaren Rolls Out the Hybrid 2023 Artura Supercar, Forbes (Jan. 5, 2023), https://www.forbes.com/sites/joshmax/2023/01/05/mclaren-throws-its-hat-into-the-electrichybrid-ring-with-the-2023-artura/?sh=42c0eb057746.

Based on the SVMs' active transition into hybrid and battery electric vehicles—with its attendant improvements in GHG emissions—the existence of a robust credit trading market, and the significant lead time proposed by EPA for transitioning the SVMs into the broader program, We support EPA's proposal. [EPA-HQ-OAR-2022-0829-0759, p. 99]

Organization: Ferrari N.V. and Ferrari North America, Inc.

Innovation runs within Ferrari, so the challenge of building a Ferrari for a low-emissions future is one that we are already embracing despite our negligible contribution to the total air pollutant emissions due to the low volumes and typical low average annual mileage. [EPA-HQ-OAR-2022-0829-0572, pp. 2-3]

FERRARI CONTRIBUTION

Ferrari fully supports and welcomes the climate protection initiatives of the United States (US) Government, provided that all stakeholders contribute their share, and that the achievements obtained so far are taken into account. [EPA-HQ-OAR-2022-0829-0572, pp. 2-3]

Saying that all stakeholders should contribute their part means that the negligible contribution to air pollutant emissions of vehicles registered in US and produced by SVMs should be taken into account in the Impact Analysis evaluations. [EPA-HQ-OAR-2022-0829-0572, pp. 2-3]

The even more negligible contribution to the total emissions of high performance vehicles registered in US and produced by low volume manufacturers due to the typical low mileage of 2,543 miles per year2 should also be considered. [EPA-HQ-OAR-2022-0829-0572, pp. 2-3]

2 Proposed Decision on "Exemption from Average Fuel Economy Standards", National Highway Traffic Safety Administration

The integration of hybrid and electric technologies more broadly into our car portfolio over time may present challenges and costs. We expect to increase R&D spending in the medium term particularly on hybrid and electric technologies related projects. In addition, this transformation of our car technology creates risks and uncertainties such as the impact on driver experience, and the impact on the cars' residual value over time, both of which may be met with an unfavorable market reaction. [EPA-HQ-OAR-2022-0829-0572, p. 3]

In the long term, although we believe that combustion engines will continue to be fundamental to the Ferrari driver experience, hybrid and pure electric cars may become a much more essential technology for performance sports cars thereby displacing combustion engine models. Having said that, we trust that the effort required by EPA must be commensurate with the share of emissions for which each stakeholder is responsible. [EPA-HQ-OAR-2022-0829-0572, p. 3]

SVM's PECULIARITIES

The strong reduction in greenhouse gas and air pollutant emissions over the past decade – driven mainly by engine and after treatment efficiency improvements – was achieved despite our peculiarities. [EPA-HQ-OAR-2022-0829-0572, pp. 3-4]

Customer acceptance [EPA-HQ-OAR-2022-0829-0572, pp. 3-4]

Our brand symbolizes exclusivity, innovation, state-of-the-art sporting performance and Italian design, craftsmanship and engineering heritage. [EPA-HQ-OAR-2022-0829-0572, pp. 3-4]

The heart of a Ferrari is its engine. Proof of this, for the fourth year running, Ferrari's turbocharged V8 engine has been named Engine of the Year 2019 at the prestigious International Engine of the Year Awards, a feat never achieved by any other engine in the history of the awards. [EPA-HQ-OAR-2022-0829-0572, pp. 3-4]

Ferrari cars should make a customer's dream become true. [EPA-HQ-OAR-2022-0829-0572, pp. 3-4]

Ferrari cars are developed for the joy of driving to deliver an exhilarating experience behind the wheel, they are not simple passenger cars. [EPA-HQ-OAR-2022-0829-0572, pp. 3-4]

Therefore, considering that SVM have to face more severe technology requirements in order to maintain their unique selling points like sounds and performance, Ferrari trusts this to be taken into proper consideration by providing more time to such manufacturers. [EPA-HQ-OAR-2022-0829-0572, pp. 3-4]

Unique solutions [EPA-HQ-OAR-2022-0829-0572, p. 4]

Several emission control technologies may not be simply implemented on a high performance vehicle without losing the performance level and the real nature of the product. More time is needed to develop and adapt emission control technologies to the sports cars, finding the way to guarantee peculiarities. Moreover, for an OEM, the development of an ad-hoc technological solution is linked to the technological capacity of a company and therefore to its global size: considering Small Volume Manufacturer's production capacity and their Companies size, more time should be guaranteed due to the resulting limited technological potential. [EPA-HQ-OAR-2022-0829-0572, p. 4]

No benefit related to mass production standard technologies [EPA-HQ-OAR-2022-0829-0572, p. 4]

SVM suppliers have to adapt their products to unique applications without the mass production standard technologies benefits, since the SVM production volume request is very low. Therefore, extra time is needed also for the supply chain adjustment. [EPA-HQ-OAR-2022-0829-0572, p. 4]

Keep achieving outstanding results on technological innovation with limited human and financial resources [EPA-HQ-OAR-2022-0829-0572, p. 4]

As a luxury performance car manufacturer and low volume producer, despite the high margins of our cars, we compete with larger automobile manufacturers many of which have greater financial resources. Nevertheless, we have been able to achieve outstanding results on technological innovation with limited human and financial resources. [EPA-HQ-OAR-2022-0829-0572, p. 4]

SVM Criteria Pollutant Standards [EPA-HQ-OAR-2022-0829-0572, p. 5]

As described above, EPA has historically recognized the peculiarities and challenges that manufacturers responsible of high-performance vehicles face. This is also the case for criteria pollutant standards, especially considering that EPA, differently from the current Tier 3 approach, has not proposed any special provisions for SVMs. In this regard, we suggest including a specific impact assessment on the elimination of Tier 4 derogations for SVMs. [EPA-HQ-OAR-2022-0829-0572, p. 5]

Ferrari also suggests EPA to reconsider the possibility of maintaining provisions like those already granted in current US Regulation. Similarly, the CARB ACC II LEV IV Regulation, recognizing the challenges and negligible impact of SVMs4, allows them to benefit from special provisions. [EPA-HQ-OAR-2022-0829-0572, p. 5]

4 CARB ACC II Regulations Initial Statement of Reasons (April 12, 2022), chapter III, section C, paragraph 7

a) NMOG+NOx Standards

EPA is proposing to remove any NMOG+NOx fleet-average flexibility for SVMs, requiring an alignment to Large Volume Manufacturers (LVMs) targets starting with MY 2027, unreasonably changing the current Tier 3 regulation that allows SVMs to comply with 51 mg/mi standard until MY 2027, and therefore cutting their target by more than half (i.e. 22 mg/mi compared to 51 mg/mi). For later years, EPA is requiring SVMs to comply with an overall 76% standard reduction in just 5 model years. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

Ferrari strongly believes this approach is unfair, especially in light of the unexpected change of the Tier 3 regulation and the huge implied percentage of BEVs that manufacturers responsible of high performance vehicles shall include in their fleet. While most LVMs can benefit from a wide range of models to compensate for the few vehicles that pollute the most, independent SVMs like Ferrari have to deal with a huge and unfeasible BEV penetration in their car portfolios since the beginning of the legislation. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

Ferrari acknowledges EPA’s intention of aligning SVM targets to those of LVMs. However, this sharp reduction in NMOG+NOx standards is not feasible in such a short amount of time. In support of this, California recognized the impracticability of these manufacturers4, allowing them to comply with a fleet-average standard of 51 mg/mi for the entire regulatory period. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

4 CARB ACC II Regulations Initial Statement of Reasons (April 12, 2022), chapter III, section C, paragraph 7

Ferrari's commitment to reducing NMOG+NOx emissions is reflected on several of our models (Ferrari Portofino M, Ferrari Roma, 296 GTB, Ferrari Purosangue) which are currently certified as BIN 50. An even more remarkable result has been achieved with our Ferrari Purosangue, the first and only V12 model certified as BIN 50 in the United States. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

However, the current state of art does not allow high-performance vehicles with modern passive heating systems to achieve a certification level below BIN 50, and therefore large investments and time-consuming activities on active heating devices (e.g. burner, electric heating catalyst) are required. In addition, the very limited demand of those devices due to mass market focus on electrification will inevitably lead to ad hoc development with related huge costs and times. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

SVM Greenhouse Gas Emissions Standards [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

Historically, EPA has recognized the unique design considerations and compliance challenges faced by SVMs, allowing them to benefit from alternative GHG standards. EPA is now proposing to keep providing SVMs special provisions, resulting in an extension of the already approved MY 2021 alternative CO2 target through MY 2024 included. And then, starting with MY 2025, EPA is requesting SVMs to align with Large Volume Manufacturer (LVM) CO2 targets with a very limited phase-in. [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

Ferrari welcomes EPA's proposal of keep providing flexibilities for SVMs. However, we strongly believe that these provisions are minor as they require SVMs to comply with a very sharp GHG standard reduction well before the commencement of the regulation (i.e. MY 2025 rather than MY 2027). Moreover, by establishing an alignment with LVM standards, EPA is currently requesting SVMs an improvement that is far greater than that required to LVMs (see Figure 1). [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

EPA also recognized that it is impossible for SVMs to comply with the proposed CO2 standards and expects them to seek credit purchases as a compliance strategy. This demonstrates that the proposed alternative targets do not meet the requirements of CAA §202 (a) which states that standards "take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such a period". [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

Ferrari completely agree with EPA's statement on the unfeasibility of the proposed CO2 standards for small volume manufacturers. Moreover, we believe it is unfair to set a standard so stringent as to effectively require SVMs to entire rely on another manufacturer to guarantee compliance. For these reasons, Ferrari strongly believes that the same GHG improvements requested to LVMs should also be applied to SVMs (see Figure 2). [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

Therefore, the alternative standards approved for model year 2021 should continue to apply through model year 2026 included. Starting with new regulation in model year 2027, small volume manufacturers should comply with GHG standards according to a reduction percentage of no more than 50% in MY 2032 compared to MY 2026, consistent with the improvement requested to LVMs. [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

Ferrari's commitment to reducing GHG emissions is reflected in several business decisions, such as large investments in advanced assets and industrial buildings with the aim of extending our concept of global GHG emission reduction. To deliver our commitment to electrification, in 2022, we started the construction of the 40 thousand square meter e-building, where we will handcraft the unique Ferrari electric engines, inverters, battery modules, magnets and assembly lines that you will only find in a Ferrari. [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

This plant development will assure us a technical capacity in excess of our needs for the years to come, while maintaining the uniqueness of our model and remaining true to the Ferrari DNA which has characterized our history. [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

SEE ORIGINAL COMMENT FOR FIGURE 1: Cumulative GHG standard stringency increase relative to MY 2021, comparing the proposed SVM standards to the current and proposed primary standard and considering a constant footprint value. [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

SEE ORIGINAL COMMENT FOR FIGURE 2: Proposed cumulative GHG standard stringency increase relative to MY 2026, considering a constant footprint value. [EPA-HQ-OAR-2022-0829-0572, pp. 7-8]

Organization: Mclaren Automotive, McLaren Group

Background

Given that we are significantly below the 5,000 USA sales per year, we fall within the Small-volume manufacturer (SVM) definition. As a SVM we have limited product portfolios, limited number of drivetrains, limited financial and human resources, and longer product development times and vehicle life cycles. Unlike other parts of the market, given our limited product portfolio we do not have the ability to make significant redesigns each year and as such we are unable to take advantage of fleet emission averaging programs. [EPA-HQ-OAR-2022-0829-0748, pp. 1-2]

We produce lightweight high-performance supercars, which drive far fewer miles than the average car. As such, emissions from our vehicles are negligible. Despite generally having higher emission rates (grams per mile), SVM average total mileage accumulation is extremely low – approximately 2,543 miles1. We believe that EPA should consider the de minimis use of our vehicles and those of SVMs when considering final standards under this rulemaking. [EPA-HQ-OAR-2022-0829-0748, pp. 1-2]

1 U.S. Department of Transportation, National Highway Traffic Safety Administration, Exemptions From Average Fuel Economy Standards; Passenger Automobile Average Fuel Economy Standards (Proposed rule; proposed decision to grant exemption), 87 Fed. Reg. 39439, 39449 (Jul. 1, 2022).

EPA'S NPRM need to provide SVMs with sufficient and reasonable lead time together with adequate flexibilities [EPA-HQ-OAR-2022-0829-0748, pp. 1-2]

Historically, EPA has recognized the unique design considerations and compliance challenges faced by SVMs. We have been provided with additional flexibilities such as alternative, less stringent standards, and alternative phasedowns with periods of stability to address the challenges we face. Unlike in past rulemakings, we do not believe that the EPA's multi-pollutant NPRM adequately addresses SVM concerns and challenges. [EPA-HQ-OAR-2022-0829-0748, p. 2]

The need for additional flexibilities and lead-times remains exceptionally high for SVMs and McLaren for the following reasons: [EPA-HQ-OAR-2022-0829-0748, p. 2]

- Electrification remains extremely challenging given limited resources available and the lack of technological developments in battery technology to produce the lightweight high-density batteries required to electrify a high-performance supercar. [EPA-HQ-OAR-2022-0829-0748, p. 2]

- Battery technology has not developed enough for application within high-performance lightweight supercars. Technology is developing and we have plans to electrify further, however time is needed. [EPA-HQ-OAR-2022-0829-0748, p. 2]

- Limited product portfolio and longer product life cycles mean that making regular improvements to products is exceptionally challenge for SVMs like McLaren. When electrification is available, there is limited ability to rapidly roll out technology across the whole product portfolio - time will be needed. [EPA-HQ-OAR-2022-0829-0748, p. 2]

While technology is developing and there are plans for electrification in the future, it still remains that time is needed for technology to catch up to the needs of a lightweight high-performance super car. Furthermore, with low production volumes our ability to amortize expensive product development costs is also limited, our R&D paybacks are far longer. At McLaren, our journey to electrification will be challenging given the pressures we see in the market, the demand for battery components and key materials, furthermore, we are without a larger OEM partner to share the development burden or to take external technology. [EPA-HQ-OAR-2022-0829-0748, p. 2]

These challenges and the need for additional flexibilities remain important for MY 2027 and later. Demand for our products remains high, as does the performance. Electrifying lightweight high performance supers is exceptionally challenging. While there has been greater electrification of mass market vehicles, as outlined above, it is important to note that battery technology has not developed enough for application within high-performance supercars. Technology is developing and we have plans to electrify further; however, time is needed. McLaren are targeting launching a full BEV towards the end of the decade, we see some developments in battery technology and other core components which may make a BEV lightweight supercar possible. [EPA-HQ-OAR-2022-0829-0748, pp. 2-3]

This is further evident when looking at the market for BEV supercars and the current and potential market offerings which are around the $1m plus price bracket. Lightweight BEV supercars must compete with ICE/PHEVs for all performance attributes. Below the $1m+ low volume segment, there are currently no lightweight high-performance BEV Supercars in the 'series production' category, which for brands such as McLaren, are products that contribute the majority of our annual production volume. [EPA-HQ-OAR-2022-0829-0748, pp. 2-3]

Given the challenges we have highlighted in moving towards greater electrification for SVMs like McLaren, EPA is effectively relying on credit trading flexibility as the means by which

SVMs will maintain compliance with GHG standards. We believe this is inappropriate for several reasons and demonstrates that the proposed alternative standards do not meet the requirements of CAA§ 202(a) that standards "take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such a period". First, we believe it is inappropriate to set a standard so stringent as to effectively require a manufacturer to entirely rely on another manufacturer to maintain compliance. Additionally, there is an inherent risk that even if a credit-generating manufacturer is willing to sell credits, the credits may be purchased by other parties before SVMs can access them. Having to purchase credits to comply with the proposed GHG standard would also divert resources away from electrification challenges. [EPA-HQ-OAR-2022-0829-0748, p. 3]

As stated, allowing for certainty and time to adjust to changes remains important for SVM like McLaren. An SVM standard also must take into account that engines and vehicles already developed will have to company with a standard in MY2024 which is currently unknown. Allowing for early years less stringent targets is essential given that design decisions which have already been made. It is also important for GHG policy to be fair and equitable. The EPA SVM proposal would require over 50% BEV mix in MY2026, based on McLaren analysis, far higher than Primary Standards requirements and effectively impossible given the lack of technology available to electrify high performance supercars. [EPA-HQ-OAR-2022-0829-0748, p. 3]

Key areas of concern for McLaren

In order to address the concerns that we have highlighted in this submission we propose the following recommendations to the EPA. [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

SVM Greenhouse Gas Emissions Standards

We support the EPA's proposal to sunset the individual application process for alternative SVM standards. However, given the challenges we have outlined above around technology developments and the need for extra lead time, we propose that the EPA maintain the approved MY2021 individual standards through to the end of MY2025. The EPA proposes to change requirements for SVMs before MY 2027 with little or no explanation of how circumstances have changed significantly since those regulations were agreed or how SVMs will meet the revised requirements with virtually no lead-time. Furthermore, the EPA's proposal envisions a massive increase in stringency in MY 2025 (53% average stringency increase) again, with no lead-time. [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

Allowing certainty to the continued individual standards through to MY2025, will allow for greater time for developing and implementing electrification compatible technologies and help address lead time concerns. [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

We propose the following:

- For MY 22, 23, 24 and 25: For SVMs that have been granted alternative bespoke standards in the 2020 notice Federal Register: Determinations of Light-Duty Vehicle Alternative Greenhouse Gas Emissions Standards for Small Volume Manufacturers, continue for MY 22, 23, 24 and 25 the alternative standard for MY 21 [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

- For MY 2026 and later, eliminate company-by-company alternative SVM GHG standards and create a new regulatory provision applicable to all SVMs. [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

- Bring SVMs towards the Primary Standard via an SVM phased-in target reduction requiring a 50% GHG reduction in MY 2032 compared to SVM MY 2025 emissions. [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

- Establish a trajectory from MY 2026 to MY 2032 that has either a linear reduction or one or more reasonable step changes. [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

- Defer consideration of incorporating SVMs into the Primary Standard until a subsequent separate rulemaking. [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

This proposal will provide the additional time SVMs like McLaren [EPA-HQ-OAR-2022-0829-0748, pp. 3-4]

SVM Criteria Pollutant Standards

As outlined above, as a SVM we face unique challenges in meeting very stringent GHG standards, particularly those that rely on electrification. This is also the case for criteria pollutant standards which we are impacted by further, given the reduction in flexibilities proposed by the EPA. The EPA proposes to abandon the MY 27 and 28 SVM NMOG+NOx standards set out in Tier 3 (and on which we have been planning towards), and propose instead to increase stringency and require SVMs to adhere to the primary Tier 4 NMOG+NOx standard. Under the EPA's proposal, we would need to meet the same criteria pollutant and particulate matter emission standards on the same schedule as large manufacturers, despite our much less frequent new model platform introductions and lower fleet diversity, resulting in our corresponding limited ability to utilise average provisions. [EPA-HQ-OAR-2022-0829-0748, p. 4]

Historically, EPA have provided additional flexibilities and provision to SVMs, recognising the challenges we face. Furthermore, these flexibilities have been recognised and provided for in CARB's ACC II LEV IV regulation. With limited engine families, SVMs like McLaren are unable to utilise flexibilities with averaging, unlike mass market OEMs with many product lines. In order to properly account for the unique challenges faced by SVMs with regard to fleet averaging - based standards, it is important to set the degree and frequency of SVM step-downs to reflect SVM realities -- limited product lines, with longer product development and life cycles. We would propose the following alternative to the EPA's proposal: [EPA-HQ-OAR-2022-0829-0748, p. 4]

- MY 2027 -- Maintain for all SVMs the already-in effect MY 27 Tier 3 SVM NMOG+NOx standard (51m g/mi) [EPA-HQ-OAR-2022-0829-0748, p. 4]

- MY 2028 -- Maintain for all SVMs the already-in effect MY 28 Tier 3 SVM NMOG+NOx standard (30 g/mi) [EPA-HQ-OAR-2022-0829-0748, p. 4]

- MY 2029-32 - continue the 30 mg/mi standard for SVMs [EPA-HQ-OAR-2022-0829-0748, p. 4]

Organization: Specialty Equipment Market Association (SEMA)

Effects on Low-Volume Manufacturers and Major Manufacturers

The current proposal, if finalized, would end the exemption for low-volume manufacturers. The EPA's prior criteria pollutant and GHG rulemakings recognized that special flexibility rules for small automakers were necessary and appropriate. These smaller OEMs typically manufacture and sell about 4,000 cars each year, which represents 0.02% of the total 14 million US passenger car sales in 2022.15 Most of these specialty vehicles are not "daily drivers" but are for "occasional use." As a result, the average annual miles driven by these vehicles is drastically less than that of a typical passenger vehicle. SEMA believes that small-volume manufactured vehicles have minimal impact on the environment, and their existing exemption should remain in place. [EPA-HQ-OAR-2022-0829-0596, p. 6]

15 The Detroit News: Cox Automotive increases its 2023 new-vehicle sales forecast (Link: https://www.detroitnews.com/story/business/autos/2023/06/27/cox-automotive-boosts-new-vehicle-sales-forecast-2023/70359959007/).

EPA Summary and Response

Summary

General comments:

SVMs commented that most of their vehicles are for "occasional use," with average annual miles driven far less than that of a typical passenger vehicle, and typical lifetime mileage of about 60,000 miles. The SVMs also commented that their low U.S. and global volumes result in lower access to suppliers and delayed access to supplier-provided technologies. They further assert that they have limited, narrowly focused product lines that do not have significant redesigns every year, and that receive little flexibility from fleet emission averaging programs.

SVMs also commented that EPA should establish provisions for hardship relief, which would allow the Agency to approve requests for extended compliance deadlines based on a situation of severe economic hardship, but with no requirement to demonstrate all of the elements of severe economic hardship and no maximum duration of the hardship relief.

Air conditioning (AC) GHG comments:

SVMs commented that the elimination of AC leakage credits along with what they believe are changes in the AC efficiency test procedures make the compliance situation worse for them. They specifically are concerned with the number of suitable test samples needed to perform the AC efficiency tests.

GHG comments:

SVM commenters assert that EPA projects that SVM fleets on average, and individually, will exceed the proposed standards, requiring purchased credits in order to continue selling vehicles in the US. SVM commenters disagree that they should be required to rely on credit trading flexibility as a key means to maintain compliance with standards. SVM commenters assert that the proposed standards would have a large increase in stringency without proper lead time. In order to comply with the proposed standards, they believe credits would have to be purchased, and there is uncertainty in an SVM's ability to obtain credits. SVMs believe that a standard that cannot be achieved without the purchase of credits is unfair. SVMs noted that EPA's modeling shows that the proposed standards cannot be met without purchasing credits which they feel demonstrates that the proposed alternative targets do not meet the requirements of CAA §202 (a). SVMs support EPA's proposal to sunset the individual application process for alternative standards and recommend that EPA maintain the approved MY 2021 individual standards through MY 2026. SVMs also noted that EPA proposed to start their program before most of the regulation comes into effect (MY 2025 rather than MY 2027), and to bring SVM targets into alignment with the primary MY 2032 targets. SVMs believe that this proposal would require SVMs to comply with a very sharp GHG emissions reduction. They believe that given the unique challenges they face as compared to full-line manufacturers it is too soon to propose a convergence of the alternative and primary standards. They suggested that EPA defer consideration of placing SVMs on the primary standards to a subsequent rulemaking.

Mclaren Automotive commented that battery technology has not developed enough for application within high-performance supercars, and that BEV supercars must compete with ICE/PHEVs for all performance attributes.

Environmental and Public Health Organizations supports our approach for phasing in the SVMs into the primary program. They also stated that EPA's conclusions that a transition of SVMs to the primary program coheres with the recent announcements and developments in the business model of the SVMs who have previously pursued less stringent standards. They noted that there are only four SVMs currently subject to less stringent standards (Ferrari, Aston Martin, Lotus, and McLaren) and all are moving toward greater hybridization and electrification, which will facilitate compliance with the primary LDV GHG standards.

Criteria pollutant comments:

SVMs commented that EPA has a history of giving SVMs additional lead time to comply with criteria pollutant standards. In the proposal they felt EPA has not given additional lead time to SVMs and did not explain a basis, which they felt was a mistake. They comment that the phase-in proposed for larger OEMs does not work for SVM since they have few models. They also noted that the new NMOG+NOx standards supersede the previously established Tier 3 phase in for SVM which extended compliance through MY 2027 and MY 2028. They also stated the proposed NMOG+NOx requirements are excessively stringent – too stringent, too soon.

Some SVMs commented that the elimination of Bin 125 would be unfair and unreasonable because it would put them in the untenable position of having to, with limited resources, simultaneously implement EVs while also investing in an attempt to reengineer Bin 125 vehicles to a much more stringent standard.

SVMs commented that it is thus unreasonable to impose the proposed PM standards and timetable on SVMs, especially considering the minimal environmental benefit obtained together with how drastic the proposed change is compared to existing Tier 3 levels and the CARB ACCII PM standards. SVMs further recommended that they be exempt from cold testing requirements given that they believe it is not yet fully understood what is needed to meet the 0.5 mg/mile standard at 20F with high-performance engines.

Specialty Equipment Manufacturers stated that SVMs have an existing exemption from criteria pollutants.

Response:

General comments response:

In response to the SVM claims that they should be exempt from standards on the basis that their high performance vehicles are driven less than typical vehicles, EPA disagrees that standards should be established based on a projection of annual miles driven or lifetime mileage accumulation. Any such data is too speculative, and anecdotal at best, to serve as a basis for determining appropriate emissions standards, and would be unenforceable as there would be no workable means to track vehicles subject to the SVM standards as they are driven over their useful lives to monitor mileage.

Regarding the comment that SVMs have limited access to technology and need additional lead time, as discussed further below, for both the GHG and criteria pollutant programs, EPA is providing additional lead time compared to the proposal. We believe that this additional lead time will provide the time needed to access the technologies needed to meet the standards.

SVMs requested hardship relief. EPA notes that there are existing hardship provisions for small businesses in 40 CFR part 1068 allowing for temporary exemption from certain standards in the case of severe economic hardship. These existing provisions attempt to balance concerns about the need for every manufacturer to take steps to produce vehicles that meet the standards with concerns that EPA does not wish to force small businesses into insolvency if it can be avoided. Accordingly, under 40 CFR 1068.250 where a small business can demonstrate it has "taken all possible business, technical, and economic steps to comply" and "[n]ot having the exemption will jeopardize the solvency of your company" and "[n]o other allowances are available under the regulations in this chapter to avoid the impending violation," EPA has discretion to grant up to three one-year delays in the compliance deadline.

EPA believes it would be inappropriate to extend the existing hardship provision to SVMs for multiple reasons. First, the SVMs are not small businesses, but established automotive companies. Second, EPA judges that the credit market is sufficiently robust and mature that it is highly unlikely an SVM could make a showing that "no other allowances are available" for compliance. Third, the purpose of this provision is to provide a temporary relief valve to avoid insolvency, but the commenters propose eliminating the requirement to show a risk of insolvency and to make the process indefinite. This would be fundamentally inconsistent with the purpose and function of the hardship exemption. While we disagree that hardship relief is appropriate for SVMs, we are providing several years of additional lead time to meet the final standards, as described further below in this section.

AC GHG comments response:

SVMs commented that it would not be fair to eliminate AC leakage credits. For the final rule, EPA is not eliminating AC leakage credits as proposed, but instead is phasing them down over multiple years as discussed in Section 3.1.3 of this RTC and preamble section III.C.5. SVMs commented that the AC efficiency test procedure was problematic. EPA has not reopened the AC efficiency test procedures in this rulemaking. Manufacturers have successfully complied with the existing AC efficiency test procedures, and those procedures continue to apply.

GHG comments response:

Commenters asserted that EPA's modeling shows that SVMs will not comply as a group or individually without credit trading. EPA disagrees. We have modeled reasonable compliance paths for the SVMs and have also modeled a "no credit trading" scenario which identifies a reasonable compliance path for the SVMs even if no automaker is willing to sell credits, a situation which we consider very unlikely to occur (especially in light of the surplus credits generated by EV-only manufacturers).

In other words, EPA demonstrates that SVMs can comply with the final standards if either appropriate GHG-reducing technologies are applied or, like other OEMs, SVMs avail themselves of the credit trading flexibilities.

SVMs commented that their respective MY2021 alternative standards should be kept in place through MY 2026, instead of EPA's proposal that SVMs phase into the primary program standards starting in MY 2025. EPA acknowledges that MY 2025 has already begun, and that MY 2026 begins as early as January 2, 2025, approximately 9 months from the date of this final rule. In response to these comments, EPA believes it is appropriate to extend the SVM alternative standards established in MY2021 through MY 2026, instead of through MY 2024 as proposed. Specifically, EPA is finalizing that SVM alternative standards established for MY 2021 will apply through MY 2026 to provide the requested stability for SVMs so that SVMs have an opportunity to reduce their GHG emissions in future years. This schedule provides a total of an additional five years of stability for the SVMs to transition from their existing MY 2021 standards into delayed primary program standards after MY 2026. Starting in MY 2027, SVMs will meet primary program standards albeit with additional lead-time. EPA is finalizing that SVMs will meet the primary program standards for MY 2025 in MY 2027, providing an additional two years of lead time, and then under a continued phase-in SVMs will be subject to the primary program standards for MYs 2032 and later. EPA believes this phase-in structure provides adequate lead time for the SVMs to transition into the primary program.

Commentors stated they had concerns about the availability of the credit market, but our compliance data indicates that SVMs in fact all have purchased GHG credits in the past several years, evidence that the credit market is available to them if needed. EPA notes that the cost of credits is likely to be small relative to the MSRP of the supercars that these manufacturers produce.

SVMs commented that we should establish provisions similar to the California ACC II program. As EPA has discussed in responding to other comments, the ACC II program has a somewhat different structure, focused primarily on a phased-in ZEV mandate, than EPA's performance-based standards. Accordingly, EPA does not believe it is always appropriate to compare the individual standards in each program to each other without considering the broader context. More broadly, EPA recognizes that CARB has offered some special accommodations to SVMs, but notes that EPA has likewise offered significant accommodations to SVMs. EPA notes that CARB commented that they expect that ACC II will set the SVMs on the correct path to be in compliance with EPA's standards by 2032, which is exactly as we have phased SVMs into the EPA final standards. We did not propose tracking the ACC II provisions for SVMs because we found it is more appropriate, for purposes of EPA's program, to bring SVMs into compliance with the generally applicable standards, albeit with significant additional lead time, and because we found that there is a feasible compliance path for SVMs to meet the GHG standards as finalized. After reviewing comments (including both those of SVMs as well as those of CARB and other commenters) we find our proposed conclusions, that the standards are feasible and appropriate for SVMs, are still warranted and we decline to adopt ACC II standards for SVMs. .

In response to McLaren Automotives comment on supercars and BEV technology, EPA notes that the final rule provides the SVMs a delayed phase-in that should allow the time needed for SVMs to develop appropriate pollution control technologies suited for their products, or if they choose to rely on credits trading, to purchase such credits.

Criteria pollutant comments response:

In response to SVM concerns about the need for additional lead time in meeting the criteria pollutant emissions standards, in the final rule EPA has provided additional lead time. Upon consideration of the comments, EPA recognizes that the proposed phase-in would be challenging for the SVMs. Thus, EPA is delaying the phase-in period for SVMs to comply with the Tier 4 criteria pollutant program until the last year of the overall program's phase-in period, MY 2032. This extended phase-in should alleviate the concerns that the standards stringency increases too quickly. EPA is also re-establishing the phase-in that existed under the Tier 3 program for MYs 2027 and 2028. In response to commenters concerns about the availability of the credit market, our compliance records show that at least one SVM has participated in the criteria pollutant credit market, and all SVMs have participated in the GHG credit market (see response above in this section).

Regarding the SVM concerns that Bin 125 should be available indefinitely, as discussed in Section III.D.10 of the preamble, EPA believes it is not appropriate to keep Bin 125 indefinitely, given this emissions level is considerably higher than the final fleet average standard of 15 mg/mi, and that producing vehicles far below 125 g/mi is feasible in the timeframe of this rule. However, EPA is providing SVMs with additional time to phase-down to lower emissions bin certification levels in that we are allowing SVMs the option to certify at Bin 125 through the end of the phase-in period, MY 2032.

Specialty Equipment Market Association states that SVMs have been exempted previously from criteria pollutant and GHG standards, which is an incorrect statement. EPA's rules have not in the past exempted SVMs; for GHGs, in past rules we have provided a process for SVMs to seek alternative emissions standards, and in this final rule we are providing an extended time period for SVMs to continue being subject to higher (less stringent) emissions standards than in the primary program for larger volume manufacturers, with a final phase-in to the primary program by MY 2032. For criteria pollutants, EPA is providing an extended phase-in for SVMs, similar to past programs.

SVM's commented that EPA must justify imposing on SVMs the proposed new cold NMOG+NOx standard. EPA disagrees that it must specifically evaluate with respect to SVMs the costs of compliance relative to the air quality benefits, or that it must conduct a benefit-cost analysis specific to SVMs. The standards that EPA is adopting in this rule are fully justified under the Clean Air Act as explained in preamble Sections III-V. The text and structure of Act sets forth EPA's authority to set forth emissions standards for classes of motor vehicles and generally require all "manufacturers" to comply, see, e.g., CAA section 202(a)(1)-(3), 206(a), with specific exceptions not applicable here, see, e.g., CAA section 202(b)(1), 206(a)(5). Consistent with the statute, EPA generally requires all manufacturers to meet the standards that EPA has found to be feasible and appropriate under the CAA. This approach achieves the pollution control and public health goals of the CAA and the particular standards at issue, and it ensures a level playing field for all manufacturers. Nothing in applicable standard-setting provisions imposes special analytical requirements on EPA with regard to SVMs or indicates that EPA is legally required to exempt SVMs from generally applicable emissions regulations.[362]

In some cases, EPA has derogated from the general policy of uniform standards when other policy concerns provide a sufficient reason to do so. For example, small businesses have been granted certain exemptions, consistent with the Small Business Regulatory Enforcement Fairness Act. Similarly, EPA has provided certain accommodations to small volume manufacturers in the past in recognition that the small volume manufacturers do have some features that distinguish them from larger OEMs. However, EPA has never indicated that prior accommodations would persist permanently; rather we evaluate the additional flexibility granted to SVMs based on the record before us. In our judgment, the market for pollution control technologies and the market for tradeable credits have both developed significantly since EPA originally provided some additional leeway to SVMs. Although the Act does not require EPA to conduct analysis specific to SVMs, EPA has done so. We assessed the feasibility of SVMs to comply with these standards and have found that the SVMs can attain standards could be attained at a reasonable cost in the lead time allowed. Even in the absence of modeling, EPA would be justified in expecting that large, sophisticated automotive manufacturing firms such as these, selling luxury cars and other vehicles at the high end of the automotive market, could identify a path to compliance, whether by installing additional pollution control technologies or the purchase of credits. EPA has judged that the standards being adopted today are justified under the CAA and that over the course of these model years SVMs will no longer warrant special treatment under those standards, and those conclusions together justify the application of these standards to SVMs.

3.1.8 - MDV incentive multipliers

Comments by Organizations

Organization: Alliance for Automotive Innovation (Alliance)

V. Medium-Duty Vehicle (MDV) Requirements

A. MDV Incentive Multipliers

EPA requests comment on two suggested changes to MDV Incentive Multipliers for BEVs, PHEVs and FCEVs as part of this proposal296; neither of these two changes are appropriate and neither should be adopted. First, EPA proposes to eliminate the multiplier one year earlier than currently allotted in the regulations. Second, EPA proposes potentially also phasing out the multiplier incentive over multiple model years by revising the multipliers to reduce their magnitude for model years prior to MY2027, for example for MYs 2025-2026. EPA points to "rapid increase in vehicle electrification in the MDV market" as a justification for its proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 190-191]

296 NPRM at 29244.

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[362] *See also* International Harvester Co., 478 F.2d at 640 ("The driving preferences of hot rodders are not to outweigh the goal of a clean environment.").

The current advanced technology multipliers in existing Heavy-Duty GHG Phase 2 for MYs 2021 through 2027 [297] are reproduced below:

297 Greenhouse Gas Emissions and Fuel efficiency Standards for Medium- and Heavy-Duty engines and Vehicles –Phase 2, 81 Fed. Reg. 73478 (October 25, 2016) (Phase 2 rule).

Figure 68: Advanced Technology Multipliers in Existing Heavy-Duty GHG Phase 2

Technology: Multiplier

Plug-in hybrid electric vehicles: 3.5

All-electric vehicles: 4.5

Fuel cell-electric vehicles: 5.5 [EPA-HQ-OAR-2022-0829-0701, pp. 190-191]

Due to multiple unknowns in the market uptake for battery electric MDVs, it would be inappropriate to reduce the magnitude of the multipliers prior to MY2027 or end the use of these multipliers one year early. Sales volumes of electric powertrains are much lower for MDV and heavy-duty vehicles (HDVs), especially for specialized vehicles applications. These vehicles are primarily work vehicles, which makes predictable reliability of existing technologies and versatility important. HDVs are generally more expensive than light-duty vehicles, which makes it a greater monetary risk for purchasers to invest in new technologies. [EPA-HQ-OAR-2022-0829-0701, pp. 190-191]

EPA also points to the Inflation Reduction Act as an enabling factor to reduce the multipliers prior to MY2027; however, there remain significant uncertainties to the extent customers will be able to take advantage of IRA tax incentive provisions of for MDVs. If MDV battery packs do not meet the battery component and critical mineral requirements, or the MDVs are not assembled in North America, those vehicles will be ineligible for 30D tax incentives. Moreover, while businesses and fleets can use IRA Section 45W, it is not clear to what extent MDV buyers will utilize these provisions, because the commercial entity, particularly if purchasing the vehicles, must have sufficient tax headroom to offset any claimed the credits. [EPA-HQ-OAR-2022-0829-0701, pp. 190-191]

EV multipliers are crucial to provide sufficient time for the market to develop, especially to support a substantial transformation in the MDV segment. EPA recognized important reasons for these EV multipliers in the Phase 2 rule, including medium- and heavy-duty vehicles are more expensive, they are primarily work vehicles, sales volumes are lower, and adoption rates for advanced technologies are minimal. EPA proposes to continue to provide EV incentives for at least FCEVs in the concurrent EPA HD GHG rulemaking. [EPA-HQ-OAR-2022-0829-0701, p. 191]

While EPA suggests the IRA and other measures might cushion the blow, these other factors are uncertain and do not warrant eliminating the EV multipliers. Importantly, the IRA tax incentives are not coupled with charging infrastructure funding. These MDVs will likely require, in many cases, dedicated high-power charging stations to ensure work and fleet vehicles are charged in a timely and efficient manner for their work cycle. Larger batteries will require more time and power to charge, an aspect of EPA's EV feasibility analysis that was not addressed and ignores the additional challenges of electrification for this sector. [EPA-HQ-OAR-2022-0829-0701, p. 191]

Further, any change in the multipliers would disrupt the planning and development cycles already underway. Any such change would also reduce stability and certainty associated with MDV GHG standards, potentially resulting in compliance challenges or additional, unnecessary industry cost. [EPA-HQ-OAR-2022-0829-0701, p. 191]

For all the reasons provided above, these EV multipliers for BEVs, PHEVs, and FCEVs should be left in place and unaltered through MY2027 to encourage manufacturers to continue to invest in advanced technologies in the Medium-Duty space and provide manufacturers necessary lead-time to make appropriate investment decisions. [EPA-HQ-OAR-2022-0829-0701, p. 191]

Organization: California Air Resources Board (CARB)

U.S. EPA requested comment on its proposal to eliminate advanced technology multipliers for medium-duty BEVs, PHEVs, and FCEVs after the 2026 MY. CARB supports this proposal. As U.S. EPA rightly notes, multipliers provide important incentives for spurring technology advancement but must be balanced with potential emission increases from conventional vehicles. With rapid ZEV technology development in the medium-duty vehicle segment, the timing is appropriate to sunset multiplier credits for medium-duty vehicles as U.S. EPA has already done for light-duty vehicles. [EPA-HQ-OAR-2022-0829-0780, pp. 17-18]

As noted above, the ACT and ACF rules will dramatically increase the penetration of ZEVs in the medium- and heavy-duty vehicle segments in California. These policies will accelerate ZEV technology development and adoption in the medium-duty sector, further reducing the need for multiplier credits. [EPA-HQ-OAR-2022-0829-0780, pp. 17-18]

Organization: International Council on Clean Transportation (ICCT)

Regarding some finer details of the proposed MD standards, ICCT supports EPA's proposal to phaseout ZEV multipliers in MY2026 instead of MY2027. The expected growth in MD BEV van share by MY2027 could result in overcompliance credits being available in MY2027, which can be used to offset undercompliance by vans and pickups which are still ICE-powered. Generally, ending multipliers earlier would improve the real-world climate benefits of the proposed rule. Additionally, recent ICCT research on the costs of BEV and PHEV MD vans and pickups suggests that within the timeframe of the proposed rule, plug-in MDVs will be cost-competitive with their gasoline or diesel counterparts either upfront or both upfront and during ownership.160 Consequently, such advanced technology vehicles will not need multipliers as a production incentive. Lastly, ICCT also supports the proposed 22,000 lbs limit to the GCWR input in the work factor equation, for the reasons EPA provided in its proposal (Preamble 29242). [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

160 Mulholland, E. (2022). Cost of electric commercial vans and pickup trucks in the United States through 2040. International Council on Clean Transportation. https://theicct.org/publication/cost-ev-vans-pickups-us-2040-jan22/

Organization: Natural Gas Vehicles for America (NGVA)

EPA Must Take Steps to Address the Damage Caused by Its Uneven Treatment of Low Carbon Technologies

EPA's prior notice as part of the Clean Truck Initiative was extremely frank about the reasons that the agency had provided significant regulatory credits for electric vehicles.12 Pertinent parts of that discussion are included here: [EPA-HQ-OAR-2022-0829-0597, pp. 12-13]

12 2022-04934.pdf (govinfo.gov)

As stated in the HD GHG Phase 2 rulemaking, our intention with these multipliers was to create a meaningful incentive to those considering adopting these qualifying advanced technologies into their vehicles. The multipliers are consistent with values recommended by California Air Resources Board (CARB) in their supplemental HD GHG Phase 2 comments. (footnote omitted). CARB's values were based on a cost analysis that compared the costs of these technologies to costs of other conventional GHG- reducing technologies. Their cost analysis showed that multipliers in the range we ultimately promulgated would make these technologies more competitive with the conventional technologies and could allow manufacturers to more easily generate a viable business case to develop these technologies for heavy-duty vehicles and bring them to market at a competitive price. [EPA-HQ-OAR-2022-0829-0597, pp. 12-13]

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As we stated in the 2016 HD GHG Phase 2 final rule preamble, we determined that it was appropriate to provide such large multipliers for these advanced technologies at least in the short term, because they have the potential to provide very large reductions in GHG emissions and fuel consumption and advance technology development substantially in the long term. However, because the credit multipliers are so large, we also stated that we should not necessarily allow them to continue indefinitely. Therefore, they were included in the HD GHG Phase 2 final rule as an interim program continuing only through MY 2027. [EPA-HQ-OAR-2022-0829-0597, pp. 12-13]

The above passages appear on pages 17594 and 17595 of the March 28, 2022, Federal Register notice. [EPA-HQ-OAR-2022-0829-0597, pp. 12-13]

It is noteworthy that EPA acknowledges the credits are not based on emission benefits. The credits are based on cost with the intent on making electric vehicles "more competitive" with conventional technologies. It is noteworthy that the notice in this rulemaking contains virtually the exact word for word explanation regarding the incentives for electric vehicles.13 [EPA-HQ-OAR-2022-0829-0597, pp. 12-13]

13 See 87 FR at 26010 – 26011.

Organization: Rivian Automotive, LLC

Evaluate Stricter MDV Emissions Standards and Begin Phasing Out Advanced Technology Vehicle ("ATV") Multipliers in MY25 [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

Second, EPA should phase out ATV multipliers starting in MY25. EPA originally devised ATV multipliers to encourage the use of advanced technologies such as electric drivetrains. According to the agency, when first implemented in the GHG Phase 2 program, ATV multipliers represented a "tradeoff" between incentivizing nascent technologies and providing credits unattached to real-world environmental benefits, "which could allow higher emissions from credit-using engines and vehicles."32 At least one study of policy design issues in fuel economy and GHG emissions standards calls the efficacy of multipliers into question for precisely this reason. By artificially enhancing the compliance value of BEVs, PHEVs, and FCEVs, the multiplier can enable manufacturers to sell additional conventional vehicles if those units deliver a greater financial return at the expense of greater emissions.33 [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

32 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 87 (May 5, 2023) (revising 40 C.F.R. Parts 85, 86, 600, 1036, 1037, and 1066), 29,244.

33 Kenneth Gillingham, NBER Working Paper No. 29067, Designing Fuel-Economy Standards in Light of Electric Vehicles (2021), available at https://www.nber.org/system/files/working_papers/w29067/w29067.pdf.

As EPA acknowledges, the costs and benefits of this approach might balance out differently when the incentivized technologies barely exist on a commercial scale, but that is simply no longer the case among MDVs. Accordingly, Rivian welcomes the agency's proposal to remove ATV multipliers but recommends beginning a phaseout in MY25 as suggested below, with the value of the BEV/FCEV multiplier stepping down to 2.5 and then 1.5 before sunsetting entirely. PHEV multipliers should step down in value to 1.75 and 1.25 in MY25 and MY26, respectively. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

Technology: PHEV; MY24: 3.5; MY25: 1.75; MY26: 1.25; MY27: -

Technology: BEV; MY24: 4.5; MY25: 2.5; MY26: 1.5; MY27: -

Technology: FCEV; MY24: 5.5; MY25: 2.5; MY26: 1.5; MY27: -

[EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

Table 3. Rivian recommends phasing out ATV multipliers on a declining schedule beginning in MY25. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

With sales of BEV vans already growing quickly, a glut of multiplied credits could come into the market before the proposed sunset year of MY27. New regulatory obligations under ACT will come into force in six states by MY25 and only compound this reality, leading to the sale of thousands of MD BEVs nationwide— each worth potentially 4.5 times their true benefit for federal GHG compliance purposes. This could have consequences for BEV sales across the MD segment for several years. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

For the most impactful rules possible, we recommend EPA reconsider more stringent emissions standards and begin phasing out ATV multipliers in MY25. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

Organization: Stellantis

EPA should maintain previously defined EV Multipliers

EPA is proposing to end advanced technology (BEV, FCEV, and PHEV) multipliers for medium-duty vehicles in 2027MY, one year earlier than scheduled. The agency also seeks comment on reducing the magnitude of the multipliers for 2025-26MY. Aligned with Auto

Innovators, Stellantis does not believe the advanced technology credit multipliers should be adjusted or reduced in the 2025-27MY timeframe. The Phase 2 rule was finalized in 2016, and [redacted text.] We believe the proposal to change or end advanced technology multipliers in the 2025-27MY does not provide sufficient lead time as required by the Clean Air Act. [EPA-HQ-OAR-2022-0829-0678, p. 22]

EV Multipliers – Ends Advanced Technology (EV) multipliers in 2027MY (one year early) and is considering limiting/reducing 2025-26MY multiplier credits. [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

Stellantis recommends that EPA should:

-Retain GHG saving technology flexibilities recognizing the GHG benefit that continues to be present on electric vehicles and that will naturally decrease as EV penetration increases [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Tesla, Inc.

Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

- Eliminate credit multipliers for all vehicles; and [EPA-HQ-OAR-2022-0829-0792, p. 2]

Credit Multipliers Decrease BEV Deployment and Should Not Be Extended or Renewed

Tesla supports the continuing elimination of advanced technology multipliers to ensure overall program integrity. Firmly establishing a one-for-one credit ratio is a more rational and transparent compliance mechanism and creates actual BEV vehicle deployment, thereby enabling deeper emission reduction targets.164 [EPA-HQ-OAR-2022-0829-0792, p. 26]

164 Id., at 29197.

Tesla asserts that providing credit multipliers can unnecessarily dampen actual deployment of BEVs and lead to backsliding on emission reductions. This is true regardless of the technology to which a multiplier may be attached and is not applicable just to BEVs. Accordingly, Tesla also supports the agency's proposed elimination of the medium-duty credit multipliers for all ZEVs after MY 2026.165 Indeed, considering the high level of the current medium-duty multiplier, rather than serve as an incentive, the multiplier is likely to further delay manufacturers from deploying large amounts of medium-duty BEVs in the U.S. until 2027. [EPA-HQ-OAR-2022-0829-0792, p. 26]

165 Id., at 29244-45.

EPA Summary and Response

Summary:

EPA received comments both in support of and in opposition to its proposal to eliminate MDV multiplier incentives for MY 2027 vehicles. The Alliance and Stellantis opposed the elimination of the multipliers for MY 2027, which were established in 2016 under the Phase 2 GHG standards, as they believed the multipliers are important given market uncertainties, the lower sales volumes of MDVs compared to LDVs, and that any changes in the multipliers would be disruptive to manufacturers' planning and development cycles already underway. Stellantis asserted that removing the MY 2027 multipliers would be counter to the Clean Air Act lead time provisions. In response to EPA's request for comment on whether we should phase-down the existing MDV multipliers for MYs 2025 and 2026, the Alliance and Stellantis also opposed any changes in the multipliers for these model years, on the same basis as their comments regarding the MY 2027 multipliers.

In contrast, several commenters (CARB, ICCT, Rivian and Tesla) supported EPA's proposal to remove multipliers for MY 2027. These commenters believed that multipliers are no longer necessary given the rapid advancement of BEVs in the MDV market and given their concern that multipliers erode the emissions benefits of the program and could result in emissions backsliding. With respect to EPA's request for comment on whether to phase-down the multipliers for MYs 2025 and 2026, Rivian supported phasing out the multipliers starting in MY 2025 and suggested specific values for stepping down the MY 2025-2026 multipliers. Rivian pointed to BEV van sales growing rapidly, especially with the adoption of the Advanced Clean Trucks program by several states, and the concern that the existing multipliers could result in a glut of credits.

NGVA asserts that the multiplier credits were originally established with the "intent on making electric vehicles more competitive" with conventional technologies.

Response:

EPA agrees with the commenters who supported elimination of the MDV multipliers for MY 2027, and we are finalizing that provision as proposed. As discussed further in section III.C.3.iii of the preamble, while we did anticipate some growth in electrification would occur due to the credit incentives in the Phase 2 final rule back in 2016, we did not expect the level of innovation since observed, or the IRA or BIL incentives. Given these developments, we believe the existing advanced technology multiplier credit levels for MY 2027 MDVs are no longer appropriate for maintaining the balance between encouraging manufacturers to continue to invest in new advanced technologies over the long term and potential emissions increases in the short term. We further agree with commenters that, if left as is, the MY 2027 MDV multiplier credits may allow for backsliding of emission reductions expected from ICE vehicles for some manufacturers in the near term (i.e., the generation of excess credits which could delay the introduction of technology in the near or mid-term) as sales of advanced technology MDVs that can generate the incentive credit continue to increase. In light of the rapid increase in vehicle electrification in the MDV market, as proposed, EPA is removing the BEV, PHEV, and FCEV multipliers for MY 2027.

Though EPA requested comment on phasing down the MDV multipliers for MYs 2025 and 2026, we have decided not to make any changes to the multiplier levels for those model years. In response to the comment from Stellantis that ending the MDV multipliers in 2025-2027 does not provide sufficient lead time under the Clean Air Act (CAA), EPA notes that for GHG standards the statute does not establish minimum lead time requirements. However, EPA does consider lead time as a factor in determining the appropriate standards under CAA section 202(a), and we have in fact considered the issue of lead time in the context of the MDV multipliers and the overall stringency of MDV standards. Given that MY 2025 has already begun and that MY 2026 begins as early as nine months from this final rule, EPA believes it would not be appropriate to change the MY 2025 or 2026 multipliers. Therefore, the MDV MY 2025-2026 multipliers will remain in effect as established under the Phase 2 rule.

In response to NGVA, as EPA discussed in the Phase 2 rule initially establishing the MDV multipliers and recapped in the light/medium-duty proposal, we acknowledge that multipliers represent a tradeoff between incentivizing new advanced technologies that could have significant benefits well beyond what is required under the standards and providing credits that do not reflect real world reductions in emissions, which could allow higher emissions from credit-using engines and vehicles. At relatively low adoption levels, we believe the balance between the benefits of encouraging development of advanced technologies as compared to any negative emissions impacts of multipliers would be appropriate and justify maintaining the current advanced technology multipliers through MY 2026.

3.1.9 - Timeframe of the standards

Comments by Organizations

Organization: American Honda Motor Co., Inc.

Regulation End Date

The agency requests stakeholder feedback on whether standards under this program should be set beyond MY2032: [EPA-HQ-OAR-2022-0829-0652, pp. 30-31]

EPA is requesting comments on whether the standards should increase in stringency beyond MY 2032. EPA seeks comment on whether the trajectory (i.e., the levels of year-over-year stringency rates) of the proposed standards for MYs 2027 through 2032 should be extended through 2033, 2034 or 2035, or whether EPA should consider additional approaches to the trajectory of any standards that were to continue increasing in stringency beyond 2032.51 [EPA-HQ-OAR-2022-0829-0652, pp. 30-31]

51 88 Fed. Reg. 29239 (May 5, 2023)

Although Honda would prefer that EPA set standards through MY2031 in order to align its regulatory timeline with that of the upcoming CAFE rule by NHTSA (an agency that is statutorily restricted to setting rules no longer than five years in length), we acknowledge that approach is not under consideration by EPA.52 [EPA-HQ-OAR-2022-0829-0652, pp. 30-31]

52 Honda also plans to provide feedback to NHTSA on its forthcoming CAFE NPRM, a similarly important rule that has significant overlap – as well as distinct differences – with the vehicle GHG regulation.

As noted earlier in these comments, the agency's proposed stringency is heavily predicated upon an assumed swift and seamless EV market transformation. In reality, that transformation has many uncertainties and risks associated with it, including multiple influential factors that are entirely outside the control of automakers. Given the high degree of uncertainty associated with this market transformation, we believe this rulemaking should not include standards beyond the agency's proposed MY2032 window. [EPA-HQ-OAR-2022-0829-0652, p. 31]

Recommendation: Honda suggests the agency set standards no later than MY2032. [EPA-HQ-OAR-2022-0829-0652, p. 31]

Organization: American Lung Association (ALA) et al.

EPA should set a course to emission controls out through the 2035 model year to address the ongoing need for cleaner combustion and increased certainty for zero-emission technologies. By capturing vehicle model years out to 2035 as an increasing number of states' ACCII standards have, EPA can ensure that the policies stay ahead of, rather than trail, zero-emission vehicle markets and automakers' announced combustion engine phaseouts to provide ongoing certainty in emission reductions. [EPA-HQ-OAR-2022-0829-0745, p. 3]

Organization: Arconic Corporation (ARCO)

7. The EPA is requesting comments on whether the standards should increase in stringency beyond MY 2032. EPA seeks comment on whether the trajectory (i.e., the levels of year-over-year stringency rates) of the proposed standards for MYs 2027 through 2032 should be extended through 2033, 2034 or 2035, or whether EPA should consider additional approaches to the trajectory of any standards beyond 2032.

Arconic recommends including the upstream power generation emissions for BEV vehicles. With that change, Arconic supports more stringent EPA standards in coordination with DOT CAFE standards beyond the 2027-2032 range covered in this proposed rule. [EPA-HQ-OAR-2022-0829-0741, p. 4]

Organization: CALSTART

2. Automaker Market Signal

In addition to pairing impactful incentives with ambitious regulations in the legislative ecosystem, automakers benefit from clear market signals. The automotive industry has committed to expanding ZEV offerings and many automakers are already on a roadmap to transitioning to 100% ZEVs by 2035. Providing market certainty through strong regulation unlocks greater deployment of capital, as evidenced by the $200+ billion worth of announced sector investments within the past two years.2 [EPA-HQ-OAR-2022-0829-0618, pp. 3-4]

2 https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-headed-for-the-u-s/.

By enacting strong vehicle emissions standards that require vehicle manufacturers to produce increasingly efficient and clean vehicles, as well as drive the electrification of the transportation sector, the EPA will help ensure wide-scale availability of the vehicles that support healthy communities. Commensurately, as battery and vehicle production achieve greater economies of scale, ZEV cost declines are expected. Projections show ZEVs reaching purchase cost parity with internal combustion engine (ICE) vehicles by the mid to late 2020's, after which they are projected to further decline in cost, saving money for all consumers, with particular benefit for low-income consumers. [EPA-HQ-OAR-2022-0829-0618, pp. 3-4]

CALSTART believes there are important takeaways from these comments that can help inform and structure a stronger Light-Duty and Medium-Duty Vehicles standard:

3. Extend the proposed rule to 2035, resulting in the equivalent of 100% ZEV sales by 2035, consistent with ACC II.

Organization: Elders Climate Action

We ask EPA to revise the rule to set a zero emission standard for all new L/MDVs by 2035, and establish a phase-in schedule for the standard that includes ZEV sales targets for MYs 2027-29 that are the same as the CARB ACT rule. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

Organization: Kia Corporation

- Kia supports EPA’s six model year time period proposed for the standards from MYs 2027–2032. There is considerable uncertainty associated with the uptake of these technologies in ways that are difficult to predict even within the six model years.3 Consequently, extending the rule beyond MY2032 is inappropriate at this time. [EPA-HQ-OAR-2022-0829-0555, p. 3]

3 88 Fed. Reg. 29,311.

Six Model Year Timeline for Program is Appropriate

EPA requests feedback on whether the standards should extend beyond MY2032.5 Kia urges EPA not to extend the rulemaking beyond MY2032. As drafted, the proposal – any or all of the alternatives proposed – will require the automotive industry to take on transformative efforts, including historic investments, and rely on sufficient investments from industries beyond the automotive industry. Further, the industry will take on significant risks regarding consumer EV acceptance. As EPA has pointed out in the proposal, there is considerable uncertainty associated with the uptake of these technologies in ways that are difficult to predict even within the six model years.6 Consequently, extending the rule beyond MY2032 is inappropriate at this time. [EPA-HQ-OAR-2020829-0555, p. 4]

12 5 88 Fed. Reg. 29,239.

6 88 Fed. Reg. 29,311.

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

EPA should consider extending and increasing both the LDV and MDV standards through MY 2035, which will send a strong signal to industry and the public and align with MYs covered by the ACC II and ACT regulations. [EPA-HQ-OAR-2022-0829-0584, p. 9]

Organization: POET, LLC

VII. EPA Should Not Yet Extend Continually More Aggressive Standards Beyond Model Year 2032.

Vehicle technologies and market dynamics may considerably change by 2023, including BEV-induced strains on the electric transmission and local distribution grids, critical mineral supply chains, and energy security risks created by EPA over-indexing on a preferred technology. Accordingly, POET strongly recommends against having standards set now that continue to increase in stringency beyond 2032. [EPA-HQ-OAR-2022-0829-0609, p. 29]

Organization: South Coast Air Quality Management District

12. There are five key issues we request U.S. EPA address before finalizing the rule. Extend the phase-in period and adopt more stringent standards to align with California's ACC II regulation. The proposed standards will be phased in over a six-year period from model year (MY) 2027 through 2032 with increasing stringency each year. We recommend that the phase-in period be extended to 2035 and later model years to better align with the ACC II implementation schedule which extends out to MY 2035 and subsequent years. [EPA-HQ-OAR-2022-0829-0659, p. 2]

Organization: Toyota Motor North America, Inc.

EPA requests comment on whether the standards should extend beyond the 2032 model year. Toyota is concerned that the proposal has not adequately addressed the market uncertainty surrounding the proposed standards through 2032 model year. Therefore, we believe it would be inappropriate to extend the standards beyond 2032. [EPA-HQ-OAR-2022-0829-0620, pp. 26-27]

Organization: Wisconsin Department of Natural Resources

In this action, EPA is proposing new, more stringent emissions standards for criteria pollutants and greenhouse gases (GHG) for light-duty vehicles and medium-duty vehicles that would phase-in over model years 2027 through 2032. [EPA-HQ-OAR-2022-0829-0507, p. 1]

The WDNR offers the following specific comments on the proposal:

2. Extending standards to model year 2035. EPA is requesting comment on if these new standards should be extended to MY 2035. If EPA elects to extend the standards an additional three years, EPA should consider undertaking a "mid-course review" to ensure the standards are still appropriate and whether a change in stringency (to reflect the current state of technologies and the market) is warranted. [EPA-HQ-OAR-2022-0829-0507, p. 2]

EPA Summary and Response

Summary:

In its NPRM, EPA requested comment on whether the trajectory (i.e., the levels of year-over-year stringency rates) of the proposed standards for MYs 2027 through 2032 should be extended through 2033, 2034 or 2035, or whether EPA should consider additional approaches to the trajectory of any standards beyond 2032.

In their comments, some NGOs and state organizations supported extending the standards through 2035, citing the need to send a strong market signal, and/or to be consistent with ACC II. In contrast, automakers that responded expressed concerns of market uncertainty, were EPA to extend the rulemaking past MY 2032. In its comments, while acknowledging that EPA did not seek comment on a shorter timeframe, Honda requested that EPA only set standards through MY 2031 which they believe is important to align with the proposed CAFE standards.

Response:

EPA responds to many of these comments in Section III.C.2.iv.c of the preamble. In sum, EPA understands commenters' concerns about uncertainty out to the MY 2035 time frame, and believes it is appropriate to consider standards for MY 2033 and beyond in a future rulemaking. EPA disagrees with Honda's request to set standards only through MY 2031 as the rulemaking lays out a strong basis that standards through MY 2032 are feasible and appropriate under the Clean Air Act.. After considering all of these comments, EPA is finalizing standards for MYs 2027 through MY 2032 for both light-duty and medium-duty vehicles.

3.1.10 - Alternative compliance pathway

Comments by Organizations

Organization: Environmental Defense Fund (EDF) (1of 2)

ii. EPA should finalize a Leadership Pathway to incentivize compliance with ACC II nationwide.

In response to EPA's request for comments on GHG regulatory alternatives, EDF recommends EPA finalize an alternative, "Leadership Pathway." Under the Leadership Pathway, manufacturers could choose to comply with California's ACC II ZEV sales requirements nationwide to demonstrate compliance with EPA's greenhouse gas requirements. Manufacturers would continue to comply with EPA's proposed Tier 4 air pollution standards. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

The leadership pathway would be a voluntary, alternative compliance framework that manufacturers could choose, but once chosen, it would be enforceable. EPA has included similar, alternative pathways in past regulations where doing so would deliver equivalent or greater environmental benefits. Adopting a leadership pathway along these lines in these standards would allow manufacturers that anticipate exceeding the level of ZEVs reflected in EPA's proposal to comply with the same set of requirements in California and 177 states and nationwide in a consistent and streamlined fashion. As we demonstrate below, it would also deliver significant additional pollution reductions as compared to any of EPA's proposed alternatives. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

Under ACC II, ZEVs must constitute a set percentage of a manufacturer's light-duty sales in MYs 2026 through 2035. The percentage of ZEV sales in MY 2032 is 82% growing to 100% by 2035. PHEVs with an EPA rated range of 50 miles count as a ZEV up to 20% of the ZEV percentage requirement (i.e., 16.4% of total sales in 2032). There are no explicit GHG standards for ICEVs starting in 2026. EPA projects that manufacturers could meet its proposed 2032 GHG standards by selling 67% BEVs by 2032, 15% less than under ACC II. While ICEV emissions are included in fleet-average GHG emissions counting towards the proposed standards, EPA's modeling indicates that little new ICEV controls are applied beyond 2026. Thus, on the surface, the ACC II ZEV standards appear to be more stringent than EPA's proposed GHG standards. In order to confirm this, EDF has conducted modeling using OMEGA 2 to compare fleet-average

GHG emissions under ACC II ZEV standards and under EPA's proposed GHG standards. We analyzed a scenario in which ACC II ZEV requirements would be met through 2035, with ZEV sales constant thereafter (ACC II 2035). [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

EDF used OMEGA 2 to model the ZEV sales requirements by setting the minimum fraction of BEV sales within a vehicle segment (i.e., sedans, CUV/SUVs, and pickups) in the "required sales share" file to match those of ACC II. This is analogous to the approach taken by EPA when it modeled the impact of ACC II in California and ACC II adopting States. However, our analysis applied minimum ZEV sales requirements to all vehicle sales and did not create a second vehicle fleet for those sold in the ACC II states.111 [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

111 EDF also increased the cap on total battery capacity usage on line 67 of the OMEGA 2 batch file. This arbitrary increase is not material to this case, as EDF is not claiming that there will be sufficient battery availability for all manufacturers to comply with ACC II nationwide. We only want to determine the relative benefits of individual manufacturers who might desire this option. They would only do so if they believed that they would have adequate access to ZEV battery capacity.

As discussed above, ACC II allows PHEVs with a 50-mile on-road range to count as a full ZEV. EPA's proposal would set the utility factor for a PHEV50 at roughly 67%. The current OMEGA 2 model does not include the modeling of PHEVs. However, if a manufacturer chose to meet the ACC II ZEV sales requirements with the maximum 20% level of PHEV50 sales, effectively 6.7% of total ZEV operation would be powered by gasoline. For example, assuming maximum PHEV share in 2032, the 82% ZEV standard could be equivalent to 76.5% BEVs and 23.5% ICEVs. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

We left the selection of which vehicles to electrify entirely up to OMEGA 2. We also left the GHG standards constant at the levels of the current MY 2025 GHG standards, as ACC II imposes no direct restrictions on ICEV emissions after 2025. As a practical matter, the control of ICEV emissions has little or no impact on fleetwide GHG emissions or vehicle electrification after 2025. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

Table 9 shows BEV sales under the ACC II scenario, as well as under EPA's proposed GHG standards and EPA's Alternative 1 standards.

[See original attachment for Table 9: ZEV Sales as a Function of Total Vehicle Sales] [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

As the Table shows. Projected ZEV sales under the EPA proposal and Alternative 1 are significantly less than those projected for the ACC II scenario. At the same time, while still higher than EPA's two scenarios, the projected BEV sales under the ACC II scenario using OMEGA 2 are lower than required by ACC II. The shortfall between the ACC II ZEV sales requirement and the level of ZEV sales in the OMEGA 2 simulation in 2032 is 8%. In 2035, the shortfall grows to 17%for ACC II 2035.112 [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

112 EDF was unable to direct OMEGA 2 to increase BEV sales to meet the ACC II targets. As a result, the projected impacts for the ACC II scenarios are under-estimated.

We noticed that OMEGA 2 decreases its projections of ZEV sales in 2033 for some GHG/ZEV scenarios presumably due to the end of the IRA tax credits. This occurs to a greater degree for less stringent scenarios, like the Proposal, but to a much smaller degree for

Alternative 1 and ACC II 2035. BEV sales then recover to 2032 levels by 2035 under the Proposal. Regardless of these modeling differences, actual real-world compliance with ACC II requirements would result in greater levels of ZEVs and greater environmental benefits than we have shown here. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

Fleetwide GHG levels under the various scenarios are shown in Table 10.

[See original attachment for Table 10: Fleetwide GHG Certification Levels from OMEGA 2 Output (g/mi)] [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

The above table shows fleetwide certification (tailpipe) GHG emission levels are significantly lower under the ACC II scenario than under either EPA scenario. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

We then used EPA's Effects Model to project total GHG and criteria air pollutant emission reductions from passenger cars and light-trucks through 2055. EDF used the same emission input files as EPA used in modeling its Proposal and Alternative, which assumed that new vehicles were equipped with gasoline particulate filters (i.e., emission_rates_vehicles-with_gpf.csv). [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

The results are shown in Table 11. Reductions of both upstream and downstream emissions relative to EPA's No Action scenario are included, using EPA's upstream emissions input files.113 [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

113 We believe that EPA's estimates of upstream gasoline emissions are substantially under-estimated, as they fail to consider emissions from petroleum production, petroleum transportation and gasoline distribution. This issue is discussed in more detail in our heavy-duty comments.

[See original attachment for Table 11: Cumulative GHG and Criteria Pollutant Emission Reductions from Passenger Car and Light Trucks Through 2055 (GHG: million metric tons; criteria pollutant: U.S. tons)] [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

ACC II 2035 is projected to achieve 53% more cumulative GHG emission reductions through 2055 than EPA's Proposal and 36% more than EPA's Alternative 1. The ACC II scenario would also achieve substantially greater criteria pollutant emission reductions than either EPA scenario. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

Table 12 shows the monetized benefits projected for the three scenarios.

[See original attachment for Table 12: Cumulative Net Monetized GHG and Criteria Pollutant Benefits from Passenger Car and Light Trucks Through 2055: Net Present Value in 2027 (billion 2021 dollars, discounted at 3% per year)] [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

The ACC II scenario would provide more GHG and criteria pollution benefits than either of the two EPA scenarios. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

Accordingly, EDF recommends that EPA adopt an alternative Leadership Pathway with ZEV sales consistent with ACC II through 2035 as an option for compliance with its Final Rule.114 While the above analysis focuses on ACC II through 2035, EDF also evaluated ACC II through 2032 and likewise found it would deliver greenhouse gas and air pollutant benefits as compared to the proposal (although lesser in magnitude than ACC II through 2035). This reinforces our conclusion that a voluntary compliance alternative along these lines would deliver important additional environmental benefits and provide a pathway to align requirements with those that California and many other states either have, or likely will, adopt. [EPA-HQ-OAR-2022-0829-0786, pp. 41-45]

> 114 EDF also modeled a leadership pathway with ACC II ZEV consistent sales through only 2032. While EDF recommends having the leadership pathway extend through 2035, if EPA limited it to only 2032, it would still provide benefits in excess of any of EPA's current proposals. See Appendix B for more details.

Organization: General Motors, LLC (GM)

GM is an industry leader with plans to become carbon neutral in its global product portfolio and its operations by 2040 and has set science-based targets in line with the Paris Agreement and the U.S. Nationally Determined Contribution in support of that goal. GM understands the importance of greenhouse gas (GHG) regulations that are aligned with complementary policies. Ultimately, these policies, which include support for permitting reform, domestic supply chain development,consumerncentives, and charging infrastructure, are critical to the overall success o f the regulations. GM, and the U.S. auto industry overall, have made great strides with GHG reduction technologies since the first GHG standards were adopted for the 2012 model year. We look forward to accelerating that progress with our EV transition. [EPA-HQ-OAR-2022-0829-0700, pp. 2-3]

Today, GM reiterates our commitment to support a regulation that reaches the Administration' s original goals (i.e., 50% EV share 2030, 60% GHG reduction from model year 2021 to 2030) and is aligned with other applicable vehicle regulations. These goals represent the appropriate path toward all EVs by 2035 and re-affirm our commitment to long-term science-based climate targets. These goals also recognize the profound uncertainties of supply chain, manufacturing, infrastructure, and consumer market dynamics through the interim years, as well as related to the implementation of the Inflation Reduction Act (IRA) through the regulation timeframe. [EPA-HQ-OAR-2022-0829-0700, p. 3]

GM supports the creation of a "Leadership Pathway," an optional compliance path for fast-moving companies that will further accelerate EV deployment. We encourage EPA to develop an innovative opt- in compliance pathway that rewards companies that deliver greater-than-projected EV volumes for greater multipollutant reductions. A voluntary program for companies with higher EV deployment has the potential to result in greater overall national EV volumes than the Executive Order 2030 goal (i.e., 50% EVs), the NPRM 2032 goal (67% EVs), and California's Advanced Clean Cars II. [EPA-HQ-OAR-2022-0829-0700, p. 5]

This Leadership Pathway is consistent with General Motors's ground-breaking call in 2018 for a National Zero Emission Vehicle (NZEV) program that enables scale by promoting ZEV investment that meets customer demand throughout the entire nation to address climate change. Given the continued acceleration of EV sales, a Leadership Pathway would provide a logical extension of that NZEV concept. Given companies have committed to the transition in the U.S., we believe that U.S. transportation climate, local air pollution, and petroleum use goals can and should be achieved through high-volume EV sales. If properly conceived, a Leadership Pathway would exceed the Administration's criteria pollutant, GHG emission, and fuel consumption goals, and reward automakers that are acceleratin g that transition to zero-emission vehicles with less complexity and with fewer certification requirements. [EPA-HQ-OAR-2022-0829-0700, p. 5]

Organization: Porsche Cars North America (PCNA)

Porsche supports the development of an alternative compliance pathways, providing additional flexibility within the overall suite of light-duty regulation.

Porsche appreciates EPA including within the MPR preamble reference to alternative compliance pathways that may be considered and included within the Final Rule. Porsche agrees with the agency that an alternative pathway could be developed to help encourage earlier adoption of zero- and near-zero emission technologies that would match or even accelerate GHG and criteria emission reductions beyond the levels proposed within the various scenarios in the proposal. Alternative compliance pathways have been, and can continue to be, a pragmatic regulatory tool that helps agencies achieve their desired policy outcomes while providing manufacturers with greater choice and potentially improved alignment with their individual product strategies. [EPA-HQ-OAR-2022-0829-0637, pp. 4-5]

Porsche would support the development of an alternative pathway for this final rule. An alternative pathway could be an option available to any Original Equipment Manufacturer that would establish requirements that could be met in lieu of primary vehicle certification and fleet average performance-based standards. Each manufacturer would have an equal opportunity to review and participate in this pathway. Porsche believes that an alternative pathway could be developed that would be equitable in terms of manufacturers contributing to the policy goals of the NPRM. Furthermore, Porsche believes that an alternative pathway could be structured such that regardless of how many manufacturers chose to participate, there would be no incremental burden on non-participating manufacturers. Porsche respects that manufacturers serve very different market segments and that an alternative pathway may not be appropriate for all manufacturers. [EPA-HQ-OAR-2022-0829-0637, pp. 4-5]

An alternative pathway that focuses on the deployment of zero- and near-zero emission vehicles will directly contribute to the carbon and pollution reduction policy goals of this MPR, in addition to the petroleum reduction goals of DOT's CAFE regulation and with the air quality goals within California's recently adopted Advanced Clean Cars 2 regulations. In addition, this pathway will help manufacturers concentrate their human and financial resources into the development and manufacturing capacity of zero- and near-zero emission vehicles, potentially leading to accelerated deployment of such vehicles and with the greater potential for cost reductions. This type of pragmatic focused pathway can deliver regulatory certainty, compliance streamlining, and increased environmental and energy benefits. [EPA-HQ-OAR-2022-0829-0637, p. 5]

.In general, like the primary suite of regulations, Porsche believes an alternative pathway would center upon an annual compliance requirement that would contain a mix of targets, boundary conditions, and flexibilities. Manufacturers would commit to utilizing this pathway the details of which could be defined within a new Subpart. Compliance with the terms within this new Subpart would be in lieu of compliance with the primary performance-based fleet average and vehicle certification requirements. [EPA-HQ-OAR-2022-0829-0637, pp. 5-6]

With regards to form and structure, Porsche generally views an alternative pathway that would likely be centered on an accelerated ramp rate of zero- and near-zero emission vehicles and technologies. The alternative pathway could include annual targets for the nationwide deployment of zero- and near-zero emission vehicles. The targets could reflect an incremental level above the industrywide projected rates of zero- and near-zero emission vehicles needed to comply with finalized performance-based standards. In addition, Porsche believes that the pathway could provide recognition for actions from manufacturers that support electrification through complementary measures such as deployment of charging infrastructure or customer education programs that would both be helpful to increasing consumer adoption. [EPA-HQ-OAR-2022-0829-0637, pp. 5-6]

Porsche recognizes that this type of pathway may be characterized as a Nationwide "EV mandate" which could negatively impact consumer choice and remove other technologies from the market. Porsche believes that the alternative pathway could be structured with flexibility to include technologies that are able to demonstrate significant and meaningful emissions benefits. Porsche recognizes that certain vehicle segments may better achieve emissions goals and customer acceptance through technologies other than full electrification. As such, a flexibility for being inclusive, even if for a limited portion of the overall requirement, may be a pragmatic and helpful approach. [EPA-HQ-OAR-2022-0829-0637, pp. 5-6]

Porsche is aware of discussions associated with these types of zero-emission vehicle policies regarding the performance requirements for the remaining combustion models that would continue to be sold. The dialogue being that combustion models would be free to "backslide" in their emission performance or fuel efficiency should they no longer be subjected to stringent certification and fleet average requirements. Stakeholders have contended that this potential "backsliding" could erode or otherwise offset the benefits being achieved even with increased zero-emission vehicle sales. Porsche believes that a reasonable set of boundary conditions could be developed as part of the alternative pathway that would help ensure policy outcomes by preventing backsliding of the remaining combustion fleet. There are likely a series of measures that could be implemented to protect against such erosion of emissions or fuel economy performance that would allow manufactures to focus on their zero-emission fleet, but not at the expense of reduced combustion vehicle performance. These types of "anti-backslide" measures have been used in the past within vehicle regulations. Manufacturers could outline their roadmap of remaining combustion models and demonstrate to the Administrator how the manufacturer would preserve the level of performance for each remaining vehicle over the duration of the regulation. Porsche believes there could also be some requirements for limited, targeted improvements in these combustion concepts that may help achieve incremental emissions benefits without major redesign or certification resources. Overall, this approach could effectively "snap a chalk line" for each manufacturer to preserve combustion vehicle performance as the vehicles phase-down in a manufacturers fleet. [EPA-HQ-OAR-2022-0829-0637, pp. 5-6]

As mentioned above, Porsche believes it is likely that the terms of an alternative pathway would need to be consistent for each participating manufacturer regardless of overall size within the US market. Because smaller volume-based manufacturers already are provided limited flexibilities for annual compliance, it is unlikely that additional flexibilities would be needed within an alternative pathway. As such, EPA could consider whether it remains appropriate to maintain provisions for related entities as such provisions may no longer serve a purpose. Manufacturers could be provided the option to participate in the alternative pathway on an individual basis or to continue with the current coordinated compliance. [EPA-HQ-OAR-2022-0829-0637, pp. 5-6]

Porsche also believes that the potential benefits of an alternative pathway could extend beyond the boundaries of this specific NPRM. Porsche recognizes that an alternative pathway developed within this rulemaking would necessarily be limited to acting in lieu of regulatory requirements directly under EPA's management. However, Porsche recognizes that an alternative pathway could provide similar benefits within the regulatory structure of other related State and Federal regulations. As noted earlier, an accelerated ramp rate of zero- and near-zero emission technologies could equally serve these programs. As such, Porsche recommends that an alternative pathway be structured and coordinated across agencies to provide manufacturers with a holistic, comprehensive compliance strategy that would significantly improve regulatory certainty and streamlined implementation. Porsche believes it could be possible for California and NHTSA to coordinate with EPA to develop equivalent alternative pathways that would work separately under each agencies own statutory authority, but aligned to ensure that a manufacturer who brings an accelerated rate of zero- and near-zero emission vehicles to market can achieve compliance with the full range of requirements. [EPA-HQ-OAR-2022-0829-0637, pp. 6-7]

Porsche acknowledges that this would be an extensive investment in agency resources to define the specifics of an alternative path in time for a Final Rule as projected in CY2024. Nevertheless, Porsche hopes that these comments are sufficiently responsive to the request for comment by EPA which could create the opportunity for details to be developed by EPA. Porsche would seek to be an active, constructive resource for the agency in helping to inform the details on such an alternative pathway. [EPA-HQ-OAR-2022-0829-0637, pp. 6-7]

Organization: Volkswagen Group of America, Inc.

Alternative Pathway

With respect to alternatives to the current Averaging, Banking and Trading (ABT) program to allow manufacturers flexibility to comply, EPA seeks public comment on the potential merits of such an alternative pathway concept, whether it would be advantageous for both the GHG as well as the criteria pollutant standards program, and how it might be structured. Volkswagen supports the EPA's consideration of alternative pathways to help encourage earlier adoption of zero emission vehicles with the aim to accelerate GHG and criteria emission reductions beyond the levels adopted. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4]

Electrification is the core of future mobility. Volkswagen believes an inter-agency coordinated alternative compliance pathway could simplify overall GHG, CAFE and criteria compliance to all standards by recognizing an optional National ZEV program alternative. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4]

Alternative optional compliance pathways can be a regulatory tool for agencies to achieve their desired policy outcomes while providing manufacturers with greater choice and improved alignment with their product strategies. Volkswagen recognizes that manufacturers follow different strategies, while serving very different market segments and customer needs. Each manufacturer would have an opportunity to participate. The pathway would require structuring such that non-participating manufacturers would not be disadvantaged. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4]

Volkswagen proposes that OEMs who meet the optional National ZEV alternative pathway, above the EV final rule threshold, be found in compliance with all performance-based standards, including GHG, CAFE and Tier 4/LEV IV emissions regulation. Local ZEV III standards would stay in place. This would become a meaningful alternative to achieve EPA's objective of transitioning the U.S. automotive fleet towards EVs and would set a clear focus on transformation and investment in ZEV technologies. A comparable approach is currently in development in the United Kingdom, which plans to establish a ZEV mandate as the new lead regulation, instead of strengthening the existing CO2 fleet standards. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4]

Volkswagen believes that an alternative pathway that focuses on the acceleration of zero emission vehicles will help manufacturers concentrate their resources into development and manufacturing of these vehicles. Investing in a diminishing ICE fleet would direct resources away from EV ramp-up, which would be counterproductive to the goal. By having a complete focus on an EV fleet, the regulatory complexity and burden for manufacturers would be drastically reduced. In turn, this could improve vehicle speed to market and deliver more choices at lower costs for customers. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4]

Volkswagen acknowledges that the alternative pathway could potentially result in an emission "backslide" in ICE vehicles. Volkswagen therefore suggests establishing a reasonable set of boundary conditions as part of the alternative pathway to ensure anti-backsliding for the remaining ICE fleet. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4]

The optional alternative pathway will ultimately serve the objectives of the Clean Air Act, State air quality and federal fuel economy standards. Volkswagen believes that legislative and regulatory action would be needed to complete the transition of vehicles on the road from ICE to ZEV. A clear, focused pathway will help provide regulatory certainty, compliance streamlining and increased environmental benefits. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4]

Volkswagen recognizes that this would be a potentially significant agency and legislative resource investment to include in time for the Final Rule, and that these comments do not provide exact suggestions for structure and requirements of such an alternative path. Volkswagen does not have specific parameters outlined for this pathway as they could extend past the scope of this NPRM. However, EPA should consider using this rulemaking as an opportunity to offer an optional alternative ZEV compliance pathway for greenhouse gas and criteria emissions that could be implemented in concert with similar alternative ZEV compliance pathways for the CAFE and CARB regulatory programs. Volkswagen will be an active and constructive resource for the agencies and manufacturers to discuss and define the details on such an alternative pathway. [EPA-HQ-OAR-2022-0829-0669, pp. 3-4

EPA Summary and Response

Summary:

In the NPRM, EPA solicited public comments on whether there would be merit to considering alternative pathways that might encourage manufacturers to achieve lower CO_2 emissions than the final standards earlier in the program. Three stakeholders (EDF, GM, Porsche and Volkswagen) each provided comment in support of a conceptual voluntary pathway that would be more stringent than the standards finalized in this rulemaking.

Response:

EPA appreciates commenters feedback and willingness to discuss and develop such an alternative, or “leadership” pathway concept. As we more fully describe in Section III.C.2.iv.c of the preamble, EPA is not finalizing such a pathway in its final rulemaking, due to the need for additional exploration and assessment of such a pathway. However, EPA is open to continued dialogue with stakeholders in the spirit of trying to better define such a pathway for a potential future action.

3.2 - GHG standard curves

3.2.1 - LDV footprint curves

Comments by Organizations

Organization: Alliance for Automotive Innovation

A. Major Concerns with the Proposed GHG Standards

2. Footprint Attribute

Auto Innovators supports the continued use of footprint-based standards. Historically, the footprint attribute has served relatively well as a surrogate for vehicle tractive energy requirements, providing a means to set standards appropriate to different sizes of vehicles. [EPA-HQ-OAR-2022-0829-0701, p. 110]

9.Development of Footprint Curves

a)Footprint Trends

Auto Innovators disagrees with EPA’s assessment that the footprint-based standards have resulted in a general increase in vehicle footprint as a means to reduce compliance burden. When vehicles are redesigned, their footprint may change for any number of reasons. Furthermore, we believe a closer look at vehicle trends would reveal that vehicle type and segment size shifts play as large a role in changing average footprints as increases in footprint for any given model of vehicle. Finally, while a slightly larger footprint may yield a nominal compliance benefit, such benefits are relatively small (a couple of g/mile at most) and are limited by other model design parameters. [EPA-HQ-OAR-2022-0829-0701, pp. 120-121]

The relatively short comment period prevents us from exploring this topic more thoroughly, and we may take time outside of the rulemaking comment period to discuss this issue further if it remains a concern to EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 120-121]

b).Footprint Curves

Regardless of the shape of the footprint curves, we are concerned that their level in general will require rapid EV uptake through both the early and late majority market phases in less than a decade, from the early adopter stage the market is in today. [EPA-HQ-OAR-2022-0829-0701, pp. 120-121]

EPA’s proposed approach to seeing footprint-based target curves is a dramatic change from prior rulemakings.

In the 2010 rule, target curves were developed with the concept of fitting known vehicle data, and then applying gram per mile improvement requirements across the range of vehicle sizes. In 2012, some adjustments were made to the truck curve shape and cut-points to better reffect the light-duty truck fleet. EPA then generally applied percentage reductions to the targets year- over-year with the understanding that greenhouse gas reduction technologies would achieve similar percentage improvements across the entire size range of vehicles. That same general process was followed in the 2020 and 2021 GHG rulemakings. Mathematically and technologically, this process has resulted in gradually flattening slopes and a truck target curve that has generally moved closer to passenger car target curve in each year, other than when corrections were made to the curve fitting in the 2012 rulemaking. Over the history of these developments, one can still trace back to the premise of curves that reflect the energy demands of various sizes and types of vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 120-121]

Now, EPA proposes to move away from the prior process of applying a percentage reduction to both passenger car and light-duty truck curves. For light trucks, EPA proposes to set a target curve based on the passenger car curve with an off-set for four-wheel/all-wheel-drive and a linear function to represent increasing towing capacity with increasing vehicle size. The base passenger car target curve (upon which the truck curve is based) has had its slope fattened to the point where footprint plays little role in the target. [EPA-HQ-OAR-2022-0829-0701, pp. 120-121]

These changes, particularly setting a truck curve based on the car curve, are technical in nature, and difficult to fully evaluate and comment adequately on in the short period of time provided for comment. The proposed changes are based on the sort of analysis that would have been better discussed with the public in advance of a proposed rule. Auto Innovators may continue analysis post-comment period and would appreciate further discussion with EPA if needed. In the meantime, we offer the following observations. [EPA-HQ-OAR-2022-0829-0701, pp. 120-121]

i)Target Curve Slope

Flater GHG performance across vehicle size is an expected outcome of applying ZEV technology (with zero tailpipe emissions instead of a percentage improvement to a prior technology) across the entire range of vehicle sizes. However, making the assumption of rapid EV market share gains across all vehicle sizes effectively forecloses opportunities for plug-in hybrid electric vehicles that have some zero emission operation, but also include ICE operation that would be better suited to a target curve with some slope. [EPA-HQ-OAR-2022-0829-0701, pp. 121-123]

Concerns with a flat passenger car curve grow when that passenger car curve is then used to derive a light truck curve. Although the proposed truck curves have more slope than the passenger car curves they are derived from, that slope is intended (at least to our understanding of EPA's analysis) to account for towing capacity. However, the underlying assumption of massive EV uptake is there because the towing adjustment is applied to the underlying passenger car curve. Such an approach fails to consider potential differences in overall EV uptake and type of EV uptake in the light-duty truck fleet. EPA may model that BEV uptake in the light-duty fleet will rapidly catch and equal that in the passenger car fleet across all vehicle types, but that is an artifact of the model itself. The model simply reacts to whatever targets it is given, and outputs the technology path, associated emission levels, etc. that would be required to meet that target. It does not consider the market as automakers do, where different technologies might be better suited to different vehicles to meet market needs. [EPA-HQ-OAR-2022-0829-0701, pp. 121-123]

ii)Light-Duty Truck Curves Based on Passenger Car Curves

There was insufficient time for us to analyze EPA's derivation of the four-wheel/all-wheel-drive offset and towing utility functions for light-duty trucks. However, we are concerned that even if applying such adjustments to passenger car targets is technically accurate (we withhold judgement here) and the derivations are correct (again withholding judgement), EPA proposes to make the switch from a system based on historic performance to a new one based on the passenger car curves starting in MY 2027. This results in a large increase in truck stringency in the first year of the proposed program. As can be observed in the EPA Trends Report, light-duty trucks have already gradually fallen behind regulatory requirements on average.223 Now, EPA asks them to make a large leap forward in emissions performance from an already disadvantaged position with virtually no lead-time. (Some manufacturers have already begun offering MY 2024 vehicles; MY 2027 can begin in less than three years.) [EPA-HQ-OAR-2022-0829-0701, pp. 121-123]

223 To some extent, this is likely because manufacturers have generally added electric vehicles to passenger car fleets, using passenger car compliance to offset truck fleet emissions. Light-duty truck electrification has generally trailed that of passenger cars.

iii)"Footprint Neutral" Slope

We similarly have not had enough opportunity to evaluate EPA's derivation of a "footprint-neutral" slope. However, we can say that regardless of any math that EPA might apply, manufacturers simply don't think about vehicle footprint in those terms. They consider wheelbase and trackwidth in terms of driving dynamics, vehicle customer functionality, safety, and other attributes that customers care about. [EPA-HQ-OAR-2022-0829-0701, pp. 121-123]

iv)Low and High Footprint Cut Point Changes

EPA also proposes changes to the cut points where the target curves become flat instead of following a function of footprint. [EPA-HQ-OAR-2022-0829-0701, pp. 121-123]

We do not oppose moving the low footprint cut points for passenger cars and light-duty trucks higher. While the market implications of such action are unclear, we can certainly agree that the extremely low GHG emission targets for the smallest vehicles have been a challenge to meet. [EPA-HQ-OAR-2022-0829-0701, pp. 121-123]

EPA is also proposing to lower the high footprint cut point for trucks. In 2012, the high cut point was increased in recognition that there were already a number of larger vehicles with footprints higher than the cut point, resulting in standards that did not reflect their size. There remain a number of vehicles up to approximately 78 ft2 footprint in the light truck fleet. Lowering the high footprint cut point would only serve to punish those vehicles. We recommend that EPA keep the light-duty truck high footprint cut-point at 74 ft2. [EPA-HQ-OAR-2022-0829-0701, pp. 121-123]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

The proposed standards need to limit upsizing as the light-duty fleet electrifies [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

In the past decade the U.S. automotive market has seen a shift towards larger vehicles. The average footprint for all vehicle types has increased and more and more light trucks are being sold compared to cars. This has been a major factor for the recent stagnation in real- world fuel efficiency of the fleet.17 We applaud EPA for attempting to counter these trends with the proposed standards and for correcting conditions from past GHG rulemakings that have exacerbated the issue. Lowering the cutpoints on the light truck curve will reduce emissions by setting a more stringent standard for the largest trucks, as will the flattening of both the car and light truck curves and reducing the GHG grams per mile (gpm) gap between them. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

17 https://www.epa.gov/automotive-trends

EPA must correct the slope of its car curve to accurately reflect BEV penetration [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

ACEEE agrees that the slopes of the car and light truck curves that demonstrate the relationship between vehicle footprint and the relevant emissions targets should reflect rising BEV penetration over the period of the standards, and that the appropriate slope for ZEVs should be zero. Tailpipe-only accounting combined with steep curves means that the production of large ZEVs can generate a considerable number of credits for a given manufacturer, which will incentivize vehicle companies to upsize their ZEV offerings and ignore improvements to ICEV options. For an ICEV car curve, EPA has determined that the appropriate slope to avoid incentivizing vehicle upsizing or downsizing is 0.8 gpm/ft2 and contends that the curve should be adjusted over time based on the ZEV share of sales. However, the car curve slopes for both the proposed standards and Alternative 1 are inconsistent with this finding, as explained below. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

Table 1. Car curve slope unadjusted and adjusted for BEV penetration

Model Year	Proposed Standard Car Curve Slope (gpm/sq-ft)	Expected Car BEV Penetration	Adjusted Slope (gpm/sq- ft)	Alternative 1 Car Curve Slope	Expected Car BEV Penetration	Adjusted Slope (gpm/sq-ft)
2027	0.64	43%	1.12	0.59	44%	1.05
2028	0.56	51%	1.14	0.51	50%	1.02
2029	0.47	59%	1.15	0.42	58%	1.00
2030	0.43	65%	1.23	0.38	67%	1.15
2031	0.39	69%	1.26	0.34	72%	1.21
2032	0.35	73%	1.30	0.30	74%	1.15

[EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

ACEEE calculated the adjusted slopes in Table 1 based on EPA's description of their methodology in the Draft Regulatory Impact Analysis (DRIA) where a slope of 0.8 is scaled to 0.4 to reflect 50% ZEV penetration (p.1-7). The adjusted slopes shown in Table 1 are far higher than 0.8 and rise over time with increases in BEV penetration. If 0.8 is the slope that minimizes the incentive to upsize or downsize vehicles, then anything higher than that would encourage the manufacture of larger vehicles and lead to higher emissions. Given that the light truck curve is based on EPA's car curve but has added offsets, the light truck curve would be similarly affected. EPA projects that average footprints will rise as a result of the proposed standard, further evidence that the curves as proposed are too steep (DRIA p.1- 14). We strongly recommend that EPA flatten both curves to accurately reflect expected BEV penetration in accordance with its own analysis. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

Offsets for the light truck curve should be decreased to reflect real-world conditions [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

EPA constructs the light truck curve for the proposed standards by adding offsets (in the form of higher levels of emissions for a given footprint) to the car curve then similarly adjusting it for light truck BEV penetration. The first offset is for all-wheel drive (AWD) capability. EPA assumes that crossover vehicles need additional emissions allowances to allow for AWD capability, which would effectively classify them as truck crossovers (DRIA p.1-8). This offset is set at 10 grams per mile (gpm) and is applied uniformly across the entire ICEV-only light truck curve. However, not all light trucks have AWD and EPA's adjustment to the emissions allowance is based on an analysis of what is needed to add AWD to a model (DRIA p.1-8 – 1-9). Therefore, applying this offset to all light trucks, regardless of whether they have AWD, unnecessarily increases the allowable emissions level. In 2021, 78% of pickups and 87% of truck SUVs had AWD while almost 20% of car SUVs and sedans had AWD capabilities.18 The 10 gpm offset should be reduced to account for this and not further incentivize the shift of cars to trucks. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

18 https://www.epa.gov/automotive-trends

The second adjustment that EPA makes to the car curve to create the light truck curve is for towing and hauling capability. To accommodate towing and hauling, EPA increases towing allowance linearly from 0-63 gpm for light trucks with footprints between 45 and 70 square feet on an all-ICEV curve. However, EPA assumes that all light trucks need to be able to haul and tow and therefore applies the allowance across the board . Not every vehicle classified as a light truck needs to tow or haul significant amounts of cargo. The vehicles that do need to tow or haul may only do so occasionally, and some may never need to.19 The 63 gpm offset for the all-ICEV light truck curve should be lowered to reflect the data on usage of towing and hauling capabilities by light truck owners. [EPA-HQ-OAR-2022-0829-0642, pp. 6-8]

19 https://www.thedrive.com/news/26907/youIt-need-a-full-size-pickup-truck-you-need-a-cowboy-costume

Organization: American Petroleum Institute (API)

vii. The proposed emissions standards are unfounded because EPA fails to explain its rationale for selecting the proposed emissions control levels.

EPA provides an expansive explanation of the Proposed Rule in the 263-page Federal Register notice. But noticeably missing is any explanation of how EPA derived the numeric emissions standards that the Proposed Rule would establish. The "footprint-based standard curve coeffcients" for cars and light trucks are clearly presented in the proposal. 88 Fed. Reg. at 29236. While EPA describes these curves as "targets, rather than standards," the curves effectively represent the emissions standards because the enforceable obligation for each manufacturer is derived by summing the actual sales-weighted values derived through application of the curves. Id. at 29236 n. 405. Because of the ABT compliance provisions, a manufacturer can demonstrate compliance for its fleet even if each of its vehicles does not meet the emissions limit applicable to that vehicle according to the curves. But each manufacturer must meet an enforceable in-use emissions standard for each vehicle type based on the level of emissions to which the vehicle is certified. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

In presenting the curves, EPA discusses a wide variety of relevant factors -- including the upper and lower cutpoints, the slope of the curve, incentives/disincentives for consumer choice of larger vehicles (and the resulting impact on overall GHG emissions reductions), the impact of BEVs, and the relationship between the car and truck curves (the later Including consideration of load and towing capacity). In addition, the preamble includes extensive discussion of the predicted costs of the Proposed Rule and technical feasibility. But nowhere does EPA explain how the numeric values of the curves (i.e., the actual GHG emissions rate that would be applied to each vehicle upon application of the curve) were derived and how those particular values are justified. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

It is bedrock administrative law that an "agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." Motor Vehicle Mfrs. Assn. of the United States, Inc. v. State Farm Mut. Automobile Ins. Co., 463 U.S. 29, 43 (1983). EPA's failure to do so here renders the Proposed Rule fatally arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

Additionally, the lack of explanation violates EPA's procedural obligation to develop a statement of basis and purpose that, among other things, explains "the factual data on which the proposed rule is based" and "the methodology used in … analyzing the data." CAA § 307(d)(3). Unless that failure is corrected, API and other interested parties do not have adequate notice of and opportunity to comment on one of the most fundamental aspects of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0641, pp. 32-33]

Organization: Arconic Corporation (ARCO)

4. Arconic agrees with proposed cut points on the proposed emission target curves. These cut point changes will limit the future vehicle footprint increases. [EPA-HQ-OAR-2022-0829-0741, p. 3]

Organization: CALSTART

12. 1. Close the footprint loophole which incentivizes automakers to classify vehicles as light trucks resulting in larger, less efficient vehicles that decrease overall safety for all road users. [EPA-HQ-OAR-2022-0829-0618, p. 2]

Footprint Loophole

As the EPA is well aware, SUV and light truck sales have surged over recent decades because these vehicle types have faced less stringent emissions regulations, leading OEMs to focus on their sales. While stricter emissions regulations have reduced the missions impact of cars, the loophole has also decreased new car sales from around 50% to 20% as OEMs prioritized SUVs and light trucks. These larger vehicles consume around 20% more fuel than conventional cars, making it especially important to address this loophole.1 [EPA-HQ-OAR-2022-0829-0618, pp. 2-3]

1 https://www.wired.com/story/the-us-wants-to-close-the-suv-loophole-that-supersized-cars/.

One possible solution to address the loophole is the changes to footprint-based standards, which would reduce the “offset” between the car and truck slopes. Extending standards through 2035 would also minimize uncertainty and provide the market ample clarity that it must transition all light cars, trucks, and SUVs to be zero-emission by 2035. [EPA-HQ-OAR-2022-0829-0618, pp. 2-3]

Organization: Center for American Progress (CAP)

d. Eliminate Incentives to Make Larger Vehicles–In its final rule, EPA should work to eliminate all incentives to make vehicles larger, including avoiding incentivizing larger ZEVs. To accomplish this, EPA should remove ZEVs from the footprint curve system entirely. At a minimum, EPA should credit ZEVs at the midpoint of their respective curves, removing the incentive to build larger ZEVs. Eliminating incentives to build larger vehicles both increases pedestrian safety and contributes to the overall success of the rule in decreasing emissions.26 Larger vehicles are on average more expensive and their larger size and corresponding losses in aerodynamic efficiency are realized by the consumer as reduced range or increased upfront cost in order to compensate for this inefficiency. EPA should also remove incentives to upsize ICE vehicles in its final rule. To do so, EPA should further reduce the difference between the car and truck curves and scale the car curve such that it does not create an incentive to upsize ICE vehicles. Larger ICE vehicles present the same safety concerns as large ZEVs and also emit more during operation. [EPA-HQ-OAR-2022-0829-0658, p. 6]

26 Insurance Institute for Highway Safety and the Highway Loss Data Institute, “SUVs, other large vehicles often hit pedestrians while turning, March 17, 2022, available online: https://www.iihs.org/news/detail/suvs-other-large-vehicles-often-hit-pedestrians-while-turning

Organization: Consumer Reports (CR)

6.3. Changes to the Footprint Curves

Overall CR supports the efforts by EPA to eliminate the regulatory incentive for automakers to shift their fleet mix from smaller cars to larger light trucks. This shift towards larger and less efficient vehicles has eroded a significant portion of the emissions improvements that could have been delivered by EPA’s past light-duty vehicle GHG standards. A recent analysis by CR found that while the average fuel economy from new vehicles has improved by 30% from 2003 to 2021, it would have improved by 43% had the fleet mix stayed the same as it was in 2003.44 [EPA-HQ-OAR-2022-0829-0728, p. 22]

44 Vehicle Price Trends: Fuel Economy and Safety Improvements Come Standard, Consumer Reports, February 21, 2023, https://advocacy.consumerreports.org/wp-content/uploads/2023/02/CR-Vehicle-Price-Trends-Feb-21-202 3.pdf.

While consumers can and should be able to select the vehicle that best suits their needs, the EPA GHG program should not provide an implicit incentive for automakers to build and promote larger and more polluting vehicles. The efforts by EPA to narrow the gap between the car and light truck curves, and to reduce the slopes of both footprint curves in this current rulemaking will go a long way towards reducing the incentive for automakers to use mix shifting as a compliance strategy, but it is unclear if it will completely eliminate the incentive. [EPA-HQ-OAR-2022-0829-0728, p. 22]

CR agrees with the data-driven approach EPA used to identify the appropriate offset for vehicles with 2-wheel drive versus vehicles with 4-wheel drive. However, there are questions about the use of towing as a means to define the slope of the truck curve. [EPA-HQ-OAR-2022-0829-0728, p. 22]

Most Americans never use their vehicle's towing capabilities.45 Granting vehicles significant additional emissions allowance for an attribute that is rarely actually utilized by consumers has the potential to continue to perpetuate the shift towards larger vehicles, without appreciable improvement in functional utility for consumers. At a minimum, EPA should factor in the actual consumer demand and usage of towing capabilities into their analysis for the footprint curves, or consider alternative potential definitions of utility. One alternative would be to consider combined passenger and cargo volume, which is more likely to be valued and utilized by consumers. [EPA-HQ-OAR-2022-0829-0728, p. 22]

45 You Don't Need A Full-Size Pickup Truck, You Need a Cowboy Costume, The Drive, March 15, 2019, https://www.thedrive.com/news/26907I-dont-need-a-full-size-pickup-truck-you-need-a-cowboy-costume.

Organization: District of Columbia Department of Energy and Environment (DOEE)

Footprint Curves

DOEE is generally supportive of the concept of revising the vehicle footprint curves. Research has shown that vehicle footprint's use in determining compliance can distort production decisions toward larger vehicles17, which results in vehicles that are less safe to pedestrians and bicyclists and also can lead to an emission rebound effect. However, there are still issues with EPA's proposal. Perpetuating a disconnection between cars and trucks will likely continue the movement toward larger vehicles, therefore, EPA should apply only one curve to all passenger vehicles. This curve should either be flat or near flat since vehicle downsizing is a preferred policy effect that reduces vehicle footprints, and the reduced vehicle footprint in turn reduces emission rebound effects and dangers to pedestrians and bicyclists that engage in the truest zero-emission transportation options. [EPA-HQ-OAR-2022-0829-0550, pp. 5-6]

17 Whitefoot,K.S.,Skerlos,S.J.,DesignincentivestoincreasevehiclesizecreatedfromtheU.S.footprint-based fueleconomystandards.EnergyPolicy(2011),doi:10.1016/j.enpol.2011.10.062

Organization: Environmental. and Public Health Organizations

VII. Revisions to Elements of the Light-Duty Regulatory Program Are Warranted.

In addition to promulgating strong emission standards for light-duty vehicles, EPA should finalize important revisions to the light-duty regulatory program. As detailed below, we recommend that EPA revise the light-duty footprint curves and ensure that the final standards do not incentivize larger BEVs. We also urge EPA not to permanently foreclose the possibility of including upstream emissions in compliance accounting. [EPA-HQ-OAR-2022-0829-0759, p. 57]

A. EPA is correct to address the misaligned incentives present in the current footprint attribute curves.

As EPA identified in its analysis of the market, sales of utility vehicles have greatly outpaced the sales of cars (sedans, coupes, etc.) over the past decade.153 Unfortunately, the design of the footprint attribute curves underpinning the Agency's GHG standards has played a role in incentivizing manufacturers to shift market share towards utility vehicles, which generally have emissions targets much higher than passenger car equivalents.154 EPA is appropriately proposing to revise the design of these curves by considering not just what is technically achievable but also how manufacturers would respond to a given attribute curve,155 rather than starting from a broader view of makeup of the current fleet, as was used to originally define the attribute curves.156 [EPA-HQ-OAR-2022-0829-0759, p. 57]

153 DRIA, Section 1.1.1 & 1-4, Figs. 1.1 & 1.2.

154 A review of this evidence is available at Union of Concerned Scientists, The SUV Loophole: How a changing sales mix is affecting the efficacy of light-duty vehicle efficiency regulations (2016), https://downloads.regulations.gov/EPA-HQ-OAR-2015-0827-4016/attachment_2.pdf.

155 "In determining an appropriate slope for the car curve, EPA modeled a range of car slopes to evaluate the footprint response – that is, to assess the tendency of the fleet to upsize or downsize as a compliance strategy." DRIA at 1-6.

156 A full discussion is available in Section 3.2 of the RIA to EPA's MY 2012-2016 LDV GHG standards. U.S. EPA, Final Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards: Regulatory Impact Analysis. EPA-420-R-10-009 (Apr. 2010), available at https://nepis.epa.gov/Exe/ZyPDF.cgi/P1006V2V.PDF?Dockey=P1006V2V.PDF. See also U.S. EPA & NHTSA, Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 35324, 25359-68 (May 7).

1. EPA has appropriately characterized its footprint attribute curve for passenger cars.

In developing the car curve, EPA has appropriately balanced technology-driven emissions reductions for vehicles of different sizes and manufacturers' likely non-technology responses to its attribute curves. EPA should finalize these updates to the car curve. [EPA-HQ-OAR-2022-0829-0759, p. 57]

2. EPA has overestimated performance-related emissions when calculating the footprint attribute curves for light trucks. [EPA-HQ-OAR-2022-0829-0759, p. 58]

In determining the shape of the light truck attribute curve, EPA has appropriately started from the passenger car curve, compensating for different features that distinguish a passenger car and light truck. However, EPA has overestimated the impacts of those factors. [EPA-HQ-OAR-2022-0829-0759, p. 58]

The first characteristic it uses to distinguish a light truck is the addition of 4- or all-wheel-drive (4/AWD) to a crossover utility vehicle, which shifts a vehicle from the passenger car to light truck classification.157 EPA estimated this value in a similar manner to previous work and arrived at a comparable but slightly reduced value for the difference in CO2 values,158 likely resulting from improvements in all-wheel-drive packages that have diminished the powertrain losses associated with the driveshaft and differential. This is a reasonable estimate to use as an offset, if the offset is applied solely to the share of light trucks with 4/AWD, as EPA has done.159 [EPA-HQ-OAR-2022-0829-0759, p. 58]

157 This is true provided the vehicle also meets the requirements of 49 C.F.R. § 523.5(b)(2).

158 Compare 12.5 g/mi (EPA, DRIA at 1-9) to 14.2 g/mi from UCS, The SUV Loophole, at 3.

159 “Based on this anal’sis, EPA's proposed footprint curves reflect an offset between the car and truck curves of 10 g/mi for ICE vehicles equipped with AWD.” DRIA at 1-9.

SEE ORIGINAL COMMENT FOR Figure VII.A-1. Maximum tow rating, by footprint (model year 2019) [EPA-HQ-OAR-2022-0829-0759, p. 58]

The other additional criterion EPA uses to distinguish the light truck curve from the passenger car curve is the application of towing. Considering the maximum towing capacity, we were largely able to reproduce the slope of the curve for maximum towing capacity vs. footprint independently (Figure VII.A-1). However, maximum towing capacity does not actually reflect the real towing capabilities of the fleet because the maximum towing capability for a large share of models is dependent upon additional equipment installation. As a result, EPA is unintentionally incorporating into its regulatory curves excess performance capability—while there may be variance for a vehicle’s maximum tow capability based on powertrain and drivetrain, without a tow package (which may include a trailer hitch, changes to wiring to support connection to a trailer, and an upgraded rear axle), a vehicle’s ability to tow may be significantly more limited (as illustrated in Table VII.A-1). With one ton or more difference between a vehicle’s capability with and without the tow package, ascribing the maximum capability to all vehicles could unreasonably allow more than 20 g/mi additional GHG emissions based on the Agency’s estimate of 9 g/mi per 1,000 pounds payload.160 EPA should apply any adjustment only according to the capability of vehicles as sold in the final rule. [EPA-HQ-OAR-2022-0829-0759, pp. 58-59]

160 DRIA at 1-11.

Table VII.A-1. Maximum towing capacity for 10 most popular light trucks with and without tow package161[EPA-HQ-OAR-2022-0829-0759, p. 59]

161 These towing capacities reflect the trim variant with the highest towing packages, both with and without the vehicle’s tow package. Many of these vehicles have engine options that offer lower towing capability.

Vehicle Make and Model: Ford F-150

Maximum Towing Capacity (lbs.)

With Tow Package: 14,000

Without Tow Package: 11,300

Vehicle Make and Model: Chevy Silverado/GMC Sierra

Maximum Towing Capacity (lbs.)

With Tow Package: 13,300

Without Tow Package: 9,900

Vehicle Make and Model: Ram 1500

Maximum Towing Capacity (lbs.)

With Tow Package: 12,750

Without Tow Package: 10,100

Vehicle Make and Model: Toyota RAV-4

Maximum Towing Capacity (lbs.)

With Tow Package: 3,500

Without Tow Package: 1,500

Vehicle Make and Model: Honda CR-V

Maximum Towing Capacity (lbs.)

With Tow Package: 1,500

Without Tow Package: n/a

Vehicle Make and Model: Toyota Tacoma

Maximum Towing Capacity (lbs.)

With Tow Package: 6,800

Without Tow Package: 3,500

Vehicle Make and Model: Jeep Grand Cherokee

Maximum Towing Capacity (lbs.)

With Tow Package: 7,200

Without Tow Package: 3,500

Vehicle Make and Model: Toyota Highlander

Maximum Towing Capacity (lbs.)

With Tow Package: 5,000

Without Tow Package: n/a

Vehicle Make and Model: Chevy Equinox

Maximum Towing Capacity (lbs.)

With Tow Package: 1,500

Without Tow Package: n/a

Vehicle Make and Model: Ford Explorer

Maximum Towing Capacity (lbs.)

With Tow Package: 5,600

Without Tow Package: 3,000

In contrast to its application of the 4/AWD emissions factor, EPA did not apply its adjustment for towing-related emissions in a sales-weighted fashion. By instead applying the assumed maximum tow capability regardless of application of the towing package needed to support this, EPA is basing the curve on outsized performance characteristics. Just as EPA did not factor in whether there might be sports cars or high-output luxury models in determining the passenger car attribute curve, EPA should limit its assessment of light truck characteristics to only those features which are actually deployed. While there may be a subset of the market that requires towing performance, which thus differentiates the light trucks from cars, that additional emissions offset should be applied on a sales-weighted basis solely to the respective segment of the fleet that is utilizing the maximum tow package. For the remainder of the fleet, only the base tow capability should be considered. This will necessarily reduce the slope of the attribute curve as currently defined. [EPA-HQ-OAR-2022-0829-0759, pp. 59-60]

3. EPA should further reduce the footprint of the cut point for light trucks based on pickup certification. [EPA-HQ-OAR-2022-0829-0759, p. 60]

EPA has proposed phasing down the footprint of the cut point ("elbow") of the light truck attribute curve down to 70 sq. ft. The Agency should reduce it further, faster. [EPA-HQ-OAR-2022-0829-0759, p. 60]

EPA has identified the need for the reduction in the cut point but has mistakenly focused on the average footprint of full-size pickups as the rationale.162 While it is true that the average footprint has increased, and EPA is right to be concerned about incentives to upsize the pickup fleet, a large part of the reason for this increasing footprint is related to the growing share of four-door pickups. For example, the Ford F-150 has shifted from a mix of standard/extended/crew cab split of 17/50/33 in 2012 to 5/30/65 in 2022,163 which increases the average wheelbase significantly for a standard bed and, thus, the vehicle's footprint. However, it is not the average footprint that is the relevant factor in setting the location of the cut point, but the relationship between the certified emissions from a full-size pickup truck and its footprint. [EPA-HQ-OAR-2022-0829-0759, p. 60]

162 DRIA–at 1-14 - 1-15.

163 Data from Wards Intelligence, "U.S. Light Vehicles by Bod' Style, '22 Model Ye'r" and "'12 Model U.S. Domestic Car and Light Truck Output by Body Style."

SEE ORIGINAL COMMENT FOR Figure VII.A-2. 2020 light-duty pickup market share and emissions, by footprint164

164 MY 2020 data taken from EPA's CCEMS modeling supporting the 2023-2026 final rulemaking. https://www3.epa.gov/otaq/ld/EPA-CCEMS-PostProcessingTool-Project-FRM.zip.

(left) While one-quarter of pickup sales are so-called “mid-size” pickups, the full-size pickup market in 2020 was highly concentrated around a footprint of 66 to 70 square feet, with 68% of all pickup sales falling in that narrow range. (right) While some larger pickups exist, those vehicles have virtually the same emissions because they have similar capability as the smaller vehicle, even if they have a larger bed and/or cab. This is indicated by horizontal “lines” of dots (proportional to sales) for a given sub-model trim (e.g., the Stellantis pickups with 410 g/mi). [EPA-HQ-OAR-2022-0829-0759, p. 60]

The effect of increasing the footprint at which the cut point occurs is to relax the standard for full-size pickup trucks, particularly those with longer beds and larger cabs, which have larger footprints. This cut point does not reflect the level of technical feasibility or actual certification of those larger pickups, however. As can be seen in Figure VII.A-2, pickups of a given powertrain and towing package configuration are certified to virtually identical fuel economy and emissions standards, as indicated by the flat rows of dots in Figure VII.A-2 spanning a range of footprints. This suggests that these larger pickup trucks should have standards consistent with the smallest full-size footprint vehicles, as was identified when the curves were first designed. [EPA-HQ-OAR-2022-0829-0759, p. 61]

EPA should move swiftly to set the cut point of its standards at the average footprint of full-size pickups with a standard cab and bed because any vehicles with a larger footprint will be certified at virtually identical emissions levels, and it is precisely this flattening that the position of the cut point of the curve is meant to reflect. That footprint would correspond to 68.1 sq. ft. for MY 2022. [EPA-HQ-OAR-2022-0829-07591]

12. B. EPA should ensure that the final standards do not incentivize larger BEVs.

While we support EPA’s incorporation of projected BEV penetration into the slopes of the footprint curves for the model years covered by the Proposal, we remain concerned that the Proposal retains the incentive for automakers to manufacture larger BEVs, a trend that has the potential to erode the environmental benefits of EPA’s vehicle standards and that EPA anticipates will occur under the Proposed Standards. The final standards should incorporate a regulatory treatment of BEVs that discourages upsizing or selective manufacturing of larger BEVs. [EPA-HQ-OAR-2022-0829-0759, p. 61]

As discussed previously, we support EPA’s proposal to reflect projected BEV penetration in developing the slopes of the footprint curves. As EPA explains, the curves’ flatter slope is “by design and reflects our projection of the likelihood that a future fleet will be characterized by a greatly increased penetration of BEVs, even in a no-action scenario.” 88 Fed. Reg. at 29235. Inclusion of BEVs in establishing the curves has the effect of flattening their slope because BEVs have no tailpipe emissions and therefore factor into the curves at 0 g/mile. [EPA-HQ-OAR-2022-0829-0759, p. 61]

While it is appropriate to reflect projected rates of BEV penetration in setting the slope of the footprint curves, it does not follow that it is appropriate to distinguish BEVs based on their vehicle footprint for purposes of regulatory compliance, effectively “rewarding” larger footprint BEVs. “From a physics perspective, a positive footprint slope for [combustion] vehicles makes sense because as a vehicle’s size increases, its mass, road loads, and required power (and corresponding tailpipe CO_2 emissions) will increase accordingly.” 88 Fed. Reg. at 29235. The corollary, however, is that regulatory distinctions based on vehicle footprint lack a compelling basis for BEVs. As EPA notes, “a fleet of all BEVs would emit 0 g/mi, regardless of their respective footprints.” Id. “[F]ootprint does not have any relationship with tailpipe emissions from BEVs.” DRIA at 1-6. [EPA-HQ-OAR-2022-0829-0759, pp. 61-62]

Currently, manufacturers receive a considerable regulatory compliance benefit from producing larger-footprint BEVs: these BEVs increase the average footprint of the fleet and thus loosen the GHG emissions standard that the overall fleet will be required to meet. Because the GHG benefit of BEVs does not depend on their footprint and there is no practical need for crediting larger-footprint BEVs more robustly than smaller-footprint BEVs, the laxer standards applicable to fleets with larger-footprint BEVs come without any attendant climate benefit. At the same time, larger-footprint BEVs are likely to be heavier and less efficient, requiring more electricity to travel a given distance and typically requiring larger batteries and more of the materials that comprise those batteries, and carrying increased purchase costs. BEV footprint upsizing has adverse consumer, grid-related, and environmental consequences. [EPA-HQ-OAR-2022-0829-0759, p. 62]

Concerns about incentivizing a shift to larger BEVs are well-founded. According to EPA’s modeling, BEVs in MY 2032 are projected to increase in size relative to MY 2020. DRIA at 1-13–1-14, Fig. 1-12. The increase is 1.6 sq. feet for sedans, 1.9 square feet for CUVs/SUVs, and 3.3 square feet for pickups. DRIA at 1-13, Tbl. 1-2. Selective manufacturing of larger-footprint BEVs—which similarly raises the average footprint of the fleet—is already occurring. Automaker GM recently ceased production of its lone small-footprint BEV: the Chevy Bolt.165 GM’s remaining near-term BEV offerings are all larger vehicles: SUVs and pickup trucks.166 A number of other automakers are also selectively manufacturing exclusively larger-footprint BEVs, including Ford, which currently produces only an SUV (the Mustang Mach-E) and a pickup truck (the F-150 Lightning); Rivian, which produces only an SUV (the R1S) and pickup truck (the R1T); and Volvo, which produces only a cross-over (the C40) and three SUVs (the XC40, EX30, and EX90).167[EPA-HQ-OAR-2022-0829-0759, p. 62]

165 Khristopher J. Brooks, GM to stop making Chevrolet Bolt, its best-selling electric vehicle, CBS News (Apr. 26, 2023), https://www.cbsnews.com/news/chevy-bolt-end-production-gm-vehicle/.

166 See General Motors, Electrification, EV Spotlight, https://www.gm.com/commitments/electrification.

167 See Ford, Explore Going Electric, https://www.ford.com/electric/; Rivian, Vehicles Made for the Planet, https://rivian.com/; Volvo, Our Cars, Our Full Range, https://www.volvocars.com/us/.

EPA’s final regulations should include a regulatory mechanism that discourages the manufacture of larger BEVs. [EPA-HQ-OAR-2022-0829-0759, p. 62]

Organization: Ford Motor Company

Car vs. Truck Stringency

Ford appreciates EPA’s efforts to develop a data-driven, analytical basis for determining the appropriate relative stringency between the car and truck footprint curves. It is essential to full-line OEMs that the utility provided by trucks—particularly large pickup trucks—continue to be appropriately credited in the footprint-based standards. Any changes should made cautiously and gradually, with awareness of the broader context of the other sweeping changes that automakers are managing during the timeframe of this rule. [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

Ford believes the following modifications to the EPA's truck utility methodology are appropriate:

- Increase the 9 g CO2/mile per 1000 lbs of incremental towing to 11 g CO2/mile to account for increased road loads on highly capable towing vehicles (e.g., losses from larger brakes, axles, and engine parasitics). [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

- Increase the sales weighted towing delta from 7000 lbs to 8500 lbs to better capture the full range of towing capabilities for full size pickup trucks. [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

- Decrease the expected EV penetration rate from 50% to 35% for the harder-to-electrify full-size pickup truck market. [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

These refinements would result in an approximately 40 g CO2/mile difference between the Car and Truck curves by 2032MY utilizing the maximum footprint of 70 ft2, as shown in the graph below. Ford would like to continue to work with EPA to fully explain our rational and recommendations. [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

[See original comment for Graph 1: Vehicle Utility vs Truck Footprint Curves] [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

Organization: International Council on Clean Transportation (ICCT)

On footprint curves, ICCT commends EPA for its proposed standards becoming increasingly flat, and we see clear evidence that the car and truck footprint curves could be flattened even further, as discussed below. [EPA-HQ-OAR-2022-0829-0569, p. 5]

OBSERVATIONS ABOUT PROPOSED FOOTPRINT CURVES

ICCT supports EPA's proposed standards' stringency, as well as the shape of the footprint curves. Nevertheless, data suggests that the footprint curves can be adjusted both to increase stringency (within the limits of the proposal) as well as to slow or reverse the trend of upsizing and the shift from cars to trucks. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

ICCT commends EPA for its proposed standards becoming increasingly flat. The proposal to flatten the curves over time and move the truck cutpoints inwards are a welcome shift that can help prevent upsizing to some extent. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

ICCT also commends EPA for reducing the gap between the truck and the car curves, and for its transparency and request for comments on the development of the truck curve (Preamble III.B.2.ii; DRIA 1.1.3.2). By EPA's own acknowledgement, and supported by recent data, there is clear evidence that EPA could flatten both the car and the truck curves even further. This is discussed below. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

EPA assumed in the OMEGA model inputs that the willingness-to-pay (WTP) of vehicle footprint is $200/sq ft, which is "on the low end of the range suggested in the literature (e. a. Greene 2018)" and recognizes "a higher WTP would create a stronger upsizing tendency, which would suggest an even flatter "size-neutral" slope". The Greene, (2018) paper cited by EPA refers to the summary in Whitefoot and Skerlos, (2012) that the average marginal WTP ranges from $340 to $2,000 for an additional square foot of vehicle size (i.e., the overall length of a vehicle multiplied by the width). Considering the potentially wide difference in the average consumer valuation of vehicle attributes in the literature, EPA could assume the mid-point, rather than the low end, of the average values of WTP from literature as the basis to determine the slope of the footprint-based standard curve. As a result, the slope of the passenger cars curve, which is also used as the baseline to develop the truck curve, would be flatter than the proposed standard curves. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

EPA recognizes that the majority of light-duty vehicles serve to "move passengers and their nominal cargo" which implies light-duty vehicles "could be represented by a single curve" (Preamble 29234). ICCT supports the application of a single curve for all light-duty vehicles, due to the similar purpose and utility across all light vehicles. However, in the absence of a single curve for all light-duty vehicles, the proposed approach of deriving the truck curve from the car curve is generally sound. As discussed further below, ICCT recommends flattening the truck curve further by reducing the offset allocated to trucks. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

To justify the truck curve offset, EPA states that it "identified a subset of light trucks…which are more appropriately controlled with a modified set of standards" (Preamble 29234). EPA identifies these vehicles as those "larger trucks which are designed for more towing and hauling capability [and] require design changes to allow for handling of these larger loads and this is reflected in increased engine capability, body-on-frame design, and greater structural mass" [emphasis added] (DRIA 1.1.3.2, page 1-8). EPA's analysis of fleet tailpipe CO2 emissions data from these vehicles establishes the "utility offset" which is built into the truck curve. (EPA also analyzed an AWD offset, but this offset is a significantly lower g/mi adjustment than the utility offset.) Importantly, EPA states: "many crossover vehicles and SUVs exhibit similar towing capability between their 2WD and AWD versions" (Preamble 29235). [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

Since many crossovers and SUVs classified as trucks differ from their car variants only due to the presence of AWD, these truck crossovers and SUVs benefit from the utility offset of the truck curve, without demonstrating any purported need for such a utility. This leads to targets that are comparatively easy to meet for these vehicles. EPA further states, "The purpose of maintaining a unique truck curve is centered around accounting for the utility of [full size pickups] in particular" (Preamble 29235). [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

In summary, the utility offset is calculated by and added to the truck curve to specifically account for the higher emissions of full-size pickups, or body-on-frame vehicles, as these vehicles are distinguished by "[use] for more work-like activity" (Preamble 29235). Because the utility offset is based on the vehicles most likely to be used for their higher utility, the offset ideally would be calculated based on the number of vehicles that meet those criteria. Bearing these criteria in mind, there is evidence that the utility offset could be adjusted lower. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

Although the utility offset is based on pickups, since this offset is added to the truck curve, it applies to all vehicles classified as trucks. EPA projects that pickups will represent 24% of all trucks in MY2027-2032.146 Thus, only 24% of trucks meet the criteria EPA used to determine the utility offset. Furthermore, by MY2030, EPA projects the MY2030 pickup share to be 45% (EPA chooses MY2030 as a reference point, DRIA 1-12). The initial estimated utility offset of 63 g/mi (DRIA 1-11) could be reduced accordingly to account for the projected share of vehicles that actually have higher utility and non-zero tailpipe emissions: [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

Initial utility offset: 63 g/mi MY2030 pickup share: 24% MY2030 ICE pickup share: 55% ICE pickup share-adjusted utility offset: 8.3 g/mi [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

146 central analysis output file, 2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv

Alternatively, the utility offset could be recalculated according to the projected MY2030 sales share of body-on-frame vehicles, which is roughly one third. Of these, roughly half are ICE, leading to a body-on-frame-based utility offset of about 11 g/mi. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

In addition to the characteristic of having greater structural mass (mainly due to body-on-frame construction), EPA stipulates that increased engine capability also supports the addition of the utility offset. However, as discussed previously (see Atkinson cycle and MHEV subsections), most pickups and large SUVs spend most driving time under low load. Contrary to EPA's assertion that these vehicles are used for more work-like activity (Preamble 29235), data suggests truck drivers rarely use the extra utility for which their light-duty trucks are built. One 2019 study found 75% of truck owners tow once or never each year, 35% haul once or never each year, and 70% go off-road once or less per year.147 In a 2023 report, 63% of F150 owners were found to tow rarely or never, 32% rarely or never hauled, over half frequently commuted in their trucks, and 87% frequently used their trucks for shopping/errands.148 That is, despite having more capable engines, data supports the conclusion that pickups rarely use this extra capability. Consequently, when outfitted with advanced engines, such vehicles are likely to spend more time than cars in highly efficient combustion modes, which are better suited for lower load driving. Pickups and SUVs also stand to benefit the most from advances in MHEV technologies. As current MY2023-2026 and proposed MY2027-2032 standards engender efficient pickups, the real-world utility impact will diminish, due to both greater efficiency and high share of low load driving. This conclusion further supports reducing the truck utility offset. [EPA-HQ-OAR-2022-0829-0569, pp. 56-58]

147 Berk, B. (2019, March 13). You Don't Need a Full-Size Pickup Truck, You Need a Cowboy Costume. Thedrive.com. https://www.thedrive.com/news/26907/you-dont-need-a-full-size-pickup-truck-you-need-a-cowboy-costume

148 Chase, W., Whalen, J., Muller, J. (2023, Jan 23) Pickup Trucks: from workhorse to joyride. Axios. https://www.axios.com/ford-pickup-trucks-history

Organization: Joshua Linn

1. How Much Do Regulations for Fuel Economy and Emissions Incentivize the Production of Larger Vehicles?

In Section III.B.2.ii of the proposed standards, EPA "solicits comments on the proposed changes to the shape of the footprint curves, including the flattening of the car curve and our approach for deriving the truck curve from the car curve." Using estimated compliance costs estimated from a recent working paper, I quantify how much the existing footprint curves incentivize vehicle manufacturers to reclassify cars as light trucks and to increase vehicle footprint. The implication is that flattening the curves would reduce these incentives. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Since 2012, vehicle manufacturers have faced greenhouse gas (GHG) emissions requirements that depend on the mix of vehicles sold; a manufacturer that sells larger vehicles and light trucks rather than cars faces less stringent requirements for GHG emissions. This regulatory structure incentivizes manufacturers to shift their product offerings to avoid strict GHG requirements, which potentially increases emissions. Just how strong are those incentives? [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

1.1. Regulatory Background and Recent Vehicle Size and Class Trends

Safety and technology rationales have driven GHG emissions standards to depend on vehicle size and class (e.g., car or light truck). Prior to 2012, a single fuel economy standard of 27 miles per gallon applied to all cars, and about 20–25 miles per gallon applied to all trucks. Reducing a car's weight and size can both increase its fuel economy and reduce its GHG emissions—making a vehicle smaller and lighter could help a manufacturer meet both standards. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

However, the US Department of Transportation's (DOT) concerns about the safety of smaller vehicles have led it to discourage manufacturers from reducing vehicle size by setting higher Corporate Average Fuel Economy (CAFE) requirements for smaller vehicles relative to larger ones. In turn, EPA harmonized its GHG standards with CAFE standards by setting weaker GHG emissions standards for larger vehicles like trucks, given that GHG emissions are inversely related to fuel economy. DOT and EPA have made the car/truck distinction for statutory and technological reasons, since vehicle attributes that are common to light trucks, such as all-wheel drive, increase a vehicle's emissions rate and reduce its fuel economy. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Since the adoption of size-based standards in 2012, new vehicles have been getting larger, and sales have shifted from cars to light trucks. Between 2011 and 2022, the average vehicle footprint (roughly, the area defined by the four wheels) increased by about 4 percent, and the share of cars in total passenger vehicle sales dropped from about 65 percent to 40 percent. In the GHG standards that EPA proposed in April this year, the agency notes that the increasing size and shift from cars to trucks has increased average emissions rates by about 10 percent. [Link: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf] [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

1.2. Incentives to Increase Vehicle Size or Convert Cars to Light Trucks

What could have caused the size increase of vehicles and the shift to light trucks? The GHG regulations themselves could be a factor, since increasing a vehicle's size or converting a car to a light truck hypothetically would yield extra compliance credits, all else equal (a car can be reclassified as a light truck if it has all-wheel drive and satisfies a few other conditions). Consumer demand also could play a role, if consumers want big cars and light trucks and manufacturers respond to consumer preferences. Production costs also may affect vehicle size. For instance, lower production costs for larger vehicles may motivate manufacturers to make more large vehicles. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Disentangling these explanations is not easy since we'd have to predict what sizes and car/truck mix manufacturers would have offered if consumer demand were different or if emissions and fuel economy standards did not depend on vehicle footprint. But we can get a sense of the relative incentive of the existing standards by comparing them with incentives that instead are created by consumer demand. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

From a regulatory standpoint, the value of making a vehicle larger or converting a car to a light truck depends on how many compliance credits are generated and the value of those credits. In recent research [Link: https://www.resources.org/common-resources/can-state-level-regulations-help-reduce-national-emissions-from-passenger-vehicles/], I estimated those credit values (other research [Link: https://www.journals.uchicago.edu/doi/abs/10.1093/reep/rex010] has used the few publicly observed trades to estimate those credit values). Table 1 shows how much a manufacturer would have profited by increasing a vehicle's size or converting a car to a light truck, based on the credit values and crediting rules from 2022. Note that these calculations hold all else equal, so the numbers don't account for the decrease in fuel economy that typically results from making a vehicle larger (and heavier) or converting a car to a light truck. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Table 1. Incentives to Increase Vehicle Size or Convert Cars to Light Trucks

	Increase vehicle size	Reclassify car as a light truck
Value of additional greenhouse gas credits	$2,679	$3,124
How much consumers would pay	$12,264	$8.942

Note: Figures are presented as 2022 dollars.

[EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Table 1 shows that increasing a vehicle's footprint from 45 to 55 square feet generates about $2,700 in additional credits per vehicle. For reference in terms of smaller vehicles, a Toyota Prius v has a footprint of 45 square feet, and the Mercedes S-Class (a large luxury car) has a footprint of 55 square feet. For light trucks, the Honda CRV (a small crossover) has a footprint of 45 square feet, and the Range Rover has a footprint of roughly 55 square feet. These examples are meant to contextualize the footprint numbers—remember that the $2,700 refers to hypothetically taking the Prius v or CRV and increasing its footprint from 45 to 55 square feet without changing the vehicle's fuel economy or performance. The table also shows that converting a car to a light truck, again without changing fuel economy or performance, yields about $3,100 per vehicle. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Consumers also incentivize manufacturers to offer larger vehicles and convert cars to light trucks. Consumers tend to prefer larger vehicles because of the additional cabin and cargo space. They also may prefer light trucks to cars (all else equal) because of some of the attributes that trucks tend to offer, such as all-wheel drive or extra towing capacity, or because of differences in style or perception. I've estimated consumer preferences for vehicle size and all-wheel drive, which can provide a sense of how much consumers have incentivized manufacturers to offer larger vehicles or convert cars to light trucks. Table 1 shows that consumers value a car or light truck that has 55 rather than 45 square feet to the tune of about $12,000, which is more than four times the value of the additional credits derived from selling a larger vehicle. Likewise, consumers are willing to pay about $8,900 extra for all-wheel drive, which captures some of the value of a light truck over a car, which is about three times larger than the value of the additional credits for reclassifying the vehicle. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Do these numbers represent a big or small incentive for a manufacturer to increase a vehicle's footprint or convert a car to a light truck? The calculations in Table 1 show that the standards for GHG emissions and fuel economy have provided a substantial incentive to increase vehicle size or convert cars to light trucks. The incentives from the regulations are smaller than the incentives of consumer demand, but several thousand dollars per vehicle could be sufficient to change how manufacturers approach vehicle size or classification. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

1.3. Conclusions

When EPA finalizes the post-2026 standards, the agency could reduce the importance of vehicle footprint or the difference in credit value between cars and light trucks. Such changes would make it less likely that reclassifying cars or increasing vehicle size would undermine expected emissions gains of the post-2026 standards. The changes would reduce the incentives for increasing vehicle size or reclassifying vehicles, not just for gasoline-powered vehicles but also for plug-in electric models. Any changes in the final standards also could affect the demand for batteries and critical minerals indirectly, given that larger plug-in vehicles require larger batteries, which in turn increases vehicle weight and the need for critical minerals. [EPA-HQ-OAR-2022-0829-0635, pp. 4-6]

Organization: Lucid Group, Inc.

Industry commitments and investment in EVs along with both government and industry investments in the associated infrastructure demonstrate the momentum and capacity to accelerate the electrification transition. Lucid agrees with the agency and expects that the U.S. vehicle fleet in the future will be largely electric. Vehicle footprints on U.S. roadways are steadily getting larger.9 Whether attributable to consumer demand or in conjunction with other factors, EPA has noted that previously finalized footprint curves may have played a role in fostering this trend and states that a slope too flat would incentivize overall fleet downsizing, while a slope too steep would encourage upsizing as a compliance strategy. Lucid believes the reversal of this trend is highly dependent on the outcome of this rulemaking process and will require stringent tailpipe emission standards in addition to the mitigation of potential compliance avoidance strategies. [EPA-HQ-OAR-2022-0829-0664, pp. 3-5]

9 The 2022 EPA Automotive Trends Report, available at https://www.epa.gov/system/files/documents/2022-12/420r22029.pdf.

Organization: Kate Whitefoot

1. The proposed flatter footprint curves are advantageous to decreasing incentives to further increase vehicle size. Since MY2008, the light-duty GHG regulations have set different targets for vehicles depending on the vehicle's footprint (a measure of size computed as wheelbase track width). A peer-reviewed study by Whitefoot and Skerlos (Whitefoot and Skerlos, 2012) shows that these standards en- courage automakers to design larger vehicles as a path to compliance. Specifically, they encourage a combination of adjusting prices to shift demand to larger vehicles and making adjustments to vehicle footprint during redesign. As EPA's 2022 Automotive Trends Report shows, sales-weighted average size and weight of light-duty vehicles has indeed

increased since the footprint-based standards first went into effect. This increase in vehicle size has been seen across all body-styles from MY2008-MY2022, with the largest size increases in pickup trucks. Moreover, the share of larger vehicles in the market has grown dramatically, with a decrease in sedans, and increase in pickup trucks, and a large increase in truck SUVs. In the proposed regulation, EPA proposes flattening both the passenger car and light truck footprint curves to decrease this incentive to further increase the size of vehicles in response to the policy. [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

Recommendation: EPA move forward with flattening the footprint curves for both passenger cars and light trucks in the final rule to decrease the incentive to increase vehicle size. [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

2. Differences between the car and light truck footprint curves may still create incentives to further “upsize” the fleet. Differences in the passenger car and light truck footprint curves - both in terms of the offset between the curves and differences in slope - can create an incentive to produce more light trucks or reclassify what would have been a passenger car as a light truck as a compliance pathway, as pointed out in Whitefoot and Skerlos (2012) and National Academies of Sciences, Engineering, and Medicine (2021). In the proposed rule, EPA has decreased the difference between the car and truck curves and flattened the curves to reduce the numerical difference be- tween passenger car and light trucks. This is advantageous to reducing these incentives to shift the fleet further toward light trucks and reclassify cars as light trucks in response to the policy. However, since light trucks have less stringent GHG targets than passenger cars, even if they are of identical size, the proposed regulations may still create an incentive to reclassify cars as light trucks and/or further increase production of light trucks relative to cars due to the structure of the policy. [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

Recommendation: EPA should consider further flattening the footprint curve for light trucks or other changes to the structure of the regulation that would disincentivize reclassifying cars as light trucks and/or further increasing the production of light trucks relative to cars in response to the regulations. [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

3. Drawbacks of using footprint as a proxy for towing and hauling capability. EPA describes that the reasoning for the offset and steeper slope of the light truck footprint curve from that of the car curve is (in addition to AWD) because of the towing requirements of light trucks, which may make it more difficult for these vehicles to meet lower GHG rate targets. However, there is significant variation of towing and hauling ratings of different light trucks of the same size. And, consumers have a range of preferences for the towing and hauling rating of the light trucks they consider purchasing. By using vehicle footprint as a proxy for towing and hauling capabilities, the proposed regulation may create distorted incentives. [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

Recommendation: EPA should consider whether using towing and hauling capability directly as attributes in this or future rules rather than using footprint as a proxy for towing and hauling capabilities would eliminate incentives to further “up- size” the fleet or otherwise create unintended shifts in vehicle designs in response to the GHG regulations. [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

Supporting Information [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

We attach as supporting information the following peer-reviewed publications:

References

National Academies of Sciences, Engineering, and Medicine (2021). Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035. The National Academies Press, Washington, DC.

Whitefoot and Skerlos (2012). Design incentives to increase vehicle size created from the us footprint-based fuel economy standards. Energy Policy, 41:402–411. [EPA-HQ-OAR-2022-0829-0703, pp. 2-3]

Organization: Mazda North American Operations

In addition, the standards immediately increase dramatically in stringency beginning in 27MY, with a resulting 36% BEV requirement. These standards are particularly accelerated for vehicles classified as light trucks, since the gap between passenger cars and light trucks is reduced. Mazda believes it is very important that the ramp-up and the light truck gap reduction should be slower in the early years of the program, as the industry, consumers, and suppliers adapt to this new reality. [EPA-HQ-OAR-2022-0829-0595, pp. 2-3]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

Mitsubishi participated in the develo–ment of - and –upports - the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0682, p. 2]

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators:

1. Closely align the multi-pollutant emissions standards with President Biden's 2030 goal by assuming no more than 40-50% PHEVs and FCEVs by 2030, even though our experience leads us to caution that this itself is very ambitious, and is predicated on the assumption that the necessary supportive policies will be effectively implemented. [EPA-HQ-OAR-2022-0829-0682, p. 2]

2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping- stone to full BEV acceptance. [EPA-HQ-OAR-2022-0829-0682, p. 2]

3. Maintain the current PHEV Utility Factor (UF) and work with industry to identify opportunities to increase PHEV electric operation. This is the ideal stepping-stone technology to encourage long-term BEV acceptance and utilization. [EPA-HQ-OAR-2022-0829-0682, p. 2]

4. Keep the proposed approach to determine the passenger car curves, and consider adjusting the cutpoint and stringency levels of the light-duty trucks during the early years of the program. [EPA-HQ-OAR-2022-0829-0682, p. 2]

5. Maintain the existing GHG program flexibilities, such as Air Conditioning and Off-Cycle technologies credits (including the alternative method to apply off-cycle credits), and

allow previously approved technologies to continue receiving credits. [EPA-HQ-OAR-2022-0829-0682, p. 2]

6. Align the Tier-4 (criteria pollutants) with CARB's LEV-IV criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 2]

7. Consider the impact that very aggressive GHG standards will have on vehicle affordability, and especially the detrimental impact to low-to-moderate income families. Regardless of the vehicles that regulation may require us to produce, it is critical that regulators always keep the accessibility of consumers in mind. [EPA-HQ-OAR-2022-0829-0682, p. 2]

The rationale for each one of these recommendations is further explained below. [EPA-HQ-OAR-2022-0829-0682, p. 2]

4. GHG Footprint Curves

Mitsubishi holds a unique position in the industry as the manufacturer with the smallest fleet-average vehicle footprint. As such, Mitsubishi also has the strictest GHG and CAFE standard among vehicle manufacturers. Despite having the lowest fleet GHG emissions of any mass-market vehicle manufacturer6, Mitsubishi has accrued GHG deficits for MY20 and MY21, while other manufacturers with higher GHG fleet emissions have accrued credits7. While we understand the math that delivers this result, we question whether this outcome is what the program set out to achieve. Mitsubishi supports EPA's reevaluation of the footprint curves, and the attempt to ensure fleetwide GHG reduction in a neutral manner. [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

6 Excludes BEV-only manufacturers

7 2022 EPA Automotive Trends Report

The following section includes suggestions for improving upon the proposed curves. [EPA-HQ-OAR-2022-0829-0682, 6-8]

12. A. Footprint Curve Slope

The footprint curves were developed to ensure all vehicles large and small are encouraged to improve efficiency. But the curves must also prevent unintended consequences resulting in total fleet GHG reductions not meeting the original intended goal. To that end, the footprint curves should not place larger vehicles at an advantage over smaller vehicles, thereby biassing the market toward larger, heavier vehicl–s which - even if fully ele–trified - are worse for the environment that smaller electric vehicles, primarily because of the amount of battery minerals they use, and the amount of energy needed to propel them. [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

In developing the proposed footprint passenger car curves, EPA utilized a "willingness-to-pay" methodology, which compares the willingness of a consumer to purchase a larger vehicle, against the additional cost and emissions of a larger vehicle. In addition to willingness-to-pay, EPA adjusts the curves based on projected BEV sales, which are set at a compliance-value of zero g/mi. The result is a relatively flat curve compared to previous light-duty GHG regulations. [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

Mitsubishi supports an approach for creating a "neutral" slope that balances vehicle size and emissions improvements, to ensure all vehicles are incentivized equally. Due to the limited comment period, Mitsubishi is not able to comment on whether EPA has achieved a neutral slope, but Mitsubishi believes EPA is taking the right approach to achieve this goal, and that the adjustments made in the proposed passenger car curves are directionally correct. Mitsubishi may provide EPA additional feedback after the defined comment period. [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

In developing the light truck footprint curves, EPA uses the passenger car curve as a baseline. EPA then adds two offsets in developing the light truck curves, 2WD vs AWD performance and towing/hauling capability. Finally, these offsets are reduced by the BEV share expected by passenger cars and light trucks for the given model year. [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

The light truck fleet will be affected the most by this approach by requiring a 21% reduction in GHG emissions between MY26 and MY27. To date, the light truck fleet between MY12 and MY21 has, at best, achieved a year-over-year GHG reduction of 4% (MY18)8. As it is proposed, the standard puts an unreasonable burden on the light truck fleet to achieve historic GHG reductions in a very limited timeframe. Based on considerable historical performance, a 21% improvement in one model year is simply not reasonable or achievable, and EPA should reconsider the stringency increase of light trucks for MY27. [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

8 Ibid

With the current proposed light duty footprint curve, a typical BEV light-duty pickup truck could receive a credit of 46 Mg while a typical small CUV would receive a credit of 32 Mg9. The proposed footprint curves would still result in a considerable incentive to electrify the largest of vehicles, which typically use more battery resources than a smaller electrified vehicle (see Figure 2). One possible approach to mitigate this discrepancy could be to adjust the lower cutpoint on the footprint curve. EPA has proposed increasing the cutpoint to 45 sq.ft. to provide an additional incentive for smaller Icles which are both economical and fuel efficient. However, EPA also decided to phase in the cutpoint by increasing the cutpoint by 1 sq.ft. each year, until achieving a cutpoint of 45 sq.ft. by MY30. To provide additional incentive for these smaller vehicles, EPA should increase the cut point to 45 sq.ft for all vehicles in MY27, rather than phasing it from MY27 to MY30. [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

9 For MY27: a 69 sq.ft. light truck would earn a credit of 202.2 g/mi/vehicle (~46 Mg/vehicle) and a 45 sq.ft. light truck would earn 140.8 g/mi/vehicle (~32 Mg/vehicle)

[See original for graph titled " Figure 2. BEV Battery System Weight versus Vehicle Footprint"]10 [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

10 Survey of BEV Battery System Weight in A2MAC1 Database

Mitsubishi asks EPA to reconsider the approach used in developing the light truck footprint curve and take into further consideration the over-incentive to upsizing light truck BEVs. In addition, EPA should consider incentivizing smaller light truck BEVs, as we believe this would provide a zero emissions benef [EPA-HQ-OAR-2022-0829-0682, pp. 6-8]

Organization: National Automobile Dealers Association (NADA)

The proposal would maintain the footprint structure of the existing light-duty standards, but update the footprint standard curves "to flatten the slope of each curve and to narrow the numerical stringency difference between the car and truck curves" based on the vehicle technologies EPA projects automakers will use to comply.9 [EPA-HQ-OAR-2022-0829-0656, p. 3]

9 88 Fed. Reg. at 29196, 29234.

D. EPA Should Retain the Existing Compliance Flexibilities, Multipliers, Credits, and Footprint- Based Structure of its Standards.

NADA strongly supports EPA's stated intention to retain the footprint-based structure of its light-duty standards.70 The vehicle footprint attribute-based framework has worked well to encourage continuous improvements across all vehicle types, regardless of product mix, to reduce incentives to downsize or down-weight vehicles (thereby helping to maximize occupant safety), to spread compliance costs broadly across all regulated OEMs, and to enable fleet mixes that allow OEMs to capitalize on the critical consumer choice factors that drive successful fuel economy and emissions improvements. [EPA-HQ-OAR-2022-0829-0656, p. 16]

70 88 Fed. Reg. at 29196, 29234.

NADA strongly opposes any flattening of footprint curves to correspond with projected increases in new EV market penetration.71 Fleet-wide standards should be technology neutral and set at levels that are achievable without EVs so as not to penalize those OEMs (and their dealers) that choose not to aggressively develop, produce, and push EVs to market.72 [EPA-HQ-OAR-2022-0829-0656, p. 16]

71 88 Fed. Reg. at 29234-38.

72 NADA shares the concerns raised by AAI in it comments regarding proposed footprint curve changes.

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

NESCAUM and the OTC also generally support EPA's proposal to revise the footprint standards for LDVs and work factor standards for MDVs. EPA should adopt footprint curves that incentivize downsizing of all LDV and MDV types and classes to protect pedestrians and cyclists. [EPA-HQ-OAR-2022-0829-0584, p. 9]

Organization: POET, LLC

On Location also finds other technical issues that EPA should further evaluate to support a robust vehicle GHG regulatory program. For instance, OnLocation finds that if BEV "penetration is different than EPA projections, then EPA's proposed compliance curves are likely to be inconsistent with the analysis used in their development and penalize larger footprint vehicles."124 OnLocation also finds that additional review by EPA of its battery learning curve (i.e., the extent to which EPA projects battery costs will decline) is warranted, for reasons including that EPA could be substantially understating the total cost of the rule.125 [EPA-HQ-OAR-2022-0829-0609, p. 27]

124 Id.

125 Id at 8.

Shape of footprint curve depends on BEV penetration rate

As noted in the Proposed Rule, “The slope that corresponded with a neutral response for ICE vehicles only (overall, no change in the average footprint of ICE vehicles) was 0.8 g/mi/square foot. This slope was then scaled down accordingly-for example, based on a nominal BEV sales penetration of around 50%, this 0.8 slope would be scaled down to 0.4 (based on the remaining 50% of ICE vehicles).”6 [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

6 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis, 1-7.

The targets defined in the Proposed Rule are a function of vehicle footprint. That is, the compliance target depends upon the footprint of the vehicle. Figure 15 shows the EPA’s proposed footprint for cars. If the penetration of BEV is much below the proposal, the footprint target function is too flat relative to the actual market share of non-BEV vehicles, penalizing ICE vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

[See original attachment for Figure 15]

Source: “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles,” Federal Register Vol. 88, No. 87, pg. 29237. [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Organization: Stellantis

Proposed Standards Tougher on the Most Popular Vehicles

As discussed above, EPA’s rule sets aggressive targets for vehicle GHG emissions reductions. EPA’s proposed rule targets fleet performance improvement exceeding a 50% reduction in CO2 emissions. [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

Analysis shown in EPA’s NPRM showcases industry fleet targets and impacts representing an aggregate of vehicle types. In reality, an industry or OEM fleet target is actually comprised of volume weighted targets of different vehicles divided into two separate car and truck fleets. [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

EPA proposes significantly more stringent standards for trucks and SUVs – the segments most demanded by customers – than it does for sedans/small cars. As seen in Figure 8 below, pickup stringency exceeds sedan stringency by 14% in 2027MY, and SUV stringency exceeds sedan stringency by 10%. In fact, sedan stringency is relaxed in the first year of the rule (by 1%).[EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

Change in GHG Standards Per Year by Vehicle Type (Preferred Alternative)

Figure 8 - Pick-up truck and SUV stringency is more severe than sedans at the start of the proposed rule

2007

Total Fleet: -7%

CUV/SUV: -9%

Pickup: -13%

Sedan: 1%

2008

Total Fleet: -13%

CUV/SUV: -13%

Pickup: -13%

Sedan: -13%

2009

Total Fleet: -15%

CUV/SUV: -16%

Pickup: -16%

Sedan: -15%

2030

Total Fleet: -8%

CUV/SUV: -8%

Pickup: -9%

Sedan: -8%

2031

Total Fleet: -9%

CUV/SUV: -9%

Pickup: -9%

Sedan: -9%

2032

Total Fleet: -11%

CUV/SUV: -12%

Pickup: -11%

Sedan: -11%

[EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

The disproportionate impact of EPA's proposal on different vehicle types can been seen in the footprint curves in the proposed rule. As seen in Figure 9 below, EPA is applying much more stringent targets to trucks and large sedans with much less stringent standards for small cars. [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

SEE ORIGINAL COMMENT FOR CHART Car Fleet Stringency Curves vs Light Duty Truck Feet Stringency Curves Figure 9 - Large cars and all trucks face more difficult standards [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

As shown in Figure 10 below, taken from the 2022 EPA Trends Report, pickups and truck SUVs are by far the most popular vehicles demanded by customers, making up over 60% of industry vehicle sales. EPA's proposed rule disproportionately punishes these vehicles while giving small sedans relief in initial years of the rule. This results in certain vehicles taking on more of the GHG reduction burden than others. [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

Also shown in Figure 10, OEM mix of vehicle types can vary widely, and these differences drive significant stringency differences when calculating an OEM's overall fleet average target. As discussed above, the NPRM proposes drastically different stringencies for cars vs trucks. This stringency imbalance will compound through an OEM's higher or lower mix of certain vehicle types producing disproportionately easier standards for "car centric" OEMs and harder standards for truck and SUV biased OEMs. These disproportionate stringencies may result in an electrification pace that is infeasible for some vehicle types and less challenging for others. [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

SEE ORIGINAL COMMENT FOR Table 3.4 Model Year 2021 Estimated Real-World Fuel Economy and CO2 by Manufacturer and Vehicle Type and Figure 10 – EPA is proposing more stringent standards on the trucks and SUVs – the most popular vehicles in the market today [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

EPA should apply stringency evenly across vehicle types driving the entire industry at the same rate of improvement regardless of vehicle types or product mix towards the ultimate goal of further GHG reductions by 2032MY. [EPA-HQ-OAR-2022-0829-0678, pp. 9-11]

Organization: Tesla, Inc.

Tesla welcomes the EPA's proposal to reduce GHG emission standards across the light- and medium- fleet and to adjust the footprint-based standards curves to reduce incentives to upsize vehicles.115 [EPA-HQ-OAR-2022-0829-0792, p. 16]

115 88 Fed. Reg. at 29196.

Organization: Zero Emission Transportation Association (ZETA)

ZETA supports the proposed revisions to the car and light truck footprint curves, including the flattening of each slope over the timeframe covered by the standards, and we encourage EPA to finalize the changes as proposed. As EVs continue to grow in market share, EPA emission standards should reflect the decreasing disparity in emissions from different sized vehicles within each vehicle segment. In other words, there are no tailpipe emissions from EVs and as they become the predominant vehicle technology in automakers' fleets, EPA standards should be designed to continue incentivizing zero-emission technologies rather than to encourage production of larger, higher-emitting ICEVs. To that same end, we support the proposed revisions to the footprint cutpoints as well and encourage EPA to finalize them as proposed. [EPA-HQ-OAR-2022-0829-0638, p. 27]

EPA Summary and Response

In the NPRM, EPA requested comment on its methodology for establishing the slopes for the car and truck curves. EPA received comments from several stakeholders. We summarize and address a majority of them in our discussion of the derivation of car and truck slopes in Section III.C.2.ii of the preamble.

Other unique aspects of stakeholder comments are provided here:

In its comments, API argues that EPA did not have any basis or explain how the numeric values of the curves were derived. API stated "nowhere does EPA explain how the numeric values of the curves (i.e., the actual GHG emissions rate that would be applied to each vehicle upon application of the curve) were derived and how those particular values are justified." EPA disagrees. As the commenter correctly notes, compliance with the GHG program is based on fleet average emissions values and includes flexibilities for banking and trading credits. As such, there is no requirement or expectation that any single vehicle will meet its own GHG target. This is a well-established approach based on previous light- and medium-duty GHG standards (which EPA did not reopen) and is an important feature of the GHG program, since it gives manufacturers the flexibility to apply technologies in a way that best meets individual vehicle product characteristics with their respective business strategies. In selecting the numerical level of the GHG targets, EPA considered ranges of values both higher and lower than the final standards and the costs, lead time and emission reductions associated with various levels of stringency, as well as other factors. These ranges were presented as Alternatives in the NPRM, and the higher and lower values were excluded considering the balance of factors such as feasibility and lead time, cost, and safety as described in preamble Section V of the NPRM preamble. Upon consideration of public comments and our updated analysis based on the best available information in the public record, EPA refined the range of considered values further for this final rule with curves and numerical targets that are higher and lower than the final standards. Furthermore, in addition to the level of the final standards, EPA has described the technical bases upon which the numerical values for curve slopes and cut points were determined (as described in Sections III.C.2.ii and iii of the final rule preamble). Throughout the process of evaluating various levels of stringency and the associated emissions reductions EPA also assessed each stringency level in consideration of manufacturing costs and lead time. EPA's selection of the final standards was neither arbitrary nor capricious but firmly guided by EPA's CAA authority to reduce vehicle emissions, and is fully described in Sections III, IV and V of the preamble to this final rule and the accompanying RIA.

The Alliance commented that EPA had deviated in its traditional methodology for establishing footprint curves. The Alliance noted that EPA had historically assessed the performance of the existing fleet and used the current fleet as a basis for year over year improvements. EPA disagrees with the Alliance's comments. Although on the surface the methodology for establishing the curves may look different as compared to previous rulemakings the fundamental objectives and metrics remain the same. The agency considered various levels of stringency and the associated emissions reductions with respect to cost of compliance, energy, lead-time and safety as well as manufacturing constraints for emerging technology and materials. The relative increases in stringency of past rulemakings were largely tempered by incremental improvements in advanced gasoline technology and low to moderate penetrations of electrification. However, given significant amounts of electrification which support a manufacturers compliance at 0 g/mile, a methodology which focuses on incremental improvements in ICE technology is no longer appropriate.

In its comments, the Alliance "disagrees with EPA's assessment that the footprint-based standards have resulted in a general increase in vehicle footprint as a means to reduce compliance burden." In contrast, EPA received comments from other stakeholders which supported EPA's approach to establishing the footprint curves. In its comments, RFF estimated that increasing a vehicle's footprint from 45 to 55 square feet generates about $2,700 in additional credits per vehicle. Dr. Whitefoot referenced a peer-reviewed study showing that the footprint standards have encouraged automakers to design larger vehicles as a path to compliance.[363] EPA disagrees with the Alliance's position. While EPA acknowledges that there are multiple other factors (target market/consumer preference, profit potential, etc) that might incentivize a manufacturer to redesign a vehicle with a larger footprint than its predecessor, there is clear evidence that the average vehicle footprint – for each of the five vehicle classes presented in the EPA Trends report – has increased since the outset of the footprint-based standards.[364]

Later, the Alliance commented that EPA's "assumption of rapid EV market share gains across all vehicle sizes effectively forecloses opportunities for plug-in hybrid electric vehicles that have some zero-emission operation, but also include ICE operation that would be better suited to a target curve with some slope." EPA disagrees: there are certainly opportunities for PHEVs to contribute towards compliance, as they will achieve an appropriate percentage of zero-tailpipe GHG according to their respective utility factor. In fact, EPA demonstrates through a sensitivity case that the standards could be met largely through the use of PHEVs, under a scenario where we held the level of BEVs to those available in the current market; see preamble Section III.F.4.

The Alliance and Stellantis noted that under the proposed standards there was an effective large increase in truck stringency for the first year of the program due to the change in the slopes and relative offset between the car and truck curves. As we discuss in Section I.C of the preamble and more fully in RTC Section 3.3, we have addressed this concern raised by the Alliance and other stakeholders in our selection of the final standards, which provide adequate lead time and a slower pace of the standards in the early years of the program.

The following comments address EPA's approach to using towing in the utility offset in the development of the truck curve:

In its comments, Consumer Reports was supportive of the reduction in both the car/truck offset and the overall slope; it expressed "questions about the use of towing as a means to define the slope of the truck curve," while pointing to a survey that shows most Americans never tow. Instead, CR suggested using combined passenger and cargo volume as an alternative attribute to towing for purposes of establishing the truck slope. While EPA recognizes there might be other

[363] Whitefoot and Skerlos (2012). Design incentives to increase vehicle size created from the us footprint-based fuel economy standards. Energy Policy, 41:402–411
[364] Environmental Protection Agency, "The 2023 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975," EPA-420-R-23-033, December 2023.

attributes that could indicate an appropriate slope of the truck curve, we believe that towing is the most appropriate; further unlike other attributes where consistent data across vehicles is lacking, towing data is available for each vehicle model, and were able to successfully correlate towing with increased tailpipe CO2 (via GCWR rating and required engine torque) as we describe in RIA Chapter 1.1.3.2.

Dr. Whitefoot outlined the drawbacks of using footprint as a proxy for towing and hauling capability and highlighted the variation of towing and hauling of different trucks of the same size. She recommended that EPA might consider whether using towing and hauling capability directly as attributes in this or future rules, rather than using footprint as a proxy for towing and hauling capabilities, would eliminate incentives to further "up-size" the fleet or otherwise create unintended shifts in vehicle designs in response to the GHG regulations. EPA thanks the commenter for this suggestion. However, as towing and hauling ratings may vary by model and trim level, these ratings are not as easily verified and may present an opportunity for towing capability to be added to a vehicle as means of complying with less stringent standards if they are directly used as attributes that determine a vehicle's CO2 target. This may have an unintended consequence of added weight and reduced aerodynamics and increased vehicle emissions.

The following comments address the level of the utility offset in the development of the truck curve:

In its critique of the utility offset for the truck curve, the Alliance claims that EPA "fails to consider potential differences in overall EV uptake and type of EV uptake in the light-duty truck fleet." We are interpreting this commenter's remark as asserting that EVs are more suitable for some market segments and may be preferred in some market segments more than others. While the OMEGA model does not restrict EVs from any particular vehicle segment within the light-duty fleet because EPA has concluded that the technology is feasible across the entire light duty fleet, EPA does recognize that there may be varying consumer preferences for EVs, for example, between a sedan buyer and a pickup truck buyer. These consumer differences are characterized in the consumer module of OMEGA, described in RIA Chapters 8.1 through 8.3, and also discussed further in RTC Section 13.2. EPA anticipates that vehicle manufacturers will continue to balance their customer product preferences and compliance plans, just as they have historically done.

In its comments, Ford – while supportive of the general methodology used to derive the truck curve – suggested modifications to EPA's assumptions used to calculate the truck slope, including increasing the towing-based CO2 offset (from 9 g/mile per 1000 lbs towing to 11 g/mile to account for increased road loads on highly capable towing vehicles), an increase in the towing delta from least to most capable truck offset, and a reduction in assumed PEV penetrations (from 50% down to 35%) of full-size pickups. Taken together, all of these changes to inputs would result in an increase of 40 g/mi to the maximum utility offset. While EPA appreciates the specific technical recommendations, we have investigated each one and believe there is insufficient data on which to base changes in these factors of our analysis (and note that Ford did not provide data upon which to support their technical recommendations), especially upon consideration of comments from other stakeholders as discussed below.

In contrast, several other commenters (e.g., ACEEE, CR) argued that EPA overestimated the utility offset, because we did not scale down the offset according to real-world usage data indicating minimal levels of towing and hauling. While aware of this usage disparity, EPA disagrees with this suggestion. Regardless of the amount of time a truck is used to tow or haul in the real world, the 2-cycle emissions of a vehicle designed for greater towing and hauling will consistently reflect an increase in tailpipe emissions commensurate with a more capable powertrain, a heavier frame, and higher road loads (even though it is tested unloaded per the regulations). In essence, the design changes necessary to enable the more capable vehicle will continuously impact vehicle emissions independent of the real-time towing/hauling activity, and thus EPA believes it is appropriate to reflect such utility in the relative CO2 targets for light trucks.

ICCT argued that EPA should not base the full offset on only 24% of the light truck fleet that is projected to be pickups in MY 2027-2032. Instead, ICCT believes the offset should be scaled down accordingly. EPA disagrees, as the applied amount of g/mi offset increases linearly with footprint, and the majority of pickup trucks reside at the maximum footprint near 70 square feet. Because of the linearly increasing nature of the offset from smallest to largest footprint, the smaller footprint trucks naturally scale down as they are also reflective of lower utility. The sales-weighted average footprint of all light trucks was approximately 53 square feet in MY 2022 – so in terms of its overall stringency effect for light trucks under this approach, the sales-weighted utility-based offset would only average about 1/3 of the maximum offset, or about 10.5 g/mile over the fleet. This is almost the same as the magnitude of the offset that ICCT suggested (11 g/mile) in their alternative scaling using percentage of body-on-frame trucks as a basis for the offset.

On the other hand, Environmental and Public Health Organizations also commented that EPA based its utility offset calculation assuming the maximum towing capacity for each model, which does not apply to each individual vehicle within towing models. It argued that the maximum towing capacity is only relevant to those models equipped with additional options (towing packages, etc). EPA agrees with this comment, although we do not have sales data to identify exact tow ratings (or a distribution of tow ratings) for all vehicles sold. We recognize that our assessment of average utility offset might be conservative for this reason.

In its comments, CAP stated “EPA should further reduce the difference between the car and truck curves and scale the car curve such that it does not create an incentive to upsize ICE vehicles. ” EPA thanks CAP for its comment recommending that the offset be further decreased; however, CAP did not provide any supporting basis or data for EPA to review in this context. Regarding the car curve: in RIA Chapter 1.1.3.1, EPA explains the methodology used to determine a “neutral-slope” car curve. Supported by our modeling analysis, it is EPA’s assessment that the derivation of the neutral slope strikes a balance in neither incentivizing increase or decreases in vehicle footprint. Overall, the fleet average footprint is projected to remain relatively unchanged under the final footprint curves.

As we discussed in Section III.C.2.ii of the preamble, upon consideration of all the above comments in support of both larger and smaller offsets, we believe that the proposed level of offsets applied to the truck curve are appropriate and are finalizing the offsets between the car and truck footprint curves as proposed.

Environmental and Public Health Organizations and CAP expressed a desire for EPA to avoid incentivizing large ZEVs. Furthermore, CAP recommended that EPA should remove ZEVs from the footprint curve and credit ZEVs at the midpoint of the car and truck curves. As we describe in Section III.C.7 of the preamble, EPA is treating all light duty vehicles similarly. Thus, we are setting the emissions targets for BEVs based on their footprints and including only emissions measured directly from the vehicle in the vehicle GHG program for MYs 2027 and later, consistent with the treatment of all other vehicles. We have taken into consideration the goal raised by these commenters to avoid incentivizing larger BEVs, and we believe our adjustments to the footprint curves are a more appropriate means of addressing this concern, For further discussion on comments related to the treatment of BEV emissions in this rulemaking refer to Section 3.1.5 of this RTC.

NESCAUM / OTC recommended curves that incentivize downsizing of all types to protect pedestrians/cyclists. EPA's aim in establishing the footprint curves is to neither incentivize upsizing or downsizing of the fleet. We further consider issues of vehicle safety in RTC section 22.

DOEE and ICCT recommended that EPA adopt a single curve applicable to all vehicles, both cars and trucks. EPA stated in the proposal that we did not reopen the issue of separate standards (footprint curves) for cars and trucks. While we are maintaining the two curve standards, as we discuss in Section III.C.2. of the preamble and Chapter 1.1.3 of the RIA, we are establishing car and truck curves more appropriate for their respective fleets while accounting for differences in utility within the footprint-based standards. With these changes, EPA believes the program mitigates any incentives manufacturers might have had in the prior program to shift regulatory classes or upsize vehicles as a means of compliance.

ICCT commented that EPA used too low of a willingness to pay (WTP) valuation in its OMEGA inputs, and suggested that EPA use a higher value, for example, the midpoint of the range they cited which would be $1170. EPA thanks commenter for the suggestion, but we consider our WTP to be appropriate at this time.

In its comments, NADA "strongly opposes any flattening of footprint curves to correspond with projected increases in new EV market penetration." Similarly, in its comments, POET stated "If the penetration of BEV is much below the proposal, the footprint target function is too flat relative to the actual market share of non-BEV vehicles, penalizing ICE vehicles." EPA disagrees with both commenters claims. As in past GHG rulemakings, these standards are performance based, fleet-averaging, and technology-neutral. When the curves were first established, almost every vehicle was a conventional ICE vehicle and steeper slopes were more appropriate for that type of powertrain as those vehicles emitted more GHG on a g/mile basis and emissions rates were more sensitive to increases in footprint. However, with cleaner vehicle technologies, regardless of the powertrain (with BEVs as the extreme case of 0 g/mi tailpipe), vehicle emissions are less sensitive to increases in footprint, and the slope will appropriately become flatter as a byproduct of a more stringent fleet average. In short, the stringency defines the slope rather than an example BEV penetration which might be achieved to comply with that stringency. There should be no difference in the curve slope amongst complying fleets of different BEV penetrations and technology mixes which achieve the same fleet stringency.

3.2.2 - MDV work factor curves; work factor definition

Comments by Organizations

Organization: Alliance for Automotive Innovation (Alliance)

B. Major Concerns with the Proposed Medium-Duty GHG

Standards [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

1. Too Stringent of a GHG Standard

EPA has set too difficult of a GHG target for medium-duty vehicles. The proposal, shown in Figure 69 below, requires a 37% GHG reduction from 2028MY to 2032MY, with an additional 6.1% burden on 2027MY gas engines with a retroactive change to the previously published GHG standards to achieve fuel neutral standards. The agency relies on flawed modeling that results in overly aggressive EV penetration estimates to develop the work factor standards. The overall stringency is harder still with the proposed early removal of EV multipliers, capping GCWR contribution to work factor, and adjustments to the Medium-Duty Passenger Vehicle Definition. [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

[See original attachment for Figure 69: EPA Proposed Medium-Duty GHG Standards (2027-32MY)] [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

2. Assumes overly aggressive EV penetration (98% EV cargo vans)

EPA, through modeling, has forecast an unreasonably high EV penetration. This is particularly true for Medium-Duty cargo vans. For example, Figure 70 below shows the results of EPA's Omega modeling for Industry compared to CARB's HD ZEV rule. While we agree that last mile delivery is a great opportunity for electrification, it is preposterous to believe that nationwide electrification of cargo vans will outstrip CARB requirements by 20% in 2027, almost 50% in 2030 and over 60% in 2032. Similarly, it is unrealistic and infeasible for new cargo vans sales to reach 98% EV in 2032 (starting from essentially 0% today in EPA's model). [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

[See original attachment for Figure 70: Comparison of electrification -EPA OMEGA Forecast vs CARB HD ZEV rule] [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

Light-duty electrification is already well under way and has been progressing for about 20 years. Plus, the Administration set a stretch goal of 40-50% electrification by 2030. It does not make sense to estimate 92% electrification of this MDV segment in 2030MY when it is only just starting to introduce EVs in the formative years of the rule. There is no empirical support for a forecast of such rapid market adoption. Further, public charging infrastructure will not generally be practical to delivery companies. This means a massive installation of charging infrastructure on private property will be required within a few years. It has not, however, begun in a meaningful way. [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

For EPA's forecast to be true, it would have to apply to not just the well-known last mile delivery companies, but also to many small businesses such as HVAC, plumbing, and flower delivery. It is very unlikely that such small businesses will be near EPA's assumed EV penetration rate for cargo vans. Based on the above, at most, EPA should model industry as just meeting CARB's requirements each year, with no more than one half of the estimated electrification in states that do not adopt CARB's rule. [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

EPA attempts to justify reopening of the published HD Phase 2 final rule due to its anticipated levels of electrification of medium duty vehicles in 2027MY, as shown in Figure 71, below. [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

[See original attachment for Figure 71: EPA Table 13-132, Projected BEV Penetrations, Proposed Standards – MDVs]298 [EPA-HQ-OAR-2022-0829-0701, pp. 192-193]

298 Draft Regulatory Impact Analysis, p. 13-53.

3. Weight Impacts of Proposal

Manufacturers recommend that EPA not limit GCWR beginning in MY 2030 in the Work Factor equation. The EPA proposed action interacts with MDPV definition, and creates more stringent standards for high GVWR, high GCWR vehicles when compared to lower GVWR, high GCWR counterparts. If EPA would like to limit GHG targets for high work factor vehicles, manufacturers recommend that EPA do that directly, like how EPA limits GHG targets for high footprint vehicles in light-duty. [EPA-HQ-OAR-2022-0829-0701, p. 194]

Manufacturers recommend that EPA consider the extent to which pickups may "weight out" to Class 4, if equipped with battery electric vehicle technology, while retaining the capability of Class 3 internal combustion engine vehicles common in the market today. In other words, to maintain these vehicles' work functionality, a larger (heavier) battery will be needed, resulting in possibly increasing vehicle weight to exceed the Class 3 category. To the extent that adopting ZEV technology would shift vehicles to different regulatory (weight) classes, EPA should take this into account when setting standards by either offering manufacturers flexibilities on regulatory groupings or by setting stringency that reflects the vehicles remaining in the regulatory set, after manufacturers incorporate ZEV technology. This concern is also discussed below under the MDPV definition section. [EPA-HQ-OAR-2022-0829-0701, p. 194]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

Medium-duty pickups need to electrify faster

The proposed standards for medium-duty vehicles (MDVs) are premised on 46% BEV adoption by MY 2032 (FR 29331), well below the 67% BEV penetration anticipated for LDVs. EPA expects MDV electrification to be driven by vans, 98% of which would be electric by MY 2032. Pickups, which account for almost two-thirds of MDV sales (DRIA Table 3-1), would reach only 19% electrification. EPA should adjust penetration estimates for these large pickups. [EPA-HQ-OAR-2022-0829-0642, pp. 8-9]

It is not clear from the proposal or DRIA how EPA arrived at such low medium-duty pickup electrification projections. These projections stand in sharp contrast with those for light-duty pickup electrification, which would reach 68% in 2032 (FR 29329 Table 80). Not long ago, full-size light-duty pickups were viewed as unlikely candidates for electrification. That concern was not borne out, as evidenced by several recent popular releases. EPA projects an average footprint of 69.1 square feet for BEV pickups in MY 2032 (DRIA 1-14), placing the average BEV pickup well into the full-size pickup range. [EPA-HQ-OAR-2022-0829-0642, pp. 8-9]

Medium-duty BEV pickups are not yet on the market, and skepticism regarding their imminent arrival is common, based largely on high towing requirements common for these trucks. Yet at this juncture, it is reasonable to anticipate that their electrification potential would approach that of full-size light-duty pickups. EVs excel at providing the torque needed for towing, so the challenge for electric medium-duty pickups is not capability to tow but rather towing range, i.e., battery capacity. Even vehicles requiring high towing capacity may not need to tow their loads for extended distances; many medium-duty pickups are engaged in mining, construction, and utility work, where towing needs may be for work on site, rather than for accessing the site. EPA should segment medium-duty pickups by application and by towing and range requirements and assess their electrification potential accordingly. [EPA-HQ-OAR-2022-0829-0642, pp. 8-9]

California's Advanced Clean Trucks program requires 40% of Class 2b-3 pickups to be ZEVs in 2032. After considering the various applications of these trucks in California, over 70% of which were for personal use, and following developments in the electric truck market, CARB decided to accelerate requirements for Class 2b-3 pickups to start in MY 2024 instead of waiting until 2027 as initially proposed.20 California's Advanced Clean Fleet program also will require about 40% of pickups to be ZEVs by 2032 under the EV milestone option.21 [EPA-HQ-OAR-2022-0829-0642, pp. 8-9]

20 https://ww3.arb.ca.gov/regact/2019/act2019/fsor.pdf

21 https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/acf22/fsor.pdf Table IV-8

Moreover, EPA's heavy-duty Phase 3 proposal finds electrification potential rates for all categories of heavy-duty trucks, ranging from Class 4 versions of medium-duty pickups to tow trucks to long haul tractors, higher than the 19% projected for medium-duty pickups in MY 2032. This is further evidence that EPA should consider in more detail the actual requirements for medium-duty pickups and the extent to which BEVs might meet those needs. [EPA-HQ-OAR-2022-0829-0642, pp. 8-9]

Finally, for those medium-duty pickups that must tow heavy loads long distances, both plug-in hybrid electric vehicles (PHEVs) and fuel cell vehicles (FCEVs) should be considered. As EPA notes, PHEVs may be well suited to Class 2b pickups (DRIA 3-11). We urge EPA to incorporate in the final rule findings from contract work now underway to investigate the potential for PHEVs in pickup applications (FR 29298), including by adding PHEVs as a compliance option and increasing the stringency of MDV standards to the extent appropriate. Similarly, EPA should include an analysis of fuel cells for high-mileage, high-towing pickups. EPA's heavy-duty Phase 3 proposal projected that 25% of long haul tractors could be FCEVs by MY 2032, indicating confidence that any infrastructure and cost challenges associated with FCEVs can be addressed by then. [EPA-HQ-OAR-2022-0829-0642, pp. 8-9]

Organization: Environmental. and Public Health Organizations

VIII. Stronger GHG and Criteria Pollutant Standards for Medium-Duty Vehicles Are Feasible.

We now turn to EPA's proposed emission standards for medium-duty vehicles. Below, we examine the combustion vehicle and zero-emission technologies that can further reduce GHG emissions from the medium-duty fleet, comment on EPA's modeling, address economic considerations, and make suggestions on certain aspects of EPA's regulatory program. We also offer recommendations for the Tier 4 NMOG+NOx standards and PM requirements. As detailed below, strong GHG and criteria pollutant emission standards for MDVs are feasible and cost-reasonable. [EPA-HQ-OAR-2022-0829-0759, p. 64]

A. EPA must strengthen its GHG standards for MDVs.

EPA's proposed GHG standards for MDVs significantly underestimate the potential for feasible emissions reductions from the Class 2b-3 fleet, particularly pickup trucks. EPA has primarily focused on the electrification of MDVs in setting its standards.169 However, not only has it underestimated the share of MDVs that could be electrified, it has underestimated the technologies available to reduce GHG emissions from gasoline- and diesel-fueled vehicles. EPA should adopt more stringent final standards for MDVs that reflect greater application of both the zero-emission powertrain and conventional emission control technologies that are feasible and widely available. [EPA-HQ-OAR-2022-0829-0759, p. 64]

169 DRIA at 1-21: "The feasibility of the 2027-2032 GHG standards is based primarily upon an assessment of the potential for a steady increase in MDV electrification, primarily within the van segment."

1. The combustion vehicle technology pathways show the feasibility of stronger standards.

EPA proposes as its 2027 standard the current (Phase 2) standards for diesel pickups and vans, and then adjusts those standards in the future based on assumptions about the level of electrification within the fleet. In fact, in EPA's modeling, combustion MDVs actually increase average direct tailpipe emissions by 1.5% between 2022 and 2032, with the increase being even larger for the Phase 2 baseline. The modeling thus indicates that no technological improvements to combustion MDVs are needed to comply with even the existing Phase 2 standards through 2027.170 [EPA-HQ-OAR-2022-0829-0759, p. 64]

170 This remains true for the "No IRA" sensitivity, though there is virtually no difference in the assumed production of electric MDVs between the default modeling run and this sensitivity case, indicating the degree to which electrification is expected to take off in the commercial van space due to improved TCO.

Subsequent to finalization of the Phase 2 standards in 2016, a number of technologies have been developed that EPA did not originally consider in establishing those standards; nor were the Phase 2 standards predicated on the full adoption of even those technologies that were identified at the time. As EPA noted in its Phase 3 heavy-duty vehicle proposal: "In developing the Phase 2 CO2 emission standards, we developed technology packages that were premised on technology adoption rates of less than 100%. There may be an opportunity for further improvements and increased adoption through MY 2032 for many of these technologies included in the heavy-duty (HD) GHG Phase 2 technology package used to set the existing MY 2027 standards."171 [EPA-HQ-OAR-2022-0829-0759, p. 65]

171 88 Fed. Reg. at 25960.

By ignoring technologies for Class 2b-3 combustion vehicles that could achieve emissions reductions beyond the Phase 2 standards, EPA is setting its MDV standards below a level of readily achievable technology adoption (and, indeed, many of these technologies are already being deployed). Below, we walk through a number of the technologies that EPA should assume will be deployed by MDV manufacturers in the timeframe of the MDV Proposal. [EPA-HQ-OAR-2022-0829-0759, p. 65]

a. EPA should consider additional compression-ignition (diesel) engine technologies.

Manufacturers of diesel engines for Class 2b-3 pickups and vans will deploy new engines in order to meet the 2027 NOX standards that EPA finalized last year.172 However, the Agency's modeling assumes that diesel vehicles will reduce GHG emissions by less than 1% from 2022 to 2032. This leaves a tremendous amount of technology on the table, not just from what the Agency identified in the Phase 2 rulemaking and assumed would be needed to meet the standards already on the books, but also from additional improvements that have been developed since then. [EPA-HQ-OAR-2022-0829-0759, p. 65]

172 See 88 Fed. Reg. 4296.

Diesel engine efficiency continues to increase, with HHD (Class 8) diesel engines demonstrating up to 55% brake-thermal efficiency (BTE) in response to the second phase of the SuperTruck program. The Navistar and Cummins/Peterbilt teams demonstrated 55% BTE, compared to the 50% target for the first phase, while Daimler, Volvo, and PACCAR all demonstrated over 50% BTE, with a clear pathway towards the 55% target. The PACCAR team's progress is particularly illuminating, as they undertook an additional challenge to meet "ultra low NOX" targets consistent with EPA's recent regulation as part of their overall efficiency effort, indicating that these levels of thermal efficiency are not incompatible with achieving the 2027 NOX standards.173 [EPA-HQ-OAR-2022-0829-0759, pp. 65-66]

173 See Zukouski, Russ, Navistar SuperTruck II: Development and demonstration of a fuel-efficient class 8 tractor & trailer, DOE Annual Merit Review, (Jun. 21-23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace103_%20Zukouski_2022_o_4-29_1232p m_ML.pdf; Mielke, David, 2022 Annual Merit Review: Cummins/Peterbilt SuperTruck II, DOE Annual Merit Review, (Jun. 21-23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace102_dickson_2022_o_rev2%20-%20Trai lLife-GCCC%20IN0110%20REVISED.pdf; Bashir, Murad, et al., Daimler: Improving transportation efficiency through integrated vehicle, engine, and powertrain research - SuperTruck 2, DOE Annual Merit Review, (Jun. 21-23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace100_Villeneuve_2022_o_4-30_1116am_ ML.pdf; Bond, Eric, et al, Volvo SuperTruck 2: Pathway to cost-effective commercialized freight efficiency, DOE Annual Merit Review, (Jun. 23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace101_bond_2022_o_5-1_129pm_ML.pdf; Meijer, Maarten, Development and demonstration of advanced engine and vehicle technologies for class 8 heavy-duty vehicle ([PACCAR] SuperTruck II), DOE Annual Merit Review (Jun. 21-23, 2022), https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace124_Meijer_2022_o_4-29_1056pm_KF. pdf.

Significant improvements in efficiency are not limited to the largest engines and can also be feasibly deployed on Class 2b-3 vehicles. Ford's latest iteration of its 6.7L Power Stroke diesel engine cut GHG emissions by 3.5% over the previous generation when it was introduced in 2020, and 2023 saw an additional 3% improvement due to a revised injection system.174 General Motors released its new 6.6L Duramax diesel engine in 2023 with improved cylinder heads, fuel injection, and other features in a design that is meant to increase both power and efficiency, particularly at higher output.175 These engine improvements are already being deployed today but are not captured in the Agency's OMEGA2 modeling. [EPA-HQ-OAR-2022-0829-0759, p. 66]

174 To assess these improvements, we refer to the combined transient cycle certification results for the MHD Power Stroke family of diesel engines available in the chassis cab/F-650 and F-750 configurations. The engines available in the heavy-duty pickups are not required to certify to isolated engine tests, but are likely to see similar levels of improvement, even with the higher power output, since they also have the same underlying technology.

175 GMC Pressroom, The Ultimate Heavy Duty: GMC Introduces its Most Luxurious, Advanced and Capable Sierra HD Ever (Oct. 6, 2022), https://media.gmc.com/media/us/en/gmc/home.detail.html/content/Pages/news/us/en/2022/oct/1006-sierra.html. It is difficult to compare apples-to-apples between the new and old Duramax engines due to limited certification data and because some of that efficiency improvement was used to reduce tailpipe NOx, since the new diesel-equipped Silverado/Sierra HD 2500 have a reduced NMOG+NOx bin of 200 vs. 250 mg/mile. Additionally, because the standards are set by "work factor," the increase in power used to raise towing capacity by 4000 pounds increases the allowable emissions for the engine, which means that despite an apparent increase in certified CO2 emissions of 2.4%, there could be a net improvement in compliance of up to nearly 5% as the result of up to a 7% increase in the model year 2023 emissions target.

Mild electrification also offers increased emissions reduction capabilities. Eaton demonstrated that it is possible to outperform simultaneously the 2027 NOx standards and the Phase 2 CO2 standards through a number of different aftertreatment and powertrain combinations,176 including those applicable to Class 2b-3 vehicles. A recent research paper by Eaton demonstrates various combinations of control technologies manufacturers can target CO2 and NOx emissions levels over different regulatory cycles to develop a technology package that is suitable for compliance, including packages that can achieve CO2 reductions beyond Phase 2 while meeting EPA's future 2027 NOx standards.177 [EPA-HQ-OAR-2022-0829-0759, pp. 66-67]

176 See generally Dorobantu, Mihai, Eaton considerations on MD/HD GHG Phase 3, OIRA-Eaton meeting, (Mar. 23, 2023), https://www.reginfo.gov/public/do/eoDownloadDocument?pubId=&eodoc=true&documentID=215442

177 McCarthy, J., et al. 2023. "Technology levers for meeting 2027 NOX and CO2 regulations." SAE Technical Paper 2023-01-0354. https://doi.org/10.4271/2023-01-0354.

One of the strategies deployed by Eaton is a 48V electric heater, which could be deployed easily with a 48V mild hybrid powertrain, again illustrating the complementary technology packages available to manufacturers to simultaneously meet GHG and NOx standards. The 48V mild hybrid powertrain can power accessories, including those related to emissions control, and can also help reduce engine-out NOx. This was also demonstrated through testing by FEV as a strategy particularly relevant to medium-heavy-duty vehicles that share chassis and power requirements with the Class 2b-3 pickups and vans covered by this proposal.178 Such developments should be incorporated into the Agency's analysis of the level of emissions reductions achievable from diesel-powered Class 2b-3 vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 67]

178 Fnu, D., et al. 2023. "Application of 48V mild-hybrid technology for meeting GHG and low NOX regulation for MHD vehicles." SAE Technical Paper 2023-01-0484. https://doi.org/10.4271/2023-01-0484.

In the Phase 2 rulemaking, EPA excluded cylinder deactivation from medium-duty diesel engines,179 but its own analysis now shows that manufacturers are likely to deploy that technology to meet the heavy-duty NOx standards.180 Similarly, a recent report by Roush identified cylinder deactivation as a likely engine configuration for many Class 2b-3 vehicles.181 The Agency should consider this technology in its OMEGA2 modeling, further increasing the available emissions reductions technologies for diesel-powered vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 67]

179 81 Fed. Reg. at 73754, Table VI-4. Note, however, that the agencies did consider a "right-sizing" of diesel engines, based on a 4-cylinder vs. 6-cylinder engine, and cylinder deactivation could be seen as a control-based attempt to yield the equivalent improvement without altering the maximum output. See NHTSA, Commercial medium- and heavy-duty truck fuel efficiency technology study – Report #2, U.S. Dep. of Transportation, 52–53 (Feb. 2016), https://www.nhtsa.gov/sites/nhtsa.gov/files/812194_commercialmdhdtruckfuelefficiency.pdf.

180 EPA, Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards, Regulatory Impact Analysis, at 108–131 (Dec. 2022), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1016A9N.pdf.

181 Himanshu Saxena et al., Electrification Cost Evaluation of Class 2b and Class 3 Vehicles in 2027–2030, Roush, at 24-25, 28-30 (May 2023), https://cdn.mediavalet.com/usva/roush/r0YBSBBv00edOiBP759yoA/3Hcv7F_W-0G9ek0ODPgNMg/Original/Elect rification%20Cost%20Evaluation%20of%20Class%202b-3%20Vehicles%20in%202027-2030_ROUSH.pdf. [hereinafter Saxena et al., Electrification Cost Evaluation].

b. EPA should consider additional spark-ignition (gasoline) engine technologies.

Another significant opportunity for increased improvement to combustion vehicles lies in spark-ignition (SI) engines, for which Phase 2 required no engine improvements beyond the 2016 SI engine standard. While this is somewhat rectified in EPA's move to a fuel-neutral standard for Class 2b-3 pickups and vans—which effectively results in a 5-6% increase in stringency for MDVs—this still does not fully recognize the potential improvement available from gasoline engines. And in fact, in the Agency's modeling, gasoline vehicles see, on average, 5% higher emissions in 2032, compared to 2022.182 [EPA-HQ-OAR-2022-0829-0759, pp. 67-68]

182 Because the model preferentially selects vans for electrification, some of this decrease is related to a shift in the vehicles included in the remaining gasoline fleet. However, even when limited to gasoline pickups there is an apparent backsliding in emissions, with an increase of 3%. This is similar to the backsliding that appears in the modeling of light-duty vehicles (see Section VI.A.2).

The weakness in EPA's Phase 2 targets for SI engines and vehicles is apparent in looking at manufacturers' growing bank of compliance credits to-date, particularly for Ford Motor Company, the largest SI engine supplier. Ford has run a credit surplus in every year of the vocational engine program, but this surplus exploded in MY 2020 with the release of its latest 7.3L V8 engine, codenamed "Godzilla."183 Even though the engine platform is relatively low-tech (naturally aspirated, pushrod V8), by utilizing variable cam timing and a variable-displacement oil pump, Ford's engine achieved a significant improvement in efficiency. The engine was also designed with fuel economy at load in mind for applications like towing. A smaller engine built on the same platform replaced the older base engine in 2023, no doubt increasing Ford's overcompliance and increasing the efficiency of even more of the MDV fleet. [EPA-HQ-OAR-2022-0829-0759, p. 68]

183 EPA, Final Phase 1 EPA Heavy-Duty Vehicle and Engine Greenhouse Gas Emissions Compliance Report (Model Years 2014-2020), Appendix B, at 40-42 (Nov. 2022) https://nepis.epa.gov/Exe/ZyPDF.cgi/P1016962.PDF?Dockey=P1016962.pdf.

General Motors is not standing still, either—its fifth-generation small-block V8 platform is getting a next generation update to a 5% improvement over the current generation,184 and the current generation is already a credit generator for GM's heavy-duty vehicles under the Phase 2 program.185 No further details are available about the heir to the current iron-block direct-injection L8T variant found in GM's heavy-duty offerings. [EPA-HQ-OAR-2022-0829-0759, p. 68]

184 Wren, Wesley, This is why GM is launching a new small block V8, Autoweek, (Feb. 3, 2023) https://www.autoweek.com/news/industry-news/a42746723/why-gm-is-launching-a-new-small-block-v8/.

185 EPA, Final Phase 1 EPA Heavy-Duty Vehicle and Engine Greenhouse Gas Emissions Compliance Report (Model Years 2014-2020), Appendix B, at 43.

Note that neither of these new improvements reflect technology adoption that was further anticipated for gasoline engines when the Phase 2 regulations were finalized. EPA assumed that cylinder deactivation (discrete or continuous), downsizing, and mild and strong hybridization would be used to meet those standards,186 yet none have yet been deployed in Class 2b-3 pickups and vans. This further underscores the significant amount of emissions reductions that are still readily achievable for Class 2b-3 vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 68]

186 81 Fed Reg. at 73776, Table VI-13.

Organization: Ford Motor Company (Ford)

Medium-Duty Vehicle GHG Stringency

Ford does not support EPA's proposal to limit the gross combined weight rating (GCWR) input into the work factor equation to 22,000lb. EPA's stated goal with this proposed modification is "to prevent increases in the GHG emissions target standards that are not fully captured within the loads and operation reflected during chassis dynamometer GHG emissions testing." However, work factor is not only used in determining MDV GHG emissions targets—it is also part of determining whether a vehicle in the 8,501-14,000lb gross vehicle weight rating (GVWR) range is an MDV or an MDPV in EPA's proposed revisions to the MDPV definition. Limiting work factor by capping GCWR input may reclassify MDVs as MDPVs in ways contrary to EPA's stated goals of capturing vehicles that "do not have significant work capabilities (e.g., towing and hauling), as measured by the work factor, relative to other vehicles in the MDV category." This would be an inappropriate and inaccurate comparison to make if work factor, the basis of the comparison, is not calculated in the same way over time. [EPA-HQ-OAR-2022-0829-0605, pp. 9-10]

To meet EPA's stated goal and ensure that manufacturers do not "generate windfall compliance credits for higher GCWR ratings," it would be more straightforward to modify the structure of MDV GHG standards directly. As one possibility, rather than a linear equation with the CO_2 g/mi standard constantly increasing as a function of work factor, the CO_2 standard could increase linearly only up to a certain work factor value, after which it would remain constant even if work factors continued to increase. In this way, EPA could address increases in GHG emission standards due to increasing GCWRs without distorting the use of work factors in other areas. [EPA-HQ-OAR-2022-0829-0605, pp. 9-10]

Organization: International Council on Clean Transportation (ICCT)

MEDIUM-DUTY VEHICLES

ICCT supports EPA's proposed standards for MDVs but believes the available evidence could justify greater stringency than proposed. ICCT also recommends the MDV standards be fuel neutral and require public availability of MDV-related data (sales, emissions, fuel consumption, vehicle attributes/technologies).152 These recommendations form the basis for ICCT's comments on the proposed MDV standards, discussed further below. [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

152 Lutsey. N. (2015). Regulatory considerations for advancing commercial pickup and van efficiency technology in the United States. International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/ICCT_pickup-van-efficiency_20150417.pdf

Stringency

ICCT supports the proposed MDV standards but believes they could be strengthened. The proposed standards would not require as high GHG reductions for MDVs as for light-duty trucks. The proposed MDV standards, if finalized, would require a net 36.5% improvement in tailpipe CO2 emissions, for a given work factor over MY2027-2032. This total improvement is much higher than that required by the current Phase 2 standards. However, the proposed LD truck standards require a total 46% improvement for a given footprint over MY2027-2032. This level of improvement comes after years of increased efficiency required by MY2017-2026 regulations. Figure 16 compares the 2-cycle CO2-e emissions of ICE LD pickups, MD vans, and MD pickups versus footprint. Each datapoint represents a single ICE model as calculated by OMEGA in MY2022 (baseline MY2021 emissions values are not available for all models, and OMEGA projects virtually 0% BEV share of these segments in MY2022). Since MD vehicles are tested at higher weight than LD vehicles, to compare MD and LD data, the emissions data of MDV were adjusted downwards assuming a test weight equal to curb weight plus 300 lbs (equivalent to the LD test weight). It was assumed that for every 10% reduction in test weight, CO2 emissions decreased by 4%.153 Solid-filled points represent a single model, and pattern-filled points represent the sales-weighted average emissions in MY2022, and the projected emissions in MY2032 to comply with the standard.154 Projected emissions were calculated based on the proposed standard curves for MY2032 assuming constant footprint (for LD pickups) or constant work factor with average test weight adjustment (for MD vehicles). As the figure shows, LD pickups are more efficient than similarly sized MDV, and the required improvement over the course of MY2022-MY2032 is much higher for LD than for MD. The different utility of LD vs MD notwithstanding, due to years of lagging behind the stringency levels of LDV, there are opportunities for increasing the stringency of the MD standards. [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

153 Isenstadt, A. and German, J (ICCT); Piyush Bubna and Marc Wiseman (Ricardo Strategic Consulting); Umamaheswaran Venkatakrishnan and Lenar Abbasov (SABIC); Pedro Guillen and Nick Moroz (Detroit Materials); Doug Richman (Aluminum Association), Greg Kolwich (FEV). (2016). Lightweighting technology development and trends in U.S. passenger vehicles. http://www.theicct.org/lightweighting-technology-development-and-trends-us-passenger-vehicles]

154 Preamble Tables 27 & 31

SEE ORIGINAL COMMENT FOR Figure 16. Comparison of on-cycle CO2 emissions of light-and medium-duty trucks, by model (solid fill) and sales-weighted average (pattern fill) calculated in OMEGA in MY2022. Average MY2022 and projected required MY2032 emissions are shown connected by arrows, indicating the percent reduction in emissions over MY2022-2032. [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

As acknowledged by EPA (DRIA 1-19), many gasoline and diesel efficiency-improving technologies have yet to be broadly implemented among medium-duty vehicles. In particular, many LD-related technologies like those discussed in previous sections in these comments can be applied to MD vans and some pickups. For instance, strong and mild hybrid systems that are well-suited for full-size LD SUVs and pickups could be scaled up for MD implementation. Light heavy-duty diesel powertrains can also benefit from hybridization and heavy-duty versions of LD efficiency technologies.155,156,157 Hybrid versions of LD vans and pickups today suggest that mild, strong, or plugin hybridization may be viable options for certain MD applications.158 [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

155 Isenstadt, A., German, J. (2017). Diesel Engines. International Council on Clean Transportation. https://theicct.org/publication/diesel-engines/

156 Buysse, C., Sharpe, B., Delgado, O. (2021). Efficiency technology potential for heavy-duty diesel vehicles in the United States through 2035. International Council on Clean Transportation. https://theicct.org/publication/efficiency-technology-potential-for-heavy-duty-diesel-vehicles-in-the-united-states-through-2035/

157 Posada, F., Isenstadt, A., Badshah, H. (2020). Estimated cost of diesel emission-control technology to meet the future California low NOx standards in 2024 and 2027. International Council on Clean Transportation. https://theicct.org/publication/estimated-cost-of-diesel-emissions-control-technology-to-meet-the-future-california-low-nox-standards-in-2024-and-2027/

158 According to the MY2023 Fuel Economy Guide (https://fueleconomy.gov/feg/download.shtml), the Ford F150 hybrid is 17%-20% more efficient in combined, unadjusted (2-cycle) fuel consumption than its non-hybrid counterpart with the same 3.5L engine; the Pacifica PHEV in charge sustaining mode is 31% more efficient than its equivalent non-hybrid counterpart (3.6L engine); Tundra HEV is 5.3%-10.3% more efficient than non-HEV equipped with Atkinson cycle engine; Ram 1500 mild hybrid is 13.3%-16% more efficient than its non-hybrid version

If EPA incorporated into its analysis additional cost curve classes (incorporating MD versions of advanced gasoline engines and hybrid powertrains), as well as additional options for lightweighting (high strength steel body and frame and/or percentage-based mass reduction), and PHEVs (see PHEV discussion earlier), then its MD analysis would be much more robust. [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

Just as many LD ICE technology improvements extend to MD ICE vehicles, all of the innovations and developments in BEV technologies and battery packs discussed earlier also apply to both LD and MD classes. As with LDV BEV modeling, incorporating lower battery costs, rightsized motors, and improved EV efficiency within OMEGA for MDV would reduce the cost of MD BEVs. In a 2022 study on relative costs of EV MDV, ICCT projected that MD pickups and vans of 300-mile range or less would reach price parity with their diesel counterparts within the timeframe of this proposal.159 Over the first five years of ownership, MD BEVs of 300-mile range or less reach total cost parity with both their diesel and gasoline counterparts before 2030. In other words, well within the timeframe of the proposal battery-electric MDVs are cheaper to purchase and own than non-plugin MDVs. [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

159 Mulholland, E. (2022). Cost of electric commercial vans and pickup trucks in the United States through 2040. ICCT. International Council on Clean Transportation. https://theicct.org/publication/cost-ev-vans-pickups-us-2040-jan22/

Discussed further below, it is difficult to assess specific areas to improve the analysis of the MD proposed standards due to minimal explanation of the technical inputs into the MD analysis, and how they differ from or are similar to the LD analysis. [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

Regarding some finer details of the proposed MD standards, ICCT supports EPA's proposal to phaseout ZEV multipliers in MY2026 instead of MY2027. The expected growth in MD BEV van share by MY2027 could result in overcompliance credits being available in MY2027, which can be used to offset undercompliance by vans and pickups which are still ICE-powered. Generally, ending multipliers earlier would improve the real-world climate benefits of the proposed rule. Additionally, recent ICCT research on the costs of BEV and PHEV MD vans and pickups suggests that within the timeframe of the proposed rule, plug-in MDVs will be cost-competitive with their gasoline or diesel counterparts either upfront or both upfront and during ownership.160 Consequently, such advanced technology vehicles will not need multipliers as a production incentive. Lastly, ICCT also supports the proposed 22,000 lbs limit to the GCWR input in the work factor equation, for the reasons EPA provided in its proposal (Preamble 29242). [EPA-HQ-OAR-2022-0829-0569, pp. 60-62]

160 Mulholland, E. (2022). Cost of electric commercial vans and pickup trucks in the United States through 2040. International Council on Clean Transportation. https://theicct.org/publication/cost-ev-vans-pickups-us-2040-jan22/

Fuel neutrality

ICCT strongly supports EPA's switch to a single set of standards curves for all MDVs, regardless of fuel type. [EPA-HQ-OAR-2022-0829-0569, pp. 62-64]

Organization: Rivian Automotive, LLC

EPA proposes meaningful improvements to the MDV standards that, as modeled, would result in BEV sales of 46 percent in the MDV segment by MY32—higher even than the requirements of the Advanced Clean Trucks ("ACT") rule. Rivian applauds this level of foresight. As our own products demonstrate, BEVs can readily meet the needs of Class 2b-3 fleets. Regulations can and should push the pace of emissions reduction via electrification in this category. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

However, closer examination of the proposal reveals uneven outcomes. While EPA rightly expects rapid and widespread electrification of vans—achieving 98 percent BEV penetration in MY32—pickups languish. In fact, EPA's modeling shows electrification backsliding in the pickup segment in the early years of the regulation. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

Projected BEV Penetrations29

MY: 2027; Vans: 35%; Pickups: 7%; Combined: 17%

MY: 2028; Vans: 55%; Pickups: 1%; Combined: 20%

MY: 2029; Vans: 73%; Pickups: 3%; Combined: 28%

MY: 2030; Vans: 92%; Pickups: 4%; Combined: 34%

MY: 2031; Vans: 97%; Pickups: 15%; Combined: 43%

MY: 2032; Vans: 98%; Pickups: 19%; Combined: 46%

[EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

Table 2. The penetration rate for BEVs declines in the pickup segment in the early years of the regulation. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

29 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 13-53.

EPA should take care not to inadvertently establish a regulatory framework that allows for “slow-walking” MD pickup electrification. The technology can meet the needs of many duty cycles, including those involving towing. But the rapid uptake of BEVs in the van fleet coupled with ATV multipliers in the early years of the program could inflate credit banks. As a consequence, van electrification could slow to some extent, and/or manufacturers could prolong the life of conventional MD pickups in their planning portfolios for longer than would otherwise be necessary. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

We recommend a two-track approach to ensuring the strongest possible standards for MDVs. First, EPA should evaluate the feasibility of even more stringent emissions requirements. As in the LD segment, EPA’s modeling appears to omit Rivian.30 Yet, Rivian’s order book includes 100,000 all-electric Class 2b-3 vans, several thousand of which already operate on U.S. roads. Similarly, the agency‘s analysis does not appear to account for the effects of California‘s Advanced Clean Fleets (“ACF”) regulation. Approximately 142,000 Class 2b-3 vehicles will be subject to the requirements of ACF in California alone and will be required to electrify over the coming years. CARB expects ACF to add significantly to the state‘s medium- and heavy-duty ZEV population above and beyond the impact of the companion ACT rule.31 The agency should assess to what extent ACF implementation and the addition of Rivian’s committed BEV van production to the national fleet could support a lower fleet average emissions target. [EPA-HQ-OAR-2022-0829-0653, pp. 10-12]

30 The agency reports projected GHG emission rates for five MDV manufacturers—Ford, General Motors, Mercedes- Benz, Nissan, and Stellantis, per U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 13-49.

31 California Air Resources Board, “Advanced Clean Fleets Regulation Summary,” May 17, 2023, available at www.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-summary.

Organization: RV Industry Association (RVIA)

RVIA strongly opposes EPA’s overreaching proposed rule for the reasons discussed below and requests the agency exclude motor homes from having to comply with the proposed medium- duty vehicle standards. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

In contradiction to this NPRM, the EPA has already proposed, in the Phase 3 GHG rule (see 88 FR 25996), to establish standards for motor homes that correctly acknowledge the reality that motor homes are not well-suited for electrification. Under the proposed Phase 3 GHG rules, the EPA would establish a CO2 standard of 226 g/mi for MY2027 and later motor homes. As discussed in the Phase 3 GHG NPRM, the agency has proposed this standard given the negative implications of electrifying the motor home chassis. To power a motor home, the batteries would take up space that is otherwise necessary for housing the various elements of a motor home. It would also add significant amounts of weight to the motor home making it no longer capable of being equipped with the components typically found in a motor home. It makes no difference whether a motor home falls under the MD/HD Phase 3 GHG rules or the LD/MD rules, the issues are the same. Standards which can only be met by battery-powered vehicles are not practicable for motor homes. EPA staff who authored the Phase 3 GHG rule have acknowledged this. In establishing standards for medium-duty vehicles within this rule, staff need to be consistent and exclude motor homes from standards that would force them to be electrified. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Motor homes are often operated in locations where there is no electricity. This is known as "boondocking." Frequently, motor homes will be operated for weeks at a time at such locations. When motor homes are operated in a boondocking scenario, there is no possibility of EV charging. Electrification simply does not work for this operating use case. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Unlike medium-duty vehicles that might be conveniently recharged overnight, motor homes are routinely driven 500 miles or more a day making it necessary to fully recharge mid-trip. A multi- hour charging event is simply not something the typical motor home driver would find acceptable. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Motor homes are typically a discretionary purchase by families who tend to be very cost sensitive. Large increases in price for a vehicle that is operated on average only 20 days per year and that travels on average only 4,000 miles will not be viewed favorably by potential buyers. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

The ability to recoup higher vehicle costs through refueling savings is minimal given motor homes are driven sparingly by their owners. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

If finalized, EPA's rule will severely limit the use and affordability of motor homes. As a result, it will severely hurt motor home manufacturers, dealers, their employees and their families. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Regarding the certification of medium-duty motor homes powered by internal combustion engines, as well as vehicles used to tow RVs, RVIA supports the concerns raised by the Alliance for Automotive Innovation in its comment letter. Such concerns include: [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA's proposed rule is neither reasonable nor achievable in the timeframe provided. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA's proposed rule is a de facto battery electric vehicle mandate. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA outstrips Biden administration's own 50 percent light-duty electrification executive order from 2021. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA underestimates battery costs and makes unrealistic battery electric vehicle (BEV) sales assumptions. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA makes no concurrent requirements to support the infrastructure and battery critical minerals for the required EVs or the drivers that must buy them. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Organization: Stellantis

Implicit / Explicit MDV GHG Standards are Infeasible

The EPA is proposing a very challenging set of regulatory changes for the medium-duty vehicles that are infeasible. This includes direct core stringency changes along with four other actions that further increase stringency: [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

- Core Stringency Changes – Proposes an overall 37% reduction in work factor based GHG standards for 2028-32MY [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

- Work Factor Cap – Introduces a 22,000 lbs. GCWR Cap on Work Factor that further increases the GHG stringency [redacted text.] [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

- Fuel Neutrality Changes – Saddles gas product with an additional 6.1% reduction by modifying current 27MY standards (i.e., pushing fuel neutrality) [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

Core Stringency - EPA overestimated MDV GHG Reduction [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

EPA has proposed a 37% GHG reduction from 2028MY to 2032MY. The overall stringency is largely driven by a very high assumed rate (98% in 2032MY) of electrification for cargo vans. Stellantis supports AAI's comments questioning this level of electrification for cargo vans, and requests that EPA model industry electrification for the cargo van segment as just meeting CARB's requirements each year in California and states that adopted the HD ZEV rule, and no more than half that rate in other states. GHG standards should be established from this more realistic electrification rate. [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

Work Factor Cap – Further increases MDV GHG Stringency (and Forces Criteria Engine Certification) [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

In the multi-pollutant draft rule, the agency proposes to limit the GCWR contribution to work factor calculations at 22,000 lb. starting in 2030MY. This is proposed due to an agency concern that higher GCWR values are not reflected in the inertia weight of the vehicle when tested for GHG. In the HD GHG Phase 1 rule7, work factor was developed as a standard due its very high correlation to CO2. The agency has not provided data to demonstrate this is no longer accurate. [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

7 Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57106 (Sept. 15, 2011).

[redacted text.] [EPA-HQ-OAR-2022-0829-0678, pp. 17-18]

Fuel Neutrality – EPA Punishes Gasoline ICE MDVs

EPA proposes new, fuel neutral GHG standards for medium-duty vehicles beginning in 2027MY for spark-ignition (gas) engines by reopening the Phase 2 GHG rule, resulting in a 6.1% jump in stringency. EPA explains that reopening of the current published rule is needed due to their anticipated levels of electrification of MDVs in 2027MY. [EPA-HQ-OAR-2022-0829-0678, p. 20]

Stellantis disagrees with this approach. [redacted text.] Respecting lead time needs, fuel neutrality should be phased in over several years (30/60/100), and not fully implemented until 2032MY. [EPA-HQ-OAR-2022-0829-0678, p. 20]

Stellantis recommends that EPA should:

GHG Standards

- Revise standards that align to achievable EV adoption rates that do not force an overly optimistic technology transition for the market and industry: [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Revise stringency adopting an ‘Alternative 3’ profile removing front-loading of EV adoption, modified to ensure 2030MY standards can be met with a 40-50% BEV+PHEV+FCEV combined technology penetration [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Include PHEV technology as a critical transition technology to a fully electrified future – without incorrect discounting – particularly in highly capable vehicle segments [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Treat trucks and SUVs fairly by including PHEV technology as an important bridge to a BEV future, and ensure year-over-year required improvements are the same as cars [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Fix incorrect MDV adjustments that mistakenly force medium-duty vehicles into light-duty standards and double stringency of high capability products arbitrarily [EPA-HQ-OAR-2022-0829-0678, p. 24]

- Include a provision that compliance with EPA’s GHG standards would constitute compliance with CAFE standards [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Winnebago Industries (Winnebago Industries)

While Winnebago Industries is very excited about the potential to introduce ZEVs such as the eRV2, there are significant practical technological and economic challenges to ZEV motorhomes in the motorhome Class B product category, which often align with EPA medium duty vehicles between 8,501 and 14,000 lbs. gross vehicle weight rating. The Proposed Rules do not adequately address this category of motorhomes, and if promulgated in its current state, these rules will create a serious risk of substantial negative impacts to this important Winnebago Industries group of products. [EPA-HQ-OAR-2022-0829-0636, p. 2]

For reference, the Proposed Rule will impact eighty-nine percent of the Winnebago brand motorhomes currently being produced. For the larger RV industry, based on calendar year 2022, the Proposed Rule would affect approximately fifty percent of the nearly 50,000 motorized RVs produced. This is very significant and impactful for the RV industry but, in comparison, is an extremely small portion of the millions of light- and medium-duty vehicles produced annually for the U.S. market. [EPA-HQ-OAR-2022-0829-0636, p. 2]

As EPA is aware, RVing throughout the United States often involves driving several hundred miles to reach a stationary location, frequently through very remote areas of the country including to "off-the grid" locations. In particular, Winnebago Industries' medium duty Class B camper vans have a highly unique use compared to other products in the same regulatory category, a reality which is not currently reflected in the Proposed Rule. This very unique vehicle usage presents great practical challenges to the RV/motorhome industry to transition to ZEV technologies with current and foreseeable future developments in battery and overall vehicle design as well as the obviously critical charging and energy supply infrastructures that are needed for long-distance and remote-area RV usage. [EPA-HQ-OAR-2022-0829-0636, pp. 2-3]

It is therefore of critical importance to Winnebago Industries (and the entire motorhome industry) that EPA provide sufficient flexibility in engine and vehicle certifications to allow Americans to continue to take part in one of our country's favorite recreational activities and avoid catastrophic impacts to our business and the RV industry. [EPA-HQ-OAR-2022-0829-0636, pp. 2-3]

Based on this impact, Winnebago Industries respectfully requests the Proposed Rule exclude motor homes from having to comply with the proposed medium-duty vehicle standards. Given the low volumes in question, there would be a negligible impact on overall vehicle emissions, allowing the RV industry to continue to serve the important roles in American business and way of life. [EPA-HQ-OAR-2022-0829-0636, pp. 2-3]

In the alternative, we have two further suggestions to address the impacts the Proposed Rule would have on Winnebago Industries. First, that EPA adopt a low volume exemption for the medium-duty vehicle category, specific to motor homes, that would allow Winnebago Industries and its certifying chassis suppliers to continue to produce internal combustion engine (ICE) vehicles while ZEV technologies for medium duty vehicles continues to evolve. The potential ramifications cannot be overstated: if Winnebago Industries' chassis suppliers determine that production of a low volume of chassis for motorhomes is no longer commercially beneficial or technically viable, Winnebago Industries and the entire RV industry could suffer tremendously. [EPA-HQ-OAR-2022-0829-0636, p. 3]

Secondly, we encourage EPA to adopt a form of optional custom chassis motorhome vehicle certification standard, similar to the provisions in the heavy-duty greenhouse gas (GHG) 2 and proposed GHG 3 rules. An optional certification standard for manufacturers of medium duty motorhome chassis – again, manufacturing at a very low volume compared to other vehicle types in the Proposed Rule – would permit Winnebago Industries' chassis suppliers to meet our limited needs. [EPA-HQ-OAR-2022-0829-0636, p. 3]

EPA Summary and Response:

Summary

EPA appreciates the comments received regarding the MDV Work Factor (WF) Curves. EPA received a range of comments and recommendations that are summarized below.

ACEEE and ICCT both commented that the Agency's analysis incorporated too few BEV pickups and that increased levels of electrification of MDV. ACEEE, ICCT, and EPHO all supported more stringent MDV GHG standards than proposed. ACEEE and ICCT provided comparisons of MDV pickup truck electrification to light-duty pickup truck electrification as justification for increased electrification of MDV pickups, including MDV applications requiring high towing capacity. ACEE commented that the Heavy-duty Phase 3 NPRM had higher percentages of BEV in heavy-duty categories of Class 4 and above than included within the analysis of MDV for the Light- and Medium-duty Multipollutant NPRM. ACEEE also commented that both PHEVs and FCEVs should be incorporated into EPA's MDV analysis. ICCT commented that PEV MDVs would be cost competitive with ICE MDVs within the timeframe of this rulemaking. ICCT further supported phasing out ZEV multipliers in 2026 instead of 2027. EPHO commented that additional compression ignition technologies could be applied within the Agency's analysis and provided examples of specific Class 8 long-haul trucks within the DOE SuperTruck Program achieving 55% brake thermal efficiency. EPHO also provided examples of recent, more efficient versions of the Ford 6.7L and GM 6.6L MDV compression ignition engines. Similarly, EPHO commented that additional spark ignition engine technologies could be applied within the Agency's analysis, citing recently developed Ford 7.3L and GM MDV spark ignition engines. EPHO also commented that 48V MHEV would also be applicable to MDV applications.

Within its comments on MDV GHG, Ford neither specifically supported nor opposed the stringency of the GHG standards. Ford's MDV GHG comments focused specifically on opposition to the proposed changes to the work factor (WF) calculation that capped GCWR within the WF calculation to no greater than 22,000 pounds. Ford suggested that the GHG standards could increase linearly up to a certain WF value and then standards could flatten above such a WF value and that such an approach would adequately address the Agency's concerns as stated in the proposal.

Winnebago's comments asserted that the proposed regulations, if unchanged would pose a serious risk to Winnebago's motorhome products. Winnebago was specifically concerned regarding its Class B motorhome products and in general described that there would be practical challenges for motorhomes to transition to ZEV technologies "…with current and foreseeable future developments in battery and overall vehicle design as well as the obviously critical charging and energy supply infrastructures that are needed for long-distance and remote-area RV usage." Winnebago asked the Agency consider two alternatives to the proposed GHG standards specifically for MDV motorhome applications:

1. Adoption of a low volume exemption from GHG standards specifically for MDV motorhomes
2. Adoption of an optional custom chassis motorhome vehicle certification standard, similar to the provisions in the Heavy-Duty Greenhouse Gas Phase 2 Final Rule and the Heavy-Duty Greenhouse Gas Phase 3 GHG Proposed Rule

RVIA voiced strong opposition to the proposed GHG standards. They asserted that there were specific exceptions for motorhomes both within the Heavy-Duty Phase 3 GHG Proposed Rule and within the previous Heavy-Duty Phase 2 GHG standards. They also asserted that the proposed MDV standards could only be met by battery electric vehicles and thus represented a BEV mandate for MDV. RVIA stated that battery electric drivetrains are not practical for motor homes. RVIA further asserted that the standards would not be achievable within the rulemaking timeframe. They also stated that there would be no EV charging capability during RV boondocking (off-grid camping). RVIA asked for motorhomes to be excluded from GHG emissions standards.

Both the Alliance and Stellantis opposed the GHG standards for MDV, stating that were too stringent and with Stellantis further characterizing the standards as "infeasible". The Alliance and Stellantis specifically cited a 37% reduction in GHG from MY 2028 through MY 2032 as too stringent, and that the assumption of 98% electrification of van applications in the proposal was too high. The Alliance referred to an Administration electrification "stretch goal" for MDV of 40 to 50% vs. what the Alliance estimated to be 92% electrification of MDV. Both the Alliance and Stellantis opposed proposed changes to the WF calculation that capped GCWR within the WF calculation to no greater than 22,000 pounds.

The Alliance requested that the Agency "…consider the extent to which pickups may "weight out" to Class 4, if equipped with battery electric vehicle technology…" and to take into consideration vehicles shifting to different regulatory weight classes when setting GHG standards and/or offering GHG compliance flexibilities.

Stellantis requested that van electrification not exceed that required for CARB HD ZEV compliance for vans. Stellantis also requested that the GHG standards be revised to "achievable EV adoption rates that do not force an overly optimistic technology transition for the market and industry". Stellantis stated that the move to fuel neutral standards for MDV GHG in 2027 "punishes ICE gasoline" and that such neutrality should be phased in at a rate of 30%, 60%, and 100%, with the 100% not occuring until 2032. Stellantis asked the Agency to include PHEV technology within its analysis. Stellantis requested that EPA include provisions such that compliance with Federal GHG standards for MDV would constitute simultaneous compliance with Federal Corporate Average Fuel Economy standards for MDV.

Response:

The Agency does not agree with ACEEE and ICCT that GHG standards and levels of electrification, and other technologies applicable light-duty pickup trucks are necessarily appropriate for MDV pickup trucks. Such an approach does not take into full consideration the different use cases for MDV trucks compared to light-duty pickups, in particular substantially higher tow capability which, in the case of some diesel MDV pickups, includes GCWR as high as 45,000 pounds, approximately twice that of the highest light-duty truck GCWR. The adjustments applied by ICCT to MDV pickup trucks to allow comparison with light-duty pickup trucks do not fully account for differences between testing at loaded vehicle weight for light-duty trucks versus adjusted loaded vehicle weight for MDV. The adjustment applied by ICCT also does not account at all for other significant impacts on vehicle road loads for MDV, such as increased aerodynamic drag from the increased frontal area due to both powertrain cooling requirements and higher load suspension requirements; increased road load from tire friction and tire aerodynamic drag, especially for dual-rear-wheel applications; increased frictional and rotational losses from heavier-duty axle and differential components; etc. Vehicle dynamometer testing, PEMS testing, or use of full vehicle energy simulations using models such as the EPA ALPHA model or using commercial simulation packages such as Gamma Technologies GT-SUITE™ would allow a valid estimate comparing similar technologies applied to both light-duty and MDV applications and their resulting impacts on either footprint-based or WF-based GHG standards; however none of these approaches appear to have been used within ICCT's analysis.

With respect to ACEEE's comparison of MDV electrification to the analysis supporting the Heavy-duty Phase 3 proposal, similar to light-duty to MDV comparisons, the use cases for heavy-duty applications are also different from MDV. The higher percentages for BEVs in the heavy-duty proposal were for a combination of vocational and long-haul applications, and there are also considerable differences between electrification of vocational heavy-duty compared to that of long-haul heavy-duty applications. Vocational applications in MDV are largely represented by incomplete MDV, which make up less than 5% of MDV sales. Towing capability and adaptability to a variety of uses are key considerations within the design of MDV pickup trucks, and the required utility for MDV differs from that of both lighter and heavier weight categories, and also differs within MDV between van and pickup truck applications. Our compliance modeling for the final rule shows a PEV total of 41% of total MDV sales in 2032, of which more than three-fourths of the PEVs are BEVs (See RIA Chapter 12.2.3).

With regards to EPHO's comments that more advanced technology should be considered within EPA's analysis, many updates to the MDV technologies available within OMEGA are consistent with EPHO's recommendations. For example, the Ford 7.3L MDV spark ignition referred to by EPHO is used within EPA's updated ALPHA and OMEGA analyses for the final rule (see RIA Chapter 3.5.1). A more recent and higher efficiency engine design than the two MDV compression ignition engines cited by EPHO was used to represent future MDV compression ignition engines. The agency also included more advanced engine technologies in its analysis for the final rule, going beyond EPHO's recommendations. For example, we included advanced spark ignition Miller-cycle dedicated hybrid engines and downsized compression ignition dedicated hybrid engines within the OMEGA analysis of MDV PHEVs for the final rule.

With respect to comments from ACEEE and Stellantis regarding the Agency including PHEVs within its analysis of MDV GHG emissions, EPA completed a detailed modeling study that included modeling of an MDV PHEV with considerable all-electric range capability and very high towing capability, referred to as a range extended electric truck or REET (Bhattacharjya et al. 2024). The study demonstrated the potential for an approximately 80% reduction in CO_2 emissions over the regulatory drive cycles for a MDV REET pickup with a maximum GCWR of approximately 30,000 pounds and without compromising towing range relative to ICE MD while in charge-sustaining operation. Results from the study were incorporated into OMEGA compliance modeling of MDV for the final rule. Our OMEGA compliance modeling for the final rule shows that PHEVs may play a larger role than BEVs with respect to MDV pickup truck GHG compliance. For example, OMEGA results for MY 2032 estimated MDV pickup truck sales at 11% PHEV and 10% BEV (See RIA Chapter 12.2.3).

Bhattacharjya, S. et al. (2024). Heavy-light-duty and Medium-duty Range-extended Electric Truck Study – Final Report. Docket EPA-HQ-OAR-2022-0829.

The Agency has not finalized a ZEV multiplier phase out in 2026 as recommended by ICCT. Within the final rule, the BEV, PHEV, and FCEV multipliers are removed for MY 2027. The rate of MDV electrification, particularly with respect to anticipated growth of electric van sales used for last mile delivery applications, is consistent with a MY 2027 elimination of multiplier.

The Agency agrees with Ford that eliminating the cap on GCWR within the WF calculation and instead applying a flattening of standards above a WF threshold would still address the Agency's concerns. This approach would also eliminate the impacts on MDPV work factors and the MDPV definition as described in the comments from Stellantis and the Alliance. We estimated that the GCWR of 22,000 pounds from the proposed WF calculation change would be approximately equivalent to an MDV WF of 5,500 pounds and implemented a change in the MDV GHG compliance curve coefficients such that flat standards apply above a WF of 5,500 pounds beginning in MY 2030. The Agency also finalized a more gradual change to the impact of WF on the standards than that reflected by the WF calculation change in the proposal. The flattening of the standards applies at WF ≥ 8,000 pounds in 2028 and WF ≥ 6,800 pounds in 2029. This approach is analogous that the Agency has taken with respect to the gradual phase-in of flattening within the light-duty foot-print-based curves. For more information regarding the final WF-based MDV GHG compliance curves and coefficients, please see preamble Section III.C.3.

Regarding the two specific recommendations from Stellantis to "Fix incorrect MDV adjustments that mistakenly force medium-duty vehicles into light-duty standards and double stringency of high capability products arbitrarily and "include a provision that compliance with EPA's GHG standards would constitute compliance with CAFE standards," EPA responds to the former in Section 3.1.1 of this document. Regarding the latter recommendation about CAFE standards, EPA does not have the statutory authority to implement this type of declaration.

RVIA's and Winnebago's comments regarding the proposed 2027 and later MDV GHG standards, potential impacts on MDV Class B and Class C[365] motorhomes, the manner in which Heavy-Duty Phase 2 has been implemented for motorhomes, and the provisions regarding motorhomes in the Heavy-duty Phase 3 proposal incorrectly conflate previous and current flexibilities available for engine-certified applications which are not, and have not been, applicable to chassis-certified applications. For example, 2022 through 2024 model MDV Class B and Class C motorhomes have certificates of conformity as either complete MDV vans (in the case of Class B motorhomes) and thus are subject to GHG standards under 40 CFR § 86.1819 or are incomplete vehicles (in the case of Class C motorhomes) that are certified as "cab-complete" vehicles using the cab-complete and sister-vehicle provisions of 40 CFR § 86.1819-14 (j) (2). There are currently motorhome-specific GHG standards for motorhomes subject to engine certification. These provisions were discussed by RVIA and Winnebago within the context of Class 2b and Class 3 vehicles under the Heavy-duty Phase 2 GHG and within the context of MDV subject to 2027 and later GHG standards. The Phase 2 GHG standards applicable to motorhomes are summarized in Table 5 of 40 CFR § 1037.105. Those specific standards are only applicable to heavy-duty vehicles at or below 14,000 pounds GVWR that are excluded from the standards in 40 CFR 86.1819. Since MDV (or previously, Class 2b and Class 3) motorhomes are currently certified as either complete vehicles or as cab-complete vehicles, they must comply with GHG standards under 40 CFR § 86.1819 and are specifically excluded from GHG

[365] Note that Class B and Class C are industry designations for motorhomes and are not regulatory terms.

compliance under 40 CFR § 1037 and thus the motorhome-specific standards under 40 CFR § 1037.105 have not been applicable to MDV motorhomes under the Heavy-Duty Phase 2 program (see 40 CFR § 86.1819, 40 CFR § 1037.5 and 40 CFR § 1037.105). Also, the specific applicability under 40 CFR § 86.1819 and 40 CFR § 1037.5 was not changed within either the 2027 and later Light- and Medium-duty Multipollutant NPRM, the Heavy-duty Phase 3 GHG NPRM, nor the Light- and Medium-duty Multipollutant Final Rule. Since we did not propose changes to applicability for the MDV and/or Class 2b and Class 3 GHG standards, and since we did not ask for comment on any such changes to applicability, we consider such changes to applicability to be out of scope for this final rule.

Both RVIA and Winnebago provide details regarding the challenges of applying BEV technology to MDV motorhomes. The GHG standards are performance-based standards that do not require specific technologies for compliance. Our OMEGA compliance modeling for the final rule estimates that approximately 32% of MDVs sold in MY 2032 are projected to be BEV and 9% are projected to be PHEV, with remaining 59% being conventional ICE vehicles. If we look solely at vans, OMEGA projects 75% of vans to be BEV, 5% to be PHEV, and the remaining 20% to be conventional ICE. For the final rule, we also analyzed a "No Additional BEVs" sensitivity in OMEGA that relied primarily on PHEVs for GHG compliance and assumed no MDV BEVs at all. For that sensitivity, OMEGA projects 50% of total MDV sales as PHEV. See preamble section IV.G.2. Of those, 63% of MDV pickup sales and 25% van sales were projected to be PHEV, and the remaining vehicles were conventional ICE.

According to RVIA published data (RVIA, 2020), Class B motorhome sales for MY2020 totaled 7,222 vehicles, which represents 0.82% of total MDV sales in 2020 or 2% of MDV van sales in 2020. Similarly, Class C motorhome sales for MY2020 totaled 21,685, which represents 2.5% of total MDV sales in 2020 or 7% of total MDV van sales in 2020. These percentages are very small when compared either to total MDV sales or MDV van sales, and thus there are many different compliance scenarios under which manufacturers of MDVs can provide either complete vans or cab-complete vehicles to the RV industry for completion into motorhomes that are entirely based upon either:

- conventional ICE technologies
- a combination of ICE and PHEV technologies -or -
- a combination of ICE, PHEV and BEV

RVIA (2020). 2020 RV Shipments Surpass 2019 By 6% With December Shipments Best on Record – Market Report, December 2020. https://www.rvia.org/news-insights/2020-rv-shipments-surpass-2019-6-december-shipments-best-record

With respect to Winnebago's request that the Agency consider two MDV GHG alternatives for the final rule, namely, a low volume exemption specifically for MDV motorhomes or adopting an optional custom chassis motorhome vehicle certification standard, either alternative would be a significant departure from either the proposed rule or from the manner in which chassis-certified MDV have been treated in previous GHG regulations. Motorhome manufacturers do not certify these products to MDV GHG standards - they purchase complete and cab-complete vans from manufacturers who hold certificates of conformity. The van designs upon which MDV motorhomes are based on not small volume, despite the relatively small volume of the motorhomes that the MDV vans are converted to. Manufacturers will continue to produce products suitable for RV use, including complete and cab-complete PHEV and conventional ICE vans in sufficient quantity to meet demand for RV use while still complying with the MDV GHG standards that we have finalized. Neither Winnebago nor RVIA provided any information to substantiate that MDV manufacturers intend to cease sales of future ICE and potential future PHEV vans or cab-complete vans to RV manufacturers as MDV manufacturers comply with future GHG standards. Given the changes EPA has made in the stringency of the final MDV standards in the early years of the program, which provide additional lead time for manufacturers to develop and apply technologies compared to the proposal, and given the importance of the air pollutant emissions reductions for public health and welfare, we believe it is not appropriate to provide additional exemptions and flexibilities.–

3.3 - Feasibility

EPA appreciates the comments received on the topic of the feasibility of the final GHG standards. Many of the more detailed comments that are focused on specific aspects of feasibility are addressed in other sections of the preamble and RTC. The discussion and responses here are related to feasibility of the GHG standards in the broad sense and the appropriateness of the level of standards that EPA is setting (RTC Section 3.3.1). Also addressed are the specific topic of lead time needed to reach the final level of stringency in MY 2032 (RTC Section 3.3.2) and the feasibility of vehicle technologies for reducing GHG emissions (RTC Section 3.3.3). Comments related to the feasibility of the PEV supply chain and critical materials are addressed in RTC Chapter 15. Comments related to the feasibility of electricity generation and charging infrastructure needed to support greater numbers of PEVs are addressed in RTC Chapters 17 and 18. Comments related to the consumer markets for light- and medium-duty vehicles are addressed in RTC Chapters 13 and 14.

3.3.1 - Levels/stringency of the standards

Comments by Organizations

Organization: Alliance for Automotive Innovation

GHG Standards

Leap-frogs Biden administration’s own 50% executive order

The stringency of the NPRM proposed standards increases faster than at any time in history. In fact, by assuming BEVs alone will make up 60% of the new vehicles sold in 2030 and 67% of new vehicles just two years later, the proposed requirements leap-frog even President Biden’s ambitious 2030 target of 50%, which included BEVs, fuel cell electric vehicles (FCEVs), and plug- in hybrid electric vehicles (PHEVs) by 2030. The 60% BEV-only proposal also goes beyond the same goal of 50% electric vehicles by 2030 (which again included BEVs, PHEVs, and FCEVs) described in The U.S. National Blueprint for Transportation Decarbonization, authored by four cabinet level agencies including EPA and issued in January 2023 – just a few months before this proposal was published. [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

Recommendation

GHG – Better align to President Biden's 2030 electrification goal

To address the concerns identified above, Auto Innovators and our members recommend EPA reevaluate the GHG standards and more closely align with President Biden's 2030 goal. Thus, we recommend adopting requirements for 40 to 50% BEV, PHEV, and FCEVs in 2030 with continued increases through 2032. These standards should be coupled with and connected to regularly measured infrastructure deployment and battery critical mineral supply levels available during this rule. [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

A. Major Concerns with the Proposed GHG Standards

1. Overall Stringency / BEV Market Share Required

EPA has proposed greenhouse gas standards that it estimates will require approximately 60% BEV sales by MY 2030 and 67% BEV sales by 2032.150 As explained in Section I (EV Feasibility), the conditions which would enable such a high level of BEV market share are not present today and are highly uncertain in the timeframe considered by this rulemaking. Some manufacturers have already started to build MY 2024 vehicles,151 and establishing the necessary infrastructure, supply chains, manufacturing capacity, and customer acceptance in less than six years (in the case of MY 2030) or eight years (in the case of MY 2032) is far from certain. [EPA-HQ-OAR-2022-0829-0701, p. 89]

150 NPRM at 29329.

151 See FuelEconomy.gov.

B. Discussion on Alternatives Considered by EPA

1. Alternative 1 (More Stringent)

We support EPA's conclusion that "Alternative 1 would not be appropriate because of uncertainties concerning the cost and feasibility of such standards."170 Alternative 1 would lower GHG standards by approximately 10 g/mile relative to the proposed standards, bringing forward proposed requirements by approximately one to two years. This alternative would further exacerbate the concerns, and further stress the need for market feasibility, that Auto Innovators already has with the proposed standards. [EPA-HQ-OAR-2022-0829-0701, pp. 93-94]

170 NPRM at 29347.

2. Alternative 2 (Less Stringent)

Although Alternative 2 is relatively easier than the proposed standards, it still does not address Auto Innovators' concerns. In particular, Alternative 2 is estimated to require greater than 50% BEV market share by 2030, albeit with somewhat less of a requirement in 2032. [EPA-HQ-OAR-2022-0829-0701, pp. 93-94]

3. Alternative 3 (More Consistent Stringency Increases MYs 2027-2029)

Of the alternatives presented by EPA, Alternative 3 best addresses our concerns with the front- loading of the proposed standards while still achieving 97% of the estimated CO_2 emission reductions.171 However, MY 2030 (which can begin as early as calendar year 2029) BEV penetration rates estimated by EPA under Alternative 3 remain in excess of 50%, which is a cause for concern, without any inclusion of the role of PHEVs. Post-2030 BEV penetration is also a potential concern, but at least provides a couple of more years of lead-time to develop the necessary supply chains, manufacturing capacity, market, and supporting fueling infrastructure. [EPA-HQ-OAR-2022-0829-0701, pp. 93-94]

171 7,300 MMT total CO_2 emissions reduction through 2055 under the proposed standards (NPRM at 29348, Table135) vs. 7,100 MMT total CO_2 emissions reduction through 2055 under Alternative 3 (NPRM at 29350, Table 138).

C. Auto Innovators Recommendation

As a logical outgrowth from EPA's Alternative 2 and 3 and The U.S. National Blueprint for Transportation Decarbonization, Auto Innovators recommends the following approach. [EPA-HQ-OAR-2022-0829-0701, p 71]

1.Adjust the linear approach in Alternative 3 from MY 2026 to MY 2030 to arrive at Auto Innovators' goal of achieving 40-50% EV market share (inclusive of BEVs, PHEVs, and FCEVs) in 2030 and The U.S. National Blueprint for Transportation Decarbonization.172 [EPA-HQ-OAR-2022-0829-0701, p. 71]

172 Note, MY 2031 can start as early as January 2, 2030.

2. From MY 2030 to MY 2032 use a separate linear reduction to arrive at final performance-based standards that are supported by reasonably certain projections of EV supply chain, manufacturing, market, and infrastructure in that timeframe. (Please see our additional comments on EV feasibility in Section I, comments on EPA's other alternatives in Section III.B, and comments on a conceptual adjustment mechanism in Section II.) [EPA-HQ-OAR-2022-0829-0701, p. 71]

3. Performance-based standards should assume de minimis improvements in the overall efficiency of the average internal combustion engine vehicle, allowing manufacturers to focus investments on the design and production of EVs, and improving ICE vehicles only where it makes sense to do so. (Please see our additional comments on improvements to internal combustion engine vehicles, below.) [EPA-HQ-OAR-2022-0829-0701, p. 71]

Auto Innovators' proposed alternative outlined above represents a logical outgrowth of the Proposed Rule. "Agencies, are free — indeed, they are encouraged — to modify proposed rules as a result of the comments they receive," as long as "interested parties 'should have anticipated' that the change was possible, and thus reasonably should have filed their comments on the subject during the notice-and-comment period."173 Indeed, stakeholder comments proposing an idea may themselves indicate that an outcome was the logical outgrowth of the agency's initial proposal.174 [EPA-HQ-OAR-2022-0829-0701, pp. 71-72]

173 Ne. Md. Waste Disposal Auth. V. E.P.A., 358 F.3d 936, 951-52 (D.C. Cir. 2004) (internal quotation omitted).

174 See, e.g., id. At 952 (noting that "[n]numerous commenters" raised an issue); Nat. Res. Defense Council, Inc. v. Thomas, 838 F.2d 1224, 1243 (D.C. Cir. 1988) (noting that "public comments raised the possibility" of a particular approach).

In this case, our proposal naturally flows from the objectives, approach, and broad range of alternatives identified in the Proposed Rule and could have reasonably been anticipated by interested parties. To the extent EPA has concerns as to whether adopting this proposal would be a logical outgrowth of the Proposed Rule, we encourage it to take steps that would explicitly identify the proposal as a possibility for comment by interested parties.175 [EPA-HQ-OAR-2022-0829-0701, p. 72]

> 175 See, e.g., Thomas, 838 F.2d at 1243 (endorsing a procedure in which EPA issued a public notice advising of the possibility of a new approach suggested by a comment on the proposed rule, affording interested parties the opportunity to respond prior to promulgation of the final rule).

Organization: American Honda Motor Co., Inc.

In our view, neither the proposed standards nor any of the three alternatives adequately address the inherent market uncertainties and potential for noncompliance that exists within the agency's ambitious timeline. Rather, the proposal sets the stage for what may be a profoundly disruptive and costly set of noncompliance obligations across the industry. We respectfully urge the agency to finalize a more reasonable emissions reduction trajectory, along with a broader array of compliance flexibilities. We believe that standards in line with Honda's publicly stated electrification targets are representative of a challenging but workable requirement. [EPA-HQ-OAR-2022-0829-0652, pp. 32-33]

Organization: American Lung Association (ALA) et al.

Fortunately, the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA) provide for hundreds of billions in investment in cleaner vehicles, energy and infrastructure to accelerate the transition away from combustion to protect health across the nation. Further, seven states have so far adopted the Advanced Clean Cars II program (ACCII) that sets a 100 percent sales requirement by 2035. EPA's stronger standards through Model Year 2026 were strengthened to deliver a critical ramp to greater zero-emission technology pathways. Given these developments and the rapid growth in the zero-emission vehicle market, we view the proposed standards and stronger Alternative 1 as strong starting points for approving stringent standards in 2023. [EPA-HQ-OAR-2022-0829-0745, p. 2]

Therefore, we recommend that EPA set multi-pollutant passenger vehicle standards for 2027 and later years that:

Build upon the more stringent Alternative 1 Greenhouse Gas Proposal
EPA's proposal includes a more stringent Alternative 1 that should be strengthened and adopted as the final rule. Alternative 1 provides for a more stringent standard of approximately 10 mg/mile of greater GHG emission reductions. This is a good start that should be strengthened further to achieve greater reductions in the later years of the program beyond 2030. The final rule should be based upon increasingly tighter standards beyond the 2030 timeframe to exceed the benefits of the proposed rule, but to also accelerate emission reductions in the later years of the rule. As noted above, a growing number of states have adopted the Advanced Clean Cars II program to establish a 100 percent zero-emission vehicle sales standard for model year 2035. EPA's proposal estimates that one technology pathway for compliance could see battery electric vehicles representing nearly 70 percent of new vehicle sales by 2032. Setting the Alternative 1 GHG standard in line with the states' pathway to 100 percent sales in 2035 would increase the benefits of the standard. [EPA-HQ-OAR-2022-0829-0745, p. 2]

Health Benefits of Zero-Emission Technologies

EPA's proposals note the significant clean air benefits of the proposed rule and illustrate the increased benefits of the stronger Alternative 1. The American Lung Association's recent "Driving to Clean Air" report highlighted that approaching a 100 percent zero-emission sales scenario by 2035, along with a non-combustion electricity generation grid, could result in major health benefits. The report found that the cumulative health benefits could reach $978 billion by 2050, including nearly 90,000 premature deaths avoided, over 2 million asthma attacks avoided and more than 10 million lost workdays avoided due to cleaner air.4 EPA's analysis shows that a potential compliance pathway for the proposal could result in nearly 70 percent of new vehicle sales being battery electric vehicles by 2032. We call on EPA to continue the trajectory of a stronger Alternative 1 to include more stringent GHG standards through 2035. [EPA-HQ-OAR-2022-0829-0745, p. 3]

4 American Lung Association. "Driving to Clean Air." June 2023. https://www.lung.org/clean-air/electric-vehicle-report/driving-to-clean-air.

Organization: Arconic Corporation (ARCO)

6. EPA is soliciting comment on the proposed standards as well as Alternatives 1, 2, and 3. EPA anticipates that the appropriate choice of final standards lies within this range. We understand the suggested three alternatives to the proposed standards to be:

- Alternative 1 is more stringent than the proposal across the MY 2027-2032 time period-on average 10 g/mile lower than the proposed targets. [EPA-HQ-OAR-2022-0829-0741, pp. 3-4]

- Alternative 2 is less stringent than the proposal across the MY 2027-2032 time period-on average 10 g/mile higher than the proposed targets. [EPA-HQ-OAR-2022-0829-0741, pp. 3-4]

- Alternative 3 achieves the same stringency as the proposed standards in MY 2032 but provides for a more consistent rate of stringency increase for MY 2027-2031. This has the effect of less stringent year-over-year increases in the early years of the program. [EPA-HQ-OAR-2022-0829-0741, pp. 3-4]

Arconic suggests revising the definition of emissions for BEVs to include the upstream power generation emissions. Revising this definition would likely require some modification to the yearly emissions targets. With targets modified in this manner, Arconic does not have a position on the trajectory (i.e., the levels of year-over-year stringency rates) in this rule making. [EPA-HQ-OAR-2022-0829-0741, pp. 3-4]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

CARB finds that a more stringent set of standards, and thus certainly the proposed standards as well, are technically feasible and cost-effective and recommends that U.S. EPA incorporate CARB's recommendations and adopt the most stringent standards feasible. [EPA-HQ-OAR-2022-0829-0780, p. 67]

Organization: California Attorney General's Office, et al.

Our States and Cities1 hereby submit these comments in response to the United States Environmental Protection Agency's ("EPA") notice of proposed rulemaking titled "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." 88 Fed. Reg. 29,184 (May 5, 2023) ("Proposal"). We strongly support increasing the stringency of EPA's greenhouse gas ("GHG") and criteria pollutant emissions standards, and we urge EPA to adopt standards more stringent than the proposed standards. [EPA-HQ-OAR-2022-0829-0746, p. 1]

> 1 The States of California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Maine, Maryland, Minnesota, New Jersey, New Mexico, New York, North Carolina, Oregon, Rhode Island, Vermont, Washington, and Wisconsin; the Commonwealths of Massachusetts and Pennsylvania; the District of Columbia; the City and County of Denver; and the Cities of Chicago, Los Angeles, New York, and Oakland.

EPA has long recognized that GHG and criteria pollutant emissions from new motor vehicles and new motor vehicle engines endanger public health and welfare, and, under Section 202(a) of the Clean Air Act, this recognition triggers a mandatory duty to reduce such emissions. The technologies necessary to reduce GHGs and criteria pollutants from new motor vehicles already exist and are widely in use in the market today. The costs of these technologies are reasonable and declining, and the application of these technologies generally results in consumers saving money over the life of a new vehicle. Moreover, the societal benefits of more stringent standards significantly exceed the costs of those standards. EPA thus has every reason to adopt stronger emissions standards to satisfy its statutory mandate to reduce emissions of harmful air pollution. [EPA-HQ-OAR-2022-0829-0746, p. 1]

In the Proposal, EPA set forth four alternative sets of GHG standards: the proposed standards, a more stringent alternative (Alternative 1), a less stringent alternative (Alternative 2), and an alternative similar in stringency to the proposed standards on a different timeline (Alternative 3). [EPA-HQ-OAR-2022-0829-0746, pp. 1-2]

We believe that the record before the agency supports the adoption of standards more stringent than the proposed standards and accordingly set forth potential improvements to EPA's models and compliance program below. As EPA recognizes in the Proposal, the necessary emission control technologies have already been developed and brought to market, and automakers have been planning for substantially more stringent standards in large portions of the global market. In addition, the crediting flexibilities already built into the program (which EPA has not reopened)—including the ability to trade, carry-forward, and carry-back credits—place automakers in even better positions to craft strategies to comply with more stringent standards. [EPA-HQ-OAR-2022-0829-0746, pp. 1-2]

As discussed below, the need for more stringent standards is critical, and the industry's ability to meet stronger standards and to cost-effectively reduce dangerous pollution is clear. We urge EPA to adopt standards more stringent than the proposed standards. [EPA-HQ-OAR-2022-0829-0746, pp. 1-2]DISCUSSION

EPA's proposed standards carry out the purpose and requirements of Section 202(a) of the Clean Air Act. See 42 U.S.C. § 7521(a). The proposed standards would reduce current and impending threats to public health and welfare and provide manufacturers sufficient lead time to apply the requisite emission control technologies, all at reasonable costs of compliance. However, given that emissions reductions beyond the proposed standards are feasible and cost-effective, our States and Cities urge EPA to adopt standards more stringent than the proposed standards. [EPA-HQ-OAR-2022-0829-0746, p. 27]

Standards more stringent than EPA's proposed standards would comport with its statutory mandate in Section 202(a) and further the statutory objective by reducing the threats from vehicle pollution to public health and welfare. EPA projects that the proposed standards will reduce GHG emissions by more than 7.3 billion metric tons of carbon dioxide (CO2), 120,000 metric tons of methane (CH4), and 130,000 metric tons of nitrous oxide (N2O) through 2055, in addition to criteria pollutant reductions of 44,000 tons per year of nitrogen oxides (NOx), 9,800 tons per year of fine particulate matter (PM2.5), 200,000 tons per year of non-methane organic gases (NMOG), 2,800 tons per year of sulfur oxides (Sox), and 1.8 million tons per year of carbon monoxide (CO) by 2055. 88 Fed. Reg. at 29,348 (Table 135); id. At 29,351 (Table 139). More emission reductions are feasible. See CARB Comment at 17-22. Given EPA's description of these emissions reductions as an "essential factor" in its determination of the appropriate level of the proposed standards, id. At 29,344, and the primacy Congress placed on addressing pollution's danger to public health and welfare in Section 202(a), 42 U.S.C. § 7521(a)(1), our States and Cities urge EPA to increase the stringency of its standards beyond those proposed. [EPA-HQ-OAR-2022-0829-0746, p. 28]

Our States and Cities agree with EPA's recent conclusion that, in light of the "increased urgency of the climate crisis," the United States needs "to achieve far deeper GHG reductions from the light-duty sector in future years beyond the compliance timeframe for the [2023-26] standards." 86 Fed. Reg. 74,434, 74,498 (Dec. 30, 2021). EPA's proposed standards are an important step toward those deeper reductions, but it can go further. Standards that effectively require the production and deployment of lower-emitting and zero-emission vehicles will promote longer- term, deeper emissions reductions critical to avoiding catastrophic impacts of climate change. [EPA-HQ-OAR-2022-0829-0746, p. 29]

C. The Benefits of the Proposed Standards Significantly Outweigh their Costs

Our States and Cities agree with EPA's practice to "set standards to achieve improved air quality consistent with [S]ection 202, and not to rely on cost-benefit calculations, with their uncertainties and limitations, as identifying the appropriate standards." 88 Fed. Reg. at 29,198. Likewise, we agree that EPA's cost-benefit analysis "reinforces [EPA's] view that the proposed standards are appropriate," id., and we believe it also supports adoption of standards more stringent than the proposed standards. To promote transparency and clarity around the proposed standards, we add a few comments pertinent to EPA's cost-benefit analysis below. [EPA-HQ-OAR-2022-0829-0746, p. 36]

Organization: CALSTART

2. Adopt the strongest possible option, providing stringency which is at least as strong as Alternative 1. [EPA-HQ-OAR-2022-0829-0618, p. 2]

At a high level, strong standards maintain the recent positive momentum in the light duty sector and provide a regulatory framework that complements the historic incentives of the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) and is consistent with the current market. We applaud EPA staff for its ambitious and highly necessary Phase 2 stringency and encourage EPA to adopt a Phase 3 at least as stringent as Alternative 1. Below, we describe our justification for Recommendation 1 (closing the footprint loophole) and then discuss the drivers, barriers, and possible solutions to Recommendations 2-4 (adopting standards at least as stringent as Alternative 1, and extending the standards through 2035, and sending clear market signals). [EPA-HQ-OAR-2022-0829-0618, p. 2]

1. Ecosystem-Supportive Activities

This regulation represents a historic step in transitioning the automotive industry toward 100% sales of ZEVs. The proposed rule works in concert with IIJA, IRA, ACC II, LCFS, and other critical clean transportation programs that will reduce tailpipe emissions and increase the number and quality of light-duty ZEVs and plug-in hybrid electric vehicles (PHEVs) on the road. With game changing federal incentives now in place and stringent California regulations leading the way, the EPA now has the opportunity to match these incentives and guide the nation towards accelerated light-duty vehicle decarbonization with a Phase 3 standard at least as stringent as Alternative 1. Transitioning light-duty vehicles to electric power will dramatically improve air quality as well as substantially reduce greenhouse gas emissions due to the progressively cleaner energy generation portfolio of the nation's electrical grid. [EPA-HQ-OAR-2022-0829-0618, p. 3]

3. Fleet Electrification

A strong Light-Duty and Medium-Duty Vehicles standard will enable businesses small and large to electrify their light duty fleets and operations, which will result in cost savings through lower fuel and maintenance costs, a significant reduction in the risks that volatile fuel prices and supply pose to the economy and will help those businesses meet their climate goals. Coupled with incentives and programs associated with the IRA, the EPA's Alternative 1 proposed standards will accelerate electric vehicle adoption and allow manufacturers to meet the demand of businesses and consumers across the country. [EPA-HQ-OAR-2022-0829-0618, p. 5]

For example, CALSTART recently hosted a Ride and Drive event in Fresno, California on behalf of CARB's Advanced Clean Fleets (ACF) Rule. In support of this rule, CALSTART launched its Cal Fleet Advisor program that educates and offers fleets assistance as they work to electrify and meet ACF requirements. [EPA-HQ-OAR-2022-0829-0618, p. 5]

After meeting with dozens of fleets in Fresno, one takeaway became clear: most of these fleets were not planning to electrify until they were regulated to do so, but now that a clear time horizon has been set, they are beginning the necessary conversations with utilities, OEMs, and other relevant stakeholders. [EPA-HQ-OAR-2022-0829-0618, p. 5]

The lack of a clear and ambitious requirement like ACF was bottlenecking progress rather than technical and market limitations. Similarly, a clear and expedited timeline like Alternative 1 and beyond will drive fleets to make electrification a priority. Ultimately, this will benefit fleets with lifetime cost savings, reduced local air pollution, and climate mitigation. [EPA-HQ-OAR-2022-0829-0618, p. 5]

Organization: Center for American Progress (CAP)

CAP Recommendations:

1. Based upon the above considerations, CAP urges EPA to adopt a final rule that reflects its Alternative 1 proposal with the following modifications:

a. Increase Later Year Stringency–Alternative 1 features robust emissions reductions from 2027 through 2029, with emissions targets decreasing by at least 17 g/mi between those years.22 This continued pace of increasing stringency is essential to ensuring the uptake of available technologies that reduce greenhouse gas (GHG) emissions. However, the potential benefits of this robust ramp up may be lost due to a lack of continued stringency in the latter years of the rule from 2029 through 2032, during which time emissions targets only decrease by a maximum of 9 g/mi per year.23 EPA should improve upon its Alternative 1 stringency levels between 2029 and 2032 to achieve more significant emissions reductions in its final rule. Failing to do so could undermine the standard because automakers could count on credits generated by overcompliance during the rule's later years to delay investments in emissions reducing technologies. [EPA-HQ-OAR-2022-0829-0658, p. 5]

22 U.S. Environmental Protection Agency, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis," April 2023, available online: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

23 Ibid.

b. Maintain Early Year Ramp-up–Likewise, it is also critical that EPA maintain Alternative 1's ramp up between 2027 and 2029 to encourage investments in proven technologies to reduce emissions and avoid automakers delaying investments in compliance technologies that are available now. As noted previously, automakers are making historical investments in EV manufacturing and technology24. A weakening of the early year ramp up could potentially allow for overcompliance during those years, with credits being relied upon for compliance in later years. Such delay would needlessly increase the volume of higher emission vehicles to the American vehicle fleet for decades to come. [EPA-HQ-OAR-2022-0829-0658, p. 5]

24 Environmental Defense Fund, "U.S. Electric Vehicle Manufacturing Investments and Jobs," March 2023, available online: https://www.edf.org/media/report-finds-investments-us-electric-vehicle-manufacturing-reach-120-billion- create-143000

Organization: Ceres BICEP (Business for Innovative Climate and Energy Policy) Network

The BICEP Network commends the U.S. Environmental Protection Agency (EPA) for proposing multipollutant emission standards for light- and medium-duty vehicles (LMDV) through Model Year (MY) 2032 and urges EPA to finalize standards aligned with U.S. climate commitments. As businesses with footprints across the country, BICEP network companies seek greater availability of clean vehicles in every state to reduce consumer and business transportation costs as well as greenhouse gas (GHG) emissions, protect public health, and enhance the global competitiveness of U.S. industry. [EPA-HQ-OAR-2022-0829-0600, p. 1]

Specifically, the BICEP Network urges EPA to adopt light-duty vehicle (LDV) GHG emissions standards at least as strong as Alternative 1 through 2030, and stronger thereafter. The BICEP Network also urges EPA to adopt LDV criteria pollutant standards and medium-duty vehicle (MDV) multi-pollutant emissions standards at least as stringent as currently proposed. To ensure alignment with U.S climate goals, support businesses in reducing transportation costs, meeting corporate commitments, and address public health concerns, these regulations must drive a significant shift to electrification as well as ensure the efficiency of and reduce criteria pollutants from internal combustion engine (ICE) vehicles. [EPA-HQ-OAR-2022-0829-0600, p. 1]

Existing policies, market trends, and available funding, including the Advanced Clean Cars II (ACC II) rule adopted by California and six other states; manufacturer and corporate zero-emission vehicle (ZEV) commitments; and the significant incentives provided by the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) for vehicle and battery manufacturers, purchasers, and charging infrastructure, all justify standards supporting greater ZEV sales shares. [EPA-HQ-OAR-2022-0829-0600, p. 1]

BICEP Network companies see climate change as a significant business risk, reducing GHG emissions as a major economic opportunity, and recognize the urgency of ensuring near-term reductions. In its most recent March 2023 report,1 the International Panel on Climate Change (IPCC) emphasized the necessity to "massively fast-track climate efforts by every country and every sector and on every timeframe,"2 underscoring the urgency of drastically reducing GHG emissions by 2030. Given that the transportation sector is the largest source of U.S. GHG emissions,3 strong vehicle emission standards are critical to meeting U.S. climate goals. Recent analysis from the International Council of Clean Transportation (ICCT) concludes that aligning the light-duty vehicle sector with climate goals would require a 77% zero- emission vehicle (ZEV) sales share in 2030.4 A key finding of BloombergNEF's 2023 Electric Vehicle Outlook was that "(d)irect electrification via batteries is the most efficient, cost-effective and commercially available route to fully decarbonizing road transport."5 Although ICCT predicts that IRA incentives could stimulate up to 56-67% electric vehicle sales by 2032,6 even Alternative 1 falls short of this level of electric vehicle sales share, let alone what is needed to meet climate goals. Further, given that ICE vehicles will make up the majority of the fleet for many years, it is also necessary to ensure greater GHG reductions from these vehicles. [EPA-HQ-OAR-2022-0829-0600, pp. 1-2]

1 https://www.ipcc.ch/report/ar6/syr/.

2
https://www.unmultimedia.org/avlibrary/asset/3022/3022200/#:~:text=UN%20Secretary%2Dgeneral%20Ant%C3%B3nio%20Guterres%20said%
20that%20the%20new%20IPCC,on%20all%20fronts%20%2D%2D%20everything%2C.

3 https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

4 https://theicct.org/wp-content/uploads/2023/05/The-Global-Automaker-Rating-2022_final.pdf.

5 https://about.bnef.com/electric-vehicle-outlook/.

6 https://theicct.org/publication/ira-impact-evs-us-jan23/ (p. ii).

BICEP members' abilities to meet their own climate commitments are contingent on strong standards that will ensure the availability of clean vehicles across the U.S. and drive the necessary shift to electrification. Unfortunately, the U.S. currently lags behind the European Union and China in EV sales,7and a recent study projects a shortage of EVs needed to meet American consumer demand.8 Strong U.S. vehicle emission standards are necessary to ensure the availability of clean vehicles for our members and the global competitiveness of the U.S. auto industry. [EPA-HQ-OAR-2022-0829-0600, pp. 1-2]

7 https://theicct.org/epa-pr-rule-ldv-mdv-apr23/.

8 https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf.

Thus, on behalf of the companies in the BICEP network, I urge EPA to adopt light-duty vehicle (LDV) GHG emissions standards at least as strong as Alternative 1 through 2030, and stronger thereafter. I also urge EPA to adopt LDV criteria pollutant standards and medium-duty vehicle (MDV) multi-pollutant emissions standards at least as strong as those currently proposed to mitigate climate risk, strengthen U.S. economy, and address public health and equity concerns. [EPA-HQ-OAR-2022-0829-0600, p. 3]

Organization: Ceres Corporate Electric Vehicle Alliance (CEVA)

The Alliance applauds the Environmental Protection Agency (EPA) for its commitment to adopting multi-pollutant emissions standards for Model Years (MY) 2027 and later light- and medium- duty vehicles and greenhouse gas (GHG) emissions standards for heavy-duty vehicles, and urges EPA to align these standards with U.S. climate and public health goals.1 Specifically, the Alliance supports: [EPA-HQ-OAR-2022-0829-0511, p. 1]

1 https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf

-Light-duty vehicle GHG emissions standards aligned with Alternative 1, the strongest standard proposed in this rulemaking, which will result in a 59% reduction in average fleetwide carbon dioxide emissions by MY2032 from a MY2026 baseline. The Alliance also encourages EPA to move forward with its proposed criteria pollutant emissions standards for light-duty vehicles, reducing fleetwide average MY2032 criteria pollutant emissions 60% from MY2025 levels.2 [EPA-HQ-OAR-2022-0829-0511, p. 1]

2 https://www.epa.gov/system/files/documents/2023-04/lmdv-multi-pollutant-emissions-my-2027-nprm-2023-04.pdf (p.42)

-Medium-duty vehicle (Class 2b and 3) multi-pollutant emissions standards aligned with its current proposal, which will ensure a 44% reduction in average fleetwide GHG emissions by MY2032 from a MY2026 baseline, and a 66 76% reduction in criteria pollutant emissions by MY2032 from a MY2025 baseline.3 [EPA-HQ-OAR-2022-0829-0511, p. 1]

3 Ibid. (p.42)

https://ww2.arb.ca.gov/sites/default/files/2023-06/ACT-1963.pdf (p.5)

Light- and Medium-Duty Vehicle Standards:

Coupled with the significant financial incentives of the Inflation Reduction Act, EPA's Alternative 1 proposed standards for light-duty vehicles will galvanize manufacturers to improve battery technology, increase ZEV range, and boost production volume, thus providing more affordable and operationally diverse zero-emission light-duty vehicles as the ZEV market matures. Alternative 1 will go farthest in supporting Alliance members' fleet electrification goals, many of which aim to reach full fleet electrification by 2030 or soon thereafter. [EPA-HQ-OAR-2022-0829-0511, p. 2]

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

In response to EPA's request for comments on specific aspects of the rule, we offer the following suggestions to ensure the rule is as successful as possible:

- EPA requested comment on what levels of carbon dioxide (CO_2) emissions stringency to pursue between 2026 and 2032, and suggested one recommended stringency schedule and three alternative schedules. We believe that the federal government needs to streamline widespread adoption of EVs to avoid the inefficiency that comes with significantly varied markets across the country. At times, it has been hard to get the products consumers want in Colorado, because the initial stock of popular models gets sent to larger states like California even though our state is an ideal market with strong EV incentives. For example, the State of Colorado put In an order for over 100 Ford F-150 Lightnings, but only four have been delivered thus far. Similarly, it has been challenging for consumers to access popular models with great potential for mountain driving, such as the Toyota RAV-4 Prime. Thankfully, delivery times are starting to improve, but as the supply chain normalizes, it is critical that states like Colorado have equal access to the full range of vehicle choices, and that will be enhanced by the federal government taking the lead on regulations that normalize production and delivery across the country. Alternative 1 would provide the most consistency with what Colorado is already pursuing. We urge the federal government to place even greater focus on consistency and streamlining of regulations in order to help us accelerate EV adoption with the urgency that we need. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

Organization: Darius

I write in opposition to the U.S. Environmental Protection Agency's proposed multipollutant standards for light-and medium-duty vehicles (Docket ID No. EPA-HQ-OAR-2022-0829). I have serious concerns with all three of the options included in the draft rulemaking, as the EPA seeks to lower carbon emissions under timelines that effectively make electric vehicles the only option for automakers to meet the pollution limits from 2027 through 2032. [EPA-HQ-OAR-2022-0829-0519, p. 1]

The future of automotive technology matters to consumers, millions of automotive enthusiasts, and all the men and women who work in the industry. Accordingly, I ask that the EPA does not follow through on any of the three options outlined in this proposed rulemaking and instead pursues a rulemaking for light and medium-duty vehicles that embrace a technology-neutral approach that factors in the infrastructure that exists, the innovation we are all capable of, consumer preferences, and the lifecycle emissions of the technology that powers our vehicles. [EPA-HQ-OAR-2022-0829-0519, p. 1]

Organization: District of Columbia Department of Energy and Environment (DOEE)

DOEE supports EPA's action to address light-duty and medium-duty vehicle emissions. DOEE believes the Proposal and Alternatives 2 and 3 are not sufficiently stringent to ensure the health, prosperity, and safety of citizens, particularly those who are already overburdened and vulnerable to air pollution from vehicles. DOEE supports the multipollutant emissions standards in Alternative 1 as it is projected to result in industry-wide reductions of 61 percent (61%) in fleet average GHG emissions target levels from existing MY 2026 standards. Alternative 1 also boasts CO2 levels that are 10 g/mi lower on average than the proposed targets and reduces greenhouse gasses (GHG) at more significant rates than either the Proposal, Alternative 2, or Alternative 3. [EPA-HQ-OAR-2022-0829-0550, p. 1]

EPA Proposal and Alternatives 1, 2, and 3

DOEE recognizes that EPA's proposed light-duty and medium-duty Multi-Pollutant Emissions Standards requiring lower vehicle emissions are feasible and appropriate under the Clean Air Act (CAA). The proposed rulemaking, while it falls short, is a necessary important step toward meeting climate goals and cleaner, healthier air. As EPA illustrates, there is a critical need for further criteria pollutant and GHG reductions to address the adverse impacts of air pollution from light and medium duty vehicles on public health and welfare. With continued advances in internal combustion emissions controls and vehicle electrification technologies coming into the mainstream as primary vehicle emissions controls, EPA believes substantial further emissions reductions are feasible and appropriate under the Clean Air Act. 88 FR 29341. [EPA-HQ-OAR-2022-0829-0550, pp. 1-2]

Vehicle emission reduction technology advancements validate substantial reductions in vehicle emissions to impactfully address climate change and people's health. Eliminating polluting emissions from vehicles is crucial to protect public health and mitigate the negative effects of climate change. EPA has demonstrated in its proposal that light- and medium-duty emissions reductions are both technologically feasible and will result in varying degrees of health benefits. Despite each proposal's feasibility and health benefits, DOEE finds that EPA's Proposal, Alternative 2, and Alternative 3 are insufficient in comparison to the feasible Alternative 1. Alternative 1 provides a stronger foundation for improving quality of life and mitigating detrimental climate change impacts. Therefore, DOEE recommends that EPA adopts Alternative 1. [EPA-HQ-OAR-2022-0829-0550, pp. 1-2]

As EPA mentions in Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Section II, without substantial changes to the way people drive, how people travel, or what people use to travel, the District, and the United States as a whole, will not avoid the worst consequences of climate change. EPA recognizes that vehicles, including passenger vehicles, are major sources of air pollution and poor health, yet the proposed rulemaking from EPA fails to be analogous to the severity of the ensuing climate change impacts. In fact, [EPA-HQ-OAR-2022-0829-0550, p. 2]

EPA proposes to find that standards substantially more stringent than Alternative 1 would not be appropriate because of uncertainties concerning the cost and feasibility of such standards. EPA proposes to find that standards substantially less stringent than Alternative 2 or 3 would not be appropriate because they would forgo feasible emissions reductions that would improve the protection of public health and welfare. 88 FR 29201. [EPA-HQ-OAR-2022-0829-0550, p. 2]

DOEE recognizes that the costs involved in implementing and meeting stringent emissions requirements would be high. However, DOEE disagrees that standards substantially more stringent than Alternative 1 would be inappropriate due to cost and feasibility. The cost of inaction or insufficient action toward eliminating vehicle emissions in conjunction with climate change will be far greater to both public and environmental health and welfare. [EPA-HQ-OAR-2022-0829-0550, p. 2]

Summary

It is crucial that EPA promulgate the new criteria pollutant and greenhouse gas emission standards for light-duty and medium-duty vehicles in a timely fashion. DOEE urges the EPA to alleviate air pollution burdens by adopting vehicle emission standards as strict as those stated in Alternative 1. The criteria pollutant and greenhouse gas emission standards in Alternative 1 will result in tangible and sufficient emission reductions that substantially reduce adverse health burdens while mitigating further disastrous health, climate, and environmental consequences. The cost of inaction on the health of people and the environment far outweighs the cost of a rulemaking requiring zero or near-zero emission vehicles. [EPA-HQ-OAR-2022-0829-0550, p. 6]

Organization: Elders Climate Action

The latest climate modeling report (AR6) from the Intergovernmental Panel on Climate Change (IPCC) now makes clear that exceeding 1.5o C before 2050 is "more likely than not" even with implementation of the most aggressive GHG reduction scenario, but that the excursion above 1.5o C can be limited to a few decades if we reduce GHG emissions by half before 2030, and achieve net zero emissions by 2050. But if we fail to meet either of those targets, it is "more likely than not" that global temperatures will reach 2.0 o C with dire consequences for humanity. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

To achieve net-zero emissions economy wide by 2050, zero emission technologies currently available must be deployed as soon as possible to put GHG emissions from our largest source of emissions – transportation – on the path toward zero. EPA's proposed rule merely reduces carbon fuel combustion by less than 1%. A zero emission economy cannot be achieved if vehicles continue to burn carbon fuels. Internal combustion engines (ICEs) must be replaced as quickly as possible by zero emission vehicles (ZEVs). [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

EPA's proposed L/MDV rule does not chart a course toward implementing either the national policy declared by President Biden or reflect the urgent need to cut GHG emissions in half by 2030 to avoid much worse future climate catastrophes. The rule preamble acknowledges that the proposed rule changes will reduce L/MDV CO_2 emissions by only .2 MMT during MY 2027 from 29 MMT to 28.8 MMT. Over the 20 year useful life of vehicles sold in MYs 2027-29 the rule will allow millions of diesel and gasoline vehicles to be added to the Nation's highways which will emit an estimated 1.7 billion MT of CO_2. These emissions will wipe out more than half of the 3.1 billion MT of CO_2 reduction achieved by EPA's SAFE 2 rule for light duty vehicles. These L/MDV emissions are the equivalent of operating 21 new coal-fired power plants. A large fraction of these emissions could be avoided if EPA adopted the CARB zero emission standard for L/MDVs in the ACT rule. The rule does not achieve, or describe how it will contribute to achieving, zero emissions by 2050. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

We ask EPA to revise the rule to set a zero emission standard for all new L/MDVs by 2035, and establish a phase-in schedule for the standard that includes ZEV sales targets for MYs 2027-29 that are the same as the CARB ACT rule. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

ZEV sales targets are needed now – [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

- to establish benchmarks for all engine manufacturers to create a level playing field that promotes competitive market conditions for zero emission vehicles based on performance, reliability and cost;

- to ensure a market for ZEVs that will justify early investment by third parties in the development of supply chains needed for production of batteries and fuel cells;

- to ensure the capacity of the industry to ramp up to 100% of sales to ensure that ZEVs will be available in time to replace on-road ICE vehicles by 2050;

- for MY 2027 to give the industry enough lead time to develop supply chains, plan the conversion of production facilities and develop marketing campaigns designed to assure public acceptance of their products. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

Organization: Electrification Coalition (EC)

To mitigate the impacts of climate change and to reduce national and economic security threats, the U.S. needs a solution that will decarbonize our economy, reduce dependence on oil and position the U.S. to maintain our status as a global leader in a new economy that is based on minerals. The shift to electricity as a fuel source, also called transportation electrification, is the solution to this triad of concerns. [EPA-HQ-OAR-2022-0829-0588, pp. 2-3]

For these reasons, the adoption of the strongest possible proposal would significantly limit the greenhouse gas emissions from internal combustion engine vehicles and require them to be cleaner, bringing the market for these internal combustion engine vehicles to the tipping point and thereby accelerating the adoption of EVs. The EPA forecasts that the proposed rule would lead to 67% of new sales of LD/MD vehicles being zero-emission (electric) in 2032, depending on the vehicle type. [EPA-HQ-OAR-2022-0829-0588, pp. 2-3]

Therefore, the EC supports the adoption of the strongest possible proposal, as it will accelerate the adoption of EVs in the LD/MD sector. [EPA-HQ-OAR-2022-0829-0588, pp. 2-3]

Organization: Energy Innovation

Energy Innovation appreciates the opportunity to submit these comments to the U.S. Environmental Protection Agency (EPA) regarding its Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (proposed rule). Energy Innovation is a nonpartisan energy and climate policy firm. We provide independent analysis and science-based research to policymakers and other decision-makers seeking to understand which policies are most effective to ensure a climate-safe future for all. Our team has expertise in modeling climate policy, including policies that support a cleaner power grid and electrify transportation, buildings, and industry. Our recommendations are data-driven and informed, in part, by our peer-reviewed Energy Policy Simulator (EPS) model. [EPA-HQ-OAR-2022-0829-0561, p. 1]

We appreciate the EPA's extensive work to develop these proposed emissions standards for criteria pollutants and greenhouse gases for light-duty and medium-duty vehicles (LDVs and MDVs, respectively) for model years 2027 (MY 2027) and later. We commend the EPA's diligent analysis in its development of the proposed rule, which reflects the impact of new federal and state policies and advances in clean vehicle technologies. The EPA has set forth a proposed rule that aligns with its statutory directive in Section 202(a)(1) of the CAA to enhance the stringency of LDV and MDV vehicle tailpipe standards needed to reduce emissions that endanger public health and welfare: "'the Administrator shall by regulation prescribe (and from time to time revise)…standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles … which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'"1 We concur with the EPA's analysis that the proposed rule and Alternative 1 are aligned with its statutory directive—the proposed more stringent standards offer technologically feasible and cost-effective options to reduce harmful GHG and other air polluting emissions over the timeframe the standards would be in place. [EPA-HQ-OAR-2022-0829-0561, p. 1]

1 U.S. EPA, "Proposed Rules: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (EPA–HQ–OAR–2022–0829; FRL 8953–03– OAR)," Federal Register 88, no. 87 (May 5, 2023), https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf, 29231-2.

II. Modeling shows that new federal policies combined with state policies will advance the battery electric vehicle (BEV) market faster, which supports the EPA's adoption of the more stringent Alternative 1 in the proposed rule. [EPA-HQ-OAR-2022-0829-0561, p. 2]

In the EPA's proposed rule, the GHG tailpipe standards for LDVs are "projected to result in an industry-wide average target for the light-duty fleet of 82 grams/mile (g/mile) of carbon dioxide (CO_2) in MY 2032, representing a 56 percent reduction in projected fleet average GHG emissions target levels from the existing MY 2026 standards."12 The proposed GHG standards for MDVs are "projected to result in an average target of 275 grams/mile of CO_2 by MY 2032, which would represent a reduction of 44 percent compared to the current MY 2026 standards."13 The proposed rule will also reduce cumulative GHG emissions between 2027 and 2055: CO_2 by 26 percent, methane (CH_4) by 17 percent, and nitrous oxide (N_2O) by 25 percent, compared to no-action scenario.14 See table 135 below from the proposed rule. [EPA-HQ-OAR-2022-0829-0561, pp. 5-7]

12 U.S. EPA, "Proposed Rules," May 5, 2023, 29196.

13 U.S. EPA, 29196.

14 U.S. EPA, 29348.

[See original attachment for "Table 135 – Estimated GHG Impacts of the Proposed Standards Relative to the No Action Scenario, Light-Duty and Medium-Duty"]

While the proposed rule is an improvement over the status quo, greater emissions reductions via higher rates of electrification in the LDV and MDV sectors are needed to reduce harmful air pollutants and mitigate climate change. We believe EPA's alternative to the proposed rule (Alternative 1) is the preferred option (as discussed further below) because it will achieve greater emissions reductions more quickly, while still being technologically feasible and cost-effective. [EPA-HQ-OAR-2022-0829-0561, pp. 5-7]

Fortunately, the Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Law (BIL) helped tip the scale in favor of climate-oriented investments and the adoption of zero-emission technologies,[ii] particularly battery electric vehicles (BEVs), and also hydrogen fuel cell electric vehicles (FCEVs).[iii] [EPA-HQ-OAR-2022-0829-0561, pp. 4-5] ii This includes technologies that eliminate tailpipe GHG emissions and other pollutants, namely battery electric vehicles (BEVs) for LDVs and MDVs.

iii Based on our analysis and current market trends, we do not anticipate FCEVs will play a sizable role in the LDV and MDV market for the foreseeable future. However, we recognize the value of technology-neutral standards.

Energy Innovation's modeling reveals that the IRA's transportation electrification incentives (combined with infrastructure investments in the BIL) can jump-start transportation decarbonization this decade. However, these federal policies are insufficient to cut the sector's GHG emissions at the pace needed to achieve the U.S. nationally determined contribution (NDC) and to align with the Paris Agreement to limit global warming and achieve net zero by 2050. Mitigating the transportation sector's (especially LDVs and MDVs) impact on the climate and public health will require additional policy and regulatory action in the next decade, including stronger federal tailpipe emissions standards. Our modeling shows that widespread deployment of clean vehicles, powered by a clean grid, can help reduce GHG emissions to meet the U.S. NDC.8 See Figures 1 and 2. [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

8 Robbie Orvis et al., "Closing the Emissions Gap Between the IRA and 2030 NDC: Policies to Meet the Moment" (Energy Innovation Policy and Technology LLC, December 2022), https://energyinnovation.org/publication/closing-the-emissions-gap-between-the-ira-and-ndcpolicies-to-meet-the-moment/.

[See original attachment for line graph titled "Economy-Wide Greenhouse Gas Emissions"] [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

Figure 1. Economy-wide GHG emissions by scenario. Source: Orvis, Robbie, et al., Closing the Emissions Gap Between the IRA and 2030 [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

U.S. NDC: Policies to Meet the Moment (Energy Innovation, December 2022), available at: https://energyinnovation.org/publication/closing-the-emissions-gap-between-the-ira-and-ndc-policies-to-meet-the-moment/. [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

[See original attachment for line graph titled "Transportation Sector GHG Emissions and Reductions"] [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

Figure 2. Reductions in transportation sector emissions in the IRA and NDC scenarios relative to business as usual. Source: Orvis et al., [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

Closing the Emissions Gap Between the IRA and 2030 U.S. NDC. [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

As we discuss in the next section, BIL and IRA have put the U.S. on the cusp of a cleaner transportation future. Incentives and investments made possible by these laws will help tip the scale in favor of BEVs and zero- emission technologies. However, they are not enough to fully transform the transportation sector. The standards set forth in the final rule must be sufficiently stringent to expedite the shift away from polluting ICE vehicles for the sake of climate stability, human health, society, and future generations. [EPA-HQ-OAR-2022-0829-0561, p. 8]

II. MODELING SHOWS THAT NEW FEDERAL POLICIES COMBINED WITH STATE POLICIES WILL ADVANCE THE BEV MARKET FASTER, WHICH SUPPORTS THE EPA'S ADOPTION OF THE MORE STRINGENT ALTERNATIVE 1 IN THE PROPOSED RULE. [EPA-HQ-OAR-2022-0829-0561, p. 8]

We agree with the EPA that the passage of the BIL and IRA represent significant "support for investment in expanding the manufacture, sale, and use of zero-emission vehicles by addressing elements critical to the advancement of clean transportation and clean electricity generation in ways that will facilitate and accelerate the development, production and adoption of zero-emission technology during the time frame of the rule."20 Our modeling supports these findings. [EPA-HQ-OAR-2022-0829-0561, p. 8]

20 U.S. EPA, 29195.

A primary takeaway from the ICCT-EI Study analysis is that the IRA's financial incentives for vehicles and manufacturers enable and support the adoption of more stringent federal vehicle standards at a lower cost and higher benefit to consumers.25 However, EV sales shares from our analysis are not guaranteed. Federal tailpipe standards are a critical tool that give auto manufacturers clear direction to retool their production lines to produce ZEVs at scale. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

25 Peter Slowik et al., "Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States" (International Council on Clean Transportation and Energy Innovation, January 2023), https://energyinnovation.org/wpcontent/uploads/2023/01/Analyzing-the-Impact-of-the-Inflation-Reduction-Act-on-EV-Uptake-in-the-U.S..pdf.

The IRA incentives provide one lever to move the market, and the EPA's standards provide an additional lever. The ICCT-EI Study and other studies mentioned in the EPA's proposed rule point to "greatly increased penetration of electrification across the U.S. light-duty fleet in the coming years, without specifically considering the effect of increased emission standards under this proposed rule."26 Given that fact, it is reasonable to infer that the EPA's proposed rule represents more of a floor, not a ceiling. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

26 U.S. EPA, "Proposed Rules," May 5, 2023, 29189.

Given the urgent need to reduce harmful GHG emissions and other tailpipe pollutants, any additional amount of emissions reductions that final standards can achieve is preferable to other alternatives. And modeling demonstrates that more emissions reductions are feasible in the time frame, given the availability of incentives in the BIL and IRA. [EPA-HQ-OAR-2022-0829-0561, p. 12]

In conclusion, we invite the EPA to rely on the ICCT-EI Study and other analyses to support adoption of the most stringent set of emission standards (Alternative 1) to accelerate the adoption of pollution-free BEVs. [EPA-HQ-OAR-2022-0829-0561, p. 12]

In the next section, we discuss several relevant factors that may further accelerate EV adoption and impact learning curves for BEV economics, which provide additional rationale for the adoption of the most stringent standards. [EPA-HQ-OAR-2022-0829-0561, p. 12]

Organization: Environmental. and Public Health Organizations

While the market is clearly heading in the right direction, EPA's standards should facilitate even greater deployment of zero-emission and combustion vehicle technologies to help protect the public from the destructive effects of climate change and air pollution generally. To this end, we urge EPA to finalize the strongest possible emission standards. While we do not believe it is necessary for EPA to set standards beyond 2032 at this point, it is critical that the final standards are sufficiently stringent through model year 2032 to ensure that the U.S. is on track to reach 100% new ZEV sales in 2035. The standards in Alternative 1, but with greater stringency after 2030, are feasible and would better serve EPA's statutory mandate to address the environmental and health impacts of air pollution from light- and medium-duty vehicles. Finalizing such standards will provide feasible, critical air pollution emission reductions, as directed by Congress in the Clean Air Act. [EPA-HQ-OAR-2022-0829-0759, pp. 8-9]

IV. EPA's Own Analysis Shows that Additional Stringency Is Feasible and Would Produce Greater Societal Benefits.

While we support the Proposed Standards, EPA must go further—specifically, by adopting Alternative 1 with a steeper increase in stringency after 2030 to ensure the country is on track to reach 100% new ZEV sales by 2035. As detailed throughout this comment letter, such standards are feasible and offer significantly more air pollution reductions, consumer savings, and societal benefits. And as EPA itself acknowledges, adopting less stringent standards where more stringent ones are achievable "would forgo feasible emissions reductions that would improve the protection of public health and welfare." 88 Fed. Reg. at 29201. In this section, we explain how EPA's own data show that final standards more stringent than the Proposed Standards are warranted. In the sections that follow, we detail the feasibility and superiority of Alternative 1 with a steeper increase in stringency after 2030. [EPA-HQ-OAR-2022-0829-0759, p. 24]

Alternative 1 also provides greater pollution reductions and societal benefits than the Proposed Standards. Under EPA's modeling, Alternative 1 would avoid 8,100 million metric tons (MMT) of CO2 emissions through 2055 relative to the No Action scenario, id. at 29203, tbl. 14, in contrast to the 7,300 MMT avoided under the Proposed Standards, id. at 29198, tbl. 3. Alternative 1 also provides greater reductions in criteria pollutants and air toxics. Compare id. at 29198-99, tbls. 4 and 5, to id. at 29203-05, tbls. 13-16. In addition, Alternative 1 has greater societal net benefits: ranging from $1,500-2,500 billion through 2055, id. at 29205-06, tbl. 17 (3% discount rate), depending on the values used for the GHG emission reductions, versus a range of $1,400-2,300 billion under the Proposed Standards. Id. at 29200, tbl. 6. [EPA-HQ-OAR-2022-0829-0759, p. 25]

EPA's analysis shows that Alternative 1 is also feasible. It relies on the same existing technology—vehicle electrification—at the core of the Proposed Standards, and the share of battery-electric vehicles (BEVs) in the new vehicle fleet projected by EPA under Alternative 1 is very similar to those under the Proposed Standards, with the share under Alternative 1 never exceeding those under the Proposed Standards by more than 3 percentage points through 2032. Id. at 29333, tbl. 99 (BEV penetration of 60% under the Proposed Standards in 2030, versus 63% under Alternative 1). While we are recommending that EPA finalize a modified version of Alternative 1 (which would yield higher levels of BEV penetration, as detailed in Section V below), EPA's analysis at least shows that BEV levels associated with Alternative 1 are eminently feasible. [EPA-HQ-OAR-2022-0829-0759, p. 25]

According to the Alliance for Automotive Innovation, in the first quarter of 2023, there were 55 BEV models and 40 Plug-in Hybrid (PHEV) models available in the United States, representing a variety of vehicle types, including sedans, crossovers, SUVs, and light-duty trucks.102 The technology is only improving, and the number of models of plug-in electric vehicles (PEVs, which include both BEVs and PHEVs) available in the U.S. is projected to reach 197 by the end of 2025.103 Higher levels of PEV adoption are already driven by strong consumer demand and greater model choice. And as is discussed throughout these comments, the charging infrastructure, electric grid, and vehicle supply chain will be able to accommodate the projected levels of BEVs—indeed, sending a strong regulatory signal will facilitate that process. Moreover, given the flexibility in EPA's program, as well as the fact that EPA's modeling did not include any PHEVs or improvements to combustion vehicle greenhouse gas emissions (and in fact projects increasing GHG emissions from the combustion vehicle fleet, as discussed in Section VI.A), it is likely that the levels of BEVs would be lower in the real-world than EPA projected as automakers employ such technologies to comply with the final standards. That is because making even minor improvements in combustion vehicle GHG emissions—or even simply holding the average emissions of the combustion vehicle fleet constant—or manufacturing PHEVs will allow automakers to achieve compliance with relatively fewer levels of ZEVs than EPA projected. [EPA-HQ-OAR-2022-0829-0759, p. 26]

102 Alliance for Automotive Innovation, Get Connected: Electric Vehicle Quarterly Report, First Quarter, 2023 (2023), https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023% 20Q1.pdf.

103 Rachel MacIntosh et al., Electric Vehicle Market Update, Environmental Defense Fund and ERM 7 (April 2023), https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf; see also Jeff S. Bartlett & Ben Preston, Automakers are Adding Electric Vehicles to Their Lineups. Her''s Wha''s Coming, Consumer Reports (Jan. 6, 2023),https://www.consumerreports.org/hybrids-evs/why-electric-cars-may-soon-flood-the-us-market-a9006292675/.

V. Outside Analysis Demonstrates the Significant Benefits of Stronger Emission Standards, Particularly Alternative 1 with a Steeper Increase in Stringency After 2030.

Outside analysis also shows the benefits of adopting final standards stronger than EPA proposed. Environmental Resources Management, Inc (ERM), one of the largest sustainability consultancies globally, was commissioned by NRDC to provide an independent, third-party analysis of EPA's proposed standards and alternative proposals, as well as a recommended approach. ERM's methodology, assumptions, and results are described throughout this section, and the ERM report is attached to this comment letter.104 ERM's analysis shows that Alternative 1 with a steeper increase in stringency after 2030 would produce significant societal benefits. [EPA-HQ-OAR-2022-0829-0759, p. 26]

104 Dave Seamonds, et al., ERM, Impacts of EPA Light-& Medium-Duty Multi-Pollutant Standards: National Scenario Results, June 2023 [hereinafter ERM, Impacts Report] (attached to this comment letter).

ERM's analysis employed a modeling framework that leveraged EPA's tools to inform and develop inputs to ERM's Benefit-Cost Analysis (BCA) framework. It is important to note that while this analysis is based on EPA's "baseline" scenario, we believe this "baseline" is ultimately not an accurate reflection of a "No Action" scenario, as it is overly conservative. We explore this further in Section XV, but ultimately the most relevant of the analyses that EPA considered supports baseline ZEV sales greater than the baseline levels projected in the "EPA No Action" scenario. [EPA-HQ-OAR-2022-0829-0759, p. 26]

Where possible, ERM mirrored EPA's methodology to keep its analytical approach and resultant comparisons consistent with EPA's approach in the Proposal, and to allow for an apples-to-apples comparison. [EPA-HQ-OAR-2022-0829-0759, p. 26]

Policy Scenarios

ERM investigated five different policy scenarios: EPA's no action "baseline" ("EPA No Action"); EPA's preferred approach ("EPA Main Proposal"); our recommended approach, which reflects greater increases in stringency after model year 2030 ("Alternative 1+"); EPA's strongest option ("EPA Alternative 1"); and EPA's weakest option ("EPA Alternative 3"). [EPA-HQ-OAR-2022-0829-0759, p. 27] Modeling Background

EPA's updated MOVES model (MOVES3.R3105) was utilized to model electric vehicle (EV) adoption rates (sales and in-use), vehicle miles traveled (VMT), and pollutant emissions by vehicle type. Cost assumptions (battery costs, incremental vehicle costs, charging equipment costs, etc.) and vehicle classification/identification information and sales shares were incorporated into both ERM's BCA framework and its modification and application of MOVES3.R3 data outputs. ERM's BCA framework was applied to compare and evaluate the impacts across several policy scenarios as compared to the EPA No Action case. [EPA-HQ-OAR-2022-0829-0759, p. 27]

105 Although MOVES3.R1 was used for L/MD rulemaking, MOVES3.R3 reflects an updated version of MOVES3.R1 but maintains relevant L/MDV data and assumptions.

SEE ORIGINAL COMMENT FOR PIE CHART–- Figure V.B-1: National Light- and Medium-Duty Vehicle Fleet106. [EPA-HQ-OAR-2022-0829-0759, p. 28]

106 ERM, Impacts Report at 6.

This pie chart is based on EPA's modified version of MOVES. EPA projects that the majority of vehicles subject to the rule will be SUVs and light trucks (~160 million), followed by passenger cars (i.e., sedans), which are projected to number just over 100 million vehicles. The remainder is made up of Class 2b (chassis-certified only) and Class 3 medium-duty vehicles, projected to number around 14 million vehicles nationwide; note that "incomplete" class 2b/3 vehicles covered by the proposed Phase 3 heavy-duty rulemaking were not included in this analysis. [EPA-HQ-OAR-2022-0829-0759, p. 28]

1. Reductions in greenhouse gas emissions will bring climate change benefits to environmental justice communities.

Reducing GHG emissions from light- and medium-duty vehicles will help reduce the significant harm that climate change inflicts on environmental justice communities. By 2055, the Proposed Standards would avoid 7,300 million metric tons (MMT) of CO2 emissions, 88 Fed. Reg. at 29198, tbl. 3, and EPA's calculations show the Proposal would produce climate benefits of between $82 and $1,000 billion in 2020 dollars by 2055, depending on the values used for GHG emission reductions. Id. at 29200, tbl. 6 (using a 3% discount rate). As compared to the Proposed Standards, by 2055 Alternative 1 would achieve an additional 800 MMT of CO2 savings, 88 Fed. Reg. at 29203, tbl. 14, and increase climate benefits by between $9 and $100 billion. Id. at 29205, tbl. 17. And adopting Alternative 1 with a faster ramp rate after 2030 would bring even more climate benefits to environmental justice communities. See infra Section V (detailing the societal benefits of more stringent standards). [EPA-HQ-OAR-2022-0829-0759, p. 19]

D. Alternative 1+ Results in Greater Emissions Reductions and Public Health Impacts than EPA's Preferred Approach

The ERM modeling results regarding GHG tailpipe and upstream emissions, shown below in Figure V.E-1, show the emissions reductions possible by taking an Alternative 1+ approach from 2026-2040, as well as the cumulative reductions from the other policy scenarios and the monetized value of these reductions (shown in Table V.E-1). These benefits are compared to EPA's No Action scenario, which is quite conservative in its projections for what market conditions are expected to be in a no action scenario. [EPA-HQ-OAR-2022-0829-0759, p. 30]

A final rule aligned with our recommended approach would be expected to achieve more than a 52% reduction in emissions of CO2 by 2040 compared to 2026 and result in almost $148 billion in climate benefits by 2040 – approximately $35 billion more than would be possible from an EPA Main Proposal approach during the same timeframe. Accordingly, EPA's failure to finalize a rule that aligns with our recommended approach would unnecessarily leave significant climate benefits on the table. [EPA-HQ-OAR-2022-0829-0759, pp. 30-31]

SEE ORIGINAL COMMENT FOR Figure V.E-1: Comparison of Projected Climate Benefits110 [EPA-HQ-OAR-2022-0829-0759, p. 31]

110 Id. at 11.

SEE ORIGINAL COMMENT FOR Table V.E-1: Projected Cumulative Reduction and Monetized Value (per policy scenario)111 [EPA-HQ-OAR-2022-0829-0759, p. 31]

111 Id.

ERM analysis used EPA's identified Social Cost of Carbon as the basis for monetized social benefits. This analysis also used a 3% average discount rate and escalated the monetary values to 2021 levels to be consistent with other costs contained within the benefit cost model. [EPA-HQ-OAR-2022-0829-0759, pp. 30-31]

1. Comparison of Overall Societal Benefits

The results from ERM's analysis (depicted in Figure V.I-1) show that on a net societal basis––inclusive of the costs to fleets as well as air quality benefits, climate benefits, and reduced utility bills—the greatest benefits are seen with Alternative 1+ at about $125.7 billion through the 2040 timeframe. [EPA-HQ-OAR-2022-0829-0759, p. 35]

SEE ORIGINAL COMMENT FOR Figure V.I-1: Comparison of Possible Annual Net Societal Benefits119 [EPA-HQ-OAR-2022-0829-0759, p. 36]

119 Id. at 15.

This figure depicts net annual societal benefits (which incorporates net incremental fleet cost savings, climate benefits, air quality benefits, and reduced utility bills). [EPA-HQ-OAR-2022-0829-0759, p. 36]

XXIX. Conclusion

EPA should finalize emission standards for light- and medium-duty vehicles that are at least as stringent as Alternative 1 but with increasing stringency from 2030 to 2032 to put the country on track for 100% new ZEV sales by 2035. EPA can and must go further than it has proposed. Adopting the recommendations set forth in this comment letter would result in feasible, cost-beneficial emission standards that would better serve EPA's statutory mandate to protect public health and welfare. [EPA-HQ-OAR-2022-0829-0759, p. 205]

Organization: Environmental Defense Fund (EDF) (1of 2)

III. EPA's final light-duty standards should deliver pollution reductions at least at the level of the proposal.

In this section, we outline the breadth of factors supporting the feasibility and cost-effectiveness of protective pollution standards. We recommend that EPA strengthen the standards in a manner that delivers pollution reductions at least as great as the proposal that EPA is considering. We also highlight the importance of adjustments that could secure even greater pollution reductions by including in the final rule a voluntary (but once chosen, enforceable) alternative leadership pathway that, for manufacturers choosing the pathway, would ensure ACC II levels of ZEV deployment nationwide. In addition, especially if EPA modifies the proposal's phase-in of the standards in the early years of the program as indicated in Alternative 3, we recommend that EPA consider increasing the stringency of the 2031-2032 standards to potentially increase cumulative GHG reductions relative to the proposal, and at minimum, protect the benefits achieved under the standards as proposed. [EPA-HQ-OAR-2022-0829-0786, p. 16]

A. Feasibility, cost, and lead time support final standards at least as protective as the proposal.

In this section, we examine a series of interlocking analyses and factors that support standards at least as protective as EPA's proposed emissions standards, including 1) extensive independent analysis related to rapidly-declining ZEV costs, including the impacts of the IRA in further advancing ZEV cost declines and accelerating ZEV deployment; 2) manufacturers' projections of battery cost declines; 3) an assessment of market indicators, including manufacturer investments and commitments, which are broadly consistent with and reinforce these study findings; 4) a discussion of leading state actions, including the ACC II rule; and 5) presentation of a revised baseline analysis, which synthesizes and quantifies each of these factors. Each of these factors, both individually and when taken together, demonstrate that EPA's proposed standards are feasible and cost-effective. [EPA-HQ-OAR-2022-0829-0786, p. 16]

B. EPA should strengthen standards in a manner that delivers pollution reductions at least as great as the proposal.

The above analysis demonstrates the feasibility of standards that deliver pollution reductions at least as great as EPA's proposal. In this section we offer two suggested approaches EPA should pursue to further strengthen the standards: 1) adopting stronger standards in later model years of the program, reflecting additional ZEV deployment; and 2) finalizing a voluntary (but once chosen, enforceable) leadership pathway that incentivizes ACC II levels of ZEV deployment nationwide. [EPA-HQ-OAR-2022-0829-0786, p. 37]

i. Primary standards should be strengthened to reflect additional ZEV deployment in later years of the program.

The foregoing factors support protective standards. They also especially underscore the opportunities to strengthen the later model years of the program, similar to EPA's decision in its MY 2023-2026 standards to strengthen the MY 2026 standards. Even more so here, manufacturers have substantial lead-time, and most cost assessments project both upfront cost-parity (or savings) and substantial savings on a total cost of ownership basis in that timeframe. IRA credits will still apply, delivering further cost savings. Moreover, though our comments show that EPA has reasonably considered infrastructure, grid-related issues, supply and critical mineral considerations in both the near and long term, even stakeholders raising concerns about those considerations have focused most on perceived near-term constraints. And California's ACC II program will be delivering 76% ZEVs in 2031 and 82% in 2032. In summary, in the 2031-32 timeframe, there is broad consensus that ZEVs will be cheaper to purchase, own, and operate, will be produced at significant volumes relying on supply chains that have been strengthened and secured, and will be sold at percentages significantly greater than EPA's proposal in the states that have adopted ACC II standards. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

In addition to being feasible, strengthening standards in later model years of the program is critical to delivering additional pollution reductions and important to ensure we are firmly on the pathway to ensuring all new vehicles sold by 2035 are zero-emitting. In this section, we have demonstrated how adjustments in stringency in these later model years will deliver significant emissions reductions. EPA should consider strengthening the later model years of the program across all of its proposed alternatives, but we underscore the vital importance of such strengthening in circumstances that would ensure any finalized alternative delivers pollution reductions at least as great as the proposal. To illustrate this, we have examined EPA's proposed Alternative 3 and examined how EPA might strengthen the later model years to ensure modified standards would deliver emission reductions at least as great as the proposal and, separately, at least as great as Alternative 1. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

Table 5, below, shows the fleetwide targets for EPA's no action case, as well as the Proposal and Alternatives 1 and 3. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

[See original attachment for Table 5: Fleetwide Certification CO2 Targets Sales Under Certain EPA Options (g/mi)] [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

As the table demonstrates, GHG standards under the EPA Proposal and Alternative 1 are front- loaded, with the largest year over year reductions occurring between 2026 and 2029. In contrast, Alternative 3 achieves roughly the same GHG target as the Proposal in 2032, but achieves this level more gradually. In terms of "cumulative 2027-2032 MY grams per mile", Alternative 1 achieves 60 gram-years per mile more control than the Proposal, while Alternative 3 achieves 27 gram-years per mile less control than the Proposal. In other words, the slower decrease means cumulative GHG reductions from Alternative 3 are lower than the Proposal even though they reach the same standard by 2032. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

As described above, we have combined the slower, but steadier levels of GHG reductions reflected in Alternative 3 with greater levels of GHG reductions in the later MYs so that the overall level of GHG reductions afforded in one scenario by the Proposal and the other, by Alternative 1, are achieved. EDF selected cumulative GHG emission reductions through CY 2055 as a reasonable metric for overall GHG reduction potential. To do this, we used a spreadsheet model that reflects the basic scrappage and annual mileage versus age distributions used in EPA's OMEGA 2 model. EDF assumed constant vehicle sales between 2027 and 2055, which is consistent with the results of EPA's OMEGA modeling. We also ignored VMT rebound, which is again reasonable given the small changes in ICEV CO2 emissions projected in EPA's OMEGA modeling.110 [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

110 EPA assumed that BEVs would be driven the same number of miles as the ICEVs they replaced, so electrification produced no change in fleet VMT.

Using this model, EDF found that reducing the fleetwide GHG targets of Alternative 3 in MYs 2031 and 2032 by 2.1 and 4.2 g/mi, respectively, would match the Proposal's cumulative 2055 GHG emission reduction. Analogously, reducing the fleetwide GHG targets of Alternative 3 by 8.7 and 17.4 g/mi in MYs 2031 and 2032 would match Alternative 1's cumulative 2055 GHG emission reductions. The CO2 emission targets under these amended scenarios are shown in Table 6. EPA assumed that BEVs would be driven the same number of miles as the ICEVs they replaced, so electrification produced no change in fleet VMT. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

[See original attachment for Table 6: Fleetwide Certification CO2 Targets Sales Under Certain EPA Options and Two New Scenarios (g/mi)] [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

EDF also estimated the level of BEV sales under the two new control scenarios by assuming that ICEV emissions in 2032 continue through 2055 (roughly 250 g/mi CO2 for average ICEV). The results are shown in Table 7. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

[See original attachment for Table 7: BEV Sales Under Various EPA Options and Two New Scenarios] [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

The increased level of BEV sales in the last two years of Alternative 3 in order to match the performance of the Proposal are modest: less than 1% increase in MY 2031 and 3% points in MY 2032. The increases in BEV sales required to match the performance of Alternative 1 are more substantial but still reasonable: 3% points in MY 2031 and 7% points in MY 2032. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

Moreover, as we discuss earlier in these comments, automakers can also choose to meet standards through additional ICEV reductions and deployment of PHEVs. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

EDF used the OMEGA 2 and OMEGA Effects models to project the cumulative benefits of the Proposal, Alternative 1 and the two other scenarios based on Alternative 3. The emission reductions projected for the four scenarios are summarized in Table 8. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

[See original attachment for Table 8: Cumulative Emission Reductions for Calendar Years 2027-2055 (Million metric tons for GHG, metric tons for criteria pollutants)] [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

The GHG emission reductions for the two scenarios with strengthened later year standards either exceed those of the Proposal and Alternative 1 or are within 1%. The same relationship holds for emissions of fine PM and NOx. However, the sOx emission reductions for the two scenarios with strengthened later year standards are much larger than those for the Proposal and Alternative 1, likely due to the fact that vehicle electrification is larger in the later years when the electrical grid is cleaner. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

Accordingly, we encourage EPA to consider strengthening standards in later model years of the program (2031 and 2032), which can deliver important, additional emission reductions regardless of the alternative EPA finalizes. It is especially vital that the agency do so to ensure any final rule delivers emission reductions at least as great as the proposal, should EPA otherwise choose to pursue a pathway like Alternative 3 that, absent strengthening, would not deliver these benefits. [EPA-HQ-OAR-2022-0829-0786, pp. 38-41]

Organization: Ford Motor Company

Ford supports the 2032 endpoint of the Multi-Pollutant Proposal which may result in approximately 67 percent of new light- and medium-duty vehicles being ZEVs. As summarized here and detailed in the Attachment, the most reliable way to reach that endpoint is for the EPA to adopt the "Alternative 3" GHG standards with several, modest adjustments. [EPA-HQ-OAR-2022-0829-0605, p. 2]

To achieve the 2032MY goals EPA has proposed and Ford supports, the final regulation must have the following elements. First, regarding the stringency of the GHG standards, the EPA should finalize the Alternative 3 standards with minor adjustments to the utility allowance inherent in the truck curves and provide a phase-out for refrigerant credits (rather than eliminate all at once). The Alternative 3 standards effectively draw a straight line from 2026 to 2032; that is, they would require roughly equal reductions in absolute grams-per-mile targets over the duration of the program. Alternative 3 reaches the same endpoint in 2032 as the EPA's main proposal, and therefore would achieve the primary goal shared by Ford and EPA—widespread adoption of ZEVs. In contrast, EPA's main proposal, Alternative 1, and Alternative 2 each would require precipitous reductions in 2027 – 2029; this is not feasible and does not align with the anticipated scaling of the EV supply chain and manufacturing base. Similarly, the EPA's proposal to end refrigerant credits altogether in 2027 would be abrupt and have the effect of standards being even more strict; EPA should phase these credits out over time. Lastly, EPA's final regulations must continue to recognize the utility provided by trucks. Although electrified vehicles hold promise for all vehicles classes, ICE-powered trucks will continue to provide unique capability and utility for many years. The EPA proposal (and Alternative 3) would reduce the existing truck utility allowance too severely. [EPA-HQ-OAR-2022-0829-0605, p. 3]

As the EPA and others consider the many trade-offs in this rulemaking, Ford must emphasize that investments in EVs will yield far greater emissions reductions than investments toward incremental improvements to already-advanced ICE technologies. These considerations are particularly important in the early years of the EPA program, where the EV market must reach critical mass. Accordingly, we encourage EPA to avoid setting criteria emissions requirements that will force unnecessarily large or ill-timed investments and distract both automakers and the supply base with little air quality benefit. [EPA-HQ-OAR-2022-0829-0605, p. 4]

Light-Duty GHG Stringency and Alternatives

Ford commends EPA staff for recognizing the uncertainty and challenges associated with such a transformation rulemaking effort by including alternatives to the main proposal. Ford believes that Alternative 3 represents the most feasible pathway toward achieving a successful program, and considers the following aspects of Alternative 3 to be essential elements of a final rule: [EPA-HQ-OAR-2022-0829-0605, p. 5]

1) Alternative 3 includes a more feasible, uniform ramp rate across the 2027 – 2032MY program timeframe while reaching the same endpoint as the main proposal. In contrast, the main proposal, and Alternatives 1 and 2 are impractically “front-loaded”, with higher year-over-year stringency increases in the early years of the program. [EPA-HQ-OAR-2022-0829-0605, p. 5]

2) Alternative 3 also distributes a change in the relative stringency of the car and truck curves over the 2027 – 2032MY timeframe. The main proposal and Alternatives 1 and 2 apply this adjustment all in one year (2027MY) creating a step-change in the truck stringency that is infeasible for full-line OEMs. It should be noted that while Ford supports the distributed approach of such a rebalancing as implemented in Alternative 3, Ford disagrees with the magnitude of this rebalancing as described in the following section. [EPA-HQ-OAR-2022-0829-0605, p. 5]

Organization: Hyundai Motor America

President Biden’s Executive Order 14037 – setting an EV penetration target of 50% in MY 2030 – Should Guide the Final Rule.

Hyundai supports EPA’s overall emissions reduction goals and, as a legacy automaker with a high share of EV sales compared to our peers, we understand EPA’s goal of the NPRM to aggressively accelerate penetration of BEVs. Hyundai continues to support the already aggressive goal set by the Biden Administration on August 5, 2021, in the “Executive Order on Strengthening American Leadership in Clean Cars and Trucks” (“Executive Order 14037”) that 50 percent of all new passenger car and light truck sales in MY 2030 be battery, fuel cell, and plug-in hybrid electric vehicles. [EPA-HQ-OAR-2022-0829-0599, p. 2]

However, the Proposed Alternative deviates in substantial ways from Executive Order 14037. First, the Proposed Alternative not only significantly increases the penetration rates, but also ignores the PHEVs and FCEVs that were previously included in that calculation, and which are critical to facilitating a safe and reliable transition to EVs. These adjustments are premised on overly- optimistic assumptions and do not account for the numerous hurdles facing implementation of such an aggressive transition timeline. As described in more detail in this comment and in the comments of the Alliance for Automotive Innovation (“AFAI”), the Proposed Alternative does not adequately consider significant challenges faced by all aspects of the market when forcing such transformational change. For example, the Proposed Alternative insufficiently accounts for supply chain constraints, availability of safe and responsibly sourced critical minerals (which are essential for battery production), manufacturing limitations, inadequate charging infrastructure, and significantly lagging consumer acceptance. In light of these challenges, the ambitious timelines proposed by EPA will likely further drive up the cost of EVs, making these vehicles less available to the mass market consumers and priority communities who arguably need them the most. [EPA-HQ-OAR-2022-0829-0599, p. 2]

Accordingly, we request that EPA modify the final standard to appropriately consider these significant challenges, and encourage EPA to adopt the proposal put forward by AFAI. We look forward to working with EPA in finalizing a rule that achieves historic emission reductions and fortifies our path toward full electrification while also allowing for a safe, affordable, and reliable transition for US consumers. [EPA-HQ-OAR-2022-0829-0599, p. 2]

We appreciate EPA's efforts to finalize a rule that achieves historic emissions reductions and puts industry on a firm path toward full electrification. However, the Proposed Alternative goes beyond what was already an aggressive target set by the Biden Administration, setting a drastically steep ramp for compliance while simultaneously removing much needed flexibilities. The current proposal inadequately accounts for real-world challenges, including the short lead time provided to vastly improve charging infrastructure, significant supply chain challenges, availability of safe and reliable supply of critical minerals, manufacturing limitations, and significantly lagging consumer acceptance rates. In addition, the true cost to consumers and automakers resulting from the IRA provisions is not fully reflected in the NPRM. We encourage the EPA to work directly with industry to better understand and analyze these challenges. For these reasons, we believe the Proposed Alternative may not be achievable and therefore support the AFAI Proposal which – while it is ambitious – better reflects real-world challenges and opportunities. [EPA-HQ-OAR-2022-0829-0599, p. 10]

Organization: Institute for Policy Integrity at New York University School of Law

IV. Barring a Compelling Reason Otherwise, EPA Should Select the Alternative That Will Maximize Net Social Welfare

Section 202 of the Clean Air Act instructs EPA to balance its mandate to safeguard "public health and welfare" with an "appropriate" consideration of costs.198 In the Proposed Rule, EPA "finds that the expected compliance costs for automakers are reasonable in light of the emissions reductions in air pollutants and the resulting benefits for public health and welfare" and recognizes that a finding of significant net benefits "reinforces" its conviction that the proposed standards are "appropriate."199 Moreover, President Biden has reaffirmed the principles of Executive Order 12866,200 which include a mandate that each agency, "in choosing among alternative regulatory approaches, . . . should select those approaches that maximize net benefits," including "distributive impacts" and "equity," to the extent permitted by law.201 EPA should follow these principles in setting these standards. [EPA-HQ-OAR-2022-0829-0601, pp. 29-30]

198 42 U.S.C. §§ 7521(a)(1)–(2).

199 Proposed Rule, 88 Fed Reg. at 29,198, 29,344.

200 Exec. Order 14,094 § 1, 88 Fed. Reg. 21,879 (Apr. 11, 2023).

201 Exec. Order 12,866 § 1(a), 58 Fed. Reg. 51,735, 51,735 (Oct. 4, 1993).

Applying these standards, EPA should more strongly consider Alternative 1 (the most stringent among the options analyzed), particularly in light of the economic recommendations and analysis presented in this letter. EPA's proposed program would reduce emissions and increase net social welfare and so is justifiable,202 yet the analysis accompanying the Proposed Rule shows that Alternative 1 would result in $200 billion more net benefits through 2055.203 Critically, EPA concludes that Alternative 1 is "anticipated to be feasible."204 Alternative 1 is more net beneficial than the proposed program in part because of greater reductions in air pollution,205 which EPA describes as "[a]n essential factor . . . in determining the appropriate level of the proposed standards."206 Moreover, the $200 billion figure does not take into account significant unmonetized benefits that would likely further increase Alternative 1's relative advantages.207 [EPA-HQ-OAR-2022-0829-0601, pp. 29-30]

202 Proposed Rule, 88 Fed. Reg. at 29,200 tbl.6.

203 Compare Proposed Rule at 29,200 tbl.6, with id. at 29,200 tbl.17 (at a 3% discount rate and the 9[5t]h percentile values for the SC-GHG at a 3% discount rate).

204 Proposed Rule, 88 Fed Reg. at 29,280. EPA concludes that "standards substantially more stringent than Alternative 1 would not be appropriate because of uncertainties concerning the cost and feasibility of such standards." Id. at 29,201.

205 Compare Proposed Rule, 88 Fed Reg. at 29,348 tbl.135, and id. at 29,355–56 tbl.147, with id. at 29,348 tbl.136, and id. at 29,356 tbl.148.

206 Proposed Rule, 88 Fed Reg. at 29,344.

207 See Proposed Rule, 88 Fed Reg. at 29,380 (noting that the Proposed Rule does not monetize the benefits associated with reducing ambient concentrations of ozone, reductions in direct exposure to NO2 and mobile source air toxics, improved ecosystem effects, or visibility); id. at 29,389 (noting that the Proposed Rule does not monetize military benefits as a result of reductions in U.S. oil imports); RIA at 7-38 tbl.7-1 (showing that the Proposed Rule does not monetize numerous adverse impacts of PM2.5, including certain cardiovascular, respiratory, cancer, nervous system, metabolic, reproductive, and developmental effects).

Additionally, further analysis shows that Alternative 1 is likely even more net beneficial versus the proposed program than EPA currently acknowledges. Applying updated discount rates and climate-damage valuations shows that Alternative 1 is $300 billion more net beneficial than the proposed program.208 Furthermore, approval of the preemption waiver for California's Advanced Clean Cars II (ACC II)—which could occur before this rule is finalized, and thereby shift the analytical baseline—may further reinforce the conclusion that Alternative 1 is most net-beneficial.209 According to EPA's analysis, selecting Alternative 1 in the absence of the waiver would increase BEV penetration relative to the proposed program by 2 percentage points and increase per-vehicle cost by $611 in 2032.210 In contrast, selecting Alternative 1 with the waiver already in place would increase BEV penetration relative to the proposed program by 4 percentage points (i.e., doubling the incremental effect) while increasing per-vehicle cost by $763 in 2032 (a far more modest increase on a percentage basis).211 This suggests that Alternative 1 may be even more net beneficial compared to the proposed program with ACC II in place. [EPA-HQ-OAR-2022-0829-0601, pp. 29-30]

208 See supra p. 12 tbl.3.

209 EPA conducts sensitivity analysis that considers how approval of the ACC II preemption waiver would affect the agency's regulatory impact analysis but does not present the benefits, cost, or net benefits under that scenario. Nor was Policy Integrity able to determine the benefits, cost, and net benefits under this sensitivity in OMEGA.

210 Proposed Rule, 88 Fed Reg. at 29,333 tbl.99; id. at 29,203 tbl.12.

211 Id. at 29,355 tbl.108; id. at 29,355 tbl.109.

For the reasons discussed in supra Section I and elsewhere in this letter, Alternative 1 would not substantially increase legal risk under the major questions doctrine. Alternative 1 relies on the same regulatory approaches that have considerable precedent in prior EPA tailpipe rules.212 It also has similar effects on BEV penetration.213 [EPA-HQ-OAR-2022-0829-0601, pp. 29-30]

212 See generally supra Part I.B.

213 See supra p. 10 tbl.2.

Accordingly, barring a compelling reason otherwise, EPA should select the regulatory alternative that maximizes net benefits—according to EPA's current analysis, Alternative 1. [EPA-HQ-OAR-2022-0829-0601, pp. 30-31]

Organization: International Council on Clean Transportation (ICCT)

ICCT recommends the adoption of Alternative 1, the most stringent option EPA presents in its proposal for the light-duty vehicle (LDV) GHG standards. We believe even greater GHG reductions than laid out in Alternative 1 would be feasible because today's technology, policy, and market landscape have primed the market for a rapid transition to cleaner vehicles. Substantial public and private sector investments and a comprehensive package of federal and state level policies make the timing and stringency of the proposed rule achievable, feasible, and cost-effective. At the federal level, the combination of substantial consumer and industry incentives from the $370 billion allocated to climate and clean energy investments through the Inflation Reduction Act of 2022 (IRA) will accelerate the shift to electric vehicles while supporting a domestic supply chain and charging infrastructure buildout. In parallel, the Bipartisan Infrastructure Law complements the IRA by investing $7.5 billion in electric vehicle charging infrastructure, $10 billion in clean transportation, and more than $7 billion in battery components, critical minerals, and materials. [EPA-HQ-OAR-2022-0829-0569, p. 3]

At the state level, policymakers are charging ahead with their own zero-emission vehicle regulations, investments, consumer incentives, planning, and infrastructure deployment. California's Advanced Clean Cars II (ACC II) regulations will require dramatic reductions in light-duty vehicle emissions to 100% zero-emissions by 2035 through the Zero-Emission Vehicle Regulation and the Low-emission Vehicle Regulations. Many other U.S. states follow California's leadership on automotive emissions regulations. As of May 2023, 7 states have adopted ACC II and it is likely that others will follow. By adopting its proposal, EPA can build on ACC II and expand access to cleaner vehicles more broadly across the U.S. [EPA-HQ-OAR-2022-0829-0569, p. 3]

Globally, automakers have already announced over $1.2 trillion in investments in electrification. These investments will lead to greatly expanded model line-ups and production volumes, technological advancements, and reduced costs. [EPA-HQ-OAR-2022-0829-0569, p. 3]

ICCT recommends EPA finalize Alternative 1 for the greenhouse gas (GHG) emissions standards for light-duty vehicles (LDV) and believes the GHG standards for medium-duty vehicles (MDV) could also be strengthened. These recommendations are based on thorough and clear evidence (detailed in the sections below) that additional GHG reductions could be possible through continued and cost-effective internal combustion engine (ICE) technology improvements and battery electric vehicle (BEV) penetration at lower costs than EPA estimates in its modeling. [EPA-HQ-OAR-2022-0829-0569, p. 4]

ICCT strongly supports the proposed multi-pollutant emission standards for light-and medium-duty vehicles for model years 2027-2032 and recommends its finalization as quickly as possible. Doing so will provide a clear long-term signal that automakers, suppliers, charging companies, and utilities need to make needed investments with confidence. [EPA-HQ-OAR-2022-0829-0569, p. 5]

PROPOSED STRINGENCY

ICCT supports the proposed standards and recommends EPA finalize Alternative 1. Our research shows that the proposed standards are likely less costly than estimated and can be met with a variety of technological approaches and pathways, evidenced by the BEV and ICE technology updates discussed above. Alternative 1 is even more cost-effective and delivers greater environmental and health benefits than the proposed standards. [EPA-HQ-OAR-2022-0829-0569, pp. 55-56]

Comparing Tables 6, 17-19 of the Preamble, Alternative 1 is projected to result in higher net benefits than any other standards contained in the proposal. Moreover, fuel savings alone offset increased technology costs several times over. As discussed above, BEV and ICE technology cost, effectiveness, and availability that has yet to be incorporated by EPA's modeling will make complying with Alternative 1 standards easier and less costly than currently modeled. Furthermore, with widespread adoption of California's ACC II program in other states, the cost of Alternative 1 decreases substantially. Comparing DRIA Tables 13-45 and 13-49, by MY2032 the projected manufacturing cost under Alternative 1 (versus the ACC II adoption sensitivity baseline) are nearly identical to the costs of the proposed standards (versus the central analysis baseline without ACCII adoption). [EPA-HQ-OAR-2022-0829-0569, pp. 55-56]

Organization: Jaguar Land Rover NA, LLC (JLR)

To support the transition to a zero-emission future, JLR would welcome EPA's consideration of our following recommendations:

1) An Alternative Glidepath to Reaching the 2032MY Target

Disconnect between Targets Set by U.S. Blueprint for Transportation Decarbonization, Biden Executive Order (E.O. 14037) and EPA Proposed Standards [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

Despite being one of the four agencies who created the U.S. Blueprint for Transportation Decarbonization, published in early 2023, there is a disconnect between the goals identified in the roadmap and EPA proposed standards. [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

The actions highlighted in the Blueprint build on the August 2021 E.O. 14037 4 which set an ambitious goal for:

"50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles." [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

4 Executive Order 14037 of August 5, 2021 - Federal Register: Strengthening American Leadership in Clean Cars and Trucks

The Blueprint specifically calls to:
"Continue to provide funding and policy incentives to accelerate the uptake of low- or zero-emission vehicles and invest in supporting infrastructure…Achieve 50% of electric light-duty vehicle sales by 2030". [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

EPA's proposal is significantly more aggressive than the above targets, with a total fleet projected BEV rate of 60% in 2030MY to achieve the new standards, which would require coordination and investment above and beyond that already accounted for within the Blueprint to achieve. The true delta between the targets cannot be quantified fully, as EPA's analysis does not include PHEVs, and we would like to highlight the comment made by EPA that they "recognize that the inclusion of PHEVs could potentially increase the combined ZEV share projection beyond the BEV penetration levels shown...". If PHEV share remained constant at 20% of the ZEV fleet (including PHEV) as per 2022 sales,5 the 60% BEV share required to achieve standards could rise to 72% ZEV share in 2030MY, 22% greater than the E.O. 14037 and Blueprint goals. [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

5 S&P Global Mobility (IHS Markit) - Automotive Global Vehicle Registrations - https://www.marketplace.spglobal.com/en/datasets/automotive-global-vehicle-registrations-(248) (subscription)

JLR suggests that EPA's 2030MY target reflects a maximum projected ZEV share of 50%, aligning with both the Blueprint and E.O. 14037 which JLR supports. [EPA-HQ-OAR-2022-0829-0744, p. 5]

We need less stringent targets in the early years and then, based on our plan, we expect to achieve the more ambitious targets in the outer years which will allow us to meet EPA's 2032MY target. The front-loaded stringency in the NPRM, drives tough targets before 2030MY and could divert investment away from this journey. This could drive us to accrue large liabilities for 2024 and 2025MY as we begin to transition our fleet. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

The difficulty in the beginning of the regulation is compounded by the extremely high step change between 2026 and 2027MY standards (when adjusted to reflect the proposed reduction in allowable AC and off-cycle credits.) Due to the changes to the footprint curves, light truck standards increase at almost double the rate of passenger car (21% vs 12%). This particularly impacts JLR as an OEM with a high percentage of off-cycle technologies (OCT) and air conditioning (A/C) featured in our vehicles, as noted in the 2022 EPA Automotive Trends Report8. Reaching the 10 g/mile OCT cap and with the highest reported A/C credit (24.2 g/mile), equivalent to an 8% reduction from tailpipe emissions for A/C credits alone in 2021. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

8 The 2022 EPA Automotive Trends Report–- https://www.epa.gov/system/files/documents/2022-12/420s22001.pdf

[See original for graph, "Figure 2–- See appendix A1 for more details"] [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

Our alternative proposal for the standards as illustrated in Figure 2 above includes a lower rate of stringency increase in the earlier years (MYs 2027-2030) than in the later years. The 2027MY combined fleet target is identical to the proposed target for EPA's Alternative 3 scenario. Although this is less stringent than the central EPA proposal, we propose from 2030MY onwards an increased ramp rate to match the central proposed target of 82 g/mile in 2032MY. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

Setting targets out to 2032MY, eight years in advance, is appreciated from a planning perspective, and we support the end goal, however it is difficult to predict what will happen with regards to the EV transition and we need time to develop the fleet and grow the EV market sustainably. This suggested amendment to the stringency rates will not affect the overall aim of the regulation as our proposed end target is equivalent to EPA's goal. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

We believe that reduced stringency in the earlier years of the regulation is essential and JLR requests that EPA adopt our alternative stringency proposal. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

Appendix A1

To generate our alternative proposal, we have taken the projected BEV penetration values for the NPRM Proposed Alternatives 2 and 3 in 2029MY, (46%, 52%) and the corresponding proposed combined fleet targets in g/mile. (132, 122) [EPA-HQ-OAR-2022-0829-0744, p. 13]

The JLR Alternative Proposal is based on a 50% BEV penetration rate at 2030MY. To find the corresponding appropriate target in g/mile, the fleet target change between Alternative 2 and 3 (10) is divided by the difference in proposed BEV rates (6%). This increment is multiplied by four to find the step change between Alternative 3 and JLR Alternative Proposal. This value is subtracted from the Alternative 3 target to give the new JLR combined fleet target in g/mile as stated in the table below. [EPA-HQ-OAR-2022-0829-0744, p. 13]

2029MY Standards	Alternative 3	JLR Alternative Proposal	Alternative 2
Proposed Combined Fleet Target (g/mile)	132	125.3	122
Projected BEV Penetration (%)	46	50	52

In terms of YoY stringency increases, the JLR Alternative proposal:

- 2027MY matches Alternative 3,
- 2028 and 2029MY have identical stringency increases compared to the NPRM Proposal for 2030 and 2031MY,
- 2030MY increase is equal to the 2028MY Alternative 3 step change,
- 2031MY jump aligns with Alternative 3 in 2032MY,
- 2032MY increase is slightly higher than proposed in both NPRM and Alternative 3 to reach the same end point.

Stringency	NPRM Proposal	Alternative 3	JLR Alternative Proposal
2027MY	18%	11%	11%
2028MY	14%	10%	8%
2029MY	15%	11%	9%
2030MY	8%	13%	10%
2031MY	9%	14%	17%
2032MY	12%	17%	21%

[EPA-HQ-OAR-2022-0829-0744, p. 13]

Organization: Kia Corporation

- Kia strongly recommends EPA reevaluate its proposed GHG standards and instead align closer with the 2030 goal set in President Biden's Executive Order (EO) 14037.2 Kia supports a goal of 40-50 percent zero emission vehicles (ZEVs) – battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs) by model year (MY) 2030 with continued increases through MY2032, coupled with appropriate supporting policies. [EPA-HQ-OAR-2022-0829-0555, pp. 2-3]

2 "Strengthening American Leadership in Clean Cars and Trucks," Executive Order 14037, August 5, 2021, 86 Fed Reg 43,583.

EPA discusses that standards substantially more stringent than Alternative 1 would be inappropriate "because of the uncertainties concerning the cost and feasibility of such standards."10 Kia argues that proposing requirements above 40-50 percent ZEV penetration by 2030 would be inappropriate. [EPA-HQ-OAR-2022-0829-0555, pp. 5-6]

10 88 Fed. Reg. 29,201.

If EPA finalizes any of the proposed GHG standards included in the NPRM, it could have harmful consequences to the EV market by going too far too fast by forcing EVs at a rate that outpaces EV affordability, EV infrastructure, and critical mineral supply chain. Going too fast could end in consumer rejection of EVs that will be difficult to ever overcome. [EPA-HQ-OAR-2022-0829-0555, pp. 5-6]

However, out of EPA's proposed standards, Alternative 3 would be harmful, but the least harmful, to automakers, the EV market, and consumers. To be clear, Alternative 3 proposed standard, achieving the same stringencies as the proposed standards in MY2032, is still grossly overly optimistic. However, Alternative 3 at least provides for a more consistent rate of stringency and a more realistic slope of consumer acceptance over MYs 2027 - 2031 than EPA's other proposals. [EPA-HQ-OAR-2022-0829-0555, pp. 5-6]

Kia is staunchly committed to electrification. But regulation of the vehicle industry alone will not create a dramatic increase in demand for electric vehicles or smooth supply chain volatilities. [EPA-HQ-OAR-2022-0829-0555, pp. 5-6]

Organization: Lucid Group, Inc.

Support for the Cleanest Alternative

As proposed, GHG standards would increase in stringency each year over a six-year period starting in MY 2027, targeting a resulting industry-wide light-duty fleet average of 82 grams/mile (g/mi) of CO_2 in MY 2032. Lucid recognizes the significance of a 56% reduction in the projected fleet average GHG emissions target levels from the existing MY 2026 standards, however, we believe we face an existential crisis from climate change and industry needs to do their part to address this threat. As such, Lucid strongly encourages the agency to adopt Alternative 1, which is estimated to lead to CO_2 targets that are 10 g/mi lower on average than the proposed rule. We find that Alternative 1 is consistent with actions from this Administration to combat the climate crisis and ramps up the nation's progress toward a zero-emission future and its benefits sooner. [EPA-HQ-OAR-2022-0829-0664, pp. 3-5]

Of the alternatives provided by EPA alongside the proposed standards, Lucid finds that Alternative 1, which is projected to result in an average light-duty target of 72g/mi and EPA has determined to be feasible in terms of cost and highly protective of human health and the environment, provides the most appropriate and immediate response to the tailpipe emissions that are attributable to light-duty combustion vehicles on our roadways. However, an updated assessment that includes current production EVs in the market would further affirm EPA's feasibility findings. EPA cited Ward's Automotive Intelligence data that portrays U.S. electrified new sales percentages implied by OEM announcements for 2030 or before, yet the dataset omitted several EV market participants that could have further influenced EPA's findings. EPA used MY 2019 as the basis for their analysis in the proposed rulemaking, which is not reflective of the tremendous strides that yielded the EV marketplace of today. [EPA-HQ-OAR-2022-0829-0664, pp. 3-5]

The benefits of stringent tailpipe emissions standards are widespread. One such example can be found in the health disparities between communities that are close in proximity to major roadways and arteries and those that aren't, as these locations often exhibit high concentrations of air pollutants from motor vehicles. Populations who live, work, or go to school near high-traffic roadways experience higher rates of adverse health effects as compared to populations that are located away from major roads.7 Relatedly, EPA regulations for vehicles have lowered the near-road concentrations and gradients of traffic-related air pollution around major roads.8 This impact demonstrates that tailpipe emission standards go beyond combatting the climate crisis and directly impact the health of communities today, an output that EPA has stated each of the alternatives must reflect. [EPA-HQ-OAR-2022-0829-0664, pp. 3-5]

7 In the widely-used PubMed database of health publications, between January 1, 1990 and December 31, 2021, 1,979 publications contained the keywords "traffic, pollution, epidemiology," with approximately half the studies published after 2015.

8 Sarnat, J.A.; Russell, A.; Liang, D.; Moutinho, J.L; Golan, R.; Weber, R.; Gao, D.; Sarnat, S.; Chang, H.H.; Greenwald, R.; Yu, T. (2018) Developing Multipollutant Exposure Indicators of Traffic Pollution: The Dorm Room Inhalation to Vehicle Emissions (DRIVE) Study. Health Effects Institute Research Report Number 196, available at: https://www.healtheffects.org/publication/developing-multipollutant-exposure-indicators-trafficpollution-dorm-room-inhalation.

Organization: Maryland Department of the Environment (MDE)

The Maryland Department of the Environment (MDE) is writing to express our support for the above proposed rule to establish Multi-Pollutant Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. MDE agrees that this comprehensive federal program would achieve significant greenhouse gas (GHG) and criteria pollutant emissions reductions, improve air quality, and result in substantial public health benefits while helping us meet our climate and air quality goals. MDE urges the Environmental Protection Agency (EPA) to adopt the proposed criteria pollutant standards. MDE also urges EPA to adopt the most stringent, technologically feasible Alternative 1 GHG emissions standards. Alternative 1 is the closest to being in alignment with the California Advanced Clean Cars II (ACC II) regulations, which Maryland is in the process of adopting. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland has made a lot of progress over the past few decades towards clean air. The improvements have been so substantial that the EPA has proposed to determine that the Washington, District of Columbia-Maryland-Virginia nonattainment area has clean data for the 2015 8-hour ozone national ambient air quality standard (2015 ozone NAAQS). A Clean Data Determination (CDD) is the first step in being redesignated from nonattainment to attainment. The Baltimore nonattainment area will also be eligible for a CDD in the near future if the area continues to stay at or below the ozone standard. Nitrogen oxides (NOx) are a precursor pollutant of ground-level ozone and are also precursors to secondary small particulate matter (PM2.5). Exposures to these two pollutants are associated with premature death, increased hospitalizations, and emergency visits due to exacerbation of chronic heart and lung diseases and other serious health impacts. Some areas of the state experience higher rates of illnesses such as asthma than average, and these illnesses are aggravated by these pollutants. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

While significant progress has been made statewide, continuing to reduce NOx emissions, especially those from the transportation sector, is critical to our efforts to attain and maintain the ozone NAAQS. Regional modeling shows that a significant portion of the ozone-forming pollutants are transported into Maryland from upwind states. EPA estimates that strengthening these standards will reduce NOx and PM2.5 emissions nationally by 41% and 35% in 2055, respectively, which combined with state reductions can provide cleaner air for Marylanders. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland is working hard to reduce in-state emissions from the transportation sector. Efforts include the Maryland Clean Cars Act that instructed MDE to adopt the California Advanced Clean Car (ACC I) regulations that require manufacturers of passenger cars and light-duty trucks to sell increasing percentages of zero-emission vehicles (ZEVs). The regulations also include low-emission vehicle (LEV) standards to reduce criteria pollutants and GHG emissions from new gasoline powered vehicles. As noted above, Maryland is in the process of adopting California's ACC II regulations. The ACC II regulations require auto manufacturers to sell an increasing percentage of ZEVs over time, with a phase in of a 100 percent sales target by 2035. ACC II also established increasingly more stringent exhaust and evaporative emissions standards for criteria pollutants from these vehicles. Maryland's recently enacted Clean Trucks Act of 2023 requires MDE to adopt California's Advanced Clean Trucks (ACT) regulations that require manufacturers of medium-and heavy-duty vehicles to sell increasing percentages of ZEVs by 2035. Maryland is also a signatory to both the 2013 Multi-State Zero-Emission Vehicle Memorandum of Understanding and the 2020 Multi-State Medium-and Heavy-Duty ZEV Memorandum of Understanding under which the signatory states are working collaboratively to accelerate ZEV adoption, coordinate ZEV policy, develop the ZEV market, and build out infrastructure. The recently enacted Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) will provide significant funding to advance electrification and charging infrastructure that will enable the widespread electrification of this vehicle market. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Adopting the most stringent, technically technical feasible Alternative 1 GHG emissions standards at the federal level will provide considerable support for Maryland's efforts to meet our GHG reduction goals. Transportation accounts for almost half of all GHG emissions generated in the State. The Climate Solutions Now Act of 2022 (CSNA) established a statewide goal of a 60 percent reduction in GHG emissions from 2006 levels by 2031. The CSNA requires more stringent GHG emission reductions economy wide and requires state agencies execute plans, programs, and policies in order to achieve these goals. Enacting the most stringent GHG emissions standards that are technologically feasible will complement the many strategies being implemented under the CSNA. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland has implemented emissions reduction measures across all sectors, including on-road transportation to reduce the state's GHG and NOx emissions. Federal programs such as these standards are needed to provide significant additional reductions of these pollutants as they also provide benefits across the economy. The EPA's leadership in strong regulatory GHG limits from motor vehicles could also help reduce ozone and PM2.5 precursors, providing further reductions to help meet our climate and air quality goals. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

For these reasons, MDE supports the EPA's proposal to adopt the proposed criteria pollutant standards and the most stringent, technologically feasible Alternative 1 GHG emissions standards for model year 2027 and later light-duty and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

On behalf of the 52 undersigned local officials, we urge the EPA to protect the health of our cities' residents and fight climate change by finalizing the strongest clean car and truck vehicle emission standards before the end of 2023. [EPA-HQ-OAR-2022-0829-0732, p. 1]

EPA should finalize the most stringent standards possible for the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (LDV) and the Greenhouse Gas Emissions Standards for Heavy-Duty Engines and Vehicles Phase 3 (HDV). We recommend these car and truck standards: [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Be aligned on rulemaking timelines; [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Account for technological advances and cost-savings in zero-emission technologies, including those made possible by recent legislation; [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Achieve critically necessary reductions in greenhouse gases (GHGs) and other pollutants; and [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Be developed with thorough stakeholder involvement that ensures all affected communities can engage in the rulemaking process. [EPA-HQ-OAR-2022-0829-0732, p. 1]

Ambitious federal standards, coupled with actions we are taking in our cities and towns to accelerate the use of clean vehicles, will enable our localities to more quickly cut transportation pollution and help ensure our residents and businesses have access to zero-emission technologies. [EPA-HQ-OAR-2022-0829-0732, p. 1]

By implementing these recommendations, we believe that the resultant standards will not only meet the Clean Air Act's statutory command to protect public health, but will also help lower fuel costs for consumers, create good, green jobs, and reduce burden on frontline communities. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Outcomes

The final standards should [EPA-HQ-OAR-2022-0829-0547, p. 8]:

- Ensure the LDV and HDV standards support greater zero-emission vehicle adoption by considering market growth expected from IRA and IIJA investments (which will surpass existing commitments outlined in Executive Order 14037); [EPA-HQ-OAR-2022-0829-0547, p. 8]

- Put the nation on a trajectory to ensure 100 percent of all LDVs and HDVs sold in 2035 are zero-emission vehicles including pathway milestones assuring continuous progress; and [EPA-HQ-OAR-2022-0829-0547, p. 8]

- Reflect recently adopted state LDV and HDV emissions standards, consistent with state authority under the Clean Air Act. [EPA-HQ-OAR-2022-0829-0547, p. 8]

Organization: Mazda North American Operations

GHG

The CO2 fleet average standard reductions go well beyond what Mazda and the rest of the industry expected from this rule. President Biden's Executive Order 14037 targeted a goal of 50% new EV (BEV and PHEV) sales by 2030. The auto industry also publicly committed to a similar 40-50% EV target by 2030 (BEV and PHEV). The standards proposed under this rule would result in a requirement of 60% new BEV sales in 2030, and 67% by 2032. Not only are we concerned about the exceptional stringency of the proposed rule but also very concerned that these targets do not include PHEVs in any way: Mazda believes strongly that PHEVs are part of the solution as we undergo the largest vehicle powertrain transformation since the ICE became dominant in about 1920. [EPA-HQ-OAR-2022-0829-0595, p. 2]

In addition, the standards immediately increase dramatically in stringency beginning in 27MY, with a resulting 36% BEV requirement. These standards are particularly accelerated for vehicles classified as light trucks, since the gap between passenger cars and light trucks is reduced. Mazda believes it is very important that the ramp-up and the light truck gap reduction should be slower in the early years of the program, as the industry, consumers, and suppliers adapt to this new reality. EPA's proposed “Alternative 3” is a step in the right direction, but the linear reduction in standards is insufficient to alleviate the harsh early years when the long-term targets are so aggressive. [EPA-HQ-OAR-2022-0829-0595, pp. 2-3]

Organization: Mercedes-Benz AG

we recommend EPA seek a more modest ramp-up, similar to Alternative 3, to appropriately provide flexibility in the early years of the greenhouse gas (“GHG”) program. [EPA-HQ-OAR-2022-0829-0623, p. 2]

Organization: Minnesota Pollution Control Agency (MPCA)

The MPCA has supported EPA's previous efforts to strengthen vehicle emissions standards and appreciates the opportunity to comment on the proposed rule. We see the proposed rulemaking as an opportunity to advance climate action, reduce harm to Minnesotans from criteria pollutants and air toxics, and accelerate the transition to electric vehicles in our state. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Importance of new federal greenhouse gas standards for climate action

The transportation sector represents the largest source of greenhouse gas emissions in Minnesota. The top three sources in the transportation sector are light-duty trucks, heavy-duty trucks, and passenger cars.1 These categories are inclusive of light and medium-duty vehicles discussed in this proposal. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Stronger vehicle emissions standards at the federal level have lowered greenhouse gas emissions from vehicles generally. However, the long-term consumer trend of choosing larger vehicles and the general trend of more miles driven (except during the pandemic) are counteracting more significant emissions reductions in this sector. Increased emissions stringency at the federal level is critical to continuing the trend of emission reductions in this sector. Accelerating light-and medium-duty vehicle electrification is vital for Minnesota to meet its climate and air pollution goals. Specifically, adopting new light-and medium-duty vehicle emissions standards would: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

1 Greenhouse gas emissions in Minnesota 2005-2020, https://www.pca.state.mn.us/sites/default/files/lraq-2sy23.pdf.

-Help the state meet economy-wide greenhouse gas emissions reduction goals.

In 2022, as part of the publication of the state's Climate Action Framework,2 Governor Walz and Lieutenant Governor Flanagan endorsed the economy-wide greenhouse gas emissions reduction goal for the state to reduce emissions by 50% by 2030 and to become carbon-neutral by 2050. In May 2023, Minnesota codified these targets in statute. Achieving these goals will require action at all levels of government, across businesses, and by individuals. The proposed multipollutant standards will be critical for reducing emissions from the transportation sector. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

2 Minnesota's Climate Action Framework, https://climate.state.mn.us/minnesotas-climate-action-framework.

-Advance transportation actions and targets in the state's Climate Action Framework.

Minnesota's Climate Action Framework is a plan that sets a vision for how the state will address and prepare for climate change. The framework broadly guides the direction of climate action toward a carbon-neutral, resilient, and equitable future for Minnesota and contains immediate, near-term actions, as well as key progress indicators with measurable targets. The framework was developed based on significant input from stakeholders, the public, and the Tribal Nations located within Minnesota's modern borders. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

The proposed light-and medium-duty vehicle standards would advance the following actions in the Clean Transportation goal: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

--Increase the use of clean fuels, including lower-carbon biofuels (Sub-initiative 1.2.1)

--Expand electric vehicle (EV) charging infrastructure (Sub-initiative 1.2.2)

--Increase EV availability and access (Sub-initiative 1.2.3)

--Accelerate the transition to EVs and clean transportation (Sub-initiative 1.2.4)

--Improve vehicle efficiency and emissions standards (Sub-initiative 1.2.5)

Additionally, the proposed standards would advance the following targets for the Clean Transportation goal:

--Reduce greenhouse gas emissions from the transportation sector 80% by 2040

--Reach 20% electric vehicles on Minnesota roads by 2030 [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Importance of new federal standards in accelerating vehicle electrification efforts in Minnesota

The MPCA agrees that zero emission vehicle technology is available and viable in many use cases, and the technology is rapidly advancing. Vehicle manufacturers have made major commitments to electrification. However, to address its regulatory obligations to reduce harmful climate-changing pollutants, EPA must lock in those commitments, ensure all manufacturers act, and push the manufacturers to go farther faster. The significant investments that Minnesota is making, as well as the investments from the Bipartisan Infrastructure Law and Inflation Reduction Act will support the industry's transition to electrification and its ability to achieve stringent emissions standards. [EPA-HQ-OAR-2022-0829-0557, p. 3]

The proposed standards would provide more certainty in these efforts and help Minnesota transition more quickly to electric vehicles, achieving earlier reductions in greenhouse gas emissions, criteria air pollutants, and air toxics. Minnesota has made significant efforts toward electrification; now we need EPA to adopt stringent vehicle emissions standards that will drive manufacturers to produce these vehicles at the scale needed to address climate change. [EPA-HQ-OAR-2022-0829-0557, p. 4]

MPCA comments and recommendations

The following are Minnesota's comments and recommendations on the proposed rulemaking:

- Set greenhouse gas emissions standards that are at least as stringent as Alternative 1 [EPA-HQ-OAR-2022-0829-0557, p. 4]

The MPCA strongly supports EPA's initiative to develop greenhouse gas emissions standards for light- and medium-duty vehicles. Specifically, MPCA supports standards that are at least as stringent as Alternative 1. The MPCA recognizes the regulation of greenhouse gases as an important role for the EPA and sees the proposed rule as an important step forward for climate action and pollution reduction. While states have the right under Section 177 of the Clean Air Act to adopt the more stringent alternative emissions standards adopted by California, it remains critical that the federal government meet its obligation to implement strong national standards. MPCA encourages EPA to adopt the most stringent standards that are technologically feasible. [EPA-HQ-OAR-2022-0829-0557, p. 4]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

To determine a realistic maximum volume of EVs the market can support for each of the model years covered by the rule, we believe EPA should consider certain critical factors. Among these factors, we believe EPA must make a thorough and realistic year-by-year assessment of key factors like projected battery costs, projected supply of battery critical-minerals, projected residential and public charging infrastructure availability, projected electrical grid capacity, and consumer acceptance of BEV technology in the broader arena. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Mitsubishi participated in the development of -and supports -the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0682, p. 2]

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators [EPA-HQ-OAR-2022-0829-0682, p. 2] :

1. Closely align the multi-pollutant emissions standards with President Biden's 2030 goal by assuming no more than 40-50% PHEVs and FCEVs by 2030, even though our experience leads us to caution that this itself is very ambitious, and is predicated on the assumption that the necessary supportive policies will be effectively implemented. [EPA-HQ-OAR-2022-0829-0682, p. 2]
2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping-stone to full BEV acceptance. [EPA-HQ-OAR-2022-0829-0682, p. 2]
3. Maintain the current PHEV Utility Factor (UF) and work with industry to identify opportunities to increase PHEV electric operation. This is the ideal stepping-stone technology to encourage long-term BEV acceptance and utilization. [EPA-HQ-OAR-2022-0829-0682, p. 2]
4. Keep the proposed approach to determine the passenger car curves, and consider adjusting the cutpoint and stringency levels of the light-duty trucks during the early years of the program. [EPA-HQ-OAR-2022-0829-0682, p. 2]
5. Maintain the existing GHG program flexibilities, such as Air Conditioning and Off-Cycle technologies credits (including the alternative method to apply off-cycle credits), and allow previously approved technologies to continue receiving credits. [EPA-HQ-OAR-2022-0829-0682, p. 2]
6. Align the Tier-4 (criteria pollutants) with CARB's LEV-IV criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 2]
7. Consider the impact that very aggressive GHG standards will have on vehicle affordability, and especially the detrimental impact to low-to-moderate income families. Regardless of the vehicles that regulation may require us to produce, it is critical that regulators always keep the accessibility of consumers in mind. [EPA-HQ-OAR-2022-0829-0682, p. 2]

The rationale for each one of these recommendations is further explained below. [EPA-HQ-OAR-2022-0829-0682, p. 2]

1. Overall GHG Stringency

Mitsubishi shares the views expressed by Auto Innovators regarding stringency of the GHG standards from MY27 through MY32. In particular, Mitsubishi is concerned that the BEV shares needed for compliance and the accelerated rate of increasing stringency proposed by EPA will create considerable risk based on factors outside the control of the industry. [EPA-HQ-OAR-2022-0829-0682, pp. 2-3]

The White House, on August 5, 2021, announced Executive Order 14037 which set a target of 50% electric vehicles by 2030. In this NPRM, EPA is estimating a BEV share of 60% by 2030, and 67% by 2032, well beyond the 50% goal of EO 14037, which included BEVs, PHEVs, and FCEVs. EPA justifies this, in part, due to manufacturer announcements and recent policies such and the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA). However, similar analysis by the Energy Information Administration (EIA) in May 2023, projects such programs will result in an EV share between 11 and 26 percent by 2050. [EPA-HQ-OAR-2022-0829-0682, pp. 2-3]

In its paper, the EIA acknowledges, "…significant uncertainties are inherent to projecting the rate…" of EV adoption. Among the factors EIA includes for this uncertainty are future policies, technology advancement, availability and access to EV infrastructure, consumer behavior, and mineral supply chains. Even with the most optimistic assumptions, the EIA only projected a 26% share of new sales coming from EVs, and that is at nearly thirty years from now3. The wide range of projected EV market shares by two government agencies within the same Administration illustrates the uncertainty of EV market drivers, yet this proposal offers no opportunities for course correction should market conditions, which are outside the control of automakers, fall short of EPA's optimistic assumptions. This, of course, leads to questions on the methodology of this NPRM. [EPA-HQ-OAR-2022-0829-0682, pp. 2-3]

3 https://www.eia.gov/todayinenergy/detail.php?id=56480, Accessed June 23, 2023

EPA included three alternatives to the proposed standard: Alternative 1 is more stringent by 10 g/mi, Alternative 2 is less stringent by 10 g/mi, and Alternative 3 proposes a linear reduction in GHG emissions starting with the MY26 standard and ending with the proposed GHG standard in MY32. While Alternative 3 reduces the stringency burden in the early years of the program, it would still require over 50% BEVs by MY30. Mitsubishi supports Auto Innovators' proposed approach to overall stringency, as, regardless of early-adopter acceptance of BEVs, we question the penetration of this technology into the mass-market approaching 50% by 2030. [EPA-HQ-OAR-2022-0829-0682, pp. 2-3]

Organization: National Association of Clean Air Agencies (NACAA)

GHG Emission Standards and Related Issues [EPA-HQ-OAR-2022-0829-0559, pp. 7-8]

NACAA supports the strongest LMDV CO2 emission standards that are technologically feasible. EPA proposes progressively more effective performance-based CO2 emission standards for MY 2027 through 2032 LDVs and MDVs. The proposed standards do not mandate the use of any specific technology, nor do they mandate that any percentage of vehicle production be ZEVs. Instead, each manufacturer may choose what mix of emission control technologies is best suited for its fleet to meet the standards. [EPA-HQ-OAR-2022-0829-0559, pp. 7-8]

The proposed LDV standards are projected to result in an industry-wide average target for the light-duty fleet of 82 gm/mi of CO2 in MY 2032, which represents a 56-percent reduction in projected fleet average GHG emissions target levels from the existing MY 2026 standards. EPA also puts forth three LDV alternatives for comment. Alternative 1 has more rigorous LDV CO2 standards than the proposal; Alternative 2 has weaker LDVs CO2 standards than the proposal; and Alternative 3 culminates with the same MY 2032 LDV CO2 standard as the proposal but reaches that standard at a more gradual rate. [EPA-HQ-OAR-2022-0829-0559, pp. 7-8]

For LDVs, NACAA supports, at a minimum, EPA's proposed CO2 standards with the addition of anti-backsliding requirements to ensure that non-ZEV vehicle emissions do not increase over time. NACAA firmly opposes Alternative 2 or any final program that is weaker than the proposal. Also, EPA should not pursue a more gradual rate of phase in for any standards it finalizes, such as under Alternative 3, unless the agency tightens the standards in MYs 2031 and 2032 to make up in full for the loss of the emission reductions that would occur from the less protective standards in the earlier years of the program. [EPA-HQ-OAR-2022-0829-0559, pp. 7-8]

For MDVs, NACAA supports EPA's proposed CO2 standards including the proposal to revise the existing MY 2027 CO2 standard because of the increased feasibility of GHG emission-reducing technologies for this sector in this time frame. EPA's proposed MDV CO2 standards would increase in stringency from MY 2027 through MY 2032, when the standards are projected to result in an average target of 275 gm/mi of CO2, representing a reduction of 44 percent from the current MY 2026 standard. [EPA-HQ-OAR-2022-0829-0559, pp. 7-8]

Organization: National Parks Conservation Association (NPCA)

First and foremost, NPCA urges EPA to move forward with Alternative 1 for light-duty vehicles instead of proceeding with other less stringent alternatives included in the proposal. We further urge EPA to increase the stringency of Alternative 1 starting in 2030 to require additional ZEV sales and ensure a greater degree of certainty in achieving one hundred percent ZEV LDV sales by no later than 2035. We firmly believe a strengthened Alternative 1 provides the greatest degree of emission reductions, the highest level of health, climate, and cost benefits, and is both technologically and economically feasible. A more stringent Alternative 1 is also necessary to keep the U.S. in line with the administration's stated 50% ZEV sales by 2030 vehicle electrification goal, as well as follow what many experts say is needed to stay under the 2° C warming threshold.18 NPCA, moreover requests that for non-ZEV vehicles sold post 2027, EPA improve upon Alternative 1 to include additional emission reduction controls for the remaining fossil fuel powered vehicles on the market. [EPA-HQ-OAR-2022-0829-0607, p. 4]

> 18 See, The White House, FACT SHEET: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks, (August 5, 2021), available at, www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact- sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/.

Organization: Nissan North America, Inc..Nissan appreciates the Administration's focus on and support for advancing electrification and carbon neutrality and shares the same long-term goal of transitioning to zero emission vehicle society. However, Nissan believes that market realities, infrastructure needs, consumer impacts, and lack of battery critical mineral availability necessitate an adjustment of the GHG standard stringency in this rulemaking timeframe. [EPA-HQ-OAR-2022-0829-0594, p. 1]

Nissan is committed to transitioning its vehicle portfolio to EVs over time and intends to remain an industry leader in EV and related battery technology innovations. Nissan supports President Biden's overall efforts to increase sales of battery, fuel cell, or plug-in hybrid electric vehicles (BEVs, FCEVs, and PHEVs, respectively) over the next decade. The Administration already announced aggressive penetration targets in the August 5, 2021 "Executive Order on Strengthening American Leadership in Clean Cars and Trucks" (hereinafter "Clean Cars EO"). The Proposed Multi-Pollutant Rule, however, goes well beyond the already ambitious goals announced in President Biden's Clean Cars EO. Not only has the penetration percentage been significantly increased (jumping from 50 percent to 60 percent in 2030), but the make-up of that percentage has drastically changed: EPA's Proposed Multi-Pollutant Rule would require a 60 percent penetration rate for BEVs only, excluding the FCEV and PHEV technologies that are critical to shepherding a safe, affordable, and reliable transition to clean vehicles. EPA has moved the goalpost, not by a few feet but by miles.

In light of these myriad challenges, EPA should adjust the proposed GHG standards set forth in the Proposed Multi-Pollutant Rule. Nissan supports a final rule that takes these realities into consideration and seeks an ambitious yet achievable target for plug-in electric vehicle (“PEV”)penetration, closer to the already ambitious targets set in the Clean Cars EO. At a minimum, Nissan requests that EPA adjust the proposed GHG standards and targets to account for a blended PEV percentage, taking into consideration emissions reductions from PHEVs and BEVs collectively. EPA has historically considered the emissions benefits of both groups of advanced technology vehicles, acknowledging the importance and need of PHEVs in the consumer shift towards clean vehicles. Nissan and others in the industry are committed to transforming the industry and have already invested significantly in pressing forward on the transition to EVs. The Proposed Multi-Pollutant Rule goes beyond what is achievable and simply forces too much too quickly. There simply is not a realistic path to achieve the level of accelerated shift in the proposed timeframe. More time is needed for such extensive and transformational change.

VII. Endorsement of Comments from the Alliance for Automotive Innovation

As a member of the Alliance for Automotive Innovation (“the Alliance”), Nissan fully endorses the comments on the Proposed Multi-Pollutant Rule submitted separately by the Alliance. In particular, Nissan highlights several points from the Alliance’s comments, including: [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support realigning the GHG standard stringency ramp up rates with market reality and uncertainties. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support realigning the Federal criteria emission standards with California’s program. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Emphasis regarding the industry’s commitment to work towards electrification as quickly as practicable, while also taking into consideration resource availability, technological capabilities, market challenges and limitations, and consumer adoption hurdles. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support continuation of tailpipe-based program and treatment of 0 g/mi for EVs [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Request reconsideration of the proposed changes in the AC and off-cycle credit programs: [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Request continuing AC and off-cycle credit eligibility for EVs that are part of mixed fleets [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Oppose phase-out of off-cycle credits and request the off-cycle credit cap be maintained at 15 g/mi [EPA-HQ-OAR-2022-0829-0594, p. 9]

Organization: Nissan North America, Inc.

These new proposed targets lose sight of the transformational change that is needed from all sectors of the U.S. economy. Automobile manufacturers such as Nissan have made and will continue to make significant investments to push the industry forward; however, such drastic and front-loaded timelines require significant changes and investments from suppliers, energy providers, mineral extraction and processing industries, battery and charging equipment manufacturers, etc. Such drastic changes to the market are nearly impossible on such a compressed timeline, particularly given the current market constraints affecting nearly all impacted sectors, such as supply-chain complications and limited availability of raw materials. This is especially true with respect to the critical minerals that are essential to battery production for EV expansion and development; EPA has not demonstrated that the critical minerals needed to meet the extremely aggressive EV penetration rates are available to be extracted in a safe, responsible, and reliable manner. Significant cooperation and organization from federal, state, and local governments will also be required to facilitate the roll-out and adoption of EVs and related charging infrastructure. [EPA-HQ-OAR-2022-0829-0594, p. 4]

Beyond the significant market and governmental challenges posed by such a drastic implementation timeline, consumer adoption will be critical to success. Consumer adoption of EVs has historically lagged behind expectations, leaving a significant hurdle to encourage a large and swift shift to EVs. Consumers need to be convinced not only of the appeal, safety, affordability, and reliability of EVs themselves, but they need to adopt the necessary community and home charging equipment to facilitate their use. Consumers will need to adapt their trip planning and driving behavior to allow for vehicle charging needs. The only way to drive these significant behavioral changes is to assure consumers that charging infrastructure is available and reliable. This is simply not a reality today and is unlikely to be a reality in time to drive such a significant shift within the timeline of the Proposed Multi-Pollutant Rule. These challenges are magnified due to the unclear and uncertain benefits under the Inflation Reduction Act, which place significant limitations on EV consumer incentive programs and charging infrastructure programs. Moreover, many consumers are reluctant or unable to purchase EVs due to their significant price premium. The Proposed Multi-Pollutant Rule will only exacerbate these inequalities, with EV prices likely to increase even more due to extreme investments required by all market sectors involved. Driving too much change too quickly will shut out many communities who need clean vehicles the most. It will likely force consumers who are uncertain about ZEV adoption to continue to operate aging ICE vehicles much longer. This is contrary to the intent of the proposal. [EPA-HQ-OAR-2022-0829-0594, p. 5]

VII. Endorsement of Comments from the Alliance for Automotive Innovation

As a member of the Alliance for Automotive Innovation ("the Alliance"), Nissan fully endorses the comments on the Proposed Multi-Pollutant Rule submitted separately by the Alliance. In particular, Nissan highlights several points from the Alliance's comments, including [EPA-HQ-OAR-2022-0829-0594, p. 9]:

- Support realigning the GHG standard stringency ramp up rates with market reality and uncertainties. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support realigning the Federal criteria emission standards with California's program. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Emphasis regarding the industry's commitment to work towards electrification as quickly as practicable, while also taking into consideration resource availability, technological capabilities, market challenges and limitations, and consumer adoption hurdles. [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support continuation of tailpipe-based program and treatment of 0 g/mi for EVs [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Request reconsideration of the proposed changes in the AC and off-cycle credit programs: [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Request continuing AC and off-cycle credit eligibility for EVs that are part of mixed fleets [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Oppose phase-out of off-cycle credits and request the off-cycle credit cap be maintained at 15 g/mi [EPA-HQ-OAR-2022-0829-0594, p. 9]

- Support coordination and harmonization between EPA, NHTSA, and CARB. One fleet should meet all programs with a common goal. [EPA-HQ-OAR-2022-0829-0594, p. 9]

While Nissan understands and supports the Administration's efforts to push for progress in EV penetration, the current proposal goes well beyond the already aggressive goals set in President Biden's Clean Cars EO. The current proposal is not achievable for numerous reasons, including technology and resource limitations, limited availability of safe and responsibly-sourced critical minerals, supply chain and manufacturing constraints, insufficient charging and energy infrastructure, and significantly lagging consumer adoption, among other reasons. In order to allow for a safe, reliable, and equitable transition to EVs, the proposal must be modified to take these factors into consideration. [EPA-HQ-OAR-2022-0829-0594, pp. 9-10]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

NESCAUM and the OTC offer the following specific comments on the NPRM.

A. Proposed LDV and MDV GHG Emissions Standards

NESCAUM and the OTC strongly support EPA's proposal to establish CO_2 emissions standards for LDVs and MDVs that would increase in stringency each year from MYs 2027–2032. EPA should adopt the most stringent standards that are technologically feasible. [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

EPA's proposed LDV standards are projected to result in an industry-wide average target for the light-duty fleet of 82 g/mi of CO_2 in MY 2032, representing a 56 percent reduction in projected fleet average GHG emissions target levels from existing MY 2026 federal standards. EPA's proposed MDV standards are projected to result in an average target of 275 g/mi of CO_2 by MY 2032, which would represent a reduction of 44 percent compared to the current MY 2026 standards. EPA also proposes to revise the existing standard for MY 2027 given the increased feasibility of GHG emissions reducing technologies in this time frame. [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

EPA's analysis finds that the proposed LDV and MDV standards could reduce net CO_2 emissions by 7.3 billion metric tons through 2055. EPA estimates the cumulative monetized climate benefits of the standards through 2055 to be $330–$500 billion (2020 $US) depending on upstream emissions and the selected discount rate.24 [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

24 See EPA, DRIA, EPA-420-D-23-003 (Apr. 14, 2023), https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0360.

Considering the state of the U.S. and global LDV and MDV markets, NESCAUM and the OTC believe that GHG standards more stringent than EPA's proposal are technologically feasible. [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

B. Multi-State Collaboration

The NESCAUM and OTC states have long understood the benefits of a coordinated approach to transportation electrification policy development and implementation. Many are signatories to the 2013 Multi-State Zero-Emission Vehicle Memorandum of Understanding,17 which set light-duty ZEV sales targets for ten states to achieve by 2025; memorialized their commitment to work together to develop policies and programs to achieve those targets; and created the Multi-State ZEV Task Force, facilitated by NESCAUM, to enable states to collaborate and coordinate on ZEV policy. NESCAUM and the Task Force have developed two action plans with recommendations for states to accelerate light-duty ZEV adoption18 and policy guidance on a wide range of related issues and topics. [EPA-HQ-OAR-2022-0829-0584, pp. 5-6]

17 Multi-State Zero-Emission Vehicles Program Memorandum of Understanding (Oct. 2013), https://www.nescaum.org/documents/zev-mou-10-governors-signed-20191120.pdf/.

18 See, e.g., Multi-State ZEV Task Force, Multi-State ZEV Action Plan 2018-2021: Accelerating the Adoption of Zero Emission Vehicles (June 2018), https://www.nescaum.org/topics/zero-emission-vehicles/multi-state-zev-action-plan-2018-2021-accelerating-the-adoption-of-zero-emission-vehicles; Multi-State ZEV Action Plan (May 2014).

Most of the NESCAUM and OTC states are also signatories to the 2020 Multi-State Medium-and Heavy-Duty ZEV Memorandum of Understanding,19 now signed by a diverse coalition of 17 states, the District of Columbia, and the Canadian province of Quebec. Collectively, the U.S. signatories represent 43 percent of the U.S. population, 49 percent of the U.S. economy, and 36 percent of the nation's medium-and heavy-duty vehicles.20 The 2020 MOU commits the signatories to collaborate to accelerate the market for zero-emission trucks, vans, and buses, and sets targets to achieve at least 30 percent medium-and heavy-duty ZEV sales by 2030 and 100 percent ZEV sales by no later than 2050. Some of the signatories have established more ambitious targets. In July 2022, NESCAUM and the Task Force released an action plan with more than 65 strategies and recommendations for state policymakers to support the rapid, equitable, and widespread electrification of MHD vehicles.21 The signatories and other Task Force states are currently working to implement these recommendations. [EPA-HQ-OAR-2022-0829-0584, pp. 5-6]

19 Multi-State Medium-and Heavy-Duty Zero-Emission Vehicle Memorandum of Understanding (July 2020), https://www.nescaum.org/documents/mhdv-zev-mou-20220329.pdf/.

20 Collectively, the U.S. signatories represent 43 percent of the U.S. population, 49 percent of the U.S. economy, and 36 percent of the nation's MHD vehicles. See Census Bureau, 2020 Population and Housing State Data (Aug. 12, 2021), https://www.census.gov/library/visualizations/interactive/2020-population-and-housing-state-data.html; Bureau of Economic Analysis, GDP and Personal Income,

https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=1&isuri=1 (visited June 23, 2022) (2021 Real GDP); Atlas Public Policy, EV Hub, https://www.atlasevhub.com/materials/medium-and-heavy-duty-vehicle-registrations-dashboard/#06f2a5dfc39daf9cc (visited June 23, 2022) (2019 IHS market data).

21 See Multi-State ZEV Task Force, Multi-State Medium-and Heavy-Duty Zero-Emission Vehicle Action Plan: A Policy Framework to Eliminate Harmful Truck and Bus Emissions (July 27, 2022), https://www.nescaum.org/documents/multi-state-medium-and-heavy-duty-zero-emission-vehicle-action-plan/.

NESCAUM and the OTC strongly support EPA's proposal to establish CO2 emissions standards for LDVs and MDVs that would increase in stringency each year from MYs 2027–2032. EPA should adopt the most stringent standards that are technologically feasible. [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

EPA's proposed LDV standards are projected to result in an industry-wide average target for the light-duty fleet of 82 g/mi of CO2 in MY 2032, representing a 56 percent reduction in projected fleet average GHG emissions target levels from existing MY 2026 federal standards. EPA's proposed MDV standards are projected to result in an average target of 275 g/mi of CO2 by MY 2032, which would represent a reduction of 44 percent compared to the current MY 2026 standards. EPA also proposes to revise the existing standard for MY 2027 given the increased feasibility of GHG emissions reducing technologies in this time frame. [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

EPA's analysis finds that the proposed LDV and MDV standards could reduce net CO2 emissions by 7.3 billion metric tons through 2055. EPA estimates the cumulative monetized climate benefits of the standards through 2055 to be $330–$500 billion (2020 $US) depending on upstream emissions and the selected discount rate.24 [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

24 See EPA, DRIA, EPA-420-D-23-003 (Apr. 14, 2023), https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0360.

Considering the state of the U.S. and global LDV and MDV markets, NESCAUM and the OTC believe that GHG standards more stringent than EPA's proposal are technologically feasible. [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

Organization: Our Children's Trust (OCT)

On behalf of America's youth, Our Children's Trust respectfully provides these comments on the U.S. Environmental Protection Agency's ("EPA") proposed Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. As the Nation's only law firm dedicated to representing youth whose constitutional rights are being infringed by their government's conduct that causes climate change, we write to advise EPA to strengthen the federal emission standards for light- and medium-duty vehicles so that they meet the urgency of the climate crisis and align with the deep emission reductions scientists say are needed to protect the climate system and the constitutional rights of youth. We also ask that the EPA revise its Draft Regulatory Impacts Analysis so that it reflects the true costs of climate change, the true benefits of more swiftly electrifying the transportation sector, and utilizes no discount rate or a discount rate that does not discriminate against children and future generations. EPA must align its rulemaking with the best available science to protect children. [EPA-HQ-OAR-2022-0829-0542, p. 1]

We are well beyond the time for incremental measures. These rules need to go further, faster and across a longer time horizon so that the entire transportation sector, and supporting industrial sectors, can plan and respond as quickly as feasible. The technology is there to expedite the transition away from the internal combustion engine and eliminate their sales by 2030 for passenger cars and light duty trucks. This is not only economically feasible, it is enormously beneficial. [EPA-HQ-OAR-2022-0829-0542, p. 1] Wim Thiery et al., Intergenerational Inequities in Exposure to Climate Extremes, 374 Science 158 (2021).

Organization: Porsche Cars North America (PCNA)

Porsche provides the following comments in support of and in conjunction with the AFAI. These comments seek to define a more achievable regulatory package that makes meaningful progress towards decarbonization goals. Furthermore, Porsche supports the concept of broadly monitoring our collective progress across all sectors involved in the march towards electrification. [EPA-HQ-OAR-2022-0829-0637, p. 19]1. Porsche supports the AFAI proposal for an annual GHG reduction goal that aligns with the 40-50% electrification industry position.

As described within the AFAI comments, Porsche is supportive of a piecewise linear annual compliance pathway that is a logical extension of the three alternative pathways proposed within the NPRM. The piecewise linear pathway could be designed with stringency levels that reflect the industrywide anticipated levels of electrification at various years from 2027-2032MY. The estimated annual compliance curve (reflecting industry average annual fleet average targets) would consist of two linear phases. The phases would essentially reflect industry wide annual percent levels of electrification that would include both pure battery electric and plug-in hybrid electric. The first phase of the piecewise linear curve defining stringency for MY2027-2030 would extend from MY2026 estimated levels of industrywide electrification and arrive at GHG targets that reflect 40-50% of industrywide electrification. The second phase of the piecewise curve could then extend from those targets in MY2030 to a more ambitious level of stringency in MY2032 that best reflects an achievable level of industrywide electrification. [EPA-HQ-OAR-2022-0829-0637, p. 19]

The importance of having a clear touch point in 2030 model year is that it reflects general industry wide positioning regarding support for an ambitious goal of 40-50% of new electrified vehicle sales at that time. This goal is aligned with the President's Executive Order and with the National Blueprint for Electrification. The range of 40 to 50% reflects a reasonable variance for such an ambitious transformative goal and as such Porsche believes that it would be reasonable to select the midpoint of this range to inform the program stringency in MY2030. In addition, Porsche believes it is reasonable for the 40-50% to include within it a mix of BEVs and PHEVs that reflects the anticipated allowance of PHEVs within CARB’s ACC2 ZEV mandate (i.e., approximately 20% PHEV within the 40-50% of total BEV/FCV/PHEV portion of new vehicle sales). [EPA-HQ-OAR-2022-0829-0637, p. 19]

Beyond 2030, the pathway should again use a linear progression, but towards a more ambitious level of electrification. The appropriate level of electrification should reflect a reasonable assessment of consumer adoption and industry readiness that pushes electrification. This target could again include a mix of BEV and PHEV vehicles consistent with the consideration during the initial phase and reflective of the continued allowance for PHEVs within CARB's ACC2 ZEV mandate (i.e., 20% PHEV of the total % of BEV/FCV/PHEV). [EPA-HQ-OAR-2022-0829-0637, p. 19]

Organization: Rivian Automotive, LLC

EPA's proposal is clearly a big step toward a fully decarbonized L/MDV sector. Nonetheless, Rivian believes an even stronger rule is possible and appropriate. Our analysis of the NPRM identified opportunities to strengthen the standards further with the adoption of Alternative 1 and targeted adjustments to certain flexibility provisions. We also offer various comments in response to other proposed changes in the discussion below. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

EPA Should Select Alternative 1 and Make Other Changes to Strengthen the Rule

EPA should select Alternative 1—and weigh the feasibility of even more stringent targets—for three key reasons. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

EPA shows that, of the alternatives considered, Alternative 1 delivers the greatest net benefits. Agency modeling demonstrates that Alternative 1 rests on realistic assumptions of improvement in emissions from ICE vehicles. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

Alternative 1 Offers the Greatest Net Benefits

In the documents introducing and accompanying the proposed rule, agency staff detailed the results of an extensive cost-benefit analysis performed as part of its deliberations. EPA's own calculations show that Alternative 1, of the proposed alternatives, will deliver the greatest net benefits to Americans, including an array of monetized climate and public health benefits. Specifically, the agency found that their main proposal would result in present value net benefits ranging from $850 billion to $1.6 trillion (7 percent and 3 percent discount rates, respectively; SC-GHG at 3 percent) while Alternative 1 would result in benefits ranging from $930 billion to $1.8 trillion (using the same the discount rates and SC-GHG).7 Despite these clear findings, EPA initially proposed a less beneficial alternative without a compelling justification. This is inconsistent with both the Biden Administration's stated goals and priorities and, perhaps most importantly, with the directive of Executive Order 12866, later reaffirmed by Executive Order 13563, that "in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits..."8 Accordingly, Rivian believes EPA should, and is obligated to, select Alternative 1 in its final determination. Finalizing any of the other proposed alternatives would not be justifiable on cost- benefit grounds. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

7 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 10-30 – 10-31.

8 Exec. Order No. 12,866, 58 Fed. Reg. 190 (Oct. 4, 1993); Exec. Order No. 13,563, 76 Fed. Reg. 14 (Jan. 21, 2011).

Finalize Standards at Least as Stringent as Alternative 1 to Put the U.S. on the Path to 100 Percent EV Sales

With the multi-pollutant emissions standards proposal for MY27 and later, EPA rose to the occasion. The standards as proposed are well calibrated to industry's investments in vehicle electrification. With the growing focus on EV development and sales, automakers can achieve deep cuts to vehicles emissions in the next decade. Indeed, Rivian finds that the available evidence supports at least the most stringent of the alternatives EPA considered. While some stakeholders argue for softening the requirements, Rivian's analysis shows that tighter standards are feasible. We call on the agency to finalize Alternative 1. EPA should strengthen its analysis with full inclusion of Rivian's production volumes, which we believe will further support the case for Alternative 1 and a second look at the MDV standards. We also recommend sunsetting the off-cycle program for all vehicle types earlier than proposed and phasing out MDV ATV multipliers. We generally support battery durability and warranty standards aligned with GTR 22 but offer some considerations regarding implementation. [EPA-HQ-OAR-2022-0829-0653, p. 17]

The need for urgent action on climate change has never been greater. We have also never before seen such a committed partner in the federal government. With some modifications and the selection of Alternative 1, the proposed regulations could mark a true turning point in our industry's journey toward a fully decarbonized future. [EPA-HQ-OAR-2022-0829-0653, p. 17]

Organization: Sierra Club et al.

We appreciate the EPA's proposal, which moves our vehicles in the right direction. However, the final emissions standard for light-duty vehicles should: [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Secure greater pollution reductions with a focus on strengthening the later model years of the program, reflecting the cost-effective availability of greater zero-emission vehicle adoption due to market growth expected from IRA and IIJA investments (which will surpass existing commitments outlined in Executive Order 14037) and state leadership; [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Put the nation on a trajectory to ensure 100 percent of all light- and medium-duty vehicles sold in 2035 are zero-emission vehicles including pathway milestones assuring continuous progress; [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Appropriately take advantage of available cost-effective improvements to new fossil-fuel vehicles; [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Leverage the growth in ZEV deployment associated with state clean car standards adopted under state authority granted by the Clean Air Act; and [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Establish protective zero-emission vehicle durability and warranty requirements [EPA-HQ-OAR-2022-0829-0668, p. 2]

We appreciate the EPA's proposal, which moves our vehicles in the right direction. However, the final emissions standard for light-duty vehicles should: [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Secure greater pollution reductions with a focus on strengthening the later model years of the program, reflecting the cost-effective availability of greater zero-emission

vehicle adoption due to market growth expected from IRA and IIJA investments (which will surpass existing commitments outlined in Executive Order 14037) and state leadership; [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Put the nation on a trajectory to ensure 100 percent of all light- and medium-duty vehicles sold in 2035 are zero-emission vehicles including pathway milestones assuring continuous progress; [EPA-HQ-OAR-2022-0829-0668, p. 2]

Organization: South Coast Air Quality Management District

There are five key issues we request U.S. EPA address before finalizing the rule.1. Extend the phase-in period and adopt more stringent standards to align with California's ACC II regulation. The proposed standards will be phased in over a six-year period from model year (MY) 2027 through 2032 with increasing stringency each year. We recommend that the phase-in period be extended to 2035 and later model years to better align with the ACC II implementation schedule which extends out to MY 2035 and subsequent years. [EPA-HQ-OAR-2022-0829-0659, p. 2]

In terms of stringency, the proposed non-methane organic gases plus nitrogen oxides (NMOG+NOx) standard would phase down to 12 mg/mi by MY 2032 for light-duty vehicles (LDVs), a 60 percent reduction from the Tier 3 standard of 30 mg/mi. For medium-duty vehicles (MDVs), the NMOG+NOx standard would phase down to 60 mg/mi by MY 2032, representing 66 percent to 76 percent reduction from the Tier 3 standard of 178 mg/mi for Class 2b and 247 mg/mi for Class 3 vehicles, respectively. While these standards represent substantial progress, we urge U.S. EPA to consider more stringent standards for CO2 and criteria pollutants to help our region achieve the national ambient air quality standards. We therefore support the adoption of the Alternative 1 stringency level for greater reductions of emissions, including NOx (47,000 tons vs 44,000 tons in 2055) as well as a higher BEV (Battery Electric Vehicle) penetration rate compared to the proposed standards (69% vs 67% in MY 2032). [EPA-HQ-OAR-2022-0829-0659, p. 2]

Furthermore, U.S. EPA should consider additional measures that are technically and economically feasible. For example, the ACC II requires manufacturers to comply with an annual zero emission vehicle (ZEV) sales percentage requirement that scales up from 35 percent in MY 2026 to 100 percent by MY 2035 (including up to 20% PHEVs). CARB's analysis supports this requirement to be both technically and economically feasible based on projected technology advancements. In comparison, the projected 69 percent BEV penetration rate in MY 2032 for Alternative 1 falls short of the ACC II requirements. We understand the proposed standards are performance-based without any mandate on ZEV sales percentages, however, U.S. EPA should conduct an additional feasibility analysis for more stringent standards that will achieve higher BEV penetration rates. [EPA-HQ-OAR-2022-0829-0659, p. 2]

Organization: Southern Environmental Law Center (SELC)

This means EPA must adopt standards that are least as strong as those it has identified as Alternative 1—the most stringent alternative analyzed as part of this proposal and a standard that EPA itself notes is "anticipated to be feasible."52 Alternative 1 will result in significant benefits compared to the current proposal, and these benefits add up. The Alternative 1 standards are projected to result in fleet-wide CO2 targets that are on average 10 g/mi lower than the current proposal,53 resulting in 800 million metric tons fewer CO_2 emissions through 2055.54 This is an approximately 61 percent reduction in projected fleet average GHG emissions target levels from the existing model year 2026 standards,55 and the Alternative 1 standards are expected to result in an approximately 69 percent battery-electric vehicle (BEV) penetration—one of the main ZEV technologies—in 2032.56 Alternative 1 also results in significantly fewer emissions of criteria pollutants and other air toxics through 2055.57 Together, these and other benefits from the stronger Alternative 1 standards are projected to deliver between $20 and $30 billion more in net benefits in calendar year 2055 than the current proposal.58 [EPA-HQ-OAR-2022-0829-0591, pp. 6-7]

52 Id. at 29201.

53 Id. at 29201.

54 See id. at tbls. 135, 136.

55 Id. at 29202.

56 Id. at tbl. 96.

57 Id. at tbls. 139, 140. We note that some of these tables appear to be mislabeled.

58 Id. at tbls. 156, 157.

Ultimately, these and other factors suggest that EPA should consider adopting even stronger standards than Alternative 1. Standards that put the United States on the path of achieving 100 percent ZEV sales by 2035 should be feasible and have the potential to result in significant benefits for communities and the environment. For example, it has been estimated that standards ensuring that all passenger vehicle sales are zero-emission by 2035 could "avoid more than 600 million metric tons of greenhouse gas emissions every year by 2040 and a total of more than 11.5 billion tons by 2050."64 Studies have projected that the widespread transition to ZEVs coupled with a shift to non-combustion electricity would result in over $978 billion in cumulative public health benefits by 2050 nationwide,65 and 40 percent of these benefits would be experienced by the 500 counties with the highest populations of color.66 [EPA-HQ-OAR-2022-0829-0591, p. 8]

64; See ENV'T DEF. FUND, CLEAN CARS, CLEAN AIR, CONSUMER SAVINGS: 100% NEW ZERO EMISSION VEHICLE SALES BY 2035 WILL DELIVER EXTENSIVE ECONOMIC, HEALTH, AND ENVIRONMENTAL BENEFITS TO ALL AMERICANS12 (Jan. 2021),s.edf.org/climate411/wp-content/blogs.dir/7/files/2021/01/FINAL-National- White-Paper-Protective-Clean-Car-Standards-1.26.21.pdf.

65 Driving to Clean Air: Health Benefits of Zero Emission Cars and Electricity, AM. LUNG ASS'N 2 (June 2023), https://www.lung.org/clean-air/electric-vehicle-report/driving-to-clean-air.

66 Zeroing in on Healthy Air, AM. LUNG ASS'N 11 (2022), https://www.lung.org/getmedia/13248145-06f0-4e35- b79b-6dfacfd29a71/zeroing-in-on-healthy-air-report-2022.

Organization: Stellantis

Greenhouse Gas Reductions are Front-Loaded

EPA proposes stringent standards for the 2027-2032MY that achieve ambitious GHG reductions. As shown in Figure 5 below, even the least stringent alternative (Alternative 2) proposed by EPA achieves a 50% reduction in GHG emissions by 2032 compared to 2026, while

EPA's proposed or preferred stringency achieves 56% total reduction by 2032 compared to 2026. [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

SEE ORIGINAL COMMENT FOR Table 10. Comparison of proposed combined fleet standards to alternatives. Figure 5 -Comparison of alternatives proposed in the EPA NPRM [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

In addition to setting ambitious overall targets for CO2 reduction, EPA's proposed rule demands that these reductions are primarily achieved early in the program with less reduction required in later years. In the proposed standards, the stringency jump required in the first year of the program (2027MY) is close to double that of stringency change in later years. This "front-loaded" stringency is even more evident when looking at the different fleets. Figure 6 below shows that in EPA's proposed stringency, pickup trucks must reduce GHG emissions by 14% per year in the initial 3 years in 2027-2029MY of the program followed by 10% per year reduction required in 2030-2032MY. [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

SEE ORIGINAL COMMENT FOR Graph Industry Fleet Targets by MY (Preferred Alternative) Figure 6 -Standards are much more stringent in the early years of the program – especially for trucks [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

Figure 7 below summarizes output from EPA's OMEGA model estimating the millions of megagrams of CO2 saved under the proposed rule and Alternative 3, which is a more linear alternative that EPA also included the proposed rule that does not front load reductions. [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

SEE ORIGINAL COMMENT FOR GRAPH CO2 Saved vs 2026MY Figure 7-Proposed cumulative GHG savings are significantly front-loaded [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

This analysis shows that under the EPA's proposed rule 63% of the CO2 saved would be achieved in the first 3 years of the program with the remaining approximately 35% being saved in the back end of the new program. Alternative 3 (or the more linear alternative) takes a more rational approach to realizing aggressive GHG reductions driven by a dramatic technology transformation. Stellantis shares AAI concerns that Alternative 3 exceeds the 40-50% EV commitment in 2030, however at least the CO2 savings under Alternative 3 are spread out more evenly over the entire rulemaking period allowing more time early on to address market concerns. [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

Stellantis (and industry) have made bold commitments supporting an electrified future, but time and flexibility are needed to transition from an automotive market that today is less than 10% BEV and PHEV combined to a future that is dominated by electric vehicles. EPA's proposed rule significantly front loads stringency and GHG savings during this critical time of transition in a way that overlooks the needed market enablers. EPA should deploy a stringency that allows the time needed for a more practical transition to an EV dominated market. Stringency and GHG reductions should not be front-loaded but, instead, should ramp up and increase as the market increases. [EPA-HQ-OAR-2022-0829-0678, pp. 7-9]

EPA Needs to Address EV Market Uncertainty & GHG Stringency Concerns [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

As discussed above, EPA has erred by assuming an overly optimistic market adoption of a single EV technology justified by policies that represent partial solutions. The GHG targets justified by these assumptions exceed what industry and the Biden administration jointly agreed to and likely exceed what reasonably can be achieved in a 50-state market. Targets are front-loaded and biased against the most popular trucks and SUVs that customers demand today. [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

Stellantis believes that EPA can address these concerns by incorporating key changes into the GHG footprint targets in the final rule. [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

First, EPA should finalize a fleet GHG target that can be achieved with a combined BEV, PHEV, and fuel cell electric vehicle (FCEV) penetration rate of 40-50% in 2030MY. This would align EPA to the ambitious and unprecedented transformation of the market that was jointly agreed to by the Biden administration, the UAW, Stellantis and other OEMs. [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

Second, EPA should set a footprint stringency that does not front-load the needed EV penetration rates and GHG savings by adopting a profile like Alternative 3 proposed in the NPRM. Alternative 3 (unlike the proposed scenario) is less stringent earlier in the program when new products and supply chains are critically coming “online”. The Alternative 3 profile makes up for this early relief with increased stringency over the proposed option in later years. This strategy of “back loading” stringency ultimately delivers the same GHG savings as the proposed standards but does so in a way that recognizes the needed transition the market and industry need to make. [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

Figure 12 below demonstrates the approach Stellantis believes EPA should take when finalizing these targets. It is important to note that penetration rates and GHG targets beyond 2030 are uncertain as we remain focused on achieving the ambitious levels in 2030 jointly committed to by the Biden administration and industry. [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

SEE ORIGINAL COMMENT FOR FIGURE 12–- EPA should set linear stringency through 2030 that can be achieved with 40-50% BEV+PHEV+FCEV penetration [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

Organization: Tesla, Inc.

Tesla supports the proposed Alternative 1 with added stringency so that the final performance standards achieves a fleet BEV penetration rate greater than 69% in MY 2032.2 Alternative 1 is estimated to provide greater CO2 emissions reduction of -51% from no action by 2050 compared to -46% under EPA’s proposal, and the additional stringency will result in even greater emission reductions.3 Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

-Eliminate off-cycle crediting for all types of vehicles; [EPA-HQ-OAR-2022-0829-0792, p. 2]

-Revisit the plug-in hybrid electric vehicle (PHEV) utility factor to accurately reflect real world emissions; [EPA-HQ-OAR-2022-0829-0792, p. 2]

-Amend the proposal to create parity in promoting motor vehicle air conditioning (MVAC) efficiency adoption; [EPA-HQ-OAR-2022-0829-0792, p. 2]

-Maintain the existing zero emissions upstream approach for BEVs; [EPA-HQ-OAR-2022-0829-0792, p. 2]

-Eliminate credit multipliers for all vehicles; and [EPA-HQ-OAR-2022-0829-0792, p. 2]

-Ensure BEVs continue to be accounted for, and participate in, the NMOG + NOx reduction standard. [EPA-HQ-OAR-2022-0829-0792, p. 2]

EPA has long considered BEVs to be the most effective mobile source pollution mitigating technology, stating over a decade ago, “From a vehicle tailpipe perspective, EVs are a game-changing technology.”38 Additionally, study after study shows BEVs are a superior technology for reducing air pollution and GHG emissions over their lifetime.39 On a well to wheels analysis including upstream emissions, the U.S. Department of Energy (DOE) has repeatedly found BEVs to be far superior in emission performance than internal combustion engine (ICE) technology.40 For example, a Tesla Model 3 or Model Y charging on the U.S. grid has average lifecycle emissions almost 3.5 times less than an average premium ICE vehicle.41 As a result, over a 17-year lifetime, a Tesla vehicle driver can avoid emitting over 55 tons of CO2e.42 [EPA-HQ-OAR-2022-0829-0792, pp. 6-7]

38 77 Fed. Reg.62624, 62815 (Oct. 15, 2012); See also, IPCC, AR6 Climate Change 2022: Mitigation of Climate Change (April 4, 2022) at 2-78 (Electric vehicles (EVs) powered by clean electricity can reduce GHG emissions and such policies are important for spurring adoption of such vehicles and GHG emission reductions); at 10-41 (BEVs manufactured and operated can lower emission by 85% compared to ICE vehicles) available at h ttps://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf (last visited Sept. 12, 2022).

39 See e.g., McKinsey, Battery 2030: Resilient, sustainable, and circular (Jan. 16, 2023) (In the worst case scenario, with no low-carbon electricity, total life-cycle emissions for BEVs are about 50 percent lower in Europe and 72 percent lower in the United States compared with ICE vehicles) available at h ttps://www.mckinsey.com/industries/automotive-and-a ssembly/our-insights/battery-2030-resilient-sustainable-and-c ircular?stcr=032392E457A548838A737BD614EB8B24&cid=other-eml-alt-mip-m ck&hlkid=38d0ad0585af40979275683ed8a9d167&hctky=10204926&hdpid=b8cb9677-a52c-48a1-b6ae-ded25e562aac; Environmental Research Letters, Mapping electric vehicle impacts: greenhouse gas emissions, fuel costs, and energy justice in the United States (Jan. 11, 2023) (finding that over 90% of vehicle-owning U.S. households would see reductions in both GHGs and transportation energy burden by adopting an EV) available at h ttps://iopscience.iop.org/article/10.1088/1748-9 326/aca4e6?utm_source=cbnewsletter&utm_medium=email&utm_term=2023-01-1 4&utm_campaign=Daily+Briefing+12+01+2023; ICCT, A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars (July 20, 2021) available at h ttps://theicct.org/publications/global-LCA-p assenger-cars-jul2021 ; National Academies of Science, Accelerating Decarbonization of the U.S. Energy System (Feb. 2, 2021) at 97 (“Further, light-duty trucks and buses should be electrified, particularly in urban areas. Over the next decade, the United States needs to ensure that electric vehicles become the predominant share of new purchases.”); available at h ttps://www.nap.edu/read/25932; Environment International, Assessing the health impacts of electric

vehicles through air pollution in the United States (Nov. 2020) available at h ttps://www.sciencedirect.com/science/article/pii/S016041202031970X.

40 See, Department of Energy, Alternative Fuels Data Center, Emissions from Hybrid and Plug-In Electric Vehicles available at h ttps://afdc.energy.gov/vehicles/electric_emissions.htmlhttps://afdc.energy.gov/vehicles/electric_emissions.html.

41 Tesla, Impact Report 2022 at 31-34.

42 Tesla, Impact Report 2022 at 22, 149.

First, Tesla modelling points toward a significant overcompliance with the existing MY 2023-26 standards. Tesla's internal modeling projects 28% ZEV sales in MY 2026. See Figure 2 – Projected U.S. BEV Market Share. This represents an 11% over EPA's earlier predicted MY 2026 ZEV sales level (17%) resulting from the amendments to the MY 2023-26 standards.116 Indeed, there are 206 different BEVs announced for the market in 2027. See Figure 3 – BEV Model Availability in the U.S. Thus, this expected overcompliance carries into future model years as Tesla projects business as usual BEV market share sales to be above those projected by EPA under its proposal. See Figure 2 – Projected U.S. BEV Market Share. [EPA-HQ-OAR-2022-0829-0792, pp. 16-17]

116 EPA, EPA Finalizes Greenhouse Gas Standards for Passenger Vehicles, Paving Way for a Zero-Emissions Future (Dec. 20, 2021) available at h ttps://www.epa.gov/newsreleases/epa-finalizes-greenhouse-gas-standards-passenger-vehicles-paving- way-zero-emissions

SEE ORIGINAL COMMENT FOR Figure 2 – Projected U.S. BEV Market Share [EPA-HQ-OAR-2022-0829-0792, pp. 16-17]

Figure 3 – BEV Model Availability in the U.S. [EPA-HQ-OAR-2022-0829-0792, pp. 16-17]

Second, the overcompliance with the existing standards should be a precursor to the EPA's modelling of the proposed alternatives. The agency's own modelling shows significant overcompliance with both the proposed standard and Alternative 1 in MY 2032. EPA indicates the proposed standard results in a cumulative credit surplus of over 36.8M Mg representing almost 1.6M BEVs that will not be sold.117 See Figure 4. EPA's Projected Credit Surpluses in MY 2032. [EPA-HQ-OAR-2022-0829-0792, pp. 17-18]

117 Draft RIA at 13-13, Table 13-23. See EPA, The 2022 EPA Automotive Trends Report (Dec. 2022) at 79 (calculation utilizing conversion table to back out production Annual Implied Missing BEVs = (Net credits * 1,000,000) / (Tesla Annual 2027-2032 Weighted g/mi Target * Weighted VMT)).

Similarly, the agency finds that Alternative 1 still results in a credit surplus of over 18.5M Mg.118 As provide in Figure 4, this credit surplus represents the credit value of approximately 1.3M BEVs that would not be sold over the 2027-32 period.119 See Figure 4. EPA's Projected Credit Surpluses in MY 2032. This oversupply of credits in My 2032 indicates that manufacturers have the capability to comply with a standard that is more stringent than Alternative 1. [EPA-HQ-OAR-2022-0829-0792, pp. 17-18]

118 Id., at 13-17, Table 13-30.

119 See, footnote 117.

SEE ORIGINAL COMMENT FOR Figure 4. EPA's Projected Credit Surpluses in MY 2032 [EPA-HQ-OAR-2022-0829-0792, pp. 17-18]

Organization: Toyota Motor North America, Inc.

2. The annual stringency increases in the first three years of the proposed rule are extreme and outside historical norms. EPA has historically recognized that technology penetration is slower in early stages of market development and increases more rapidly over time. The proposed early ramp rates run directly contrary to this reality. We are also concerned that this extreme rate may have a paradoxical effect on CO_2 emissions – lowering the volume of older, higher polluting vehicles replaced because artificial shortages will be created of low-carbon non-BEV vehicles that many customers prefer. Automakers need time to invest in EV and battery production capacity, for the charging infrastructure to develop across the country, and for the market to mature. To reduce carbon dioxide emissions as much as possible, as soon as possible, customers need choices that encourage replacement of high-CO_2 emitting vehicles with low-or zero-CO_2 emitting vehicles. EPA should smooth the early rates of increase in recognition of these factors. [EPA-HQ-OAR-2022-0829-0620, p. 2]

5. GHG Program

The Proposed Rule fails to demonstrate the penetration of BEVs assumed for compliance with the proposed standards is feasible. The proposal notes “While emission standards set by the EPA under CAA section 202(a)(1) generally do not mandate use of particular technologies, they are technology-based, as the levels chosen must be premised on a finding of technological feasibility.”17 CAA section 202(a)(1) states “Any regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.”18 [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

17 88 Fed. Reg at 29232.

18 42 U.S.C. § 7521(a)(2).

The aggressive ramp up of BEVs (see Table 1) required to comply forces a rapid transformation of how vehicles are manufactured, driven, fueled, and serviced. As such, “leadtime and requisite technology” must extend to the availability of critical minerals, the readiness of a sustainable battery supply chain and fueling infrastructure, as well as other market-related factors that will affect the price and consumer demand of BEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

[Table 1 Annual BEV Penetration Assume for Compliance w/ Proposed Standards] [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

MY 2027: BEV Share 36

MY 2028: BEV Share 45

MY 2029: BEV Share 55

MY 2030: BEV Share 60

MY 2031: BEV Share 63

MY 2032: BEV Share 67]

[EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Today's PEV support system clearly cannot meet the needs of the future envisioned by the proposal. Our comments explain why the proposal lacks a clear justification for how the support system will be in place over the period of the proposed standards. Neither EPA nor auto manufactures can control the timing or outcomes of these essential support measures. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Finally, EPA has taken a more measured view of technology risk and uncertainty in past vehicle emissions rulemakings in which technology costs were lower and automakers had significantly more direct control over managing their technology development, deployment, and sales mix to comply. In this Proposed Rule, EPA appears to be taking a much more cavalier approach to risk, lead time, and ensuring the "requisite technology" is available, despite the high cost of BEVs, the massive uncertainty around mineral supplies, the significant investment needed in charging infrastructure and the power grid, and the uncertain market demand for BEVs. The standards in the Final Rule should be adjusted to better account for market uncertainties. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Organization: Volkswagen Group of America, Inc.

Supporting President Biden's Goal

Together with many other manufacturers, Volkswagen remains committed to President Biden's goal to reach 40- 50% EV sales by 2030. Taking into account the concerns for the current and future market situation and the uncertainties not in our control, we expect achieving these targets will be a stretch goal for the industry. To establish a feasible pathway into e-mobility for the entire automotive industry, we recommend making the NPRM's targeted EV share consistent with President Biden's Executive Order 14037 on Strengthening American Leadership in Clean Cars and Trucks and to ensure they are safeguarded by similar ambitious EV ecosystems. [EPA-HQ-OAR-2022-0829-0669, p. 2]

GHG Standards

GHG Alternative Target Curves – Aligned with AFAI (Section III.E.)

The EPA has proposed three alternative light-duty GHG standards. AFAI has suggested a logical outgrowth of Alternatives 2 and 3. Volkswagen agrees with the linear Alternative 3 with the combined goal of 50% Plug-in electric vehicles (PEVs), which includes plug-in hybrid electric vehicles (PHEVs) and battery-electric vehicles (BEVs), penetration by 2030. Volkswagen prefers the AFAI aligned proposal. However, if EPA seeks input only on the proposed Alternatives, Volkswagen then prefers Alternative 3. [EPA-HQ-OAR-2022-0829-0669, p. 4]

Alternative 3 has consumer-based advantages from cost, product availability perspective, and better aligns with the regulatory aims toward improving human health and environment protection. Alternative 3 is characterized by similar year-over-year reduction rates (as compared to Alternatives 1 and 2) with all targets converging and achieving the same overall results by MY2032. [EPA-HQ-OAR-2022-0829-0669, p. 4]

Volkswagen believes that Alternatives 1 and 2, both having high reduction rates in the earlier years, do not align with projections of consumer adoption of EVs in the market. Furthermore, when additional EV models are available in the market with improved range, consumer acceptance and demand is expected to improve more linearly. EPA also recognizes that the Alternative 1 and 2 are not recommended due to feasibility, cost, public health and welfare. [EPA-HQ-OAR-2022-0829-0669, p. 4]

Organization: Wisconsin Department of Natural Resources

In this action, EPA is proposing new, more stringent emissions standards for criteria pollutants and greenhouse gases (GHG) for light-duty vehicles and medium-duty vehicles that would phase-in over model years 2027 through 2032. [EPA-HQ-OAR-2022-0829-0507, p. 1]

The WDNR offers the following specific comments on the proposal:

Proposed standards. EPA's proposed GHG standards for light-duty vehicles will result in a 56% increase in stringency of CO2 standard from model year (MY) 2026 to 2032. EPA is proposing three alternatives to this standard (one more stringent, one less stringent, and one with the same final stringency as the proposal, but with a different rate of increase). EPA is not proposing specific alternatives to its proposed GHG standards for medium duty vehicles or the criteria pollutant standards. [EPA-HQ-OAR-2022-0829-0507, p. 2]

Both the proposal and the alternatives presented by EPA will result in substantial decreases in CO2 and criteria pollutant emissions. As such, EPA should finalize standards within this range that best reflect the technology available to manufacturers in the timeframe of the affected model years and that will be achievable in practice. [EPA-HQ-OAR-2022-0829-0507, p. 2]

Organization: World Resources Institute (WRI)

We applaud the Biden administration for acting swiftly and using the full force of Clean Air Act authorities to propose new, more stringent vehicle emissions standards to reduce criteria pollutants and greenhouse gas (GHG) emissions from passenger (and other) vehicles to address climate pollution and public health impacts. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Transportation accounted for the largest portion (29%) of total U.S. greenhouse gas emissions in 2021, and light duty vehicles [Link: https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions] (including passenger cars and light-duty trucks) represent the largest category with 58% of the transportation sector's GHG emissions. Furthermore, studies (such as the recent 'Zeroing in on Healthy Air' [Link: https://www.lung.org/getmedia/13248145-06f0-4e35-b79b-6dfacfd29a71/zeroing-in-on-healthy-air-report-2022.pdf] from the American Lung Association) show that regulations and policies designed to reduce GHG emissions, such as through accelerating electric transportation, will have the added benefit of reducing other forms of pollution -including air toxics and particulate matter -that impact public health and disproportionately impact overburdened communities. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

To address these significant sources of transportation pollution and its legacy of disproportionate impacts, we express our support for EPA's proposed "Alternative 1," which would set the most stringent emissions reduction standards. While these proposed standards are technology neutral, electric vehicles present the best option for compliance as they emit zero tailpipe pollution, resulting in improved public health and climate outcomes. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Thus, we urge EPA to strengthen and finalize the strongest rule possible as [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

1. Complementary policies provide incentives for vehicle manufacturers and consumers in the transition; and
2. Strong private investments are rapidly expanding supply chains and manufacturing, helping to accelerate the transition to cleaner, electric vehicles.

[EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Organization: Zero Emission Transportation Association (ZETA)

We thank the U.S. Environmental Protection Agency (EPA) for the opportunity to comment on its notice of proposed rulemaking to set multipollutant emission standards for model years 2027 and later light- and medium-duty vehicles. ZETA encourages the agency to finalize more stringent standards than Alternative One for light-duty greenhouse gas emissions and finalize light-duty multipollutant standards that are equally as stringent. We also encourage the agency to finalize medium-duty GHG and multipollutant standards that are as stringent as possible. We believe these standards are achievable and will ensure the supply chain has the regulatory certainty needed to protect the investments being made today that will put the sector on a path to a ze–-emission future. [EPA-HQ-OAR-2022-0829-0638, p. 1]

1. Introduction

The Zero Emission Transportation Association (ZETA) appreciates the opportunity to comment on EPA's proposed rulemaking1 to set multi-pollutant emission standards for model years 2027-2032 light- and medium-duty vehicles (LMDVs), consistent with Executive Order 14037.2 ZETA applauds EPA's ambition shown in these proposed standards and we believe EPA should finalize more stringent standards than Alternative One to further incentivize zero emission vehicle deployment and improve local health outcomes. This proposed rulemaking offers an opportunity to begin to phase out internal combustion engine vehicles (ICEVs)—thereby locking in significant emissions reductions, protecting public health and the environment, and backstopping the industry's investments in electrification technologies. These standards will also play a key role in helping achieve the Biden-Harris Administration's blueprint for decarbonizing the transportation sector while adhering to U.S. commitments under the Paris Climate Agreement.3 The blueprint calls for continuously strengthened vehicle emissions standards through the next two decades as a central pillar of the U.S. GHG reduction strategy. [EPA-HQ-OAR-2022-0829-0638, p. 5]

1 See 88 FR 29184 (May 5, 2023)

2 Executive Order 14037 "Strengthening American Leadership in Clean Cars and Trucks," (August 5, 2021) https://www.federalregister.gov/documents/2021/08/10/2021-17121/strengthening-american-leadership-in-clean-cars-and-trucks

3 The U.S. National Blueprint for Transportation Decarbonization (January 2023) https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf

5. ZETA Comments on the Proposed Emission Standards for LDVs

ZETA and its member companies appreciate the opportunity to submit comments on EPA's proposed rule to set multipollutant and GHG emission standards for class 1-2a LDVs. We urge the agency to finalize standards more stringent than Alternative One for LDV GHG emissions and to finalize LDV multipollutant standards that are equally as stringent. For reasons discussed throughout these comments, we believe such stringency is feasible and finalizing such standards will ensure the supply chain has the regulatory certainty needed to protect the investments being made today that will put the sector on a glide path to a zero-emission future. Backtracking on the stringency of these proposed standards in the final rule will not only jeopardize the health, climate, and environmental benefits but would create regulatory uncertainty. [EPA-HQ-OAR-2022-0829-0638, p. 26]

6. ZETA Comments on the Proposed Emission Standards for MDVs

In regards to the proposed GHG and multipollutant emission standards for class 2b-3 MDVs, we encourage EPA to finalize standards that are as stringent as possible. ZETA supports the proposed revisions to the work factor curves, including the cutpoints and slope changes over time, for the same reasons discussed above in the LDV footprint curve context. Ultimately, we believe EPA's proposed changes to the work factor curves will more accurately capture the benefits of EVs and drive greater emissions reductions over the MY 2027-2032 time frame covered by these standards. We encourage EPA to finalize these changes as proposed. [EPA-HQ-OAR-2022-0829-0638, pp. 27-28]

EPA Summary and Response

EPA received many comments supporting, opposing, or recommending changes to the proposed standards or the alternatives on which EPA sought comment. As discussed in greater detail in preamble sections III.D and V, in evaluating the proposal and alternatives in arriving at a decision on the appropriateness of final standards, EPA considered several factors, including differences in manufacturer costs and lead time, CO_2 emissions reductions and technology penetration projections.

The following summary addresses similar comments made by multiple commenters.

EPA received many comments in support of either the proposed standards, or of the more stringent light-duty GHG standard, Alternative 1. Several stakeholders (the American Lung Association, the California Attorney General's Office, CALSTART, Ceres BICEP, Ceres CEVA, Colorado Energy Office et. al, DOEE, Energy Innovation, Institute for Policy Integrity at NYU Law, ICCT, Lucid, MDE, MPCA, Southern Env. Law Center, Tesla, WRI) supported the most stringent alternative – Alternative 1 – or recommended that EPA finalize standards "at least as strong as Alternative 1." More commenters (CAP, Environmental and Public Health Organizations, NPCA, Rivian, South Coast Air Quality Management District) recommended that EPA modify Alternative 1, predominantly by increasing the stringency in the later years to ensure that the US is on a path to full electrification by 2035. Other groups (EC, NACAA, NESCAUM, Our Children's Trust, Sierra Club) requested that EPA strengthen the standards beyond the proposed levels, or that EPA make the standards the "strongest possible." The Sierra Club supported the proposed standards, but analogous to other stakeholders, recommended greater stringency in the later model years (2030-2032).

While many traditional OEMs commented that the stringency of the proposed standards was too stringent, only one manufacturer (Honda) overtly rejected all of the stringency options presented in the NPRM. In fact, several automakers commented in support of Alternative 3, albeit with some modifications. In its comments (which member companies Hyundai, Kia, Mazda, Mitsubishi, Nissan, Porsche, Stellantis, Toyota and Volkswagen endorsed), the Alliance for Automotive Innovation highlighted concerns with front-loading of the proposed standards and Alternatives 1 and 2 while preferring the less steep ramp rate of Alternative 3 in the early years of the program. However, they recommended that EPA adjust the stringency in MY 2030 to align with a projected market share of 40-50% EVs (which includes BEVs, PHEVs and FCEVs), and then adjust standards with stringency increases from MY 2030 to 2032 "that are supported by reasonably certain projections of EV supply chain, manufacturing, market and infrastructure in that timeframe." Several auto manufacturers suggested that, in additional to the Alternative 3's more linear year-over-year phase-in of the standards and its lesser stringency prior to 2032 compared to the proposal, that EPA also consider a slower phase-down or phase-out of some of the credit flexibilities, such as off-cycle credits and air conditioning leakage credits. Those credit provisions are further discussed in Sections 3.1.3 and 3.1.4 of this RTC. Generally, the auto manufacturer comments noted that additional lead time was needed, especially in the early years of the program, in order to provide time for the scale up of battery supply chains and for the production of PEVs. Many individual auto manufacturers provided specific examples of such lead time and feasibility issues, especially for the early years of the standards phase-in.

After carefully reviewing all comments, combined with our updated technical analysis, EPA selected the Alternative 3 footprint curves for its final standards. As EPA explains in Sections III.C and V of the preamble, Alternative 3 strikes a balance by allowing for a more linear stringency increase in the early years (which will help to address concerns over lead time) while ending at the same numerical stringency in MY 2032 as the proposed standards. Moreover, the delayed phase-out of the A/C refrigerant and off-cycle credits described in Section III.C.5 and III.C.6 of the preamble (and Sections 3.1.3 and 3.1.4 of this RTC) address automaker concerns about lead time and the transition to the more stringent standards in the later years. See Sections I.B and III.C.1 of the preamble for further details on the final standards and their basis. For the final rulemaking, EPA considered two new alternatives to the final standards (Alternative A, which were the proposed standards as presented in the NPRM, and Alternative B, less stringent than the final standards). A more detailed discussion of the alternatives for the final rule is provided in Section IV.E of the preamble. In order to assess feasibility in light of uncertainties in our assumptions, EPA conducted multiple sensitivity analyses. These are described in Section IV.F of the preamble.

In response to commenters who recommended Alternative 1, upon considering the entirety of the comments and record, especially in light of the auto manufacturers comments and in consideration of our updated analysis including higher battery costs for PEVs, and for the reasons discussed in section V of the preamble, EPA concluded that the proposed standards would present challenging issues of feasibility and lead time. In light of the fact that Alternative 1 was more stringent than the proposed standards, we concluded, without undertaking further final rule analysis, that the Alternative 1 standards would present even greater issues of feasibility and lead time. As we discussed above, several commenters requested that EPA strengthen the standards beyond the proposed levels, or that EPA make the standards the "strongest possible." In consideration of emission reductions, technological feasibility, costs, lead time concerns (including scale up of battery supply chains and PEV production capacity) and other factors, EPA believes the final standards are appropriate as discussed at length in section V of the preamble. As shown in Table 8-23 and Table 8-24 in RIA Chapter 8.6.6.1, EPA projects that the final rule with the more gradual year-over-year stringency but landing with the same stringency in MY2032 as the proposal will achieve 98% of the cumulative emissions reductions of the proposed standards (Alternative A) by 2055. A more detailed comparison of the per-vehicle incremental costs (12.1.2), and technology penetrations (12.1.3) for each alternative can be found in the RIA. We also discuss some related comments in Section 2.3 of this RTC.

The following is a summary of unique comments related to stringency:

In comments, Ford expressed support for Alternative 3 and its 2032 MY endpoint (which is equal to the MY 2032 stringency of the proposed standards). Additionally, Ford suggested its own modifications to Alternative 3, including a phase-out for refrigerant credits and an increase in the utility allowance in the truck curve which would effectively increases the slope (and thus decrease the stringency) of the truck curve. These structural modifications are addressed in more detail in RTC Sections 3.1.3 and 3.2.1, respectively.

In its comments, Honda opposed the three alternatives presented in the NPRM, pointing to market uncertainties and potential for noncompliance. While not providing specifics, Honda requested a "more reasonable" emissions reduction trajectory and a broader array of compliance flexibilities. EPA believes that the final standards (i.e., the CO2 footprint curves of Alternative 3), when combined with the slower phase-down of A/C and off-cycle credits, addresses Honda's request for a more reasonable trajectory of stringency increase. We believe these standards to be appropriate as we discuss in preamble Section III.C and V.

Separately, Jaguar Land Rover (JLR) recommended an alternative trajectory to that of Alternative 3 which would relax the stringency in years 2028 through 2031, in part to offset EPA's proposed reduction in allowable A/C and off-cycle credits. JLR suggested targets of approximately 150 g/mi in 2028 and roughly 140 g/mi in 2029 (both by visual inspection of Figure 2 in its comments [EPA-HQ-OAR-2022-0829-0744]), 125.3 g/mi in 2030, and approximately 104 g/mi in 2031. Upon review, the difference in JLR's suggested stringency from the updated Alternative 3 targets (updated in the final rulemaking to reflect the MY 2022 base year fleet and AEO 2023 car/truck shares) is minimal. In MY 2030, the stringency that JLR is requesting is more than offset by the delayed phase down of potential A/C and off-cycle credits that we have included in the final standards, and thus should largely address the numerical stringency adjustments to Alternative 3 that JLR has requested in its comments. EPA provides a summary of the A/C and off-cycle credits available in the final standards in Section III.C.2.iv, Table 21 of the preamble.

Arconic, which advocated for inclusion of upstream power generation emissions in compliance calculations for electric vehicles, acknowledged that the numerical standards would have to be modified if such an approach were taken, but did not take a position on the trajectory/stringency rates in this rulemaking. We address comments received on the compliance treatment for BEVs in Section 3.1.5 of this RTC.

In its comments, Darius opposed all three alternatives and while not specifying a recommended level of stringency, requested that the rulemaking be technology-neutral and account for lifecycle emissions. As these are fleet-averaging, performance-based standards, this is a technology-neutral rulemaking. However, consistent with past rulemakings, we are not adopting a lifecycle emissions approach, as we discuss in greater detail in Chapter 19.2 of this RTC.

EDF supported Alternative 3 although it recommended an increase in stringency beyond MY 2030 by reducing fleetwide GHG targets of Alternative 3 in MYs 2031 and 2032 by 2.1 and 4.2 g/mi, respectively, so that this revised trajectory would match the cumulative 2055 GHG emissions reductions projected for the proposed standards. In response, the stringency of our final standards is based on our updated analysis which considers technology feasibility, lead time and cost. The emissions reductions which we discuss in the preamble are an outcome of our analysis; in summary, we are not trying to maintain the reductions of the proposed standards (or any other predetermined future cumulative GHG reduction goal). EDF also recommended that EPA finalize a voluntary leadership pathway that incentivizes ACC II levels of ZEV deployment nationwide; that comment is addressed in RTC Section 3.1.10.

Elders Climate Action, while not commenting on the proposed standards or the three alternatives, recommended that EPA include ZEV sales targets for MYs 2027-29 that are the same as the CARB ACT rule, and set a zero emissions standard by 2035. We disagree with this approach. We are adopting fleet average performance-based standards through MY 2032 as described in section I.B. of the preamble, we do not believe it is appropriate to set minimum sales targets for any technology. We address this comment and additional comments on the timeframe for the standards in RTC Section 3.1.9.

In addition to its comments on overall stringency, Tesla also made recommendations to several program structure elements which we address in the appropriate subsections of RTC Section 3.1.

Some commenters explicitly requested that EPA add anti-backsliding requirements for non-ZEVs: these comments are addressed within RTC Section 12.3.

Additionally, the Alliance urged that the final standards should be based on an assumption of little to no improvement in ICE vehicle emission reductions due to required investments in BEV development. In preamble I.B and as discussed in RTC Section 12.5.3, EPA presents multiple pathways available to manufacturers to comply with the final standards. Several commenters pointed out that ICE improvements are available (addressed in RTC Section 12.3). Each manufacturer may choose the technologies and compliance path most appropriate for their situation.

3.3.2 - Lead time

<u>Comments by Organizations</u>

Organization: 25x'25 Alliance, et al.

The undersigned parties offer the following comments on EPA's proposed rule, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty

Vehicles." We write these comments because we believe that the proposed rules would establish an overly aggressive, high-risk program that would be counterproductive in achieving the agency's environmental and health objectives. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

In establishing or revising Clean Air Act Section 202(a) standards, EPA must consider issues of technological feasibility, cost of compliance, and lead time. Among other things, that means the agency must look closely at the impact of its proposed standards on net emissions of air pollutants and their associated public health effects, impacts on the automotive industry, impacts on the vehicle purchasers/consumers, energy security, and safety, and how the proposed approach would compare to other possible rulemakings. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

EPA's review of relevant factors in the current proposal is seriously deficient. The chief failure comes because the agency elides two distinct types of feasibility: the technological feasibility of electric vehicles as a part of the fleet and the technological feasibility of electric vehicles as the whole of the fleet. We do not dispute the former, but overwhelming evidence disproves the latter. First, there are no established supply chains capable of supplying the raw materials to manufacture the millions of vehicles needed—just over the next decade—to supply the projected market. Second, the infrastructure necessary to support these vehicles, particularly recharging infrastructure, is not and will not be available in the necessary timescales. The high density of chargers needed in major metropolitan areas and vast web of chargers needed to span the rural areas of the Country will require tremendous planning and investment. The long lead times associated with new renewable generation means that this added marginal electric load will be powered by natural gas and coal for the foreseeable future. And current prices, lack of infrastructure, and public opinion militate strongly against the conclusion that a ten-fold increase in the annual sales of electric vehicles will occur in the next eight years. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

And current prices, lack of infrastructure, and public opinion militate strongly against the conclusion that a ten-fold increase in the annual sales of electric vehicles will occur in the next eight years. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

Organization: Alliance for Automotive Innovation

Neither reasonable nor achievable in the timeframe provided

With that said, as proposed, the NPRM standards—both greenhouse gas (GHG) and criteria—are neither reasonable nor achievable in the timeframe covered in this proposal. Auto Innovators does not believe they can be met without substantially increasing the cost of vehicles, reducing consumer choice, and disadvantaging major portions of the United States population and territory. EPA's proposed rules effectively assume that everything will go perfectly in the transformation to electric vehicles (EVs)3 between now and 2032. For example, the NPRM appears to assume that: [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

3 The term "electric vehicles" as used herein refers collectively to battery electric, plug-in hybrid electric, and fuel cell electric vehicles.

- An over-abundance of battery critical mineral mines, critical mineral processing capacity, and battery component, cell, and pack production facilities leads to continued battery price reductions. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Most critical minerals for light- and medium-duty vehicles (LDVs and MDVs) are sourced and processed from the U.S. or countries with which we have a free trade agreement (FTA). [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Every EV battery is produced in the U.S. by 2027 and receives the maximum Inflation Reduction Act (IRA)4 Section 45X manufacturing tax credit. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Most battery electric vehicle (BEV) and most BEV buyers qualify for maximum tax credits when purchasing or leasing a BEV under the IRA 30D and 45W. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Congress makes no future changes to the federal law that reduces tax credits for BEVs or BEV batteries. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Apartments, condominiums, and residential street parking throughout the U.S. (roughly half of the U.S. housin858loomberg858858re retrofited to provide convenient, low- cost, reliable BEV charging. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Public and workplace charging infrastructure deployment keeps pace with vastly increased BEV deployments. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Utilities and their regulators in all 50 states request, approve, and build out the needed power generation, service lines, and the corresponding connections to charge not only the proposed light-duty BEVs but also medium-duty and heavy-duty BEVs required in this proposal and other state regulations. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- Electricians and construction professionals are available nationwide to install, maintain, and repair electric vehicle chargers. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3]

- New criteria emission requirements involve “off the shelf” technology and will not draw resources away from the industry transformation to EVs. [EPA-HQ-OAR-2022-0829-0701, pp. 2-3–

4 H.R.5376 - 117th Congress (2021-2022): Inflation Reduction Act (Aug. 16, 2022), available at htps://www.congress.gov/bill/117th-congress/house-bill/5376/text.

GHG Standards

Leap-frogs Biden administration’s own 50% executive order [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

The stringency of the NPRM proposed standards increases faster than at any time in history. In fact, by assuming BEVs alone will make up 60% of the new vehicles sold in 2030 and 67% of new vehicles just two years later, the proposed requirements leap-frog even President Biden’s ambitious 2030 target of 50%, which included BEVs, fuel cell electric vehicles (FCEVs), and plug- in hybrid electric vehicles (PHEVs) by 2030. The 60% BEV-only proposal also goes beyond the same goal of 50% electric vehicles by 2030 (which again included BEVs, PHEVs, and FCEVs) described in The U.S. National Blueprint for Transportation Decarbonization, authored by four cabinet level agencies including EPA and issued in January 2023 – just a few months before this proposal was published. [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

Unlike EPA's past regulations that could be met by automaker action alone and without consumer participation or even knowledge, these standards require large numbers of BEVs and are based on many assumptions that are largely outside the control of either EPA or individual automakers. Getting these standards right is critical not only to the automakers that must comply with them, but also to the U.S. global competitiveness and the U.S. economy. If the standards push too fast, too soon, we risk relying on other nations to supply the minerals and batteries needed to produce more EVs. If the standards push too slowly, there is less incentive to develop the necessary supply chain capacity in the U.S. Balancing the requirements with the realities of the marketplace and the supply chain will be key to a successful rule that also solidifies our nation's electric vehicle competitiveness and leadership. [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

Successfully transitioning from ICE vehicles to electric vehicles—a goal we share with EPA— requires massive changes from all sectors of the U.S. economy: from automotive suppliers to home builders to utilities, labor to mining to mineral processing. Successful implementation also requires substantial consumer changes such as installing home charging and pre-planning long trips to ensure adequate fueling infrastructure along the way. [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

For our part, automakers can produce electric vehicles, but the proposed regulations are only feasible if we can address and affrmatively answer these questions:

1. Can people afford EVs? [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

2. Can people fuel EVs? [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

3. Can automakers obtain the battery critical minerals to power EVs? [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

4. Will customers embrace the technology on such a large scale in such a short time? [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

The answers to these questions are not yet known, but lead to the fundamental question and the substance of these comments: Is the U.S. ready for the transformation in the timeframe the NPRM lays out? No. We are not. [EPA-HQ-OAR-2022-0829-0701, pp. 3-4]

Automakers are committed to electrification. The industry publicly agreed in August 2021 that BEVs, PHEVs, and FCEVs could constitute 40 to 50% of new vehicle sales by 2030 with the right combination of supportive measures. Some, but not all, of those supportive measures have started, but they are nowhere near complete and certainly not suffcient to support the even higher requirements in the proposed regulations that substantially leapfrog that target. [EPA-HQ-OAR-2022-0829-0701, p. 5]

I. EV Feasibility

A. Overview

EPA proposes to set transformat ive greenhouse gas (GHG) standards that are projected to require reaching 55% battery electric vehicle (BEV) sales by calendar year (CY) 2028 (model year 2029),7 63% sales by CY 2030 (MY 2031), and 67% sales by the end of this rule (MY 2032).8 It is also proposing criteria pollutant standards that are generally premised on the same or similar BEV sales. By the time these regulations are finalized, MY 2027 will be less than two years away, and MY 2032 seven years away.9 The projected levels of BEV market share are a substantial increase over the 50% EV sales by 2030 described in Executive Order 14037 (which included plug-in hybrid electric vehicles (PHEVs) and fuel cell electric vehicles (FCEVs) in addition to BEVs)10 and reafirmed by EPA and three other cabinet-level agencies in The U.S. National Blueprint for Transportation Decarbonization in January 2023.11 Although EPA's analysis attempts to demonstrate the possibility of achieving such lofty goals, EPA fails to demonstrate a reasonable probability of doing so in the timeframe of its proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 24-25]

7 Model years can begin as early as January 2 of the calendar year preceding the model year designation. (40 C.F.R. § 86.1803-01, definition of "model year"; § 85.2304, definition of "annual production period".) Therefore, model year 2029 can begin as early as January 2, 2028, effectively making a model year 2029 standard a calendar year 2028 requirement.

8 NPRM at 29329. (Table 80.)

9 EPA anticipates finalizing this rulemaking in March 2024. (Spring 2023 Unified Agenda of Regulatory and Deregulatory Actions, RIN 2060-AV49.) Model year 2025 can begin as early as January 2, 2024, making the lead-time of this rule less than two to seven years.

10 Executive Order 14037, "Strengthening American Leadership in Clean Cars and Trucks" (Aug. 5, 2021). 86 Fed. Reg. 43583 (Aug. 10, 2021).

11 U.S. Department of Energy, Department of Transportation, Department of Housing and Urban Development, and Environmental Protection Agency, The U.S. National Blueprint for Transportation Decarbonization (Jan. 2023). Available at htps://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation- decarbonization.pdf. (Retrieved Jun. 20, 2023).

Technological feasibility is a cornerstone of rulemaking under section 202(a) of the Clean Air Act. Regulations promulgated under section 202 "shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."12 As EPA acknowledges, this means that emission standards "must be premised on a finding of technological feasibility."13 EPA's conclusions regarding technological feasibility are subject to review under the Administrative Procedure Act; they must be the "product of reasoned decision making," and the agency must provide a reasoned explanation for its projections of feasibility.14 [EPA-HQ-OAR-2022-0829-0701, pp. 24-25]

12 42 U.S.C. § 7521(a)(2).

13 NPRM at 29232; see also Nat. Res. Defense Council v. E.P.A., 655 F.2d 318, 322 (D.C. Cir. 1981)

14 Nat. Res. Defense Council, 655 F.2d at 328.

The Proposed Rule requires an aggressive ramp-up in BEV sales, forcing a staggering increase in the use of a nascent technology at unprecedented levels and on an expedited timeframe. This Proposed Rule will constitute a transformative shift in the makeup of the nation's vehicle fleet. In this context, EPA must take a holistic approach in evaluating technological feasibility, considering not just whether BEV technology presently exists in a vacuum, but also weighing whether the market is able to support the level of BEVs demanded by the rule—that is, whether the "application of the requisite technology" (here BEVs), to the extent required by the Proposed Rule and on the timeline required, is feasible. This assessment must include full and adequate consideration of important factors including, but not limited to, the availability of adequate charging infrastructure, consumer acceptance of BEV technology, electricity generation and capacity concerns, and issues related to battery manufacturing and supply chains.15 [EPA-HQ-OAR-2022-0829-0701, pp. 24-25]

15 See NPRM at 29297-324, 29341-42 (acknowledging that it is appropriate to consider such issues in discussing feasibility); see also, e.g., Bluewater Network v. E.P.A., 370 F.3d 1, 22 (D.C. Cir. 2004) (considering whether EPA had adequately explained the basis of its “prediction of the feasible pace of implementation”).

Additionally, regulations issued under section 202 of the Clean Air Act must not be arbitrary and capricious, a standard identical to the one imposed by the Administrative Procedure Act.16 This standard requires that EPA consider all “important aspect[s] of the problem” and engage in “reasoned decision making,” and that it “consider[] the relevant factors and articulate[] a rational connection between the facts found and the choice made.’”17 [EPA-HQ-OAR-2022-0829-0701, pp. 24-25]

16 See 42 U.S.C. § 7607(d)(9)(A); see also Nat’l Petrochem. & Refiners Ass’n v. E.P.A., 287 F.3d 1130, 1135 (D.C. Cir. 2002).

17 Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43, 53 (1983); Nat’l Ass’n of Clean Air Agencies v. E.P.A., 489 F.3d 1221, 1229 (D.C. Cir. 2007).

With respect to the Proposed Rule, we are concerned that EPA has fallen short of these legal and procedural obligations. We are seriously concerned that the requirements of the Proposed Rule go beyond what is technologically feasible, contrary to the requirements of the statute, when these important feasibility factors are taken into account.18 We are also concerned that the Proposed Rule fails to consider—or inadequately considers—crucial issues and evidence, and the standards contained in the Proposed Rule do not bear a rational connection to the facts in the record. We outline our concerns as to feasibility below. [EPA-HQ-OAR-2022-0829-0701, pp. 25-26]

18 EPA states that it selected the range of alternatives presented in the Proposed Rule “because they represent a range of standards that are anticipated to be feasible and are highly protective of human health and the environment.” NPRM at 29201; See also id. at 29280 (same). To the extent that EPA is determining section 202 standards based on which standards are “highly protective of human health and the environment,” this is goes beyond what is legally required. This language is absent from section 202(a), which simply instructs EPA to “prescribe . . . standards applicable to the emission of any air pollutant,” subject to the considerations of feasibility and cost of compliance. 42 U.S.C. § 7521(a).

The NPRM, which aims to establish stringent emission standards for light-duty automotive vehicles, including EVs, highlights the complex challenges that lie ahead. While this Proposed Rule represents a crucial step toward a cleaner and more sustainable transportation sector, its implementation poses unique hurdles and underestimates the actions needed to realize the targeted EV market share. Addressing concerns such as manufacturing capacity, battery production, charging infrastructure, and consumer acceptance of EVs are paramount to the success of this ambitious proposed regulation. [EPA-HQ-OAR-2022-0829-0701, pp. 25-26]

Despite these major gaps, the EPA in its Proposed Rule incorrectly assumes these policy actions represent a complete answer to achieve not just a 40-50% EV market in the U.S., but in fact go well beyond this level by assuming a perfect transition to a BEV market of 60% in MY 2030. This incredibly aggressive technology diffusion curve for BEV adoption is faster than any new automotive technology to date, even exceeding the adoption rate targeted by California (the most mature EV market in the U.S.). Moreover, EPA's reliance on its model projections depends heavily on factors beyond the control of it and the automakers. [EPA-HQ-OAR-2022-0829-0701, pp. 27-28]

Although the push toward electrification to combat climate change and reduce greenhouse gas emissions is moving forward, implementing a nationwide regulation that essentially requires automakers to produce and sell a certain percentage of EVs poses significant obstacles. From technological limitations to infrastructure gaps and consumer adoption barr'ers, the EPA's electric vehicle mandate is poised to encounter numerous hurdles that will inhibit successful implementation. Affordability, charging and refueling infrastructure, permitting reform, and critical mineral supply chains are significant challenges that need to be addressed for the widespread adoption of EVs to be feasible at the levels contained in EPA's proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 27-28]

In the following subsections, Auto Innovators provides perspective on the multitude of market enablers needed to support a mature EV market and show how EPA's assumptions take an overly optimistic, if not infeasible, approach to technology adoption and EV market growth. [EPA-HQ-OAR-2022-0829-0701, pp. 27-28]

C. Historical Technology Adoption Versus EV Penetration Assumptions

Figure 2 shows the penetration rate of automotive technologies that have been introduced in the last nineteen years. Technologies that follow the most aggressive growth curve are those that are generally transparent to the customer. Eight speed transmissions, gasoline direct injection (GDI) engines, and stop-start have become standard features, and have little or no impact on customer driving behaviors. BEVs, on the other hand, require drivers to make active changes to their driving habits and potentially additional investments (e.g., home charging equipment). In short, BEVs require change, whereas many of the most successful automotive technologies do not. [EPA-HQ-OAR-2022-0829-0701, pp. 29-30]

EPA is assuming that automobile manufacturers can increase BEV production as quickly as they have adopted new transmission or engine technologies, despite the need to build entirely new supply chains and manufacturing facilities. Underlying such rapid growth is also an assumption that the majority of new vehicle buyers will accept BEVs and their inherent changes to driving habits. [EPA-HQ-OAR-2022-0829-0701, pp. 29-30]

[See original comment for Figure 2: Examples of historical automotive technology adoption29 compared to projected BEV market share under the EPA proposal.30] [EPA-HQ-OAR-2022-0829-0701, pp. 29-30]

29 U.S. Environmental Protection Agency, Automotive Trends Report (Mar. 2023), Detailed data. Available at https://www.epa.gov/automotive-trends/explore-automotive-trends-data#DetailedData. See Detailed Real-World Fuel Economy, CO2 Emissions, and Vehicle Attribute and Technology data.

30 Reflects EPA proposal, central analysis.

EPA has assumed a steep growth in BEV adoption at rates typically only seen in the evolution of disruptive technologies such as the cell phone, the television and microwave ovens, all of which added significant direct convenience and other benefits to customers and that cost substantially less at the time of purchase than an automobile. BEVs, on the other hand, have not thus far experienced such rapid adoption. In terms of convenience or additional new utility, BEVs offer generally superior acceleration performance, home refueling (a convenience not available to all customers), potentially lower fuel costs (that are dependent on where and when a vehicle is charged), and environmental benefits (important to some, but transparent to many). [EPA-HQ-OAR-2022-0829-0701, p. 31]

Thus, EPA makes an extremely aggressive assumption for a nascent technology that has not been fully embraced by the consumer and that faces many additional industrial and market challenges. [EPA-HQ-OAR-2022-0829-0701, p. 31]

J. Conclusion

EPA suggests that reaching a U.S. light-duty battery electric vehicle market share 60% by MY 2030 and two-thirds of all light-duty vehicle sales by MY 2032 is feasible and practicable. The conditions which would enable such a high level of BEV market share are not present today and are highly questionable based on the estimates that EPA relied on in this proposed rulemaking. [EPA-HQ-OAR-2022-0829-0701, p. 83]

III. Light-Duty Vehicle Greenhouse Gas Standards

In 2021, Auto Innovators accepted the challenge of driving light-duty EV purchases (including BEVs, PHEVs, and FCEVs) to between 40 and 50% of new vehicle sales by 2030.145 This commitment was, and remains, premised on having the necessary complementary policies in place to support the 40-50% goal. The Inflation Reduction Act and the Infrastructure Investment and Jobs Act are steps in the right direction, which industry had identified as critical to meeting, not exceeding, our goal of 40-50% EVs by 2030. However, these policies are not a guarantee of the future state of the U.S. EV market and are only part of the coordinated and parallel actions that will be necessary to expand EV sales. [EPA-HQ-OAR-2022-0829-0701, p. 88]

145 Alliance for Automotive Innovation (Aug. 5, 2021), “Auto Innovators: Aligning Policies for a Cleaner Future.” https://bit.ly/45GXdC5.

Concurrent with Auto Innovators announcement, President Biden signed Executive Order 14037 calling for 50% of all new passenger car and light truck sales to be EVs, including BEVs, PHEVs, and FCEVs.146 This policy direction was again affirmed by four cabinet level agencies, including EPA, in The U.S. National Blueprint for Transportation Decarbonization in early 2023.147 [EPA-HQ-OAR-2022-0829-0701, p. 88]

146 Executive Order 14037, “Strengthening American Leadership in Clean Cars and Trucks” (Aug. 5, 2021). 86 Fed. Reg. 43583 (Aug. 10, 2021).

147 U.S. Departments of Energy, Transportation, and Housing and Urban Development; U.S. Environmental Protection Agency, The U.S. National Blueprint for Transportation Decarbonization (Jan. 2023) at 9.

EPA’s proposed rule for MY 2027 to 2032 unilaterally moves those goal posts, requiring approximately 60% BEV sales by 2030.148 The proposed rule also excludes consideration of PHEVs, a technology that is readily available, comprises 1.4% of today’s overall EV sales,149 and that serves an important role in advancing consumer acceptance of EVs. If manufacturers were to substitute PHEVs for some of those BEVs, the overall EV market share would increase further. [EPA-HQ-OAR-2022-0829-0701, p. 88]

148 NPRM at 29333. (Table 99, Proposed standards, 2030.)

149 Alliance for Automotive Innovation (2023), Advanced Technology Sales Dashboard, calendar year 2022. Data compiled by the Alliance for Automotive Innovation using information provided by S&P Global Mobility (formerly IHS Markit). Last updated Mar. 3, 2023; retrieved Jun. 23, 2023.

Auto Innovators does not believe the GHG standards, as proposed, are feasible for the industry as a whole given the lead-time provided to apply the necessary technologies (electric vehicles) to meet them. Our specific concerns with EPA's analysis vis-à-vis electric vehicles are focused on the lack of assessment of necessary and critical market, supply chain, and infrastructure development as described in more detail in Section I (EV Feasibility). Our comments here focus more specifically on the proposed light-duty vehicle greenhouse gas standards. [EPA-HQ-OAR-2022-0829-0701, p. 88]

As EPA notes, BEVs accounted for 5.8% of the new U.S. light-duty passenger vehicle market in 2022.153 Moreover, EPA's MY 2023-2026 GHG emissions standards that were finalized at the end of 2021 projected only a 17% light-duty penetration rate for both BEVs and PHEVs by MY 2026.154 Despite this low rate of consumer acceptance, the Proposed Rule projects a light-duty BEV penetration rate of 67% by MY 2032, up from 36% in MY 2027.155 Importantly, in the absence of these and other strict regulatory programs (such as California's ZEV mandate), EPA projects a significantly lower MY 2032 BEV penetration rate of only 39%.156 It is unclear from EPA's analysis how the regulations alone justify a 28 percentage point increase in BEV market between having regulations versus not. This is particularly concerning given that EPA's no- action analysis presumably includes the same level of existing supportive mechanisms such as the IRA and IIJA, assumptions for infrastructure development, and other market-enabling features. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

153 Id. at 29189

154 See Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74485, Table 33 (Dec. 30, 2021).

155 NPRM at 29329, Table 80.

156 Id. at 29329, Table 81.

In other words, a staggering increase in the implementation and adoption of BEV technology underpins the Proposed Rule and is the central means by which the rule effectuates its contemplated emissions reductions. But this shift to electrification is not a simple matter of swapping one technology for another. The mass adoption of BEVs on the scale required for compliance with the Proposed Rule's standards requires a much broader transformation in the way vehicles are manufactured, purchased, fueled, serviced, and disposed of. Indeed, the Proposed Rule would reorder much of the U.S. automobile industry—which supports roughly 10.3 million American jobs and $558 billion in annual car sales, and about 6% of the U.S.'s Gross Domestic Product (GDP).157 Consumers must be willing to purchase BEVs at mass scale; the power sector must be able to generate and deliver adequate electricity158—which itself will contribute to emissions—while maintaining grid reliability and otherwise meeting consumer and industrial demand; adequate charging infrastructure must be available; batteries and other components must be manufactured at an increasing rate, critical minerals sourced, and supply chains developed. These needs must be met not only for light-duty vehicles, but also for medium- and heavy-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

157 See Economic Insights, Alliance for Automotive Innovation, htps://www.autosinnovate.org/resources/insights.

158 In addition to increasing electricity capacity, utilities are also facing a transition in technology types and more renewable sources, as proposed under the “Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants” [88 FR 33240, May 23, 2023].

As expressed throughout this comment, we have serious concerns that the market will not be able to bear the requirements of the Proposed Rule and that those requirements will not be feasible given these considerations. Compliance will impose significant costs, and require extraordinary effort, on the part of regulated parties—costs which will be passed along to consumers. Setting such stringent standards has the potential to create a significant market disruption, with consequences not only for the automobile industry but for the entire U.S. economy. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

3. Front-Loading of the Proposed Standards

The proposed standards are heavily front-loaded, seeking over half of the required GHG emissions improvements in the first two years, and nearly three-quarters of the improvements in the first three years.166 [EPA-HQ-OAR-2022-0829-0701, pp. 92-93]

166 Calculation by Auto Innovators based on EPA-estimated fleetwide CO2 targets corresponding to the proposed standards (NPRM at 29240, Table 29).

The proposed front-loading of the standards increases the risk to the feasibility of the standards since they are largely premised on widespread fleet electrification. As noted, it will take time to develop the supply chains, infrastructure, and market for EVs, and the proposed front-loading further limits recovery opportunities if everything doesn’t go exactly as planned. [EPA-HQ-OAR-2022-0829-0701, pp. 92-93]

While both passenger car and light truck standards are front-loaded in general, the proposed MY 2027 standard stringency increase for trucks (21%) is almost double that of cars (12%).167 Although these reductions become more balanced over the course of the proposed MY 2027-2032 program, light-duty trucks would shoulder more of the burden with a 52% stringency increase between MY 2026 and 2032 as compared to cars with a 45% stringency increase.168 [EPA-HQ-OAR-2022-0829-0701, pp. 92-93]

167 Calculation by Auto Innovators based on EPA-estimated fleetwide CO2 targets corresponding to the proposed standards (NPRM at 29240, Table 29).

168 Calculation by Auto Innovators based on EPA-estimated fleetwide CO2 targets corresponding to the proposed standards (NPRM at 29240, Table 29).

Much of this difference between passenger car and light-duty truck stringency increases (particularly in MY 2027) likely stems from EPA’s proposal to move away from its historic approach to setting standards (a set percentage reduction to an existing footprint target curve) toward setting light-duty truck standards based on passenger car standards.169 EPA proposes to make this switch in a single year (MY 2027), which results in a large step change in light-duty truck stringency, which should be reassessed on whether such a jump is feasible. [EPA-HQ-OAR-2022-0829-0701, pp. 92-93]

169 See DRIA at 1-8 et seq. (Development of truck curve.)

Organization: Alliance for Vehicle Efficiency (AVE)

Evaluation of feasibility

In contrast to previous rulemakings, EPA's assessment of the proposed standards' feasibility must account for a major transformation of the automotive market, its supply chains, technical workers, and the materials needed to produce a compliant fleet. EPA should also account for ZEV production volatility based on China's ability to withhold critical minerals which are not mined in the U.S. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Many of the estimates for future compliance in the Proposal assume that within four years, all the following requirements will be in place: that significant quantities of critical minerals and materials will be available, that the nation's electrical grid will be reliable (and cleaner), that new supply chains will be established, and that all the necessary technology and components needed for zero- emission vehicles (ZEVs) will be mass produced. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Should any of these assumptions be inaccurate, automotive manufacturers will likely assume significant financial risks as they modify their operations and production. The Proposal also assumes that consumers will purchase enough of these new vehicles for manufacturers to meet sales volumes for compliance levels. To reduce these risks, EPA should re-evaluate the ZEV marketplace to determine the new standards' feasibility prior to the effective date. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Technology integration across the U.S. fleet does not happen quickly

EPA is predicting a very significant number of battery electric vehicles (BEVs) to be available to consumers.5 Advanced vehicle technology integrations, however, are historically slow to take effect. As indicated in EPA's 2020 Trends Report, "…it has taken, on average, approximately 15- 20 years for new technologies to reach maximum penetration across the industry." 6 [EPA-HQ-OAR-2022-0829-06, pp. 2-4]

12 5 Federal Register / Vol. 88, No. 87 / Friday, May 5, 2023 / at 29188

6 EPA 2020 Trends Report at p.63

Eleven years ago, EPA made similar predictions about the increased use of then-available technologies to meet future standards, many of which never came close to EPA's predictions. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

"The agencies believe that advances in gasoline engines and transmissions will continue for the foreseeable future, and that there will be continual improvement in other technologies, including vehicle weight reduction, lower tire rolling resistance, improvements in vehicle aerodynamics, diesel engines, and more efficient vehicle accessories." 7 [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

7 Federal Register / Vol. 77, No. 199 / October 15, 2012 / at 62631

Indeed, broad acceptance of BEVs by consumers is still a question for large portions of the country, and the Proposal does not fully address this issue. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Organization: American Coalition for Ethanol (ACE)

Hurdles to Arbitrarily Regulating BEVs as the Only Way to Reduce Vehicle GHG Emissions

According to the U.S. Energy Information Administration, BEVs will comprise about 17% of all vehicle sales by 2030.1 EPA's proposal aims to force an astonishing transition requiring BEVs to represent an average of 78% of all sales of sedans, 68% of all pickup sales, and 62% of all crossover and SUV sales by 2032.2 [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

1 https://www.eia.gov/outlooks/aeo/narrative/consumption/sub-topic-01.php.

2 Table 80 of EPA's Proposed Rule.

On the surface, this transition does not seem feasible, and in the draft regulatory impact analysis, the Agency itself admits that prior tailpipe GHG emission standards have underperformed relative to what was originally projected. [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

Automakers are highly skeptical of the feasibility of reaching this immense level of BEV sales in EPA's proposed timeframe. According to John Bozzella, the President and CEO of the Alliance for Automotive Innovation, "a lot has to go right for this massive – and unprecedented – change in our automotive market and industrial base to succeed, especially as 284 million light-duty vehicles across the country (that average 12 years in age) remain on the roads. As of last year, EVs accounted for just over 1% of all light-duty vehicles."3 [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

3 April 12, 2023 blogpost by John Bozzella, President and CEO of the Alliance of Automotive Innovation.

The Auto Innovators have pointed out President Biden's 2021 Executive Order (EO 14037), which seeks 40 to 50% electric vehicle sales by 2030, was always a "stretch goal," and it includes plug-in hybrids, fuel cell, and BEVs and depends upon complimentary policy relating to dozens of factors outside of the vehicle, such as charging station availability, mineral availability, and grid capacity.4 EPA's proposal represents a "significant movement of the country's electrification goal posts – not by a little, but by a lot" according to Auto Innovators testimony from Mike Hartrick. [EPA-HQ-OAR-2022-0829-06, pp. 2-3]

12 4 https://www.whitehouse.gov/briefing-room/presidential-actions/2021/08/05/executive-order-on-strengthening-american- leadership-in-clean-cars-and-trucks/.

Setting aside whether this proposal is feasible or not from an automaker standpoint, the fact is the Agency is relying on dozens of factors outside of the direct control of automakers and their suppliers for the proposal to come to fruition. In fact, EPA itself lacks the jurisdiction to regulate or control complimentary polices needed to solve for many of these needs, such as securing foreign supplies of raw materials and minerals to make batteries, access to home and public charging infrastructure, state and local building codes, grid capacity and reliability, and perhaps most importantly, consumer preferences and fears associated with such a monumentally fast transition to BEVs. [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

In response to these practical hurdles, testimony from Mr. Hartrick of the Auto Innovators goes on to say "…there is no clear pathway to meet the totality of these needs in the timeframe considered in the proposed rulemaking without significant impacts to automakers, workers, consumers, and ultimately the availability of vehicles that meet the needs of individuals, families, and businesses across the country." [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

Non-binding company commitments about BEV production and EPA's reliance upon them does not prove the proposal is feasible. The number of these non-binding commitments and projections relied upon by the Agency is astounding and unprecedented. Indeed, recently in setting final 2023 through 2025 renewable volume obligations (RVOs) for advanced biofuel, EPA specifically chose not to rely on the non-binding production capacity forecasts and commitments of prospective advanced fuel producers. As a result, the final advanced biofuel RVOs are lower than desired by many of these prospective producers, but achievable in EPA's view. Why would the Agency abandon that logic for this rulemaking and put all its faith in similarly non-binding commitments from BEV enthusiasts when proposing these ambitious tailpipe standards for vehicles? [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

Mr. Bozzella, the President and CEO of the Auto Innovators, sums it up this way: "The administration's 50% (electric vehicle) goal in 2021 was aspirational, but it was also based on clearly defined climate goals, credible assumptions, and data. The 60+% BEVs by 2030 plan, on the other hand, is a house of cards. It rolls up rosy forecasts (like EV batteries will eventually cost automakers nothing) and other hopeful assumptions."5 [EPA-HQ-OAR-2022-0829-06, pp. 2-3]

12 5 June 28, 2023 blogpost by John Bozzella, President and CEO of the Alliance of Automotive Innovation.

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

The proposed light- and medium-duty rule is also arbitrary and irrational in many ways. The Clean Air Act and common sense alike require that EPA adopt regulations only if the agency first determines that compliance will be feasible. The proposed rule flunks that core criterion many times over. Electric vehicles are barely in use today, and the numbers needed to meet EPA's new emissions standards are many times higher than current levels. As EPA admits, compliance with its proposed rule depends on a drastic increase in the number of electric vehicles produced and purchased by 2032. Sales of battery-electric light-duty vehicles, for example, would likely have to jump tenfold or more. Achieving such a surge in the availability and adoption of electric vehicles would present grave challenges in any circumstance, but it is especially implau- sible given EPA's arbitrary and unjustifiably truncated timeline. [EPA-HQ-OAR-2022-0829-0683, pp. 3-4]

EPA predicts that such a sea change would occur, but its forecast fails on its own terms: it relies heavily on manufacturers' nonbinding and aspirational announcements of future plans, oversimplified and illogical assumptions about the purchasing decisions of light- and medium-duty vehicle owners, and unreliable estimates of the costs that electric-vehicle users will incur. [EPA-HQ-OAR-2022-0829-0683, pp. 3-4]

Moreover, EPA's feasibility analysis fails to meaningfully confront multiple serious obstacles to the widespread adoption of electric vehicles on which its proposed rule depends. Increased production of electric vehicles is constrained by the supply of certain minerals critical to manufacturing batteries. That supply is sharply limited; mining and processing operations are nowhere near the levels needed to support the expansion of electric vehicles EPA's proposed rule would require. The supply chain is subject to serious disruptions, as other fed- eral agencies have underscored. For example, nearly all existing supply of several critical minerals is controlled by a small number of foreign and unfriendly nations. The insufficiency of these essential inputs will only become more acute as worldwide demand for them increases. And developing new operations would be a decades-long process that extends far beyond the compliance period for the proposed rule. On average, it takes 16 years to move mining projects from discovery to first production, and another ten to begin producing at max- imum capacity. EPA barely addresses this problem in its proposed rule and offers no plausible solution. [EPA-HQ-OAR-2022-0829-0683, p. 4]

Section 202(a) requires EPA to consider whether compliance with the proposed emissions standards is feasible, giving appropriate consideration to the cost of compliance. 42 U.S.C. § 7521(a)(2) ("Any regulation prescribed . . . shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."). While the agency may take future advances into account, it may not promulgate rules on the basis of "crystal ball" prognostications. NRDC v. EPA, 655 F.2d 318, 328 (D.C. Cir. 1981) (internal quotation marks omitted). Instead, the agency must explain why its projections are "reason[able]" and defend "its methodology for arriving at numerical estimates." Id. Here, that includes answering theoretical objec-tions to widespread electrification, identifying the major steps necessary to achieve that objective, and offering plausible reasons for believing that each of those steps can be completed in the time available. Id. at 331–32. [EPA-HQ-OAR-2022-0829-0683, p. 18]

EPA's proposed rule is not feasible for multiple independent reasons. Over- all, EPA's conclusion that compliance with its proposed standards is possible assumes a drastic increase in the adoption of light- and medium-duty electric vehicles that is implausible and unrealistic within the proposed rule's con- strained timetable. In addition, EPA has failed to confront several specific im- pediments to the expanded availability and adoption of light- and medium-duty electric vehicles, including serious threats to the supply of minerals critical to manufacturing batteries; the Nation's inadequate charging and refueling infra- structure and limitations of its electricity grid; and safety concerns with electric vehicles that will deter uptake by users and may prompt intervention by other regulators. EPA cannot rationally conclude that compliance with its proposed emission standards is feasible without demonstrating how these obstacles will be overcome. [EPA-HQ-OAR-2022-0829-0683, p. 18]

The agency's conclusion that compliance with the proposed rule is feasible critically depends on the electric-vehicle adoption rates it projects for model years 2027 through 2032. EPA expects that by 2032, 67 percent of light-duty vehicles and 46 percent of medium-duty vehicles will be battery-electric. 88 Fed. Reg. at 29,329, 29,331. Those numbers are staggering. Current adoption rates are much lower, and the assumptions that EPA makes to project such sizeable increases are unwarranted. [EPA-HQ-OAR-2022-0829-0683, p. 19]

a. Current Adoption Of Electric Vehicles

Today, battery-electric vehicles make up a small minority of vehicles in both the light- and medium-duty categories. Manufacturers offer a limited number of models, and relatively few consumers buy them. [EPA-HQ-OAR-2022-0829-0683, p. 19]

Although EPA claims that the production of electric vehicles is growing rapidly, see 88 Fed. Reg. at 29,188–89, the U.S. Department of Energy reports that there are only 68 models of light- and medium-duty battery-electric vehicles available for the current model year. See U.S. Dep't of Energy, Alternative Fuels Data Ctr., Alternative Fuel and Advanced Vehicle Search, https://tinyurl.com/y853dwvt (last accessed June 26, 2023). Thirty-five of them are se- dans or wagons; twenty-nine are SUVs; four are pickup trucks; and none are vans. Id. This limited number of options may be a result of exceedingly low demand. According to the agency, in 2022, battery-electric vehicles accounted for only 807,000 new car sales, or about 5.8 percent of the new light-duty passenger-vehicle market. 88 Fed. Reg. at 29,346. Currently, "in most of the United States, the share of EVs is zero or near-zero." Kenneth T. Gillingham et al., Has Consumer Acceptance of Electric Vehicles Been Increasing?, Forthcoming, Am. Econ. Ass'n, at 6 (Jan. 2023) ("Consumer Acceptance"). This is particularly true in rural areas. In Wyoming for example, there were "only 456 electric cars and light trucks registered statewide as of March 2022." Robert N. Charette, The EV Transition Explained: Converting Gasoline Superusers, IEEE Spectrum (Dec. 11, 2022) ("EV Transition"), https://tinyurl.com/5dnry66s. [EPA-HQ-OAR-2022-0829-0683, p. 19]

By and large, the light- and medium-duty sectors have not embraced a shift from internal-combustion-engine vehicles to electric ones. [EPA-HQ-OAR-2022-0829-0683, p. 19]

To reach EPA's projected rates of adoption, the manufacture and sale of electric vehicles would have to experience rampant growth. EPA has identified no evidence to demonstrate that this will occur, let alone on the constrained timetable of its proposed rule. Instead, the agency relies on speculation and ignores important and relevant data. [EPA-HQ-OAR-2022-0829-0683, p. 20]

Organization: American Fuel & Petrochemical Manufacturers

C. The Proposal's Deployment Timeline is Impracticable

EPA's emissions standards rely on the unsubstantiated assumption that the U.S. electricity and transmission grid and ZEV charging infrastructure will be available to charge the massive numbers of ZEVs that will enter the market. As outlined below, available data supports the Alliance for Automotive Innovation's conclusion that the timeline for EPA's standard is infeasible.36 [EPA-HQ-OAR-2022-0829-0733, p. 13]

36 Alliance for Automotive Innovation, Comments to the Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Proposed Rule, Docket No. EPA-HQ-OAR-2022-0829 (hereinafter AAI Comments) at iv.

B. The Proposed Rule Contravenes the Clean Air Act's Direction that EPA's Regulations be Technologically Feasible

Section 202(a)(2) requires EPA to provide lead time to "permit the development and application of the requisite technology."104 But, as discussed in Section IV.B, EPA's overly-aggressive demands for electrification cannot be supported—there will not be sufficient infrastructure to generate and transmit electricity and charge the vehicles EPA is requiring OEMs to produce. EPA has simply failed to provide both the OEMs, as well as the ancillary services required to sustain an electrified fleet, with enough time to develop the necessary infrastructure.105 EPA's failure to adequately ensure sufficient infrastructure demonstrates that it is not providing sufficient lead time to "permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."106 [EPA-HQ-OAR-2022-0829-0733, p. 25]

104 42 U.S.C. § 7521(a)(2).

105 See AAI Comments at ii-iv.

106 Id. (emphasis added).

As EPA considers the technological feasibility of its Proposal, it should further consider the OEMs' position that they will not possess adequate resources to adapt to these stringent requirements within the prescribed timeframe, especially in light of increasing global supply chain issues and price increases associated with battery demand.110 EPA's proposal will require an unprecedented rate of vehicle technology change that the nation and OEMs have never experienced before. [EPA-HQ-OAR-2022-0829-0733, pp. 25-26]

110 AAI Comments at ii-iv.

B. The Proposed Rule is Impracticable

1. EPA's Proposed Rule Ignores the Reality of Current ZEV Production.

In describing the need for this regulatory action, EPA suggests that rapid electrification resulting from the Proposed Rule either is already in progress or aligned with the automotive industry. In support, EPA cites public statements of the automotive industry to justify the proposed standards.124 Representing 42 car companies, automotive suppliers, and automotive technology companies that produce about 97 percent of the new vehicles sold in the United States, the Alliance for Automotive Innovation (AAI) submitted the following comments on this Proposal: [EPA-HQ-OAR-2022-0829-0733, pp. 28-29]

124 Proposed Rule at 29,329.

- The proposed GHG and criteria pollutant standards "are neither reasonable nor achievable in the timeframe covered in this proposal";125 [EPA-HQ-OAR-2022-0829-0733, pp. 28-29]

125 Alliance for Automotive Innovation, Comments to the Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Proposed Rule, Docket No. EPA-HQ-OAR-2022-0829 (hereinafter AAI Comments) at ii.

- EPA's proposal cannot be met "without substantially increasing the cost of vehicles, reducing consumer choice, and disadvantaging major portions of the United States population and territory";126 [EPA-HQ-OAR-2022-0829-0733, pp. 28-29]

126 Id.

The Proposed Rule's standards exceed even the public aspirations of OEMs' vehicle and market share targets. [EPA-HQ-OAR-2022-0829-0733, pp. 28-29]

2. EPA's Proposed Rule Commands Impractical Adoption Rates.

Automakers may be publicly acquiescing to government demands, but this does not demonstrate that the technology and infrastructure will be available in the stated period and, most critically, that consumers are ready and willing to adopt electric vehicles. Indeed, many of the automakers have set "goals" for their electrification, premised explicitly on a litany of federal and state subsidies for purchase and infrastructure assistance. And these government demands, and indeed government subsidies, can vanish in an instant, through changes in administrations or judicial challenges. [EPA-HQ-OAR-2022-0829-0733, pp. 30-31]

Organization: American Highway Users Alliance

Key Concerns with the Proposed Rule

The Highway Users is deeply concerned that the proposed requirements for significant reduction in GHG emissions from new light-duty and medium-duty vehicles are very, very possibly not achievable by manufacturers in the limited time frame provided to achieve such significant reductions in emissions. The Alliance for Automotive Innovation has already submitted testimony in this docket that the proposed rule would require 2/3 of vehicles covered by this docket to be battery electric vehicles by 2032. In today's market the share of new light-duty and medium-duty vehicles that are electric vehicles (EVs) is one-tenth of that share nationally, and far, far lower in many regions of the country. So, the rule essentially calls for an industrial transformation, something more easily said than done, not to mention the proposed rule's impacts on consumers and vehicle choice. [EPA-HQ-OAR-2022-0829-0696, p. 2]

More specifically, EPA's proposal in this docket appears to be premised on huge and rapid growth in the portion of light-duty and medium-duty vehicles that are electric powered (EVs) as well as on rapid transformation of the marketplace in a number of related areas that are not the subject of the proposed regulation. EPA seems to have made favorable assumptions on many issues bearing on the feasibility of the proposal, including as to the issues set forth below. The Highway Users, on the other hand, drawing on the expertise of its members, questions that, within the MY 2027 – 2032 timeframe of the proposed rule, all or most of the following will– ccur, that -- [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- high-speed and other electric charging stations will be sufficiently available to service light- duty and medium-duty EVs in quantities and locations sufficient to encourage customers to buy EVs, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- electric utilities can timely provide connections from the electric grid to those charging stations, or hydrogen fueling stations – and provide the refueling and charging connections at reasonable cost, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- the electric grid will have the capacity to meet the demand for electricity that will be required to support increased electrification of trucks, buses, and passenger cars, even if the connections can be timely made to charging stations (both public and private) that do not yet exist in sufficient numbers, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- charging times can be reduced sufficiently to encourage customers to buy these EVs, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- major industries, including vehicle manufacturers and their suppliers, can implement major changes in vehicles as rapidly as the NPRM assumes (given the limited current market penetration of these EVs), [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- there will be an adequate supply of rare earth and other critical minerals, and the ability to process them, with those minerals being so essential to the manufacture of EVs and batteries, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- with a large portion of such minerals being sourced and/or processed overseas, including in China and Africa, whether the national interest in sourcing and processing such minerals in the United States can be met, and [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- potential customers of these EVs will proceed to purchase them in sufficient quantity, notwithstanding significantly higher up-front costs, uncertain availability of charging facilities, and other concerns. [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

This last consideration is highly important because if the potential customers of these EVs do not become actual customers to a sufficient extent, the manufacturers are unlikely to produce the vehicles in the quantities EPA has estimated will be required to be compliant with the regulations, in turn greatly reducing the benefits of the proposal as EPA estimated. [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

Significantly, at the same time that EPA has issued this NPRM, it has also issued a major proposal calling for reduced tailpipe emissions of CO2, other GHGs, and other substances from heavy-duty vehicles. See 88 Fed. Reg. 25926 (April 27, 2023). That proposed rule, similar to the one in this docket, assumes astronomical growth in EVs as a percentage of new heavy-duty vehicles. That rule faces similar questions regarding feasibility due to, among other uncertainties, the availability of charging infrastructure that is sufficiently fast, the cost of such heavy duty EVs, the ability of the electric grid to provide electricity to support the growth in those EVs, the ability of the electric utilities to provide connections from the grid to charging facilities, and the availability of critical minerals, processing facilities and battery components, and electrical steel, widely used in transformers, electric vehicle chargers and other products important to the widespread adoption of electric vehicles.2 [EPA-HQ-OAR-2022-0829-0696, pp. 3-4]

2 A May 22, 2023 letter from nine major organizations to President Biden expressed concern over the "skyrocketing demand and limited availability of domestically produced electrical steel. Signatories included the Alliance for Automotive Innovation, the Edison Electric Institute and the International Brotherhood of Electrical Workers.

With these two large-scale rules being advanced at the same time, the feasibility of the proposals is even more challenging. It is not as if manufacturing charging stations for heavy-duty, light-duty, and medium-duty vehicles is unrelated. At least some supplies and components are relevant to all; the critical minerals and related processing are needed for all. But suppliers and electric utilities can only gear up so quickly. This confluence of proposed regulations (further combined with separate and significant regulatory actions by the California Air Resources Board) compounds the challenges for relevant industries to comply. It makes it harder to make favorable assumptions on how quickly changes can be made to facilitate marketplace acceptance of EVs. [EPA-HQ-OAR-2022-0829-0696, pp. 3-4]

For reasons including those outlined above, the proposed rule should be revised to provide more time for vehicles to achieve the proposed emission reductions A revised proposal should not only provide more time to achieve a given level of emission reductions but, while still calling for reductions, should call for achievable reductions. The need for revision of the proposal is so significant that EPA should not proceed directly to a final rule after considering comments in this docket. [EPA-HQ-OAR-2022-0829-0696, p. 4]

Instead, EPA should issue a revised NPRM so the public can have the opportunity to comment on a more realistic approach to the effort to reduce GHG and criteria emissions from light-duty and medium-duty vehicles. Such a solution would reduce emissions but more gradually, over a longer period of time than the model years that are the subject of the proposed rule. [EPA-HQ-OAR-2022-0829-0696, p. 4]

Feasibility of the proposal is highly questionable and benefits are likely overestimated [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

We are skeptical that the GHG and criteria reductions estimated by EPA can be realized in the proposed rule's timeframe. [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

Organization: American Honda Motor Co., Inc.

Achieving these goals will not be easy, requiring (among other activities) new technology and vehicle development, factory renovations, battery and auto assembly factories, realignment of the supply network, the existence of a vast, well-functioning public charging infrastructure, and the formation of joint ventures and alliances. It was with such considerations in mind that, in our comments to the agency regarding proposed MY2023-2026 vehicle greenhouse gas (GHG) standards, Honda specifically cautioned EPA that "it is important that the agencies not approach such [electrification target] announcements as foregone conclusions."4 Unfortunately, in this rulemaking the agency did just that – set aggressive targets while pointing to industry statements as a basis for the feasibility of its proposed standards. It is worth noting that the agency's proposed level of electrification just six years from now – barely one product design cycle away – is a full 50% higher than Honda's publicly stated target.5 [EPA-HQ-OAR-2022-0829-06, pp. 4-5]

12 4 American Honda Motor Co., Inc. comments on Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions. September 27, 2021. Docket ID No. EPA–HQ–OA2021–0208.

12 5 60% in 2030, versus Honda's publicly stated goal of 40% in 2030

Pointing to complementary policies, including those in the Inflation Reduction Act (IRA), the agency has characterized its standards as "readily achievable,"6 a position that suggests the agency believes all major stakeholders (including consumers, the critical minerals supply chain, utilities, state and local governments, charging infrastructure providers, parts suppliers, battery manufacturers and automakers, among others) are "ready" to effectuate an electrified transportation system in line with the agency's proposed stringency and timeline. Honda respectfully disagrees. Based on our experience in creating and marketing battery electric vehicles over the past 25 years, we believe the agency has significantly underestimated the numerous intertwined external challenges that lie ahead – and, moreover, the fact that a missed target in any one of these areas has significant potential to derail not only our shared decarbonization goals, but also the compliance status of regulated parties. [EPA-HQ-OAR-2022-0829-0652, p. 5]

6 https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards- cars-and

In the auto industry, internal forecasts of future environmental regulations are a necessity, as multi-year planning timelines for products often dictate that development decisions be made well in advance of full clarity on the status of a given future regulation. [EPA-HQ-OAR-2022-0829-0652, p. 10]

E. Agency Faith in a Swift and Seamless EV Market Transition

As noted earlier in these comments, one of the more troubling aspects of the NPRM is the agency's assumed fast and smooth market transition to widespread electric vehicle adoption. This assumption permeates numerous regulatory requirements and key parameters in the proposal, including fleet average GHG stringency, fleet average NMOG+NOx stringency, and overall cost of the regulation to consumers. While major automakers, including Honda, have announced significant targets for levels of vehicle electrification in the coming years, those intentions have also been sincerely caveated – not as excuses or planned off-ramps, but rather to acknowledge the many uncertainties that remain about consumer adoption, a substantial number of which hinge on the development of a full and robust vehicle electrification ecosystem which includes numerous factors outside of Honda's control. [EPA-HQ-OAR-2022-0829-0652, p. 22]

iv. Feasibility and Modeling.

A review of EPA's modeling cost and assumptions for battery costs, critical minerals, battery raw materials, and impacts of federal incentives calls into question EPA's approach and conclusions regarding feasibility of the proposed standards. [EPA-HQ-OAR-2022-0829-0641, pp. 22-23]

- The cost reduction model used in the analysis seems to be based on a model used for part cost reductions driven by improved economies of scale on fixed capital equipment. Given that raw materials make up a significant portion of battery costs, EPA should also use a raw material supply cost model that considers the increasing costs for raw materials with increased supply. [EPA-HQ-OAR-2022-0829-0641, pp. 22-23]

- Cost and price are concepts that the agency uses interchangeably in the regulation. The true cost of the regulation is not fully calculated since the portion of the consumer- facing price is paid for by the government. The agency should fully account for the technical feasibility of any CO2-reducing technology on a cost basis as defined in the CAA regardless of governmental taxation breaks for electric vehicle technology production and sale. [EPA-HQ-OAR-2022-0829-0641, pp. 22-23]

- The cost impact of "fueling" the significant number of electric vehicles assumed in the regulation (67% implied EV share by 2032) is not fully calculated or considered as part of the technical feasibility analysis and cost for the technology. The costs of adding additional solar, wind, and hydropower plants should be considered in the regulation as they are a necessary part of bringing electric vehicles to market. [EPA-HQ-OAR-2022-0829-0641, pp. 22-23]

These topics are further addressed in Appendix B. [EPA-HQ-OAR-2022-0829-0641, pp. 22-23]

Organization: BlueGreen Alliance (BGA)

Automakers have announced $120 billion in new investments in clean vehicle manufacturing in the last eight years, with over 40% of those investments occurring in the six months following the passage of the Inflation Reduction Act in August 2022.8 Domestic automakers' 2023 Q3 profits were the highest they have been since 2016.9 Moreover, due to the passage of transformative programs in the Infiation Reduction Act and the Bipartisan Infrastructure Law, automakers and their suppliers have more federal resources than ever before to support the transition to cleaner vehicles in ways that do not shortchange their workers, their communities, or the environment. [EPA-HQ-OAR-2022-0829-0667, p. 7]

8 Environmental Defense Fund, "Report finds U.S. investments in electric vehicle manufacturing reach $120 billion, create 143,000 new jobs," March 2023. Available Online: https://www.edf.org/media/report-finds-investments-us-electric-vehicle-manufacturing-reach-120-billion- create-143000.

9 U.S. Bureau of Economic Analysis, Corporate profits with inventory valuation adjustments: Domestic industries: Nonfinancial: Manufacturing: Durable goods: Motor vehicles, bodies and trailers, and parts, March 2023. Available Online: https://fred.stlouisfed.org/series/N411RC1Q027SBEA.

Organization: BMW of North America, LLC (BMW NA)

Ultimately, BMW NA believes that the 'roposed Rule's target of 67% EV share by MY32 is overly ambitious and cannot reasonably be achieved given the short amount of remaining time that is left to resolve the outstanding challenges. [EPA-HQ-OAR-2022-0829-0677, p. 2]

BMW NA does have concerns and questions regardi'g the Agency's basis for proposing the massive jump in stringency, particularly for the light truck fleet, from MY26 to MY27. An increase in the BEV market share from 17% to 36% within one year, as predicted by EPA, is impractical to achieve. BMW NA has no indication that the light truck segment will change dramatically in 2027. Therefore, an incremental increase of BEV share is more appropriate. [EPA-HQ-OAR-2022-0829-0677, p. 3]

Organization: BorgWarner Inc.

BorgWarner supports the goals of EPA's proposal. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

BorgWarner supports EPA's approach to decarbonize the light-and medium-duty vehicle sectors. However, the proposed pace for battery electric vehicle (BEV) adoption requires continued significant support and incentives from state and federal regulators. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

The demand for BEVs across all vehicles sectors is rising. Critical mineral supply will need to increase significantly to support the growth of the BEV market. Battery production, along with the necessary charging infrastructure, will ultimately depend on suppliers and manufacturers having access to increasingly domestically sourced and processed critical materials and minerals in sufficient quantities. Automotive suppliers operate in an integrated, complex worldwide supply chain and access to international markets is critical to our ability to meet production demands. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

The Infrastructure Investment and Jobs Act (IIJA), the Inflation Reduction Act (IRA), and CHIPS & Science Act were each important initial steps to enable industry, consumers, and communities to make the EV transition across the U.S. These significant investments are critical in supporting the continued growth of U.S. manufacturing and ensuring the initial transition results in affordable EVs for consumers and profitability for manufacturers. EPA should recognize that a majority of the programs needed to help achieve the EV transformation are still awaiting regulations and guidelines. In addition, the supplier industry, along with automakers and communities, will need time to implement the necessary investments in supply chains, infrastructure, and workforce to make the shift to electrification successful. [EPA-HQ-OAR-2022-0829-0640, pp. 3-4]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

The technologies to meet and exceed the proposed standards are available today. U.S. EPA's analysis finds that zero-emission vehicle (ZEV) technologies are cost-effective compliance options that manufacturers will increasingly deploy. With the rapid development of ZEV technology—supported by commitments from automobile manufacturers, unprecedented public investments in vehicles and infrastructure, and growing consumer demand—the U.S. market is poised to adopt these clean vehicle technologies at scale. The two most common examples of ZEVs are battery electric vehicles (BEV) and fuel cell electric vehicles (FCEV), which rely on different control technologies to eliminate vehicle emissions. BEVs use batteries with an on-board charger to store energy from the electrical grid to power electric motors. Fuel cell electric vehicles are full electric drive vehicles where the propulsion energy is supplied by hydrogen stored on board and a fuel cell stack that transforms the chemical energy stored in hydrogen into electricity for the drive motor. Although not fully zero-emission because of the use of internal combustion engines, plug-in hybrid electric vehicles (PHEV) also use battery packs to power electric motors. [EPA-HQ-OAR-2022-0829-0780, pp. 7-8]

The Proposal Will Deliver Urgently Needed Emission Reductions and is Technologically Feasible

The proposed standards at a minimum are technologically feasible with significant net benefits. The proposal is consistent with U.S. EPA's clear authority to regulate motor vehicle emissions, and manufacturers have control technologies available and in use today to meet and exceed the proposed standards. [EPA-HQ-OAR-2022-0829-0780, pp. 11-12]

The ACC II regulations and U.S. EPA's proposed standards both address multiple pollutants, including GHGs, particulate matter (PM), and non-methane organic gas (NMOG) and nitrogen oxides (NOx), from light- and medium-duty vehicles. Control technologies are available today to meet and exceed the proposed standards. Although ZEV technologies are not the only approach manufacturers can use to comply with the proposed standards, U.S. EPA's analysis concludes that they are one of the most cost-effective and thus will play a large role. ZEVs are especially beneficial and effective because they eliminate vehicle tailpipe emissions across all pollutants, and many manufacturers are actively supporting ZEV market expansion and have publicly committed to significantly increase ZEV production. This is being driven in large part by technology improvements such as declining battery costs, dedicated electric vehicle platform design enabling lower manufacturing costs and reduced vehicle energy consumption, improvements in battery pack capacity and energy efficiency, and fuel cell system improvements. 6 In response, the market has grown significantly with the availability of numerous BEV and FCEV models that meet consumer preferences and operational needs. A variety of state and federal programs, including California and Section 177 state regulatory actions and incentive programs, the federal Inflation Reduction Act, and the federal Infrastructure Investment and Jobs Act are supporting ZEV penetration, building the necessary infrastructure, and providing a backbone for the successful implementation of U.S. EPA's proposed standards. [EPA-HQ-OAR-2022-0829-0780, pp. 11-12]

6 For additional discussion on zero-emission vehicle (ZEV) technology improvements, see: CARB. Advanced Clean Cars II, Staff Report: Initial Statement of Reasons (ISOR). April 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf.

CARB has reviewed the proposed standards and finds that they are technically feasible within the proposal's timeframe. CARB also finds that more stringent standards are technically feasible and offers recommendations to that end. CARB also reviewed the draft regulatory impact analysis (DRIA) and finds that U.S. EPA has taken an appropriate but generally conservative approach to estimating costs, suggesting that the net benefits are likely understated. This section summarizes CARB's review and offers specific recommendations to strengthen the proposal to: achieve additional emission reductions and public health benefits; advance equity and environmental justice; ensure ZEVs meet the needs of drivers, including those who purchase vehicles in the used car market; and provide as consistent a set of standards for ZEVs nationwide as possible, reducing complexity for manufacturers and consumers alike. [EPA-HQ-OAR-2022-0829-0780, pp. 11-12]

Feasibility of proposed standards

California's effective vehicle GHG fleet average emission rate for new vehicles is similar to U.S. EPA's proposal due to similar expected shares of ZEVs entering the market in the 2026 through 2032 MYs and beyond. California's ACC II regulations require that an increasing share of new vehicle sales be zero-emission, ramping up from 35 percent for the 2026 MY to 100 percent for the 2035 MY. As part of the ACC II rulemaking, CARB estimated that 75 percent of new car sales in California in 2032 will be BEVs to comply with the ACC II regulations (with a small percentage of additional fuel cell and plug-in hybrid electric vehicles). In comparison, U.S. EPA projects a 67 percent BEV market share nationwide to comply with the proposed federal GHG standards in the same year. [EPA-HQ-OAR-2022-0829-0780, pp. 12-13]

In establishing its ZEV sales requirement, CARB assessed the technical feasibility and cost of ZEV technologies to determine a feasible pace of ZEV introduction in California. 7 This assessment found several market trends that will drive widespread ZEV penetration in the coming years, including a rapidly expanding number of ZEV models, increasing all-electric range, technological battery and fuel cell advancements, energy efficiency improvements, and declining battery costs. These market trends are also occurring at the national and international levels, and they underpin the technical feasibility of U.S. EPA's proposed standards. Further, as U.S. EPA notes in its proposal, every manufacturer has a public commitment to significant if not full electrification in the next 20 years. 8 Based on public announcements, it is expected that over 100 ZEV and PHEV models will be available to consumers before the 2026 MY. [EPA-HQ-OAR-2022-0829-0780, pp. 12-13]

7 CARB. ACC II ISOR. Appendix G: ACC II ZEV Technology Assessment. April 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/appg.pdf.

8 87 Fed. Re–. at 29,191 - 192.

In addition to these existing market trends, the implementation of ACC II in California and an expanding number of other states will further spur technological development, supporting widespread ZEV deployment and providing additional support that the proposal is not only achievable, but that manufacturers could exceed the standards as proposed. [EPA-HQ-OAR-2022-0829-0780, pp. 12-13]

U.S. EPA's modeling shows that the lowest cost compliance option to meet the proposed standards would result in 46 percent of medium-duty vehicles being battery-electric by the 2032 MY, relying primarily on zero-emission van technologies. Under California's ACT regulation, 40 percent of a manufacturer's medium-duty vehicle sales will be required to be zero-emission in the 2032 MY, increasing up to 45 percent the following MY. In its 2023 ACF rulemaking, CARB identified at least ten zero-emission Class 2b-3 van and pick-up truck models that are commercially available, up from only two manufacturers offering zero- emission Class 2b and 3 vehicles when CARB developed ACT. 10, 11 As in the light-duty sector, manufacturers are investing and will continue to invest in new technologies to comply with California's regulations, providing support that U.S. EPA's proposed standards are technically feasible. In the van category, four of the largest medium-duty van manufacturers—Ford, GM, Stellantis, and Daimler—have announced product availability by 2024 in the U.S.. 12, 13, 14, 15 For pickups, numerous zero-emission models are coming to market as some pickups designed for the passenger vehicle market are now being certified as medium-duty pickups, including the Ford F150 Lightning, the Rivian R1T, and the Tesla Cybertruck. 16 , 17 , 18 [EPA-HQ-OAR-2022-0829-0780, pp. 16-17]

10 CARB. Advanced Clean Fleets (ACF) ISOR. August 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/acf22/isor2.pdf.

11 CARB. ACF Initial Statement of Reasons. Appendix J: Commercial ZEV List. August 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/acf22/appj.xlsm.

12 Ford. 2023 eTransit Van. https://www.ford.com/commercial-trucks/e-transit/. Accessed June 15, 2023.

13 Mercedes-Benz. The all-new eSprinter. https://www.mbvans.com/en/esprinter. Accessed June 15, 2023.

14 BrightDrop. BrightDrop Zevo. https://www.gobrightdrop.com/. Accessed June 15, 2023.

15 Car and Driver. "Ram Confirms Electric ProMaster Van Is Coming to the U.S. in 2023." February 24, 2023. https://www.caranddriver.com/news/a43063537/2023-ram-promaster-ev-confirmed/. Accessed June 15, 2023.

16 CARB. Ford Executive Order A-0120-2424-1. https://ww2.arb.ca.gov/sites/default/files/classic/msprog/nvepb/executive_orders/EO%20Web%20Files/PC - LDT-MDV/2023/0002/pc-ldt-mdv_ldt-mdpv_a—-2424-1 sdt--20221205.pdf

17 CARB. Rivian Executive Order A?480?0005. https://ww2.arb.ca.gov/sites/default/files/classic/msprog/nvepb/executive_orders/EO%20Web%20Files/PC - LDT-MDV/2023/0006/pc-ldt-mdv_mdp–a-480-4 sdt--20221216.pdf

18 Tesla. Re: Support for a Strengthened Advanced Clean Truck Rule. December 9, 2019. https://www.arb.ca.gov/lists/com-attach/120-act2019-VyMFZlAiWWYEYwdY.pdf

As with ACC II, many other states have adopted or announced plans to adopt CARB's regulations on medium- and heavy-duty vehicles, including the ACT rule. This broader adoption of ZEV technologies in the medium-duty sector will continue to drive technological advancement and support compliance with the proposed standards, further illustrating the technical feasibility of the proposal. [EPA-HQ-OAR-2022-0829-0780, pp. 16-17]

The U.S. has no choice but to take bold action to dramatically reduce GHG emissions across the economy. Motor vehicles are a key GHG emissions source, and U.S. EPA's proposal represents an absolutely critical step towards reducing transportation emissions and stabilizing the climate. However, there are opportunities to do more, particularly protecting or insuring against conventional vehicles increasing their GHG emissions. Motor vehicles also continue to contribute to poor air quality for millions of people across the country. The public health benefits from the suite of proposed standards will reduce healthcare costs and improve quality of life. These benefits are especially important for our country's most vulnerable residents, many of whom face disproportionate exposure to air pollution and are the first to suffer the effects of climate change. [EPA-HQ-OAR-2022-0829-0780, p. 67]

CARB finds that a more stringent set of standards, and thus certainly the proposed standards as well, are technically feasible and cost-effective and recommends that U.S. EPA incorporate CARB's recommendations and adopt the most stringent standards feasible. [EPA-HQ-OAR-2022-0829-0780, p. 67]

Organization: California Attorney General's Office, et al.

Recent congressional actions demonstrate the federal commitment to substantial electrification of the transportation sector. In 2021, Congress passed the Bipartisan Infrastructure Law, which allocates $7.5 billion to building out a national network of electric vehicle chargers, $7 billion to ensure domestic manufacturers have the critical minerals and other components necessary to make electric vehicle batteries, and $10 billion for clean transit and school buses.110 In 2022, Congress passed the CHIPS and Science Act, which invests $52.7 billion in America's manufacturing capacity for the semiconductors used in electric vehicles and chargers.111 Later in 2022, Congress passed the Inflation Reduction Act, which provides $7,500 to buyers of new electric vehicles and $4,000 to purchasers of pre-owned electric vehicles.112 Additionally, the Inflation Reduction Act provides billions of dollars to support vehicle manufacturers' expansion of their domestic production of clean vehicles,113 and billions to support battery production in the United States and mining and processing of critical minerals needed for battery cells and electric motors.114 The Inflation Reduction Act also allocates billions to upgrade the nation's power grid in order to help address the new surge in grid demand from electric vehicles.115 [EPA-HQ-OAR-2022-0829-0746, pp. 18-19]

110 White House, Building a Better America: A Guidebook to the Bipartisan Infrastructure Law for State, Local, Tribal, and Territorial Governments, and Other Parties (May 2022), at 136, available at https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf.; White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action (Jan. 2023) at 46, available at, https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.

111 White House, Guidebook to the Inflation Reduction Act, supra n. 110, at 46.

112 Id.

113 Id. at 47.

114 Id. at 10, 26, 47.

115 Id. at 34.

In the Bipartisan Infrastructure Law, Congress directed $5 billion toward States to expand charging infrastructure under the National Electric Vehicle Infrastructure ("NEVI") Formula Program.134 To date, all 50 States have submitted and received approval for their NEVI plans.135 These plans detail the considerable resources and local expertise that state transportation, energy, and environmental agencies bring in support of Congress's vision of a "national network of electric vehicle charging infrastructure."136 Those resources include the mobilization of significant public and private nonfederal monies,137 the strategic siting of EVSE infrastructure in high-demand areas and major transportation corridors,138 designing resilience strategies to pair chargers with distributed generation and storage resources,139 and providing model ordinances for municipal governments to support EVSE expansion.140 These plans also illustrate the importance of greater EV adoption to States' climate targets.141 [EPA-HQ-OAR-2022-0829-0746, pp. 22-24]

134 Pub. L. No. 117–58, § 801 (Nov. 15, 2021), 135 Stat. 1421.

135 Federal Highway Administration, Fiscal Year 2022/2023 EV Infrastructure Deployment Plans, available at https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/index.cfm?format=list#map.

136 Pub. L. No. 117-58, §801, 135 Stat. 1422.

137 See, e.g., Colorado NEVI State Plan, at 31, available at https://www.codot.gov/programs/innovativemobility/assets/co_neviplan_2022_final-1.pdf (describing state funds available for cost sharing); New Jersey NEVI State Plan, at 23 (describing establishment of a New Jersey Green Fund with monies from the Regional Greenhouse Gas Initiative to provide low-cost financing for EVSE projects).

138 See, e.g., California NEVI State Plan, at 34-40, available at https://www.codot.gov/programs/innovativemobility/assets/co_neviplan_2022_final-1.pdf (describing phases of EVSE build-out along transport corridors).

139 See, e.g., Oklahoma NEVI State Plan, at 54, available at https://www.codot.gov/programs/innovativemobility/assets/co_neviplan_2022_final-1.pdf (proposing, e.g., preferences for EVSE paired with distributed energy resources like solar or battery storage).

140 See, e.g., Pennsylvania NEVI State Plan, at 7, available at https://www.penndot.pa.gov/ProjectAndPrograms/Planning/EVs/Documents/Final%20PA%20NEVI%20State%20Plan%20(ver%207-21-2022).pdf; Pennsylvania Department of Transportation, EV Model Ordinance Toolkit, available at https://www.penndot.pa.gov/ProjectAndPrograms/Planning/EVs/Pages/EV-Model-Ordinance-Toolkit.aspx

141 See, e.g., North Carolina NEVI State Plan, at 5, 16, 28, available at https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/nc_nevi_plan.pdf (discussing state climate and transportation policy and NEVI program); New York NEVI State Plan, at 19-26, available at https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/ny_nevi_plan.pdf (same).

B. The Proposed Standards Allow Adequate Lead Time to Apply the Requisite Technologies, and the Costs of Compliance Are Reasonable

Section 202(a) requires EPA to afford manufacturers the lead time necessary for the "development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." 42 U.S.C. § 7521(a)(2). Given that the requisite technologies needed to satisfy the proposed standards (as well as the more stringent alternative) have already been developed and are widely used today, EPA need only provide the lead time necessary for manufacturers to continue deploying these technologies across their vehicle fleets. Indeed, the ALPHA and OMEGA models that EPA used to model manufacturer compliance with the proposed standards utilized a menu of only existing technologies. 88 Fed. Reg. at 29,294. In addition to Section 202(a)'s general lead time requirement, for criteria pollutant standards applicable to medium-duty vehicles with gross vehicle weight over 6,000 pounds, the Clean Air Act further requires EPA to provide a minimum of four years' lead time and three years' stability, because it defines these vehicles as "heavy-duty" for purposes of Section 202(a)(3)(C). 42 U.S.C. § 7521(b)(3)(C). [EPA-HQ-OAR-2022-0829-0746, pp. 32-33]

Our States and Cities believe that EPA's proposed standards, as well as standards more stringent than EPA's proposed standards, satisfy these statutory requirements. EPA estimates the proposed standards per-vehicle cost to industry as ranging from $401 (for model-year 2029) to $1,164 (for model-year 2032) relative to the no-action scenario. 88 Fed. Reg. at 29,328 (Tables 77 & 78). These are in line with or lower than the per-vehicle costs of previous GHG standards EPA has adopted. 75 Fed. Reg. 25,324, 25,463 (May 7, 2010) (Table III.D.6-4) ($948 for model year 2016); 77 Fed. Reg. 62,624, 62,865 (Oct. 15, 2012) (Table III-34) ($1,836 for model year 2025); 86 Fed. Reg. 74,434, 74,483 (Table 30) (Dec. 30, 2021) ($1,000 for model year 2026).184 Likewise, these projected costs are in line with historical exercises of EPA's Section 202(a) authority.185 [EPA-HQ-OAR-2022-0829-0746, pp. 32-33]

184 The per-vehicle costs for Alternative 1's standards are similarly comparable to the per-vehicle costs of the 2012 rulemaking. Draft RIA, at 13-29 ($1,775 for model year 2032).

185 See, e.g., J.R. Mondt, Cleaner Cars: The History & Technology of Emission Control Since the 1960s (2000), at 214 ("[W]hen three-way catalytic converters were implemented in 1980-83, the additional cost increment [per vehicle, in 1996 dollars] amounted to approximately $1200").

Organization: CALSTART

2. Expected EV Deployment Timelines

One commonly discussed concern is the timeline related to EV deployments and whether there will be a sufficient number of EV options to justify more ambitious standards. The U.S. EV market is significantly more robust than it was only a few years ago. IHS Markit predicts that by 2026, there will be 130 available models offered by 43 brands.2 Having over 43 brands offering over 130 models by 2026 supports the argument that we do not need a delayed ramp up of standards (Alternative 3), and rather the market will be prepared by 2027 to meet Alternative 1's accelerated timeline. Additionally, numerous OEMs have committed to an all-electric lineup in the coming decade. This includes General Motors, Ford, Nissan, Volkswagen, and others.3 Helping guide all OEMs towards 100% zero-emission vehicle sales by 2035 with Alternative 1 and extending the timeline through 2035 would lead more OEMs to plan for this benchmark, increasing competition and decreasing costs. [EPA-HQ-OAR-2022-0829-0618, p. 4]

2 https://www2.deloite.com/us/en/insights/focus/future-of-mobility/electric-vehicle-trends-2030.html#:~:text=In%20the%20United%20States%2C%20IHS,2026%2C%20o?ered%20by%2043%20brands.&text=Achieving%20price%20parity%20with%2C%20or,adapt%20to%20manufacturer%20emission%20targets.

3 https://qmerit.com/blog/ev-inevitability-what-the-2035-auto-manufacturer-commitment- means-for-utilities/

Organization: Clean Fuels Development Coalition et al.

II. The Proposed Rule in Infeasible Because it Dramatically Underestimates the Cost of Electric Vehicles.

Section 202(a) requires that standards under that provision cannot take effect until “after such period as [EPA] finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.” 42 U.S.C. § 7521(a)(2). This consideration is commonly known as the “feasibility” requirement. See 88 Fed. Reg. 29,232. If the “cost of compliance” would discourage the adoption of the “requisite technology,” then the rule is not feasible. [EPA-HQ-OAR-2022-0829-0712, p. 15]

The proposal suggests that compliance with its proposed standards is fIe only because it anticipates that the share of electric vehicles will increase dramatically, “by almost 30 percentage points over [a] 6-year period, from 36 percent in MY 2027 up to 67 percent of overall vehicle production in MY 2032.” 88 Fed. Reg. 29,329. As a result, the cost of electric vehicles is the linchpin of this plan. If electric vehicles cost too much, consumers will buy fewer, and proposed standards will become infeasible. While the exact costs are difficult to disentangle, the proposal’s estimated vehicle technology costs suggest that electrifying the fleet comes with a price tag of about $3,900 per added electric vehicle sold.9 But these estimates are flawed in at least three ways: they underestimate current electric vehicle costs, they underestimate future electric battery costs, and overestimate the availability of Clean Vehicle Tax credits. [EPA-HQ-OAR-2022-0829-0712, p. 15]

9 This is based on $59.6 billion in vehicle technology costs between 2027 and 2032, divided by the approximately 15 million additional electric vehicles EPA expects its proposal to require over the same time span. This neglects that some of the vehicle technology costs are incurred by the adoption of new technology for internal combustion engine vehicles. It is also only the cost incurred for the additional electric vehicles EPA projects to be sold only as a result of its regulation. In the agency’s projected “no-action” scenario, the share of electric vehicles rises from 27 percent in 2027 to 39 percent in 2032. See Table 129, 88 Fed. Reg. 29,340. These “baseline” electric vehicle penetrations are calculated using the same vehicle technology costs discussed below, and thus represent inflated numbers. If electric vehicle costs are recalculated appropriately, the baseline share of electric vehicles would decrease, the number of additional electric vehicles over this baseline to comply with EPA’s proposed standards would increase, and the cost of compliance with EPA’s proposal would riseortionately.

12. B. The non-binding company commitments and projections EPA cites do not prove feasibility.

The non-binding company commitments and projections EPA cites do not prove feasibility See 88 Fed. Reg. 29,190-93 (“While manufacturer announcements such as these are not binding, and often are conditioned as forward-looking and subject to uncertainty, they indicate that manufacturers are confident in the suitability of PEV technology as an effective and attractive option that can serve the functional needs of a large portion of light-duty vehicle buyers.”). The auto manufacturers’ statements are not binding, and these companies could change their mind at any time. Many of these statements were made in response to the in direct response to the Biden Administrations urging.16 Further, many of these statements were made with the expectation that EPA would continue to provide various compliance flexibilities—like multipliers—that reduce the real-world stringency of the standards. As noted, the proposed rule would cut these avoidance strategies. [EPA-HQ-OAR-2022-0829-0712, p. 27]

16 Compare FACT SHEET: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks, White House Briefing Room (Aug. 5, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president- biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/ ("[T]he Presi dent will sign an Executive Order that sets an ambitious new target to make half of all new vehicles sold in 2030 zero-emissions vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles…. That is why today, American automakers Ford, GM, and Stellantis and the United Auto Workers (UAW), will stand with President Biden at the White House with aligned ambition.") with Fred Lambert, Ford, GM, and Stellantis announce joint 40-50% EV sale goal in 2030, Electrek (Aug. 5, 2021), https://electrek.co/2021/08/05/ford-gm-stellantis-joint-40-50-ev-sale-goal-2030/. ("To- day, Ford, GM and Stellantis announce their shared aspiration to achieve sales of 40-50% of annual U.S. volumes of electric vehicles (battery electric, fuel cell and plug-in hybrid vehicles) by 2030 in order to move the nation closer to a zero-emissions future.").

Organization: Consumer Energy Alliance (CEA)

As consumers become more accepting of electric vehicles (EV), taxpayer-funded incentives expand, and automobile manufacturers produce a greater variety of models, EV purchases are expected to keep growing. Policymakers, however, should be increasingly mindful not to put the cart before the horse when it comes to attempting to drive consumers to purchase'products they aren't ready 'o accept, they can't afford to purchase, and that face significant supply-chain bottlenecks that are already limiting supply and increasing costs. This is an area which we explored in-depth in our report Freedom to Fuel: Consumer Choice in the Automotive Marketplace.1 [EPA-HQ-OAR-2022-0829-0788, pp. 1-2]

1 https://consumerenergvalliance.org/cms/wp-content/uploads/2023/06/CEA EV REPORT 2023.pdf

Should this rule be adopted i– its current form - lacking both technological feasibility and eco–omic practicality - the result will be limiting consumer options and thwarting environmental progress through depressing innovation. [EPA-HQ-OAR-2022-0829-0788, pp. 1-2]

Organization: Consumer Reports (CR)

2. The Proposed EPA GHG Standards for MYs 2027+ are Achievable

Transportation accounts for 28% of GHG emissions in the United States7—more than any other sector. EPA's GHG Standards for Light- and Medium-Duty vehicles offer a cost-effective way to reduce these emissions and criteria pollutants, while maintaining a technology-neutral approach. [EPA-HQ-OAR-2022-0829-0728, pp. 7-8]

7 Sources of Greenhouse Gas Emissions, U.S. Environmental Protection Agency, 2021, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

2.1. Automakers Have Multiple Options for Compliance

EPA's proposal for MY27+ Light- and Medium-Duty vehicle GHG standards are strong, achievable, technology-neutral performance standards. EPA's analysis found that electric vehicles (EVs) are likely to be the most cost-effective compliance pathway for automakers to meet these standards, but they are not the only option. EPA estimated that an EV-only compliance pathway would require 67% of vehicles sold to be EVs by 2032. However, automakers can also use a mix of improvements in internal combustion engine (ICE) fuel efficiency, conventional hybrids, plug-in hybrids (PHEV), and even hydrogen fuel cell electric vehicles (FCEV) to comply with these standards. CR's modeling presented in Section 6.2 shows that automakers can utilize a wide range of options to comply with these rules. Most automakers will be able to comply with these rules while only selling between 50-60% battery electric vehicles (BEVs) by using a mix of widely available and cost effective technologies. Automakers that invest heavily in conventional and plug-in hybrids will be able to comply while selling as few as 40% BEVs in 2032. [EPA-HQ-OAR-2022-0829-0728, pp. 7-8]

CR estimates that an EV-only compliance pathway would result in the production of enough EVs for approximately 25% of Americans to own one by the end of 2032. In a 2022 nationally representative survey of 8,027 US adults, CR found that 36% of Americans were already “definitely” or “seriously considering” an electric vehicle if they were to buy or lease a vehicle today, indicating that consumer demand may already exceed what is needed to comply with these standards.8 This demand will also increase as consumers see the benefits from recently enacted investments in public charging infrastructure. A deeper dive on consumer demand dynamics can be found in Section 4 of this comment. [EPA-HQ-OAR-2022-0829-0728, pp. 7-8]

8 More Americans Would “Definitely” Get Electric Vehicles, Consumer Reports, July 7, 2022, https://advocacy.consumerreports.org/press_release/more-americans-would-definitely-get-electric-vehicles/.

2.2. The Proposal is in Line With Automakers Commitments

EPA’s analysis of existing automaker EV commitments shows that the industry was already on track to deliver around 50% EVs by 2030. The proposed standards simply reflect a slight boost to the trajectory the industry was on according to public commitments by automakers.9 Since these are technology-neutral standards automakers can adjust to this either by slightly increasing their electrification plans or by deploying existing, cost-effective efficiency technology to their remaining ICE vehicle fleets. As of January 2023, automakers and battery makers planned to invest $860 billion in the transition to EVs by 2030, including $210 billion in the U.S, according to an analysis by Atlas Public Policy.10 [EPA-HQ-OAR-2022-0829-0728, pp. 7-8]

9 Automakers Are Adding Electric Vehicles to ’heir L’neups. Here's What's Coming., Consumer Reports, March 10, 2023, https://www.consumerreports.org/cars/hybrids-evs/why-electric-cars-may-soon-flood-the-us-market-a9006 292675/.

10 $210 Billion of Announced Investments in Electric Vehicle Manufacturing Headed for the U.S., Atlas EV Hub, January 12, 2023, https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufact uring-headed-for-the-u-s/.

6.2. Modeling of Compliance Pathways

EPA’s compliance modeling estimates the single most cost-effective compliance pathway for the vehicle fleet under the proposed regulation. However, it is not the only possible compliance pathway automakers can take. Different automakers are likely to take wildly different compliance pathways, with some automakers going all in on EVs, while other automakers may hedge their bets with more hybrids and PHEVs. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

CR modeled a range of reasonable alternative compliance pathways that automakers might consider. The modeling considers different levels of continued ICE improvement and deployment of PHEVs as a percentage of all plug-in vehicles.43 The results of this analysis for model year 2032 are shown in Table 6.1. They show that a wide range of compliance pathways are available to automakers that can reduce the required BEV sales market share for model year

2032 to between 50-60% with varying levels of ICE improvement and PHEV deployment. There is even a feasible compliance option which would allow compliance with only 40% BEVs with heavy investment in hybrid and PHEV technology. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

43 ICE improvements of 1% (low), 3.5% (medium) and 5% (high) are modeled. PHEV market share was modeled as a percentage of all plug-in vehicles with values of 0%, 10%, 20% and 40% modeled.

[See original com–ent for Table 6.1 - Modeling of Compliance Alternatives for EPA's Proposed Standards for MY2032] [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

A few scenarios were also modeled for EPA's Alternative 1. These results are shown in Table 6.2. They find that with only a small improvement in ICE vehicles (1% per year reduction in emissions), automakers can comply with these stronger standards with a minimal increase in BEV market share from 67% to 68% compared to EPA's modeling of the proposed standards. Further reductions in BEV market share are also possible with further investment in ICE improvement and PHEV deployment. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

[See original com–ent for Table 6.2 - Modeling of Compliance Alternatives for EPA's Alternative 1 for MY 2032] [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

Overall these results show that automakers have many potential reasonable compliance pathways to comply with either EPA's proposed standards or the stronger Alternative 1. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

Organization: Cummins Inc.

II. General Principles

Aligned with Cummins' commitments described above, Cummins offer these principles for consideration as EPA develops its Final Rule addressing criteria pollutant and GHG emissions for light-duty (LD) and medium-duty vehicles (MDV): [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

- A harmonized national program for criteria pollutant, GHG, and fuel efficiency standards by EPA, the California Air Resources Board (CARB), and the National Highway Traffic Safety Administration (NHTSA) is essential to assure the greatest improvements are achieved in the most cost-efficient manner and to provide vehicle and engine manufacturers, suppliers, and end-users with the certainty necessary for investment in technologies to improve emissions. We urge the agencies to work together towards a single, nationwide program. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

- Sufficient regulatory lead time and stability should be provided to allow manufacturers to develop and implement the technologies needed to improve emissions and spread investments over time to minimize cost to customers. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

- Standards should be performance-based and technology neutral, as opposed to standards which mandate a specific technology, to allow manufacturers to innovate across a broad range of technologies to meet customers' diverse needs. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

• Standards should be fuel neutral (i.e., same stringency regardless of fuel type) to ensure the environmental benefits of the regulation are achieved regardless of the fuel type chosen by customers. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

• The tradeoff between oxides of nitrogen (NOx) and carbon dioxide (CO2) reductions must be considered when setting the stringency of standards. Also, linkage of criteria pollutant and GHG certification and compliance protocols is important so that improvement in one type of pollutant is not achieved at the expense of the other. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

• Well-to-wheels emissions should be considered in assessing technology effectiveness to ensure alignment of the standards with the most beneficial path to zero emissions. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Cummins currently certifies heavy-duty (HD) pickup trucks with gross vehicle weight ratings (GVWR) between 8,501 and 14,000 pounds, also known as Class 2b and 3 vehicles, meeting EPA's Tier 3 criteria pollutant emissions standards and Phase 2 GHG standards. Diesel Class 2b and 3 pickup trucks can have significant towing capability and are used in applications going beyond personal use such as construction and agriculture, and as such, do vital work for America. Our additional comments detailed below pertain to those vehicles. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Organization: Delek Holdings, Inc.

I. EPA's Proposed Rule is Based on Flawed Market Projections.

EPA's proposed standards are based on ZEV adoption rates that are unrealistic and unsupported by any concrete evidence. Because higher rates of ZEV adoption are essentially required for engine manufacturers to even come close to meeting the proposed standards, EPA projects adoption rates for MY2027 through MY2032 will be: 45–78% for sedans, 38–62% for SUVs, and 11–68% for pickups, totaling an adoption rate of 36–67% fleet-wide.3 These MY27 estimates are essentially required, despite the reality of the current ZEV market: for MY21, only 4.4% of the U.S. light-duty vehicles produced were PEVs (including both BEVs and plug-in hybrid electric vehicles).4 But EPA does little to acknowledge this reality, much less account for the true feasibility of ZEV penetration into the LD/MD vehicle market. [EPA-HQ-OAR-2022-0829-0527, p. 2]

3 Proposed Rule at ,329 (Table 80).

12 4 Proposed Rule at 29,189 (BEVs alone made up only 5.8% in MY22).

Organization: Environmental. and Public Health Organizations

VI. EPA's Proposed Standards Are Technologically Feasible at Reasonable Cost, as Are Alternative 1 Standards with a Faster Ramp Rate After 2030.

Not only does Alternative 1 with increasing stringency after 2030 yield significant societal benefits, it is also technologically feasible at reasonable cost. In this section, we detail the combustion vehicle and zero-emission technologies that can secure additional emissions reductions from the light-duty fleet, comment on EPA's modeling, and address technology costs.

We also offer recommendations for the Tier 4 NMOG+NOx standards and PM requirements. [EPA-HQ-OAR-2022-0829-0759, p. 36]

2. The electrification technology pathway shows the feasibility of stronger standards.

When it comes to electrification, EPA's OMEGA2 modeling applies electrification almost exclusively to commercial vans, with the model assuming just 236,000 Class 2b-3 electric pickups will be sold out of more than 5.2 million Class 2b-3 pickups sold between 2022-2032

(4.5%). On the other end of the spectrum, the model shows sales of just over 1.2 million electric vans out of just under 2.8 million total sales over the same period (43.4%), with electric vans achieving a 98% market share by 2032. The reasons for such a broad disparity are entirely artificial—for example, the model's 25% cap on production of Class 2b-3 BEV pickups—and do not reflect the latest available data on technology or cost. 187 [EPA-HQ-OAR-2022-0829-0759, pp. 68-69]

187 In its OMEGA2 modeling, EPA has set an artificial cap of 25% on the maximum production of Class 2b-3 BEV pickups, identified in the production_constraints-body_style_MD.csv input file. There is no sufficient justification for this cap in the DRIA or preamble, with the exclusive reference found on p. 1-21 of the DRIA, for which the Agency writes: "The primary assumptions within the work factor based GHG standards for MDV from 2028 to 2032 include an approximately 8 percent year over year improvement, to a large degree from electrification of MDV vans and to a lesser degree electrification of a small fraction (<##########25 percent) of MDV pickups and adoption of other technologies."

a.EPA's modeling should better reflect the favorable economic case for electric pickup trucks.

A recent report by Roush examined the potential for electrification of MDVs under a range of scenarios, finding that electrification is cost-competitive in the great majority of them. 188 It is clear that some amount of the difference between the uptake of Class 2b-3 pickups and vans in the OMEGA2 modeling stems from the far lower range assumed for vans (150 miles) compared to that of pickups (300 miles). But as illustrated in Table VI.A-1 below, 189 Roush finds that by 2030, even when comparing a low-cost combustion powertrain to the most costly battery chemistry (NMC811) deployed in a 400-mile electric Class 3 pickup, 190 the electric pickup still achieves total cost of ownership (TCO) parity within the typical loan length for a new vehicle (7 years). And when comparing a Class 3 pickup with a low-cost battery (LFP) to a high-cost internal combustion engine powertrain, a 400-mile electric pickup would pay off within 1 year, well within the payback period assumed for consumers by manufacturers within EPA's OMEGA2 model. [EPA-HQ-OAR-2022-0829-0759, p. 69]

188 Saxena et al., Electrification Cost Evaluation at 26.

189 Table VI.A-1 is adapted from Saxena et al., Electrification Cost Evaluation, Tbl. 24, at 145. Scenario 1 represents the adoption of low-cost BEV and high-cost combustion vehicle technologies; Scenario 2, medium-cost BEV and combustion vehicle technologies; and Scenario 3, high-cost BEV and low-cost combustion vehicle technologies. Id. at 28-29.

190 Roush used an LFP battery for its low-cost BEV, an NMC811 battery for its medium-cost BEV, and a "10% costlier" NMC811 battery for its High-bost BEV. Id. at 30-31.

Table VIII.A-1. Time to achieve TCO parity for Class 2b-3 BEVs with a 2027 and 2030 purchase timeframe [EPA-HQ-OAR-2022-0829-0759, p. 69]

[See original comment for Table VIII.A-1.].

When accounting for the impacts of the IRA, the economic case for electrification of Class 2b-3 pickups is even clearer, as shown in Table VI.A-2. Here the impact of the full § 30D credit is shown, which is also the maximum allowable limit of the § 45W (commercial clean vehicle) credit for Class 2b-3 vehicles. 191 Roush's analysis finds that purchase price parity is achieved for virtually all BEV classes in the timeframe of the analysis, so the § 45W commercial vehicle credit is not applicable in the later years of their analysis. 192 In fact, Roush finds that, with the application of IRA credits, by MY 2027 all BEVs except the 400-mile pickup will be priced at or below a comparable combustion vehicle 193; and that all MY 2027 BEVs will achieve TCO parity within the first two years of vehicle ownership. 194 Here it is worth noting that, despite the large share of MDVs that are purchased for commercial fleets, EPA did not directly include the § 45W credit in its analysis, instead applying the same combination of the § 30D and § 45W credit as it did for LDVs. 195 Because the § 45W credit is based on the lesser of $7500 or the difference in purchase price, this credit should act to hedge uncertainty in the Agency's analysis, though that is not how it was treated within the OMEGA2 modeling runs. [EPA-HQ-OAR-2022-0829-0759, p. 70]

191 Id. at 175-79. The § 45W credit is based on 30% of the basis of a vehicle not powered by a gasoline or diesel internal combustion engine, or the difference in purchase price between a qualified clean vehicle and a comparable combustion vehicle. In the case of vehicles that have a GVWR less than 14,000 pounds (which includes Class 2b-3 vehicles), the total credit is capped at $7500.

192 Id. at 195.

193 Id.

194 Id. at 197-98.

195 This is not immediately apparent in the text of the preamble or DRIA but can be assessed by comparing the contents of the vehicle_price_modifications_20230314b.csv input files from the LDV and MDV modeling runs, which are identical.

Table VIII.A-2. Time to achieve TCO parity with IRA § 30D credits for MYs 2023 and 2027 196 [EPA-HQ-OAR-2022-0829-0759, pp. 69-71]

196 This table is adapted from Saxena et al., Electrification Cost Evaluation, Tbl. 30, at 193.

[See original comment for Table VIII.A-2.].

The Roush report is not the only analysis to find a strong economic rationale for the adoption of zero-emission MDVs. A recent report from the National Renewable Energy Laboratory (NREL) found that cost parity will be achieved before 2035 (even in the absence of the IRA) for medium- and heavy-duty vehicles, including Class 3 vans and Class 4-5 vehicles that share a platform with Class 2b-3 pickups (which were not part of that analysis).197 Similarly, a recent International Council on Clean Transportation (ICCT) report on electric MDVs finds that purchase price parity with diesel MDVs will be achieved prior to 2032 for 300-mile and lower BEVs, even in the absence of IRA funding.198 And when IRA funding is considered, even 400-mile BEV pickups would achieve purchase price parity in the timeframe of this rule.199 [EPA-HQ-OAR-2022-0829-0759, p. 71]

197 Catherine Ledna et al., NREL, Decarbonizing medium- and heavy-duty on-road vehicles: Zero-emission vehicles cost analysis, Mar. 2022, at 2, 46 https://www.nrel.gov/docs/fy22osti/82081.pdf.

198 Eamonn Mulholland, ICCT, Cost of electric commercial vans and pickup trucks in the United States through 2040 (Working Paper 2022-01), Jan. 2022, at 11 (Fig. 5), https://theicct.org/wp-content/uploads/2022/01/cost-ev-vans-pickups-us-2040-jan22.pdf.

199 See id.

There is some difference in costs between EPA's assessment and other studies such as those described above: on average, according to EPA, Class 2b-3 combustion pickups will cost about $5,000 less (from a purchase price standpoint) than a comparable electric pickup.

However, with the Agency's application of an average IRA credit of $6,000 in 2032, this would still yield cost parity, on average, so even EPA's higher cost assessment cannot fully explain the reason for Class 2b-3 pickups electrifying at such a reduced rate in the Agency's modeling. Even more than that, this disparity is almost entirely influenced by the relative price difference of gasoline and diesel pickups in EPA's modeling, with the Agency's BEV300 pickups just $1,100 more expensive than diesel pickups without the IRA incentives, not far off ICCT's conclusion that BEV300 pickups will achieve cost parity with diesel pickups by 2031.200 Despite this, the model's conversion rate of combustion vehicle sales to electric vehicle sales is virtually indistinguishable between gasoline and diesel pickups, at roughly 20% for each, seemingly indicating that neither purchase price nor TCO parity have a significant impact on sales. Given that many Class 2b-3 vehicles are purchased for commercial use,201 such modeling behavior is inconsistent with the economically-driven decisionmaking that would be expected to occur in the real world.202 [EPA-HQ-OAR-2022-0829-0759, p. 71]

200 Id.

201 See id. at 1; Saxena et al., Electrification Cost Evaluation, at 49.

202 For example, EPA's own analysis of the heavy-duty market assumed a conversion rate of 80% when cost parity is achieved. 88 Fed. Reg. at 25992, Tbl. II-23. And analysis from NREL finds this number to be nearly 100%; see comparison at pp. 59-60 of EDF, Comment Letter on GHG Standards for HD Vehicles, June 16, 2023, https://downloads.regulations.gov/EPA-HQ-OAR-2022-0985-1644/attachment_1.pdf (data from Ledna et al. 2022).

Based on EPA's own modeling, BEV variants for over 71% of the Class 2b-3 market achieve first cost parity with their combustion-powered equivalent by 2032 when including IRA incentives, including 57% of the Class 2b-3 pickup truck market.203 This is a substantially higher share of vehicles than the model assumes will be deployed. [EPA-HQ-OAR-2022-0829-0759, p. 72]

203 This was established using the output files for the OMEGA2 MDV runs, using the vehicles file (2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv) to compare in a given model year BEV variants with their combustion equivalent, sharing a base-year vehicle ID.

For all of these reasons, EPA's modeling does not accurately reflect the favorable economic case for commercial MDV electrification, particularly for pickups. While some of these modeling problems can be ascribed to differences in battery costs and EPA's unreasonable choice to include an artificial 25% production cap on BEV pickups, other problems are intrinsic to assumptions made within the model that do not reflect the Agency's own assessment of likely adoption of electrification for commercial vehicles, particularly considering the incentives available under the IRA. [EPA-HQ-OAR-2022-0829-0759, p. 72]

XVI. EPA Should Not Repeat Its Past Pattern of Underestimating ZEV Technology Advancements and ZEV Deployment Within the Fleet.

The regulatory history shows that EPA's projections of ZEV technology advancements and overall ZEV deployment within the fleet routinely prove too conservative. EPA should not repeat those same mistakes in this rulemaking. For example, EPA's light-duty GHG rule finalized in 2012 set standards for MYs 2017–2025 and projected "very small" numbers of electric vehicles in the light-duty fleet through MY 2025. 77 Fed. Reg. at 62917. In the 2012 rule, EPA projected combined PHEV and BEV penetration of only 1% for the MY 2021 car fleet. Id. at 62872. Yet BEV sales alone accounted for at least 3.2% of all vehicle sales in MY 2021.278 In the 2012 rule, EPA did not even project combined BEV and PHEV sales that high by MY 2025. For the combined car and truck fleet, EPA projected BEV and PHEV penetration of only 2% by MY 2025, and for the car fleet alone, BEV and PHEV penetration of only 3% by MY 2025. Id. at 62874, 62875 Tbl. III-52. EPA re-evaluated those projections in 2016 and 2017, again projecting MY 2025 technology penetrations of around 3% or less for BEVs.279 And EPA's 2020 rule still projected only 3.4% BEVs by MY 2025. 85 Fed. Reg. at 24936 Tbl. VII-29. [EPA-HQ-OAR-2022-0829-0759, pp. 106-107]

278 Cox Automotive, In a Down Market, EV Sales Soar to New Record (Jan. 13, 2023), https://www.coxautoinc.com/market-insights/in-a-down-market-ev-sales-soar-to-new-record/; EPA, The 2022 Automotive Trends Report, at 74. See also Ilma Fadhil et al., ICCT, Electric Vehicles Market Monitor for Light-Duty Vehicles: China, Europe, United States, and India, 2020 and 2021, at 6 (2023), https://theicct.org/publication/ev-ldv-major-markets-monitor-jan23/ (estimating nearly 5% total U.S. BEV and PHEV sales in MY 2021).

279 See EPA, Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022–2025, at ES-10 (2016) https://www.nhtsa.gov/sites/nhtsa.gov/files/draft-tar-final.pdf; EPA, Final Determination on the Appropriateness of the Model Year 2022–2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, at 4-5, 21 (2017), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100QQ91.pdf.

In the 2012 rulemaking, EPA also considered a more stringent alternative projecting a 5% combined BEV and PHEV penetration for MY 2025 for the car fleet, but it rejected this alternative based on "serious concerns about the ability and likelihood manufacturers can smoothly implement [that level of] increased technology penetration." 77 Fed. Reg. at 62877. Yet automakers ultimately surpassed that "serious[ly] concern[ing]" electrification penetration level in MY 2022 with BEVs alone. In MY 2022, BEV sales reached at least 5.8% of total light-duty vehicle sales,280 and this growth has continued, with the United States on track to vastly outpace EPA's previous projections of MY 2025 light-duty vehicle electrification. In Q1 of 2023, for example, U.S. light-duty BEV sales alone reached 7.2% of total vehicle sales.281 [EPA-HQ-OAR-2022-0829-0759, p. 107]

280 Cox Automotive, In a Down Market, EV Sales Soar to New Record. See also EPA, The 2022 Automotive Trends Report, at 74 (preliminary report that electric vehicle sales, including both BEVs and PHEVs, were 7.2% of total sales in 2022).

281 Cox Automotive, Another Record Broken: Q1 Electric Vehicle Sales Surpass 250,000, as EV Market Share in the U.S. Jumps to 7.2% of Total Sales (Apr. 12, 2023), https://www.coxautoinc.com/market-insights/q1-2023-ev-sales/.

EPA's projections of ZEV technology advancements and deployment have also proven too conservative in the heavy-duty sector. In the 2016 Phase 2 Final Rule, for example, EPA projected very small levels of HD ZEV penetration through MY 2027. In that rule, EPA projected "limited adoption of all-electric vehicles into the market," and stated that the Agency "do[es] not project fully electric vocational vehicles to be widely commercially available in the time frame of the final rules." 81 Fed. Reg. at 73500, 73704.282 By the time EPA proposed a new rule in 2022, however, the Agency recognized that its 2016 projections were underestimates. See, e.g., 87 Fed. Reg. at 17595 ("Several factors have changed our outlook for heavy-duty electric vehicles since 2016. First, the heavy-duty market has evolved such that in 2021, there are a number of manufacturers producing fully electric heavy-duty vehicles in several applications."). Despite having predicted very limited HD ZEV penetration through MY 2027 in 2016, EPA noted that by 2019, there were already approximately 60 makes and models of HD BEVs available for purchase, "with additional product lines in prototype or other early development stages." Id. EPA explained that "manufacturers and U.S. states have announced plans to shift the heavy-duty fleet toward zero-emissions technology beyond levels we accounted for in setting the existing HD GHG Phase 2 standards in 2016," and recognized the need "[t]o update the MY 2027 vehicle CO2 standards from the HD GHG Phase 2 rulemaking to reflect the recent and projected trends in the electrification of the HD market." Id. at 17598. EPA acknowledged its 2016 under-projections again in the Phase 3 proposal, stating that the Agency has "considered new data and recent policy changes," and is "now projecting that ZEV technologies will be readily available and technologically feasible much sooner than we had projected." 88 Fed. Reg. at 25939. In both the light- and heavy-duty sectors, then, EPA's previous projections of ZEV deployment have proven far too conservative, and automakers have repeatedly shown they can deploy zero-emission technologies on a scale and at a pace far greater than EPA originally predicted. [EPA-HQ-OAR-2022-0829-0759, pp. 107-108]

282 See also 81 Fed. Reg. at 73818 ("As we look to the future, we are not projecting the adoption of electric HD pickups and vans into the heavy duty market…we believe there is no need to a cap for HD pickups and vans because of the infrequent projected use of EV technologies in the Phaseeframe.").

12. A. EPA has broad discretion in considering consumer preferences when promulgating emission standards but should not give undue weight to that factor.

As explained in EPA's Proposal and Section II of these comments, when promulgating new emissions standards under Clean Air Act § 202(a), EPA must consider the statutory criteria of technological feasibility, cost of compliance, and lead time.412 EPA may consider other factors, and in the past has considered a rule's various impacts on vehicle purchasers.413 [EPA-HQ-OAR-2022-0829-0759, p. 152]

412 42 U.S.C. § 7521(a); 88 Fed. Reg. at 29186.

413 88 Fed. Reg. at 29186.

While EPA has often considered consumer acceptance in its Section 202 rulemakings, the Agency may not let the unique preferences of each and every consumer dictate its consideration of the appropriateness or feasibility of emission standards. In International Harvester Company. v. Ruckelshaus, 478 F.2d 615, 640 (D.C. Cir. 1973), the D.C. Circuit Court of Appeals concluded: [EPA-HQ-OAR-2022-0829-0759, p. 152]

We are inclined to agree with the Administrator that as long as feasible technology permits the demand for new passenger automobiles to be generally met, the basic requirements of the Act would be satisfied, even though this might occasion fewer models and a more limited choice of engine types. The driver preferences of hot rodders are not to outweigh the goal of a clean environment. [EPA-HQ-OAR-2022-0829-0759, p. 152]

While International Harvester involved emission requirements for light-duty vehicles under a provision of the 1970 Amendments, the principles the court expressed apply just as well to standards under Section 202(a)(1). As detailed in Section II, Congress intended EPA's standards to push the industry toward greater emission reductions and did not expect them to preserve the market dominance of any particular type of powertrain or power source. EPA should not give oversized weight to arguments questioning consumer preferences, which is not a factor Congress identified in Section 202(a)(1). [EPA-HQ-OAR-2022-0829-0759, p. 152]

While EPA has discretion whether to consider and how much weight to give purchaser acceptance in setting emission standards, that discretion is limited by EPA's primary statutory duty to set standards that adequately protect public health and welfare. An understanding of consumers' willingness to purchase and drive PEVs could inform the feasibility and effectiveness of EPA's regulations. EPA's attention to consumer preferences, however, cannot compromise its overall Clean Air Act mandate to mitigate the automobile's "devastating impact on the American environment," International Harvester, 478 F.2d at 622, or the Agency's primary duty to protect public health and welfare by minimizing harmful air pollution. Most importantly here, however, is that consumer acceptance of PEVs is widespread and growing, and PEVs provide the vehicle features and characteristics that drivers want and need. Thus, as this section will explain, consumer acceptance is not a barrier to PEV penetration at the levels projected by EPA's Proposal or at levels consistent with Alternative 1 with increasing stringency after 2030. [EPA-HQ-OAR-2022-0829-0759, pp. 152-153]

Organization: Environmental Defense Fund (EDF) (1of 2)

Executive Summary

EPA's primary proposal is eminently feasible and consistent with the automakers own publicly announced product plans. In fact, EPA's proposed standards, in certain aspects, reflect a conservative assessment of zero-emitting vehicle (ZEV) deployment in the coming years. [EPA-HQ-OAR-202829-0786, p. 2]

12. C. EPA's proposal is performance-based and can be cost-effectively met with a range of different technologies.

As with EPA's decades-long reliance on the ABT provisions described above, EPA has likewise long established performance-based standards that can be met with a range of emissions- improving technologies. EPA's proposed standards are no exception – they are performance- based and can be met using a range of ZEV and ICEV improvements. [EPA-HQ-OAR-2022-0829-0786, p. 12]III. EPA's final light-duty standards should deliver pollution reductions at least at the level of the proposal.

In this section, we outline the breadth of factors supporting the feasibility and cost-effectiveness of protective pollution standards. We recommend that EPA strengthen the standards in a manner that delivers pollution reductions at least as great as the proposal that EPA is considering. We also highlight the importance of adjustments that could secure even greater pollution reductions by including in the final rule a voluntary (but once chosen, enforceable) alternative leadership pathway that, for manufacturers choosing the pathway, would ensure ACC II levels of ZEV deployment nationwide. In addition, especially if EPA modifies the proposal's phase-in of the standards in the early years of the program as indicated in Alternative 3, we recommend that EPA consider increasing the stringency of the 2031-2032 standards to potentially increase cumulative GHG reductions relative to the proposal, and at minimum, protect the benefits achieved under the standards as proposed. [EPA-HQ-OAR-2022-0829-0786, p. 16]

A. Feasibility, cost, and lead time support final standards at least as protective as the proposal.

In this section, we examine a series of interlocking analyses and factors that support standards at least as protective as EPA's proposed emissions standards, including 1) extensive independent analysis related to rapidly-declining ZEV costs, including the impacts of the IRA in further advancing ZEV cost declines and accelerating ZEV deployment; 2) manufacturers' projections of battery cost declines; 3) an assessment of market indicators, including manufacturer investments and commitments, which are broadly consistent with and reinforce these study findings; 4) a discussion of leading state actions, including the ACC II rule; and 5) presentation of a revised baseline analysis, which synthesizes and quantifies each of these factors. Each of these factors, both individually and when taken together, demonstrate that EPA's proposed standards are feasible and cost-effective. [EPA-HQ-OAR-2022-0829-0786, p. 16]

ii. Market developments further support the feasibility and lead time reflected in EPA's proposal.

Market developments, including manufacturer plans to introduce new BEVs, concrete investments to produce these and other vehicles at volume, and future commitments for significant BEV sales are all consistent with and reinforce the conclusions of the above-described analyses and likewise support the feasibility of protective EPA standards. In fact, these market developments in many cases show manufacturers' plans to produce BEVs at even greater volumes than EPA has assumed. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Increasing BEV Availability and Sales Volumes. An updated report by ERM, based on announcements by major auto manufacturers, finds the number of electrified models available in the U.S. is projected to dramatically increase, reaching 197 by the end of 2025, with over 58 new models slated to launch in model years 2022-2025 (Figure 5).58 As Figure 6 shows, these vehicles will be available across all vehicle types and classes, and, as a result of IRA tax incentives, there will be five light-duty EV models available with a net cost of under $30,000 manufacturer's suggested retail price (MSRP) by the end of 2023 and 15 models available for under $40,000.59 In the United States, more than 800,000 light-duty EVs were purchased in 2022, a 65 percent increase from 2021. The first quarter of 2023 saw EV sales reach over 258,000 units, almost a 45 percent year over year increase.60 [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

58 Electric Vehicle Market Update: Manufacturer and Commercial Fleet Electrification Commitments Supporting Electric Mobility in the United States. April 2023. ERM for EDF. https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf (Attachment S)

59 Id.

60 Id.

[See original attachment for Figure 5: Total Light-duty PHEV and BEV U.S. Models Available by Year] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: ERM, EV Market Update (April 2023) [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

[See original attachment for Figure 6: Total Light-duty PHEV and BEV U.S. Models Available by Body Type] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: ERM, EV Market Update (April 2023) [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Near-Term Investments Dramatically Increase Production Capacity. In addition to introducing new electric vehicles, manufacturers are investing billions of dollars to produce them at volume. As noted above, a report by WSP for EDF found over $120 billion in private EV supply ecosystem investments and 143,000 new jobs announced in the last eight years. That analysis also evaluated the production capacity of announced facilities with concrete investments. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

As shown in the Figures below, by 2026, U.S. manufacturing facilities will be capable of producing an estimated 4.3 million new electric passenger vehicles each year, which represents about 33 percent of all new vehicles sold in 2022. And by 2026, battery manufacturing facilities will be capable of producing more than 1,000 gigawatt hours (GWh) in battery capacity, sufficient to supply up to 11.2 million new passenger vehicles each year, which represents an estimated 84 percent of new vehicle sold in 2022. Both of these levels far exceed EPA’s projections for BEV deployment. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

[See original attachment for Figure 7: Total Announced EV Manufacturing Capacity (2020-2026)] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: WSP, U.S. Electric Vehicle Manufacturing Investments and Jobs [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

[See original attachment for Figure 8: Total Announced Battery Manufacturing Capacity (2017-2027)] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: WSP, U.S. Electric Vehicle Manufacturing Investments and Jobs [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Manufacturer Commitments. In addition to near-term model availability and supporting production investments, vehicle manufacturers have articulated medium- to long-term commitments to even more substantially grow ZEV sales with many working toward a full ZEV fleet within the next decade. For instance, according to the recent market update from ERM, Ford expects 50 percent of its global vehicle volume, and 100 percent of its European volume, to be fully electric by 2030 with a goal of producing 2 million EVs annually by 2026; GM plans to offer a lineup of electric-only models by 2035; Honda has a goal of achieving carbon neutrality by 2050 and 100 percent ZEV sales in North America by 2040—with interim sales goals of 40 percent by 2030 and 80 percent by 2035; Volvo has committed to becoming a fully electric car company by 2030—with an interim goal of reaching 50 percent of global EV car sales and having one million EVs on the road by 2025; and Stellantis aims for 100 percent of sales in

Europe and 50 percent of sales in the U.S. to be BEVs by the end of the decade,61 As EPA notes in the preamble to this proposal, virtually every major automaker is already planning on widespread electrification across global fleets. Figure 9, below, is an updated synthesis of these manufacturer commitments. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

61 Id.

[See original attachment for Figure 9: Global Sales Goals by Manufacturers]

Source: ERM, EV Market Update (April 2023) [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Market indicators are consistent with and strongly support protective standards. Manufacturers have (and are planning to continue to) offer new vehicles. They have invested billions of dollars to produce these vehicles at near term volumes that far exceed EPA's projections. And almost every company has articulated medium- to longer term ZEV commitments that are broadly consistent with levels in EPA's proposal. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Vehicle Manufacturer EV Commitments

Many vehicle manufacturers have made commitments to transition a significant portion of their sales to ZEVs. While many of the commitments are for a share of manufacturers' global sales, several OEMs have made U.S. specific commitments or have committed to transition their entire fleet which would mean all of their U.S. sales would be ZEV as well. Even for global commitments, manufacturers with significant U.S. sales volumes will nonetheless need to sell meaningful ZEVs to meet their commitments. Because some sales might exceed these global commitments while others fall short, we used global commitments as a reasonable proxy for U.S. sales share. Table 4 below shows OEM commitments and includes a total using 2022 manufacturer sales shares to calculate a weighted ZEV commitment. [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

[See original attachment for Table 4: Manufacturer ZEV Commitments as Share of Total Sales] [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

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84 PR Newswire, Honda Targets 100% EV Sales in North America by 2040, Makes New Commitments to Advances in Environmental and Safety Technology (Apr. 23, 2021), https://www.prnewswire.com/news-releases/honda- targets-100-ev-sales-in-north-america-by-2040-makes-new-commitments-to-advances-in-environmental-and-safety- technology-301275727.html.

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87 Mark Kane, Mazda Announces Full-Scale Launch of BEVs in 2028-2030 (Nov. 22, 2022), https://insidee897loomm/news/623055/mazda-full-scale-launch-bevs-2028-2030//

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98 Luke Wilkinson. Volkswagen 'New Auto' strategy predicts near 100 per cent EV sales by 2040 (Jul. 15, 2021), https://www897loomberg897ss.co.uk897loomberg897n/355550/volkswagen-new-auto-strategy-predicts-near-100-cent-ev-sales- mix-2040

*Due to rounding, the sum of the market share may not equal the total

All major OEMs have set ZEV targets of at least 30% sales starting in 2030. Considering both U.S.-specific and global commitments would result in 47% of new vehicles sold in the U.S. in 2030 being ZEVs. Even unrealistically assuming only the US-specific commitments and the 100% commitments apply, at least 29% of LDV sales in 2030 would be ZEVs growing to 44% in 2035 and 48% in 2040. The 2030 value is plotted above in Figure 12. We also note that the 2035 and 2040 estimates using both approaches are perhaps significantly understated given that some manufacturers with commitments in 2030 have not made 2035 or later commitments but will nonetheless likely increase ZEV sales during that timeframe. [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

EV Manufacturing Investment Announcements

As discussed above, in their March 2023 report, WSP analyzed investment announcements for domestic EV manufacturing. Their analysis found that announced investments amount to the production of 4.4 million EVs per year by 2026 in the U.S.99 This equals roughly a third (31%) of all LDVs sold in the U.S. last year. Vehicle manufacturers have already committed to manufacturing these vehicles and it provides a lower bound for what might be expected as more manufacturers make EV investment announcements, and the industry continues to grow. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

99 U.S. Electric Vehicle Manufacturing Investments and Jobs, Characterizing the Impacts of the Inflation Reduction Act after 6 Months, WSP for EDF, (March 2023). https://blogs.edf.org/climate411/files/2023/03/State-Electric- Vehicle-Policy-Landscape.pdf.

Over the past ten years, between 60% and 70% of the LDVs sold in the U.S. were domestically manufactured with imports accounting for the remaining 30% to 40%.100,101 It is reasonable to expect that not all EVs purchased in the U.S. will be domestically produced. To scale the vehicles, we have assumed that the proportion of EVs within the pool of domestically produced vehicles will be the same as those imported. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

100 Board of Governors of the Federal Reserve System. Industrial Production and Capacity Utilization– G.17 Table 3. Originally from Ward's Communications, Chrysler, and GM. 16 Nov 2022. https://www.federalreserve.gov/releases/g17/current/table3.htm.

101 Bureau of Economic Analysis. Motor Vehicle Unit Retail Sales, Table 6. 2023, https://apps.bea.gov/national/xls/gap_hist.xlsx

If the U.S. imported 35% of its vehicles, the average of the last ten years, the EV manufacturing investments have been made already account for 48% of domestically made vehicles sold in the U.S. If the trend of more domestically produced EVs continues and only 20% of sales are imports, the U.S. produced 4.4 million EVs would result in 39% of LDV sales being EVs. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

For this analysis, we chose an assumption of 80% domestically produced EVs. While this number is higher than the current share of domestic production, it is in line with the recent trend of onshoring EV manufacturing.102 There are significant incentives and funding opportunities to make domestically producing EVs more attractive to manufacturers. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

102 David Gohlke, Zhou, Yan, Wu, Xinyi, and Courtn“y, Calista. 2022. "Assessment of Light-Duty Plug-in Electric Vehicles in the United ”tates, 2010 – 2021". United States. https://doi.org/10.2172/1898424. https://www.osti.gov/servlets/purl/1898424. (Attachment Z)

Manufacturers only make announcements for facilities a few years in advance of production. As such, this gives a glimpse into the near future but should the general trend in announcements continue, tremendous growth would be expected for domestic EV manufacturing. To that end, WSP's analysis is current only through March of 2023. Since that time, manufacturers have announced billions of dollars in additional investment and production capacity, which reinforces the likelihood that these trends will continue to grow and accelerate over time. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

ii. Market developments further support the feasibility and lead time reflected in EPA's proposal for Class 2b and 3 vehicles.

Automakers have already begun producing electric versions of Class 2b and 3 cargo vans, step vans, box trucks, large SUVs and pickup trucks. According to ERM, there are currently 13 automakers – including Ford, GM, Daimler, Lightning, Rivian and VW – with plans to produce or already producing 17 models of medium-duty ZEVs with battery ranges up to 500 miles.117 And fleets have already started ordering and implementing these ZEVs. USPS announced that it will purchase 9,250 Ford E-Transit electric delivery vans, which will contribute to USPS' pledge to buy at least 66,000 electric vehicles through 2028.118 In just two years since its launch in 2021, General Motors' BrightDrop has secured more than 30 commercial customers across industries like retail, rental, parcel delivery and service-based utilities, including FedEx, Walmart, Hertz, DHL Express and Purolator.119 The company anticipates accelerating production of its electric delivery vans to reach a 50,000-unit annual volume capacity by 2025.120 Amazon signed a deal with Rivian in 2019 to buy 100,000 Rivian step vans by 2030. Thousands of the delivery vans had been delivered to Amazon and put in circulation in cities across the nation by the end of 2022.121 New York City announced it will purchase 925 EVs, including 382 Chevy Bolts, 360 Ford E-Transit vans, 150 Ford F-150 E-Lightning pickup trucks, 25 PHEV street sweepers, and seven Mack LR BEV garbage trucks.122 These fleet and automaker commitments and investments are another clear indication that EPA's proposed standards for Class 2b and 3 vehicles are feasible. [EPA-HQ-OAR-2022-0829-0786, pp. 50-51]

117 Rachel MacIntosh, Harrison Branner, Kayla Escobar, and Sophie Tolomiczenko, Electric Vehicle Market Update: Manufacturer & Commercial Fleet Electrification Commitments Supporting Electric Mobility in the United States, ERM for EDF (April 2023). https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf. (Attachment S)

118 Mihalascu, Dan, "USPS To Purchase 9,250 Ford E-Transit Electric Delivery Vans." insideEvs. 1 Mar 2023. https://insideevs.com/news/655022/usps-purchase-9250-fordetransit-electric-delivery-vans

119 Roberts, Daniel and Maria Violette, "Order Update: Your BrightDrop EV is on the Way." Brightdrop. 3 April 2023. https://www.gobrightdrop.com/newsroom/first-canadian-built-zevos-shipped.

120 Id.

121 Amazon, Amazon's Electric Delivery Vehicles from Rivian Roll Out Across the U.S. (July 21, 2022), https://www.aboutamazon.com/news/transportation/amazons-electric-delivery-vehicles-from-rivian-roll-out-across- the-u-s

122 Lewis, Michelle, "New York City is buying 925 EVs – here's what's included." electrek. 4 Jan 2023. https://electrek.co/2023/01/04/new-york-city-is-buying-925-evs-heres-whats-included/.

Organization: Ford Motor Company

To achieve the 2032MY goals EPA has proposed and Ford supports, the final regulation must have the following elements. First, regarding the stringency of the GHG standards, the EPA should finalize the Alternative 3 standards with minor adjustments to the utility allowance inherent in the truck curves and provide a phase-out for refrigerant credits (rather than eliminate all at once). The Alternative 3 standards effectively draw a straight line from 2026 to 2032; that is, they would require roughly equal reductions in absolute grams-per-mile targets over the duration of the program. Alternative 3 reaches the same endpoint in 2032 as the EPA's main proposal, and therefore would achieve the primary goal shared by Ford and EPA—widespread adoption of ZEVs. In contrast, EPA's main proposal, Alternative 1, and Alternative 2 each would require precipitous reductions in 2027 – 2029; this is not feasible and does not align with the anticipated scaling of the EV supply chain and manufacturing base. Similarly, the EPA's proposal to end refrigerant credits altogether in 2027 would be abrupt and have the effect of standards being even more strict; EPA should phase these credits out over time. Lastly, EPA's final regulations must continue to recognize the utility provided by trucks. Although electrified vehicles hold promise for all vehicles classes, ICE-powered trucks will continue to provide unique capability and utility for many years. The EPA proposal (and Alternative 3) would reduce the existing truck utility allowance too severely. [EPA-HQ-OAR-2022-0829-0605, p. 3]

As the EPA and others consider the many trade-offs in this rulemaking, Ford must emphasize that investments in EVs will yield far greater emissions reductions than investments toward incremental improvements to already-advanced ICE technologies. These considerations are particularly important in the early years of the EPA program, where the EV market must reach critical mass. Accordingly, we encourage EPA to avoid setting criteria emissions requirements that will force unnecessarily large or ill-timed investments and distract both automakers and the supply base with little air quality benefit. [EPA-HQ-OAR-2022-0829-0605, p. 4]

Standards Continuation Beyond 2032MY

In multiple areas of the NPRM the EPA has requested comment on continuation of light- and medium-duty GHG and criteria pollutant standards beyond 2032MY. Ford opposes continuation of any of the standards beyond the 2032MY. Industry already faces substantial uncertainty before 2032MY, and it is not feasible to establish a robust program beyond that time. [EPA-HQ-OAR-2022-0829-0605, p. 8]

Organization: Governing for Impact and Evergreen Action (GFI)

Fortunately, technological solutions to combat the rising emissions have become more abundant and more affordable.22 Electric vehicles represent the most promising technology to reduce vehicle emissions at the scale needed, as major automakers and fleet owners are aware. Many have made commitments to transition to exclusively manufacturing or buying EVs by the end of the next decade, as noted in the Proposed Rule.23 These automaker commitments come at a time when clear market demand — the number of EVs sold in the US jumped from 1.7% of new car sales in 2020 to a startling 5.7% in 202224 — is supported by an abundance of new federal funding incentives, thanks to the Infrastructure Investment and Jobs Act and the Inflation Reduction Act ("IRA"). So far in 2023, EV demand continues to grow: EVs made up 7% of new cars sales in the first quarter.25 [EPA-HQ-OAR-2022-0829-0621, p. 3]

22 Jack Ewing, "Electric Vehicles Could Match Gasoline Cars on Price This Year," N.Y. Times, https://www.nytimes.com/2023/02/10/business/electric-vehicles-price-cost.html (Feb. 10, 2023).

23 Proposed Rule at 29296 (citing International Energy Agency, "Global EV Outlook 2022," p. 107, May 2022, https://iea.blob.core.windows.net/assets/e0d2081d-487d-4818-8c59-69b638969f9e/GlobalElectricVehicleOutlook2022.pdf).

24 Zachary Shahan, "US Electric Car Sales Increased 65% in 2022," CleanTechnica, https://cleantechnica.com/2023/02/25/us-electric-car-sales-increased-65-in-2022/ (Feb. 25, 2023).

25 Mark Kane, "US: All-Electric Car Sales Increased in q1 2023: 257,000 registrations," INSIDEEVS, https://insideevs.com/news/667516/us-electric-car-sales-2023q1/ (May 16, 2023).

Outside analyses pre-dating the Proposed Rule have also proved more bullish than the EPA's central No Action scenario. In 2021 — prior to the IRA's passage — IHS Markit "predicted a nearly 40 percent U.S. [Private] EV share" of car sales in 2030, according to the Proposed Rule's literature review.65 (In other words, what the EPA projects will occur after accounting for generous IRA tax credits, IHS Markit estimated would take place even without those historic incentives.) Post-IRA, Bloomberg New Energy Finances estimates the 2030 EV share of new car sales at 52 percent by 2030.66 The International Council on Clean Transportation and Energy Innovation concluded that share will reach between 56-67 percent by 2032.67 Indeed, the Proposed Rule acknowledges the inherent uncertainty involved in projecting into the future.68 As a result, the agency conducted several sensitivity cases beyond the central No Action baseline, modeling various alternate "No Action" assumptions (for example, likely forthcoming state policies) that predicted a range of EV shares—in one of these alternate No Action cases, EV penetration reached as high as 66 percent in MY 2032.69 [EPA-HQ-OAR-2022-0829-0621, pp. 8-9]

65 Proposed Rule at 29189 (citing IHS Markit, "US EPA Proposed Greenhouse Gas Emissions Standards for Model Years 2023–2026; What to Expect," August 9, 2021. Accessed on March 9, 2023 at https://www.spglobal.com/ mobility/en/research-analysis/us-epa-proposed-greenhouse-gas-emissions-standards-my2023-26.html).

66 Proposed Rule at 29189 (citing Bloomberg New Energy Finance (BNEF), "Electric Vehicle Outlook 2022," Long term outlook economic transition scenario).

67 Proposed Rule at 29189 (citing International Council on Clean Transportation, "Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the US," ICCT White Paper, January 2023. Available at https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23.pdf).

68 Proposed Rule at 29296.

69 Ibid.

Organization: HF Sinclair Corporation

c. The Proposed Rule Is Not Technologically Feasible Within the Required extend

The Clean Air Act does not direct EPA to drive emission standards for regulated pollutants to zero as quickly as possible. Rather, under section 202(a)(2), EPA must ensure that any standards are issued with sufficient lead time "to permit the development and application of the requisite technology, given appropriate consideration to the cost of compliance within such period."40 For EPA's aggressive PEV mandates, the "requisite technology" not only includes manufacturing the vehicles themselves but also the underlying charging infrastructure necessary to power these vehicles. Here, EPA has not demonstrated that sufficient charging stations, utilities, and other infrastructure needed to support the deployment of an electrified fleet within the Proposed Rule's contemplated timeline is possible. Without the ability to charge the PEVs EPA will be requiring OEMs to produce, the Proposed Rule is nonsensical. Furthermore, according to a recent study, 23% of 657 public charging stations in the San Francisco Bay area were broken, and a big charging company, ChargePoint, had an operational success rate of just 61%.41 [EPA-HQ-OAR-2022-0829-0579, pp. 10-11]

40 42 U.S.C. § 7521(a)(2).

41 NYT, "A Frustrating Hassle Holding Electric Cars Back: Broken Chargers," (Aug 16, 2022), available at https://www.nytimes.com/2022/08/16/business/energy-environment/electric-vehicles-broken-chargers.html.

Take Virginia as a representative example highlighting the gap between the Proposed Rule's required infrastructure and that which is actually feasible. According to a report by the Consumer Energy Alliance, attached herein, Virginia currently has 7.6 million light-duty vehicles on the road. Assuming Virginia transitions to 100% PEV by 2035, the state would need an additional 35.5 billion kWh of generation – equivalent to the generation required to power almost 70% of the homes in the state. And to maximize the zero-emission benefit of PEVs, this generation would need to come from zero-emitting sources such as nuclear or renewables (ignoring, for a moment, the energy intensity required to construct these resources). But 35.5 billion kWh corresponds to either 4 new nuclear reactors in the state or over 450,000 acres of off-shore windfarms. Neither of which is remotely feasible under the Proposed Rule.42 [EPA-HQ-OAR-2022-0829-0579, pp. 11-12]

42 CONSUMER ENERGY ALLIANCE, "Freedom to Fuel: Consumer Choice in the Automotive Marketplace," August 2023 [hereinafter, "CEA Study"]. Nor has EPA shown that the electric grid itself can meet this increased demand. As highlighted by the North American Electric Reliability Corporation ("NERC"), certain high-risk areas do not today meet resource adequacy criteria, posing significant concern about adding even more demand to the grid.43 This risk is further exacerbated by EPA's new carbon dioxide standards for fossil-fuel fired power plants, proposed shortly after the Proposed Rule and not otherwise considered in the Proposed Rule, that may rapidly phase out affordable base-load generation.44 Far from what the Proposed Rule requires, the infrastructure upgrades to support a U.S. LD fleet that is only 7% PEV would require an additional $75-125 billion, which would be passed on from utilities directly to customers.45 Today, energy insecure households, defined as those that are unable to adequately meet basic household energy needs because of cost, pay 26 cents more per square foot in energy costs as compared to energy secure households.46 This disparity will only increase as infrastructure upgrades to accommodate the increased load from PEVs is passed along to ratepayers.

43 North American Electric Reliability Corporation, 2022 Long-Term Reliability Assessment (Dec. 2022), 21, available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf (indicating that increased demand projections may lead to reliability concerns for the electric grid, especially as dual-peaking or seasonal peaking times change with increased electrification).

44 See Proposed Rule, "New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule," 88 Fed. Reg. 33,240 (May 23, 2023).

45 CEA Study at 8 (noting that the average price to consumers in New Mexico would be $117-195 per year).

46 EIA, "U.S. energy insecure households were billed more for energy than other households," (May 30, 2023) available at https://www.eia.gov/todayinenergy/detail.php?id=56640.

Absent a comprehensive understanding of the interplay between PEV manufacturing and charging infrastructure, vehicle manufacturers are left in vulnerable position. If the underlying infrastructure cannot support the influx of PEVs, or if consumers perceive the requisite infrastructure is not available or reliable, consumers will simply not purchase PEVs in the quantities requires for OEMs to meet the proposed standards. Case in point, Toyota has publicly stated that given the three major barriers to widespread PEV adoption—1) the availability of sufficient critical minerals; 2) a sufficient nation-wide charging infrastructure; and 3) overall affordability—"the most immediate way to reduce carbon emissions is through a mix of electrified options, which includes battery electric, plug-in hybrid, and hybrid vehicles."47 [EPA-HQ-OAR-2022-0829-0579, pp. 11-12]

47 Forbes, "Toyota Says Public Charging Not Ready for Pure EVs," (May 20, 2023) available at https://www.forbes.com/sites/brookecrothers/2023/05/20/toyota-admits-inconvenient-truth-about-electric-vehicle-ev-charging-time-prius-prime-rav4-prime/?sh=2b7ed7ab38b1.

Organization: Hyundai America Technical Center, Inc. (HATCI)

Overal', HMG supports EPA's push toward a ZEV future. However, we find elements of the Proposed Rule to be not only challenging, but in some cases, infeasible a nd thus counterproduct've to our (and EPA' s) ultimate goal of 100% ZEVs in the future. HMG believes that if the Proposed Rule is implemented as written, it will have significant negative impacts on the transition to ZEVs by forcing manufacturers to devote considerable resources into short-term, temporary compliance strategies with relatively little overall benefit. HATCI is also a member of the Alliance for Automotive Innovation (AFAI) and further supports the positions and comments the AFAI submitted for the Proposed Rule. [EPA-HQ-OAR-2022-0829-0554, p. 1]

HMG is concerned that the Proposed Rule will require re-prioritizing ICE instead of EV technology investments [EPA-HQ-OAR-2022-0829-0554, p. 2]

HMG has made considerable investments and changes to its business consistent with its focus on the transition to vehicle electrification and goal to achieve carbon neutrality by 2045. With these objectives in mind, HMG has proactively moved its work force over the last five years from ICE development and manufacturer to ZEV development. Such changes have been necessary to expedite the transition to 100 percent ZEVs. [EPA-HQ-OAR-2022-0829-0554, p. 2]'Unfortunately, EPA's proposed Tier 4 regulations would require extensive changes to our current ICE engines, and thus a shift in our plans back to ICE development, and consequently away from ZEV acceleration. Essentially, the Proposed Rule is likely to cause a backslide in ZEV development in order to address a short-term focus on bridge ICE technologies. [EPA-HQ-OAR-2022-0829-0554, p. 2]

Moreover, if the Proposed Rule goes into effect as of model year (MY) 2027, HMG would need to start work in calendar year 2024 to implement the extensive new engine re-developments required to comply with the Proposed Rule. The work force available to respond to the proposed Tier 4 regulations is limited due to the proactive re-organization efforts the company made to transition towards electrification, and HMG staff would have to be transitioned away from ZEV and back to ICE development. [EPA-HQ-OAR-2022-0829-0554, p. 2]

The Tier 4 regulations would also require an excessive investment in new facilities and equipment. Specifically, for just the proposed 0.5mg particulate matter (PM) requirement, HMG would need to invest in Cold FTP and PM measurable equipment and facilities. This large investment in technology for ICE vehicles would be an additional delay in our desired ZEV transformation and would likely be unavailable in time to support MY 2027 vehicle design timing. [EPA-HQ-OAR-2022-0829-0554, p. 2]

As previously noted, the Proposed Rule provides a woefully inadequate amount of lead-time to develop, prepare for, and secure the needed equipment, plus the construction and operation of new facilities to be compliant with the proposed regulations. [EPA-HQ-OAR-2022-0829-0554, p. 2]

HMG believe' the Proposed Rule's criteria pollutant standards for particulate matter (PM) of 0.5 mg/mi across FTP, 20F and US06 are technically infeasible and financially impracticable [EPA-HQ-OAR-2022-0829-0554, p. 4]

The EPA proposed a PM standard of0.5 mg/mi for LDV and MDV that must be met across three test cycles (-7°C FTP, 25°C FTP, US06), a requirement for PM certification tests at the test group level, and a requirement that every in-use vehicle program (IUVP) test vehicle is tested for PM. The 0.5 mg/mi standard is a per-vehicle cap, not a fleet average. [EPA-HQ-OAR-2022-0829-0554, p.'4]

HMG opposes EPA's proposed PM standard for LDVs and MDVs as technically infeasible and financially'impracticable. HMG's positi'n aligns with AFAl's recommendation that EPA instead adopt ACC II PM standards. HMG also recommends eliminating the proposed Cold FTP PM standards. [EPA-HQ-OAR-2022-0829-0554, p. 4]

Organization: Illinois Corn Growers Association

In the current rulemaking, there is only one technology that could achieve the standards in the current rulemaking: electric vehicles. EPA estimates that it will be necessary for automakers to electrify over half of the light and medium duty vehicles they produce and sell by the 2032 model year. This is less than nine years from now. [EPA-HQ-OAR-2022-0829-0756, p. 1]

Moreover, successful electrification of the transportation sector involves sweeping changes in other sectors, such as power generation, energy distribution and the extraction of rare materials essential to maki904loombergthing from bateries to computer chips. There is no guarantee these changes will be in place by 2032. [EPA-HQ-OAR-2022-0829-0756, p. 1]

The standards being proposed in the current rulemaking are at least as difficult to achieve as those promulgated by the U.S. Environmental Protection Agency (EPA) for criteria pollutants for the 1975 model year. Meeting those standards required the adoption of catalytic converters, unleaded gasoline detuned engines and ultimately on-board computer control. [EPA-HQ-OAR-2022-0829-0756, p. 2]

Today, EPA is proposing even more stringent standards for criteria pollutants and Carbon Dioxide (CO2), the most significant of the greenhouse gases that are altering the global climate. It is estimated that the rise in CO2 levels since the 1950's has largely been the result of the burning of fossil fuels such as gasoline. [EPA-HQ-OAR-2022-0829-0756, p. 2]

[See original attachment for table titled "Table 1. Fuel Consumption Impact Due to Proposed Standards"] [EPA-HQ-OAR-2022-0829-0756, p. 2]

Table 1 is reproduced from EPA's Draft Regulatory Impact Analysis for the proposed Multi-Pollutant Emissions Standards.1 According to this table, EPA expects the consumption of liquid fuel in the U.S. (primarily gasoline, diesel and biofuels) to drop by 50% and electrical use to increase by 110% as a result of these rules. Clearly this will result in sweeping changes to the transportation system even greater than the emission standards enacted in the 1970's. [EPA-HQ-OAR-2022-0829-0756, p. 2]

1 "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis," EPA-420-D-23-003 April 2023

In justifying the technological feasibility of the standards, the Technical Support Document3 supporting the rulemaking listed 34 technologies automakers could potentially use to comply with the standards. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

3 "Draft Joint Technical Support Document: Proposed Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards Office of Transportation and Air Quality, U.S. Environmental Protection Agency and National Highway Trafic Safety Administration, U.S. Department of Transportation EPA- 420-D-11-901,November 2011

By contrast, in support of the proposed Multi-Pollutant Emissions Standards, EPA listed only 9 potential technologies that they believe could be employed to meet the proposed standards. As shown on Table 2, page 5, the twelve automakers with the most U.S. sales have already significantly adopted these technologies on the vehicles they are producing today. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

For instance:

-9 of the 12 automakers have employed at least one of the technologies on 70% or more of their products sold in the U.S. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

-5 of the 12 automakers have employed at least three of the technologies on at least 70% of their products sold in the U.S. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

-One manufacturer has employed three of these technologies on over 90% of their products sold in the U.S. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

It appears that automakers have already widely utilized those technologies that work best with their company's vehicles and powertrains while meeting the needs of their customers. Technologies that have not found favor with multiple manufacturers are likely to have been found to be ineffective, overly expensive or failure prone. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

Thus, electric vehicles are the only technology on the list that remains largely unutilized and can deliver the massive reductions in tailpipe emissions required to meet the standards. Given the uncertainty associated with this technology, however, it seems reasonable to make other approaches to meeting the standards available to automakers. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

[See original attachment for figure "Table 2. Manufacturers Utilization of Proven Technologies"] [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

Organization: International Council on Clean Transportation (ICCT)

ICCT recommends the adoption of Alternative 1, the most stringent option EPA presents in its proposal for the light-duty vehicle (LDV) GHG standards. We believe even greater GHG reductions than laid out in Alternative 1 would be feasible because today's technology, policy, and market landscape have primed the market for a rapid transition to cleaner vehicles. Substantial public and private sector investments and a comprehensive package of federal and state level policies make the timing and stringency of the proposed rule achievable, feasible, and cost-effective. At the federal level, the combination of substantial consumer and industry incentives from the $370 billion allocated to climate and clean energy investments through the Inflation Reduction Act of 2022 (IRA) will accelerate the shift to electric vehicles while supporting a domestic supply chain and charging infrastructure buildout. In parallel, the Bipartisan Infrastructure Law complements the IRA by investing $7.5 billion in electric vehicle charging infrastructure, $10 billion in clean transportation, and more than $7 billion in battery components, critical minerals, and materials. [EPA-HQ-OAR-2022-0829-0569, p. 3]

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

We encourage the EPA to calibrate the proposed standards to an alternative set of strong standards that better reflect the feasibility of compliance so that the projected adoption of ZEVs is set to feasible levels, increases stringency more gradually, and occurs over a greater period of time. [EPA-HQ-OAR-2022-0829-0614, pp. 1-2]

II. Barriers to Compliance

The EPA's proposed GHG emissions standards for light- and medium-duty vehicles set out an ambitious target for ZEV adoption. While the proposed standards are performance-based and do not mandate the use of a specific technology, compliance all but requires the increased adoption of ZEV technologies. The EPA projects that one potential pathway for the industry to meet the proposed standards would be through the following mix of ZEV and ICE vehicles: [EPA-HQ-OAR-2022-0829-0614, p. 7]

ZEV Share Projection.17

17 Supra note 1 at 29329.

Vehicle Class	MY 2027	MY 2028	MY 2029	MY 2030	MY 2031	MY 2032
Sedans	45%	53%	61%	69%	73%	78%
Crossovers/SUVs	38%	46%	56%	59%	61%	62%
Pickups	11%	23%	37%	45%	55%	68%
Total	36%	45%	55%	60%	63%	67%

[EPA-HQ-OAR-2022-0829-0614, p. 7]

While GHG emissions standards seek to hold manufacturers accountable, many of the factors that make compliance feasible are outside of the control of manufacturers. These factors include consumer demand for EVs (market penetration), reliable charging infrastructure, grid capacity, energy costs, or the costs of key inputs, such as batteries or critical minerals. Together, under the proposed standards, these variables will serve as substantial obstacles to OEM compliance. The UAW supports using regulation to bring new technology to the auto industry, so long as the technology is proven and cost effective; regulatory timelines are feasible; and manufacturers have flexibility to meet stringency requirements through multiple technology paths. Through balanced rules, it is possible to take feasibility into account while still making substantial reductions in GHG emissions and meeting key long-term targets. As the EPA highlights, manufacturers have declared their commitment to long-term emissions reductions and electrification targets, but the pathway to those targets must be feasible and strengthen domestic manufacturing. Therefore, we encourage the EPA to recalibrate the standards so that the projected adoption of ZEVs reflects more feasible alternatives, increases more gradually, and occurs over a greater period of time. [EPA-HQ-OAR-2022-0829-0614, p. 7]

A. ICE Sales Fund EV Transition

The proposed standards must reflect what is feasible for manufacturers to produce and sell to consumers and promote domestic production of cleaner technologies. The continued production of ICE vehicles, particularly light trucks (pickup trucks, sport utility vehicles, vans, and minivans), must be supported by proposed standards. The EV industry is in its infancy. On their own, EVs are not yet profitable.18 Some automakers will lose billions producing EVs and don't expect to reach profitability any time soon.19 Therefore, federal programs and regulation must work in concert to incentivize the production of EVs. While the transition is progressing, the auto industry relies on the continued production of ICE vehicles to reach profitability and fund required investments in electrification. Domestic automakers specifically rely on the sale of light trucks to fund investment into the EV transition. [EPA-HQ-OAR-2022-0829-0614, p. 8]

18 Yeon Baik, Russell Hensley, et. al., "Making electric vehicles profitable", (McKinsey and Company, Mar. 8, 2019), https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/making-electric-vehicles-profitable.

19 Chris Bibey, "Electric Vehicles Are Draining Billions From Profitable ICE Legacy Automakers With Ford Projecting $3 Billion in Losses" (Yahoo Finance, Mar. 30, 2023), https://finance.yahoo.com/news/electric-vehicles-draining-billions-profitable-151050558.html.

Organization: Jaguar Land Rover NA, LLC (JLR)

JLR would like to highlight our concerns over EPA's plans to incorporate PHEVs into their analysis for the final rule. If EPA proceeds with the planned changes to the certified PHEV CO2 value, namely through the adjustment of the utility factor, they must acknowledge the impact this will have on fleet compliance, greatly reducing their contribution to the fleet. As such, the baseline GHG target and projected ZEV share should also be adjusted by an equal amount, to avoid an increase in target stringency by stealth. [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

We would like to comment on the statement made by EPA that "this is a projection and represents one out of many possible compliance pathways for the industry. The proposed standards are performance-based and do not mandate any specific technology for any manufacturer or any vehicle type." Due to the multitude of changes including those to PHEVs and reduction in credit flexibilities, there is very little choice with regards to technologies that will meet the incredibly challenging standards set. [REDACTED]CBI [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

In addition, the goals set out in the E.O. 14037 and Blueprint refer to vehicles sales in 2030 Calendar Year (CY), whereas the ambitious target set by EPA refers to the 2030MY fleet, which will contain a combination of vehicles sold in 2029 and 2030CY, effectively bringing the target forward by six months. [EPA-HQ-OAR-2022-0829-0744, pp. 4-5]

Increased Lead Time

Automakers need to fund their transition to electrification with their sales today. In today's extremely challenging environment, this transition is being impacted in real terms. To account for this, whilst JLR strongly supports the goals of EPA, the early years of the proposed regulation represent a considerable challenge, particularly for smaller OEMs, and should be tempered to allow for automakers to catch up following the recent stresses on industry. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

JLR is very familiar with the challenge to traditional ICE manufacturers of transitioning to zero emission vehicles. We launched the first all-electric SUV by a luxury manufacturer, the Jaguar I-PACE, in 2018. Since its debut, it has won more than 90 global awards, including World Car of the Year Award 2019. Despite this, sales peaked at only 2.1% of the JLR fleet in 2019MY in the US. [REDACTED]CBI This is our starting point today. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

We're taking our lessons from the Jaguar I-PACE as we radically redesign and launch our future fleet. Jaguar Land Rover is transforming into a sustainability-rich, electric-first business; however, we need the increased lead time to successfully execute the transformation. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

JLR made difficult decisions to launch a superior "BEV first" architecture. We relinquished two flex platforms (platform prioritizing ICE but could support BEV options), which has had subsequent timing implications. While it was a difficult decision to make, the product strategy decisions related to our Reimagine Strategy will unquestionably accelerate Jaguar Land Rover's electrified future. We support the ambition of EPA but need time to pivot our fleet to achieve the goal. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

[REDACTED]CBI Despite this aggressive electrification strategy, the proposed GHG targets will be extremely challenging to meet, especially in the beginning years as we ramp up production of our new BEV models. Our manufacturing facilities need to go through an unprecedented transformation. Our largest facility (~8000 employees) where Velar and F- PACE nameplates are built on a flex ICE/PHEV platform will be repurposed to accommodate the new all-electric Jaguar platform. Our next largest facility (~3500 employees) which currently builds our Evoque and Discovery Sport nameplates on a flex ICE/PHEV platform will become JLR's first all-electric manufacturing facility for our EMA platform. Changes to the manufacturing facilities are complex and require time to execute while old products are still being produced. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

Additionally, with the significant uncertainty around enabling conditions (e.g., infrastructure, consumer acceptance, market readiness and critical mineral supply chains) the transition period will be difficult to navigate. Due to the large number of factors outside of OEMs control, we propose that the agency take inspiration from other global legislation and commit to formal monitoring points every two years similar to the reports featured in Article 14a in the EU 2023/851 CO2 emission regulation7. Such formal monitoring points form regulatory good practice and can examine the progress of the regulation and whether any aspects need revising. The report should also take into account the progress made with factors outside industry and agency control including: [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

7 REGULATION (EU) 2023/851 amending Regulation (EU) 2019/631 (CO2 emission perf–rmance standards) - Article 14a https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R0851

- EV adoption rates
- Charging infrastructure deployment
- Battery costs (including critical minerals)
- Consumer impact

The reports will provide an objective assessment of the effectiveness of the regulation and a basis for any changes should they be required. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

We need less stringent targets in the early years and then, based on our plan, we expect to achieve the more ambitious targets in the outer years which will allow us to meet EPA's 2032MY target. The front-loaded stringency in the NPRM, drives tough targets before 2030MY and could divert investment away from this journey. This could drive us to accrue large liabilities for 2024 and 2025MY as we begin to transition our fleet. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

The difficulty in the beginning of the regulation is compounded by the extremely high step change between 2026 and 2027MY standards (when adjusted to reflect the proposed reduction in allowable AC and off-cycle credits.) Due to the changes to the footprint curves, light truck standards increase at almost double the rate of passenger car (21% vs 12%). This particularly impacts JLR as an OEM with a high percentage of off-cycle technologies (OCT) and air conditioning (A/C) featured in our vehicles, as noted in the 2022 EPA Automotive Trends Report8. Reaching the 10 g/mile OCT cap and with the highest reported A/C credit (24.2 g/mile), equivalent to an 8% reduction from tailpipe emissions for A/C credits alone in 2021. [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

8 The 2022 EPA Automo–ive Trends Report - https://www.epa.gov/system/files/documents/2022-12/420s22001.pdf

[See original fo– graph, "Figure 2 - See appendix A1 for more details"] [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

Although there is significant uncertainty in how the ZEV market will develop in this regulatory time period, JLR supports EPA's goals. We are committed to investing in reducing our greenhouse gas footprint and making a positive societal impact on our journey to net zero carbon emissions. [EPA-HQ-OAR-2022-0829-0744, p. 11]

The past few difficult trading years have left a tangible impact on this journey. We had to make business decisions in light of this reduced cashflow, which means we need more time to transition. The end goal is the same. We ask for the agency's support in allowing us to meet it, by giving us enough time to successfully transition our fleet to an electric future. [EPA-HQ-OAR-2022-0829-0744, p. 11]

Organization: Job Creators Network Foundation (JCNF)

EPA's Proposed Rule Is Not Feasible [EPA-HQ-OAR-2022-0829-0709, pp. 2-3]

In addition to being illegal, the proposal is not technically feasible. Daniel Yergi', one of the world's leading energy experts, highlights how electric cars have 2.5 times more copper in them than regular vehicles.6 He cites the Internat'onal Monetary Fund's warning that such environme"tal policies will "spur unprecedented demand for some of the m"st crucial metals," with pr"ce increases that "could derail or delay the energy transition itself."7 [EPA-HQ-OAR-2022-0829-0709, pp. 2-3]

6 Daniel Yergin, "'Net Zero' Will Mean a Mining Boom," (Link: https://www.wsj.com/articles/net-zero-will-mean-a-mining-boom-electric-cars-minerals-oil-fossil-fuels-climate-change-policy-cb8d5137) Wall Street Journal (April 12, 2023).

7 Lukas Boer, Andrea Pescatori, Martin Stuermer, Nico Valckx, "Soaring Metal Prices May Delay Energy Transition," (Link: https://www.imf.org/en/Blogs/Articles/2021/11/10/soaring-metal-prices-may-delay-energy-transition) IMF Blog (Nov. 10,2021).

Organization: Kentucky Office of the Attorney General et al.

As discussed below, the automotive supply chain is nowhere close to ready when it comes to meeting the production demands that the Proposed Rule forces through it. And even if it were, the scope and speed of the Proposed Rule requires automakers to devote every last resource they have to keeping up with that pace—including precious resources they would have spent on the development of more innovative EV technology than we have right now. This sacrifice of innovation at the altar of speed will lead to disastrous consequences down the line as the demand grows for later generations of EVs and their component parts. [EPA-HQ-OAR-2022-0829-0649, p. 4]

Start with what the Proposed Rule aims to do: restructure the American car industry around EVs in under a decade. Specifically, the Agency is pressing to grow today's 8.4% share of light-duty new EV sales to 67% by 2032. 88 Fed. Reg. at 29,189, 29,329. That allows just eight years from when the proposal will likely be finalized to achieve an eight-fold increase. How? By altering emission assessments and imposing the harshest emissions standards the Agency has ever promulgated—on the heels of what are already the "most stringent GHG standards . . . to date" for 2023–2026 model year light-Duty vehicles. Id. at 29,227 (citing 86 Fed. Reg. at 74,434). [EPA-HQ-OAR-2022-0829-0649, p. 6]

EPA tries to disclaim how extreme this proposal is by saying that the Agency is responding to "[r]ecent trends and developments in emissions control technology, including vehicle electrification and other advanced vehicle technologies," that make the "stringent emissions standards . . . feasible at reasonable cost." 88 Fed. Reg. at 29,186. But it also admits, as it must, that the Proposed Rule will forcibly accelerate market transformations—or in the Agency's more euphemistic terms, require "an increasing pace" across more of manufacturers' "vehicle fleets," id. at 29,341. Indeed, far from being "technologically neutral," the proposal's "dramatic reductions in emissions" means that the "only automaker that would meet" them right now is Tesla, which produces only EVs. See Riley Beggin, Proposed Emission Rules That Favor EVs Face Political Blowback, Government Technology (May 23, 2023), https://bit.ly/3qIesCH. [EPA-HQ-OAR-2022-0829-0649, p. 6]

Organization: Kia Corporation

EPA's proposed standards, requiring 60 percent of new vehicle sales be EVs by 2030 and 67 percent by 2032, are unrealistic in the proposed timeframe because of the vast number of market risks, consumer EV demand uncertainty, and multiple external challenges. Neither the current trajectory of consumer adoption of EVs, nor existing levels of complementary government policies are robust enough to meet the target in the timeframe outlined. EPA discusses "uncertainties" several times in the proposal, but the proposed standards do not reflect the uncertainties industry will face in transitioning our powertrain to electrification. [EPA-HQ-OAR-2022-0829-0555, p. 2]

Kia is committed to speeding the transition by investing billions in popularizing EVs to all consumers up and down the market. We urge the agency to work with stakeholders on a reasonable path forward that will result in a balanced set of standards that are achievable for automakers, workers, and consumers. A rule that is set at a more reasonable pace will ensure this transition to EVs is successful for the country. [EPA-HQ-OAR-2022-0829-0555, p. 2]

EPA's Proposed GHG Standards Are Unrealistic in the Timeframe Proposed

EPA requests comment on its proposed light-duty GHG standards that would require a 60 percent EV penetration by 2030 and 67 percent EV penetration by 2032. Alternative 3 achieves the same stringency as the proposed standards in MY2032 but provides for a more consistent rate of stringency inc–ease for MYs 2027 - 2031.7 Importantly, EPA asserts that standards substantially more stringent than Alternative 1, which is more stringent than the proposal, would be inappropriate "because of the uncertainties concerning the cost and feasibility."8 [EPA-HQ-OAR-2022-0829-0555, pp. 4-5]

7 88 Fed. Reg. 29,201.

8 88 Fed. Reg. 29,201.

Kia continues to make dramatic investments in electrification and shares EPA's goal of fully transitioning to electrification. The EPA-proposed GHG standards in the timeframe proposed, however, are not realistic given the vast uncertainties in the market. While Kia is optimistic that we can get to 60 percent electric vehicle penetration in the future, the proposed time frame of 2030 is not realistic. This timeframe is too fast given the uncertainties around EV affordability, EV charging infrastructure, and EV battery critical mineral supplies. [EPA-HQ-OAR-2022-0829-0555, pp. 4-5]

The proposed rule of requiring 60 percent BEVs of new vehicles sold in 2030 has gone well beyond President Biden's 2021 EO14037 goal of 50 percent ZEVs. As it stands today, the national BEV percentage stands at 8.6 percent market share.9 EPA is assuming aggressive penetration for EV adoption, a new technology that has not been fully embraced by consumers yet, more than any new automotive technology to date. Electric powertrain technology is not seamless to the customer like all other recent technologies have been. Additionally, the new EV powertrain technology can be upwards to +$20,000 more than competing ICE models. Affordability, EV charging infrastructure, and EV battery critical minerals are significant challenges that need to be addressed for the widespread adoption of EVs. [EPA-HQ-OAR-2022-0829-0555, pp. 4-5]

9 https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard

Because of all these factors, Kia strongly recommends that EPA reevaluates the GHG standards proposed. Kia recommends EPA align standards more closely with President Biden's 2021 goal set in the EO14037. Kia can support a target of 40-50 percent ZEVs – BEVs, PHEVs, and FCEVs by 2030 with continued increases through 2032 coupled with the right supporting policies. Even this 40-50 percent ZEVs penetration goal by 2030 was and still is an extremely challenging goal. A goal that will hinge on whether there is (1) sustained and supportive policies from the government supporting a successful EV market; (2) consumers continue to demand this new technology; and, (3) other industries outside the automotive industry make supporting market investments. [EPA-HQ-OAR-2022-0829-0555, pp. 4-5]

EPA Underestimates Market and External Challenges

EPA's proposed rule highlights the very complex challenges that lie ahead for the EV market. There are an enormous number of factors that are outside the control of automakers including manufacturing capacity, battery production, charging infrastructure, critical mineral supply, and consumer acceptance. A successful transition in the timeframe proposed will require massive changes in commitments from all sectors of the economy: vehicle suppliers, labor, utilities, charging infrastructure, home builders, mining, and mineral processing. Consumer behavior and acceptance also needs to significantly change. [EPA-HQ-OAR-2022-0829-0555, p. 6]

EPA's proposal requires automakers to sell EVs but does not propose any requirements to ensure adequate charging infrastructure to homes, highways, or businesses, or mandate utilities to have adequate capacity or provide reasonably priced high-power charging, or mandate easily accessible and affordable battery critical minerals for EV batteries. Government policies need to start today to ensure there are enough critical minerals for batteries and high-power charging. Unfortunately, there is not yet a roadmap to developing these and other essential pieces to the transition. [EPA-HQ-OAR-2022-0829-0555, p. 6]

All of the above market challenges will need to have complementary policies supporting all of the sectors outside the vehicle industry including utilities, mining, charging companies and will require them to meet targets too. It is critical that EPA take these factors into consideration when setting standards. [EPA-HQ-OAR-2022-0829-0555, p. 6]

EPA's Analysis of Supporting Government Policies is Extremely Optimistic

EPA over-estimates the utility of the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) that have started but are nowhere near complete. And we certainly cannot tell yet if these programs will be successful. Kia is also hopeful that the IIJA and IRA clean vehicle tax credit can help expedite the sales of EVs, but EPA justifies its proposal with overly optimistic forecasts about these programs. [EPA-HQ-OAR-2022-0829-0555, p. 6]

As an example, EPA forecasts that the average IRA clean vehicle credit amount (30D) will be $6000 across all EV purchases by 2032.11 Currently, there are 91 ZEVs available to purchase but only ten vehicles qualified for the tax credits in February 2023. The Internal Revenue Service (IRS) proposed rules released in March 2023 further decreased the vehicles eligible and will continue to decrease the vehicles eligible, at least in the short-term. [EPA-HQ-OAR-2022-0829-0555, p. 6]

11 88 Fed. Reg. 29,201.

Organization: Lucid Group, Inc.

Lucid agrees with EPA's finding from its technology feasibility assessment—the increasing availability of zero and near-zero tailpipe emissions technologies not only makes it ripe, but critical, to strengthen emissions standards. EV sales in the U.S. are increasing at a rapid pace. When coupled with the historic level of investment from the Biden Administration through the Bipartisan Infrastructure Law, CHIPS and Science Act, and Inflation Reduction Act, this moment is opportune to complement those incentives with cleaner tailpipe standards. Industry is currently demonstrating the feasibility of a zero-emission transition. Lucid is a modern-day example in its ability to develop the most advanced EV technology with a fraction of the capital available to larger automakers. Industry capital can similarly be redeployed to zero- emission vehicles thus transforming an original equipment manufacturers (OEM) fleet. [EPA-HQ-OAR-2022-0829-0664, pp. 2-3]

The Zero Emission Transportation Association (ZETA) and its members have found that electricity providers and grid-readiness will keep pace with the transition to zero-emission vehicles. In 2021, the U.S. fleet of electric vehicles used 6.1 terawatt hours (TWhs) of electricity, accounting for 0.15% of the total national energy generation that year.2, 3 It's estimated that an additional 15-27 TWh of annual new power generation will be needed to service EVs and related technologies. In the past, nearly 100 TWh have been added in a single year, demonstrating that such an increase is accomplishable.4 [EPA-HQ-OAR-2022-0829-0664, pp. 2-3]

2 "Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010–2021," Argonne National Lab, November 2022, available at https://publications.anl.gov/anlpubs/2022/11/178584.pdf.

3 "Monthly Energy Review May 2023," EIA, available at https://www.eia.gov/totalenergy/data/month/pdf/sec7_3.pdf.

4 "Summary Report on EVs at Scale and the U.S. Electric Power System," US Drive https://www.energy.gov/eere/vehicles/articles/summary-report-evs-scale-and-us- electric-power-system-2019.

Transmission of the energy generated is another key component, and one that this Administration has begun to address. This year, the Administration published its plan to decrease permitting timelines, including those for new transmission projects.5 Additionally, the U.S. Department of Energy proposed a rule on designating National Interest Electric Transmission Corridors.6 The Federal government is demonstrating its intent to bolster grid resilience, which in part will ensure electricity demand is met. [EPA-HQ-OAR-2022-09-0664, pp. 2-3]

5 "FACT SHEET: Biden-Harris Administration Outlines Priorities for Building America's Energy Infrastructure Faster, Safer, and Cleaner," (May 2023) available at https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/10/fact-sheet-biden-harris-administration-outlines-priorities-for-building-americas-energy- infrastructure-faster-safer-and-cleaner/.

6 Notice of Intent and Request for Information: Designation of National Interest Electric Transmission Corridors, 88 FR 30956 (May 15, 2023).

Organization: Mass Comment Campaign sponsoring organization unknown'(513 signatures)

I'm writing to express my concern about the new proposed EPA emissions rules on light and medium-duty vehicles and heavy-d'ty trucks. The EPA's recent proposals to effectively require up to 60% heavy-duty and 70% light and medium-duty vehicles s“les by 2032 t” be "zero emission" is very concerning to me. Among other defects, the proposals fail to consider lifecycle emissions and overlooks the potential for internal combustion vehicles and liquid fuels, such as biofuels, to continue improving and reducing carbon intensity. [EPA-HQ-OAR-2022-0829-1717]

Specifically, I have the following concerns with the proposals:

• Limits consumer choice and increases cost: The proposals may limit choices and increase costs for consumers, including those in economically disadvantaged groups. Many people can not afford to buy new cars already let alone top end model EVs which also require modifications to home to enable charging. [EPA-HQ-OAR-2022-0829-1717]

• Potentially affects U.S. energy security and use of biofuels: These proposals do not address the potential for biofuel to be used to create energy security benefits. [EPA-HQ-OAR-2022-0829-1717]

• Potentially provides a too optimistic forecast for EV Sales: Projected EV sales rates may be optimistic and may overstate the benefits of the proposals. [EPA-HQ-OAR-2022-0829-1717]

• The lack of infrastructure for EVs: Increased sales of EVs may rely on optimistic forecasts of increased electricity generation and charging infrastructure. [EPA-HQ-OAR-2022-0829-1717]

• The lack of critical materials: There is concern about the supply and availability of critical minerals and supply chains for battery manufacturing. The increased environmental impact of mineral mining has not been considered. Lanscape impacts to large scale surface mining operations far outweigh impacts of oil and gas drilling. [EPA-HQ-OAR-2022-0829-1717]

• Provides no incentives for existing vehicles to reduce greenhouse gas (GHG) emissions: This is a missed opportunity to accelerate GHG reduction in the early years of the program. [EPA-HQ-OAR-2022-0829-1717]

• Fails to consider electric vehicles are not zero emissions: The proposals are focused on tailpipe GHG emissions rather than life cycle emissions. Therefore, upstream GHG emissions for fuel and vehicle manufacturing and electricity generation are not included in the analysis. Maintaining an existing vehicle consumes far less energy and thus generates less overall emissions than the emissions generated by manufacturing new fleets of vehicles. [EPA-HQ-OAR-2022-0829-1717]

The EPA is not acknowledging how these proposals would trade our hard-earned U.S. energy security for mineral dependence on China. It is not in our strategic interest to ban cars that run on fuels extracted, refined, and grown in the United States, especially considering all the work that is being done here to lower the carbon intensity of those fuels. To do so would leave us more dependent on and beholden'to China and I don't think the EPA is the entity that should be making such critical economic and geopolitical decisions. [EPA-HQ-OAR-2022-0829-1717]

The EPA's proposals take the misguided position that only emissions from the vehicle tailpipes are worth counting. In doing so, the proposals do not consider internal combustion engine vehicles as a factor in lowering carbon right now using existing technologies. Consumers should have the greatest number of choices to meet their needs and budget. The final standards need to take a tech and fuel neutral approach. [EPA-HQ-OAR-2022-0829-1717]

Therefore, I ask that you do not support the new proposed EPA emissions rules on light and medium-duty vehicles and heavy-duty trucks. [EPA-HQ-OAR-2022-0829-1717]

Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

Technological advances and cost savings

> EPA should ensure the LDV and HDV standards reflect major advancements in zero-emission technologies. Globally, there are more than 839 different models of zero-emission vans, trucks and buses commercially available with new models being introduced at an unprecedented rate.1 [EPA-HQ-OAR-2022-//globaldrivetozero.org/tools/zeti-data-explorer (Accessed March 15, 2023).

Timelines

The sooner that long-term LDV and HDV standards are in place, the sooner that vehicle manufacturers and related companies will have the regulatory certainty needed to plan their decision-making, product development, and rollout. We urge the EPA to finalize both standards by the end of 2023. [EPA-HQ-OAR-2022-0829-0732, p. 1]

Organization: Mazda North American Operations

In addition, the standards immediately increase dramatically in stringency beginning in 27MY, with a resulting 36% BEV requirement. These standards are particularly accelerated for vehicles classified as light trucks, since the gap between passenger cars and light trucks is reduced. Mazda believes it is very important that the ramp-up and the light truck gap reduction should be slower in the early years of the program, as the industry, consumers, and suppliers adapt to th’s new reali“y. EPA's prop”sed "Alternative 3" is a step in the right direction, but the linear reduction in standards is insufficient to alleviate the harsh early years when the long-term targets are so aggressive. [EPA-HQ-OAR-2022-0829-0595, pp. 2-3]

Summary

Mazda is proud of its heritage and contributions to personal mobility, and we celebrated our 100th anniversary in 2020. Mazda has also long been an engineering leader known for innovative powertrains like the rotary engine and Skyactiv technology. [EPA-HQ-OAR-2022-0829-0595, pp. ’-4]

We look at EPA's NPRM and its preferred option through the lens of a company that is already working towards an ele’trified future. It's not a matter of if this transformation will happen, but when and how. Mazda, like the rest of the industry, faces many challenges: [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

- Will charging infrastructure be sufficient?

- Can the electric grid handle the increased demands?

- How will EV incentives on the federal and state level impact this shift?

- Will suppliers be able to develop and produce components like batteries (that currently require critical minerals, many from China) quickly enough and in enough volume?

- How might future laws or regulations in trade and re-shoring impact our ability to meet goals?

- Are consumers ready and willing“to move away f”om "tried and true" internal combustion engines in numbers sufficient to meet these goals?

- Can OEMs remain sufficiently profitable to fuel the transition to EVs? [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Mazda strongly requests that EPA take these considerations into account and make necessary adjustments to the proposed rule as it works towards a Final Rule. We feel the Final Rule should have more realistic targets and associated ramp ups, include PH’Vs, and adopt CARB's current LEV IV for criteria emissions. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Organization: Mclaren Automotive, McLaren Group

Given the challenges we have highlighted in moving towards greater electrification for SVMs like McLaren, EPA is effectively relying on credit trading flexibility as the means by which SVMs will maintain compliance with GHG standards. We believe this is inappropriate for several reasons and demonstrates that the proposed alternative standards do not meet the requirements of CAA§ 202“a) that standards "take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance w”thin such a period". First, we believe it is inappropriate to set a standard so stringent as to effectively require a manufacturer to entirely rely on another manufacturer to maintain compliance. Additionally, there is an inherent risk that even if a credit-generating manufacturer is willing to sell credits, the credits may be purchased by other parties before SVMs can access them. Having to purchase credits to comply with the proposed GHG standard would also divert resources away from electrification challenges. [EPA-HQ-OAR-2022-0829-0748, p. 3]

As stated, allowing for certainty and time to adjust to changes remains important for SVM like McLaren. An SVM standard also must take into account that engines and vehicles already developed will have to company with a standard in MY2024 which is currently unknown. Allowing for early years less stringent targets is essential given that design decisions which have already been made. It is also important for GHG policy to be fair and equitable. The EPA SVM proposal would require over 50% BEV mix in MY2026, based on McLaren analysis, far higher than Primary Standards requirements and effectively impossible given the lack of technology available to electrify high performance supercars. [EPA-HQ-OAR-2022-0829-0748, p. 3]

Organization: MECA Clean Mobility

EPA should try to finalize this proposed rule by the end of 2023 in order to provide lead time that would enable implementation of the medium-duty vehicle requirements prior to MY 2030. [EPA-HQ-OAR-2022-0829-0564, p. 4]

MECA appreciates the need for EPA to set standards respective to the lead time requirements stipulated in section 202(a)(3)(C) of the Clean Air Act. For this reason, the NPRM proposes new requirements for vehicles with GVWR > 6,000 lbs. to begin with MY 2030. We support EPA's inclusion of multiple voluntary early compliance pathways for vehicles with GVWR > 6,000 lbs offered in the proposed rule. Our analysis concludes that technologies are commercially available to enable phase-in of proposed medium-duty vehicle criteria pollutant standards starting with MY 2028, which EPA recognized in the proposal by allowing for alternative early compliance pathways. Therefore, we request EPA work to finalize this proposed rule by the end of 2023. We believe this will provide the necessary lead time to begin the required phase-in of criteria pollutant standards for vehicles with GVWR > 6,000 lbs starting with MY 2028. [EPA-HQ-OAR-2022-0829-0564, p. 4]

The previous light-duty GHG and CAFE regulations covering MY 2017-2025 included provisions for mid-term evaluation or review. These regulations were designed to set emission standards further into the future than this regulation proposes. In addition, significant uncertainty existed during the handling of the previous mid-term review. For these reasons, MECA does not support a similar mid-term evaluation provision in this proposal nor compliance "off-ramps" that would be triggered by results of a review. [EPA-HQ-OAR-2022-0829-0564, p. 4]

MECA members are commercializing components for electric and hydrogen fuel cell vehicles. This includes battery materials for the manufacture of both cathode and anodes utilizing unique macrostructure and composite formulations to improve efficiency and energy density. Electric component manufacturers are using state of the art transistor materials in their motors and power electronics that operate at higher voltages and temperatures thus requiring simpler cooling strategies. These next generation component designs reduce switching losses and improve electric efficiency of the system architecture in electric powertrains. To facilitate integration, component suppliers are integrating the motor, inverter and transmission into electric drive units to simplify the thermal management of the electric components and ease integration into vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

As demonstrated for combustion vehicles over the past 50 years, the market can not always be relied upon to drive innovation towards conservation of critical resources and energy security by improving the efficiency of vehicles. This has led agencies to set fuel efficiency and GHG standards. There is a significant disparity in the electric efficiency of similarly sized passenger electric vehicles today, as shown in Table 4. [See original comment for Table 4. Comparison of Energy Efficiency of BEV and PHEV Models] We urge EPA to begin compiling electric efficiency information and consider setting a minimum efficiency or energy consumption by weight class in a future rulemaking. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

Organization: MEMA, The Vehicle Suppliers Associated

The success of our industry is interwoven with the success of this proposal and the ability of the government to work with industry and other stakeholders to meet significant challenges. Therefore, the rule must address: [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

• The need for regulatory certainty. The final rule must contain an effective mix of feasible, demonstrated technology along with emerging technology, leaving options to improve emissions ’eductions in today's advanced propulsion designs. This will foster innovation in a coordinated direction, aligned with U.S. policy, but not mandate application of a narrowly defined technology path to make a positive im’act on the country's urgent environmental goals. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- The influence of –ther technologies - including internal combustion engines fueled by hydrogen and other renewable ca–bon-neutral fuels - which can impact measurable environmental improvements at scale technologies can provide immediate improvement to the environment. This is important not only for environmental improvements but for environmental justice in providing cleaner consumer vehicles immediately to communities living and working close to busy streets, highways, and other transportation networks. Inclusion of all technologies that can decarbonize the transportation sector will foster the necessary growth in manufacturing capacity, vocational performance, infrastructure improvements, and consumer acceptance. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Technology Neutrality and BEV Emissions. EPA should ensure that battery electric vehicles (BEV) are included in metrics for vehicle-to-vehicle comparison by assigning a metric that captures the pollutant emissions related to BEV operation, aligned with national electricity generation figures. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Chall’nges in our nation's infrastructure and power grid. MEMA appreciates the significant public investments being made to support clean transportation infrastructure. As these new investments in highways and main corridors are deployed, federal and state incentives are needed to further expand the EV charging and refueling infrastructure in areas that connect these major thoroughfares. Urban industrial centers will need focused buildout while rural areas will need thoughtful rollouts to achieve an effective EV charging infrastructure. These buildouts must include Direct Current Fast Charge (DCFC) and vehicle-to-grid (V2G) bidirectional charging. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Supply chain challenges. The proposed rule assumes that all materials advanced vehicles, which are not available today in the quantities needed to support the massive growth in vehicle construction, will become available within sufficient time. This places a significant and unnecessary risk on manufacturers and suppliers. Furthermore, once a company has converted production to new technology lines, that company cannot easily pivot its facilities and workforce back to the previous technology if EPA projections are not realized by the mid-to-late-2020s. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Workforce challenges. A significant increase in skilled workers will be needed to support the implementation of this rule and long-term success thereof [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Extended warranty. The necessity to clearly define the applicability of the extended warranty and the need to provide repair access to service these new vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

MEMA members are working to accelerate the performance and availability of clean-operating vehicle technologies and are directly contributing to their realization. Besides battery electric options, effective low- and zero-carbon technologies for future and current in-use vehicles also exist and can readily be put to use to reduce nationwide emissions and help EPA meet its climate goals. The success of this rule depends on greater inclusion of all available emissions reduction technologies, significant investment in infrastructure, careful understanding and investment in the domestic and global supply chain and ensured repair access to serve the improved and enhanced domestic vehicle fleet. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

Detailed MEMA Comments and Concerns on our Shared Challenges [EPA-HQ-OAR-2022-0829-0644, p. 4]

The Final Rule Must Reflect Regulatory Certainty Paired with Technology Neutrality [EPA-HQ-OAR-2022-0829-0644, p. 4]

EPA must provide sufficient regulatory certainty to manufacturers and consumers to ensure the most favorable outcome of this ambitious market transformation. The final rule must contain an effective mix of feasible, demonstrable technology along with emerging technology, and leverage all available options to improve emissions ’eductions in today's advanced propulsion designs. At the same time, the final rule must encourage innovation in clean transportation, including more advanced low- and zero-emissions technology. Conversely, a 100% ZEV mandate is not realistic, would stifle innovation and would disallow technologies that could address the urgent need to decarbonize applications for LD and MD vehicles. [EPA-HQ-OAR-2022-0829-0644, p. 4]

Technology Neutrality Pairs with Regulatory Certainty

The proposed rule disproportionally favors battery electric propulsion, which in turn discourages any further advancements for internal combustion technology, including carbon-neutral renewable fuels. Emerging innovations and recent technologies offer significant reduction in emissions from ICE vehicles, in both future and current fleets. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

Technology-forcing regulations that foster innovation aligned with policy, rather than regulations that mandate a narrowly defined technology path, will lead to a more positive national outcome. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

MEMA recognizes that the proposal attempts a performance-based standard, and the agency makes forecasts that estimate a variety of technology combinations in future fleets. By accepting the potential for technologies other than battery electric and hydrogen fuel cell, EPA can make a more immediate, widespread, positive impact on nationwide emissions reductions. Therefore, EPA must incent the development and deployment of advanced technology options to include advanced internal combustion (ICE) technologies, renewable fuels, and post-combustion CO2 capture (known as mobile carbon capture). These incentives will assist in accelerating the necessary infrastructure improvements needed to support advanced technology vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

Organization: Mercedes-Benz AG

Now more than ever, it is critical that EPA strike the right balance between regulatory objectives, supportive policies, and feasibility. As Mercedes-Benz assesses global trends and our company’s commitments, we believe that, even with funding under the Bipartisan Infrastructure Law and the Inflation Reduction Act, there remain many challenges and unknowns regarding the development of the U.S. EV market – charging infrastructure, the supply chain, battery critical minerals availability, electric grid capacity, customer acceptance, etc. It is thus uncertain how

EV sales will keep pace with the agency's NPRM targets. [EPA-HQ-OAR-2022-0829-0623, p. 2]

We would like to emphasize the importance of setting feasible and achievable standards for Class 2b and Class 3 vehicles. Similar to light-duty vehicles ("LDVs"), there remain many uncertainties in customer uptake and acceptance of medium-duty electric vehicles. Moreover, electrification in this segment lags that of light-duty, as production of these vehicles is only just beginning. As a result, there are currently limited options available to consumers, and medium-duty charging infrastructure requires additional attention, funding, and considerations appropriate for medium-duty vehicle usage. Medium-duty vans are being increasingly swept into pick-up truck focused regulations, as well as EPA's intent to treat medium-duty more like light-duty. Yet, medium-duty vans remain fundamentally different than either pick-ups or light-duty, and therefore warrant specific consideration of their technologies, customer uses, and corresponding regulatory requirements. [EPA-HQ-OAR-2022-0829-0623, pp. 2-3]

Organization: Minnesota Corn Growers Association (MCGA)

The proposed EPA standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. While the U.S. market share of BEVs will continue to expand, establishing regulations where success is solely contingent upon an unattainable tenfold increase in the production and sales of BEVs over the next eight years represents an avoidable mistake. The proposed rule would require huge investments and rapid growth in many industries, including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0612, p. 3]

The proposed rulemaking assumes that BEVs will be the dominant technology for future emissions reductions. But relying on a single technology is a risky strategy; many factors could interfere including the supply and/or cost of critical minerals, lack of BEV recharging infrastructure, slow ramp-up of wind and solar power, poor customer acceptance of BEVs in some market segments, etc. EPA estimates that 67% of U.S. vehicles sales will be BEVs in 2032, but most major automakers predict much lower BEV sales, and the world's largest automaker predicts only 20% in 2030. For comparison, MIT predicts9 that China will achieve only 40% in 2030 despite a head start and extremely strong government interventions. EPA should not base mandatory emissions standards on unrealistic predictions of BEV sales. [EPA-HQ-OAR-2022-0829-0612, pp. 5-6]

9 https://news.mit.edu/2021/chinas-transition-electric-vehicles-0429.

Organization: Minnesota Pollution Control Agency (MPCA)

MPCA believes the proposed standards are technologically feasible and necessary and urges EPA to adopt them. [EPA-HQ-OAR-2022-0829-0557, p. 5]

Organization: Missouri Corn Growers Association (MCGA)

Monumental challenges in implementing this rule.

Notwithstanding the vast challenges to everyday Americans, the aggressiveness of EPA's proposal raises immediate doubt about whether such targets are feasible within the required timeframe. The rule gives a wholly unrealistic and false impression the U.S. has a robust and reliable public EV charging infrastructure ready to accommodate the vast number of BEVs. MCGA members driving Missouri's rural roads know this is not the case. In addition, most American families will find BEVs' dismal range, extended charge time, shortage of maintenance technicians, and poor performance under heavy loads and extreme temperatures both frustrating and entirely impractical for everyday personal and business needs. [EPA-HQ-OAR-2022-0829-0578, p. 2]

Organization: National Association of Clean Air Agencies (NACAA)

Feasibility of More Protective Federal Standards for LDV and MDV Emissions of Multiple Pollutants

The evolution of light- and medium-duty zero-emission vehicles (ZEVs) and charging infrastructure is the result of leadership, commitment and innovation on numerous fronts and, by all accounts, this evolution will continue on an upward trajectory further increasing the feasibility, availability and cost competitiveness of ZEV technologies. [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

Electric vehicle (EV) sales and model availability continue to grow.11 In 2022, one in seven (10 million) light-duty vehicles sold worldwide was an EV.12 More than 800,000 of those sales were in the U.S., representing a 65-percent increase over 2021,13 and the first quarter of 2023 saw nearly 260,000 EV sales in the U.S.14 Cox Automotive has forecast that U.S. EV sales will reach 1 million in 2023.15 Further, a study prepared by ERM reports that, "Based on announcements by major automakers, the number of electrified models available in the U.S. is projected to reach 187 by the end of 2025, with over 58 new models slated to launch in model years 2022-2025."16 [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

11 https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2022/09/ERM-EDF-Electric-Vehicle-Market- Report_September2022.pdf

12 Id at 7.

13 https://www.coxautoinc.com/market-insights/in-a-down-market-ev-sales-soar-to-new-record

14 https://www.coxautoinc.com/market-insights/q1-2023-ev-sales

15 Supra note 13

16 Supra note 11, at 36

Most light- and some medium-duty vehicle manufacturers have publicly announced commitments or goals to increase ZEV sales between now and 204017 and demand by commercial fleet owners is on the rise as are their commitments to fleet electrification.18 Meanwhile, vehicle manufacturers are investing heavily in EVs. According to an October 2022 Reuters analysis of public data and projections released by 37 global automobile manufacturers, "The world's top automakers are planning an extraordinary level of spending to develop and produce millions of electric vehicles, along with the batteries and raw materials to support that production, over the next eight years. Reuters calculates that global automakers expect to spend nearly $1.2 trillion through 2030 on EVs, batteries and materials. The number, which has not previously been published, dwarfs previous investment estimates by the industry and is more than twice the previous calculation published just a year ago."19 [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

17 Id at 38.

18 Id at 41.

19 https://www.reuters.com/graphics/AUTOS-INVESTMENT/ELECTRIC/akpeqgzqypr/

The federal government is demonstrating its deep commitment to accelerating ZEV deployment. The Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) enacted by Congress and signed by President Biden in 2021 and 2022, respectively, infuse unprecedented funding into EV charging infrastructure and tax credits for commercial and personal ZEVs and battery manufacturing. As EPA acknowledges in its proposal, "These measures represent significant Congressional support for investment in expanding the manufacture, sale, and use of zero-emission vehicles by addressing elements critical to the advancement of clean transportation and clean electricity generation in ways that will facilitate and accelerate the development, production and adoption of zero-emission technology during the time frame of the rule."20 Moreover, EPA states, "Congressional passage of the BIL and IRA represent pivotal milestones in the creation of a broad-based infrastructure instrumental to the expansion of clean transportation, including light- and medium-duty zero-emission vehicles, and we have taken these developments into account in our assessment of the feasibility of the proposed standards."21 NACAA notes that given the importance of this federal funding EPA should ensure that it is allocated equitably across the country. [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

20 Supra note 1, at 29,195

21 Id at 29,196

State leadership is also playing a pivotal role in rapidly ramping up light- and medium-duty ZEV adoption. A number of states have established ambitious GHG emission reduction targets – some economy-wide and others transportation-specific – requiring aggressive reductions by as soon as 2030. States have also chosen to exercise their authority under CAA section 177 and adopt portions of the California Advanced Clean Cars (ACC) Regulation, which requires light-duty car and truck manufacturers to sell increasing percentages of ZEVs. The regulation also includes low-emission vehicle (LEV) standards to reduce criteria pollutant and GHG emissions from new cars and trucks with internal combustion engines. [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

Seventeen states have adopted the LEV standards and 15 states have adopted the LEV standards and ZEV sales requirements. Additional states have efforts underway regarding LEV and/or ZEV adoption and with each additional adopting state comes a greater share of the national light-duty vehicle market. Last year, California finalized its Advanced Clean Cars II (ACC II) Regulation, requiring manufacturers of passenger cars and light trucks to produce and deliver for sale increasing percentages of ZEVs overtime culminating with 100 percent ZEVs by 2035. Six states have adopted ACC II, six more have announced that they are pursuing adoption and still others are contemplating such action. With each additional adopting state comes a greater share of the national LDV market. [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

Regarding MDVs, in the summer of 2020, 17 states and the District of Columbia entered into the Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding (MOU), including specific goals and targets, agreeing to collaborate “to foster a self-sustaining market for zero emission medium- and heavy-duty vehicles.”22 In July 2022, this group reaffirmed and strengthened its commitment to the MOU by releasing an Action Plan for accelerating a transition to zero-emission trucks and buses.23 Eight of these states have chosen to exercise their authority under CAA section 177 to adopt the California Advanced Clean Trucks (ACT) Regulation requiring manufacturers that certify Class 2b through Class 8 chassis or complete vehicles with internal combustion engines (ICE)24 to sell increasing (through MY 2032) percentages of ZEVs as part of their annual sales through 2035, with 60 percent ZEVs for vocational vehicles and 40 percent ZEVs for tractors (short-haul and long-haul combined). Additional states have efforts underway regarding ACT and, as with LDVs, with each additional adopting state comes a greater share of the national MDV (and heavy-duty vehicle) market. [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

22 https://www.nescaum.org/documents/mhdv-zev-mou-20220329.pdf

23 https://www.nescaum.org/documents/multi-state-medium-and-heavy-duty-zev-action-plan.pdf

24 For the first time, EPA’s proposes to group Class 2b and Class 3 MDVs with LDVs in the LMDV rule (historically these vehicles have been grouped with heavy-duty vehicles).

In September 2021, five states signed the Regional Electric Vehicle Midwest Coalition Memorandum of Understanding “to accelerate vehicle electrification in the Midwest” and provide “the foundation for cooperation on fleet electrification along key commercial corridors to safeguard economic security, reduce harmful emissions, improve public health, and advance innovation” while positioning the region “to realize additional economic opportunity in clean energy manufacturing and deployment.”25 [EPA-HQ-OAR-2022-0829-0559, pp. 4-5]

25 https://www.michigan.gov/-/media/Project/Websites/leo/REV_Midwest_MOU_master.pdf?rev=6dd781b5a4eb4551b3b3a5b875d67fb9

Finally, NACAA recommends that EPA include provisions in the final rule that align with ACC II regarding data standardization, durability, warranty, minimum mileage range labeling, charging and serviceability requirements. [EPA-HQ-OAR-2022-0829-0559, p. 8]

Organization: National Association of Convenience Stores (NACS) et al.

II. Proposed Electrification Timelines are Unworkable.

The challenges associated with electrifying the light- and medium-duty fleet cannot be understated. EPA projects that the Proposed Rule will result in 67 percent of light-duty vehicles sold in 2032 being electric. That figure is an average of 78 percent electric sedans, 68 percent electric pickups and 62 percent electric crossover and SUVs.3 Conversely, EPA estimates that in the absence of any regulations, electric vehicles would make up only 39 percent of new sales in 2032.4 [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

3 Proposed Rule at ,329 (Table 80).

4 Reputable estimates on how quickly EV sales will increase vary widely. S&P Global Mobility estimates that by 2030, EVs will be 40 percent of new vehicle sales. The Energy Information Administration, on the other hand, estimates that EVs will be 17 percent of new vehicle sales by 2030. McKinsey has the highest

estimate and projects that EVs will be 48 percent of new vehicle sales by 2030. Given these varying estimates – all from highly respected sources – the Agency should exercise caution about consumers' willingness to purchase, and manufacturers' ability to deliver, EVs at the rates required by the Proposed Rule. Writing rules on its own does not mean that challenges related to supply chains for making the vehicles or consumer sentiment will change.

These timelines are entirely untethered from the market's capabilities. Most prospective EV drivers will need fast, high-powered on-the-go charging solutions before they're comfortable buying an EV.5 Although fuel retailers are very active in the National Electric Vehicle Infrastructure Program ("NEVI" Program) and other federal and state funding opportunities, it remains unacceptably difficult to identify a viable business case for installing EV charging stations. Unless those obstacles are permanently removed, these challenges will remain regardless of what the final rule demands. [EPA-HQ-OAR-2022-09-0628, pp. 3-4]

5 Consumer Reports, "Battery Electric Vehicles and Low Carbon Fuel: Overview of Methodology," April 2022,
https://article.images.consumerreports.org/prod/content/dam/surveys/Consumer_Reports_BEV%20AND%20LCF% 20SURVEY_18_FEBRUARY_2022.

Most of these impediments involve an electricity market structure that was not designed for – and is thus incompatible with – the retail fuel market. Many fuel retailers have installed EV charging stations at their outlets, utilizing any number of business models and ownership structures. Very few, if any, of these investments are profitable on a self-sustaining basis. The structural impediments to the profitability of public EV charging are too significant to overcome. These existing investments should therefore be interpreted as "beta tests" by companies exploring the charging space, rather than indicators of a viable, sustainable business model. [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

We are confident that the right combination of policy incentives and signals will enable the market to overcome any barriers that exist today. We simply fail to understand the rationale for leaving emission reduction opportunities on the table while we work toward those aspirational objectives. The best way to address practical impediments to electrification is to inject flexibility into the Proposed Rule while simultaneously promoting near-term emissions reductions through the use of multiple technologies, including renewable liquid fuels. [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

No one solution will decarbonize transportation energy. What policymakers think is the best solution today may be surpassed by subsequent ingenuity and innovation. Sound policy should not stifle innovation by mandating specific solutions. Instead, policy should set performance goals and let the market – guided by consumers – innovate to find the best way to meet those goals. [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

II. Electrification Timelines Proposed Under the Rule are Divorced from Reality.

EPA projects that the Proposed Rule will result in 67 percent of light-duty vehicles sold in 2032 being electric. That figure is an average of 78 percent electric sedans, 68 percent electric pickups and 62 percent electric crossover and SUVs.5 Conversely, EPA estimates that in the absence of any regulations, electric vehicles would make up only 39 percent of new sales in 2032.6 The extraordinary pace of electrification mandated under this rulemaking is entirely divorced from the world in which consumers and the broader marketplace operate. [EPA-HQ-OAR-2020829-0648, p. 4]

5 Proposed Rule at 29,329 (Table 80).

6 Reputable estimates on how quickly EV sales will increase vary widely. S&P Global Mobility estimates that by 2030, EVs will be 40% of new vehicle sales. The Energy Information Administration, on the other hand, estimates that EVs will be 17% of new vehicle sales by 2030. McKinsey has the highest estimate and projects that EVs will be 48% of new vehicle sales by 2030. Given these varying estimates—all from highly respected sources—the Agency should exercise caution about consumers' willingness to purchase, and manufacturers' ability to deliver, EVs at the rates required by the Proposed Rule. Promulgation of this Proposed Rule, alone, does not mean that challenges related to supply chains for making the vehicles or consumer sentiment will change.

The challenges to electrification cannot be overstated and will require an unprecedented effort irrespective of regulatory mandates. Public charging deployment is a principal obstacle. In the Proposed Rule, EPA catalogs many of the federal incentives currently in place for charging infrastructure, suggesting that these policies may ameliorate many of these challenges.7 This suggestion is short-sighted and incorrect. Subsidies alone will not create a long-term, sustainable proliferation of EV charging stations. For electrification policies to succeed in the long term, there must be a competitive, public charging market to refuel electric vehicles.8 Cars will need places to refuel, and private companies need a financial justification to spend capital to install charging stations. [EPA-HQ-OAR-2022-0829-0648, p. 4]

7 Proposed Rule at 29,307.

8 EV charging policy should promote competitive market dynamics and work with consumers' existing behavior and fuel retailers' real estate and business infrastructure. In a competitive market, private dollars will make sure infrastructure is there to meet consumers' needs. Without these market-oriented policies in place as a foundation for any public investment, there is a very real risk that public dollars spent will be stranded and wasted in ways that do not serve an appreciable number of consumers and ultimately do little to combat EV range anxiety.

c. Supply Chain and Market-Related Barriers to EV Adoption

Various other barriers to EV adoption exist beyond public charging, including consumer skepticism toward new technology, higher costs than internal combustion engine ("ICE") vehicles, limited range, lack of convenient public charging infrastructure, uncertain battery aging and resale value, dismissive or deceptive car dealerships, lack of available models, and other supply constraints.29 [EPA-HQ-OAR-2022-0829-0648, p. 9]

29 Matteo Muratori et al., PROG. ENERGY 3 022002 "The rise of electric vehicles—2020 status and future expectations" (Mar. 25, 2021) available at https://doi.org/10.1088/2516-1083/abe0ad.

EPA acknowledges, though does not meaningfully address, many of the barriers to EV adoption.30 If the Agency is interested in electrifying light-duty transportation in the United States, it should proactively redress these obstacles rather than assume they will dissipate on their own under the full weight of unachievable mandates. [EPA-HQ-OAR-2022-0829-0648, p. 9]

30 Proposed Rule at 29,311.

Organization: National Automobile Dealers Association (NADA)

II. Proposal Overview

Earlier this year, EPA proposed to revise its multipollutant emissions standards for light-duty passenger cars and trucks and light medium-duty vehicles (defined as classes 2b and 3).1 EPA states that the proposal is authorized under section 202(a) of the Clean Air Act (CAA),2 and was issued in response to Executive Order (E.O.) 14037, "Strengthening American Leadership in Clean Cars and Trucks" (Aug. 5, 2021), which set a U.S. new vehicle sales goal of 50 percent zero-emission vehicles by 2030.3 [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

1 88 Fed. Reg. 29184 et seq. (May 5, 2023).
2 42 U.S.C. § 7521(a).
3 88 Fed. Reg. at 29186, 29187, 29231-33.

The proposal seeks to establish more stringent standards for light- and medium-duty vehicles beginning with MY 2027 and to progressively tighten them through MY 2032.4 For light-duty vehicles, EPA proposes a 56 percent reduction in combined fleet average greenhouse gas (GHG) emission target levels compared to the existing MY 2026 standards.5 For medium-duty vehicles, EPA proposes a 44 percent GHG emissions reduction compared to existing MY 2026 standards, and a 37 percent reduction compared to MY 2027 standards.6 EPA also proposes non-methane organic gases plus nitrogen oxides (NMOG+NOx) standards that represent a 60 percent reduction from the existing MY 2025 light-duty standards and a 66 to 76 percent reduction for medium-duty vehicles.7 And for both light- and medium-duty vehicles, EPA's proposed standards project to reduce particulate matter emissions by more than 95 percent.8 [EPA-HQ-OAR-2022-09-0656, pp. 2-5]

4 88 Fed. Reg. at 296, 29234, 29257.
5 88 Fed. Reg. at 29196, 29234, 29239-40.
6 88 Fed. Reg. at 29196, 29234.
7 88 Fed. Reg. at 29197.
8 Id

The proposal would maintain the footprint structure of the existing light-duty standards, but update the footprint standard curves "to flatten the slope of each curve and to narrow the numerical stringency difference between the car and truck curves" based on the vehicle technologies EPA projects automakers will use to comply.9 It would also revise the air conditioning credit program by limiting credit eligibility to light-duty internal combustion engine (ICE) vehicles for tailpipe CO2 emissions control beginning in MY 2027, and remove refrigerant- based air conditioning provisions for both light- and medium-duty vehicles to maintain consistency with a separate proposal to disallow their use.10 EPA also proposes to sunset the off-cycle credits program for both light- and medium-duty vehicles by: (i) reducing the menu credit cap annually until its unavailable in MY 2031; (ii) eliminating the 5-cycle and public process pathways starting in MY 2027; and (iii) limiting eligibility for off-cycle credits to vehicles with tailpipe emissions greater than zero starting in MY 2027.11 [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

9 88 Fed. Reg. at 29196, 29234.
10 88 Fed. Reg. 29196, 29246-48.
11 88 Fed. Reg. 29196, 29249-52.

EPA forecasts that the average marginal per-vehicle cost for regulated manufacturers (OEMs) to comply with its proposed light-duty mandates will rise from $633 in MY 2027 to $944 in MY 2031, and projects that the marginal per vehicle cost of compliance will jump to approximately

$1,200 in MY 2032.12 For medium-duty vehicles, EPA's estimated average marginal per vehicle OEM cost of compliance ranges from $364 in MY 2027 to approximately $1,800 in MY 2032.13 [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

12 88 Fed. Reg. at 29201, 29328, 29343; See also EPA's Draft Regulatory Impact Analysis (DRIA) at l (able 11), 4-17, 13-25 (Table 13-45).

Importantly, these costs are in addition to those imposed by EPA in prior rules, which are necessarily built into the cost of MY 2027 and later vehicles. EPA asserts, however, that higher light- and medium-duty costs will be offset by purchase incentives arising from the Inflation Reduction Act (IRA), and by lower EV operating costs.14 [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

14 88 Fed. Reg. at 29201, 29328-29, 29344, 29364.

Based on OEM fleet electrification investment and production plan announcements and federal subsidies in the Infrastructure Investment and Jobs Act (IIJA) and the IRA, EPA contends that EV technologies have advanced to such a degree that EVs now "are a feasible way to greatly reduce emissions" and can be used "as an emissions control technology to comply with" the proposed standards.15 EPA projects that, although "[t]he proposed standards are performance- based and do not mandate any specific technology...or any vehicle type[,]" new light-duty EV sales will increase from 36 percent in MY 2027 to 67 percent in MY 2032.16 EPA also projects new medium-duty EV sales ranging from 17 percent in MY 2027 to 46 percent in MY 2032.17 [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

15 88 Fed. Reg. at 29194, 29284, 29341-44.
16 88 Fed. Reg. at 29329.
17 88 Fed. Reg. at 29331.

EPA also projects that its proposed standards will cause new light-duty vehicle sales to decrease a small amount during the first two years, increase a small amount in the next two years, and then decrease by a small amount in the final two years.18 EPA projects no change in new medium-duty vehicle sales as a result of its proposed standards based on an assumption that, because commercial buyers "are less sensitive to changes in vehicle prices than personal vehicle owners[,]" they will not "change purchase decisions if the price of the vehicle changes" and "will still purchase the vehicle that fts their needs."19 [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

18 88 Fed. Reg. at 29370.
19 88 Fed. Reg. at 29371.

The following NADA comments focus on the potential impacts of EPA's proposal on new light- and medium-duty sales, and on fleet turnover. [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

III. EPA Has Not Demonstrated That Its Proposed Standards Are Technologically Feasible, Economically Practical, or Cost Beneficial.

Of the 285 million vehicles on U.S. roads today, only 2.1 million (less than one percent) are EVs,20 but OEMs are investing and preparing significantly for the production and deployment of EVs. Indeed, 800,000 EVs were sold in 2022, capturing 5.8% of total new vehicle sales, up from 3.2% in 2021.21 And EV market share is generally expected to increase significantly over time. [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

20 See Global EV Data Explorer – Data Tools - IEA. A recently-issued Alliance for Automotive Innovation (AAI) report indicates that 3.3 million EVs—or 1.17 percent—are today operating on U.S. roads. See Get Connected EV Quarterly Report 2023 Q1.pdf (autosinnovate.org) ("Registration and Infrastructure").

21 See In a Down Market, EV Sales Soar to New Record - Cox Automotive Inc. (coxautoinc.com).

Since EPA began regulating tailpipe emissions, OEMs have successfully made incremental but affordable ICE vehicle emissions improvements while simultaneously developing and bringing new alternative technologies and fuels to market. But OEMs are limited in their ability to further improve ICE vehicle emissions in conformity with EPA's proposed standards without substantial cost increases. Consequently, it is concerning that EPA's proposed standards, if adopted, will increase the cost of covered new motor vehicles, and hinder the deployment of EVs at a critical juncture for this emerging market. [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

NADA has long supported continuous vehicle emissions improvements that are technologically achievable and affordable for household and commercial new vehicle customers. As noted above, NADA's franchised dealer members are "all-in" with selling and servicing the new EVs being produced by the OEMs they represent. In fact, nationwide, NADA expects franchised dealers to spend some $5 billion installing EV chargers, buying EV-related equipment, parts, and tools, and investing in EV training for sales and service personnel. As evidenced by these investments and by the EV-related activities at the 2022 and 2023 NADA Shows,22 America's new motor vehicle dealers recognize their importance to the broad, mass market adoption of EVs. However, they also are concerned that EPA's proposal could undermine that adoption. [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

22 See Exhibit A: "Everything Electric" at NADA Show 2022-2023.

Appropriately structured standards must involve a national, holistic approach to improving tailpipe emissions. EPA claims that it is not proposing to mandate specific technologies or the production of specific vehicle types, but its proposal is anything but technology neutral. Unlike prior rules governing tailpipe emissions, EPA's proposed standards cannot be met by ICE vehicles alone and would phase-out existing credits for ICE vehicle and hybrid technologies that have to date helped OEMs to achieve better emissions compliance. Moreover, they are premised on overly aggressive assumptions regarding future EV market penetration. If adopted, the cumulative practical effect of the proposal would be to greatly reduce the market availability of new ICE vehicles. This "if you build them, they will come" approach ignores the fact that, while franchised dealers are the OEMs' primary customers, actual emission reductions cannot be achieved unless and until new EVs take to the road. [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

Unlike for many regulated goods, prospective purchasers of new light-duty vehicles have transportation options, including the used vehicle marketplace, the service and repair of existing vehicles, and alternatives like public transit and micro-mobility. Consequently, vehicle consumer purchase behaviors must be viewed through the lens of an ever-changing marketplace that hinges on the willingness and ability of prospective purchasers to buy ever more expensive new vehicles with enhanced emissions performance. Similarly, new commercial medium-duty vehicle purchase decisions hinge on affordability, cost-efficiency, and reliability (i.e., uptime). At bottom, the market will avoid new vehicles that are too costly, that offer performance comprises, or that pose unacceptable downtime risks. [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

EPA's current proposal is flawed in that it disregards these critical demand-side marketplace factors. It also appears aimed at promoting EVs to the exclusion of ICE, hybrid, and other alternative fuel vehicles. It will likely cause OEMs to produce fewer new technology ICE and alternative fueled vehicles and will increase their cost, thereby dissuading consumers from considering their purchase. EPA's final rule should set truly technology-neutral emissions standards that maximize, not inhibit, fleet turnover. Doing so is critical to maximizing emissions reduction given that, as noted above, regulatory objectives will not be achieved unless and until new vehicles subject to more stringent emissions standards are bought. [EPA-HQ-OAR-2022-0829-0656, pp. 2-5]

Organization: National Corn Growers Association (NCGA)

The proposed EPA standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. While the U.S. market share of BEVs will continue to expand, establishing regulations where success is solely contingent upon an unattainable tenfold increase in the production and sales of BEVs over the next eight years represents an avoidable mistake. The proposed rule would require huge investments and rapid growth in many industries, including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0643, p. 2]

There are many obstacles to this shift including geopolitics, long lead times, capital investments, and consumer acceptance. [EPA-HQ-OAR-2022-0829-0643, p. 2]

Organization: National Fers Union (NFU)

I. Executive Summary

The proposed EPA standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. Battery electric vehicles will play a large role in achieving the goals, but this will require huge investments and rapid growth in many industries including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0581, p. 2]

It would be naive to believe that these dramatic changes will be achieved smoothly and quickly. There are many obstacles including geopolitics, long lead times, capital investments, and consumer acceptance. In order to achieve emissions goals in the most robust, rapid, and affordable way, EPA should encourage multiple additional solutions such as hybrid electric vehicles (including plug-in hybrids), biofuels, and E-Fuels. [EPA-HQ-OAR-2022-0829-0581, p. 2]

Organization: National Propane Gas Association (NPGA)

The EPA's goals in reducing GHGs and other pollutants is laudable, but its timeline is unachievable. [EPA-HQ-OAR-2022-0829-0634, p. 2]

Organization: Nebraska Corn Board (NCB) and Nebraska Corn Growers Association

The EPA's proposed rule is a pre-mature way to ensure electric vehicles (EV) are a part of the Biden Administration's plan for EV sales to be 50% of all vehicle sales by 2030. The "most stringent emissions proposal to date" is pushing to exceed that plan to implement around 69% acceptance by the proposed deadline. This is not feasible for rural America. [EPA-HQ-OAR-2022-0829-0583, p. 1]

Organization: Nissan North America, Inc.

III. GHG Proposal

Thanks to the leadership and early investment of Nissan, the EV market has steadily grown over the last 10 years, albeit slower than many expected. Transitioning from long-existing and established technology takes time and significant financial investment. This responsibility must be shared among the industry, its customers, and governmental entities. Widespread adoption of EVs requires not only that the automotive industry broadly embrace investment in this technology, but also that consumers show willingness to adopt the new technology. Nissan has invested billions of dollars in an effort to stimulate growth, not only investing in technology and product development but also in infrastructure and consumer outreach/education. Nissan strongly supports federal, state, and local investment in market measures to complement the efforts already in place by industry leaders such as Nissan to further encourage this shift towards EVs. [EPA-HQ-OAR-2022-0829-0594, pp. 3-4]

Nissan is committed to transitioning its vehicle portfolio to EVs over time and intends to remain an industry leader in EV and related battery technology innovations. Nissan supports President Biden's overall efforts to increase sales of battery, fuel cell, or plug-in hybrid electric vehicles (BEVs, FCEVs, and PHEVs, respectively) over the next decade. The Administration already announced aggressive penetration targets in the August 5, 2021 "Executive Order on Strengthening American Leadership in Clean Cars and Trucks" (hereinafter "Clean Cars EO"). The Proposed Multi-Pollutant Rule, however, goes well beyond the already ambitious goals announced in President Biden's Clean Cars EO. Not only has the penetration percentage been significantly increased (jumping from 50 percent to 60 percent in 2030), but the make-up of that percentage has drastically changed: EPA's Proposed Multi-Pollutant Rule would require a 60 percent penetration rate for BEVs only, excluding the FCEV and PHEV technologies that are critical to shepherding a safe, affordable, and reliable transition to clean vehicles. EPA has moved the goalpost, not by a few feet but by miles. [EPA-HQ-OAR-2022-0829-0594, pp. 3-4]

In light of these myriad challenges, EPA should adjust the proposed GHG standards set forth in the Proposed Multi-Pollutant Rule. Nissan supports a final rule that takes these realities into consideration and seeks an ambitious yet achievable target for plug-in electric vehicle ("PEV") penetration, closer to the already ambitious targets set in the Clean Cars EO. At a minimum, Nissan requests that EPA adjust the proposed GHG standards and targets to account for a blended PEV percentage, taking into consideration emissions reductions from PHEVs and BEVs collectively. EPA has historically considered the emissions benefits of both groups of advanced technology vehicles, acknowledging the importance and need of PHEVs in the consumer shift towards clean vehicles. Nissan and others in the industry are committed to transforming the industry and have already invested significantly in pressing forward on the transition to EVs. The

Proposed Multi-Pollutant Rule goes beyond what is achievable and simply forces too much too quickly. There simply is not a realistic path to achieve the level of accelerated shift in the proposed timeframe. More time is needed for such extensive and transformational change. [EPA-HQ-OAR-2022-0829-0594, p. 5]

IV. EPA Tier 4 Proposal

Nissan has continued to improve ICE vehicle technologies and steadily reduce corresponding criteria pollutant emissions. While Nissan is committed to achieving emissions reductions on all fronts – GHG and criteria pollutants – the Proposed Multi-Pollutant Rule would set criteria pollutant standards that require significant investment of financial and research and development resources to ICE technologies, thereby diverting these limited resources that are critical to achieving the Administration’s aggressive electrification goals. EPA should encourage and allow manufacturers to invest their available resources towards the ultimate goal of transitioning to EVs, which mitigates the criteria pollutant emissions as fleet electrification continues to ramp up. [EPA-HQ-OAR-2022-0829-0594, pp. 6-7]

The standards and requirements set out in the proposal are costly and inconsistent with already established standards under California’s Advanced Clean Cars (“ACC”) II program. The stringency and accelerated timeline for implementation as proposed are technically, economically, and logistically unrealistic. In particular, the proposed PM standards and elimination of commanded enrichment strategies for component protection will pose significant challenges for the industry. [EPA-HQ-OAR-2022-0829-0594, pp. 6-7]

- The proposed PM standard and accompanying phase-in schedule are not feasible given current technology and lead time considerations. The proposed new 0.5 mg/mile standard would require the installation of a gasoline particulate filter (GPF) on every vehicle in order to comply. While GPFs are not new technology, they are relatively new to the U.S. market and the proposed requirements are unique globally. Adding an emission control component such as a GPF is no simple task and requires significant research, development, and testing, as well as re-calibration of relevant software systems to account for new systems, components, and monitors within the overall vehicle software architecture. Such hardware and software changes require sufficient lead time, which is not provided under the proposal. EPA’s proposed new standard would also be implemented in the middle of the phase-in period for California’s new PM standards. EPA should align its proposal with the standard recently finalized in California, for which manufacturers have already started planning. [EPA-HQ-OAR-2022-0829-0594, pp. 6-7]

Organization: North American Suba’u, Inc.

The agency's proposed MY2027-2032 GHG standards aim to front-load standards in the early years, starting at an 18 percent increase in stringency in 2027 and declining to eight percent in 2030, nine percent in 2031, and 11 percent in 2032. While Subaru shares the goal of making significant reductions in greenhouse gas emissions, the feasibility of achieving the standards, particula’ly in the proposal's early years, must be considered particula“ly noting various "outside the vehic’e" factors (addressed below) needed to support a more aggressive EV posture. [EPA-HQ-OAR-2022-0829-0576, p. 2]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

Collectively, California and the 15 Section 177 ZEV states account for roughly 35 percent of U.S. sales of new light-duty ZEVs.12 The ZEV sales requirements in these states have helped to create a national market that enables ZEV automakers, suppliers, and charging providers to achieve economies of scale, lowers consumer costs, and promotes job creation in automotive, manufacturing, infrastructure, and supporting industries. Experience proves that ZEV sales requirements provide the regulatory certainty needed to drive public and private investment in deployment of ZEVs and charging infrastructure. Indeed, states with these requirements consistently outperform the national average for light-duty ZEV sales. From 2019 to 2022, light-duty ZEV market penetration in the Section 177 ZEV states more than quadrupled, exceeding 10 percent of total LDV sales.13 [EPA-HQ-OAR-2022-0829-0584, pp. 4-5]

12 National Automobile Dealers Association, NADA Data 2021 (2022), https://www.nada.org/media/4695/download?inline.

13 Atlas Public Policy, EV Hub, https://www.atlasevhub.com/ materials/automakers-dashboard/ (2023 IHS data) (visited Feb. 23, 2023).

Outside of California, nearly half of the nation’s public charging infrastructure has been deployed in states with ZEV sales requirements. These states also account for roughly three quarters—nearly $5 billion—of all utility funding for transportation electrification approved by state public utility commissions.14 [EPA-HQ-OAR-2022-0829-0584, pp. 4-5]

14 U.S. Department of Energy, Alternative Fuels Data Center, Alternative Fueling Station Counts by State, https://afdc.energy.gov/stations/states (visited June 9, 2023).

California’s ACC II program, finalized in 2022, requires manufacturers of passenger vehicles (designed to transport 12 persons or less) and light-duty trucks (gross vehicle weight rating less than 8,500 pounds) to produce and deliver for sale an increasing percentage of ZEVs over time and 100 percent ZEVs by 2035. ACC II also establishes increasingly more stringent exhaust and evaporative emission standards for light- and medium-duty ICE vehicles. To date, California, Massachusetts, New York, Oregon, Vermont, Virginia, and Washington have adopted ACC II. These seven states represent over 20 percent of the LDV market.15 Six more jurisdictions—Colorado, Delaware, the District of Columbia, Maryland, New Jersey, and Rhode Island—have announced their intentions to adopt ACC II. More are expected to follow given the anticipated climate, air quality, and economic benefits of the program.16 [EPA-HQ-OAR-2022-0829-0584, p. 5]

15 Recent modeling for select Section 177 states shows that adopting ACC II will result in even greater cumulative NOx and GHG emissions reductions than EPA’s proposed standards between 2025 and 2040. Across all of the states modeled, ACC II achieved 30 percent greater well-to-wheel CO2 equivalent reductions and 75 percent greater NOx reductions than EPA’s proposed standards. Some states modeled saw even greater reductions. In Connecticut and New Jersey, for example, ACC II would provide an incremental benefit of roughly two times more than EPA’s proposal. See Sonoma Technology, ACC II Program – EPA 2027 Proposal Comparison (June 8, 2013), [LINK TO NESCAUM WEBSITE WHEN POSTED].

16 National Automobile Dealers Association, NADA Data 2021 (2022), https://www.nada.org/media/4695/download?inline.

California's Advanced Clean Trucks (ACT) regulation requires manufacturers of Class 2b-8 on- road medium- and heavy-duty vehicles to sell increasing percentages of ZEVs. By model year 2035, 55 percent of sales of Class 2b-3 vehicle sales, 75 percent of class 4-8 vehicle sales, and 40 percent of Class 7-8 truck tractor sales must be ZEVs. In addition to California, seven states— Colorado, Massachusetts, New Jersey, New York, Oregon, Vermont, and Washington—have adopted the ACT regulation. These states have also adopted California's Heavy-Duty Low NOx and Phase II GHG regulations, which are designed to reduce emissions from new diesel fueled heavy-duty vehicles while the market transitions to ZEVs. Many more states are expected to follow. Like the ACC II regulation, state adoption of the ACT regulation creates economies of scale, lowers costs, promotes job creation, and provides the regulatory certainty needed to drive investment in ZEVs and infrastructure. [EPA-HQ-OAR-2022-0829-0584, p. 5]

C. Market-Enabling Complementary Policies

Many of the NESCAUM and OTC states have state-specific plans to reduce GHGs and air pollution from on-road transportation and have adopted a diverse set of market-enabling policies and programs designed to advance the market for light-, medium, and heavy-duty ZEVs. Examples include ZEV sales and purchase requirements as discussed above; ZEV and infrastructure purchase incentives; utility programs and investments in ZEV infrastructure; consumer and fleet outreach and education programs; innovative financing mechanisms; multi-family dwelling and workplace charging programs; and deployment of public charging in communities and along major travel corridors. Many states have established requirements or goals to transition state vehicles and transit fleets to ZEVs. In addition, most states have adopted clean energy or renewable portfolio standards, which require a share of power sold by their utilities to come from renewable sources. Some states have adopted 100 percent renewable energy goals. States recognize that transitioning to renewable energy sources will maximize emissions reductions from ZEVs over time. [EPA-HQ-OAR-2022-0829-0584, p. 7]

III. NESCAUM and OTC Comments on the NPRM

For the reasons carefully considered and articulated in the NPRM, and those discussed above, NESCAUM and the OTC strongly support EPA's exercise of its authority under CAA Section 202(a) to establish new and more stringent criteria pollutant and GHG emissions standards for MYs 2027 and later LDVs and Class 2b and 3 MDVs. As an initial matter, we agree with EPA's conclusion that the standards it proposes are technologically feasible and that the costs of compliance for manufacturers would be reasonable. The proposed standards would generate substantial reductions in emissions of GHGs, criteria pollutants, and air toxics, creating significant benefits for public health and welfare. We also agree that the proposal would result in reduced vehicle operating and maintenance costs for consumers. Moreover, the benefits of the regulation would far exceed its costs. EPA estimates the cumulative monetized benefits of the GHG and criteria pollutant standards through 2055, considering both upstream and downstream emissions, to be between $850 billion and $1.6 trillion (2020 $US) depending on the selected discount rate.23 [EPA-HQ-OAR-2022-0829-0584, pp. 7-8]

23 See EPA, Draft Regulatory Impact Analysis (DRIA), EPA-420-D-23-003 (Apr. 14, 2023), https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0360.

Considering the state of the U.S. and global LDV and MDV markets, NESCAUM and the OTC believe that GHG standards more stringent than EPA's proposal are technologically feasible. [EPA-HQ-OAR-2022-0829-0584, pp. 8-9]

Announcements by major manufacturers to transition their vehicles to ZEVs, agreements by large public and private fleets to purchase ZEVs, the deployment and rapid expansion of charging infrastructure networks across the country, an increasing number of states adopting the ACC II and ACT programs, and accelerating global momentum, all support the conclusion that the LDV and MDV markets are ready for rapid and widespread electrification. Alternative 1 in the NPRM is projected to result in an industry-wide average target of 72 g/mi of CO2 in MY 2032, representing a 61 percent reduction in projected fleet average GHG emissions target levels from the existing MY 2026 standards. NESCAUM and the OTC believe the standards described in Alternative 1 are technologically feasible. [EPA-HQ-OAR-2022-0829-0584, p. 9]

Organization: Office of Wyoming Governor Mark Gordon

Wyoming has a vested interest in the proposed rule. Wyoming stands to feel significant negative impacts from this rule, including: consumer costs, supply chain effects, our nation's energy security, highway funding shifts, electric vehicle (EV) charging infrastructure realities, rural population accessibility, and state vehicle fleets. It is important that the EPA not mandate that the personal vehicle and transportation market move to EVs through a rushed and backdoor emissions approach. Programs such as the Federal Highway Administration's National Electric Vehicle Infrastructure (NEVI) program illustrates how difficult a compulsory shift to EVs is to implement in rural states such as Wyoming. [EPA-HQ-OAR-2022-0829-0675, p. 1]

Organization: POET, LLC

EPA also assumes that, provided batteries are available, automakers will be able to manufacture BEVs in essentially unlimited quantities.83 EPA simply states that "vehicle assembly capacity" can "respond relatively quickly to the necessary investment commitments," because it is a "relatively well understood process."84 The situation, however, is far more complex. As the Trinity report explains, "MY 2024 is beginning which means there is at most three years of lead time remaining before automakers would be required to comply."85 EPA fails to justify its assumption of unlimited production capacity given that short lead time. EPA also fails to explain why it has assumed that vehicle redesign schedules for shifting from conventional vehicles to BEVs would be essentially identical to such schedules for conventional vehicles: [EPA-HQ-OAR-2022-0829-0609, p. 22]

83 Id. at 4.

84 Id. (quotations omitted).

85 Id. at 5.

Given the radical nature of the changes in chassis design, powertrain components, tooling, availability of components and supply chain issues, the need for new vehicle control strategies and components, and other challenges specific to electrification, it is far from clear that the existing redesign schedules are valid and likely that they need to be longer than the existing schedules.86 [EPA-HQ-OAR-2022-0829-0609, p. 22]

86 Id.

Uncertainty in BEV Penetration Rate

In its proposal, EPA forecasts almost 70% BEV penetration will occur in MY 2032 across the light duty categories (passenger car, crossover/SUV, and light truck), or over 10 million BEVs. In addition, this compliance pathway would require almost 40% BEV penetration in the medium-duty van and pickup truck categories. By comparison, EIA projects approximately 1.5 million BEVs in 2050, with only 1.2 million in 2032.2 Thus, EPA's projections of sales of approximately 11 million BEVs are almost nine times higher than those of EIA, the leading U.S. governmental source for independent energy statistics and analysis.3 [EPA-HQ-OAR-2022-0829-0609, p. 36]

2 Annual Energy Outlook (AEO) 2023 Reference Table 38, https://www.eia.gov/outlooks/aeo/tables_ref.php

3 Regarding BEV sales in EPA's analysis, EPA finds 15,834,010 total light duty vehicle sales in 2032 (Draft Regulatory Impact Analysis Table 4-18) multiplied by 70% BEV penetration (Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Fact Sheet, EPA-420-F-23-009 pg. 5).

1. The analysis U.S. EPA has performed to "demonstrate" the feasibility of a dramatic increase in BEV penetration into the light-duty vehicle fleet is based on a number of unreasonable and/or unsupported assumptions that cause the agency to substantially overstate the likely penetration rate and underestimate the cost of compliance with the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, p. 53]

Review of U.S. EPA's BEV Technology Assessment

In both the Proposed Rule and the Draft Regulatory Impact Analysis (DRIA), U.S. EPA projects that manufacturer compliance will require dramatic increases in the sale of new battery electric vehicles (BEVs). In the Fact Sheet1 accompanying the publication of the Proposed Rule, U.S. EPA states that compliance will require "…nearly 70 percent BEV penetration in MY 2032 across the combined light- duty passenger car, crossover/SUV, and pickup truck categories." This 70 percent BEV penetration value can be compared to the present (MY 2022) BEV penetration which is less than 5 percent and the 20 to 40 BEV percent rate in MY 2032 that U.S. EPA assumes will be achieved in the absence of the proposed rule even without accounting for the Proposed Rule (See DRIA Figures 4-2 and 4-3). [EPA-HQ-OAR-2022-0829-0609, pp. 53-54]

1 https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017626.pdf.

The first step in a review of the agency's BEV technology assessment needs to focus on the dramatic increase in BEV penetration forecast to occur even in the absence of the Proposed Rule. As noted above, U.S. EPA expects BEV penetration to increase by 4 to 10 times over the period of only ten years from MY 2022 to MY 2032 without the Proposed Rule. The agency also points out (DRIA Chapter 3.1.3.1) that worldwide demand for BEVs is expected to grow dramatically again in the absence of the Proposed Rule because of actions taken by other jurisdictions. However, despite the fact that a radical transformation of the auto industry and the vehicle battery industry will be required to achieve even these highly optimistic levels, U.S. EPA assumes that both BEV supply and demand in the U.S. can be accelerated by only the Proposed Rule to 2 to 3 times by MY 2032 relative to the aggressive growth already represented in the No

Action Case. Further, in its analyses of the Proposed Rule, U.S. EPA assumes that this high level of demand for BEVs will continue unchanged through MY 2055. A more reasonable assumption given U.S. EPA's apparent position that transformation of the new light- and medium-duty vehicle market to BEVs is inevitable would be to assume much slower growth in the near term along with a continuation in growth into the future. [EPA-HQ-OAR-2022-0829-0609, pp. 53-54]

U.S. EPA's overall forecast of BEV penetration into the vehicle fleet with and without the Proposed Rule can be seen in Figure 9-2 of the DRIA which is reproduced below. [See original attachment for Figure 9-2 BEV stock used in OMEGA effects calculations] As shown, even without the Proposed Rule, the fraction of BEVs in the overall light-duty vehicle fleet is projected, relative to 2027 levels, to double by 2032, triple by 2037, and reach four times by about 2050. In contrast, the agency assumes the Proposed Rule will force BEV penetration rates up by another 50% in 2032, almost double them in 2037, and more than double them by 2050. Although U.S. EPA purports that its analyses support these forecasts of incredible growth in BEV penetration, those analyses rest on a series of unreasonable, unsupported, and highly optimistic assumptions regarding BEVs as discussed below. As a result, the conclusions drawn by U.S. EPA regarding BEV penetration cannot be relied on. [EPA-HQ-OAR-2022-0829-0609, pp. 53-54]

In addition to making optimistic assumptions regarding the availability of batteries for BEVs, U.S. EPA has also assumed that even as early as MY 2027 there will be no limit to the number of BEVs that automakers can produce provided that batteries are available. More specifically, U.S. EPA states (DRIA Chapter 2.6.5) that: [EPA-HQ-OAR-2022-0829-0609, pp. 56-57]

…vehicle assembly capacity is a relatively well understood process that can respond relatively quickly to the necessary investment commitments. Given the existing activities among automakers in this area, and the relatively long lead time before MY 2027 when the proposed rule would begin, EPA did not specifically impose a limit on vehicle assembly capacity. [EPA-HQ-OAR-2022-0829-0609, pp. 56-57]

The reference to the amount of lead time prior to MY 2027 is an example of the disingenuous nature of U.S. EPA's analysis. At present, MY 2024 is beginning which means there is at most three years of lead time remaining before automakers would be required to comply with the new regulatory requirements. Another issue with the U.S. EPA analysis is that while it does purport to account for vehicle redesign schedules (DIRA Chapter 2.6.4.1), it does so based on the unsupported assumption that schedules that have applied for the redesign of conventional vehicles also apply to the transformation of a conventional vehicle platform to a BEV platform. Given the radical nature of the changes in chassis design, powertrain components, tooling, availability of components and supply chain issues, the need for new vehicle control strategies and components, and other challenges specific to electrification, it is far from clear that the existing redesign schedules are valid and likely that they need to be longer than the existing schedules. [EPA-HQ-OAR-2022-0829-0609, pp. 56-57]

Overall, U.S. EPA's analysis fails to provide convincing support for the agency's position that it is technically feasible and reasonable to expect BEV penetration to increase by 14 times current levels (e.g. ~5% to ~70%) in the space of only ten years given the complete transformation that the auto industry. U.S. EPA has failed to demonstrate that there will be a sufficient supply of batteries and then relied on the unsupported assumption that battery supply is the only factor limiting the number of BEVs that can be produced even over a very short period of time. [EPA-HQ-OAR-2022-0829-0609, p. 57]

In summary, U.S. EPA's conclusions regarding the technical feasibility and costs of achieving the BEV penetration rates associated with compliance with the Proposed rest on a set of unreasonable and unsupported assumptions. These assumptions include: [EPA-HQ-OAR-2022-0829-0609, p. 61]

1. The auto industry can switch from making primarily conventional vehicles to making primarily BEVs in under ten years; [EPA-HQ-OAR-2022-0829-0609, p. 61]

2. Sufficient quantities of batteries for BEVs will be available to automakers at costs that will drop by 50% or more from current levels within a few years despite the fact that plants needed to produce those batteries largely have not yet been built; [EPA-HQ-OAR-2022-0829-0609, p. 61]

3. Costs of BEV componentry will drop by approximately 40% in under ten years; [EPA-HQ-OAR-2022-0829-0609, p. 61]

4. Automakers will not incur significant costs associated with redesigning conventional vehicles to BEVs and in reconfiguring manufacturing facilities to produce BEVs [EPA-HQ-OAR-2022-0829-0609, p. 61]

5. Large federal purchase incentives will be available to all consumers who wish to purchase BEVs; [EPA-HQ-OAR-2022-0829-0609, p. 61]

6. Likely higher insurance costs and lower resale values for BEVs will not deter consumers from purchasing BEVs; [EPA-HQ-OAR-2022-0829-0609, p. 61]

7. Despite the fact that the Proposed Rule is forecast to double the number of BEVs in operation in the U.S. by 2055 relative to the no action case, only minimal increases in BEV infrastructure will be required to support that larger population of BEVs; and [EPA-HQ-OAR-2022-0829-0609, p. 61]

8. Consumers will prefer to purchase BEVs rather than conventional vehicles; [EPA-HQ-OAR-2022-0829-0609, p. 61]

These assumptions appear to be designed to allow the agency to reach the conclusion that the large reductions in GHG emissions required for compliance with the Proposed Rule can be easily achieved through dramatic growth in BEV penetration that will save automakers and consumers considerable amounts of money. However, they also raise the question of "if the transformation of the auto industry from conventional vehicles to BEVs is both inevitable due2 to consumer demand and will save the auto industry and consumers billions of dollars, then why is the Proposed Rule necessary? A directly related question given that the period of benefit analysis of the Proposed Rule spans the period from 2027 to 2055 is why the standards proposed by U.S. EPA which increase in stringency over the period from the MY 2027 to MY 2032 are so aggressive. If the effective date of the most-stringent standard were pushed back from MY 2032 to MY 2037, that would still provide for 18 years of full benefit compared to 23 years (80%) [EPA-HQ-OAR-2022-0829-0609, p. 61]

Organization: Porsche Cars North America (PCNA)

EPA's proposal reflects a historic level of ambition for low-carbon, low-emission mobility. [EPA-HQ-OAR-2022-0829-0637, p. 2]

EPA has proposed ambitious targets within this NPRM for the accelerated decarbonization of the light- and medium- duty vehicle segments, in addition to incremental reductions in criteria pollutants from remaining combustion models. This proposal represents one of the most stringent and technologically demanding regulatory frameworks in the history of US automotive emissions regulations. EPA projects that to achieve these requirements, consumer adoption of electric vehicles must quadruple over the next 3-4 model years from current rates of approximately 8% to nearly one-third of new vehicle sales by 2027. Over the next six model years, this growth must double again, with electric vehicles comprising of over two-thirds of annual new vehicle sales by 2032. The extent of this proposal reflects the urgency and magnitude in carbon reductions being sought by EPA to address potential impacts of climate change. [EPA-HQ-OAR-2022-0829-0637, p. 2]

EPA's proposal also reflects the historic and transformative investments being made across the auto industry by OEMs like Porsche into electromobility. As noted in the comments from AFAI, the auto industry is projected to invest over $1.2 trillion in the development and production of electric vehicles by 2030. As AFAI outlines, this investment and commitment must be matched by an equal level of effort from segments outside of the auto industry for the range of electrification goals within this proposal to have a chance at being successfully achieved. Many other sectors will play an increasingly important role in enabling the electric vehicle transition. Utilities, charging infrastructure providers, and raw material suppliers will need to execute their own transformative plans at unprecedented speed. Sustained, supportive public policy will be critical in forming a robust foundation across many sectors that need to scale up growth and capacity. [EPA-HQ-OAR-2022-0829-0637, p. 2]

Comments specific to the proposed Light-Duty Vehicle and Light-Duty Truck Greenhouse Gas Standards for MY2027 and Later [EPA-HQ-OAR-2022-0829-0637, p. 18]

As noted in the opening section of these comments, Porsche views EPA's proposed GHG standards for MY2027-2032 as a highly ambitious package of increasing annual stringency combined with overall reductions in program flexibilities. In total this proposal presents a highly challenging set of standards for the industry that will demand an unprecedented rate of electrified vehicle development, production, and consumer adoption. This proposal appears to exceed what may be achievable for the light-duty industry as a whole across all vehicle segments, price points, and utility. [EPA-HQ-OAR-2022-0829-0637, p. 18]

In less than 10 years, EPA projects that 2 out of 3 new vehicles sold to American individuals, families and businesses will need to be fully electric. The importance of this statement cannot be underestimated as vehicle purchases remain one of the most, if not the most, expensive purchase that a consumer will ever make in their lifetime. In 10 years, two out of three customers must view electrification as a completely superior mobility choice that outshines any competitive combustion vehicle in the class in which that customer is shopping. EPA's regulations create no binding obligation on consumer adoption or on matching policy requirements of other sectors who will contribute to the success of electrification. Customers cannot broadly be expected to adopt technologies that are inconvenient, difficult to live with, or ultimately more expensive to own and operate. Auto manufacturers like Porsche are investing unprecedented levels of funding to provide exciting, electrified vehicle products to meet the needs of our customers. However, manufacturers will in part be reliant on the action of other sectors to help reduce the cost of electrification and to ensure that once a consumer purchases an EV that they are supported with a reliable, convenient, and affordable charging ecosystem. [EPA-HQ-OAR-2022-0829-0637, p. 18]

EPA has described throughout the NPRM and its supporting materials, that the agency believes these standards to be achievable based upon assumptions that outline ambitious improvements in electrification costs and supply chain readiness and in the rapid deployment of affordable, accessible nationwide charging infrastructure. These assumptions are being used by EPA to justify legally binding, regulatory compliance obligations on the auto industry. Obligations that rely significantly on the successful execution of policy and development by sectors outside of the auto industry's control. Shortfalls in any number of these underlying assumptions could have direct influence on future electrified vehicle costs and readiness which in turn would negatively impact consumer adoption and future compliance. Given the extent to which the standards are premised on high levels of electrification, it is unlikely that non-electrified technologies could be deployed to make up a significant compliance shortfall should EVs fail to achieve the levels of adoption assumed by EPA. [EPA-HQ-OAR-2022-0829-0637, p. 18]

Porsche recognizes the urgency underlying t'e magnitude of EPA's proposal to'address the agency's concerns related to the effects of climate change. Porsche, like many other manufacturers, has established holistic decarbonization goals throughout our products and business operations. Porsche supports the goal of increasing the level of electrification within the light duty car park and views electrification as a key enabler for achieving climate and energy security benefits. Nevertheless, the rate of transformation inherent within regional regulations must ultimately be achievable within the boundary conditions of each market. [EPA-HQ-OAR-2022-0829-0637, p. 18]

Organization: Renewable Fuels Association (RFA)

I. Executive Summary

EPA's proposed tailpipe emissions standards for 2027 and later years set extremely aggressive goals for reducing vehicular greenhouse gas (GHG) and criteria pollutant emissions. Achieving these goals would require dramatic changes not only in vehicle design, but also in the entire transportation energy supply chain. In addition, meeting the proposed emissions standards in the manner envisioned by EPA would require a massive and rapid shift in the vehicle purchasing and refueling behavior of American consumers. Indeed, if the rule is finalized as proposed, EPA projects that electric vehicles (EVs) "could account for 67% of new light-duty vehicle sales and 46% of new medium-duty vehicle sales in MY 2032."1 By comparison, EVs accounted for just 5.8% of new light-duty vehicle sales in 2022 and accounted for just 1% of total registered light-duty vehicles.2 [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

1 U.S. Environmental Protection Agency. "Biden-Harris Administration Proposed Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future." April 12, 2023. https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and.

2 Kelly Blue Book. “America Splits Into Thirds on Electric Cars.” (March 22, 2023). https://www.kbb.com/car- news/america-splits-into-thirds-on-electric-cars/.

While EVs are likely to play an important role in achieving emissions reductions goals, the growth in EVs projected by EPA would require enormous investment and rapid expansion in many global industrial sectors. Such a transition would require immediate and dramatic growth in the mining and processing of critical minerals, a massive increase in the generation and distribution of lower-carbon electricity, and the rapid buildout of a nationwide infrastructure network for recharging EVs. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

It would be naïve and unrealistic to believe that such extraordinary changes in the marketplace can be achieved smoothly and quickly. There are numerous obstacles involved in a transition of this scale, including geopolitical and national security concerns; long lead times in permitting, material supply, design, and manufacturing; substantial capital investments; safety considerations; and unprecedented changes in consumer behavior and purchasing habits. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

Organization: Rivian Automotive, LLC

Alternative 1 is Feasible

We find that EPA’s compliance modeling and other evidence demonstrates the feasibility of this target. The agency modeled average vehicle certification values in a scenario compliant with Alternative 1. In this scenario, it appears that ICE vehicles in MY32 average approximately 230 g/mi (see Figure 2 below). (Unless otherwise specified, all emissions rates quoted in this section refer to 2-cycle test values.) Several automakers already perform at a similar standard. For example, in MY21 Mitsubishi reported average emissions of 218 g/mi while Subaru reported 238 g/mi.9 Neither manufacturer made significant use of electrification technologies in that MY.10 [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

9 U.S. Environmental Protection Agency, The 2022 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975 (December 2022), 85.

10 Id. at 88.

See original attachment for: Figure 2. Outputs from EPA’s modeling show an Alternative 1 compliance scenario in which the remaining ICE vehicles emit approximately 230 g/mi on average in MY32 (the chart’s legend somewhat obscures the blue ICE line). [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

Going forward, evidence suggests that automakers could improve fleet average ICE emissions commensurate with the targets of Alternative 1—and perhaps achieve even deeper reductions. For example, the International Council on Clean Transportation (“ICCT”) projects that the gasoline vehicle fleet can achieve average emissions of 168 g/mi by 2030, well below the ICE-only performance modeled in the Alternative 1 scenario.11 This would allow industry to comply with fewer BEV sales than EPA currently projects—or to achieve an even more stringent fleet average target by MY32. Certainly, several non- electrification emissions reduction technologies are still far from full or even majority utilization across the current fleet.12 [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

11 Stephanie Searle and Josh Miller, The International Council on Clean Transportation, “To Put the United States on Track to Reach 50% Electric Vehicle Sales in 2030, Cut the Greenhouse Gas Target in Half,” September 7, 2022, available at www.theicct.org/us-ghg-standards-ev-sales-sep22/.

12 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 3-1 – 3-6.

Large credit banks also continue to characterize the program, indicating that some degree of emissions reduction “slack” exists in the industry. Manufacturers ended MY21 with 131 Tg of GHG credit. Of that total, 24 Tg do not expire until MY25. Another 33 Tg will remain in banks until MY26.13 [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

13 U.S. Environmental Protection Agency, The 2022 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975 (December 2022), 123-124.

Booming EV sales in the coming years could further strengthen industry’s compliance position entering the MY27+ program. When EPA finalized GHG standards for MY23 and beyond in 2021, it projected that automakers could meet the requirements with EV sales of approximately 17 percent in MY26.14 To the extent that manufacturers exceed that figure by MY26—and with EV sales already at approximately 8 percent in MY22, the treId is positive—the industry might enter the new regulatory window in MY27 well positioned to comply with more stringent targets.15 [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

14 Inclusive of PHEVs, per U.S. Environmental Protection Agency, Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards: Regulatory Update (December 2021).

15 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 3-5; Alliance for Automotive Innovation, Get Connected: Electric Vehicle Quarterly Report (June 26, 2023), available at www.autosinnovate.org/posts/papers-reports/get-connected-2023-q1.

Organization: RV Industry Association (RVIA)

RVIA strongly opposes EPA’s overreaching proposed rule for the reasons discussed below and requests the agency exclude motor homes from having to comply with the proposed medium- duty vehicle standards. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

In contradiction to this NPRM, the EPA has already proposed, in the Phase 3 GHG rule (see 88 FR 25996), to establish standards for motor homes that correctly acknowledge the reality that motor homes are not well-suited for electrification. Under the proposed Phase 3 GHG rules, the EPA would establish a CO2 standard of 226 g/mi for MY2027 and later motor homes. As discussed in the Phase 3 GHG NPRM, the agency has proposed this standard given the negative implications of electrifying the motor home chassis. To power a motor home, the batteries would take up space that is otherwise necessary for housing the various elements of a motor home. It would also add significant amounts of weight to the motor home making it no longer capable of being equipped with the components typically found in a motor home. It makes no difference whether a motor home falls under the MD/HD Phase 3 GHG rules or the LD/MD rules, the issues are the same. Standards which can only be met by battery-powered vehicles are not practicable for motor homes. EPA staff who authored the Phase 3 GHG rule have acknowledged this. In establishing standards for medium-duty vehicles within this rule, staff need to be consistent and exclude motor homes from standards that would force them to be electrified. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Motor homes are often operated in locations where there is no electricity. This is known as "boondocking." Frequently, motor homes will be operated for weeks at a time at such locations. When motor homes are operated in a boondocking scenario, there is no possibility of EV charging. Electrification simply does not work for this operating use case. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Unlike medium-duty vehicles that might be conveniently recharged overnight, motor homes are routinely driven 500 miles or more a day making it necessary to fully recharge mid-trip. A multi- hour charging event is simply not something the typical motor home driver would find acceptable. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Motor homes are typically a discretionary purchase by families who tend to be very cost sensitive. Large increases in price for a vehicle that is operated on average only 20 days per year and that travels on average only 4,000 miles will not be viewed favorably by potential buyers. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

The ability to recoup higher vehicle costs through refueling savings is minimal given motor homes are driven sparingly by their owners. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

If finalized, EPA's rule will severely limit the use and affordability of motor homes. As a result, it will severely hurt motor home manufacturers, dealers, their employees and their families. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Regarding the certification of medium-duty motor homes powered by internal combustion engines, as well as vehicles used to tow RVs, RVIA supports the concerns raised by the Alliance for Automotive Innovation in its comment letter. Such concerns include: [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA's proposed rule is neither reasonable nor achievable in the timeframe provided. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA's proposed rule is a de facto battery electric vehicle mandate. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA outstrips Biden administration's own 50 percent light-duty electrification executive order from 2021. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA underestimates battery costs and makes unrealistic battery electric vehicle (BEV) sales assumptions. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA makes no concurrent requirements to support the infrastructure and battery critical minerals for the required EVs or the drivers that must buy them. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Organization: Scott Wilson

By now, you will have read in public comments that this proposed regulation will transform the way people have lived, worked, and played for over 100 years" (Alliance for Automotive Innovation) and "If finalized as proposed, the proposals would have a very significant impact on all segments of the fuels and vehicle industries and the entire U.S. economy" (American Petroleum Institute). While these statements are hyperbolic, the rule will indeed lead to significant changes to our vehicle fleet, spread over many years. That's the whole point. We've just begun taking the first few steps needed to eventually bring the Gasoline Age to an end. We have a long way to travel on this road. But, it's clear that the best way to achieve the emission targets, which even the Texas Public Policy Foundation acknowledges are under EPA's authority, is to take the combustion out of vehicles. [EPA-HQ-OAR-2022-0829-0515, p. 1]

The automaker's position (Alliance for Automotive Innovation) is that the proposed rule is overly-ambitious and that it requires "stepped-up efforts at the state and local level when it comes to building codes, permitting, and approval from public utility commissions". That is true, and is an ongoing effort, however, we cannot wait until the entire EV ecosystem is in place before ramping up vehicle production. Vehicles and their supporting social and physical infrastructure must develop together, hand-in-hand, just like the fuel, repair, and dealer systems did for gasoline vehicles. We would do well to learn from societies that are successfully transitioning to EVs, like Norway, and the EU more broadly. [EPA-HQ-OAR-2022-0829-0515, p. 1]

Organization: Sierra Club et al.

A strong LDV rule is technologically feasible and achievable because we are seeing dramatic cost and performance improvements in zero emission electric vehicle technology. This is bolstered by the availability of significant federal financial incentives, and affirmed by existing automaker commitments to deploy ZEV technologies and the adoption of state clean car standards across the country. A strong emissions standard can position the United States as a leader in ZEV technology development and manufacturing and create high-quality jobs. [EPA-HQ-OAR-2022-0829-0668, p. 2]

Organization: Stellantis

Electrification Rates Misaligned to Market and Exceed Commitments

Stellantis fully supports comments submitted through The Alliance for Automotive Innovation (AAI or the Auto Innovators) detailing the challenges associated with EPA's overly optimistic expectation for EV market growth. Stellantis remains steadfast to delivering on our commitments to achieve an electrified future, and we acknowledge EPA's efforts with this rulemaking to help support this difficult yet critical transition. However, the proposed rule significantly underestimates the actions needed to build the targeted EV market. Addressing concerns such as manufacturing capacity, battery production, charging infrastructure, and consumer acceptance of EVs will be paramount to the success of this ambitious proposed regulation. [EPA-HQ-OAR-2022-0829-0678, pp. 2-3]

- The Inflation Reduction Act (IRA) committed significant funds to incentivize the purchase of EVs [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

– however these incentives come with criteria that exclude many EV models today, and pending guidance from the IRS likely could exclude more in the future. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

- The IRA also provides an incentive to produce the needed batteries helping to offset their cost – however this only applies to the U.S., ignoring the global supply chain needed to support a 40- 50% U.S. EV market. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

Despite these major gaps, the EPA in its proposed rule incorrectly assumes these policy actions represent a complete answer to achieve a 40-50% market. EPA's proposed rule extends even further by assuming a "perfect" transition to a battery electric vehicle (BEV) only market at 60% in 2030MY – exceeding the commitment made to President Biden, the Administration's National Blueprint for Transport Decarbonization, and the Stellantis Dare Forward commitment. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

These EV penetrations are greater than those of the most mature and forward leaning EV markets in the U.S. Figure 1 below summarizes the electrification rates projected by the EPA proposed rule against the penetration rates required in California's ZEV mandate as part of their recent Advanced Clean Cars II (ACC II) program. California, the most mature EV market in the U.S., will require at least 34% BEVs in 2027, increasing to 54% in 2030, and reaching 66% in 2032. EPA's proposed rule exceeds these California rates in every year from 2027-2032 and by as much as 6% in 2030. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

SEE ORIGINAL COMMENT FOR TABLE Industry Average Electrification Rates Figure 1- EV Requirements of EPA NPRM vs. CARB ZEV Mandate and Biden Executive Order [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

EPA projects BEV rates that exceed Biden EO and the penetration of California's ZEV mandate [EPA-HQ-OAR-2022-0829-0678, p. 4]

Overly optimistic EV penetration assumptions are especially evident in the high-capability pickup segment as shown in Figure 2 below. EPA projects a 60% BEV penetration of pickup trucks by 2032MY, completely ignoring the market benefit of plug-in hybrid electric vehicle (PHEV), while assuming an "ideal" transition to BEVs despite the technology challenges to maintain range while providing the towing and hauling capabilities of today's ICE trucks. [EPA-HQ-OAR-2022-0829-0678, p. 4]

SEE ORIGINAL COMMENT FOR NPRM Share of Light-Duty Pickups that are BEV* Figure 2- Pickup truck BEV penetration of the proposed rule [EPA-HQ-OAR-2022-0829-0678, p. 4]

Stellantis supports Auto Innovators' comments recommending that EPA take a less optimistic approach in applying IRA incentives incorporating a more realistic price influence on future EV market projections. [EPA-HQ-OAR-2022-0829-0678, pp. 5-6]

This incredibly aggressive assumption for BEV adoption is faster than any new automotive technology to date, even exceeding the adoption rate targeted by California (the most mature EV market in the U.S.). This adoption rate far exceeds what is supported by the policy actions in place and adds significant risk to the automotive industry who must comply with these standards whether these assumptions hold true or not. [EPA-HQ-OAR-2022-0829-0678, pp. 5-6]

12 Stellantis supports the concerns the Auto Innovators raise that the NPRM mandates a very aggressive ramp-up in BEV sales and forces new technology at unprecedented levels in an expedited timeframe such that it may go beyond what is technically feasible, contrary to

section 202 of the Clean Air Act (CAA).4 The stringency of the proposed standards for greenhouse gas (GHG) emissions and criteria pollutants, as well as its restrictions on credit programs and other flexibilities, all would force automakers to convert to BEV fleets on a massive scale. In short, there is concern that the NPRM is seeking a transformative shift to electrification beyond what is feasible for the industry or market to bear – and beyond what Congress has provided. [EPA-HQ-OAR-20-0829-0678, p. 6]

4 42 U.S.C. §7521.

Stellantis also supports the Auto Innovators' concerns raised regarding the proposed rule's reliance on the BIL and the IRA to support the Agency's feasibility determination. In particular, EPA's reliance on these statutes as proposed to support projected BEV infrastructure, battery production and consumer demand, may be speculative and therefore call into question EPA's feasibility determination. [EPA-HQ-OAR-2022-0829-0678, p. 6]Criteria Emissions Requirements are Infeasible & Distract from Electrification

Separate from the proposed GHG standards, EPA is proposing dramatic criteria emission reductions. Left unchanged, these reductions will force OEMs to divert engineering and financial resources from our march to electrification and refocus those resources on improvements to our shrinking ICE fleet. The rationale for these proposed actions now is difficult to fathom. EV technology greatly reduces or eliminates criteria emissions – and Stellantis has committed to 50% EV technology by 2030. EPA actions exceed aggressive CARB ACCII LEV IV requirements that could provide a large benefit over EPA's existing criteria standards (e.g., CARB PM standards are a 10-fold improvement over current EPA standards) while still maintaining an EV-focused plan. Below are the most critical changes EPA is proposing. [EPA-HQ-OAR-2022-0829-0678, p. 15]

EPA should maintain previously defined EV Multipliers

EPA is proposing to end advanced technology (BEV, FCEV, and PHEV) multipliers for medium-duty vehicles in 2027MY, one year earlier than scheduled. The agency also seeks comment on reducing the magnitude of the multipliers for 2025-26MY. Aligned with Auto Innovators, Stellantis does not believe the advanced technology credit multipliers should be adjusted or reduced in the 2025-27MY timeframe. The Phase 2 rule was finalized in 2016, and [redacted text.] We believe the proposal to change or end advanced technology multipliers in the 2025-27MY does not provide sufficient lead time as required by the Clean Air Act. [EPA-HQ-OAR-2022-0829-0678, p. 22]

Recommendations and Conclusion

The standards proposed in the 2027-2032MY Multi-pollutant NPRM represent a focus on electrification of the automotive market that directionally Stellantis supports. However, the rate at which EPA has projected this transition far exceeds the ambitious targets the Biden administration and industry jointly agreed to, and even exceeds penetrations of the most mature EV markets in the U.S. The EPA bases these EV penetrations on an overly optimistic outcome of policy actions that represent only a fraction of what is needed to support a mature EV market. EPA compounds these errors by removing compliance flexibilities that have successfully incentivized proliferation of GHG saving technologies throughout the fleet. [EPA-HQ-OAR-2022-0829-0678, pp. 23-24]

Organization: Tesla, Inc.

Given the acceleration of public health and welfare impacts associated with climate change, it is incumbent upon the EPA to recognize the crucial role battery electric vehicle (BEV) technology plays today and how widespread commercial availability of BEVs in the U.S. today should inform the implementation of a more stringent finalized standard as part of this rulemaking. In designing new standards that increasingly depend upon achieving reductions of tailpipe conventional criteria pollutant emissions and ever-enhanced efficiency to reduce greenhouse gas emissions, it is fully appropriate for the agency to recognize that while the industry may be nearing the limits of incumbent internal comb–tion technologies -- or those additional gains may occur at ever greater costs per gram of –llutant reduction -- alternative technologies are increasingly available with competitive cost and performance capabilities. [EPA-HQ-OAR-2022-0829-0792, p. 1]

As provided below, the rapid pace of light-duty vehicle electrification strongly supports efforts to address the significant public health and community impacts of air pollution associated with the current light-duty vehicle fleet. This transformative technology has been amply demonstrated, is being rapidly deployed, and has significantly decreasing competitive costs. Tesla believes it is essential for EPA to establish stringent longer-term light-duty multi-pollutant emission standards that actively embrace a more rapid transition to BEVs. Such standards are well within EPA’s long-standing and well- established authority and are compelled by the record before the agency. Accordingly, Tesla encourages the agency to finalize multi-pollutant light-duty standards that are more stringent than the preferred proposed emission reduction standards. [EPA-HQ-OAR-2022-0829-0792, p. 1]

A number of studies show that the light-duty sector must rapidly decarbonize beginning this decade to meet the U.S. commitments. Further, the need for the rapid deployment of light-duty BEVs is even more critical given the lengthening time it takes to turn over the light-duty fleet. Currently, the average age of light-duty vehicles on the road in the U.S. is now at an all-time high of 12.5 years compared to two decades ago when the average age was 9.7 years.58 To meet the goal of limiting global warming for below 1.5 degrees C the passenger fleet must primarily be composed of BEVs by 2050.59 Given the aging vehicle fleet, this requires vehicles sales consisting of 100% BEVs in the early 2030s.60 Other studies have similarly highlighted BEV sales need to reach 95% by 2035 to meet the 1.5 degree C target.61 Still others have found that in order to meet net-zero emission by 2050 60% of vehicle sales must be BEVs in 2030 with no new ICE vehicle sales occurring after 2035.62 [EPA-HQ-OAR-2022-0829-0792, p. 9]

58 Axios, ’as-powered cars won't die off any time soon (May 15, 2023) available at h ttps://www.axios.com/2023/05/15/ev- e lectric-vehicles-gas-trucks-suvs-cars-a ging?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top .

59 Dimanchev, et al. T he 4Ds of Energy Transition: Decarbonization, Decentralization, Decreasing Use and Digitalization, E lectric Vehicle Adoption Dynamics on the Road to Deep Decarbonization (July 15, 2022) (highlighting that published pathways indicate that the passenger vehicle fleet must be primarily comprised of zero-emission vehicles by 2050, in a future consistent with keeping global warming below 2 or 1.5 °C. With the average lifetime of internal combustion cars in the U.S. is 16 years, achieving a ZEV share consistent with 1.5°C pathways would require a combination of a relatively early ban by around 2030 and an average non-ZEV lifetime shorter than 10 years.) available at h ttps://onlinelibrary.wiley.com/doi/10.1002/9783527831425.ch8 (last visited Sept 12, 2022).

60 Id.

61 Bloomberg New Energy Finance, Net-Zero Road Transport By 2050 Still Possible, As Electric Vehicles Set To Quintuple By 2025 (June 1, 2022) (finding that be on n track for a net-zero global fleet by 2050, zero-emission vehicles need to represent 61% of global new passenger vehicle sales by 2030, 93% by 2035, and the last ICE vehicle of any segment needs to be sold by 2038.) available at h ttps://about.bnef.com/blog/net-zero-road-transport-by-2050-still-possible-as-electric-vehicles-set- t o-quintuple-by-2 025/?utm_source=Email&utm_campaign=596500&utm_medium=Newsletter&utm_content=BNEFMonthInReviewJune&t a ctic=596500&pchash=

62 International Energy Agency (IEA), World Energy Outlook 2022, An updated roadmap to Net Zero Emissions by 2050, How do we get to net zero emissions by 2050? (Oct. 27, 2022) available at h ttps://www.iea.org/reports/world-energy-outlook- 2 022/an-updated-roadmap-to-net-zero-emissions-by-2050#abstract; See generally, ICCT, Emissions reduction benefits of a faster, global transition to zero-emission vehicles (March 2022) available at h ttps://theicct.org/wp-c ontent/uploads/2022/03/Accelerated-ZEV-transition-wp-f inal.pdf?utm_source=ICCT+mailing+list&utm_campaign=01b4a8f70d-l ately_from_feb2018_COPY_01&utm_medium=email&utm_term=0_ef73e76009-01b4a8f70d-510835924

In general, EPA appropriately recognizes the acceleration of electrification technology being developed and deployed throughout the auto industry.75 Indeed, the agency points toward the numerous manufacturer statements announcing BEV production goals that encompass the timeframe of the proposed standard. These announcements have continued to expand during the process of this rulemaking with Toyota, Hyundai, JLR, and Subaru, among others, announcing new commitments on BEVs.76 Correctly, EPA utilizes these public commitments in its analysis of the industry, and they reflect manufacturers' ability to meet stringent multi- pollutant emissions standards.77 [EPA-HQ-OAR-2022-0829-0792, pp. 11-12]

75 See generally, 88 Fed. Reg. at 29187-29195.

76 See e.g., Toyota, Toyota Unveils New Technology That Will Change the Future of Cars (June 13, 2023) available at h ttps://global.toyota/en/newsroom/corporate/39288520.html?utm_source=newsletter&utm_medIum=email&utm_campa i gn=newsletter_axiosgenerate&stream=top; Reuters, H yundai Motor Group to invest $18 bln in South Korean EV industry b y 2030 (Apr. 11, 2023) (expanding annual EV production in Korea to 1.51 million units and global volume to 3.64 million units by 2030 available at h ttps://www.reuters.com/business/947loomberansportation/hyundai-motor-groIp-invest-18-bln-ev- i ndustry-skorea-by-2030-2023-04-11/; Reuters, J aguar Land Rover boosts investment to catch up in EV race (Apr. 20, 2023) (Investing $19 billion over the next five years in BEVs) available at h ttps://www.reuters.com/business/autos-t ransportation/jaguar-land-rover-plans-invest-15-bln-pounds-electric-push-2023-04-1 9/?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top; Electrek, S ubaru suddenly breaks electric following tripled annual profits, promises 4 crossover EVs in US (May 11, 2023) available at h ttps://e947loombk.co/2023/05/11/subaru-electric-tripled-annual-profits-promises-4-crossover-ev-us/

77 See generally, BNEF, Zero Emission Vehicle Factbook: A BloombergNEF Special Report for COP 27 (Nov. 2022) (finding automakers have collectively committed to sell around 43 million EVs per year by 2030, and automakers with planned phase-outs of combustion engines now account for 30% of the global auto market.) available at h ttps://assets.bbhub.io/professional/sites/24/2022-COP27-ZEV-T ransition_Factbook.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream =top. It should be note that even this figure from less than a year ago is already outdated.

Nonetheless, EPA's proposed standards are set at a level less stringent than the depth and pace of electrification technology deployment that has already occurred and will be accelerated through market forces and numerous other state and federal policies. BEV deployment, like other technologies, will follow a S curve leading to a much more rapid pace of adoption between now and when the proposed regulations take hold. Indeed, many manufacturers have rapidly placed innovative technology across major portions of their new vehicle offerings in only a few model years.78 BEV technology will continue to follow similar paths, and deployment has already been shown to outperform the traditional S curve.79 [EPA-HQ-OAR-2022-0829-0792, p. 12]

78 See e.g., Hula, et al, Analysis of Technology Adoption Rates in New Vehicles, SAE International (April 1, 2014) available at h ttps://www.epa.gov/sites/default/files/2016-10/documents/2014-01-0781_0.pdf

79 Ark Investment, Electric Vehicles Are Outperforming the Traditional S-Curve Dynamics (July 2, 2019) available at h ttps://ark-invest.com/articles/analyst-research/ev-growth-outperforming-the-traditional-s-curve-dynamics/

As EPA recognizes, “zero and near-zero emission technologies are more feasible and cost-effective now than at the time of prior rulemakings.”87. To address this Tesla has been a leader in reducing the costs of high- performance BEVs. A Tesla Model 3’s starting price is $40,240 and, inclusive of individual qualification with the current U.S. 30D tax credit, can reach an equivalent price of $32,740.88 As recently reported, the Model 3 sells for now sells for $4,930 less than the average new vehicle sold in the U.S.89 Tesla has further outlined a pathway to reducing the production cost of its next generation vehicle by 50%.90 As evidenced by the popularity of its Model Y and Model 3 vehicles, Tesla has also demonstrated that increases in production volumes can reduce BEV costs to levels favoring them in the marketplace and facilitating broad consumer acceptance.91 [EPA-HQ-OAR-2022-0829-0792, p. 13]

87 88 Fed. Reg. at 29188.

88 Tesla, Model 3 available at h ttps://www.tesla.com/model3

89 Bloomberg, Tesla Undercuts Average US Car by Almost $5,000 in EV Shakeout (Feb. 21, 2023) available at h ttps://www.bloomberg.com/news/articles/2023-02-21/tesla-undercuts-average-us-car-by-almost-5-000-in-ev- s hakeout#xj4y7vzkg

90 Tesla, 2023 Investor Day Presentation (March 1, 2023) at 31-73, 119-131, 158 available at h ttps://digitalassets.tesla.com/tesla-contents/image/upload/IR/Investor-Day-2023-Keynote; Tesla, Impact Report 2022 at 64.

91 88 Fed. Reg. at 29312; See also, Bloomberg, Tesla and BYD Post Record Sales on Surge in Electric-Car Demand (July 3, 2023) available at h ttps://www.bloomberg.com/news/articles/2023-07-02/tesla-sets-a-new-delivery-record-as-price-cuts- y ield-results

Furthermore, the time frames for which these standards are being now proposed and will be set are ones that are perfectly appropriate under the Act. As we have repeatedly noted in comments to the Agency, auto manufacturers have acknowledged that, “integrating technologies that improve fuel economy across multiple product lines requires several years of lead time and a substantial investment of capital and engineering resources.”141 Further, “once a vehicle redesign incorporating a new vehicle technology is planned, [i]t takes a significant amount of time to retool a factory and smoothly validate the tooling and processes to mass produce a replacement technology.”142 It is critical that the rules be set now, which will provide the regulatory certainty that companies need to make these investments. [EPA-HQ-OAR-2022-0829-0792, p. 23]

141 Brief of the Association of Global Automakers and the Alliance Of Automobile Manufacturers in Opposition, Coalition for Responsible Regulation v. EPA, No. 12-1253 (Sup, Ct,, July 22, 2013) at 4 available at h ttp://www.edf.org/sites/default/files/12-1253-Brief-in-Opposition-Auto-Manufacturers.pdf.

142 Id., at 5, quoting 75 Fed. Reg. 25324, 25468.

Consistent with this approach, EPA appropriately states “While standards promulgated pursuant to CAA section 202(a) are based on application of technology, the statute does not specify a particular technology or technologies that must be used to set such standards; rather, Congress has authorized and directed EPA to adapt its standards to emerging technologies.”146 Furthermore, as the agency recognizes, “This forward-looking regulatory approach keeps pace with real-world technological developments and comports with Congressional intent.”147 [EPA-HQ-OAR-2022-0829-0792, p. 23]

146 88 Fed. Reg. at 29187 (emphasis added).

147 Id., at 29232.

Lead Time and Rapid Deployment Mean Other Factors Are Not Barriers to More Stringent Standards

While Section 202(a) directs the agency to have the proposed emission standards take effect after such period found necessary to permit the development and application of the requisite technology, these considerations must take place under the same technology forcing context utilized in assessing the vehicle technology. Under this rubric, any assessment of BEV charging infrastructure adequacy should not, based upon the extensive record available to the agency, dampen the agency’s move forward with a more a stringent standard. First and foremost, all levels of light-duty BEV charging utilize proven and demonstrably effective technology that have been applied for years. Second, economics dictate that increased build out of charging infrastructure follows deployment of BEVs, as without adequate vehicles on the road investment in such infrastructure risks becoming a stranded asset. Third, new charging technologies and solutions will continue to develop.183 [EPA-HQ-OAR-2022-0829-0792, pp. 29-30]

183 See, S&P Global, EV Chargers: How many do we need? (Jan. 9, 2023) (discussing battery swapping, wireless charging, and increased deployment of DC wallbox solutions) available at h ttps://press.spglobal.com/2023-01-09-EV-Chargers-How-m any-do-we-need

Organization: Toyota Motor North America, Inc.

2. The annual stringency increases in the first three years of the proposed rule are extreme and outside historical norms. EPA has historically recognized that technology penetration is slower in early stages of market development and increases more rapidly over time. The proposed early ramp rates run directly contrary to this reality. We are also concerned that this extreme rate may have a paradoxical effect on CO_2 emissions – lowering the volume of older, higher polluting vehicles replaced because artificial shortages will be created of low- carbon non-BEV vehicles that many customers prefer. Automakers need time to invest in EV and battery production capacity, for the charging infrastructure to develop across the country, and for the market to mature. To reduce carbon dioxide emissions as much as possible, as soon as possible, customers need choices that encourage replacement of high-CO_2 emitting vehicles with low- or zero- CO_2 emitting vehicles. EPA should smooth the early rates of increase in recognition of these factors. [EPA-HQ-OAR-2022-0829-0620, p. 2]

1. Overview

When President Biden issued Executive Order 14037 in 2021 calling for 50% electrified vehicles (defined then as battery electrics (BEVs), plug-in hybrids (PHEVs) and fuel cell hybrid electrics (FCHVs), Toyota publicly committed to making every effort to achieve those targets. However, the Proposed Rule would force about 60% BEVs alone by 2030, and 67% by 2032. This significantly moves the goal line on electrification and is paramount to a BEV mandate on an incredibly aggressive timeline. Taken separately, the proposed GHG standards and the proposed tailpipe/criteria standards each attempts to steer the future toward a BEV-only vehicle market. Together they do that and impose significant costs on internal combustion engine (ICE) vehicles currently accounting for about 94% of the new vehicle market. Toyota shares the administration's goal to decarbonize transportation, but believes the Proposed Rule requires significant adjustments. [EPA-HQ-OAR-2022-0829-0620, p. 8]

Data show that a portfolio approach to electrification which includes the technologies above plus hybrid electrics (HEVs), provides the same or greater carbon reductions as an approach that focuses exclusively on BEVs. A portfolio approach utilizing scarce critical minerals in the most effective manner to remove more traditional ICE vehicles from the road more quickly. It also provides consumers with more carbon-reducing options that fit their lifestyles and purchasing power. [EPA-HQ-OAR-2022-0829-0620, p. 8]

The Proposed Rule also for the first time imposes standards on automakers for which compliance requires significant actions by third parties over which we (or EPA) have no control. First, achieving the level of BEVs required by the Proposed Rule will require massive new supplies of critical minerals, the mines to extract them, and the refining facilities to turn ore into battery-grade material. Currently, virtually the entire mineral and battery supply chain is outside the U.S. Second, it requires massive investments in home and public charging infrastructure, as well as upgrades to the electrical grid throughout the U.S. and an accelerated shift to renewable power generation. Various provisions of the IIJA and IRA directionally support some of these areas but fall significantly short of what will be needed for the expected level of electrification. And finally, the ultimate impact of these factors on vehicle costs and consumer demand are unclear, at best. The are few contingencies for automakers and our customers in the event any or all these factors stand in the way of complying with the Proposed Rule. Our comments below address these and other issues. [EPA-HQ-OAR-2022-0829-0620, pp. 8-9]

We are prepared to follow up with additional information beyond these comments. We look forward to collaborating toward a more workable Final Rule. [EPA-HQ-OAR-2022-0829-0620, pp. 8-9]

5. GHG Program

The Proposed Rule fails to demonstrate the penetration of BEVs assumed for compliance with the proposed standards is feasible. The proposal notes "While emission standards set by the EPA under CAA section 202(a)(1) generally do not mandate use of particular technologies, they are technology-based, as the levels chosen must be premised on a finding of technological feasibility."17 CAA section 202(a)(1) states "Any regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."18 [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

17 88 Fed. Reg at 29232.

18 42 U.S.C. § 7521(a)(2).

The aggressive ramp up of BEVs (see Table 1) required to comply forces a rapid transformation of how vehicles are manufactured, driven, fueled, and serviced. As such, “leadtime and requisite technology” must extend to the availability of critical minerals, the readiness of a sustainable battery supply chain and fueling infrastructure, as well as other market-related factors that will affect the price and consumer demand of BEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

[Table 1 Annual BEV Penetration Assume for Compliance w/ Proposed Standards

MY 2027: BEV Share 36

MY 2028: BEV Share 45

MY 2029: BEV Share 55

MY 2030: BEV Share 60

MY 2031: BEV Share 63

MY 2032: BEV Share 67]

[EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Today’s PEV support system clearly cannot meet the needs of the future envisioned by the proposal. Our comments explain why the proposal lacks a clear justification for how the support system will be in place over the period of the proposed standards. Neither EPA nor auto manufactures can control the timing or outcomes of these essential support measures. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Therefore, it is disappointing that EPA removed the e-RIN proposal from the RFS set rule as it is one of the few measures for which EPA has direct authority to provide at least some level of assistance in supporting the EV shares required in the GHG proposal. After a muti-year collaboration with the auto industry, a valuable policy tool for establishing PEV markets and promoting clean energy has been lost. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Finally, EPA has taken a more measured view of technology risk and uncertainty in past vehicle emissions rulemakings in which technology costs were lower and automakers had significantly more direct control over managing their technology development, deployment, and sales mix to comply. In this Proposed Rule, EPA appears to be taking a much more cavalier approach to risk, lead time, and ensuring the “requisite technology” is available, despite the high cost of BEVs, the massive uncertainty around mineral supplies, the significant investment needed in charging infrastructure and the power grid, and the uncertain market demand for BEVs. The standards in the Final Rule should be adjusted to better account for market uncertainties. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

5.1. Annual Stringency Increase

The greatest rate of emissions reductions is required over the first three years of the proposed standards with annual rates of improvement is as high as 16% (compared to a maximum of 12%

annual rate over the final three years) (see Figure 8). This front-loaded stringency runs contrary to the longstanding recognition that technology penetration is slower in early stages of market development and accelerates with continuous refinements and growing consumer awareness and acceptance. The situation is made worse by the BEV-forcing nature of the proposal and the requisite need to establish battery supply chains, production capacity, and charging infrastructure. [EPA-HQ-OAR-2022-0829-0620, pp. 26-27]

[See original for graphs, Figure 8 Required PEV Growth Versus Infrastructure Ramp Up] [EPA-HQ-OAR-2022-0829-0620, pp. 26-27]

Organization: Valero Energy Corporation

II. EPA unreasonably relies on unreliable information and speculation to conclude that the proposed rule is feasible.

EPA cites to numerous sources in support of the feasibility of its proposal, such as the proposition that many OEMs have announced investments in ZEV technologies and have released projections for additional makes and models of LD ZEVs. However, EPA does not account for the fact that these projections are contingent on a multitude of best-case assumptions and market factors that EPA's own sources caveat heavily. Although EPA could have obtained specific data and credible information regarding manufacturers' investments and capabilities and infrastructure buildout, EPA chose not to do so. By cherry-picking headlines that appear to support the Administration's policy objectives, meanwhile disregarding material assumptions and contingencies outside the control of regulators and OEMs alike that are relevant to its analysis, EPA unreasonably relies on optimistic projections that have no basis in actual fact while overlooking the large body of credible evidence that strongly indicates that EPA's proposed standards are infeasible. [EPA-HQ-OAR-2022-0829-0707, p. 18]

This approach is inexplicably at odds with the approach EPA takes in the recently announced "RFS Set" rule, in which EPA expressly declined to rely upon fuel producers' announcements of anticipated renewable diesel production capacity in establishing the renewable fuel volumes for 2023-2025.91 Consequently, EPA's proposed rule is unsupported, arbitrary, and exceeds EPA's statutory authority. [EPA-HQ-OAR-2022-0829-0707, p. 18]

91 Renewable Fuels Standard (RFS) Program: Standards for 2023-2025 and Other Changes, announced June 21, 2023, pre-publication version available at https://www.epa.gov/renewable-fuel-standard-program/final-renewable- fuels-standards-rule-and-2025.

B. EPA disregards caveats regarding ZEV production capabilities.

EPA cites to "[a] proliferation of announcements by automakers in the past two years[,] signal[ing] a rapidly growing shift in product development focus among automakers away from internal-combustion technologies and toward electrification."118 Drawing support from these announcements, EPA concludes that it is feasible within the next decade to force transition of the domestic LDV fleet to BEV largely on the basis of third-hand sources and news articles taken out of context. Though EPA acknowledges in passing that "manufacturer announcements such as these are not binding, and often are conditioned as forward-looking and subject to uncertainty[,]"119, EPA's proposed rule is not characterized by any reciprocal flexibilities to adjust ambitious targets in order to accommodate material realities and uncertainties impacting BEV production. In contrast to EPA's projections, the same OEMs EPA cites to for support of the Proposed Rule have raised material concerns with an accelerated transition to LD BEVs. [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

118 EPA's Proposed Rule at 29190.

119 EPA's Proposed Rule at 29193.

For example, EPA cites to a May 2021 announcement from Ford, providing that "they expect 40 percent of their global sales will be all-electric by 2030."120 However, the Ford press release EPA cites to also contains the following laundry list of caveats:121 [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

120 EPA's Proposed Rule at 29190 (citing to Ford Motor Company, ''Superior Value From EVs, Commercial Business, Connected Services is Strategic Focus of Today's 'Delivering Ford+' Capital Markets Day,'' Press Release, May 26, 2021).

121 Ford Motor Company, ''Superior Value From EVs, Commercial Business, Connected Services is Strategic Focus of Today's 'Delivering Ford+' Capital Markets Day,'' Press Release, May 26, 2021).

"Cautionary Note on Forward-Looking Statements

Statements included or incorporated by reference herein may constitute 'forward- looking statements' within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements are based on expectations, forecasts, and assumptions by our management and involve a number of risks, uncertainties, and other factors that could cause actual results to differ materially from those stated, including, without limitation: [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford and Ford Credit's financial condition and results of operations have been and may continue to be adversely affected by public health issues, including epidemics or pandemics such as COVID-19; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford is highly dependent on its suppliers to deliver components in accordance with Ford's production schedule, and a shortage of key components, such as semiconductors, can disrupt Ford's production of vehicles; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's long-term competitiveness depends on the successful execution of its Plan;

- Ford's vehicles could be affected by defects that result in delays in new model launches, recall campaigns, or increased warranty costs; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford may not realize the anticipated benefits of existing or pending strategic alliances, joint ventures, acquisitions, divestitures, or new business strategies; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Operational systems, security systems, and vehicles could be affected by cyber incidents and other disruptions; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's production, as well as Ford's suppliers' production, could be disrupted by labor issues, natural or man-made disasters, financial distress, production difficulties, or other factors; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's ability to maintain a competitive cost structure could be affected by labor or other constraints; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's ability to attract and retain talented, diverse, and highly skilled employees is critical to its success and competitiveness; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's new and existing products and mobility services are subject to market acceptance and face significant competition from existing and new entrants in the automotive and mobility industries; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's results are dependent on sales of larger, more profitable vehicles, particularly in the United States; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- With a global footprint, Ford's results could be adversely affected by economic, geopolitical, protectionist trade policies, or other events, including tariffs; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Industry sales volume in any of Ford's key markets can be volatile and could decline if there is a financial crisis, recession, or significant geopolitical event; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford may face increased price competition or a reduction in demand for its products resulting from industry excess capacity, currency fluctuations, competitive actions, or other factors; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Fluctuations in commodity prices, foreign currency exchange rates, interest rates, and market value of Ford or Ford Credit's investments can have a significant effect on results; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford and Ford Credit's access to debt, securitization, or derivative markets around the world at competitive rates or in sufficient amounts could be affected by credit rating downgrades, market volatility, market disruption, regulatory requirements, or other factors; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's receipt of government incentives could be subject to reduction, termination, or clawback; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford Credit could experience higher-than-expected credit losses, lower-than-anticipated residual values, or higher-than-expected return volumes for leased vehicles; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Economic and demographic experience for pension and other postretirement benefit plans (e.g., discount rates or investment returns) could be worse than Ford has assumed; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Pension and other postretirement liabilities could adversely affect Ford's liquidity and financial condition; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford could experience unusual or significant litigation, governmental investigations, or adverse publicity arising out of alleged defects in products, perceived environmental impacts, or otherwise; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

• Ford may need to substantially modify its product plans to comply with safety, emissions, fuel economy, autonomous vehicle, and other regulations; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

• Ford and Ford Credit could be affected by the continued development of more stringent privacy, data use, and data protection laws and regulations as well as consumers' heightened expectations to safeguard their personal information; and [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

• Ford Credit could be subject to new or increased credit regulations, consumer protection regulations, or other regulations. [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

• We cannot be certain that any expectation, forecast, or assumption made in preparing forward-looking statements will prove accurate, or that any projection will be realized. It is to be expected that there may be differences between projected and actual results. Our forward-looking statements speak only as of the date of their initial issuance, and we do not undertake any obligation to update or revise publicly any forward-looking statement, whether as a result of new information, future events, or otherwise. For additional discussion, see "Item 1A. Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2020, as updated by subsequent Quarterly Reports on Form 10-Q and Current Reports on Form 8-K." [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

Moreover, in March 2023, figures released by Ford highlighted that Ford Motor Co.'s EV business had lost $3 billion before taxes during the past two years and will lose a similar amount this year as the company invests heavily in EV technology.122 Ford's 10-K filed in February 2023 further disclosed: [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

122 Krishner, Tom, Associated Press, "Ford's electricitv vehicle unit losing billions, as company invests in new technolo23, 2023), https://www.pbs.org/newshour/economy/fords-electric-vehicle-unit-losing-billions-as-company-invests-in-new-technology; see also Ford News Release, "'Refounded' Ford to Show How Customer-Focused Segments Will Drive Value and Growth, Changes in Financial Repor3, 2023) https://media.ford.com/content/fordmedia/fna/us/en/news/2023/03/23/_refounded_-ford-to-show-how-customer-focused-segments-will-driv.html.

• "We have announced plans to significantly increase our electric vehicle production volumes; however, our ability to produce higher volumes of electric vehicles is dependent upon the availability of raw materials necessary for the production of batteries, e.g., lithium, cobalt, nickel, graphite, and manganese, among others."123 [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

123 Ford 10-K Annual 3) https://shareholder.ford.com/Investors/financials/sec-filings/sec-filings-details/default.aspx?FilingId=16361873 (emphasis added).

• "As a result of the competition for and limited availability of the raw materials needed for our electric vehicle business, the costs of such materials are difficult to accurately forecast as they may fluctuate during the term of the offtake agreements and other long-term purchase contracts based on market conditions. Accordingly, we may be subject to increases in the prices we pay for those raw materials, and our ability to recoup such costs through increased pricing to our customers may be limited. As a result, our margins, results of operations, financial condition, and reputation may be adversely impacted by commitments we make pursuant to offtake agreements and other long-term purchase contracts."124 [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

124 Ford 10-K Annual 3) https://shareholder.ford.com/Investors/financials/sec-filings/sec-filings-details/default.aspx?FilingId=16361873 (emphasis added).

III. EPA fails to adequately consider important aspects and consequences of the proposed rule.

EPA's claims in the preamble seeking to distance itself from the policy directives established by the Biden Administration in Executive Order 14037 are belied by the numerous specific instances in the preamble in which EPA assumes without serious, critical, and independent analysis that the LMD vehicle fleet should be forced to transition to BEV and FCEV technologies. In its haste to fulfill the Administration's predetermined policy objectives, EPA fails to adequately consider important aspects of the rule and overlooks significant impacts and consequences that will inevitably result if the rule is adopted as proposed. [EPA-HQ-OAR-2022-0829-0707, p. 29]

The lack of rigor and discipline in EPA's methodology stands in stark contrast with EPA's typical approach to rulemaking and defies the general assessment factors for evaluating the quality of scientific and technical information that the Science Policy Council (SPC) has issued.140 In particular, this rulemaking does not have the hallmarks of the "weight-of-evidence" approach which "considers all relevant information in an integrative assessment that takes into account the kinds of evidence available, the quality and quantity of the evidence, the strengths and limitations associated with each type of evidence."141 Nor does this proposal comport with the Action Development Process outlined by EPA, which states that rules should be "based on sound scientific, economic, legal, and policy analyses" and "reflect appropriate solicitation and consideration of views outside EPA." 142 [EPA-HQ-OAR-2022-0829-0707, pp. 28-29]

140 EPA, Science Policy Council, A Summary of General Assessment Factors for Evaluating the Quality of Scientific and Technical Informationailable at https://www.epa.gov/sites/default/files/2015-01/documents/assess2.pdf.

141 Id. at p. 2.

142 EPA, Action Development Process: Guidance for EPA Staff on Developing Quality Actions (2011)lable at https://nepis.epa.gov/.

Additionally, rulemaking under the CAA almost always starts with EPA gathering and analyzing relevant information from various sources included regulated entities and other impacted entities and suppliers of controls. EPA could have requested information from vehicle manufacturers, battery manufacturers, mineral suppliers, auto dealers, insurance carriers, consumer organizations, small businesses, and others in order to obtain credible, verifiable, and standardized information in order to support a thoughtful and critical analysis of its projections regarding vehicle availability, purchase costs, battery availability, battery performance, charging infrastructure availability and performance, and other aspects of this proposal. EPA should not rely on self-serving OEM announcements as a shortcut to using its authority to gather data and complete analysis for an action with vast economic consequences. [EPA-HQ-OAR-2022-0829-0707, pp. 28-29]

2. The statutory structure of the Clean Air Act further confirms that EPA is not authorized to mandate the sale of ZEVs.

i. The statutory structure confirms Congress' focus on technologically achievable emission controls.

Several provisions of Section 202 of the Clean Air Act confirm that Congress focused on technologically feasible standards for vehicles deemed to emit pollutants that actually cause or contribute to pollution. Section 202(a)(2) requires EPA to provide manufacturers with lead time to comply with the " standards, in order "to permit the development and application of requisite technology." 42 U.S.C. § 7521(a)(2). Similarly, Section 202(a)(3)(A)(i) provides that EPA's HDV standards for certain criteria pollutants should reflect the "greatest degree of emission reduction achievable through the application of technology which the [EPA] determines will be available" during the relevant model year. Id. § 7521(a)(3)(A)(i). Those provisions contemplate that technological feasibility will meaningfully constrain the emission standards that EPA sets under Section 202(a). EPA cannot ignore technological feasibility and simply decide to require production of fewer internal combustion vehicles. [EPA-HQ-OAR-2022-0829-0707, p. 78]

Other provisions show the type of "technology" that Congress contemplated vehicle manufacturers would develop to meet those standards. Section 202(m) requires EPA to command manufacturers to install on "all" new light-duty vehicles and trucks "diagnostic systems" that identify "emission-related systems deterioration or malfunction ... which could ... result in failure of the vehicles to comply with emission standards established under this section." 42 U.S.C. § 7521(m)(l). The required diagnostic systems must monitor, "at a minimum, the catalytic converter and oxygen sensor." Id. [EPA-HQ-OAR-2022-0829-0707, p. 78]

In other words, to ensure compliance with emission standards under Section 202(a), Congress required "emissions-related systems" and accompanying "diagnostic systems" on each vehicle—again underscoring Congress's view that the vehicles subject to an emission standard actually emit the relevant pollutant in EPA's judgment. [EPA-HQ-OAR-2022-0829-0707, p. 78]

As the statutory structure demonstrates, EPA may set standards that are "technology-forcing," because they require manufacturers to adopt nascent technology that may not yet be "adequately demonstrated." NRDC, 805 F .2d at 419. EPA's rules thus have promoted the development of "automotive technologies, such as on-board computers and fuel injection systems" that improve emissions from combustion engines. 86 Fed. Reg. at 74,451. But the statute does not permit what EPA proposes here: enacting "average" standards divorced from technologically achievable limits on emitting vehicles, which instead force manufacturers to produce a different type of supposedly non-emitting vehicle altogether. [EPA-HQ-OAR-2022-0829-0707, p. 78]

Organization: Volkswagen Group of America, Inc.

Ambitious and Stringent Standards Proposed

EPA's NPRM proposes historically ambitious and stringent targets towards carbon neutrality for the light-duty and medium-duty transportation sector. Significantly noted by AFAI, the automotive industry is committing resources and investments of $1.2 trillion by 2030, while Volkswagen estimates our worldwide digitalization and electrification investment around $130 billion1 between 2023 and 2027. The ambition must be met equally by commitment of segments outside the automotive Industry. [EPA-HQ-OAR-2022-0829-0669, p. 2]

1 120 Billion Euro; Exchange rate: 1.09 USD to 1 EUR

To that end, Volkswagen supports continuous reductions in vehicle fleet average GHG emissions and criteria pollutants. Volkswagen is committed to work with U.S. agencies, utilities, charging infrastructure providers, raw material suppliers and additional stakeholders in partnership with AFAI on reasonable and achievable pathways for all manufacturers for 2027 and beyond. Sustained, complementary and supportive policy is paramount in forming a cross-sector foundation required to scale up growth and infrastructure. To achieve the shared vision of zero emission mobility, solutions must be instituted in these sectors to allow Volkswagen to provide customers with a “People’s Car” of superior utility and affordability. [EPA-HQ-OAR-2022-0829-0669, p. 2]

Organization: Volvo Car Corporation (VCC)

Particulate Matter (PM)

For several reasons, VCC is opposed to EPA’s proposal on particulate matter. Implementing the PM requirements as proposed in the NPRM is just not feasible. The EPA proposal differs from the CARB approach on PM and it is also more stringent than ACCII. Therefore, it will cause a lot of additional burden on manufacturers that are spending most of their resources on electrification. It is not just a matter of adding the gasoline particulate filter, rather it includes substantial development and investments. Such massive hardware changes are just not possible by 2027MY. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

If CARB and EPA are not harmonized then VCC would need to have two sets of hardware in the US market, one Federal and one California + S177 states. This would be very costly for a small OEM like VCC. In 2027MY VCC will only have few engine families in production according to our current plan, but this approach would mean VCC needs to double its engine programs. In addition, VCC has already decided on a hardware technical solution that meets CARB ACCII for 2026 MY and beyond but a final EPA rule is not expected until spring 2024. So it will be very difficult to implement an EPA specific hardware technical solution in time for the 2027 MY. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

VCC’s recommendation is that EPA align with CARB with regards to PM. EPA should follow the CARB ACCII PM-regulations and the CARB phase-in plan that is already in effect. This is fully consistent with the way that CARB ACC1 (LEV III) and EPA Tier3 was synchronized in the prior set of regulations. So, there is a precedent for this approach, and given that California and 177 states make up over 40% of the US car market, this approach is efficient and consistent with those regulations already in place. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

EPA’s proposal on particulate matter would create a stringent standard that requires additional hardware which is much worse for a small OEM like VCC due to our small fleets. This means investment costs need to be split on much smaller fleets. In addition, there are major development costs which would put VCC at a significant disadvantage. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

VCC has invested substantially to upgrade our dynos used for US certification testing to the latest 1066 standard. VCC did not anticipate any further upgrades to these dynos because VCC will be all electric in 2030MY. Therefore, the EPA proposal would require upgrades for one market (USA) for only 3 model years and then VCC would discontinue the whole emission measurement system in 2030. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

The proposal would also necessitate additional test capacity and different separate tests for EPA and CARB. So, it would mean doubling the number of the tests and this would create additional administrative burden in order to implement. Increasing test cells does not happen overnight and it would likely not be feasible for VCC to get the additional test cells needed for MY 2027 testing. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

In addition to separate tests, the EPA proposal differs from CARB requirements on emission and OBD certifications. If CARB and EPA are not harmonized VCC must submit two OBD applications for each engine, one for CARB and one for EPA. Many OEMs are likely in a similar position, but the implication to small volume manufacturers is much more significant than it is to the larger OEMs. VCC encourages EPA to harmonize with CARB and not require separate EPA certifications. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

New certification and compliance programs will likely be costly, especially with new tightened criteria that is proposed. VCC believes measurement accuracy is a concern at this low level. See the section on tunnel blank PM testing contained in the Alliance for Auto Innovation comments. In addition, it is not feasible with current existing sensor technology to monitor and detect the proposed requirement of 30% efficiency (See appendix for technical comments on the OBD proposal). It is also important to note that active regeneration is very infrequent on petrol engines and happens only during extreme conditions. This would make it problematic to consistently detect frequent or incomplete regeneration (See appendix for technical comments on the OBD proposal). [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

The NPRM proposed PM standard alone would mean the few remaining HEVs in Volvo Cars' cycle plan 2027MY-2029MY would likely need new hardware to accommodate a new gasoline particulate filter (GPF). For a small manufacturer like VCC, this would be necessary for 3 years only for vehicles with short life span and it would be challenging and costly. It would result in very little environmental benefit. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

EPA should consider requiring more stringent fuel requirements which would have a more significant environmental impact at a lower cost. Although changes to fuel standards are outside the scope of this NPRM, VCC believes that fuels which contain reduced particulate formation can be utilized in today's vehicles and future vehicle fleets. This would have faster and greater environmental benefit without all the burden and investment of PM filters which would be utilized for future vehicles only. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

Rather than the EPA proposed particulate matter requirements in the NPRM, VCC strongly encourages EPA adopt the CARB PM1 Regulation and allow for a Phase-In for these requirements. This is best pathway for harmonization and will deliver environmental benefits without unnecessary additional costs. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

Organization: Western Energy Alliance

it is hard to fathom how EPA comes to that conclusion. The electric grid is in no way capable of handling the huge increase in electricity demand that the rule would require, the United States does not have access to the critical minerals required for such a high market penetration of EVs, nor is the increased wind and solar energy generation available now nor in the foreseeable future to make supposedly ZEVs actually ZEVs. EPA has failed to adequately consider the impact of this rule on grid reliability. EPA should analyze grid reliability in this rulemaking and reference the large body of work raising concerns about how increased EVs will destabilize the grid.1 Without the grid capability and the critical minerals, EPA's EPA Proposed Rule on Light-Duty Vehicle Emissions Standards July 5, 2023 statement on technical feasibility is logically flawed, as current and projected grid infrastructure cannot support the goal of the proposed rule. [EPA-HQ-OAR-2022-0829-0679, pp. 2-3]

1 For example see E lectric Vehicle Dynamic Charging Performance Characteristics during Bulk Power System D isturbances, North American Electric Grid Reliability Corp. et al., April 2023; T estimony of Federal Energy Regulatory Commissioners Willie Phillips, Mark Christie, and James Danly before the Senate Energy & Natural Resources Committee, May 4, 2023, warning: "We face unprecedented challenges to the reliability of our nation's electric system."…the U.S. electric grid is "heading for a very catastrophic situation in terms of reliability…" and there is a "looming reliability crisis in our electricity markets."

EPA must reconsider its analysis on technical feasibility by considering a full range of data on grid reliability. The Rapid Energy Policy Evaluation and Analysis Toolkit Domestic, a project of Princeton University, projects electricity demand would need to increase 18% by 2030 and 38% by 2035 to meet the president's EV goals.2 Many are warning of the lack of infrastructure to support the EV goals. The nation would need to spend $20 billion to $30 billion annually on new transmission lines for the increased demand, but is spending next to nothing.3 [EPA-HQ-OAR-2022-0829-0679, p. 3]

2 Preview: Final REPEAT Project Findings on the Emissions Impacts of the Inflation Reduction Act and Infrastructure Investment and Jobs Act, Rapid Energy Policy Evaluation and Analysis Toolkit, Princeton University, April 2023.

3 Rob Gramlich, founder and president of Grid Strategies, a transmission policy group, as quoted in "Why the electric vehicle boom could put a major strain on the U.S. power grid," CNBC, July 1, 2023.

Technical Infeasibility and Impracticalities for Consumers: EPA uses flawed analysis about the technical feasibility of the rule, but the behavior aspects are also seriously deficient. There is little evidence that EVs are being accepted by consumers other than a small niche of high-end, wealthy individuals who can afford to purchase an expensive vehicle with limited range.11 Given the long refueling times and battery drain when operating the heater or air conditioning, only those who can afford a second or third vehicle for exclusive use in-town are currently purchasing EVs. There has been no evidence to date that these problems of limited range and functionality will be overcome soon to achieve the high market penetration EPA hopes with this rule. [EPA-HQ-OAR-2022-0829-0679, p. 6]

11 The Energy Information Administration (EIA) shows that 2/3 of households with EVs have incomes over $100,000. Electrified vehicles continue to see slow growth and less use than conventional vehicles, EIA, May 2018

EPA's assertion is simply not supported by facts:

“The year-over-year growth in U.S. PEV sales suggests that an increasing share of new vehicle buyers are concluding that a PEV is the best vehicle to meet their needs. Many of the zero-emission vehicles already on the market today cost less to operate than ICE vehicles, offer improved performance and handling, have a driving range similar to that of ICE vehicles, and can be charged at a growing network of public chargers as well as at home.” (p. 29189) [EPA-HQ-OAR-2022-0829-0679, p. 6]

At only 5.8% of new vehicle sales, EVs has a long way to go to meet the targets EPA is setting of 67%, a more than ten-fold increase that is a far goal from the “increasing share of new vehicle buyers…” Further, asserting that the range is similar to an ICEV is preposterous, especially in anything less than the most favorable mild weather conditions, as EVs lose range in cold and hot weather.12 [EPA-HQ-OAR-2022-0829-0679, p. 6]

12 Winter & Cold Weather EV Range Loss in 7,000 Cars, Recurrent, December 12, 2022.

The most fuel-efficient car on the market is the Toyota Prius, but even it would not meet the proposed standards. With this proposed rule EPA is squeezing out the Prius’ successful hybrid technology. The Prius MY 2032 standard is less than half the CO_2 emissions per mile of MY 2023, which range from 155 g/mi to 179 g/mi. To comply with the proposed rule, the fleet-average CO_2 emissions of Toyotas in MY 2032 would have to be 52 to 60% lower than that of today’s Prius, forcing Toyota to rapidly increase the percentage of EVs sells, regardless of consumer choice. Clearly EPA is stepping well beyond its authority by advancing a technically infeasible rule that attempts to reshape the entire vehicle marketplace. The historical record of governments attempting to plan an entire economy or sector has not been a successful one. EPA should abandon this rule. [EPA-HQ-OAR-2022-0829-0679, pp. 6-7]

Organization: World Resources Institute (WRI)

Locking in cleaner vehicle standards, and potentially extending them through 2035 as requested by auto manufacturers, will create market stability and will give manufacturers, investors, and consumers greater confidence in the direction of the vehicle market. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Based on the current and growing uptake of electric vehicles, paired with public and private investments in charging, purchasing, and manufacturing from the Inflation Reduction Act and the Infrastructure Investment and Jobs Act, these standards would be achievable under the model years proposed. Public investments from recent legislation include but are not limited to: [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

- National Electric Vehicle Infrastructure Program [Link: https://www.fhwa.dot.gov/environment/nevi/]

- Electric Vehicle Tax Credit [Link: https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after]

- Commercial Clean Vehicle Credit (45W) [Link: https://www.irs.gov/credits-deductions/commercial-clean-vehicle-credit]

- Used Clean Vehicle Credit [Link: https://www.irs.gov/credits-deductions/used-clean-vehicle-credit]

• Advanced Manufacturing Production Credit (45X) [Link: https://www.irs.gov/instructions/i7207]

[EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Complementary policies provide incentives

By leveraging the billions of dollars in new federal investments in electric vehicle charging in the Infrastructure Investment and Jobs Act and the hundreds of millions of dollars of clean transportation incentives in the Inflation Reduction Act these standards have the potential to be the floor not the ceiling for transportation emissions reductions. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

These policies provide unprecedented levels of public support for electric vehicles specifically including at least $83 billion of loans, grants, and tax credits that could support the production of low or zero-emission vehicles, batteries, or chargers according to a recent analysis [Link: https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-headed-for-the-u-s/#_ftn4] by Atlas Public Policy. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Complemented by existing state policies like the Advanced Clean Trucks and Advanced Clean Fleets rules, which require manufacturers to begin selling an increasing percentage of zero-emission vehicles starting in 2024, EPA's proposed rules can help to accelerate the transition to zero-emission transportation while improving public health and reducing climate pollution. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Private investments are rapidly expanding supply chains and manufacturing [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Since the passage of the Inflation Reduction Act less than one year ago, companies have announced tens of billions of dollars in renewable energy, battery, and electric vehicle projects across the country. From the announcement that Our Next Energy [Link: https://www.michiganbusiness.org/press-releases/2022/10/whitmer-announces-2000-jobs-investment-of-$1.6-billion-michigan-based-our-next-energy-builds-battery-manufacturing-campus-wayne-county/] has invested $1.6 billion in their first battery manufacturing campus in Wayne County, Michigan to the news that Hyundai Motor Group and SK On [Link: https://fortune.com/2022/12/08/hyundai-new-5-billion-electric-battery-plant-georgia-atlanta-biden-inflation-reduction-act/] are jointly investing $4-$5 billion to build electric battery plants outside of Atlanta, Georgia to BMW's [Link: https://apnews.com/article/technology-north-america-spartanburg-south-carolina-climate-and-environment-96753f092b29e0d384903591b5221f13] recent announcement of their $1.7 billion investment near Spartanburg, South Carolina in their shift to EV manufacturing there is ample evidence that recent policies are helping to drive substantial private investments. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

These investments are leading to rapidly developing supply chains, domestic battery production capacity, and increased manufacturing which will lead to further reductions in the cost and increases in the availability of zero-emission vehicles. This market growth will continue to increase with additional supportive policies and regulations, such as these proposed rules. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

EPA Summary and Response

EPA appreciates the comments received on the topic of the lead time needed to reduce emissions from light- and medium-duty vehicles in order to comply with the proposed GHG standards. A number of commenters shared the view that the existence of vehicle technologies for reducing GHG emissions was not in question. However, many of those same commenters objected to the pace of the standards under EPA's proposal, and specifically EPA's modeled projection of the year-over-year increases in BEV penetrations to meet the proposed standards, as well as the projected level of BEVs in MY 2032.

The feasibility of complying with GHG standards in a given future model year is closely related to the level of stringency of the standards. EPA's responses to comments on the topic of stringency/level of the GHG standards are provided in RTC Section 3.3.1. This section contains EPA responses to comments regarding the year-over-year trajectory of the ramp down of the standards, and the associated lead time available to meet the level of standards for each year – including MY 2032 when the most stringent level of standards is reached. Comments specifically related to the lead time needed to build up the PEV supply chain and secure critical materials are addressed in RTC Section 15. Comments related to the lead time needed to build out charging infrastructure and prepare electricity generation for greater numbers of PEVs are addressed in RTC Sections 17 and 18, respectively. Comments related to the rate of growth of consumer markets for light- and medium-duty vehicles are addressed in RTC Sections 13 and 14.

Various commenters (25 x '25 Alliance, AAI, AVE, ACE, AmFree, American Highway Users Alliance, BMW, Delek Holdings) asserted that the rate of ramp-up of BEV's projected through MY 2032 by EPA in the proposal does not provide sufficient lead-time for the industry and supporting developments in infrastructure, critical material supply and vehicle market. The commenters cite the NPRM's central case BEV penetration value of 67 percent in 2032, and note that value is substantially higher than today. In response, EPA does not agree that level of proposed and final standards in 2032 provides insufficient lead-time to introduce emissions-reducing technology needed to for compliance. As discussed in more detail in Preamble Section V.B, EPA's central case analysis for this final rulemaking, consistent with the NRPM analysis, considers the constraints on the ramp-up of vehicle technologies and the required lead time to introduce technologies into the new vehicle fleet. Specifically, EPA's compliance analysis accounts for the time required between vehicle redesign cycles, limits to the rate at which a manufacturer can alter its technology mix, limits to the ramp up of battery production and the availability of critical materials, and limits related to consumer acceptance as described in Chapters 2.6 and 4 of the RIA, and Section IV.C.5 of the preamble. These explicit limits are applied along with the feasibility assessment of the available technologies, which is described in RIA Chapter 3. While EPA has concluded that the central case trajectory for compliance provides sufficient lead-time, we note that it is not necessary for every manufacturer to reach the technology penetrations that EPA has presented for the industry overall. For example, because several manufacturers already produce 100 percent PEVs, or plan to do so prior to MY 2032, remaining manufacturers will necessarily have a PEV penetration rate below the industry overall rate (assuming the industry does not overcomply as a whole). Furthermore, EPA agrees with, and would like to emphasize here a comment received from Consumer Reports that the overall industry penetration rate projected for the central case is only one of many possible feasible pathways for compliance. As discussed further in RTC Section 12.5.3, for this final rulemaking analysis EPA is presenting multiple feasible pathways for compliance, which span a wide range of technology penetrations as described in the Preamble Executive Summary, and RIA Chapter 12.

Multiple commenters (AAI, AVE, Honda) asserted that the EPA's lead-time assessment for the NPRM was based on various optimistic assumptions and that the increase in vehicle electrification projected in the central analysis by 2032 was infeasible. AAI asserted that EPA effectively assumed that "that everything will go perfectly in the transformation to electric vehicles between now and 2032", while Honda commented that "a missed target in any one of these areas has significant potential to derail… the compliance status of regulated parties." EPA does not agree that the determination of compliance lead time and feasibility in the NPRM, or for these final standards, is based on assumptions that either overly optimistic or overly pessimistic. Instead, EPA's central case assumptions are derived using central estimates of important trends projected into the future from the best available sources, taking into account a wide range of potential limitations. At the same time, after considering comments and updating our data with the latest available information, EPA has adjusted both some of its cost estimates, e.g. higher estimated battery costs, and the stringency of the standards, particularly in the early years.

The two key examples of battery costs and consumer acceptance illustrate the approach used by EPA. As described in RIA Chapters 12.2.1 and 4.1, EPA did not make the most optimistic assumptions, but instead chose scenarios between a high and low range of feasible scenarios. Furthermore, EPA again notes that the central analysis is only one many feasible pathways for compliance. The various sensitivities presented in RIA Chapter 12 are selected, in part, to illustrate what might happen if key assumptions do not follow the trajectories projected for the central case analysis. These sensitivity results demonstrate that there is sufficient lead time for manufacturers to comply with these final standards using alternative pathways that reflect different combinations of compliance strategies and market conditions.

AAI, BMW, and Toyota raised a concern that the proposed light-duty GHG standards are heavily front-loaded, and have greater reductions in GHG emissions in the earlier years of the 2027-2032 timeframe. These commenters noted that supply chains, infrastructure, and market for BEVs takes time to develop, and that front-loading makes it more difficult to recover if future conditions depart significantly from projections. To illustrate, AAI notes that the initial increases in car and truck stringencies between MYs 2026 and 2027 are 12 percent and 21 percent, respectively, noting that the truck increase is significantly more than for cars. BMW noted the increase in EPA's projected BEV market share for the light-duty truck regulatory class from MY 2026 to MY 2027. Other commenters asserted that the proposed standards provided an appropriate ramp up in stringency from 2027 onward. CALSTART commented in support of the front-loaded ramp up of the proposed standards, and stated that the market would be prepared to support the proposal's Alternative 1. Overall, in response to the range of comments on the trajectory of stringency increases between MYs 2027 and 2032, EPA maintains that the proposed standards are technically feasible. However, taking into account the comments expressing concern about the relatively large portion of stringency increase that occurs before MY 2030, and between MYs 2026 and 2027 in particular, EPA concludes that compared to the proposed standards, a more gradual ramp-in of GHG stringency would be appropriate. EPA is finalizing standards that are less stringent than the proposed standards for each year from 2027 through 2031. This stringency reduction is the result of changes to several program elements in this final rule compared to the proposal, including a more gradual ramp down of the footprint standard curve (i.e., Alternative 3), an extended phase-out period for off-cycle credits a ramp down of A/C credits to a non-zero value, and a delay in the transition to the revised PHEV utility factor. For 2032, the GHG footprint standard curves are the same as the proposed standards. The overall result is that compared to the proposed standards, manufacturers will be able to deploy GHG emissions reducing technology more gradually in the early years of the program. Manufacturers will also have more time take advantage of ongoing development in the consumer market and charging infrastructure for PEVs. EPA believes that collectively all of these changes from the proposal to the final rule will be adequate to address the lead time issues raised by auto manufacturers.

CARB and the California Attorney General's Office et al. commented that the proposed standards are technically feasible, and control technologies already exist to achieve compliance in the rulemaking timeframe. The California Attorney General's Office et al. also noted that EPA's modeling included a "menu of only existing technologies" to show feasible compliance pathways. These commenters generally noted also the important role that the IRA and other incentives will have in enabling the production and market adoption of vehicles equipped with emissions-reducing technology. CARB cited several market trends that support a positive feasibility assessment, including the rapid expansion of available ZEV models, increasing all-electric range, technological advancements in batteries, declining battery costs, and improved energy efficiency. EPA acknowledges and agrees with these comments. EPA further notes that our judgement of the technical feasibility of these standards is standards is not dependent on the development of new technology, but instead is based on the increased production and adoption of technologies that have already been demonstrated at scale today.

AFPM commented specifically on the lead time needed for the development of the electrical grid and charging infrastructure needed to support the levels of BEVs projected in the NPRM's central case analysis. EPA's discussion of preparedness of infrastructure is provided in RIA Chapter 5 and RTC Sections 17 and 18.

ACE, AmFree, AFPM, and Clean Fuels Development Coalition et al. commented that the non-binding commitments of automakers for future BEV production cited by EPA in the NPRM does not prove that the proposed standards are feasible. In response, EPA notes that we chose to document automaker commitments and plans as supporting evidence for our underlying feasibility assessment. We agree with the commenter that by themselves, such statements from automakers do not, by themselves, prove that the standards are feasible.

Borg Warner commented on the importance of continued support and incentives from state and federal entities and specifically cited the importance of The Infrastructure Investment and Jobs Act (IIJA), the Inflation Reduction Act (IRA), and CHIPS & Science Act. The BlueGreen Alliance provided a description of industry investments that have already been made as a result of these incentives. EPA acknowledges and appreciates comments received about the necessary investments needed to support continued GHG reductions needed, even in the absence of new GHG standards, but also as a result of the proposed and final standards for MY 2032.

The American Highway Users Alliance commented that the concurrence of new and more stringent light and medium duty rule standards together with heavy duty standards would place additional pressure on the electrical grid and charging infrastructure, and the supply of critical materials and production capacity for batteries. This issue is addressed in RTC Sections 15 and 18.

3.4 – Other

<u>Comments by Organizations</u>

Organization: Alliance for Automotive Innovation

II. Adjustments to Address EV Market Uncertainties

As demonstrated in Section I (EV feasibility) of these comments, there is a great deal of uncertainty in EPA's projections including the ability to use the various federal tax incentives, battery cost improvements, and infrastructure development. In particular, charging/refueling infrastructure and supply of critical minerals and raw materials from IRA-compliant sources are well outside the control of either EPA or automakers. We understand EPA must use projections in its modeling. But with all of the uncertainty around these items, large inaccuracies can lead to a final rule that is grossly misaligned with the market. We propose the following conceptual market-based target adjustment system to allow for year-by-year adjustments to be made within the framework of a rule that can be finalized on EPA's desired timeline and will minimize the potential need to be reopened to react to real-world market conditions. These market- based adjustments are proposed to work in conjunction with whatever combination of target stringencies and flexibilities is promulgated in a final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 84-85]

A. Critical Mineral Availability

There are many different ways to attempt to measure or evaluate the supply of critical minerals and raw materials needed for battery production. We believe the simplest and most direct way is to look at the total percentage battery capacity across the entire U.S. market per model year that is able to qualify for the full $3,750 30D tax credit tied to extracting and processing critical minerals in the U.S. or a country with which we have a free trade agreement. If the supply of critical minerals from these countries is sufficient, then the IRA will have done the job EPA claims it will do. But if these materials are not available from qualifying sources, then the IRA will not have accomplished what EPA projected through no fault of the automakers. [EPA-HQ-OAR-2022-0829-0701, pp. 84-85]

Automakers cannot build batteries with materials that don't exist or that are unavailable. [EPA-HQ-OAR-2022-0829-0701, pp. 84-85]

An adjustment mechanism would be applied as follows. For MY 2027, each automaker will submit a pre-model year report by December 2025. Within this report, battery capacity of each EV model could be detailed, along with planned volumes and whether or not each will qualify for the critical mineral portion of 30D. Material sourcing contracts will be executed for MY 2027 by that time. EPA can aggregate this data from all manufacturers. For example, if a total of 2,000 GWh of battery capacity is planned for sale in MY 2027 according to the combined pre- model year reports, and 1,200 GWh of this capacity will qualify for the $3,750 30D credit based on sourcing and processing countries of origin, a 10 g/mi (for example) maximum potential target adjustment would be scaled according to this formula: [EPA-HQ-OAR-2022-0829-0701, pp. 84-85]

Adjustment (CM) = Adjustment (Max) * (MY (capacity) – MY (qualifying)) / (MY (capacity))

Where

Adjustment (CM) = Critical material adjustment (g/mi)

Adjustment (Max) = 10 g/mi

MY (capacity) = Industry total battery per model year (GWh)

MY (qualifying) = Industry total battery capacity (GWh) per model year qualifying for the full $3750 tax credit

Using the example data from above,

Adjustment (CM) 10 g/mi * (2,000 GWh – 1,200 GWh) / (2,000 GWh) = 4 g/mi

[EPA-HQ-OAR-2022-0829-0701, pp. 84-85]

This simple calculation could be published by EPA in the second quarter of calendar year 2026, giving automakers time to react for the bulk of MY 2027 production. This appears to be the best compromise for getting accurate information to EPA close enough to a given model year to be more accurate than projections made over three years in advance, while also providing enough time in advance to be of use for a given model year without having to be retroactively applied. [EPA-HQ-OAR-2022-0829-0701, pp. 84-85]

These challenges and the need for additional flexibility remain pertinent for MY 2027 and later regulations. The customers of these companies will still demand high performance from any vehicle sold by these manufacturers. The challenges of limited, highly focused product lines will not be eased by vehicle electrification. Limited product portfolio and product development cycles mean the ability to make regular improvements is a challenge. Battery technology has not developed enough for application within high-performance supercars. Technology is developing and SVMs have plans to electrify further; however, time is needed. Supply chain access and lead-time challenges will continue and potentially grow given rapidly rising global demand for lithium-ion batteries and trends toward vertical integration by larger companies to secure critical mineral supplies. Furthermore, given low production volumes there is also limited ability to amortize expensive product development across a volume of products – R&D and investment payback is longer. This leads to SVMs having different investment cycles which will mean they will require additional time to comply with GHG and criteria pollutant regulations. [EPA-HQ-OAR-2022-0829-0701, pp. 207-208]

With this backdrop, we are concerned that EPA appears to now dismiss these challenges in general, proposing much reduced flexibility in MY 2027 and later. [EPA-HQ-OAR-2022-0829-0701, pp. 207-208]

B. Battery Cost Reductions

There is great uncertainty as to whether battery costs will fall significantly during the time frame of this rule, as projected by EPA. While battery costs have dropped over the last decade, they appear to have plateaued around $150/kWh. With dramatic increases in demand coming and high inflation in recent years, battery costs appear to even be trending upward recently. We propose that battery pack costs could also be disclosed to EPA at the time of the pre-model year reports. EPA could then aggregate data from all automakers to develop a volume-weighted average battery pack cost per kWh for a given model year. Costs for all these battery packs will be locked in by this point in time, so there is no uncertainty in actual costs. The cost delta between EPA's projected cost estimate used as the basis for the rule and the actual cost would be used to calculate a target adjustment using, for example, the following formula: [EPA-HQ-OAR-2022-0829-0701, pp. 85-86]

Adjustment (BC) = Scaler * (Cost (actual) – Cost (estimate))

Where

Adjustment (BC) = Battery cost adjustment (g/mi)

Scaler = 0.2 g/mi/$

Cost (actual) = Industry total battery cost per model year ($/kWh)

Cost (estimate) = EPA estimated total battery cost per model year ($/kWh)

Using MY 2029 as an example with an EPA projected cost of $90/kWh and an actual industry cost of $105/kWh:

Adjustment (BC) = 0.2 g/mi * ($105/kwh) – ($90/kWh) = 3 g/mi [EPA-HQ-OAR-2022-0829-0701, pp. 85-86]

This target adjustment would be published at the same time as the critical mineral adjustment in Q2 of the calendar year preceding the model year. [EPA-HQ-OAR-2022-0829-0701, pp. 85-86]

Organization: American Petroleum Institute (API)

g. Program Review.

i. Assessment of both vehicle and infrastructure development/deployment progress.

The design of a program with heavy reliance on infrastructure that may not be widely available on the timeline proposed is optimistic at best. The proposal appears premature on the stated timeline, and essentially in conjunction with the HD GHG Phase 3 program, which would be competing for the same resources. If EPA is not willing to adjust the timeline and/or standards of the proposed programs, API requests that the agency consider incorporating a pre-program assessment as well as a program progress assessment. It is imperative that EPA provide a real-world evaluation, with an honest assessment provided to the public, regarding progress on infrastructure readiness and ZEV technology deployment. The opportunity for stranded investments by all stakeholders impacted by this program is just too great not to incorporate pre- and mid-program reviews. [EPA-HQ-OAR-2022-0829-0641, p. 23]

For a mid-program assessment, EPA could consider something akin to the Midterm Evaluation that was finalized in the 2012 joint agency rulemaking establishing the MY 2017-2025 LD GHG standards.77 Further, we recommend that EPA engage a broad stakeholder community to identify necessary elements to incorporate into such an assessment. [EPA-HQ-OAR-2022-0829-0641, p. 23]

77 “Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emissions Standards for Model Years 2022-2025.” https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas.

ii. Future program incentives and program adjustment of standards.

In addition, we also request that the agency report on the findings following review with enough time to adjust the standards if needed. Adequate lead time must be provided to the regulated community to allow for necessary adjustments to regulatory compliance strategies, and to avoid stranded investments as much as possible. A proposal based on stretch goals must incorporate an “offramp” or some opportunity to pivot if the essential elements of the program, such as charging/fueling infrastructure, do not materialize. [EPA-HQ-OAR-2022-0829-0641, p. 23]

Organization: Jaguar Land Rover NA, LLC (JLR)

EPA should consider formal monitoring points every two years to evaluate the effectiveness of the regulation given the uncertainty in how the market will develop [EPA-HQ-OAR-2022-0829-0744, pp. 5-7]

Organization: Kia Corporation

The government’s ability to implement the right complementary policies and monitoring these factors will be paramount to the success of this ambitious rulemaking. EPA standards alone cannot and will not create demand or infrastructure for EVs. [EPA-HQ-OAR-2022-0829-0555, pp. 6-7]

EPA’s Program Should Include Mechanism to Adjust Standards if Necessary

EPA’s proposal does not include any mechanism to adjust standards or correct course if the various assumptions in the model do not materialize. Market assumptions in EPA’s model include adequate charging infrastructure, consumer acceptance and demand, critical mineral supply, manufacturing capacity, power capacity, power rates, and low cost discrepancy between ICE and EVs. All of these elements – market realities and external challenges – are outside the control of automakers. There needs to be a mechanism that allows or requires EPA to revise standards if certain market conditions do not materialize at the level necessary to increase demand for EVs. [EPA-HQ-OAR-2022-0829-0555, p. 7]

Organization: Lucid Group, Inc.

Battery/Vehicle Efficiency is Critical to Long-Term Viability of EVs

EPA solicited input on additional ways the program could provide alternative pathways encouraging manufacturers to achieve lower CO_2 emissions earlier than projected in the proposal. Incentivizing EV efficiency measured by either miles/kWh or miles per gallon equivalent (MPGe) would help achieve lower CO_2 emissions and reduce the demand for raw materials and on the grid. We must ensure that we do not electrify for the sake of electrification, but instead establish policies and programs that prioritize efficient use of electricity and resources, yielding benefits such as: [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

-Reduced upstream emissions: Most EVs are charged from the power grid, which, while rapidly becoming cleaner, still includes emitting sources. More efficient EVs would use less grid electricity, thereby reducing the upstream emissions associated with their charging and vehicles miles traveled. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

-Conservation of critical minerals and associated de-risking of the supply chain: Using fewer batteries reduces the demand per vehicle for lithium and other critical materials. Reducing the use of these materials reduces supply chain bottlenecks and enhances national security. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

-Reduced consumer purchase costs: EV efficiency speeds mass adoption by reducing vehicle prices. It seeds a virtuous cycle—efficiency lowers vehicle production costs and purchase prices by reducing the number of batteries (the largest cost input for EVs) needed to achieve a targeted range. Fewer batteries lower the vehicle curb weight thereby further reducing the required cell count to achieve a desired range. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

-Reduced consumer energy costs: Efficient vehicles require less energy to travel a given distance. More efficient ICE vehicles have demonstrably reduced the gas bill for consumers, and more efficient BEVs reduce consumers' electric bill. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

-A more resilient grid through smarter energy consumption: While government programs have been known to encourage the use of electricity and have even extended to promote energy derived from wind, solar, and renewables, there exists a common denominator—use of energy. By focusing on increasing efficiency, we can foster smarter energy consumption easing the resources necessary for the grid’s clean energy transition. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

-Environmental Justice benefit: The U.S. Department of Transportation (DOT) states "low income and minority communities are more likely to be located near highways and other transportation facilities that produce local reduced air quality, and to suffer from negative health effects such as asthma." Addressing environmental inequality goes beyond roadway design and extends to the vehicles on the roads. Zero-emission vehicles (ZEVs) are a first line of defense in addressing respiratory and cardiovascular disease and other pollution-related health disparities by improving air quality in communities located in or near traffic-dense areas. Efficiency brings down the costs of such vehicles and will help increase equitable adoption of medium-and heavy-duty electric vehicles. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

-Higher overall vehicle performance: There is a misconception regarding the correlation between vehicle efficiency and vehicle performance. Traditionally, fuel efficient vehicles were not associated with high performance. However, Lucid's vehicles demonstrate that increased efficiency in EVs yields faster charging, increased power density, and higher output power derived from the same energy input providing faster acceleration capability. With higher vehicle performance often comes increased consumer interest, which in the case of electrification supports consumer adoption. [EPA-HQ-OAR-2022-0829-0664, pp. 7-9]

The National Highway Traffic Safety Administration’s (NHTSA) CAFE and EPA GHG programs already apply standards to ICE vehicles for efficiency, measured by MPG and g/mi respectively. Instituting a similar standard to EVs would apply the same expectations of efficiency to all surface transportation. Vehicle efficiency is determined by several systems and how well they've been optimized to work together. In EVs this includes but is not limited to the battery pack, drive motors, power train, and aerodynamics of the vehicle itself. The overall efficiency in EVs can be measured by MPGe or miles per kWh. EPA has the authority to establish multiplier incentives for EVs and advanced technologies to encourage such technologies in the market.10 Using this authority to implement standards for EV efficiency will encourage manufacturers to not only electrify their fleets, but also prioritize efficiency. [EPA-HQ-OAR-2022-0829-0664, p. 9]

10 "EPA also believed that the temporary regulatory incentives may help bring some technologies to market more quickly than in the absence of incentives Since the GHG performance for these vehicle types is significantly better than that of conventional vehicles, the multiplier provides a significant benefit to the manufacturer." 86 Fed. Reg. 74458-59 (Dec. 30, 2021).

Organization: MECA Clean Mobility

EPA should consider incentives and potential future requirements that advance efficiency of electric vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

Efficiency incentives and regulations have historically driven vehicle manufacturers and technology suppliers to continue to innovate and develop better materials, components, and vehicle systems to reduce energy demand, operating costs and related emissions of vehicles. Electric vehicle efficiency does not provide large benefits at today's EV sales penetration rates. However, if the goals of this rule are met by 2032, electric vehicle sales will be over 60% and EVs will make up a much larger fraction of the in-use passenger car fleet. Therefore, small improvements in efficiency will result in large reductions in grid demand. MECA suggest that EPA consider a range of both incentives and requirements to advance the efficiency of technologies that reduce the emissions footprint of all mobile sources, regardless of the source of propulsion energy. As noted above, setting non-zero certification values for battery electric and fuel cell vehicles will continue to motivate vehicle manufacturers to work with suppliers to improve vehicle efficiency. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

MECA requests that EPA explore additional incentivization structures that would allow consumers to make informed choices when purchasing electric and fuel cell vehicles. For example, EPA could institute a labeling requirement for electric vehicles with similarities to Energy Star and displaying how an electric vehicle compares to other similar electric vehicles in its class. The simplified Energy Star graphic is recognizable and understood by the majority of consumers who might not be able to interpret the value of an electric vehicle efficiency in kilowatt-hours per 100 miles, which is currently on the window sticker. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

MECA members are commercializing components for electric and hydrogen fuel cell vehicles. This includes battery materials for the manufacture of both cathode and anodes utilizing unique macrostructure and composite formulations to improve efficiency and energy density. Electric component manufacturers are using state of the art transistor materials in their motors and power electronics that operate at higher voltages and temperatures thus requiring simpler cooling strategies. These next generation component designs reduce switching losses and improve electric efficiency of the system architecture in electric powertrains. To facilitate integration, component suppliers are integrating the motor, inverter and transmission into electric drive units to simplify the thermal management of the electric components and ease integration into vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

As demonstrated for combustion vehicles over the past 50 years, the market can not always be relied upon to drive innovation towards conservation of critical resources and energy security by improving the efficiency of vehicles. This has led agencies to set fuel efficiency and GHG standards. There is a significant disparity in the electric efficiency of similarly sized passenger electric vehicles today, as shown in Table 4. [See original comment for Table 4. Comparison of Energy Efficiency of BEV and PHEV Models] We urge EPA to begin compiling electric efficiency information and consider setting a minimum efficiency or energy consumption by weight class in a future rulemaking. [EPA-HQ-OAR-2022-0829-0564, pp. 33-34]

Organization: Porsche Cars North America (PCNA)

Porsche's double-E strategy of electromobility and near carbon-neutral combustion

As stated above, Porsche has established an ambitious goal for the electrification of our cars and trucks over the next several years. This goal builds upon the range of electrified models that Porsche has offered in the United States for the past decade. Within the premium, high-performance and luxury segments in which Porsche competes, Porsche has delivered almost 45,000 BEVs and PHEVs to our US customers. These vehicles have brought a new level of complexity in development and manufacturing and continue to incur higher costs associated with batteries and electric drive componentry. Nevertheless, with continued innovation, Porsche is confident that the expanding range of electrified models, with continuously improving technical performance, will meet the needs and desires of many of our customers for the high degree of utility and performance that they demand. [EPA-HQ-OAR-2022-0829-0637, p. 4]

Importance of Monitoring Progress on the Advancement of Electrification

EPA's proposal includes a wide array of assumptions related to the development of the electrification market, costs of components, supply chain readiness, and charging infrastructure. These assumptions each contribute towards the percent of electrification that was used to inform the overall stringency of the targets. As outlined by the AFAI, Porsche supports the concept of a holistic program to monitor the overall progress of each of these assumptions and their related impacts on electrification readiness and adoption. Monitoring progress with transparent reporting is a pragmatic policy decision that does not cast doubt on the success of each of the assumptions. Rather, monitoring and reporting establishes a clear and transparent basis for ongoing dialogue between stakeholders and the EPA. This type of monitoring can provide early awareness of unexpected challenges or disruption and allow stakeholders to understand how requirements may need to be adjusted to help ensure that the requirements remain achievable. [EPA-HQ-OAR-2022-0829-0637, p. 7]

Organization: Stellantis

Target Adjustment Mechanisms Needed Based on Market Enablers

Stellantis fully supports the Auto Innovators' comments proposing a target adjustment mechanism based on key EV market enablers. This mechanism is in addition to making the other revisions needed to address concerns raised with the standards. There is a great deal of uncertainty with how critical mineral and raw material supplies, battery cost improvements, and charging/refueling infrastructure will develop over the next decade. In particular, charging/refueling infrastructure and supply of critical minerals and raw materials from non-countries of concern are well outside the control of either EPA or automakers. We understand EPA must use projections in its modeling. However, given the uncertainty around these items, large inaccuracies can lead to a final rule that is grossly misaligned with the market. The Auto Innovators' proposal of a market-based target adjustment system would allow for year-by-year adjustments to be made within the framework of a rule that can be finalized on EPA's desired timeline and will minimize the need to be reopened to react to real-world market conditions. [EPA-HQ-OAR-2022-0829-0678, p. 7]

This proposal contains three individual adjustment mechanisms of roughly equivalent magnitude. The first is based on the percentage of the entire U.S. light-duty fleet qualifying for the full $3,750 30D retail tax credit which is tied to extracting and processing critical minerals in the U.S. or a country with a free trade agreement. This is the most simple and direct way to assess whether or not raw material supplies are developing adequately. The second adjustment mechanism is based on actual EV battery costs that could be confidentially disclosed to the EPA by each automaker every model year and compared with EPA's projected battery costs used in the development of this rule. The third mechanism is simply tracking the ratio of public charging/refueling points to the number of light-duty EVs registered and on the road. As the total size of the on-road EV fleet grows, so does the amount of charging/refueling infrastructure. If these three key market enablers develop as envisioned by EPA in this rule, then the impact of these adjustments will be negligible. But if one or more of these key enablers do not develop quickly enough, then this proposed system will allow for simple, objective, and transparent metric-based adjustments to be applied equally to all of industry. These are industry-wide issues and thus should be resolved on an industry-wide basis. [EPA-HQ-OAR-2022-0829-0678, p. 7]

At a House Committee on Energy and Commerce hearing on driving affordability held on June 22, 2023, Rep. Dingell (D-MI) raised concerns with EPA Principal Deputy Administrator Goffman on what happens under the NPRM if companies cannot reach BEV as 67% of new vehicle sales in 2032, consumers cannot afford EVs, the charging stations aren't there, and the assumptions and forecasting EPA relies upon are not viable. Mr. Goffman's response included a reference to a possible market assessment review. Stellantis believes the Auto Innovators' recommended ongoing market-based target adjustment system to be the best embodiment of a direct market review. However, Stellantis could support an additional market-based review that is both objective and transparent in reaching the necessary adjustments to allow this rule to be reasonable and achievable given the large amount of uncertainty with how these key market enablers will develop over the next decade. At a minimum, Stellantis supports EPA adding modules to its annual EPA Automotive Trends Reports that capture important metrics such as the number of public EV charging stations deployed and percent of EVs purchased. [EPA-HQ-OAR-2022-0829-0678, p. 7]

EPA Summary and Response

Some manufacturers suggested that one response to the uncertainty and risk surrounding supply chain, critical minerals, manufacturing costs and charging infrastructure would be to implement a stringency adjustment mechanism based, for example, on an assessment of progress in domestic critical mineral sourcing, PEV infrastructure, or other developments the commenters deem necessary to accompany increased penetration of PEVs under the standards.

EPA notes that we have assessed issues such as the supply chain (including critical minerals), charging infrastructure needs and development, and manufacturing costs as part of our assessment of the feasibility of these standards, although actual implementation of specific measures to advance issues such as infrastructure, mining, supply chain development etc. are largely outside of EPA's statutory authority to control and are outside the scope of this rulemaking. Regarding the implementation of a stringency adjustment mechanism, EPA disagrees with this recommendation.

As we discuss in Section I.B.1 of the preamble, our final standards have been adjusted (with the more linear Alternative 3 from the proposal, combined with a slower phase-down of several credit provisions) in response to concerns about lead time and feasibility. Our technical assessment, as discussed in Sections IV and V of the preamble, is that the final standards are feasible and appropriate for the years at issue. Despite commenters' concerns over uncertainty and risk in the development of the market for electric vehicles, feasibility is not dependent on one singular technology pathway (such as BEVs): the final standards, as in previous rulemakings, are performance-based and do not require any particular technology to meet the standards. Manufacturers may choose many potential pathways to compliance that involve different mixtures of vehicle technologies. Table 4 in Section I.B of the preamble gives examples of technology pathways for compliance (with varying levels of BEV penetration, as well as varying levels of PHEVs, HEVs and non-hybrid ICE technologies) based on OMEGA modeling. Additionally, we have run sensitivity analyses (Section IV.F of the preamble) addressing low critical mineral availability, higher battery costs, and lower consumer acceptance (for any particular reason, including a lack of optimal number of chargers). In Section IV.F.4 of the preamble, we discuss a sensitivity and path to compliance in which no additional BEV models are produced that are not currently in production.

Finally, EPA notes that an automatic stringency adjustment would eliminate the predictability and certainty of the standards, which in turn would make it more likely that developments in these areas would not occur. EPA finds that making the standards contingent on future developments is unlikely to provide the appropriate signal to both the automotive industry and to those in related industries to make the investments (e.g., in development of the supply chain by the automotive industry and further deployment of charging infrastructure) about which the commenters are concerned. Many commenters (e.g., CALSTART, NESCAUM, Environmental and Public Health Organizations, ICCT) have expressed the need for clear market signals to drive these necessary investments.

Instead of introducing additional uncertainty into automakers' long-term planning, EPA has chosen to adopt standards that can reasonably be met with a variety of technology paths under a variety of potential future circumstances.

In their comments, both Lucid and MECA recommended that EPA include some mechanisms to incentivize the efficiency of electric vehicles. While EPA does recognize several goals commenters have in supporting such an idea (reduced upstream emissions, reduced demand for critical minerals, reduced purchase and operating costs, decreased grid demand, etc), – we do not agree it is appropriate to establish regulatory incentives for more efficient EVs in this final rule. However, we do note that there should be a considerable business case for manufacturers to improve EV efficiency as it will have a direct impact on required battery size, weight, range and resulting battery costs. Manufacturers that can design more efficient BEVs may benefit from a market advantage over competing vehicles in the same segment with lower efficiency. We also note that the fuel economy and environment labels on new vehicles provide information related to efficiency, including EV range and annual operating costs. To the extent that consumers demand more efficient EVs, the label is a source of information that may help consumers identify the most efficient EVs.

4 - Criteria pollutant standards

Comments by Organizations

Organization: Alliance for Automotive Innovation

Criteria – Adopt California's LEV IV Standards

For the Tier 4 criteria pollution standards, we recommend that EPA adopt California's LEV IV exhaust and evaporative emission standards adopted just seven months ago and begin in 2026MY. LEV IV standards were adopted by California last year as an effective and appropriate path forward to address the toughest in the nation air quality challenges. EPA should align with this comprehensive strategy to enable a nationwide criteria emissions program. [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

If EPA finalized the multi-pollutant regulations with these two recommendations, the final regulations would still be the most aggressive and challenging in U.S. history, and they would provide dramatic reductions in GHG and criteria emissions. However, EPA would reduce the risk of potential harmful consequences to both the EV market, and the new vehicle market in general, by forcing BEVs at a rate that outpaces the EV supply chain, infrastructure, critical mineral supplies, and customer acceptance. Getting the pace right is critical to the success of the automakers and to U.S. leadership and competitiveness. [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

2. Proposed 40 C.F.R. § 86.1811-27(c)

The proposed 40 C.F.R. § 86.1811-27(c)(1) specifies to "Measure emissions as described in paragraph (b)(1) of this section, but use the driving cycle identified in 40 CFR 1066.801(c)(5)."294 The driving cycle identified in the proposed 40 CFR § 1066.801(c)(5) is the HFFET.295 [EPA-HQ-OAR-2022-0829-0701, p. 189]

294 NPRM at 29420.

295 NPRM at 29444.

IV. Light-Duty Criteria and Toxic Pollutant Standards

Automakers are committed to ultimately achieving net-zero transportation carbon emissions and electrification of the light-duty vehicle fleet. However, this transformation requires massive investment in EV technology and supporting mechanisms such as infrastructure, all involving many stakeholders. To be successful, automakers must primarily focus resources on the transformation rather than incremental changes to existing internal combustion engine (ICE) vehicles, which are already very near zero. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

The focus of EPA and the automakers is and should be on electrification. Thus, Auto Innovators supports changes to traditional criteria emission (e.g., NMOG, NOx, and PM) standards that measurably reduce emissions, but do not add substantial additional hardware or capital costs to ICE vehicles that will soon be retired. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

Unfortunately, EPA proposes to adopt new requirements that will divert resources from our shared goal of widespread electrification. Prohibiting enrichment could require complete engine redesigns and possibly larger displacement engines to provide customers with the capability they demand. The proposed PM standards substantially increase costs and vehicle development complexity in addition to adding testing requirements. Finally, in several cases, EPA provides less flexibility and/or chooses not to align with ACC II. This lack of alignment is particularly troubling as automakers and suppliers have already developed product plans and spent resources toward meeting the ACC II regulations, and in some cases, EPA's proposal would require substantial changes during the middle of ACC II regulatory phase-ins. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

3.NMOG+NOx Cold FTP Fleet Average

EPA proposes to set a cold FTP NMOG+NOx fleet average requirement of 300 mg/mile, excluding ZEVs.258 EPA requests comment on whether a 400 mg/mile vehicle cap should be used instead of a fleet average.259 [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

258 NPRM at 29262.

259 NPRM at 29262.

Auto Innovators prefers a fleet average requirement, but requests a value of 300mg/mi for LDV+LDT1 and 400mg/mi for LDT2+HLTD+MDPV for the following reasons: [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

At -7 °C, emission reduction right after engine start-up and during catalyst warm-up is the key factor. Large displacement engines (V6, V8, etc.) inevitably have substantially higher emissions at engine startup before the catalyst is warmed up. For downsized turbocharged engines, the amount of heat supplied to the catalyst decreases due to the relationship between the recovery of the exhaust energy by the turbocharger and the heat capacity of the turbocharger itself; thus, the warm-up time tends to be longer than that of an engine without a turbocharger. During this longer warm-up time when the catalyst is in a semi-active state, the heavier vehicle with a turbocharger under high running load conditions has much higher emissions than other vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

According to the DRIA, EPA developed the proposal based on the test results of three models. The results of these three models certainly meet 300 mg/mi. However, due to differences in exhaust system layout (i.e., front catalyst distance from the engine) and engine control from these models, there are some models that cannot achieve both emission reduction before catalyst warm-up and early catalyst warm-up at a high level under -7 °C condition. There are also vehicles that are heavier than the vehicles EPA tested. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

Developing technology to adapt these vehicles to 300 mg/mi would require diverting substantial resources from electrification [EPA-HQ-OAR-2022-0829-0701, pp. 147-148] :

1.For emission systems development and evaluation, update and/or increase of chassis dynamometer system testing to make it possible to reproduce cold temperature condition is necessary. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

2.Development of pistons and injectors for better combustion and designing arrangement of emission purification devices are necessary. When changing the catalyst system (increase in the amount of precious metals, increase in the number of cells), increase in costs occurs. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

Regarding the 300 mg/mile fleet average, EPA proposes that the family emission limit (FEL) be set to a resolution of 0.1 g/mile (100 mg/mile).260 An FEL set to only a single decimal place (i.e., 0.x g/mile) provides very little flexibility among different vehicles. We recommend that EPA allow an FEL resolution to three decimal places (i.e., 0.xxx g/mile). [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

260 NPRM at 29436.

We also note that although EPA describes the 300 mg/mile fleet average as excluding ZEVs in the preamble,261 the proposed 40 C.F.R. § 86.1811-27(c)(3)(i) regulatory text does not reflect that exclusion.262 Auto Innovators agrees with the exclusion and recommends updating the regulatory text accordingly. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

261 NPRM at 29262.

262 NPRM at 29420.

Organization: American Honda Motor Co., Inc.

Unlike with previous automotive emissions regulations, in which an OEM had numerous compliance technology pathways and could strategically invest in a package of technologies that best suited its customers' needs, this proposal sets stringencies at such a level where there is just one way to comply: significant levels of electrification. Yet should the market not pan out within the agency's ambitious timeline – even for reasons entirely beyond an automaker's control, such as a slower-than-expected rollout of public charging infrastructure that has a chilling effect on consumer interest in EVs – there is no safety net, no alternate package of technologies to which an OEM can pivot and maintain compliance. Regulated parties will simply fall short, facing a profoundly disruptive and costly set of noncompliance obligations. [EPA-HQ-OAR-2022-0829-0652, p. 5]

Further complicating matters, the agency has also chosen to propose criteria emissions standards and engine operation requirements that surpass even California's stringent LEV IV tailpipe pollution standards (part of the Advanced Clean Cars II regulation) finalized just last year. As proposed, EPA's requirements will necessitate significant new internal combustion engine (ICE) development which, in turn, diverts critical resources previously allocated for vehicle electrification that would have served the very same air quality goals. [EPA-HQ-OAR-2022-0829-0652, pp. 5-6]

Recognizing California's longstanding leadership in air quality management and the historical relationship between California and federal emissions standards (where California sets a vanguard target, automakers invest to meet that requirement, and EPA subsequently accommodates a national compliance pathway by setting federal regulations similar to California upon its next round of standards), it is not an unreasonable notion for automakers to theorize that EPA's upcoming PM emissions standards might land in a similar place to California's LEV IV program. [EPA-HQ-OAR-2022-0829-0652, p. 10]

We thoroughly support the decarbonization and air quality improvement objectives promoted by the agency, as well as various elements pertaining to this regulatory proposal's design. We share the agency's desire for widespread adoption of vehicle electrification in the U.S., accelerating our mutual goal of broad transportation decarbonization. [EPA-HQ-OAR-2022-0829-0652, p. 32]

In our view, neither the proposed standards nor any of the three alternatives adequately address the inherent market uncertainties and potential for noncompliance that exists within the agency's ambitious timeline. Rather, the proposal sets the stage for what may be a profoundly disruptive and costly set of noncompliance obligations across the industry. We respectfully urge the agency to finalize a more reasonable emissions reduction trajectory, along with a broader array of compliance flexibilities. We believe that standards in line with Honda's publicly stated electrification targets are representative of a challenging but workable requirement. [EPA-HQ-OAR-2022-0829-0652, pp. 32-33]

Moreover, the emissions inventory will naturally improve as older, dirtier vehicles age out of the car parc and are replaced by cleaner, potentially even zero-emission technologies. EPA's Mobile Sources Technical Review Subcommittee (MSTRS), a diversely represented advisory group to both EPA's Clean Air Act Advisory Committee and staff from EPA's Office of Transportation and Air Quality, made similar observations to the agency in an October 2021 report: [EPA-HQ-OAR-2022-0829-0652, p. 16]

It is expected that the most meaningful reductions in criteria emissions moving forward will come not from further incremental ratcheting of standards, but rather from the ongoing process of fleet turnover: the routine replacement of old (dirty) vehicles with new (clean) vehicles. [EPA-HQ-OAR-2022-0829-0652, p. 16]

Recent research supports this understanding. 29 [EPA-HQ-OAR-2022-0829-0652, p. 16]

> 29 The Future of Mobility: A Report by the EPA Mobile Sources Technical Review Subcommittee. Available online at https://www.epa.gov/system/files/documents/2022-01/mstrs-10-14-2021-meeting-future-of-mobility-report.pdf

Recommendation: Honda strongly urges the agency to include, as part of its Final Rule, feasible GHG and NMOG+NOx standards that properly reflect risk and uncertainty associated with the electrification transition, including a possible removal or substantial weakening of IRA and BIL incentives. [EPA-HQ-OAR-2022-0829-0652, p. 24]

we understand and appreciate the agency's desire to further reduce criteria emissions from the fleet. While we support this goal in principle, we disagree with the agency's suggested approach. The NPRM's proposed PM and commanded enrichment requisites would offer only marginal emissions benefit while forcing costly new engine development (and possibly even chassis development) activities. These aspects of the proposal are highly disruptive to Honda's efforts to focus resources as we pivot to vehicle electrification. We strongly encourage the agency to adopt a federal criteria emissions program aligned with California's recently finalized LEV IV emissions standards and testing regimens. Doing so would deliver continued criteria emissions reductions for all Americans, while sidestepping unnecessary and costly regulatory inefficiencies. [EPA-HQ-OAR-2022-0829-0652, p. 33]

Organization: BlueGreen Alliance (BGA)

[Automakers have historically succeeded at reducing criteria pollutants from their ICE fleets while investing in their ZEV production capacities. EPA's light- and medium-duty standards must incentivize them to continue to achieve gains in reducing tailpipe pollutants and in their ZEV offerings. Reducing tailpipe pollution emissions from ICE vehicles is technologically feasible and affordable; there are off-the-shelf technologies like GFPs that automakers are already applying to their vehicles sold in Europe and Asia in order to comply with emission regulations there. Such technologies could easily and affordably be applied to light- and medium- duty vehicles sold in the United States, with no additional research and development needed. Because EPA's standards are performance-based and technology-agnostic, automakers can and will employ a combination of ZEV and ICE vehicle improvement technologies to comply, while supporting a range of auto manufacturing supply chain jobs. [EPA-HQ-OAR-2022-0829-0667, p. 5]

Organization: BMW of North America, LLC (BMW NA)

BMW NA supports the comments filed by the Alliance of Auto Innovators to the EPA docket. Our main concern is that a diverging approach in the United States between Federal regulations and California's regulations will substantially increase the hurdles to fulfill fleet and vehicle standards. BMW NA is aiming for one single US fleet and therefore would like to motivate EPA to align the Tier 4 rules with LEV IV as much as possible. This is referring to the rules for the NMOG+NOx fleet (bin structure and EV treatment) as well as to the vehicle standards. [EPA-HQ-OAR-2022-0829-0677, p. 4]

The fleet regulation should be harmonized, so that the same fleet composition should lead to compliance in both regulations. Other than the CARB approach, the Tier 4 fleet regulation is heavily dependent on the BEV share. As mentioned above, there is a high uncertainty what BEV share could be reached in each single year. From our perspective, the Tier 4 regulation should focus on regulating pollutant emissions of ICE vehicles. [EPA-HQ-OAR-2022-0829-0677, p. 4]

There should be no additional burdens on top of CARB vehicle standards, which are leading to additional substantial investments for a mature technology in its phase-out - e.g. for test labs or completely new after-treatment systems beyond the CARB standard. [EPA-HQ-OAR-2022-0829-0677, p. 4]

Organization: BorgWarner Inc.

BorgWarner supports EPA's proposal for a lower criteria pollutant standard. BorgWarner supports increased stringency for criteria pollutants on new LD and MD vehicles. BorgWarner produces cost-effective technology that can meet or even exceed the tighter stringency limits. We also support the gradual phase-in of these standards to allow manufacturers to develop and test the new design architectures before installing the necessary emission systems. [EPA-HQ-OAR-2022-0829-0640, pp. 6-7]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

CARB supports U.S. EPA's proposal to tighten criteria air pollutant emission standards, particularly given the continued role that internal combustion engine vehicles will play in the national fleet over the regulatory timeframe and beyond. Reducing exposure to harmful air pollution is a key element of the proposed standards, and the proposals to tighten criteria air pollutant emissions are needed to protect public health, especially in communities with disproportionate exposure to air pollution. Because U.S. EPA's proposal does not require ZEV sales, as California's rules do, the tightening of criteria air pollutant emission standards is even more critical to ensure that the internal combustion engine vehicles that will continue to be sold are becoming cleaner. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

As part of its ACC II rulemaking, CARB adopted its fourth iteration of its Low Emission Vehicle (LEV) standards, referred to as LEV IV. CARB finds that U.S. EPA's proposals are appropriate and largely consistent with the LEV IV standards. CARB has documented our analysis and recommends strengthening the proposal to realize the greatest degree of emission reductions achievable, considering cost and technology availability, to further protect public health. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

Organization: Center for Biological Diversity et al.

As environmental, community, and health organizations, we call on you to take more aggressive action to clean up the gas-powered car and truck fleet that will be polluting our nation's air and communities for decades to come. EPA's latest round of emissions reductions standards, covering Model Years 2027 through 2032, focuses on the rise of zero-emission technologies, including electrification, and the growing number of electric vehicle (EV) models that already have or will soon enter the market. While electrification is undoubtedly an effective and important means of securing emissions reductions, there will also be tens of millions of gas guzzlers that will be sold before EVs become dominant. EPA's rule should focus on curbing emissions from these vehicles as well, as they fuel climate change and needlessly pollute low-income and communities of color. [EPA-HQ-OAR-2022-0829-0671, p. 1]

Organization: Ceres Corporate Electric Vehicle Alliance (CEVA)

The Alliance applauds the Environmental Protection Agency (EPA) for its commitment to adopting multi-pollutant emissions standards for Model Years (MY) 2027 and later light- and medium- duty vehicles and greenhouse gas (GHG) emissions standards for heavy-duty vehicles, and urges EPA to align these standards with U.S. climate and public health goals.1 Specifically, the Alliance supports: [EPA-HQ-OAR-2022-0829-0511, p. 1]

1 https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf

-Light-duty vehicle GHG emissions standards aligned with Alternative 1, the strongest standard proposed in this rulemaking, which will result in a 59% reduction in average fleetwide carbon dioxide emissions by MY2032 from a MY2026 baseline. The Alliance also encourages EPA to move forward with its proposed criteria pollutant emissions standards for light-duty vehicles, reducing fleetwide average MY2032 criteria pollutant emissions 60% from MY2025 levels.2 [EPA-HQ-OAR-2022-0829-0511, p. 1]

2 https://www.epa.gov/system/files/documents/2023-04/lmdv-multi-pollutant-emissions-my-2027-nprm-2023-04.pdf (p.42)

-Medium-duty vehicle (Class 2b and 3) multi-pollutant emissions standards aligned with its current proposal, which will ensure a 44% reduction in average fleetwide GHG emissions by MY2032 from a MY2026 baseline, and a 66 76% reduction in criteria pollutant emissions by MY2032 from a MY2025 baseline.3 [EPA-HQ-OAR-2022-0829-0511, p. 1]

3 Ibid. (p.42)

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

In response to EPA's request for comments on specific aspects of the rule, we offer the following suggestions to ensure the rule is as successful as possible: [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

- Regarding criteria pollutants, we urge EPA to consider ways to align these proposed standards with California, and in doing so to avoid any backsliding in remaining conventional vehicles sold, while avoiding a scenario in which OEMs are forced to divert investment away from transportation electrification and towards technology advancement on conventional vehicles. We are concerned that the criteria standards in the EPA draft rule could have this unintended effect. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

Organization: General Motors, LLC (GM)

In many cases, an EPA final rule aligned with CARB's LEV IV in internal combustion engine criteria emission stringency and the associated test and certification procedure s will help GM achieve significant emissions reductions for internal combustion engine products as soon as MY 2027 despite limited lead time, while continuing to transition to zero-emission vehicle technologies. [EPA-HQ-OAR-2022-0829-0700, p. 6]

Considering the unprecedented nature of EPA concurrently proposing GHG and criteria pollutant standards for light-duty and medium-duty vehicles, we urge EPA to carefully align the standard stringency, phase-in percentages, assumed EV shares, and vehicle categories applicable to Tier 4 standards and the GHG standards. [EPA-HQ-OAR-2022-0829-0700, p. 5]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG strongly supports AFAl's call for the harmonization of California Air Resources Board (CARB) and EPA requirements to avoid the need for separate software for each. It is crucial to streamline the regulatory framework and establish consistent guidelines to facilitate compliance for automotive manufacturers, as well as ensure cost-effective compliance, again resulting in benefits to the environment and consumers. [EPA-HQ-OAR-2022-0829-0554, p. 9]

Organization: Kia Corporation

- Kia recommends EPA adopt the criteria emission standards the California Air Resources Board (CARB) adopted under the Advanced Clean Cars II (ACC II)(i.e., Low Emission Vehicle IV (LEV IV)). California's final standards significantly reduce criteria pollutants quickly - Particulate matter (PM), Nitrogen Oxide (NOx), Non-methane organic gasses (NMOG) - but does not divert critical resources needed to increase EV market penetration. It is critical that the criteria emissions regulatory framework is streamlined. [EPA-HQ-OAR-2022-0829-0555, p. 3]

Kia Supports Aligning with CARB's Criteria Emissions Standards Under ACC II

Kia supports a tightening of criteria emissions standards that can be accomplished cost-effectively through vehicle software calibration changes. EPA's proposed changes to criteria emissions standards would require large capital improvements, additional hardware on vehicles, and/or complete engine redesigns to maintain capability. [EPA-HQ-OAR-2022-0829-0555, pp. 9-10]

Kia recommends EPA adopt the criteria emission standards CARB adopted under the ACC II (i.e., LEV IV) as well as harmonization with CARB's phase-in schedule. Industry negotiated with California in a transparent process over years in several workshop and comment periods to develop final standards. California's final standards significantly reduce criteria pollutants – PM, NOx, MNOG – quickly but does not strand technologies or divert much needed resources. [EPA-HQ-OAR-2022-0829-0555, pp. 9-10]

While EPA is proposing a 10-fold increase in electric vehicles sales, EPA is proposing automakers redesign ICEs to meet new criteria emission standards. EPA's proposed requirements will divert the much-needed capital away from vehicle electrification. If EPA wants the vehicle industry to succeed in increasing new vehicle sales to 50-60 percent in seven years, EPA must allow automakers to focus resources on the full transformation to EVs – an expensive and monumental task. Not on incremental changes to near-zero criteria emissions on ICE vehicles. As discussed above, Kia will invest $36.3 billion by 2027 in EVs and other advanced vehicle technologies. This is a downpayment as Kia continues our aggressive EV transition to perfect our electric powertrain technology. Focusing resources on EVs is critical to ensure electrification transition is successful. [EPA-HQ-OAR-2022-0829-0555, pp. 9-10]

EPA proposes bins that are slightly different from bins finalized in ACC II. Specifically, EPA is not proposing Bin 125, Bin 25, or Bin 15, as found in ACC II, and instead is proposing a Bin 10. Kia recommends aligning EPA's new bin structure with CARB's bin structure. While Kia has no issue with the stringency of EPA's proposed bins, it would be beneficial for the bin structure to be harmonized between CARB and EPA as this would eliminate compliance and testing complexity. [EPA-HQ-OAR-2022-0829-0555, pp. 9-10]

Organization: Maryland Department of the Environment (MDE)

The Maryland Department of the Environment (MDE) is writing to express our support for the above proposed rule to establish Multi-Pollutant Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. MDE agrees that this comprehensive federal program would achieve significant greenhouse gas (GHG) and criteria pollutant emissions reductions, improve air quality, and result in substantial public health benefits while helping us meet our climate and air quality goals. MDE urges the Environmental Protection Agency (EPA) to adopt the proposed criteria pollutant standards. MDE also urges EPA to adopt the most stringent, technologically feasible Alternative 1 GHG emissions standards. Alternative 1 is the closest to being in alignment with the California Advanced Clean Cars II (ACC II) regulations, which Maryland is in the process of adopting. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland has made a lot of progress over the past few decades towards clean air. The improvements have been so substantial that the EPA has proposed to determine that the Washington, District of Columbia-Maryland-Virginia nonattainment area has clean data for the 2015 8-hour ozone national ambient air quality standard (2015 ozone NAAQS). A Clean Data Determination (CDD) is the first step in being redesignated from nonattainment to attainment. The Baltimore nonattainment area will also be eligible for a CDD in the near future if the area continues to stay at or below the ozone standard. Nitrogen oxides (NOx) are a precursor pollutant of ground-level ozone and are also precursors to secondary small particulate matter (PM2.5). Exposures to these two pollutants are associated with premature death, increased hospitalizations, and emergency visits due to exacerbation of chronic heart and lung diseases and other serious health impacts. Some areas of the state experience higher rates of illnesses such as asthma than average, and these illnesses are aggravated by these pollutants. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

While significant progress has been made statewide, continuing to reduce NOx emissions, especially those from the transportation sector, is critical to our efforts to attain and maintain the ozone NAAQS. Regional modeling shows that a significant portion of the ozone-forming pollutants are transported into Maryland from upwind states. EPA estimates that strengthening these standards will reduce NOx and PM2.5 emissions nationally by 41% and 35% in 2055, respectively, which combined with state reductions can provide cleaner air for Marylanders. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland is working hard to reduce in-state emissions from the transportation sector. Efforts include the Maryland Clean Cars Act that instructed MDE to adopt the California Advanced Clean Car (ACC I) regulations that require manufacturers of passenger cars and light-duty trucks to sell increasing percentages of zero-emission vehicles (ZEVs). The regulations also include low-emission vehicle (LEV) standards to reduce criteria pollutants and GHG emissions from new gasoline powered vehicles. As noted above, Maryland is in the process of adopting California’s ACC II regulations. The ACC II regulations require auto manufacturers to sell an increasing percentage of ZEVs over time, with a phase in of a 100 percent sales target by 2035. ACC II also established increasingly more stringent exhaust and evaporative emissions standards for criteria pollutants from these vehicles. Maryland’s recently enacted Clean Trucks Act of 2023 requires MDE to adopt California’s Advanced Clean Trucks (ACT) regulations that require manufacturers of medium-and heavy-duty vehicles to sell increasing percentages of ZEVs by 2035. Maryland is also a signatory to both the 2013 Multi-State Zero-Emission Vehicle

Memorandum of Understanding and the 2020 Multi-State Medium-and Heavy-Duty ZEV Memorandum of Understanding under which the signatory states are working collaboratively to accelerate ZEV adoption, coordinate ZEV policy, develop the ZEV market, and build out infrastructure. The recently enacted Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) will provide significant funding to advance electrification and charging infrastructure that will enable the widespread electrification of this vehicle market. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Adopting the most stringent, technically technical feasible Alternative 1 GHG emissions standards at the federal level will provide considerable support for Maryland's efforts to meet our GHG reduction goals. Transportation accounts for almost half of all GHG emissions generated in the State. The Climate Solutions Now Act of 2022 (CSNA) established a statewide goal of a 60 percent reduction in GHG emissions from 2006 levels by 2031. The CSNA requires more stringent GHG emission reductions economy wide and requires state agencies execute plans, programs, and policies in order to achieve these goals. Enacting the most stringent GHG emissions standards that are technologically feasible will complement the many strategies being implemented under the CSNA. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Maryland has implemented emissions reduction measures across all sectors, including on-road transportation to reduce the state's GHG and NOx emissions. Federal programs such as these standards are needed to provide significant additional reductions of these pollutants as they also provide benefits across the economy. The EPA's leadership in strong regulatory GHG limits from motor vehicles could also help reduce ozone and PM2.5 precursors, providing further reductions to help meet our climate and air quality goals. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

For these reasons, MDE supports the EPA's proposal to adopt the proposed criteria pollutant standards and the most stringent, technologically feasible Alternative 1 GHG emissions standards for model year 2027 and later light-duty and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0698, pp. 1-3]

Organization: Mazda North American Operations

Mazda strongly requests that EPA take these considerations into account and make necessary adjustments to the proposed rule as it works towards a Final Rule. We feel the Final Rule should have more realistic targets and associated ramp ups, include PHEVs, and adopt CARB's current LEV IV for criteria emissions. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Organization: Mercedes-Benz AG

Furthermore, we emphasize the need for flexibility in the rulemaking, particularly related to the criteria emissions. We recommend EPA align its criteria emissions standards to those adopted in California's Advanced Clean Cars II ("ACCII") Low Emission Vehicle IV ("LEV IV") standards. The ACCII program, including ZEV and LEV IV, was designed purposefully to advance electric vehicles and secure important, additional criteria emissions improvements from internal combustion engines. Aligning Tier 4's light-duty and medium-duty bins, levels of the standards, and phase-in commensurate with LEV IV will provide significant nationwide air quality benefits. To the extent EPA deviates from the LEV IV pathway, Mercedes-Benz is prepared to work with the agency to identify more appropriate pathways and timelines that maximize technology development underway for the worldwide market. We further implore EPA to use this rulemaking to seek additional areas that reduce burden, without compromising environmental benefits; as proposed, the rule significantly increases testing burden and likely requires investments in lab upgrades that detract from ongoing and necessary EV investment. [EPA-HQ-OAR-2022-0829-0623, p. 2]

The EPA NPRM contains aggressive criteria emissions standards that push the bounds of current technologies, and also rely heavily on the sale of electric vehicles. In addition, these criteria emissions standards do not properly account for the proceeding three to four years of work with the California Air Resources Board ("CARB") to develop and implement the ACCII LEV IV standards. LEV IV was developed under a mutual understanding that important and real criteria emissions controls could and should be implemented, and at the same time, as auto industry investments increasingly shift into electrification, a balance must be struck. LEV IV therefore provides air quality and health benefits without requiring automakers to divert electric vehicles investments into internal combustion engine technology upgrades and expanded testing. Additionally, Mercedes-Benz has already begun development efforts for LEV IV, and EPA's proposed standards would in many cases negate the research and development dollars already committed. [EPA-HQ-OAR-2022-0829-0623, p. 4]

Thus, Mercedes-Benz's recommends that EPA align its Tier 4 standards with the LEV IV standards, which includes adoption of the same bins used in LEV IV [EPA-HQ-OAR-2022-0829-0623, p. 4]

Organization: Minnesota Pollution Control Agency (MPCA)

- Adopt the proposed criteria pollutant standards for light- and medium-duty vehicles

MPCA also strongly supports EPA's proposal to establish more stringent emissions standards for criteria pollutants for both light- and medium-duty vehicles. EPA's modeling suggests the proposed standards would result in significant criteria pollutant and air toxics emissions reductions, which would provide substantial health and air quality benefits to Minnesotans. [EPA-HQ-OAR-2022-0829-0557, p. 4]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

Align the Tier-4 (criteria pollutants) with CARB's LEV-IV criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Organization: Porsche Cars North America (PCNA)

Comments specific to the proposed Criteria Exhaust Emission Standards for Model Years 2027 and Later [EPA-HQ-OAR-2022-0829-0637, p. 8]

Porsche provides the following comments in supplement to the comments from the AFAI specific to the proposed Tier- 4 standards for light-duty vehicles. As noted earlier, Porsche does not currently market medium-duty vehicles in the United States and offers no input for those regulatory requirements. [EPA-HQ-OAR-2022-0829-0637, p. 8]

In general, Porsche continues to maintain that the vast majority of emission reduction opportunity will be realized through the deployment of zero- and near-zero emission technology vehicles. As projected within the NPRM and the support documents, the bulk of emissions benefits should be achieved through the significant growth in electric vehicles projected by EPA for the US market. [EPA-HQ-OAR-2022-0829-0637, p. 8]

While focusing on a majority electrification strategy, Porsche continues to see a role for future advanced combustion engines in limited applications. As such, Porsche appreciates the sections of the proposal that align with California's recently adopted Advanced Clean Cars II LEV-IV program and supports comments that seek additional alignment between the two programs. This alignment will help manufacturers optimize resources and streamline planning. [EPA-HQ-OAR-2022-0829-0637, p. 8]

Organization: Stellantis

From a criteria emissions standpoint, not only did EPA assume the same optimistic EV penetrations, it also proposes tailpipe requirements on ICE products that demand significant levels of all-new technology investment on a shrinking ICE fleet. Again, EPA chooses to exceed even the most forward-leaning precedent of California driving new requirements and development that distracts from the focus needed to execute on our commitment to transition to an EV dominated market by 2035. [EPA-HQ-OAR-2022-0829-0678, pp. 23-24]

Adopt the aggressive CARB ACC II LEV IV criteria emission standards recently finalized by California. Specifically, EPA should: [EPA-HQ-OAR-2022-0829-0678, pp. 24-25]

EPA Should Adopt Stringent CARB ACCII LEV IV Criteria Emissions Standards

Stellantis fully supports AAI's comments and the recommendation to align to CARB ACC II LEV IV criteria emissions requirements. EPA should either adopt or align with California's stringent ACCII LEV IV criteria requirements, avoiding the unnecessary development of all new technology to apply to a shrinking ICE fleet (distracting from EV focus). As highlighted in the examples above, the California standards still provide significant improvements over EPA's Tier 3 standards. EPA must also continue to allow enrichment for component protection which is critically needed for continued use of highly efficient downsized turbocharged powertrains and avoid PM requirements that mandate development of all-new GPF systems and/or extraneous new testing. [EPA-HQ-OAR-2022-0829-0678, pp. 16-17]

Also, vehicles over 22,000 lb. GCWR will be forced to certify on an engine dyno for criteria emissions. Because this is misaligned with California's ACC II LEV IV rules, it forces dual certification efforts, different hardware and uncertain impacts on GHG performance. Stellantis believes the 22,000 lb. GCWR proposed requirement should not be implemented for determination of criteria emissions standards, nor should it be used to alter the GHG stringency. To address EPA concerns, criteria emissions standards should be aligned with CARB's ACC II LEV IV rules instead. [EPA-HQ-OAR-2022-0829-0678, p. 19]

Organization: Toyota Motor North America, Inc.

3. The stringency of the criteria pollutant standards (i.e., tailpipe standards) exceed California's recently finalized LEV 4 standards with little technical or scientific justification. In

fact, the proposed tailpipe standards serve as a de facto BEV mandate. EPA should adopt California's LEV4 standards – the most stringent ever put in place in the U.S. - and not go beyond these. [EPA-HQ-OAR-2022-0829-0620, p. 2]

9.1 Overall comments

Toyota believes that the focus of OEM's efforts should be on electrifying the fleet and that additional and unnecessary provisions with minimal impact on air quality should be reconsidered by the EPA. We believe that the California Air Resources Board (CARB), with their long, collaborative process with all stakeholders, has done a good job of balancing the need to protect human health and with the structure and additional provisions in their LEV IV regulation. Since conventional vehicles will remain in the sales mix though and beyond the timeframe of this Proposed Rule, the unnecessary stringency of certain Tier 4 provisions does not promote more electrification, but rather reduced Toyota's ability to assign resources from conventional engines and hinders EPA's goal of alignment with President Biden's electrification goals. Therefore, we highly recommend that EPA harmonize with the regulatory structure and stringency of the California LEV IV regulation. [EPA-HQ-OAR-2022-0829-0620, p. 48]

Organization: Volvo Car Corporation (VCC)

The proposal if adopted would create unnecessary additional burden on manufacturers that are spending most of their resources on electrification. VCC believes the US government should instead pursue policy that encourages and develops the US electric vehicle market. VCC shares the Biden administration goals on electrification and encourages EPA to implement a rule that does not have unintended consequences like delaying or deterring future electrification plans. [EPA-HQ-OAR-2022-0829-0624, p. 5]

Organization: Wisconsin Department of Natural Resources

4. Alignment with California Air Resources Board (CARB) programs. EPA proposes to align certain program elements with CARB's Advanced Clean Cars II rule (such as accounting for high-powered cold starts in plug-in vehicles) and to update onboard diagnostics (OBD) requirements to reflect CARB's 2022 OBD-II rule. To ensure national consistency and ease compliance requirements for manufacturers, EPA should seek to align such elements with approved CARB regulations whenever possible. [EPA-HQ-OAR-2022-0829-0507, p. 3]

EPA Summary and Response

Summary:

The Alliance for Automotive Innovation (AAI) as well as Ford Motor Company, Kia, Mazda, Mitsubishi, Porsche North America, Stellantis, Aston Martin, BMW and the SVM Ad Hoc group all recommended that EPA adopt CARB's ACC II criteria pollutant program in lieu of EPA's proposal. AAI along with Mitsubishi stated their belief that the proposed criteria pollutant program diverted resources away from EV development and towards ICE technologies. Honda, Mercedes-Benz AG, Porsche, Stellantis and Volvo all commented that the proposed criteria pollutant standards will distract resources from efforts to electrify the fleet and act as an unnecessary burden on the vehicle manufacturers. The Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment seemed to echo this comment and expressed concern that the criteria pollutant program could have the unintended effect of delaying electrification. In addition, Honda commented that the criteria pollutant program proposed by EPA is too reliant on electric vehicles and ancillary systems, such as charging infrastructure, to achieve the levels of electrification required to meet the proposed criteria pollutant standards and suggested. “We respectfully urge the agency to finalize a more reasonable emissions reduction trajectory, along with a broader array of compliance flexibilities.” Honda, Mercedes-Benz and Stellantis also commented on the stringency of CARB’s ACC II program and stated that the proposed criteria pollutant program from EPA went beyond the stringency of ACC II.

On the other hand, the California Air Resources Board (CARB), Ceres Corporate Electric Vehicle Alliance (CEVA) and the Center for Biodiversity (CBD) et al. all commented in favor of the proposed criteria pollutant standards, with CBD noting that “While electrification is undoubtedly an effective and important means of securing emissions reductions, there will also be tens of millions of gas guzzlers that will be sold before EVs become dominant.” CARB commented similarly “Because U.S. EPA’s proposal does not require ZEV sales, as California’s rules do, the tightening of criteria air pollutant emission standards is even more critical to ensure that the internal combustion engine vehicles that will continue to be sold are becoming cleaner.”

The Auto Alliance pointed out that the instructions for -7°C testing in 40 CFR 86.1811-27(c)(1) improperly cited a provision describing the Highway Fuel Economy Test.

Response:

EPA thanks all the commenters for providing comments regarding the proposed criteria pollutant standards. EPA believes that the form and the stringency of final criteria pollutant program addresses the comments received, provides additional alignment with the CARB ACC II program in certain respects, and is within EPA’s Clean Air Act statutory authority.

As several commenters noted, there will most likely be over 100 million ICE-based vehicles sold in the U.S. in the coming decades. Under our central case projections nearly 40% of new vehicles sold and 82% of the on-road fleet will have internal combustion engines in 2032. In addition, EPA’s GHG and criteria pollutant programs are performance-based, and vehicle manufacturers will most likely adopt different technology solutions to meet the final standards, some of which could include heavy reliance on a spectrum of ICE-based technologies such as advanced gasoline engines, hybrids and plug-in hybrids. EPA agrees that tightening emission standards for ICE-based vehicles is critically important to ensure that these vehicles continue to become cleaner.

EPA disagrees with comments that the criteria pollutant program is a distraction from electrification and with comments that the criteria pollutant program can only be met with the adoption of BEVs. Several vehicle manufacturers have announced new engine development programs, such as GM’s 6^{th} generation V8, and it seems clear that vehicle manufacturers continue to invest in ICE technology even as they ramp up their EV portfolios. In addition to electrification, manufacturers have the ability to reduce emissions from their ICE-based vehicles through available technologies including better combustion control and improved after-treatment systems allowing them to comply with the final standards with a combination of ICE improvements and electrification. The basis for our technical conclusion that these standards are feasible without the adoption of BEVs is explained further in Chapter 3.2 of the RIA.

Regarding AAI's comment that the instructions for -7°C testing in 40 CFR 86.1811-27(c)(1) improperly cited a provision describing the Highway Fuel Economy Test, we have corrected this for the final rule to refer to the testing instructions for -7°C testing at 40 CFR 1066.801(c)(6).

Many auto industry commenters recommended that EPA adopt the CARB ACC II program in lieu of our proposed criteria pollutant program. While elements of EPA's final standards are consistent with the CARB standards, as discussed further in responses later in this section, and EPA did consider aspects of the CARB standards in evaluating appropriate standards under the Clean Air Act, EPA disagrees with commenters that we should adopt the CARB's ACC II program as recommended by commenters. The CARB ACC II program holistically considers both greenhouse gas and criteria pollutant emissions, with the foundation of the ACC II program being a manufacturers' production requirement for ZEVs. Commenters did not recommend adopting the ZEV requirement provisions of ACC II and instead recommended that EPA only adopt some of the criteria pollutant elements of ACC II. This a la carte approach to emissions standards fails to consider the interdependent nature of CARB's ACC II program. CARB's treatment of ICE-based vehicles is premised on an increasing penetration of ZEVs in the California fleet, and the associated emission reductions that result from an increasing percentage of ZEVs. EPA's program, being performance-based for both GHG and criteria pollutant emissions, relies on increasingly stringent performance-based standards to achieve substantial emissions reductions nationwide. As a result, ICE-based vehicles are anticipated to be part of most manufacturers' product plans under the EPA standards. With ICE-based vehicles representing such a substantial portion of new vehicles sold and the on-road fleet for decades to come, to achieve the necessary emissions reductions for both GHG and criteria pollutant emissions it is important that ICE vehicles, in addition to electric vehicles, continue to reduce emissions. GM supports this position and commented "In many cases, an EPA final rule aligned with CARB's LEV IV in internal combustion engine criteria emission stringency and the associated test and certification procedures will help GM achieve significant emissions reductions for internal combustion engine products as soon as MY 2027 despite limited lead time, while continuing to transition to zero-emission vehicle technologies." EPA is, however, finalizing additional provisions which are responsive to certain comments recommending alignment with ACC II, as discussed further in responses later in this section.

4.1 - Program design and structure

Comments by Organizations

Organization: Cummins

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• Standards should be fuel neutral (i.e., same stringency regardless of fuel type) to ensure the environmental benefits of the regulation are achieved regardless of the fuel type chosen by customers. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

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Organization: General Motors, LLC (GM)

The following appendices provide further detailed regulatory and technical comments. Appendix A
provides recommended edits to EPA's proposed regulatory text to clarify various parts of the regu latory language to ensure a successful and aligned set of EPA regulatory requirements. The other appendices provide confidential business information to help inform various technical aspects of the criteria emission and GHG standards. In many cases, an EPA final rule aligned with CARB's LEV IV in internal
combustion engine criteria emission stringency and the associated test and certification procedure s will
help GM achieve significant emissions reductions for internal combustion engine products as soon as MY 2027 despite limited lead time, while continuing to transition to zero-emission vehicle technologies. [EPA-HQ-OAR-2022-0829-0700, p. 6]

[See original attachment for April 7, 2023 EPA Memorandum with subject: Redline Version of EPA's Proposed Regulations to Adopt New Standards for Light-Duty and Medium-Duty Vehicle Standards"] [EPA-HQ-OAR-2022-0829-0700, p. 6]

[See original attachment containing redacted confidential comments titled, "Summary of GM Technical Comments and Recommendations in Response to Environmental Protection Agency's (EPA) Notice of Proposed Rule Making (NPRM) for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (Tier IV)" [EPA-HQ-OAR-2022-0829-0700, p. 6]

Organization: KALA Engineering Consultants

Suggested Alternatives

KALA is an engineering firm and would not be making these comments unless we had some alternatives to suggest to EPA. If the EPA does the right thing and makes known the attributable upstream and downstream GHG emissions for both gasoline and BEV vehicles in a straight-forward comparison, the GHG reduction premise for the EPA Docket ID No. EPA–HQ–OAR–2022–0829 would be nullified. That leaves the criteria air pollutant emission reduction premise for the proposed rulemaking. As we stated above, we concur with EPA that BEVs would reduce criteria pollutant levels where they operate. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

However, looking at what has been happening with weather events, forest and wildfire emissions and more frequent flooding events over the last 20 years, the number of lives lost from those Climate Change-related calamities may soon overwhelm any life-saving measures that would stem from implementing the criteria pollution standards proposed in this docket, previous dockets and future dockets. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Despite that grim assessment, we feel that continuing to try and reduce criteria pollutants is worthwhile, even though massive forest fires in Canada this year seem to have wiped out any progress in that area for the time being. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Focusing Criteria Pollutant Emission Reductions on Nonattainment Areas

In the Federal Register Text for the EPA–HQ–OAR– 2022–0829, EPA identifies the number of air pollution nonattainment areas around the country. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

From Section I. A. 2, i: “There are currently 15 PM2.5 nonattainment areas with a population of more than 32 million people and 57 ozone nonattainment areas with a population of more than 130 million people.” [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Each of those PM 2.5 and Ozone nonattainment areas of the country have vehicles that are either registered within the nonattainment area or are registered in surrounding counties that by regularly driving into the nonattainment area contribute to criteria pollutant emissions within the geographic nonattainment area. The vehicles registered outside the nonattainment area itself that contribute to emissions within the actual geographic confines of the defined nonattainment area are probably used to drive to destinations inside the nonattainment area for work or other reasons. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Our reasoning for what we are about to suggest is based on the question we asked ourselves. “If we really want to make the biggest impact on highly air polluted locations, as defined by nonattainment areas, why require nation-wide criteria pollutant standards when requiring low or no operating emission vehicles to be used within or to enter nonattainment areas might obtain acceptable significant reductions?” We really must agree with the comments from South Dakota Department of Agriculture and Natural Resources (DANR), in which they said, [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

South Dakota is a large state with significant driving distance between many of our communities. Although several new electrical vehicles indicate they have a 200 mile or greater range (note – it is 224 miles one way from Pierre to Sioux Falls), a recent study shows electric vehicles (EVs) do not consistently achieve EPA' s range estimates. In addition, all batteries degrade over time. Reports indicate EV vehicle batteries will degrade between 10 and 40 percent over a 10-year life span. To maintain the battery's life, manufactures recommend batteries are not frequently depleted below 10 percent capacity or charged above 90 percent capacity. This means that an electrical vehicle should be limited to 80 percent of its capacity range to maintain the battery's life. In addition, cold, hot, and windy weather conditions may reduce an EV vehicle's range between 20 to 40 percent and may further impact the reliability of EV. South Dakota is known to have cold and windy winters and hot and windy summers, which, with current EV ranges, batteries conditions, and availability of charging stations, makes widespread use of EV s impractical in South Dakota. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

We believe that a regulatory scheme targeted at vehicles that regularly operate within nonattainment areas, requiring vehicle registrants to use low or no operating emission vehicles if they wish to operate those vehicles inside the nonattainment area on a regular basis would be one approach to reduce criteria emissions in those designated areas. Such a regulatory scheme would require cooperation with the automobile registration agencies, the air quality or resources agencies and potential enforcement agencies within the state where the nonattainment areas are located. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

By shifting focus to nonattainment areas, the efforts underway to add charging stations all over the country could be re-focused to install many more charging stations within nonattainment areas and get more bang for the Federal buck spent. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Here is how we see such a plan could work. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

A. Vehicle registrants who reside inside the non-attainment area would receive notices that their vehicle(s) do not meet newly promulgated EPA regulations for lowering air pollutant emissions in the local nonattainment area. These of course, would include fleet owners of delivery vans, service vehicles, school busses and other owners of large numbers of vehicles that operate principally inside or very nearby the nonattainment area boundaries. These notices would inform them that one or more of the vehicles they own may no longer be used to drive within the local area because the emissions from the vehicle(s) are too high. The notice would inform the registrants that they can ask for monetary assistance with purchase of a compliant vehicle (sort of like Cash for Clunkers, i.e. high polluting vehicles) or ask for a waiver due to the age of the registrant and/or very low use of the non-complying vehicles (you know, that little old lady who just drives her car to church and the grocery store). [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

B. Since vehicles are re-registered every year, state registration bureaus would ask registrants if they work or travel to destinations inside the nonattainment area on a regular basis. If so and their vehicles are non-compliant, they would receive the same notice that the non-compliant vehicle they drive into the nonattainment area must be changed out to a compliant vehicle by a date certain. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

C. Enforcement could be carried out by application of modern technology. With the advancement of Artificial Intelligence, cameras, many of which are now in place, could be connected to computer systems using software that reads the license plate numbers for vehicles entering the nonattainment area. As time goes by and the same license plates, which of course have vehicle information tied to them including engine type and possibly latest emissions testing data, are read over and over again, the registrant for that vehicle would be notified that the vehicle they are using has been spotted entering the nonattainment area multiple times, enough times to meet criteria for regular entry, and they must switch to a compliant vehicle by a date certain. Warnings and then fines could be levied in stepped amounts against repeat offenders who regularly operate non- compliant vehicles in the nonattainment area. Impoundment would be the final step. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

D. The states where these focused programs would be operating could set up a vehicle connection service similar to or connected to Craig’s List in which non-compliant vehicle owners could sell or swap their vehicles with interested parties within the state or outside of the state. The description of such vehicles would be required to notify potential buyers that the vehicle does not comply with nonattainment area emission requirements and buyers should not attempt to register the vehicle if they will be entering a nonattainment area with it regularly. There should also be a website that will show car buyers where nonattainment areas and possible candidates for nonattainment areas are located and the qualifying vehicles for each, which could be tailored to the particular criteria pollutant group, such as PM2.5 or Ozone, the area falls under. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

E. EPA might require large over-the-road trucks to drive to a central off-loading location where their cargo would be removed in a timely manner from their trailers into covered or enclosed staging platforms where pallets or other items would be re-loaded onto heavy-duty all-electric urban delivery vehicles that would then distribute the goods to various destination points within the nonattainment area (about a 75 mile round trip distance). These truck off-loading facilities would be located downwind of the prevailing winds for the area so that PM and diesel soot would be blown away from the nonattainment area most of the time and be dispersed through dilution. Moving trucks and special loads that require heavy lift machinery to off-load would be exempt from these requirements. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

We believe this sort of regulatory scheme could work better than applying universal, nation-wide criteria pollutant standards for all vehicles, especially in those locations where such standards are not actually required to meet local air quality goals. If the proposed rulemaking standards were revised to apply to nonattainment areas, and major urban corridor areas, such as the more dense parts of the I-95 corridor, the complaints seen in the comments to this rulemaking would be lessened or mitigated. We think most people can agree that vehicle requirements that address the worst air pollution areas in the country should be acceptable to protect the health of those who live and work in those areas. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

Mitsubishi participated in the development of - and supports - the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0682, p. 2]

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators:

1.

2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping- stone to full BEV acceptance. [EPA-HQ-OAR-2022-0829-0682, p. 2]

3.

4. Keep the proposed approach to determine the passenger car curves, and consider adjusting the cutpoint and stringency levels of the light-duty trucks during the early years of the program. [EPA-HQ-OAR-2022-0829-0682, p. 2]

5. Maintain the existing GHG program flexibilities, such as Air Conditioning and Off-Cycle technologies credits (including the alternative method to apply off-cycle credits), and allow previously approved technologies to continue receiving credits. [EPA-HQ-OAR-2022-0829-0682, p. 2]

6.

7. Consider the impact that very aggressive GHG standards will have on vehicle affordability, and especially the detrimental impact to low-to-moderate income families. Regardless of the vehicles that regulation may require us to produce, it is critical that regulators always keep the accessibility of consumers in mind. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Organization: Stellantis

Eliminate counting vehicles without tail pipes (BEV, FCEVs) as part of a tail pipe emissions fleet [EPA-HQ-OAR-2022-0829-0678, pp. 24-25]

Organization: Toyota Motor North America, Inc.

3. The stringency of the criteria pollutant standards (i.e., tailpipe standards) exceed California's recently finalized LEV 4 standards with little technical or scientific justification. In fact, the proposed tailpipe standards serve as a de facto BEV mandate. EPA should adopt California's LEV4 standards – the most stringent ever put in place in the U.S. - and not go beyond these. [EPA-HQ-OAR-2022-0829-0620, p. 2]

9. Tier 4 Program

Toyota supports the comments by the Alliance for Automotive Innovation by reference. The comments here are to add emphasis or additional perspective to those items. [EPA-HQ-OAR-2022-0829-0620, p. 48]

EPA Summary and Response

Summary:

In addition to the broad comments regarding the proposed criteria pollutant program, EPA also received comments from several stakeholders regarding the overall program design and structure. Mitsubishi Motors recommended that EPA consider the benefits of PHEVs in meeting future standards and that EPA should maintain the existing standards in form and stringency in the early years of this rulemaking. Toyota and Stellantis commented that they felt the stringency of the criteria pollutant program goes beyond the California ACC II program and Toyota also stated that the stringency acts a "de facto BEV mandate." Toyota also recommended that EPA adopt the California ACC II standards.

Kala Engineering Consultants provided detailed comments regarding restricting operation of vehicles with high emissions in non-attainment areas. Kala noted that not all areas in the United States were in non-attainment and recommended that vehicles and/or vehicle operation be controlled within these non-attainment areas to reduce emissions. These recommendations were made as an alternative to nationwide emissions standards that would broadly impact the entire country.

Cummins commented that standards should be fuel-neutral.

Response:

EPA has considered the vehicle manufacturer comments within the context of the overall criteria pollutant design, structure and stringency and concluded that the program design and structure, as proposed and as finalized, is appropriate. While some manufacturers commented that EPA's proposed criteria pollutant program goes beyond the stringency of California's ACC II program, EPA addresses the rationale for final standards and not adopting CARB ACC II in RTC Section 4.1.1 above.

EPA disagrees that the criteria pollutant program is a de facto BEV mandate. Each of the criteria pollutant standards is performance-based. Vehicle manufacturers are anticipated to apply a variety of technologies to meet the standards, including but not limited to BEVs. For example, many ICE-based vehicles are already being certified at or below the final fleet average NMOG+NOX standards being finalized in this rule and vehicle manufacturers have a variety of technologies that can be applied to ICE-based vehicles to reduce their criteria pollutant emissions. For additional detail regarding the current fleet compliance status and technologies that could be applied to reduce criteria pollutant emissions, please refer to RIA Chapter 3.2.

Regarding Kala Engineering Consultants recommendation to limit vehicles and/or vehicle operation to reduce emissions only within non-attainment areas instead of broadly applied national standards, while the concept of "geofencing" vehicle operation is known to EPA, we do not believe it to be an effective approach to ensuring emissions reductions, and such a concept is outside the scope of this rulemaking.

Regarding Cummins comments on fuel neutrality of the standards, the standards are fuel neutral except for medium-duty diesels at low ambient temperatures. Diesel MDV are exempt from the -7°C FTP NMOG+NO_X standard but we are requiring manufacturers to report results from this test cycle in their certifications. We are also applying a NO_X temperature correction to the in-use standards for high GCWR diesel MDV. These differences for diesel MDV are due to current limitations with respect to NO_X control from selective catalytic reduction (SCR) systems at cold ambient temperatures. The Agency will continue to monitor technology developments with respect to diesel SCR system NO_X emissions control at cold ambient temperatures.

4.1.1 - Phase-in of criteria pollutant standards

Comments by Organizations

Organization: Alliance for Automotive Innovation

B. Tier 4 Phase-Ins

1.General Tier 4 Phase-In Approach

EPA proposes to require a general phase-in of Tier 4 provisions, under which 40% (in MY 2027), 80% (in MY 2028) and 100% (in MY 2029) would need to meet all Tier 4 requirements. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

If EPA was simply proposing to adopt the same provisions as California adopted in ACC II, a short phase-in such as that proposed might be adequate. However, EPA is proposing more stringent standards, across more test cycles and conditions, than the ACC II program requirements. Manufacturers are likely to encounter technical challenges as they develop solutions to meet these new requirements, particularly if EPA finalizes its proposed general prohibition on enrichment, which will significantly impact vehicle drivability. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

Auto Innovators is also concerned that every vehicle and powertrain combination would need to pass all of the new, individual requirements in order to be counted in the phase-in. Should a vehicle that a manufacturer planned to include in a test group in the phase-in encounter unexpected challenges with one or more of the Tier 4 provisions, it would need to be pulled from the test group and would not count in the volume-weighted phase-in calculation. With the short duration provided to comply with the aggressive Tier 4 phase-in, there will likely not be enough time to solve all technical issues while still meeting the proposed phase-in. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

To address this concern, we recommend that EPA offer the option of an alternate phase-in plan, similar to what is done with current and CARB ACC II LEV IV regulations. We also recommend that EPA allow credits to be earned for early compliance, and that EPA provide a four-year phase-in period. This will allow OEMs to solve significant technical challenges and procure the hardware needed to address the Tier 4 (unique) proposed requirements. We recommend a 25/50/75/100% (MY 2027-2030) four-year phase-in. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

In addition, we request that EPA separate the Tier 4 requirements, similar to CARB's ACC II LEV IV regulation, allowing flexibility to meet different aspects of the Tier 4 regulation (e.g., PM standards vs. enrichment prohibitions), with different vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

1.PM Phase-In

As discussed elsewhere, Auto Innovators opposes EPA's proposed PM standards, but would support adoption of the California ACC II PM standards. However, if EPA finalizes its proposals instead of adopting the California PM standards as we recommend, we believe that EPA should reconsider the Tier 4 PM phase-in. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

Automakers have already begun research, design, and development of strategies to meet California's phase-in of more stringent PM standards in MYs 2026-2030. EPA's PM standards, if adopted as proposed, would likely strand those investments. Our preferred approach (if EPA proceeds with its proposal) would be to implement the federal standards after completion of the California ACC II PM phase-in. We recommend that any unique EPA PM requirements take effect starting in MY 2030 and phase-in by 40/80/100% through MY 2032. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

2. Light- and Heavy-Duty Vehicle Phase-In Split

As required under the Clean Air Act, EPA treats vehicles with a gross vehicle weight rating (GVWR) less than or equal to 6,000 lbs. (light-duty vehicles in this discussion) differently than vehicles with a GVWR greater than 6,000 lbs. (heavy-duty vehicles in this discussion). [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

Auto Innovators is concerned that EPA does not appear to have considered the implications of electrification on GVWR where some vehicles that have historically been considered light-duty, might become heavy-duty vehicles due to battery weight and no longer count in the light-duty phase-in. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

In such a scenario, EPA's assumptions about the market share of BEVs (upon which NMOG+NOx fleet average standards are premised) could be in error. Furthermore, separating the ≤6,000 lb. GVWR fleet from the 6,001 – 8,500 lb. GVWR fleet separates vehicles that are currently being used in a combined "compliant" ≤8,500 lb. fleet. Combined fleets are managed by offsetting less capable vehicles with more capable vehicles, which provides automakers the opportunity to maintain compliance while phasing out legacy vehicles and focusing on the transition to electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

We recommend that EPA allow BEV applications to optionally count in the ≤6,000 lb. GVWR fleet phase-in, regardless of GVWR. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

3. Enrichment Phase-In

Notwithstanding the above comments on EPA's proposed prohibition on enrichment, if EPA does proceed with its proposal, it should be clear how this provision is phased in. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

Auto Innovators suggests a longer phase-in for Tier 4 requirements and that separate, and appropriately timed phase-ins be applied instead of a single vehicle needing to meet all aspects of the Tier 4 requirements. The same should apply to a prohibition on enrichment, if adopted. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

Furthermore, we note a lack of clarity in the proposed regulatory text related to the phase-in for prohibition of enrichment. The proposed text at 40 C.F.R. 86.1809-12(d)(2) specifies that "This determination [that enrichment is unnecessary] is effective for all vehicles certified to Tier 4 standards."256 The proposed Tier 4 regulations require all vehicles to meet the Tier 4 NMOG+NOx standards, effective MY 2027, but other provisions of Tier 4 are phased in over three years, and vehicles that do not meet the other provisions are "interim" Tier 4 vehicles. Thus, it is not completely clear whether the proposed general prohibition on enrichment is tied to vehicles that meet the Tier 4 NMOG+NOx standards, or whether it is tied to full Tier 4 vehicles (as opposed to interim Tier 4 vehicles). [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

256 NPRM at 29418.

We recommend that if EPA adopts its proposal to prohibit enrichment for Tier 4 vehicles, it should then also modify the proposed 40 C.F.R. 86.1809-12(d)(2) text to ensure the text is interpreted as applying to only those vehicles which EPA intends it to apply. [EPA-HQ-OAR-2022-0829-0701, pp. 143-145]

2. Phase-in of Criteria Pollutant Standards and 40 CFR §86.1813-17(b)(1)(i)

Clarification is requested regarding the 8.5K – 14K incomplete vehicle ORVR phase in requirements. Is the ORVR compliance phase-in independent of the exhaust emissions phase-in tables or are the phase-in options associated. I.e., if an OEM uses a model year 2027 exhaust phase-in does that mean the ORVR phase-in must also start in model year 2027? [EPA-HQ-OAR-2022-0829-0701, p. 188]

Auto Innovators disagrees with this approach. The current 2027MY requirements should not be reopened. The 2027MY standards should remain unchanged from the final rule that EPA issued in 2016CY, as that is what OEMs have relied upon to create compliance plans. Further, the Clean Air Act section 202(a)(3)(C) mandates four-year lead time and three-year stability periods. The agency is proposing only three full years of lead time (assuming the Proposed Rule is finalized later this year) and no stability period between any of the proposed annually decreasing GHG standards. EPA's proposal is inconsistent with the CAA and, thus, no change should occur in 2027MY. Finally, OEMs need more time to adapt to a fuel neutral standard.

Therefore, when fuel neutrality is implemented, it should be phased in over several years (30/60/100), and not fully implemented until 2032MY. [EPA-HQ-OAR-2022-0829-0701, pp. 193-194]

K. Technical Issues with Proposed Tier 4 Regulatory Text

1. Proposed 40 C.F.R. § 86.1811-27(b)(6)(i)

The proposed 40 C.F.R. § 86.1811-27(b)(6)(i) specifies to "Include all light-duty program vehicles at or below 6,000 pounds GVWR in the calculation to comply with the Tier 4 fleet average NMOG+NOx standard."293 We believe the preamble text and this command's placement as part of (b)(6) makes it clear that this instruction applies only to the NMOG+NOx standards at (b)(2), and their phase-in at (b)(6)(i). Nevertheless, for the avoidance of any doubt, EPA may want to explicitly describe the standards at (b)(2) and the phase-in at (b)(6)(i) to make clear that the command does not apply to the cold temperature NMOG+NOx fleet average standards at (c)(3)(i). [EPA-HQ-OAR-2022-0829-0701, p. 188]

293 NPRM at 29420.

Organization: Alliance for Vehicle Efficiency (AVE)

AVE supports EPA's proposal for lower criteria pollutants and requests that the EPA accelerate the fleet compliance phase-in requirements for particulate matter. [EPA-HQ-OAR-2022-0829-0631, pp. 7-8]

AVE supports EPA's proposal for a PM standard of 0.5 mg/mi for both LD and all MD vehicles. AVE members produce technologies like gasoline particulate filters (GPFs) that make this stringency level feasible and cost-effective. Furthermore, AVE members are already working with manufacturers to design and install the requisite technology into many of today's vehicles. [EPA-HQ-OAR-2022-0829-0631, pp. 7-8]

AVE is concerned about the longer than necessary phase-in for compliance with the new PM stringency levels and recommends that EPA consider a 60% compliance level in 2027, followed by 90% in 2028, and then 100% in 2029. Delaying implementation appears counterproductive and unnecessary. [EPA-HQ-OAR-2022-0829-0631, pp. 7-8]

The need for quicker action is obvious. The International Coalition for Clean Transportation (ICCT) recently reported that PM emission levels across the U.S. have risen since 2015 and are now back to 2005 levels.19 In the Proposal, EPA strongly emphasizes the significant health benefits that will accrue from the lower PM standard but does not fully justify the basis for a long phase-in period. The American Lung Association reports of a long-term study of people in six U.S. cities from 1974 to 2009 that supports faster action addressing PM. [EPA-HQ-OAR-2022-0829-0631, pp. 7-8]

19 See ICCT https://theicct.org/publication/true-pm-emissions-jun23/

"The findings suggest that cleaning up particle pollution had almost immediate health benefits. The researchers estimated that the U.S. could prevent approximately 34,000 premature deaths a year if the nation could lower annual levels of particle pollution by 1 µg/m3."20 [EPA-HQ-OAR-2022-0829-0631, pp. 7-8]

20 See https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/particle-pollution

EPA references the agency's consideration of bringing environmental justice to at-risk communities and AVE supports this effort. Still, a shorter phase-in period for new stringency levels would do a great deal more to accomplish this effort and bring more immediate relief to the communities that bear a disproportionate amount of the country's particulate pollution. [EPA-HQ-OAR-2022-0829-0631, pp. 7-8]

The technologies needed to meet the proposed PM standard have already been deployed on millions of vehicles in Europe and China by the same global manufacturers who sell vehicles in the U.S. market. This experience likely negates the need for a long lead time before MY 2027. Moreover, suppliers stand ready to support manufacturers with cost-effective technology and the experience to meet the proposed standards. [EPA-HQ-OAR-2022-0829-0631, pp. 7-8]

Organization: American Honda Motor Co., Inc.

Phase-in timeline for compliance with 0.5 mg/mi standard is unreasonable [EPA-HQ-OAR-2022-0829-0652, p. 14]

In addition to concern about the agency's proposed 0.5 mg/mi stringency, we are similarly concerned with the agency's proposed phase-in schedule. EPA's proposed phase-in timeline to reach 100% compliance is just three years (from 2027-2029), providing virtually no lead time and forcing unplanned development for technologies the industry is already planning to sunset. Development cycles required by manufacturers would need to be initiated in 2023 to begin the 40% phase-in for MY2027 vehicle production. As this NPRM is unlikely to be finalized until early-to-mid 2024, manufacturers could possibly already be late in being able to meet a 40% compliance requirement for MY2027, as vehicles will already be going down the manufacturing line by late 2026. [EPA-HQ-OAR-2022-0829-0652, p. 14]

Organization: Cummins

- Sufficient regulatory lead time and stability should be provided to allow manufacturers to develop and implement the technologies needed to improve emissions and spread investments over time to minimize cost to customers. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Organization: Energy Innovation

In the EPA's proposed rule, the GHG tailpipe standards for LDVs are "projected to result in an industry-wide average target for the light-duty fleet of 82 grams/mile (g/mile) of carbon dioxide (CO_2) in MY 2032, representing a 56 percent reduction in projected fleet average GHG emissions target levels from the existing MY 2026 standards."12 The proposed GHG standards for MDVs are "projected to result in an average target of 275 grams/mile of CO_2 by MY 2032, which would represent a reduction of 44 percent compared to the current MY 2026 standards."13 The proposed rule will also reduce cumulative GHG emissions between 2027 and 2055: CO_2 by 26 percent, methane (CH_4) by 17 percent, and nitrous oxide (N_2O) by 25 percent, compared to no-action scenario.14 See table 135 below from the proposed rule. [EPA-HQ-OAR-2022-0829-0561, pp. 5-7]

12 U.S. EPA, “Proposed Rules,” May 5, 2023, 29196.

13 U.S. EPA, 29196.

14 U.S. EPA, 29348.

[See original attachment for “Table 135 – Estimated GHG Impacts of the Proposed Standards Relative to the No Action Scenario, Light-Duty and Medium-Duty”] [EPA-HQ-OAR-2022-0829-0561, pp. 5-7]

While the proposed rule is an improvement over the status quo, greater emissions reductions via higher rates of electrification in the LDV and MDV sectors are needed to reduce harmful air pollutants and mitigate climate change. We believe EPA’s alternative to the proposed rule (Alternative 1) is the preferred option (as discussed further below) because it will achieve greater emissions reductions more quickly, while still being technologically feasible and cost-effective. [EPA-HQ-OAR-2022-0829-0561, pp. 5-7]

Organization: Ford Motor Company

Standards Continuation Beyond 2032MY

In multiple areas of the NPRM the EPA has requested comment on continuation of light- and medium-duty GHG and criteria pollutant standards beyond 2032MY. Ford opposes continuation of any of the standards beyond the 2032MY. Industry already faces substantial uncertainty before 2032MY, and it is not feasible to establish a robust program beyond that time. [EPA-HQ-OAR-2022-0829-0605, p. 8]

Finally, Ford recommends that EPA defer the phase-in requirement of the new PM standards to starting in 2029MY, consistent with the Ford recommendation for the new fuel enrichment requirements. [EPA-HQ-OAR-2022-0829-0605, p. 13]

Organization: Mercedes-Benz AG

Mercedes-Benz also requests that EPA provide, at a minimum, a one-year delay and four-year phase- in for these changes in order to allow sufficient engineering development time to update engine strategies for compliance, and time to phase new engines into the fleet. This timing would be consistent with EPA’s own recognition of product cycles: “EPA has also considered vehicle redesign cycles. Based on previous public comments and industry trends, manufacturers generally require about five years to design, develop, and produce a new vehicle model.”5 Application of a new engine would not be incorporated during a vehicle refresh and instead would occur at the time of major redesign. [EPA-HQ-OAR-2022-0829-0623, p. 7]

5 NPRM at 29341.

although EPA provides several different phase-in approaches for the criteria emissions standards to meet the lead-time and stability requirements as obligated by the Clean Air Act, EPA should recognize that the proposed phase-ins do not necessarily follow industry standard product cycles. Particularly in this instance, where standards adopted by CARB have formed the main driver of emission standards since the rulemaking process began in 2020. Powertrain improvement and development of new engine platforms and is a multi-year process. These developments improve emissions performance and customer experience, but the three model year lead-time proposed for the early compliance option may not align with product cycle refreshes in the MDV segment. EPA should alter the phase-in schedule to better align with existing product cycle planning or allow manufacturers to request an alternative early-compliance pathway. This would encourage early compliance and associated emissions benefits as product cycles refresh and evolve. [EPA-HQ-OAR-2022-0829-0623, p. 19]

Organization: Porsche Cars North America (PCNA)

2. Porsche supports an extended phase-in timeline and alternative phase-in for Tier-4 Compliance

Porsche supports the comments from AFAI regarding an extended phase-in for the percentage of projected new vehicles that must comply with Tier-4 standards. As recommended by the AFAI, Porsche supports a revision to the proposed language in 86.1811-27(b)(6)(i) to require 25% in MY2027, 50% in MY2028, 75% in MY2029 and 100% in MY2030. Porsche supports this extension given the requirement in (b)(6)(i) for a vehicle to meet all the proposed standards to be considered within the phase-in. As AFAI notes, manufacturers may have difficulty in meeting narrow elements of the overall proposal, especially elements that are not aligned with California's LEV-IV programs. Because EPA is requiring vehicles to meet Tier-4 in its entirety, regardless of which part is unable to be achieved, the vehicle would not be included in the phase-in. The longer phase-in could provide additional flexibility for vehicles that need time to meet all the requirements, especially the newer requirements being proposed by EPA. [EPA-HQ-OAR-2022-0829-0637, pp. 9-10]

In addition, Porsche supports the addition of a point-based alternative phase-in option available to manufacturers to use for determining compliance with the phase-in in lieu of the annual percent-based compliance. The point-based system could utilize previous examples in which the percentage of a manufacturers fleet that meets the standards is multiplied by a declining annual value, with a minimum points requirement that must be achieved by a future date. The exact function can be developed to ensure that the alternative point-based system delivers consistent emissions reductions with the percent-based system. The opportunity to earn higher points in earlier model years would incentivize early Tier-4 concepts, which could in turn provide additional flexibility for concepts that may need to comply later either due to their redesign cycle, or for concepts which may be having challenges with specific portions of the Tier-4 package and simply need additional development time. [EPA-HQ-OAR-2022-0829-0637, pp. 9-10]

4. In the default pathway, Porsche supports adding the opportunity for early, optional Tier-4 compliance for light-duty program vehicles over 6000 pounds. [EPA-HQ-OAR-2022-0829-0637, pp. 10-11]

Porsche supports the position of the AFAI to include within the default compliance pathway outlined in 86.1811- 27(b)(6)(ii) the ability for LDT3, LDT4, and MDPV vehicles (i.e., vehicles over 6000 pounds) to optionally comply with Tier-4 requirements prior to the 2030 model year requirement. These vehicles could be referred to as "Default Path Early Tier-4" vehicles which could then be included within the Tier-4 phase-in percentages in 86.1811-27 for vehicles under 6000 pounds. The volumes used for determining compliance to the Tier-4 phase-in would include the projected volume for these Default Path Early Tier-4 vehicles and the compliance percentages would be calculated accordingly. [EPA-HQ-OAR-2022-0829-0637, pp. 10-11]

Porsche recognizes that some manufacturers may find that the default pathway better aligns with their future product portfolio versus the alternative early pathway in 86.1811-27(b)(6)(iii) (i.e., including all vehicles under 8500 pounds vehicles together). Porsche appreciates that the default pathway was defined to reflect the Clean Air Act minimum lead time for vehicles over 6000 pounds and thus reflects that there is no obligation for those vehicles to meet Tier-4 standards prior to model year 2030. This proposal for Default Path Early Tier-4 vehicles should continue to align with the Clean Air Act in that manufacturers in the default pathway are not required to choose to declare these vehicles as Default Path Early Tier-4s, but if they do, then the vehicles could be counted in the Tier-4 phase-in. [EPA-HQ-OAR-2022-0829-0637, pp. 10-11]

The option for over 6000 pounds vehicles to be included early could provide manufacturers who have selected the default pathway with some additional flexibility for complying with the Tier-4 phase-in, without having to fully reject the default pathway altogether. As noted by the AFAI, future electric vehicles are likely to incorporate larger traction batteries to meet customer demand for increasing range or utility. A manufacturer in the default pathway may find they are at risk of compliance with the under 6000 pounds Tier-4 phase-in should an electric vehicle that was intended to be part of the phase-in begin to approach the 6000 pounds threshold as product teams demand more range or utility. By allowing over 6000 pounds vehicles to still be counted in the Tier-4 phase-in, this flexibility would provide greater freedom to product teams balancing phase-in compliance with increasing customer needs. [EPA-HQ-OAR-2022-0829-0637, pp. 10-11]

Organization: South Coast Air Quality Management District

There are five key issues we request U.S. EPA address before finalizing the rule. [EPA-HQ-OAR-2022-0829-0659, p. 2]

1. Extend the phase-in period and adopt more stringent standards to align with California's ACC II regulation. The proposed standards will be phased in over a six-year period from model year (MY) 2027 through 2032 with increasing stringency each year. We recommend that the phase-in period be extended to 2035 and later model years to better align with the ACC II implementation schedule which extends out to MY 2035 and subsequent years. [EPA-HQ-OAR-2022-0829-0659, p. 2]

EPA Summary and Response

Summary:

Much like other topics regarding the proposed criteria pollutant program, EPA received several comments regarding the phase-in of the revised standards. EPA received comments that were both supportive of the proposed phase-in and recommended that the agency shorten the window of time for vehicle manufacturers to comply with more stringent requirements and comments that recommended that the agency provide more time and additional flexibility in meeting new requirements.

The Alliance for Automotive Innovation (AAI) commented that the duration of the phase-in might be appropriate had EPA adopted California's ACC II program in lieu of the proposed standards. AAI noted that, due to the differences in the two programs, manufacturers were more likely to experience technical difficulties in meeting the EPA standards. Mercedes commented similarly and stated that the ACC II criteria pollutant planning was the main driver in their product development. Mercedes added that the current phase-in does not recognize vehicle manufacturers product planning cycles. AAI made special note of EPA's proposal to eliminate command enrichment and the potential for vehicle drivability issues as the result of eliminating enrichment. AAI and Porsche also commented on the Tier 4 phase-in requirement by which the EPA proposed that all vehicles brought into Tier 4 as part of the phase-in would be required to meet all the Tier 4 provisions. AAI further noted that meeting all the provisions simultaneously on a single vehicle may increase the risk to vehicle compliance. AAI recommended that EPA allow provisions to be separated, similar to the CARB ACC II program. AAI and Porsche also recommended that EPA allow credits for early compliance and an alternative phase-in of 25/50/75/100% for MY's 2027 through 2030.

AAI also commented on specific criteria pollutant provisions. Regarding the phase-in of PM standards, AAI noted that manufacturers were already working on developing technical solutions to meet the CARB ACC II PM standards. For PM, AAI recommended delaying revised federal standards until after the ACC II program was fully phased-in. The specific recommendation as a PM phase-in of 40/80/100%, starting in MY 2030 and ending in MY 2032. AAI also made recommendations regarding the phase-in of enrichment and ORVR. AAI also suggested clarifying that the NMOG+NOx phase-in proposed at 86.1811-27(b)(6)(i) did not apply for the NMOG+NOx standards for cold temperature testing.

Alliance for Vehicle Efficiency (AVE) commented in support of EPA's PM standards and recommended a more rapid phase-in of the standards noting in the process ICCT's recent assessment the PM emissions have been increasing in the United States since 2015. AVE recommended a phase-in of 60/90/100% from MY 2027 through MY 2029. AVE emphasized the need for PM reductions by noting the impact that PM has on disadvantaged neighborhoods and the prolific application of gasoline particulate filters outside of the United States.

Cummins requested sufficient regulatory lead time and stability in order for manufacturers to develop and implement the technologies needed to improve emissions and spread investments over time to minimize cost to customers.

Ford Motor Company commented that they did not support the EPA programs extending beyond MY 2032 and recommended that the revised PM standards should begin phasing in in MY 2029.

Porsche Cars North America recommended a point-based phase-in in lieu of an annual percentage-based phase-in and noted that previous criteria pollutant programs have adopted a similar strategy for some pollutants.

South Coast Air Quality Management District (SCAQMD) recommended that EPA extend the phase-in period to MY 2035 to align with CARB's ACC II program.

<u>Response:</u>

EPA has carefully considered all the comments received regarding the phase-in for criteria pollutant standards. As a result, the agency is finalizing a phase-in that is about a year slower than proposed. Instead of the 40/80/100% phase-in from MY's 2027 through 2029 that was proposed, EPA is finalizing a 20/40/60/100% phase-in that runs from MY 2027 through MY 2030 for vehicles <6,000 pounds GVWR, maintaining the 100% phase-in for vehicles >6,000 pounds GVWR, and adding one additional year for vehicles >6,000 pounds to meet the final phase-in for criteria pollutant standards. For more information on phase-in see preamble Section III.D.1.

EPA does not believe that creating separate and unique Tier 4 phase-ins for each program provision is required or appropriate. Vehicle emissions control systems are designed and deployed as a system. Changes made to support lower NMOG+NOx standards, certification to lower emissions bins, elimination the SFTP and lower PM standards go together, and the agency feels it is reasonable to expect vehicle manufacturers to design, develop and deploy systems which are optimized to meet all of the criteria pollutant emission requirements simultaneously, just as they are today. Separate phase-ins may result in vehicle manufacturers trading off one pollutant for another to meet individual phase-in requirements.

As responded below, the EPA does not plan to finalize new restrictions on command enrichment so concerns regarding the phase-in of enrichment requirements are no longer valid.

Regarding comments such as those from Alliance for Vehicle Efficiency (AVE) regarding a faster phase-in, while it is true that tens of millions of gasoline particulate filters have been deployed worldwide, very few are commercially available as original equipment on US sold vehicles. Given that the United States has unique, and in many cases more stringent, criteria pollutant emission standards as compared to the rest of the world, the agency believes that it is reasonable to provide vehicle manufacturers with more lead-time to adapt PM control technologies to existing vehicles and calibrations.

Cummins comments regarding standards stability and lead time with respect to their products are entirely directed at vehicles with more than 6,000 pounds GVWR, which are regulatorily defined as "heavy-duty" under the Clean Air Act. EPA's default compliance programs for heavy-light-duty trucks above 6,000 pounds GVWR (e.g., LDT3, LDT4 and MDPV) and for MDV all provide a minimum of 4 years of lead time and 3 years of standards stability, as required by the Clean Air Act for heavy-duty vehicles.

On the other hand, both Ford and AAI recommended that EPA delay phase-in of the final PM standards until after CARB's ACC II PM standards were fully phased in. As EPA's PM standards are more stringent than CARB's this recommendation does not seem to be required or necessary. Given the overlapping timeframe of the two rulemakings, and statements by vehicle manufacturers that they are reducing focus on ICE powertrain development, we expect that vehicle manufacturers will design their systems to meet the most stringent PM standards and will not develop systems twice. Emission control systems that comply with EPA's final PM standards will also be compliant with CARB's ACC II program.

EPA has chosen not to adopt Porsche's recommendation for a point-based phase-in as an alternative to year over year percentage increases. The agency believes that extending the phase-in addresses Porsche's request for additional flexibilities, as well as the ability to apply BEVs to the phase-in requirements.

Regarding the SCAQMD comments regarding extending the phase-in until MY 2035 to better align with the CARB ACC II program, EPA has decided to finalize the proposed rulemaking period that results in a fully phased in program in MY 2032. EPA will continue to monitor technology progress as well as other related regulator actions as it considers potential standards beyond the MY 2032 timeframe.

The final rule includes clarifying language to state that the NMOG+NOx phase-in requirements of 40 CFR 86.1811-27(b)(6)(i) apply for 25°C testing, and not for -7°C testing.

4.1.2 - NMOG+NOx

Comments by Organizations

Organization: Alliance for Automotive Innovation

Criteria Emission Standards

Automakers will spend $1.2 trillion by 2030 as a down payment on a net-zero future, but far more will be needed. If we hope to succeed, automakers must focus resources on the EV transformation rather than incremental changes to existing, very near-zero (criteria) emission ICE vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 5-6]

This should not be interpreted as automakers requesting no criteria emission reductions or regulations. We support changes that can be made cost-effectively through software calibration changes to the vehicle. For example, we support and recommend EPA adopt the criteria emission standards California adopted under Advanced Clean Cars II (i.e., LEV IV). We worked with California over several years to develop these standards that substantially reduce real- world criteria pollutants (nonmethane organic gas (NMOG), nitrogen oxides (NOx), particulate mater (PM)), as rapidly as possible without stranding technology or diverting resources from electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 5-6]

However, some of the changes proposed in the NPRM go far beyond California's LEV IV program and would require large human and capital resources. For example, all-new engine designs, retooling of engine and vehicle production facilities, new hardware on vehicles, and additional testing laboratories are required at the same time the EPA expects 67% of new vehicles to be BEVs. These simultaneous ICE-focused activities will distract from efforts to electrify light-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 5-6]

NMOG + NOx Fleet Average

Unlike California, EPA proposes a performance-based standard that counts zero-emission vehicles in the NMOG+NOx fleet average. While EPA calls this a performance-based standard, it assumes a high BEV penetration rate for setting the standard (i.e., a light-duty vehicle at 12 mg/mi fleet average assumes 60% of the fleet are BEVs). This is more akin to a design requirement. Regulating criteria emissions from vehicles with criteria emissions (i.e., excluding ZEVs from the fleet and regulating that fleet at 30 mg/mile) is a more appropriate performance-based method. Like EPA's proposed GHG requirements, it is unknown if market sales of BEVs will achieve the specified targets. Making up for reduced BEV sales by reducing emissions from ICE vehicles will take years of development and cannot be altered on an annual basis. To avoid risk of an uncertain BEV market, major ICE investments and diverting resources from focused electrification efforts, we recommend EPA adopt the California Air Resources Board's (CARB) stringent LEV IV regulatory framework that phases-out BEVs in the NMOG + NOx fleet average. This will provide planning stability and an insurance policy from market conditions that OEMs have no control over. Adopting CARB's requirements will ensure significant reductions in tailpipe emissions while avoiding major ICE investments and maintaining the focus on electrification that will have a great reduction in criteria emissions over time. [EPA-HQ-OAR-2022-0829-0701, p. 7]

Recommendation

GHG – Better align to President Biden's 2030 electrification goal [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

To address the concerns identified above, Auto Innovators and our members recommend EPA reevaluate the GHG standards and more closely align with President Biden's 2030 goal. Thus, we recommend adopting requirements for 40 to 50% BEV, PHEV, and FCEVs in 2030 with continued increases through 2032. These standards should be coupled with and connected to regularly measured infrastructure deployment and battery critical mineral supply levels available during this rule. [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

Criteria – Adopt California's LEV IV Standards [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

For the Tier 4 criteria pollution standards, we recommend that EPA adopt California's LEV IV exhaust and evaporative emission standards adopted just seven months ago and begin in 2026MY. LEV IV standards were adopted by California last year as an effective and appropriate path forward to address the toughest in the nation air quality challenges. EPA should align with this comprehensive strategy to enable a nationwide criteria emissions program. [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

If EPA finalized the multi-pollutant regulations with these two recommendations, the final regulations would still be the most aggressive and challenging in U.S. history, and they would provide dramatic reductions in GHG and criteria emissions. However, EPA would reduce the risk of potential harmful consequences to both the EV market, and the new vehicle market in general, by forcing BEVs at a rate that outpaces the EV supply chain, infrastructure, critical mineral supplies, and customer acceptance. Getting the pace right is critical to the success of the automakers and to U.S. leadership and competitiveness. [EPA-HQ-OAR-2022-0829-0701, pp. 7-8]

IV.Light-Duty Criteria and Toxic Pollutant Standards [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

Automakers are committed to ultimately achieving net-zero transportation carbon emissions and electrification of the light-duty vehicle fleet. However, this transformation requires massive investment in EV technology and supporting mechanisms such as infrastructure, all involving many stakeholders. To be successful, automakers must primarily focus resources on the transformation rather than incremental changes to existing internal combustion engine (ICE) vehicles, which are already very near zero. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

The focus of EPA and the automakers is and should be on electrification. Thus, Auto Innovators supports changes to traditional criteria emission (e.g., NMOG, NOx, and PM) standards that measurably reduce emissions, but do not add substantial additional hardware or capital costs to ICE vehicles that will soon be retired. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

Unfortunately, EPA proposes to adopt new requirements that will divert resources from our shared goal of widespread electrification. Prohibiting enrichment could require complete engine redesigns and possibly larger displacement engines to provide customers with the capability they demand. The proposed PM standards substantially increase costs and vehicle development complexity in addition to adding testing requirements. Finally, in several cases, EPA provides less flexibility and/or chooses not to align with ACC II. This lack of alignment is particularly troubling as automakers and suppliers have already developed product plans and spent resources toward meeting the ACC II regulations, and in some cases, EPA's proposal would require substantial changes during the middle of ACC II regulatory phase-ins. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

To reduce costs while still providing similar (and substantial) environmental benefits, the EPA regulations should seek to align with criteria emissions regulations already adopted by California in ACC II. We worked closely with the California Air Resources Board (CARB) and with EPA staff in attendance and participating,255 for the past several years to develop standards that substantially reduce real-world criteria emissions (including NMOG+NOx and PM), as rapidly as possible without stranding technology or diverting resources from electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

255 At no time did EPA staff indicate a different or more stringent pathway was under development federally, while the auto industry provided input, feedback, and technical data to CARB. The California process provided an ideal forum for alignment, even if EPA could not commit to alignment at that stage.

We recommend that EPA adopt the ACC II criteria emission regulations in place of its proposal. This adoption would provide substantial environmental benefits, streamline the regulations, and allow automakers to focus resources on electrification rather than developing and deploying changes to ICE vehicles specific to EPA's proposed new requirements. At a minimum, EPA should align with ACC II through the end of the ACC II phase in periods; in most cases, ACC II regulations are fully phased in by MY 2030. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

A. Consideration of the California ACC II Criteria Pollutant Regulation as an Alternative [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

EPA failed to consider adopting various California ACC II criteria pollutant provisions, and in so doing has also failed to demonstrate the incremental costs and benefits of its proposed program relative to this existing and logical alternative. EPA has also failed to consider the appropriate time to develop and deploy the additional ICE technologies to meet its proposal, particularly in the context of an overlapping and different final state regulation. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

It is no defense to say that EPA has yet to approve a Clean Air Act waiver for these provisions. EPA has yet to reject a waiver request from California, and included the California ACC II program as a sensitivity case to the proposed greenhouse gas regulations. Unfortunately, to the extent that the ACC II sensitivity case provides estimates of criteria emission benefits, it has been challenging, if not impossible, to separate benefits associated with the GHG program from those associated with the criteria pollutant program, and even more difficult to separate the impacts from individual components of the proposed criteria pollutant program. These challenges have been exacerbated by the limited time available to comment on the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

If EPA proceeds with its own misaligned proposal to the logical alternative of California's ACC II program, it should at a minimum demonstrate the incremental benefits and costs of each of its unique program aspects relative to the ACC II program. In addition, if EPA proceeds with its own proposal, EPA should also align with ACC II through the end of the ACC II phase in periods before starting new requirements on top of those already under implementation. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

C. NMOG+NOx Standards

We recommend that EPA align its regulations to the California ACC II program. To the extent that EPA proceeds with its original proposal, we provide the following comments on the proposed NMOG+NOx requirements. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

1.Electric Vehicles in the FTP NMOG+NOx Fleet Average

a)ZEVs

EPA proposes to include ZEVs in the FTP NMOG+NOx fleet average calculations, and has correspondingly proposed fleet average standards that decline to 12 mg/mile, well below the 30 mg/mile (with ZEVs phased out) fleet average in the California ACC II program. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

Consistent with our broader recommendation that EPA align its regulations to the California ACC II program, we recommend that EPA set the Tier 4 FTP NMOG+NOx fleet average requirement at 30 mg/mile and phase-out ZEVs from the fleet average. In addition to our concerns with EPA's projections for electric vehicles, highlighted in Section I of these comments, we are also concerned that the NMOG+NOx fleet average is a second, separate regulation that is generally premised on EV market share projections. With multiple overlapping regulations (in terms of EV dependence) there may be unforeseen conflicts that could create compliance difficulties or raise regulatory costs without providing additional benefits. Even the lack of certainty of EV penetration prior to completion of a model year may cause difficulties. Our suggested approach would remove the dependence on EV market share for compliance with the FTP NMOG+NOx fleet average requirement, addressing these concerns. If EPA instead proceeds with their proposed approach, it should ensure that compliance with the NMOG+NOx fleet average standard is not overly reliant on the assumed penetration rates of electric vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

a) PHEVs

If EPA decides to proceed with its proposed approach of including ZEVs in the FTP NMOG+NOx fleet average, we believe that the criteria pollutant emissions of PHEVs should be adjusted for the zero-emission portion of their operation. Such action would recognize the emission benefits of these vehicles and would be consistent with EPA's treatment of BEVs for the purposes of criteria emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

2.High-Altitude FTP Bin Standards

EPA is proposing to regulate high-altitude FTP emissions at the same stringency as the low-altitude FTP requirement. EPA states that, “Modern engine management systems can use idle speed, engine spark timing, valve timing, and other controls to offset the effect of lower air density on exhaust catalyst performance at high altitudes.”257 While this is true during warmed-up conditions, cold start emissions are impacted by the lower air density at altitude that cannot be overcome by “modern controls.” [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

257 DRIA at 3-36.

- Reduced effectiveness of Catalyst Warm up Strategy: The lower air density at high altitude makes it impossible to warm-up the catalyst as quickly as is done at low altitude. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

- High Altitude Fuel Volatility: High altitude certification fuel has a lower vapor pressure. For a given engine power, manifold pressure and other operating characteristics are the same, but the fuel vaporization is not, which tends to result in combustion residues, which in turn impact emissions during warm-up. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

- Reduced Exhaust Gas Recirculation (EGR): The lower air density at high altitude reduces the amount of EGR, resulting in higher NOx emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

For the reasons described above, additional aftertreatment development will be necessary to meet EPA’s proposed standards. The proposed high-altitude standards will, as a result, require improvements to the aftertreatment system (precious metal content, catalyst volume and additional control devices). In addition, automakers would need to increase laboratory capacity, possibly even building additional laboratories at a significant capital cost, for high-altitude testing to develop these improved systems. These resources would be better applied to vehicle electrification. At minimum, EPA should provide a specific assessment of the emissions benefit of this added requirement, along with a full assessment of testing availability, capacity and resources. [EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

We recommend that EPA adopt the high altitude NMOG+NOx standards recently adopted in ACCII as shown in Figure 40 below.

Figure 40: Recommended High-Al□tude Standards

Bin	Low Altitude Standard (g/mi)	High Altitude Standard (g/mi)
BIN 160	160	160
BIN 125	125	160
BIN 70	70	105
BIN 60	60	90
BIN 50	50	70
BIN 40	40	60
BIN 30	30	50
BIN 25*	25	50
BIN 20	20	30
BIN 15*	15	30
BIN 10	10	20**

* Additional recommended bins – see comments elsewhere.

** No LEV IV equivalent

[EPA-HQ-OAR-2022-0829-0701, pp. 145-147]

3. NMOG+NOx Cold FTP Fleet Average

EPA proposes to set a cold FTP NMOG+NOx fleet average requirement of 300 mg/mile, excluding ZEVs.258 EPA requests comment on whether a 400 mg/mile vehicle cap should be used instead of a fleet average.259 [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

258 NPRM at 29262.

259 NPRM at 29262.

Auto Innovators prefers a fleet average requirement, but requests a value of 300mg/mi for LDV+LDT1 and 400mg/mi for LDT2+HLTD+MDPV for the following reasons: [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

At -7 °C, emission reduction right after engine start-up and during catalyst warm-up is the key factor. Large displacement engines (V6, V8, etc.) inevitably have substantially higher emissions at engine startup before the catalyst is warmed up. For downsized turbocharged engines, the amount of heat supplied to the catalyst decreases due to the relationship between the recovery of the exhaust energy by the turbocharger and the heat capacity of the turbocharger itself; thus, the warm-up time tends to be longer than that of an engine without a turbocharger. During this longer warm-up time when the catalyst is in a semi-active state, the heavier vehicle with a turbocharger under high running load conditions has much higher emissions than other vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

According to the DRIA, EPA developed the proposal based on the test results of three models. The results of these three models certainly meet 300 mg/mi. However, due to differences in exhaust system layout (i.e., front catalyst distance from the engine) and engine control from these models, there are some models that cannot achieve both emission reduction before catalyst warm-up and early catalyst warm-up at a high level under -7 °C condition. There are also vehicles that are heavier than the vehicles EPA tested. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

Developing technology to adapt these vehicles to 300 mg/mi would require diverting substantial resources from electrification:

1.For emission systems development and evaluation, update and/or increase of chassis dynamometer system testing to make it possible to reproduce cold temperature condition is necessary. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

2.Development of pistons and injectors for better combustion and designing arrangement of emission purification devices are necessary. When changing the catalyst system (increase in the amount of precious metals, increase in the number of cells), increase in costs occurs. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

Regarding the 300 mg/mile fleet average, EPA proposes that the family emission limit (FEL) be set to a resolution of 0.1 g/mile (100 mg/mile).260 An FEL set to only a single decimal place (i.e., 0.x g/mile) provides very little flexibility among different vehicles. We recommend that

EPA allow an FEL resolution to three decimal places (i.e., 0.xxx g/mile). [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

260 NPRM at 29436.

We also note that although EPA describes the 300 mg/mile fleet average as excluding ZEVs in the preamble,261 the proposed 40 C.F.R. § 86.1811-27(c)(3)(i) regulatory text does not reflect that exclusion.262 Auto Innovators agrees with the exclusion and recommends updating the regulatory text accordingly. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

261 NPRM at 29262.

262 NPRM at 29420.

F. Interim In-Use Standards

Auto Innovators recommends EPA provide interim in-use compliance standards for PM, early drive-away, and US06 NMOG+NOx standards, consistent with the approach taken by CARB in its LEV IV program.280 [EPA-HQ-OAR-2022-0829-0701, p. 178]

280 See 13 C.C.R. § 1961.4(d)(2)(A)3., (2)(C)3., (3)(A)5.a., and (3)(A)5.b.

Notwithstanding our comments opposing EPA's proposed PM standards, we recommend that test groups first certified to Tier 4 PM standards in the first four years of the program meet an in-use standard 1 mg/mile higher than the certification standard. [EPA-HQ-OAR-2022-0829-0701, p. 178]

For early drive-away and US06 NMOG+NOx standards, we recommend that test groups first certified to these Tier 4 standards in the first two years of the program meet an in-use standard 1.2 times their certification standard. [EPA-HQ-OAR-2022-0829-0701, p. 178]

Vehicles will still certify to the new standards, but the interim in-use standards reduce the jeopardy associated with new technology and more stringent standards. [EPA-HQ-OAR-2022-0829-0701, p. 178]

G. Tier 4 Emission certification Bins

For several decades, EPA and CARB have provided multiple emission certification bins – from less stringent to more stringent. Automakers can certify vehicles to any bin but must meet a sales-weighted fleet average. The use of bins provides automakers with flexibility to certify some vehicles to higher bins and others to lower bins. At the same time, the fleet average provides assurance of air quality benefits. The number of bins or emission levels associated with bins does not have even a theoretical impact on air quality. In fact, we have recommended allowing automakers to set family emission limits (FELs). Nonetheless, both EPA and CARB have restricted the number of bins in the past. [EPA-HQ-OAR-2022-0829-0701, pp. 178-179]

As we approach zero emissions, flexibility becomes far more important. Unfortunately, as shown below, the NPRM further restricts the number of bins to which vehicles can certify, including eliminating bins allowed under ACC II, and not providing bins that were added under ACC II. For example, ACC II allows Bin 125 through 2028. The inclusion of Bin 125 for a short additional period minimizes the need for additional investments in vehicles that are approaching end-of-life. As a result of fleet averaging, the number of bins has no impact on environmental benefits. [EPA-HQ-OAR-2022-0829-0701, pp. 178-179]

We therefore recommend EPA align the bins in Tier 4 with those in ACC II. We agree with the addition of Bin 10 (10 mg/mile) and plan to request CARB add this bin during their next ACC II regulatory update. We would also recommend that both EPA and CARB consider adding bins 35, 45, and 90 to provide manufacturers with greater flexibility while maintaining environmental benefits. [EPA-HQ-OAR-2022-0829-0701, pp. 178-179]

We also note that, unlike CARB, EPA does not allow a higher US06 standard for bins below 30 mg/mile. The emission variation associated with high-speed, high-load cycles on the US06 are particularly challenging at the very low emission levels (sub-30 mg/mile). Consequently, we recommend EPA align Tier 4 with ACC II and set a 30 mg/mile standard for US06 for all bins below bin 30. [EPA-HQ-OAR-2022-0829-0701, pp. 178-179]

[See original attachment for Figure 66: Comparison of EPA and CARB Bins] [EPA-HQ-OAR-2022-0829-0701, pp. 178-179]

K. Technical Issues with Proposed Tier 4 Regulatory Text

However, when evaluating the existing vehicles pulled into the new MDPV definition and making conclusions that the proposed definition would not affect the classification of existing Class 2b and 3 ICE vehicles, it does not appear that EPA considered the proposed 22,000-pound limit to GCWR in the WF calculation, which is proposed to begin in MY 2030, in combination with the 5,000-pound WF threshold. After the WF GCWR limit, many ICE work trucks in the market today would be classified as MDPV in MY 2030 and beyond (see examples below). Manufacturers encourage EPA to review compliance data submissions to reassess how the proposed MDPV definition may interact with 2023MY and 2024MY ICE products. [EPA-HQ-OAR-2022-0829-0701, pp. 198-200]

[See original attachment for Figure 73: Sample ICE Work Trucks and Classifications]

307 Press Kit: 2023 Ram Heavy Duty, Towing specifications (Public “Base Weight Total” used for example may vary from “EPA Curb” weight) htps://media.stellantisnorthamerica.com/newsrelease.do?id=24053&mid=,

The consequences of shifting ICE work vehicles to the MDPV regulatory class are significant. For criteria emissions, the MDPV NMOG+NOx targets are proposed to be 12 mg/mi in MY 2030 vs. 178 or 247 mg/mi for MDV in MY 2029 in the default compliance pathway308 (see Figure 74 below), and the MDPV definition would preclude these work trucks from certifying to proposed Bin 160 or Bin 125, which are reserved only for MDVs.309 The EPA NPRM analysis does not appear to recognize that many ICE work trucks would switch to MDPV with the proposed new MDPV definition, and no technology pathway is discussed to bring a 2029MY9 MDV work truck into a compliant light-duty averaging set. [EPA-HQ-OAR-2022-0829-0701, pp. 198-200]

308 NPRM at 29261, Table 41.

309 NPRM at 29261, Table 42.

[See original attachment for Figure 74: NPRM Table 41: LDV, LDT, MDPV and MDV Fleet Average NMOG+NOx Standards Under the Default Compliance Pathway] [EPA-HQ-OAR-2022-0829-0701, pp. 198-200]

With the proposed new MDPV definition, after the WF calculation adjustments beginning in MY 2030, many ICE work trucks over 22,000 pounds GCWR would otherwise be required to engine dyno cert if they were not MDPVs. The logic appears paradoxical and unintended. These vehicles cannot be both so alike to passenger vehicles that they should be regulated as passenger vehicles, and so alike to heavy-duty purpose-built work trucks that they should be regulated the same as light-heavy engines. Many of these ICE vehicles pulled into the new MDPV definition in MY 2030 today share engine hardware with vehicles that would be required to engine dyno cert under Part 1036 in MY 2030 due to the 22,000-pound GCWR limit. [EPA-HQ-OAR-2022-0829-0701, p. 200]

There is a stark difference between light-duty chassis dyno certification procedures, required for MDPVs, and engine dyno certification procedures for vehicles over 22,000-pound GCWR. Similar vehicles sharing parts and development resources today could be forced to pursue different development paths based on the proposed MY 2030 class definitions and test procedures. [EPA-HQ-OAR-2022-0829-0701, p. 200]

Complexity with the proposal is not limited to within the EPA program. Department of Transportation, through the Corporate Average Fuel Economy program, may have different regulatory class definitions for fuel consumption regulations than proposed by EPA. California Air Resources Board, through Advanced Clean Cars II, has different NMOG+NOx Bins, and different certification requirements than EPA proposes.310 [EPA-HQ-OAR-2022-0829-0701, p. 200]

310 htps://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/2acciifro1961.4.pdf

F. MDV BINs

13. Background NMOG+NOx Bins

As noted above in Section III.F, EPA and CARB have provided different emission certification bins – from less stringent to more stringent – for several decades. Automakers can certify vehicles to any bin but must meet a sales-weighted fleet average. The use of bins provides automakers substantial flexibility to certify some vehicles to higher bins and others to lower bins. At the same time, the fleet average provides assurance of air quality benefits. The number of bins or emission levels associated with bins does not have even a theoretical impact on air quality. In fact, we have recommended allowing automakers to set family emission limits (FELs). Nonetheless, both EPA and CARB have restricted the number of bins in the past. [EPA-HQ-OAR-2022-0829-0701, pp. 205-206]

Like LDVs, EPA has proposed Bins that do not align with the Bins in California's ACC II. As shown in Figure 75 below, EPA prohibits virtually every bin that is allowed in California's ACC II LEV IV regulations. At the same time, EPA proposes 60 mg/mile fleet average requirement for MDVs, assuming it will be met using a blend of BEVs and ICE vehicles. While EPA does propose additional bins in 10 mg/mile increments from Bin 70 to Bin 0, and we support additional bins, these are unlikely to be used for Class 2b and 3 vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 205-206]

Combined with California's restriction against selling a vehicle in California with a higher emission bin than the one sold federally (see 13 CCR 1961.4(c)(6), Equivalence of Federal Standards), this effectively mandates that every Class 2b and 3 ICE vehicle certify to Bin 125 –

the only common bin between California and EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 205-206]

[See original attachment for Figure 75: MDV Category Bins Tier 4 vs ACC II] [EPA-HQ-OAR-2022-0829-0701, pp. 205-206]

14. Recommendations on MDV Bins and NMOG+NOx stringency

Manufacturers recommend that EPA align with California ACC II stringency for MDV NOx. Manufacturers have plans for ICE vehicles to meet the Bin150 standards for gas, and Bin175 for diesel MDV powertrains, including in use testing at high loads. [EPA-HQ-OAR-2022-0829-0701, pp. 206-207]

To the extent that EPA projects that manufacturers will use ZEVs to meet lower fleet averages, EPA should carefully study which ZEVs would remain as MDVs, and be subject neither to the MDPV definition, nor Part 1036 engine dyno certification requirements, nor migrate to Class 4 to maintain current performance after accounting for the size and weight of ZEV hardware (batteries, etc.). Manufacturers recommend that ZEVs no longer meeting the final MDV definition not be included in the MDV averaging set when EPA sets standards. The NMOG+NOx fleet averages likely need to be adjusted to account for the lower BEV volumes resulting from either (or both) changes in the definitions and market projections for potential BEV sales, similar to our concerns noted with the MDV GHG fleet targets. [EPA-HQ-OAR-2022-0829-0701, pp. 206-207]

We strongly recommend EPA align the bins in Tier 4 with those in ACC II, LEV IV. Otherwise, Tier 4 will eliminate all flexibility associated with the bin system. Additional bins simply provide flexibility for manufacturers to meet the fleet average emission standards in the most cost-effective manner possible. They encourage incremental per vehicle improvements and will provide for a more effective program as BEV technology ramps up and the fleet average NMOG+NOx ramps down. [EPA-HQ-OAR-2022-0829-0701, pp. 206-207]

1. Reduce Refinery Gate and Downstream Sulfur Caps to 10 ppm

When EPA finalized the Tier 3 rules governing gasoline, it lowered the maximum average sulfur level from 30 ppm to 10 ppm. This change was essential to enable advance emissions control technology to achieve the lower tailpipe emissions standards that are part of the Tier 3 standards because, as EPA points out, “any amount of gasoline sulfur will deteriorate catalyst efficiency.”446 However, EPA continues to allow gasoline with 80 ppm sulfur at the refinery gate and 95 ppm downstream. Auto Innovators continues to stand behind previous industry comments on sulfur as detailed in the Auto Alliance Tier 3 comments.447 Refiners and the distribution system have had many years to adjust to lower sulfur standards. [EPA-HQ-OAR-2022-0829-0701, p. 274]

446 Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards, Proposed Rule, 78 Fed. Reg. 29816, 29821 (May 21, 2013).

447 Supplemental Comments of the Alliance of Automobile Manufacturers on Market Gasoline Sulfur, Alliance of Automobile Manufacturers (Oct. 31, 2013), Docket ID EPA-HQ-OAR-2011-0135-4950.

If EPA pursues lower Tier 4 emissions standards in the NPRM, we urge EPA to reduce the refinery gate cap to 10 ppm, perhaps with a phase-in period, and at the same time to develop a pathway toward a downstream retail cap of 10 ppm per gallon. The elimination of gasoline with greater than 10 ppm sulfur will enable advanced emissions control technology and will reduce the impact of sulfur on catalyst efficiency. This cap aligns with sulfur caps in the European Union and many parts of Asia, including China. The lower sulfur cap also aligns with the lower NMOG + NOx standards as proposed in the NPRM. [EPA-HQ-OAR-2022-0829-0701, p. 274]

Organization: Alliance for Vehicle Efficiency (AVE)

Finally, AVE supports EPA's proposed stringency level for NMOG + NOx cap for cold testing. The current proposal at 300 mg/mi is feasible and suppliers already manufacture the technology to comply. [EPA-HQ-OAR-2022-0829-0631, p. 8]

Organization: American Lung Association (ALA) et al.

Better Control Fine Particles and Ozone-forming Air Pollutants from New Vehicles
EPA has taken an appropriate multi-pollutant approach to the standards to ensure the cleanup of ozone-forming emissions. To maximize the benefits of the rule, EPA should consider eliminating smog-forming certification levels for higher polluting light-medium vehicles over time. While the proposals intend to push fleet averages of smog-forming emissions down by 60 percent or more, there are still allowances for much higher emitting vehicles through the entirety of the rulemaking. We also encourage EPA to phase out higher-emitting certification levels to drive both fleet average and individual vehicle emissions lower over time. [EPA-HQ-OAR-2022-0829-0745, pp. 2-3]

Organization: American Petroleum Institute (API)

ii. Criteria pollutants proposed stringency of requirements do not factor non-BEV technologies.

EPA proposes to reduce30 the NMOG+NOx standard by 60% from the current 30 mg/mile level to 12 mg/mile in 2032. We do not believe this reduction is justified either on a health benefit or a cost-effectiveness basis. Furthermore, the criteria pollutant proposal for NMOG+NOx is another example of setting a performance standard that can only be met by a specific vehicle technology. EPA has not demonstrated a technically feasible path for OEMs to meet NMOG+NOx standards with a mixed vehicle fleet comprised of large and small light-duty vehicles with ICE technologies. The examples given in the DRIA (Table 3-14) for vehicles that currently meet less than 15 mg/mile NMOG+NOx is limited to sedans and smaller SUVs, but do not include pick-up trucks and full-size SUVs. Trucks and SUVs represent a significant portion of OEM fleets.31 EPA instead anticipates and sets the standard to require the use of BEVs by OEMs to sell large SUVs and trucks, instead of allowing for a choice of technology paths which could include ICE vehicles in the fleet. This is arbitrary and capricious and could likely have implications for consumers choice and costs. Moreover, only 19 vehicles were certified below 15 mg/mi that rely only on ICE technologies out of the approximately 299 carline models certified by EPA in 2021. [EPA-HQ-OAR-2022-0829-0641, pp. 11-12]

30 In its recent Advanced Clean Cars II regulation, the California Air Resources Board has maintained a 30 mg/mile NMOG+NOx standard.

31 Henry, J. (January 3, 2022). “Light Trucks Now Outselling Cars 3-to-1”. Forbes.com. Retrieved June 30, 2023. https://www.forbes.com/wheels/news/light-trucks-now-outselling-cars/.

Organization: Aston Martin Lagonda (AML)

- Understanding what SVMs are selling in the US

Neither with regard to criteria emissions nor GHG does EPA explain in the NPRM the paucity (verging on absence) of Small OEM flexibility or additional lead-time. A misstatement in the preamble may shed light on this: in the preamble (88 FR 29405) (May 5, 2023), EPA incorrectly states (as does the Draft Regulatory Impact Analysis) that the "proposed NMOG+NOx standards should have no impact on the existing Small Business manufacturers, which currently produce only electric vehicles." This is simply not so. There most certainly are SVMs that produce internal combustion engine (ICE) vehicles for the US market, AML being one of them. Nowhere in the draft RIA does the term "small volume manufacturer" even appear, and the draft RIA thus fails to address the SVM segment of the industry. Given that the EPA has consistently recognised the SVM category, it is unusual that it would bring forward punitive regulations at those companies less able to deal with heavy sanctions. [EPA-HQ-OAR-2022-0829-0566, p. 4]

B. THERE ARE FOUR SPECIFIC TOPICS IN THE NPRM THAT ARE OF DEEP CONCERN TO SVMs

1. CRITERIA EMISSIONS

- "Moving the goalpost" for MY 27 and 28 makes the trajectory exceptionally challenging for SVMs therefore appropriate derogations are essential. Special accommodation must be made for SVMs that took strategic decisions and made technological and financial commitments more than 5 years ago and are unable to make rapid adjustments to adapt to new regulation at pace. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

EPA proposes to abandon the MY 27 and 28 SVM NMOG+NOx standards set forth in Tier 3 (and on which SVMs have been rightfully relying), and to require SVMs to adhere to the Tier 4 large volume (and short) phase-in. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

This inequitably conflicts with the already established and in effect SVM phase-in set forth in 40 CFR 86.1811-17 (h)(l), as follows: [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

SVM Fleet Average NMOG+NOx Standard (mg/mile)

Model year: 2027: In effect Tier 3: 51; In effect Tier 4: 22

Model year: 2028: In effect Tier 3: 30; In effect Tier 4: 20 [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

The NPRM's proposed change means that in MY 27, SVMs would have to meet a fleet average NMOG+NOx standard that is 57% more stringent than what they have been planning in reliance on 40 CFR 86.1811-17(hl(l). And then, for MY 28, they would have to meet a fleet average NMOG+NOx standard that is 33% lower than what they have been planning in reliance on 40 CFR 86.1811-17(h)(l). This would be an unjust "moving the goalpost".[EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

• The proposed NMOG+NOx requirements are excessively stringent - too stringent, too soon This is especially so considering Tier 3 levels and that the CARB ACCII rulemaking appropriately maintained an SVM NMOG+NOx fleet standard of 51 mg/mi through MY 34, as shown in the graph below. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

[See original comment for bar graph of SVM FTP NMOG+NOx LIMIT [g/mi]] [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

• The Proposed Tier 4 NMOG+NOx fleet average is unrealistic for companies that cannot make use of fleet averaging; SVMs should not have to rely on credit purchasing. [EPA-HQ-OAR-2022-0829-0566, pp. 6-7]

There is no recognition in the NPRM that an SVM may have only one or two ICE test groups, neither of which meets the Tier 4 fleet NMOG+NOx average. The fleet average concept in such a situation offers no flexibility; having nothing to "average", such an SVM would simply have no ability to comply and would fall into a deficit situation. It was precisely to address this type of scenario that the Tier 3 SVM flexibility provisions in 40 CFR 86.1811-17(h) were promulgated. The current rulemaking should follow suit and adopt comparable SVM flexibility. [EPA-HQ-OAR-2022-0829-0566, p. 7]

As regards credit purchasing, we reiterate how it is unfair to force SVMs to rely on risky credit purchasing (with unknown availability and at an unknown cost) to meet criteria emissions requirements. [EPA-HQ-OAR-2022-0829-0566, p. 7]

• The Proposed Interim Tier 4 provision does not provide flexibility to SVMs [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

We note that one general flexibility concession in the NPRM -- the category of "Interim Tier 4 vehicles" -- does not provide relief to SVMs. As proposed, the Interim Tier 4 provision leaves SVMs empty-handed because the benefits of Interim Tier 4 are restricted to OEMs who can otherwise meet the 40% and 80% phase-in percentages with their full Tier 4 test groups (and thus use the Interim Tier 4 category for the remaining 60% and 20% of their fleets during the phase in}. Given that SVMs - particularly those with only one or two test groups -- cannot meet the phase-in percentages with full Tier 4 cars, EPA's proposal unfairly denies SVMs the ability to make use of the benefits of the Interim Tier 4 category. [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

• In sum, as regards criteria emissions, EPA should:

• follow CARB's ACCII rules and continue the availability of Bin 125 to SVMs through MY 2034 and not require NMOG+NOx limits for cold testing.2 [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

2 EPA must justify imposing on SVMs the proposed new cold NMOG+NOx standard. Until EPA can establish that the environmental benefits outweigh the burdens on SVMs, SVMs should be exempted.

• with regard to NMOG+NOx FTP and US06 standards [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

• In order to properly account for the problems facing SVMs with regard to "fleet averaging,, and the risks of credit purchasing, as explained above, set the degree and frequency of SVM step-downs to reflect SVM realities -- limited product lines, longer product development and life cycles [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- MY 2027 -- Maintain for all SVMs the already-in effect {86-1811-17{h} MY 27 Tier 3 SVM NMOG+NOx standard {51m g/mi} [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- MY 2028 -- Maintain for all SVMs the already-in effect MY 28 Tier 3 SVM NMOG+NOx standard (30 g/mi) [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- MY 2029-32 - continue the 30 mg/mi standard for SVMs given that the environmental benefits of a more stringent standard have not been established and are vastly outweighed by the potential burden on SVMs. [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- Make the Interim Tier 4 category more flexible and available [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

- Add a new paragraph (e} to proposed 40 CFR 86.1811-27 to read as follows: [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

(e) If meeting the standards set forth in this section 40 CFR 86.1811-27 would cause severe economic hardship, small-volume manufacturers may ask us to approve an extended compliance deadline under the provisions of 40 CFR 1068.250, except that the solvency criterion does not apply and there is no maximum duration of the hardship relief [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

This provision would mirror the SVM relief made available under Tier 3 in 40 CFR 86.1811-17. [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

The above steps are necessary to comply with the Clean Air Act's section 202{a} mandate that EPA provide sufficient lead-time "to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such [lead-time]." [EPA-HQ-OAR-2022-0829-0566, pp. 7-8]

Organization: BMW of North America, LLC (BMW NA)

BMW NA supports the comments filed by the Alliance of Auto Innovators to the EPA docket. Our main concern is that a diverging approach in the United States between Federal regulations and California's regulations will substantially increase the hurdles to fulfill fleet and vehicle standards. BMW NA is aiming for one single US fleet and therefore would like to motivate EPA to align the Tier 4 rules with LEV IV as much as possible. This is referring to the rules for the NMOG+NOx fleet (bin structure and EV treatment) as well as to the vehicle standards. [EPA-HQ-OAR-2022-0829-0677, p. 4]

The fleet regulation should be harmonized, so that the same fleet composition should lead to compliance in both regulations. Other than the CARB approach, the Tier 4 fleet regulation is heavily dependent on the BEV share. As mentioned above, there is a high uncertainty what BEV share could be reached in each single year. From our perspective, the Tier 4 regulation should focus on regulating pollutant emissions of ICE vehicles. [EPA-HQ-OAR-2022-0829-0677, p. 4]

There should be no additional burdens on top of CARB vehicle standards, which are leading to additional substantial investments for a mature technology in its phase-out - e.g. for test labs or completely new after-treatment systems beyond the CARB standard. [EPA-HQ-OAR-2022-0829-0677, p. 4]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Criteria Air Pollutant Standards

CARB supports U.S. EPA's proposal to tighten criteria air pollutant emission standards, particularly given the continued role that internal combustion engine vehicles will play in the national fleet over the regulatory timeframe and beyond. Reducing exposure to harmful air pollution is a key element of the proposed standards, and the proposals to tighten criteria air pollutant emissions are needed to protect public health, especially in communities with disproportionate exposure to air pollution. Because U.S. EPA's proposal does not require ZEV sales, as California's rules do, the tightening of criteria air pollutant emission standards is even more critical to ensure that the internal combustion engine vehicles that will continue to be sold are becoming cleaner. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

As part of its ACC II rulemaking, CARB adopted its fourth iteration of its Low Emission Vehicle (LEV) standards, referred to as LEV IV. CARB finds that U.S. EPA's proposals are appropriate and largely consistent with the LEV IV standards. CARB has documented our analysis and recommends strengthening the proposal to realize the greatest degree of emission reductions achievable, considering cost and technology availability, to further protect public health. As described further below, CARB recommends that U.S. EPA adopt its proposed NMOG+NOx and PM standards, adopt elements of CARB's evaporative emission standards program, and eliminate the use of commanded enrichment as proposed while collecting additional information on the use of auxiliary emissions control devices to further improve emission standards in the future. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

NMOG+NOx Emission Standards for Light-Duty Vehicles

CARB supports U.S. EPA's proposal to reduce the light-duty vehicle NMOG+NOx fleet average standard to 12 milligrams per mile (mg/mi) with ZEVs eligible to be included in the compliance calculation. The proposal assumes that non-ZEVs will reach a fleet average of 30 mg/mi, which is identical to CARB's LEV IV requirements for light-duty vehicles. Both CARB's LEV III requirements and U.S. EPA's Tier 3 requirements previously determined that 30 mg/mi was technologically feasible without heavy reliance on ZEVs. 33 Accordingly, CARB does not project the need for development or deployment of any new technologies but rather the use of the technologies and rate of deployment previously analyzed and determined to be feasible. Technologies relied upon in the LEV III analysis included larger volume catalysts, greater catalyst precious metal loading, more optimized close-coupled catalysts, optimized thermal management, low thermal mass turbochargers, double layer catalyst washcoats, and improved fuel injection control; these technologies are described in more detail in the original LEV III rulemaking package. 34 These are the same technologies that manufacturers have largely deployed to date and can still utilize to convert current and future vehicles that, combined with ZEVs, can meet U.S. EPA's proposed standards. CARB also notes that the ZEV penetration that will help manufacturers comply with the proposed GHG standards also support compliance with the criteria air pollutant standards. [EPA-HQ-OAR-2022-0829-0780, p. 27]

33 CARB. ACC II ISOR https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf and Appendix H: ACC II LEV Technology Appendix. April 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/apph.pdf.

34 CARB. LEV III ISOR. December 2011. https://www.arb.ca.gov/regact/2012/leviiighg2012/levisor.pdf.

NMOG+NOx Emission Standards for Medium-Duty Vehicles

As under the proposed medium-duty vehicle GHG standards, CARB supports U.S. EPA's decision to better delineate the medium-duty vehicle class from heavy-duty vehicles to enable application of the most rigorous and appropriate criteria air pollutant emission standards and procedures. [EPA-HQ-OAR-2022-0829-0780, pp. 27-28]

CARB supports U.S. EPA's proposal to reduce the medium-duty vehicle NMOG+NOx fleet average standard to 60 mg/mi. As described in greater detail below, U.S. EPA's proposed medium-duty fleet average standards are not directly comparable to CARB's recently adopted LEV IV medium-duty standards for two reasons: first, CARB's standards exclude ZEVs from the fleet average while U.S. EPA's do not, and second, U.S. EPA's proposed standards apply to a different subset of medium-duty vehicles than CARB's standards. CARB has performed its own analysis to compare California's effective stringency for medium-duty vehicles to U.S. EPA's proposed standards and finds that both programs are targeting similar fleet-wide emission levels. As such, CARB expects that manufacturers will be able to use the same technology solutions to meet both the California and the proposed federal emission standards and concludes that the proposed standards are technically feasible with the current technologies available and expected ZEV penetration rates in this sector. [EPA-HQ-OAR-2022-0829-0780, pp. 27-28]

Analysis of CARB's LEV IV requirements relative to U.S. EPA's proposal

Differences in vehicles subject to CARB's LEV IV requirements relative to U.S. EPA's proposal [EPA-HQ-OAR-2022-0829-0780, p. 28]

U.S. EPA proposes to apply a single NMOG+NOx fleet average standard to all medium-duty vehicles at or under 22,000 lbs. gross combined weight rating (GCWR). 35 Based on U.S. EPA certification data, the proposed fleet average standards would apply primarily to all vans and to the gasoline-fueled trucks currently in the medium-duty classes. The proposed standards would move diesel trucks to compliance with heavy-duty engine standards. In contrast, CARB's LEV IV standard applies separate fleet average standards to Class 2b and Class 3 vehicles without regard to their GCWR; therefore, the LEV IV standard applies to both gasoline and diesel vehicles and both vans and trucks. Additionally, the LEV IV fleet average standards do not include ZEVs in the calculation of the fleet average. Thus, the LEV IV medium-duty fleet average standards apply to a different population of vehicles than U.S. EPA's proposed standards and the numeric standards of the two programs cannot be directly compared. [EPA-HQ-OAR-2022-0829-0780, p. 28]

35 Medium-duty vehicles above this GCWR cutoff would separately be required to certify to U.S. EPA's heavy-duty engine standards.

Developing estimated fleet averages to enable comparisons

Given the difference in vehicles covered by the two programs, assessing whether the two regulations are targeting similar emission levels first requires aligning the vehicle populations. CARB developed a compliance scenario to estimate the emissions from its medium-duty fleet under the LEV IV standards, then omitted diesel trucks to develop a gasoline-only fleet estimate for comparisons to U.S. EPA's proposal. [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

To create this compliance scenario, CARB adjusted the LEV IV fleet average standards by combining the Class 2b and Class 3 fleet based on sales volumes and estimated the least stringent emission "bins" 36 to which manufacturers would likely certify their vehicles to achieve minimum compliance with the respective fleet averages (summarized in Table 3). [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

36 Manufacturers certify vehicles according to test groups for exhaust emission standards that meet discrete categories or bins based on their emission rates. For instance, there is a bin at the SULEV 125 emission rate, corresponding to 125 milligrams per mile (mg/mi) of NMOG+NOx. The numerical part of the standard category, such as 125 in SULEV 125, refers to the emission standard, in thousandths of a gram per mile of NMOG+NOx emissions on the FTP driving cycle. The highest bin effectively caps the worst-case emissions that could come from some vehicles in a manufacturer's fleet certified to that bin.

Based on past trends and added complexities in diesel emission controls, the analysis estimates that diesel Class 2b vehicles will use the dirtier emission bin of super-ultra-low-emission vehicle (SULEV) 170 37 and gasoline Class 2b vehicles will use the SULEV 150 bin 38 and eventually phase into the SULEV 125 bin. CARB's EMFAC population of on-road emission sources shows that the Class 2b category is made of 61 percent gasoline vehicles and 39 percent diesel vehicles. 39 Because the Class 2b category contains more gasoline vehicles, they can remain in the SULEV 150 and 125 bins without needing to certify to lower emission levels to offset the diesels in this class. For Class 3 vehicles, CARB assumes diesel vehicles will certify to the SULEV 230 and 200 bins, 40 while the gasoline vehicles will have to phase into the SULEV 175, 150, 125, and 100 bins. 41 CARB's EMFAC population shows the Class 3 population is made of 70 percent diesel and 30 percent gasoline vehicles, which means gasoline vehicles will have to certify to the cleaner emission bins to offset the larger population of diesel vehicles using the dirtier emission bins in the Class 3 category. Estimating these phase-in percentages for the bin usage is necessary to estimate the likely emission levels for the subset of medium-duty vehicles subject to both LEV IV and U.S. EPA's proposed standard. [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

37 CARB expects manufacturers to certify their diesel medium-duty vehicles to the dirtiest emission bins, based on previous certification levels of diesel vehicles which regularly certify to the higher emission bins. For LEV IV, the SULEV 170 bin will be the dirtiest bin available for Class 2b after the SULEV 250 and SULEV 200 bins phase out. Therefore, CARB expects the diesel population of Class 2b vehicles to primarily be certified to the SULEV 170 bin. While this analysis ultimately excludes diesel vehicles, these vehicles are included in California's LEV IV fleet average standards, which means understanding the potential emissions from diesel vehicles in California is necessary to determine the likely certification levels for the gasoline vehicles that are included in the analysis.

38 CARB expects manufacturers to certify their gasoline medium-duty vehicles to cleaner emission bins than their diesel vehicles. The analysis expects all the gasoline vehicles to use the next lowest bin, SULEV 150, from the SULEV 170 bin to offset the emissions from their diesel vehicles in the SULEV 170 bins. For the 2029 MY, when the fleet average reduces to 150 mg/mi, manufacturers will have to additionally rely on vehicles certified to the SULEV 125 bin if they want to continue certifying their diesel vehicles to the SULEV 170 bin.

39 EMFAC is CARB's model that estimates the official emissions inventories of on-road mobile sources in California. It is approved by U.S. EPA for planning required to meet the NAAQS. See 40 C.F.R. §§ 93.110, 93.111; 87 Fed. Reg. 68,483, Nov. 15, 2022. Available at: https://arb.ca.gov/emfac/

40 Similar to the assumption CARB made about diesel Class 2b vehicles, CARB expects Class 3 diesel vehicles to use the dirtiest emission bins available after the SULEV 400 and 270 bins phase out. Based on previous certification levels, most Class 3 vehicles are at these expected levels.

41 Similar to the assumption CARB made about gasoline Class 2b vehicles, CARB expects Class 3 gasoline vehicles to use the next cleanest bins below those used to certify Class 3 diesel vehicles. With a larger population of Class 3 diesel vehicles, the Class 3 gasoline population needs to become much cleaner to offset manufacturers keeping their diesel vehicles certified to the higher emission standards.

[See original for table titled “Table 3. Certification Bin Assumptions for NMOG+NOx Medium-Duty Vehicle Standard Comparison.”] [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

After applying these assumptions and removing the diesel vehicles, CARB generated estimated emission levels for the gasoline-only medium-duty fleet, shown as the blue line with circles in Figure 3. CARB then developed a second estimated California LEV IV fleet that includes ZEVs, using ZEV penetrations required by CARB’s ACT and ACF regulations, shown as the dashed grey line with circles in Figure 3. [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

To estimate a version of U.S. EPA’s proposed standard to compare to CARB’s gasoline-only fleet average, CARB removed the expected ZEV penetration rates from the proposed fleet average and calculated the levels to which the remaining medium-duty vehicles would need to certify to meet the proposed fleet average. This estimated standard is shown as the dark blue line with triangles in Figure 3. [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

[See original for graph titled “Figure 3. Comparison of Proposed Medium-Duty NMOG+NOx Emission Standards to California’s LEV IV Requirements.”] [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

Comparison between estimated medium-duty vehicle fleet average emission levels under LEV IV and U.S. EPA’s proposed standards [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

Figure 3 shows the two comparisons between U.S. EPA’s proposed standards and CARB’s estimated LEV IV standards: one including ZEVs as U.S. EPA would apply their proposed Tier 4 standards and another without ZEVs as CARB would apply the LEV IV standards. [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

First, U.S. EPA’s proposed fleet average (shown as the orange dashed line with triangle markers), which is inclusive of ZEVs and Class 2b and Class 3 medium-duty vehicles, is compared to the estimated comparable LEV IV fleet average with ZEVs (shown as the gray dashed line with circle markers). Through the 2035 MY, the two curves follow similar trajectories and reach identical end points for overall emission levels. Given that both U.S. EPA’s proposed standards and CARB’s standards allow for averaging, banking, and trading of fleet average credits and deficits for vehicle manufacturers to smooth out year-to-year changes, CARB expects manufacturers could readily manage the small deviations between the two programs while deploying identical vehicles in both markets. [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

Figure 3 also compares the two emission standards for the estimated gasoline-only fleets. The projected LEV IV gasoline-only fleet average (shown as the light blue solid line with circle markers) and the estimated non-ZEV fleet average for U.S. EPA’s proposed fleet average (shown as the dark blue line with triangle markers) show similar, but not identical, trajectories through the 2031 MY. As noted above, manufacturers would be expected to manage slight deviations across MYs through the flexibilities of the program such as averaging, banking, and trading of credits and deficits relative to the fleet average. From the 2032 MY on, while the projected fleet averages are slightly different, the analysis does not account for a few factors that would likely minimize any such difference. As CARB noted in its Final Statement of Reasons for the LEV IV standards, 42 staff expects that a portion of these medium-duty vehicles will also be subject to CARB's heavy-duty in-use standards that make use of a portable emissions measurement system (PEMS) and those standards will likely result in manufacturers meeting more stringent emission levels than the fleet average would theoretically necessitate. When combined with the uncertainty in what each manufacturers' actual ZEV sales share will be (which also affects the resultant emission level their non-ZEVs would have to meet), CARB finds that the proposed standards are similar enough to the LEV IV standards that manufacturers would likely be able to deploy common emission control solutions to simultaneously meet both requirements. [EPA-HQ-OAR-2022-0829-0780, pp. 28-32]

> 42 CARB. ACC II Final Statement of Reasons. Appendix B: Summary of Comments to the Low-Emission Vehicle Regulation and Agency Response. April 2022. p. 40. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/fsorappb.pdf.

Organization: California Attorney General's Office, et al.

Finally, EPA should evaluate the risk of excess credit generation in the NMOG+NOx program for medium-duty vehicles. Because Section 202(a)(3)(C) requires three years' "stability" for NOx standards for "heavy-duty" vehicles (defined by statute to include some of the vehicles EPA now classifies as medium-duty), but not for GHG standards, the proposed medium-duty GHG standards require year-over-year reductions in model years that the medium-duty NMOG+NOx standards hold constant. Id. at 29,243 (Table 32), 29,261 (Table 41). EPA expects the industry to achieve compliance with the medium-duty GHG standards to a significant extent through electrification, which likewise reduces NMOG+NOx emissions. Id. at 29,244, 29,331. Therefore, the medium-duty fleet will likely achieve NMOG+NOx reductions even in those "stability" years. EPA should clarify whether this discrepancy poses any risk of excessive credit generation and necessitates some action to prevent dilution of the MDV NMOG+NOx standards, such as restricting credit generation under the NMOG+NOx program,191 or calibrating the model- year 2030 standards' stringency to account for such changes in the fleet, see id. at 29,261 (Table 41). [EPA-HQ-OAR-2022-0829-0746, p. 38]

> 191 For example, EPA could make credit generation dependent on manufacturers' participation in the optional early compliance pathway. Id. at 29,260.

Organization: Cummins Inc

The tradeoff between oxides of nitrogen (NOx) and carbon dioxide (CO_2) reductions must be considered when setting the stringency of standards. Also, linkage of criteria pollutant and GHG certification and compliance protocols is important so that improvement in one type of pollutant is not achieved at the expense of the other. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Organization: Environmental. and Public Health Organizations

B. Emissions of criteria pollutants from light- and medium-duty vehicles harm the public health.

EPA's proposed reductions of non-methane organic gases ("NMOG") plus NOx, as well as particulate matter, are crucial to protecting the public from harmful air pollutants. As EPA notes, "[e]mission sources impacted by [its] proposal, including vehicles and power plants, emit pollutants that contribute to ambient concentrations of ozone, PM, NO2, SO2, CO, and air toxics."67 These pollutants are linked to premature death, respiratory illness (including childhood asthma), cardiovascular problems, and other adverse health impacts. In particular, NOx emissions increase levels of ozone, because ground-level ozone forms when there are high concentrations of ambient NOx and VOCs, and when solar radiation is high.68 NOx emissions also impact particulate matter by forming secondary particles through atmospheric chemical reactions.69 Reductions in NOx emitted from LDVs will therefore result in reduced ambient levels of ozone and PM and improved health and environmental outcomes. [EPA-HQ-OAR-2022-0829-0759, p. 17]

67 88 Fed. Reg. at 29211.

68 Am. Lung Ass'n, State of the Air 2023 Report (2023) at 26, https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf.

69 DRIA at 7-10.

F. EPA should strengthen the Tier 4 NMOG+NOX standards and finalize the proposed PM requirements.

We now turn to EPA's proposed criteria pollutant standards for LDVs. As detailed below, while the proposed PM2.5 requirements are appropriate, EPA should strengthen the NMOG+NOX standards and consider ways to limit over-crediting. [EPA-HQ-OAR-2022-0829-0759, p. 53]

1. EPA should increase the stringency of the proposed NMOG+NOX standards.

a. EPA should strengthen the NMOG+NOx standards to better reflect available, feasible, and cost-effective technologies.

EPA's 2014 Tier 3 emissions standards were set based on the deployment of technologies applicable to combustion vehicles. The NMOG+NOx standards are meant to continuously phase in from 2017-2025, ultimately reaching a fleet average of 30 mg/mile on the FTP and 50 mg/mile on the SFTP. However, over this time period, an increasing share of BEVs will be sold, which are certified to 0 mg/mile NMOG+NOx. While the deployment of BEVs will not alter the tailpipe emissions reductions anticipated under the Tier 3 program, the additional BEVs, counted as 0 mg/mile, substantially reduce manufacturers' incentives to deploy the full extent of technologies EPA identified in the Tier 3 rulemaking to their combustion vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 53]

Two responses are possible from manufacturers: they either (1) deploy the same suite of internal combustion engine technologies to their combustion vehicle fleet, and therefore generate a significant amount of overcompliance credits that can be used to reduce their compliance obligations under the Tier 4 standards EPA is now proposing; or (2) reduce the deployment of technologies as EPA originally envisioned when setting the Tier 3 standards, leaving emissions reductions for their combustion vehicle fleet on the table. Either response weakens compliance with the standards. Strengthening the Tier 4 standards will help avoid these problems. [EPA-HQ-OAR-2022-0829-0759, p. 53]

Therefore, EPA's proposed NMOG+NOx standards leave a significant gap between the feasible deployment of zero-emission technologies (indicated by the share of BEVs modeled for GHG compliance) and the feasible deployment of improvements to combustion vehicles (indicated by the achievement of a Tier 3 fleet average standard without the deployment of BEVs). Figure VI.F-1 illustrates, on the left, the implicit requirements on combustion vehicles under the proposed NMOG+NOx standards with EPA's modeled adoption of BEVs under the GHG standards; and, on the right, the implied share of BEVs required by the proposed Tier 4 standards if combustion vehicles achieve Tier 3 compliance. If BEVs are deployed at levels modeled by the Agency to comply with its GHG Proposal, NMOG+NOx emissions from combustion vehicles would remain about 30% higher than the Tier 3 requirement over the timeframe of the rule. If, instead, the combustion vehicle fleet matches the Tier 3 requirements in 2027-2032, far fewer BEVs would need to be deployed to meet the Tier 4 proposed targets.These scenarios demonstrate that numerous technological pathways are available to manufacturers to comply with the Tier 4 standards and that stronger standards are entirely feasible. [EPA-HQ-OAR-2022-0829-0759, p. 53]

SEE ORIGINAL COMMENT FOR Figure VI.F-1. Emissions performance and ZEV market share implied by the combination of achieving the proposed GHG standards and Tier 3 / Proposed Tier 4 NMOG+NOx standards

If manufacturers deploy ZEVs consistent with EPA's projection of compliance with the GHG standards, tailpipe emissions performance from the remaining combustion vehicles will exceed Tier 3 standards (left). If combustion vehicles instead achieve Tier 3 emissions standards, far fewer ZEVs will be required to meet the proposed Tier 4 fleet average standards than are modeled to comply with the GHG standards (right). [EPA-HQ-OAR-2022-0829-0759, p. 54]

EPA should close this gap in relative stringency by setting a standard that reflects the full emissions reductions of the combustion vehicle technologies it has already identified as feasible (and which are readily available). Aligning the Agency's assessment of ZEV deployment and its analysis (covered primarily in the Tier 3 rulemaking) of what is achievable to reduce NMOG+NOx emissions from combustion vehicles would yield a 2032 target of 10 mg/mi, a 17% reduction from its Proposal. Interim targets would then be adjusted accordingly. [EPA-HQ-OAR-2022-0829-0759, p. 54]

Such a standard for LDVs would still be technology-neutral: The target corresponds to the lowest non-zero bin in the Proposal (Tier 4 Bin 10),137 and the Agency has already identified combustion vehicles that have certified FTP emissions below 10 mg/mi.138 Moreover, we expect that manufacturers seeking to comply with the multipollutant standards primarily through combustion vehicle technologies would be investing in further emission-reduction technologies from those vehicles, such as by ensuring their vehicles are more in line with the emissions profiles of the industry-leading vehicles, including through deployment of hybridization and other EPA-identified strategies to reduce tailpipe emissions. Alternatively, for manufacturers that want to comply with the multipollutant standards through greater deployment of zero-emission technologies, this pathway would still allow flexibility for their combustion vehicle fleet to fall short of the Tier 3 requirements, provided they sell ZEVs beyond EPA's modeled industry average. [EPA-HQ-OAR-2022-0829-0759, pp. 54-55]

137 88 Fed. Reg. at 29419.

138 DRIA at 3-41, Tbl. 3-14.

EPA has embarked on a multipollutant rulemaking precisely because technologies exist to simultaneously achieve reductions in GHGs and criteria pollutants.139 Reducing the stringency of the final standards to 10 mg/mi NMOG+NOx better aligns with the feasible and cost-appropriate technologies already identified by the Agency. [EPA-HQ-OAR-2022-0829-0759, p. 55]

139 88 Fed. Reg. at 29187.

b. EPA should consider ways to limit over-crediting.

Figure VI.F-1 (left side) shows a non-monotonic behavior—that is, the allowable emissions profile of the combustion vehicles (green line) first increases significantly from 2026-2029, then decreases. This is largely due to the delay in increasing stringency for LDT3, LDT4, and MDPV classes (Class 2 light trucks), the result of EPA's interpretation of lead time requirements under the Clean Air Act.140 The Agency has offered an optional "early compliance" pathway for manufacturers; however, this pathway increases the total stringency over the six years covered by the proposal, reducing the likelihood of manufacturers choosing this path to compliance.141[EPA-HQ-OAR-2022-0829-0759, p. 55]

140 See id. at 29258.

141 If EPA sets a 10 mg/mile standard in 2032 as recommended in Section VI.F.1.a, and thus reduces the step for Class 2 light trucks to 10 mg/mile, there would presumably be no such gap in stringency between the early and default compliance pathways.

In an effort to induce manufacturers to align with the early compliance pathway and to acknowledge the reduced emissions benefits of the stagnant standard for Class 2 light trucks from 2025-2029 (a full five-year window corresponding to the lifetime of Tier 3 credits) under the default compliance pathway, EPA should condition manufacturers' full utilization of credits in this time period on their utilization of the early compliance pathway. For example, EPA could set a limit on the amount of averaging, banking, and trading (ABT) credits that could be utilized for compliance, in order to limit windfall credits from reductions in fleet emissions that occur during the 4-year period of stagnation. This would also ensure that manufacturers do not artificially prolong compliance through an overreliance on such credits. [EPA-HQ-OAR-2022-0829-0759, p. 55]

B.EPA should strengthen the Tier 4 NMOG+NOX standards, finalize the proposed PM requirements, and finalize the proposed change to criteria pollution requirements for MDVs with a GCWR above 22,000 pounds, subject to appropriate monitoring. [EPA-HQ-OAR-2022-0829-0759, p. 74]

Consistent with the recently finalized criteria pollutant emission standards for heavy-duty engines (Classes 2b-8) and those that have been proposed for LDVs (Classes 1-2a plus medium-duty passenger vehicles) in this rulemaking, the Agency is proposing standards regulating tailpipe emissions of criteria pollutants from medium-duty vehicles. Under Clean Air Act Section 202(a)(3)(A), these standards must "reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology." 42 U.S.C. § 7521(a)(3)(A) (emphasis added). As described below, EPA should strengthen the Tier 4 NMOG+NOx standards and enact guardrails to ensure that windfall credits earned during a period of required lead time do not undercut the emissions gains possible in the 2027-2032 timeframe. We support the proposed PM2.5 requirements and the proposed change to criteria pollution requirements for MDVs with a gross combined weight rating (GCWR) of more than 22,000 pounds, subject to appropriate monitoring to prevent manipulation.[EPA-HQ-OAR-2022-0829-0759, p. 74]

1. EPA must improve the stringency of the Tier 4 NMOG+NOx standards for MDVs.

Because additional reductions in emissions of NMOG+NOx from MDVs are readily achievable, EPA must strengthen the Proposed Standards to meet its statutory mandate. Figure VIII.B-1 shows the distribution of certification data for MY 2022-2023 gasoline pickups, affirming EPA's observation that the MDV fleet is already capable of achieving levels of NMOG+NOx emissions far below the current standards. In fact, because these data are not sales-weighted and include some share of gasoline pickups that would now be required to certify to the heavy-duty engine standard under the Proposal, this table likely understates the capability of manufacturers to readily achieve reductions of NMOG+NOx emissions from their MDV combustion fleet. [EPA-HQ-OAR-2022-0829-0759, p. 74]

Figure VIII.B-1. Distribution of NMOG+NOx certification values for Class 2b-3 gasoline pickups and vans

[See original attachment for Figure VIII.B-1.].

As in the case of the proposed light-duty NMOG+NOx standards (Section VI.F, supra), EPA's Proposed Standards for MDVs are in tension with its modeling of GHG compliance (Figure VIII.B-2). Here too, the Proposed Standards are well above the average emissions value expected under the conditions that: (1) manufacturers' combustion vehicles achieve Tier 3 standards; and (2) ZEV sales consistent with EPA's GHG modeling are achieved. If EPA's compliance modeling of ZEV sales is accurate and materializes in real-world sales, the remaining combustion fleet would be able to backslide to as much as double the average NMOG+NOx emissions allowed under Tier 3 (Figure VIII.B-2 (left)). Given the danger that these pollutants cause to public health and welfare, including through localized effects, such backsliding would be wholly inappropriate under Section 202. If instead the combustion fleet achieves Tier 3 standards as expected, far fewer ZEVs would be needed to comply with the proposed Tier 4 program or the early compliance pathway. [EPA-HQ-OAR-2022-0829-0759, p. 75]

Figure VIII.B-2. Emissions performance and ZEV market share implied by the combination of achieving the proposed MDV GHG standards and MDV Tier 3 / Proposed Tier 4 NMOG+NOx standards [EPA-HQ-OAR-2022-0829-0759, p. 76]

[See original attachment for Figure VIII.B-2.].

If manufacturers deploy MD ZEVs consistent with EPA's projection of compliance with the GHG standards, tailpipe NMOG+NOx emissions performance from the remaining combustion vehicles will greatly exceed Tier 3 standards (left). If combustion vehicles instead achieve Tier 3 emissions standards, far fewer ZEVs will be required to meet the proposed Tier 4 fleet average standards than are modeled to comply with the GHG standards (right). [EPA-HQ-OAR-2022-0829-0759, p. 76]

> 210 The ZEV market share here appears significantly higher than in the GHG modeling because it excludes combustion vehicles with a gross combined weight rating (GCWR) of more than 22,000 pounds. However, ZEVs with a GCWR greater than 22,000 pounds are included in the MDV fleet in our analysis. This proposed change is further discussed in Section VIII.B.3.

The relationship between the GHG Proposal and the Tier 4 proposal means that a significant amount of NMOG+NOx reductions are left on the table, in conflict with EPA's statutory mandate to achieve the "greatest degree of emission reduction achievable." 42 U.S.C. § 7521(a)(3)(A). As mentioned previously, combustion vehicles can readily reduce emissions below Tier 3 levels, but at a bare minimum, EPA's final standards should reflect the emissions levels that would be achieved by the combustion fleet achieving Tier 3 NMOG+NOx standards with ZEVs deployed to the extent modeled to meet GHG standards. Under this more stringent standard, manufacturers would retain flexibility to invest in greater ZEV deployment or to instead apply existing, feasible, and cost-effective technologies within their combustion fleet. These modifications would better ensure that the Tier 4 MDV standards are consistent with the greatest degree of emissions reduction achievable. [EPA-HQ-OAR-2022-0829-0759, p. 76].

EPA should also take action to prevent the problems caused by a growing bank of emissions credits. Even in the absence of a GHG rule, the expected market-driven deployment of ZEVs would result in a significant bank of credits prior to 2030 under the proposed Tier 4 standard for MDVs (Figure VIII.B-2, right). Those windfall credits would either be used to delay the achievement of Tier 3 standards or to offset required reductions in the MY 2030-2032 period. In an effort to mitigate the impact of the deployment of technology (electrification) that is not required to meet the current standards, EPA should limit the use of credits generated through overcompliance with Tier 3 standards. To encourage manufacturers to adopt the more stringent early compliance pathway, the Agency could (for example) restrict the use of Tier 3 credits in the 2027+ timeframe to only those manufacturers that have elected the early credit pathway. This would be appropriate, since the Tier 3 standards fixed under the proposal through MY 2029 were predicated on the deployment of a reduced suite of emissions reduction technologies. [EPA-HQ-OAR-2022-0829-0759, pp. 76-77]

Organization: Environmental Defense Fund (EDF) (1of 2)

Passenger vehicles also emit harmful pollutants, including fine particulate matter (PM2.5) and oxides of nitrogen (NOx). These pollutants contribute to the formation of soot and smog and contribute to elevated concentrations of pollution near roadways, where millions of people live and go to school, and people of color and people with low income are disproportionately exposed to air pollution from vehicles. [EPA-HQ-OAR-2022-0829-0786, p. 6]

Please see EDF's comments on the Proposed Rule, Revised 2023 and Later Model Year Light- Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 43726 (August 10, 2021) dated September 27, 2021, and resubmitted to this docket, for a more thorough discussion of the substantial health and environmental harms associated with the pollution and GHG emissions from passenger vehicles.1 [EPA-HQ-OAR-2022-0829-0786, p. 6]

1 EDF's comments on the Proposed Rule, Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 43726 (August 10, 2021) dated September 27, 2021, at 4-6. Accessible at https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0208-0688. (Attachment A)

VII. Standards must continue to drive reductions from ICEVs and PHEVs.

EDF strongly supports EPA's proposed NMOG + NOX and PM2.5 standards. As our nation transitions to a zero-emitting fleet it is imperative that gasoline and diesel vehicles continue to reduce health-harming air pollutants to protect communities from the harms of vehicle emissions. [EPA-HQ-OAR-2022-0829-0786, p. 62]

A. EDF supports strong NMOG + NOx standards.

EDF supports light-duty vehicle and medium-duty vehicle fleet average FTP NMOG + NOX standards that include both ICEVs and ZEVs in a manufacturer's compliance calculation. We also support the proposed fleet average standards that decline from 2027–2032 in the early compliance program, the elimination of higher certification bins, a requirement for the same fleet average emissions standard to be met across four test cycles (25 °C FTP, HFET, US06, SC03), and one fleet average NMOG + NOX standard in the -7 °C FTP test. These features are important to ensure increasing ZEV deployment results in rigorous air pollution reductions and likewise prevent any offsetting pollution increases from remaining internal combustion engine vehicles. [EPA-HQ-OAR-2022-0829-0786, p. 62]

Organization: Ferrari N.V. and Ferrari North America, Inc.

a) NMOG+NOx Standards

EPA is proposing to remove any NMOG+NOx fleet-average flexibility for SVMs, requiring an alignment to Large Volume Manufacturers (LVMs) targets starting with MY 2027, unreasonably changing the current Tier 3 regulation that allows SVMs to comply with 51 mg/mi standard until MY 2027, and therefore cutting their target by more than half (i.e. 22 mg/mi compared to 51 mg/mi). For later years, EPA is requiring SVMs to comply with an overall 76% standard reduction in just 5 model years. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

Ferrari strongly believes this approach is unfair, especially in light of the unexpected change of the Tier 3 regulation and the huge implied percentage of BEVs that manufacturers responsible of high performance vehicles shall include in their fleet. While most LVMs can benefit from a wide range of models to compensate for the few vehicles that pollute the most, independent SVMs like Ferrari have to deal with a huge and unfeasible BEV penetration in their car portfolios since the beginning of the legislation. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

Ferrari acknowledges EPA's intention of aligning SVM targets to those of LVMs. However, this sharp reduction in NMOG+NOx standards is not feasible in such a short amount of time. In support of this, California recognized the impracticability of these manufacturers4, allowing them to comply with a fleet-average standard of 51 mg/mi for the entire regulatory period. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

4 CARB ACC II Regulations Initial Statement of Reasons (April 12, 2022), chapter III, section C, paragraph 7

Ferrari's commitment to reducing NMOG+NOx emissions is reflected on several of our models (Ferrari Portofino M, Ferrari Roma, 296 GTB, Ferrari Purosangue) which are currently certified as BIN 50. An even more remarkable result has been achieved with our Ferrari Purosangue, the first and only V12 model certified as BIN 50 in the United States. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

However, the current state of art does not allow high-performance vehicles with modern passive heating systems to achieve a certification level below BIN 50, and therefore large investments and time-consuming activities on active heating devices (e.g. burner, electric heating catalyst) are required. In addition, the very limited demand of those devices due to mass market focus on electrification will inevitably lead to ad hoc development with related huge costs and times. [EPA-HQ-OAR-2022-0829-0572, pp. 5-6]

Organization: Ford Motor Company

Tier 4 Criteria Emissions Program

Overview

Ford and Industry worked closely with CARB for several years to develop a tough but achievable criteria emission program as part of the Advanced Clean Cars II (ACC2) and Low Emission Vehicle IV (LEV4) rulemaking efforts. Ford believes those programs struck the right balance between reducing high-priority ICE emissions while ensuring that resources were not unduly directed away from the main goal of transitioning to zero-emissions vehicles. [EPA-HQ-OAR-2022-0829-0605, pp. 10-11]

In a departure from historical precedent, the proposed EPA Tier 4 program differs fundamentally from LEV4, and Ford recommends that EPA reconsider this approach and attempt to maximize alignment with the LEV4 program. The following comments outline our recommendations if EPA does not adopt a program that is harmonized with LEV4. [EPA-HQ-OAR-2022-0829-0605, pp. 10-11]

Light-Duty NMOG+NOx Fleet Average

Ford does not believe the NMOG+NOx fleet average associated with the main proposal is feasible. This is primarily a consequence of the direct relationship between the main GHG proposal and the NMOG+NOx fleet average (i.e., we do not find the main GHG proposal to be feasible, therefore the expected NMOG+NOx reductions that would come from such rapid adoption of ZEVs will not be achievable). Ford believes that a revised NMOG+NOx fleet average based on Alternative 3 could be feasible if derived with a sufficient "safety factor" between projected EV volumes and resulting NMOG+NOx fleet average. [EPA-HQ-OAR-2022-0829-0605, pp. 10-11]

NMOG+NOx Bin Structure

EPA has proposed several changes to the NMOG+NOx bin structure from existing Tier 3 bins, adding bins 60, 40 and 10, eliminating bins 160 and 125 for light-duty vehicles (LDVs), and simplifying medium-duty vehicle (MDV) bin structure by aligning class 2b and class 3 bins with LDV bins (retaining bins 160 and 125 for MDVs). Ford supports the addition of these extra bins but also requests several other bins be added at the upper and lower ends of this range. [EPA-HQ-OAR-2022-0829-0605, pp. 10-11]

For LDVs, Ford believes EPA's addition of bin 10 is appropriate given the range of 22 mg/mi to 12 mg/mi of the proposed Tier 4 fleet-average standards. However, we also request that EPA include bins 15 and 25, aligned with SULEV25 and SULEV15 categories in California's LEV4 LDV program. It is appropriate to include more bins in the range of the proposed standards to allow manufacturers greater precision and flexibility in certifying their vehicles given the low level of the proposed standards. [EPA-HQ-OAR-2022-0829-0605, pp. 10-11]

For MDVs, EPA has argued in the Multi-Pollutant Draft Regulatory Impact Analysis (DRIA) Chapter 3.2.1 that 100 mg/mi is a feasible capability for ICE MDVs. Despite this, no bins are proposed near 100 mg/mi capability, only at 70 and 125 mg/mi. Ford requests the inclusion of a bin 100 for MDVs, aligned with the LEV4 SULEV100 category for MDVs, as well as bins 85 and 75 for class 2b MDVs, again aligned with the LEV4 SULEV85 and SULEV75 categories for class 2b MDVs. These additional bins are further supported by figure 3-11 in the DRIA, which shows the current interquartile range of NMOG+NOx certification for gasoline MDVs as roughly 70 to 120 mg/mi (diesel IQRs are higher, from 120 to 180 mg/mi depending on van or pickup vehicle type). More bins in this range would encourage manufacturers to continue to make incremental improvements to NMOG+NOx emissions from ICE vehicles by incentivizing improvements that may be smaller than the 55 mg/mi step between bin 125 and bin 70. [EPA-HQ-OAR-2022-0829-0605, pp. 10-11]

[See original comment for Table 1: NMOG+NOx Bins for EPA Tier 4, CARB ACC II LEV 4 and Ford Proposal] [EPA-HQ-OAR-2022-0829-0605, pp. 10-11]

Organization: Green Diesel Engineering LLC

Alternative Emission Strategy Proposal

1. The Environmental Protection Agency (EPA) has stated that the Clean Air Act (CAA) was created in part "to protect and enhance quality of the Nation's air resources so as to promote public health and welfare and the productive capacity of its population" and "to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution." [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- When the CAA was enacted in 1970, our nation had levels of excessive SO2 and NOx emissions. However, changes made to fuel and combustion technology, significantly reduced those pollutants which left the air quality good by 1990. Since that time, the push to further reduce NOx emissions to hundredths of the gram per mile, inevitably resulted in a detrimental increase in CO2 and N2O greenhouse gases. This catch-22 occurs in diesel combustion, because there is a tradeoff. In order to reduce NOx (NO and NO2), the burn cycle must become less efficient and more fuel is needed for the same torque. Ironically, the more fuel that is burnt; the more CO2 is produced which seemingly defeats the purpose of reducing NOx. During the last 28 years our transportation fleet has created almost 20% more CO2 yearly, in comparison to a transportation fleet calibrated for minimum CO2 and increased NO and NO2. The US averages 1800 million metric tons of CO2 formation from the transportation sector on a yearly basis. If the US focused on minimum CO2, we could realize a drop of 450 million metric tons of CO2 per year from this sector. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- Controlling air pollution is vital in the US and the entire world. The long- term detriments of increasing CO_2 on this planet, cannot be understated. CO_2 is a stable gas with a 300-year half-life. Once CO_2 is made, it will stay in the atmosphere and continually warm the planet which could lead to environmental problems and strains on our economic systems. NOx on the other hand, is an unstable compound and has roughly a day half-life on this planet. Organically, it breaks down into N and O_2—both elements which are naturally found in our atmosphere. [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

2. A goal of CAA, is to align emission standards to “reflect the greatest degree of emission reduction achievable through the application of [available] technology.” [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- In the transportation sector, we are not achieving the greatest degree of CO_2 reduction. The entire fleet of diesel vehicles in the US could achieve a 20% reduction in CO_2 formation with proper guidance. [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- The current technology is focused on minimizing NOx without regard to CO_2. These technologies in Selective Catalytic Reduction (SCR) and Exhaust Gas Recirculation (EGR) are problematic at best and increase the life cycle operating costs. As a result, this increase in “well to wheels” emission levels must be considered in both the manufacturing and recycling processes. [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- SCR has been on vehicles for 10-15 years. Though this technology does lower NOx emissions, the by-products it generates include ammonia (NH_3) and nitrous oxide (N_2O). Ammonia is more detrimental for humans than NO or NO_2, and N_2O is a strong greenhouse gas which is roughly 300 times more potent than CO_2. In the long run, increasing these by-products is not a good trade-off for the environment or those concerned about climate change. [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

3. NO and NO_2 (NOx) have been over-regulated for decades. Yet rather than gaining a better understanding of the chemistry, properties and usefulness of NO and NO_2, issues are being researched in an effort to stimulate further reductions. [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- NO and NO_2 are naturally forming compounds on this planet, primarily as a by-product of lightning. NOx formation from lightning is greater than the entire transportation sector on a yearly basis with an estimate of 8.6-34 million metric tons. (https://www.nasa.gov/topics/earth/features/nox_lightning.html) (https://www.epa.gov/report-environment) [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- NOx never accumulates on the Earth as it is constantly decomposing into Nitrogen and Oxygen. [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- NOx is produced endogenously by humans. This means our lungs produce NOx internally as a by-product of breathing. Human NOx production varies based on food intake, activity level and constituents in the air. More research should be focused here. (Thoraz 1999;54:947-952, Nasal Nitric Oxide in Man, J Lundberg, E Weitzberg), (Integrated Science Assessment for Oxides of

Nitrogen, EPA/600/R-15/068, January 2016. Pg. 351, 356, 360-361.) [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

- Some research claims NOx leads to asthma; however, the correlation is weak and causation is not apparent. The majority of asthma cases correlate strongly with seasonal mold and pollen airborne allergens. Asthma is most prevalent in spring and fall months. (https://data.web.health.state.mn.us/asthma-charts), (Integrated Science Assessment for Oxides of Nitrogen, EPA/600/R-15/068, January 2016. Pg. 490-500.) [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

The graph above shows the significant reductions in NO2 across the US in the last 40 years. [See original attachment for graph of ambient annual nitrogen dioxide concentrations in the U.S., 1980-2016] The US has been below the National Ambient Air Quality Standards (NAAQS) safety thresholds for decades, including the 1-hour threshold at 100 ppb. We solved the NOx issue 40 years ago. NOx regulations for combustion engines should be reverted back to acceptable levels to allow for 20% CO2 reduction. Powertrains need to be calibrated for minimum fuel consumption in all operating conditions. [EPA-HQ-OAR-2022-0829-0457, pp. 1-4]

The graph above is from a NASA satellite image which highlights the areas with NOx issues. [See original comment for map of nitrogen dioxide levels throughout the Unites States] Since these areas are predominantly urban vicinities or downstream of power plants, it would be more beneficial to focus on localized efforts to reduce NOx. A good 70% of people live in the urban areas and reducing NOx in these inner cities will provide the most focused assistance. Ideally, most city transportation would be electric to eliminate emissions at source. Cities could build large parking lots outside urban areas for combustion vehicles and mass electric transit into city center. Keep in mind, electric vehicles do not reduce emissions, but rather change where those emissions are produced (battery mining / manufacturing / recycling plants) and electric power-distribution facilities. Moving the emissions away from where most people live would be prudent. Electric transportation does not reduce CO2 emissions over the vehicle life cycle due to battery manufacturing, mining, recycling and charging. Electric vehicles will help reduce smog in LA, Denver, etc. where there is poor airflow, however, they will not reduce carbon emissions when battery recycling/lifespan is incorporated in the well to wheels analysis. (https://climate.mit.edu/ask-mit/are-electric-vehicles-definitely-better- climate-gas-powered-cars),(https://www.iea.org/data-and- statistics/charts/comparative-life-cycle-greenhouse-gas-emissions-of-a-mid-size-bev- and-ice-vehicle),(https://www.epa.gov/greenvehicles/comparison-your-car-vs-electric- vehicle),(https://www.sciencedirect.com/science/article/pii/S1361920921000614). [EPA-HQ-OAR-2022-0829-0457, p. 4]

Proposed Emission Standard Guidelines

- Modify the emission standards on gasoline and diesel with the primary emphasis to be on minimizing CO2. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Increase NOx limit for diesel engines to 3 gram/mile on EPA emission test cycles. This is still cleaner than 1980 standards. With proper engine tuning, the smaller NOx increase allows for a decrease of 100 gram/mile of CO2. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Maintain the theme of clean diesel and keep particulate filters to prevent PM (particulate matter) emissions. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Manufacturers could add GPS software to go into low NOx mode when near NOx abatement zones. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Re-allocate tax incentives for urban residents to purchase BEV (battery electric vehicle) [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Work with states on regional smog issues as these are very limited in geographical area. The top cities are: Los Angeles, Denver, Miami, New York City, Houston, Atlanta, etc. Moving to primarily electric vehicles in dense population zones eliminates point of use emissions. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Work with bio-fuel producers, farmers, refineries as needed to promote plant- based fuels that do not impact the food system. Hemp would be a good starting point as the entire plant can be utilized. The seed oil produces bio-diesel and the stalk produces ethanol. A robust bio fuel industry could reduce CO_2 up to 1000 million metric tons yearly. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Re-calibrating vehicles in the field for low CO_2 will yield the quickest return on investment. [EPA-HQ-OAR-2022-0829-0457, p. 6]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG likewise provides comments regarding the Proposed Rule' s proposal to apply the standards equally at high altitude without compliance relief provisions from Tier 3 for certification. HMG suggests removing the high-altitude requirement. If this is not possible, HMG proposes the introduction of a low sales volume threshold as a viable alternative solution. This could involve implementing waivers from high altitude testing for vehicles with sales below a certain threshold. Similar relief provisions are already in place for 50 State/California requirements, where low volume sales of a particular bin result in exemption from testing. This approach would address the burden and cost associated with high altitude testing, while still maintaining appropriate emissions control measures for vehicles sold at larger volumes. Finding low sales volume test groups for testing is extremely challenging. Additionally, high altitude testing is a costly and burdensome process for OEMs. With modem emission controls in place, it is unnecessary and unreasonable to mandate high altitude testing, as acknowledged by the EPA. Removing this requirement or implementing a sales volume threshold would provide relief to manufacturers without compromising environmental standards, which would likewise result in benefits to consumers. [EPA-HQ-OAR-2022-0829-0554, p. 8]

Organization: Interfaith Power & Light

Transportation is currently the single largest source of climate pollution in the United States. In 2020, the national passenger vehicle fleet represented approximately 94% of the nation’s on-road vehicles and generated over one million tons of ozone- and particle-forming NOx emissions, which create dangerous smog. In order for the U.S to meet our Paris Climate Agreement goals we need the strongest possible long-term standards—beyond model year

2026— that will put the country on a path to a 100% zero-emission new vehicle sales target by 2035. [EPA-HQ-OAR-2022-0829-0530, p. 1]

Organization: International Council on Clean Transportation (ICCT)

CRITERIA POLLUTANT EMISSIONS

NMOG and NOx emissions

ICCT supports EPA's move to set more stringent NMOG + NOx emission limit for light-duty vehicle bins and the fleet average. We have observed that these proposed standards are more stringent than the Euro 7 emission regulations for cars and vans. The emission limit for all cars and vans in Euro 7, converted from mg/km, is 206 mg/mile. Meanwhile, in EPA's proposal, Tier 4 emission limit for all LDVs is 70 mg/mile. More details on the difference in emission limits between the two standards are show in Figure 11. Even if the SFTP early driveaway standard has a higher NMOG + NOx emission limit at 82 mg/mile, it is more stringent than the Euro 7 emission limit at 206 mg/mile. [EPA-HQ-OAR-2022-0829-0569, pp. 44-45]

For NMOG + NOx fleet average standards, EPA provides two pathways for automakers: default and early compliance. The default compliance pathway provides a full 4 years of lead time and 3 years of standards stability for LDT3, LDT4, MDPV, MDV class 2b and 3 which are defined as heavy-duty vehicles by the Clean Air Act.113 However, automakers can opt for the early compliance pathway, in which LDT3, LDT3, MDPV meet identical and declining fleet averages like LDV, LDT1, and LDT2. MDV class 2b and 3 also has gradually declining standards every model year. ICCT supports the option of the early compliance pathway that will result in higher reduction in NMOG + NOx emissions and greater environmental and health benefits. ICCT supports EPA encouraging automakers to adopt the early compliance pathway. [EPA-HQ-OAR-2022-0829-0569, pp. 44-45]

113 Emission standards for new motor vehicles or new motor vehicle engines, 42 U.S. Code § 7521, https://www.law.cornell.edu/uscode/text/42/7521

EPA could consider even lower NMOG + NOx fleet average standards for light-duty vehicles. EPA's standards are not as stringent as CARB's. CARB LEV IV phases out ZEV and PHEV in fleet average calculation, at 100% in MY 2025, 60% in MY 2026, 30% in MY2027, 15% in MY2028, to 0% by MY 2029. From MY2029+, the ICE vehicle fleet average is 30 mg/mile. The NMOG + NOx fleet average emissions under Tier 4 in MY 2029 would be higher than 30 mg/mile. For example, the EPA projects BEV penetration rate of light-duty vehicle fleet at 55% in 2029. Assuming the early compliance path, NMOG + NOx fleet average emission of ICE vehicles in 2029 could be 40 mg/mile (18 mg/mile MY2029 standards divided by the ICE vehicle penetration of 45%). Similarly, in 2032, the ICE fleet average emission could be 36 mg/mile (12 mg/mile divided by 33% ICE fleet penetration), still higher than CARB. EPA does not include a PHEV projection in the proposal. If PHEVs that still have tail-pipe emissions are included and the BEV penetration rate is lower than projected, the ICE vehicle NMOG + NOx fleet average could be higher than these calculated values. [EPA-HQ-OAR-2022-0829-0569, pp. 44-45]

However, for MDVs, the ICE fleet average emission projection could be lower than CARB's LEV IV standards for later MY 2030+. EPA projects BEV penetration rate at 46% in MY 2032. Assuming the early compliance path, NMOG + NOx fleet average emission of ICE MDV vehicles in MY 2032 could be 111 mg/mile (60 mg/mile MY 2032 standard divided by the ICE vehicle penetration of 54%), lower than CARB's fleet average of 150 mg/mile for class 2b and 175 mg/mile for class 3. [EPA-HQ-OAR-2022-0829-0569, pp. 44-45]

International comparison on NMOG + NOx emission standards

Figure 11 compares the light-duty vehicle NMOG + NOx emission standards between three authorities: European Union (Europe), CARB, and U.S. EPA. All purple markers represent standards up until MY 2025, and green markers represent MY 2025+ standards. The yellow line represents the Euro emission limits with purple circles illustrating Euro 6 standards that regulate emissions from MY2014 to 2025 cars and vans and green circles for Euro 7. Euro 6 had three separate standards for 3 categories of vehicle classes, based on vehicle weights.114 The blue line represents CARB LEV standards. LEV III had two separate standards, one for Passenger cars and Light-duty truck class 1 (LDT1), and one for LDT 2,3,4 and MDPV.115 These LEV III standards are illustrated by the purple triangles. Green triangles show LEV IV standards that are the same for all LDV vehicle classes. The red line shows the U.S. EPA Tier standards. The purple squares illustrate Tier 3 standards and the green squares Tier 4 standards. The figure also shows that Tier 3 and LEV III share the same emission limit at 0.16 g/mile or 160mg/mile and is lower than Euro 6 limits for all vehicle categories. Similarly, Tier 4 and LEV IV limits are lower than Euro 7 limits, however, Tier 4 emission limit at 70 mg/mile is lower than LEV IV limit at 125 mg/mile. [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

114 M1 are vehicles that carry passengers and comprise of no more than 8 seats in addition to the driver seats, M2 are vehicles similar to M1 and have a maximum mass not exceeding 5 tons. N1 vehicles are constructed to carry goods with maximum mass not exceeding 1305 kg (class I), 1760 kg (class Ii) and 3,500 kg (class III)

115 LDV are passenger cars with 8,500 lbs GVWr maximum, LDT1 vehicles are trucks with 3,750 lbs LVW maximum, LDT2 vehicles are trucks with 3,750 lbs LVW minimum, LDT3 vehicles are trucks with more than 6,000 lbs GVWR and with an ALVW of 5,757 lbs or less, LDT4 vehicles are trucks with more than 6,000 lbs GVWR and with an ALVW of more than 5,750 lbs. MDPVs are any passenger vehicles at or below 14,000 lbs GVWR with a work factor at or below 5,000 lbs. MDPV also includes pickups with GVWR below 9,900 lbs with an interior bed lengths less than 8 feet regardless of its work factor above 5,000 lbs. Pickups with GVWR between 9,900 and 14,000 lbs with a work factor above 5,000 lbs can be included if the interior bed length is less than 6 feet.

SEE ORIGINAL COMMENT FOR Figure 11. Light-duty vehicle NMOG + NOx emission standard comparison between CARB, EPA, and Euro standards [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

Notes:

1. EU Euro standards are max-per-vehicle or vehicle limit values that apply both in laboratory testing and real-world emission, while CARB LEV and EPA Tier programs have both limit values and fleet average values that are only laboratory test. [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

2. CARB LEV III, LEV IV and EPA Tier 3, Tier 4 set NMOG + NOx standards; EU Euro standards are the summation of independent NOx standards and NMHC/NMOG standards. [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

3. Starting MY 2029, LEV IV phase out ZEV+PHEV in the fleet average calculation, while Tier 4 still includes them. [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

4. Tier 4 LDT3,4 and MDPV standards are based on the early compliance pathway that is similar to Tier 4 PC + LDT1,2 [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

As mentioned in the previous section, Tier 4 standards include EV emissions in the NMOG + NOx fleet average calculation, while LEV IV standards gradually phase out EVs in the calculation by MY2029. As a result, even though the figure shows Tier 4 with a lower fleet average value than LEV IV, the projected ICE vehicle fleet average under Tier 4, illustrated as the dash red line, could be higher than LEV IV in MY 2029-2032. [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

Figure 12 compares the medium-duty vehicle NMOG + NOx emission standards between two authorities: CARB and U.S. EPA. All purple markers represent standards up until MY 2025, and green markers represent MY 2025+ standards. The blue lines represent CARB LEV standards, and the red lines represent EPA Tier standards. Both Tier 3 and LEV III had the same emission limit and fleet average for Class 2b and 3. However, starting with MY 2026, the Tier 4 emission limit is the same for both Class 2b and 3 at 160 mg/mile and lower than LEV IV at 250 mg/mile for Class 2b and 400 mg/mile for Class 3. Tier 4 MDV standards include EV emissions in the NMOG + NOx fleet average calculation, while LEV IV standards do not. The figure also shows that for MY 2030+, the projected ICE fleet average emissions shown as the dash red line could be lower than for the LEV IV Class 2b standards. [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

SEE ORIGINAL COMMENT FOR Figure 12. Medium-duty vehicle NMOG + NOx emission standard comparison between CARB and EPA [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

Evaporative emission

ICCT recommends EPA to set stronger running loss standards. The Tier 4 proposal allows vehicles to continue to be subject to Tier 3 evaporative emission standards, which states running loss may not exceed 0.05 g/mile. The running loss is reduced from 0.05 in LEV III to 0.01g/mile in LEV IV. According to CARB's Initial statement of reasons, since 1990, when the LEV emission standards were established, the 0.05 g/mile has not changed. The 2019 models' certification data showed that 87% of vehicles were already emitting at or below 0.01 g/mile. Thus, it is feasible for EPA to set more stringent running loss standards in alignment with CARB.116 [EPA-HQ-OAR-2022-0829-0569, pp. 45-47]

116 CARB. (2022). Initial Statement of Reasons. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf and https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf

Organization: Kia Corporation

Kia does not support a different approach than CARB, basing the standard on a ZEV and non-ZEV fleet average, because of the testing complexity this will add. Further, predicting the portion of ZEVs in the fleet will be difficult, as this will be determined by market conditions, which industry has little control over. It would be impossible for an automaker to adjust its NMOG+NOx fleet emissions if the portion of ZEVs in the fleet is less than predicted. It will also be impossible for an automaker to adjust its NMOG+NOx fleet emissions. Separating ZEVs and non-ZEVs for NMOG+NOx standard will provide needed planning stability. [EPA-HQ-OAR-2022-0829-0555, p. 11]

Kia appreciates the agency's commitment to performance-based standards and remaining technology neutral. However, Adopting CARB's ACC II will provide significant emissions reductions from ICE vehicles while avoiding diverting major resources from EV investments. [EPA-HQ-OAR-2022-0829-0555, p. 11]

Further, if EPA proceeds with its proposed approach, EPA must adjust the EV market share carefully so that projections of the NMOG+NOx standard are not skewed based on unrealistic EV penetration. [EPA-HQ-OAR-2022-0829-0555, p. 11]

Kia also recommends EPA adopt the high-altitude NMOG+NOx standards adopted through ACC II. [EPA-HQ-OAR-2022-0829-0555, p. 11]

Organization: Lucid Group, Inc.

Lucid Supports a Cleaner NMOG+NOx Standard

As mentioned above, tailpipe emissions contribute to adverse public health effects. EPA's proposed rule points out that NOx exposure impairs lung function and plant health and available technologies exist to further reduce NMOG+NOx emissions. For these reasons, Lucid strongly supports EPA's proposal to use a maximum fleet average standard of 300 mg/mi for light duty vehicles, light duty trucks, and medium duty passenger vehicles. [EPA-HQ-OAR-2022-0829-0664, p. 5]

Organization: Mclaren Automotive, McLaren Group

SVM Criteria Pollutant Standards

As outlined above, as a SVM we face unique challenges in meeting very stringent GHG standards, particularly those that rely on electrification. This is also the case for criteria pollutant standards which we are impacted by further, given the reduction in flexibilities proposed by the EPA. The EPA proposes to abandon the MY 27 and 28 SVM NMOG+NOx standards set out in Tier 3 (and on which we have been planning towards), and propose instead to increase stringency and require SVMs to adhere to the primary Tier 4 NMOG+NOx standard. Under the EPA's proposal, we would need to meet the same criteria pollutant and particulate matter emission standards on the same schedule as large manufacturers, despite our much less frequent new model platform introductions and lower fleet diversity, resulting in our corresponding limited ability to utilise average provisions. [EPA-HQ-OAR-2022-0829-0748, p. 4]

Historically, EPA have provided additional flexibilities and provision to SVMs, recognising the challenges we face. Furthermore, these flexibilities have been recognised and provided for in CARB's ACC II LEV IV regulation. With limited engine families, SVMs like McLaren are unable to utilise flexibilities with averaging, unlike mass market OEMs with many product lines. In order to properly account for the unique challenges faced by SVMs with regard to fleet averaging - based standards, it is important to set the degree and frequency of SVM step-downs to reflect SVM realities -- limited product lines, with longer product development and life cycles. We would propose the following alternative to the EPA's proposal: [EPA-HQ-OAR-2022-0829-0748, p. 4]

- MY 2027 -- Maintain for all SVMs the already-in effect MY 27 Tier 3 SVM NMOG+NOx standard (51m g/mi)

- MY 2028 -- Maintain for all SVMs the already-in effect MY 28 Tier 3 SVM NMOG+NOx standard (30 g/mi)

- MY 2029-32 - continue the 30 mg/mi standard for SVMs [EPA-HQ-OAR-2022-0829-0748, p. 4]

Organization: MECA Clean Mobility

Stringent NMOG+NOx requirements will yield substantial air quality benefits.

Assuming roughly 15 million new vehicles are sold per year and EPA's electrification estimates in the proposal, approximately 40 million light-duty ICE vehicles will be sold between MY 2027 and MY 2032. Many of these will remain on the road until 2050. MECA agrees with EPA's technology neutral regulatory approach that considers a combination of technologies from electrification to improved emission controls on ICE vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 4-5]

Our analysis of currently available certification data supports that vehicle manufacturers are making substantial progress on the path to the SULEV30 fleet average level with only the inclusion of a modest number of HEVs, PHEVs and BEVs. It has now been over twenty years since the first vehicle was certified to the SULEV30 standard and seven years since the first SULEV20. Advances in catalyst technology and honeycomb substrates have evolved to achieve NMOG+NOx emission levels well below 20 mg/mile and supports both the introduction of certification bins below the current lowest level as well as potential to achieve lower fleet average emission levels. Furthermore, catalyst coating technology combined with targeted precious metal placement has been successful in controlling costs in light of rising raw material prices. [EPA-HQ-OAR-2022-0829-0564, pp. 4-5]

The use of existing engine, hybrid powertrains and exhaust emission control architectures have also facilitated achieving the lowest SULEV20 and SULEV30 NMOG+NOx emission levels and significant CO2 reductions cost-effectively. Today, even larger SUVs and mini-vans with conventional and hybrid powertrains are being certified to the SULEV30 limit while further technology improvements continue to be incorporated into new production vehicles to enable compliance with the declining NMOG+NOx fleet average. The introduction of the additional bins as proposed by EPA will provide greater certification flexibilities to manufacturers that will complement increasing sales of electric vehicles to achieve lower fleet average emission targets. [EPA-HQ-OAR-2022-0829-0564, pp. 4-5]

EPA should consider setting a cap of 300 mg/mi for the -7°FTP NMOG+NOx standard rather than a fleet average at that level. [EPA-HQ-OAR-2022-0829-0564, pp. 4-5]

MECA commends EPA's proposal to replace the existing -7°FTP NMHC fleet average standards with a single -7°FTP NMOG+NOx standard of 300 mg/mi for LDV, LDT1 through 4 and MDPVs. We agree with the provisions of not averaging EVs into this fleet average standard, identical useful life coverage, and application of the same standard at high altitude. EPA emissions testing of vehicles in the MY 2019-2021 range at -7°C FTP showed that a 300 mg/mi standard is feasible with a large compliance margin for NMOG+NOx. Furthermore, a combination of revised calibration strategies and heating technologies, available to MY 2027 and later vehicles, could provide additional margin below the 300 mg/mi fleet average. First, vehicles designed for MY 2027 and later standards can incorporate targets based on a new cold temperature standard into new engine calibrations. Second, vehicles could also employ (separately or in tandem with engine calibration changes) electric heat in the exhaust stream via an electric heater or directly to the three-way catalyst (electrically heated catalyst or EHC). For these reasons, MECA suggests EPA consider finalizing a 300 mg/mi cap rather than a fleet average. [EPA-HQ-OAR-2022-0829-0564, pp. 4-5]

Organization: Mercedes-Benz AG

The current EPA Tier 3 rule includes separate NMOG+NOx standards for operation at high altitudes. CARB's LEV IV regulation also accounts for differences in testing at high altitude by providing different emissions standards for higher altitudes. EPA's proposed rule eliminates this allowance, calling for a constant emissions limit up to 1720 meters. EPA premises this decision on the capabilities of modern engines, citing "[m]odern engine management systems can use idle speed, engine spark timing, valve timing, and other controls to offset the effect of lower air density on exhaust catalyst performance at high altitudes."8 EPA does not consider or assess that modern engines are already designed to operate to the fullest extent, leaving little room for additional calibration to address high altitude conditions. [EPA-HQ-OAR-2022-0829-0623, pp. 8-10]

8 NPRM at 29262.

The below plot illustrates this difference with an example of the NMOG+ NOx standards for SULEV/BIN 30 for light-duty vehicles. In this example, EPA Tier 3 and LEV IV both include a standard of 30 mg/mile up to either 1520 or 1219 meters, respectively, and then a 50 mg/mile standard above that altitude point. EPA's proposed rule includes a 30 mg/mile standard for all altitudes up to 1720 meters. [EPA-HQ-OAR-2022-0829-0623, pp. 8-10]

[See original for graphs on NMOG+ NOx standards for SULEV/BIN 30 for light-duty vehicles] [EPA-HQ-OAR-2022-0829-0623, pp. 8-10]

Altitude-based standards are necessary to account for engine operation capabilities. The difference between sea level operation and altitude operation continues to increase as altitude increases. The following plots illustrate the impact of altitude on engine operation. [EPA-HQ-OAR-2022-0829-0623, pp. 8-10]

[See original for diagram on the impact of altitude on engine operation] [EPA-HQ-OAR-2022-0829-0623, pp. 8-10]

The figure above shows engine operation at sea level first and then altitude. When propulsion power is held constant (shown in green), the air available for catalyst heating (shown in red) must be reduced. Reducing the air used for catalyst heating does not allow the engine to operate in an emission-optimal strategy, resulting in higher raw emissions that the catalytic converter must be able to control. [EPA-HQ-OAR-2022-0829-0623, pp. 8-10]

The right figure shows a pair of plots again for sea level and altitude, but in this case, the catalyst heating remains constant in order to preserve efficient engine operation. This can only be accomplished by significantly reducing the power available to move the vehicle. Without an exception for altitude, the resulting situation is that both propulsion power and catalyst heating must be significantly reduced. The results is that the vehicle may not have enough power to drive. This control is physically limited, with little to no opportunity to improve engine calibrations. [EPA-HQ-OAR-2022-0829-0623, pp. 8-10]

To further detail the challenge to engine operation at altitude, note that the turbocharger is only able to compensate for the low air density to a limited extent, especially during transient driving. Using late ignition, the most important catalyst heating action cannot be fully implemented due to the lack of boost pressure, which leads to low cylinder air filling. This constraint results in an increase in raw emissions and slower heating of the catalyst. Additionally, the extent at which optimum catalyst heating operation may be implemented at low atmospheric pressure is limited to ensure combustion stability is sufficient to prevent engine stalling and provide protection of the vehicle from damage or accident. [EPA-HQ-OAR-2022-0829-0623, pp. 10-11]

Finally, real-world data shows the number of miles driven at higher altitudes under these challenging conditions are very limited. [EPA-HQ-OAR-2022-0829-0623, pp. 10-11]

Therefore, Mercedes-Benz recommends that the EPA align the requirements starting in 2027 MY with those in CARB's LEV IV rule, which provides a separate NMOG+NOx standard for vehicle operation at altitude. [EPA-HQ-OAR-2022-0829-0623, pp. 10-11]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

2. Treatment of Plug-in Hybrid Electric Vehicles (PHEVs)

PHEVs offer many benefits and should be an integral part in implementing the proposed Multi-Pollutant Emissions Rule. PHEVs provide environmental benefits and are a viable alternative for vehicle buyers not yet ready or able to own or lease a BEV. PHEVs are a steppingstone to BEV acceptance, teaching consumers the benefits of BEV ownership without the drawbacks – range anxiety, charge anxiety, etc. PHEVs directly address better overall fuel economy, and reduced GHG emissions compared to comparable gasoline-only models, while offering similar utility, comfort, and convenience. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

Additionally, PHEVs aid the transition from pure internal-combustion engines to full vehicle electrification, especially during any period when limited battery critical minerals production capacity would not be sufficient to meet the volumes necessary to supply the number of BEVs assumed in EPA's proposal. PHEVs have smaller battery packs that enable clean, electric-only – and, in our case, significant –driving, thereby using less critical minerals than comparable BEVs with bigger battery packs. The All-Electric Range (AER) of today's PHEVs already exceed the average daily commute mileage of most American drivers, and this will only increase in the future. Consumers would also benefit by having less expensive, easier to install, lower amp, home chargers installed to charge their PHEVs, rather than the more expensive, higher amp ones needed to charge larger BEV battery packs. More electrified powertrain options, including PHEVs, support the shift to electrification, reduce the demand for limited critical mineral supply, and enable greater EV access to more consumers. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

Mitsubishi supports Auto Innovators' recommendation that EPA include PHEVs in its modeling, as a substitute for some BEVs, so that PHEVs comprise at least 20% of the combined

BEV+PHEV share, based on the availability and benefits of PHEVs and concerns with battery critical minerals supply constraints. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

Equally as importantly, we also ask EPA to consider our recommendations regarding the PHEV NMOG+NOx Contribution Factor and the PHEV Utility Factor (UF) as discussed in other sections of our comments. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

6. Tier-4 criteria Pollutant Emissions

Mitsubishi echoes Auto Innovators' support for EPA's adoption of the California ACC II (i.e., LEV-IV) criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 9]

Mitsubishi supports cost-effective reductions in criterial pollutant emission from Internal Combustion Engines (ICE). However, some of EPA's proposed changes to the criteria emission standards - like the more stringent Particulate Mass (PM) and NMOG+NOx requirements and the enrichment prohibition - go above and beyond those adopted by CARB in ACC II standards. If finalized as proposed, these changes would require OEMs to divert large resources in time and capital (resources that could otherwise be directed to accelerate EV technology deployment) towards further ICE technology development and additional testing facilities. Mitsubishi believes that allowing OEMs to focus their finite R&D investments on developing EV technologies, rather than having to continue to invest in technology that is being phased out, is the most effective way to reach our shared goal to transition to electrification. [EPA-HQ-OAR-2022-0829-0682, p. 9]

NMOG+NOx Standards:

California LEV-IV regulation, 13CCR 1961.4 (d)(1)(A), phases out Zero Emission Vehicles (ZEVs) from the NMOG+NOx fleet average calculation, reaching 0% inclusion of ZEVs in MY29. The fleet average standard is maintained at 30 mg/mi for MY26 and subsequent model year vehicles. California's approach yields significant environmental benefits while reducing regulatory complexity. EPA's proposal, on the other hand, retains ZEVs in the fleet average and increases NMOG+NOx fleet average stringency to 12 mg/mi in MY32. EPA's proposed approach has significant drawbacks, including: [EPA-HQ-OAR-2022-0829-0682, pp. 9-10]

- Increasing fleet average stringency to 12 mg/mi apparently led EPA to propose one certification Bin below 12 mg/mi: Bin 10. A model certified to Bin 10, however, could not be certified under the California LEV regulation. 13CCR 1961.4 (c)(6)(A) requires the California Bin for a given model be equivalent to, or more stringent than, the federal Bin. Since California has not adopted a Certification Bin equal to or less than 10, EPA's proposed Bin 10 is impractical to implement, even if future technology is developed to make Bin 10 feasible. [EPA-HQ-OAR-2022-0829-0682, pp. 9-10]

- While retaining ZEVs in the fleet average calculation, EPA overlooked the necessity of including PHEV ZEV contribution in the fleet average calculation. [EPA-HQ-OAR-2022-0829-0682, pp. 9-10]

We support the California methodology of calculating PHEV contribution factor as detailed in 13 CCR (d)(4) namely:

PHEV NMOG+NOx Contribution Factor … the PHEV NMOG+NOx contribution factors for LDVs (in g/mi) are calculated as follows.

PHEVfactor = Std – 0.005 x ZVMTF – 0.005 x US06RF; Where:

PHEVfactor = PHEV NMOG+NOx contribution factor, rounded to the nearest 0.001 g/mi.

Std = NMOG+NOx standard, in g/mi, of the FTP emission category the test group is certified to in subsection (d)(2)(A).

ZVMTF = Zero vehicle miles traveled factor, calculated as follows. For purposes of this calculation, the maximum allowable ZVMT F that may be used is 1.0.

ZVMTf = CertRV/100 + 0.2

CertRV = Certification Range Value as defined in title 13, CCR, section 1962.4(l). [EPA-HQ-OAR-2022-0829-0682, pp. 9-10]

US06RF = US06 range factor, which is either equal to 1.0 if US06 All-Electric Range (AER) is at least 10 miles or to zero if US06 AER is less than 10 miles. The US06 AER is defined in the "California Test Procedures for 2026 and Subsequent Model Year Zero-Emission Vehicles and Plug-in Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes. [EPA-HQ-OAR-2022-0829-0682, pp. 9-10]

Although somewhat complex, the CARB methodology for adjusting PHEV NMOG+NOx certification level reasonably characterizes the environmental benefit of PHEV ZEV capability over conventional internal combustion engine only models. [EPA-HQ-OAR-2022-0829-0682, pp. 9-10]

Again, we strongly recommend EPA fully adopt the same NMOG+NOx fleet average standard structure as California LEV-IV. However, if EPA decides to retain ZEVs in the NMOG+NOx fleet average calculation, we recommend the above PHEV NMOG+NOx Contribution Factor methodology be adopted. [EPA-HQ-OAR-2022-0829-0682, pp. 9-10]

Organization: National Association of Clean Air Agencies (NACAA)

Criteria Pollutant Emission Standards and Related Issues [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

For reasons cited above, NACAA strongly supports EPA's proposal of more protective emission standards for non-methane organic gas (NMOG)+NOx and for PM. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

The proposed 12-milligrams-per-mile (mg/mi) NMOG+NOx fleet average standard for LDVs, to be phased in by MY 2032, will reduce emissions by 60 percent relative to the existing 30-mg/mi (Tier 3) MY 2025 standard set in 2014. The proposed 60-mg/mi NMOG+NOx fleet average standard for MDVs, also to be phased in by MY 2032, will reduce emissions by 66 to 76 percent from the Tier 3 standards of 178 mg/mi for Class 2b vehicles and 247 mg/mi for Class 3 vehicles. EPA's proposed cold temperature (-7°C) NMOG+NOx standards will ensure that emissions are controlled over a wide range of operating conditions. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

With respect to PM, EPA proposes a standard of 0.5 mg/mi for LDVs and MDVs, with a requirement that this standard be met across three duty cycles, including a cold-temperature (-

7°C) cycle. Such a standard will appropriately drive the use of gasoline particulate filters, which are readily available. EPA projects that making these revisions to the standards set by the agency in the 2014 Tier 3 rule would reduce PM emissions from ICE vehicles by more than 95 percent and also yield reductions in toxic air pollutants. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

NACAA also supports EPA's proposal to eliminate commanded enrichment as an auxiliary emission control device on ICE engines used in LDVs and MDVs. Commanded enrichment is an engine operation that overrides the engine management feedback control system by applying extra fuel in order to provide additional power or protect engine or exhaust system components, thereby producing very high levels of excess emissions. This strategy is deployed during normal operation and use (e.g., vehicle speeds, grades of public roads and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently). However, as EPA explains in the proposal," Technologies exist that can prevent thermal damage of engine and/or exhaust system components without the use of enrichment during normal operation and use Modern vehicles have sufficient power without the use of enrichment. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

The use of enrichment only has the potential to incrementally increase power but significantly reduces the effectiveness of the catalytic aftertreatment system, resulting in a ten-fold or greater increase of CO and HC emissions."27 NACAA recommends that in addition to eliminating commanded enrichment EPA require that vehicle data related to enrichment be collected and analyzed. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

27 Id at 29,277

Organization: National Automobile Dealers Association (NADA)

EPA also proposes non-methane organic gases plus nitrogen oxides (NMOG+NOx) standards that represent a 60 percent reduction from the existing MY 2025 light-duty standards and a 66 to 76 percent reduction for medium-duty vehicles.7 And for both light- and medium-duty vehicles, EPA's proposed standards project to reduce particulate matter emissions by more than 95 percent.8 [EPA-HQ-OAR-2022-0829-0656, p. 2]

7 88 Fed. Reg. at 29197.

8 Id.

Organization: National Farmers Union (NFU)

V. Criteria Emissions

Air quality in the United States has improved substantially.31 EPA is proposing new NMOG+NOx standards that are 60% stricter than the 2025 standards. "Data and observations indicate ICE vehicle emissions may be approaching a ZEV-equivalent level... Future vehicle emission- reduction efforts might be more profitably targeted on reducing the effect of gross emitters, which represents 2–5% of the fleet but can produce up to half the emissions."32 [EPA-HQ-OAR-2022-0829-0581, p. 13]

31 Timothy Wallington, et al., Vehicle Emissions and Urban Air Quality: 60 Years of Progress, Atmosphere 2022, 13(5), 650, available at https://doi.org/10.3390/atmos13050650.

32 S.L. Winkler, et al., Vehicle criteria pollutant (PM, NOx, CO, HCs) emissions: how low should we go?, Climate and Atmospheric Science (2018), available at https://doi.org/10.1038/s41612-018-0037-5.

Further tightening of criteria emissions standards on new vehicles may not be effective at improving air quality, but it also discourages technologies that can help meet GHG emissions reductions goals—and meet them today. For example, flexible fuel vehicles allow use of greater ethanol blends, which provide increasing GHG emissions reductions. However, overly restrictive criteria emissions standards make it more difficult to design engines, cold start strategies, and catalytic aftertreatment which can handle the wide range of fuel properties required for flex- fuel vehicles. Moreover, higher ethanol blends would reduce air toxic emissions that may be more important to focus on with respect to light-duty and medium-duty vehicles that will continue to use gasoline well into the future. [EPA-HQ-OAR-2022-0829-0581, p. 13]

Organization: National Tribal Air Association (NTAA)

Criteria Pollutant Emissions Standards

Many residents in Indian country continue to be exposed to concentrations of ozone and particulate matter that exceed current National Ambient Air Quality Standards. With a few exceptions, the sources of this pollution are outside the jurisdiction and control of Tribal governments. It is imperative that the EPA and applicable state and local authorities take all necessary measures to return Tribal communities to healthy air quality. [EPA-HQ-OAR-2022-0829-0504, p. 2]

The proposed emissions standards for new light-duty and medium-duty vehicles for non-methane organic gases plus nitrogen oxides (NMOG+NOx) constitute one key step in reducing the impacts from the largest source of these ozone-precursor pollutants. Concurrently, reduced emissions of NMOG+NOx will reduce ambient air concentrations of particulate matter, and PM2.5 more specifically. The NTAA supports the proposed standards for these pollutants across the applicable vehicle categories and looks forward to healthier air quality in our many impacted communities. [EPA-HQ-OAR-2022-0829-0504, p. 2]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

The NESCAUM and OTC regions include the New York City (NYC) Combined Statistical Area (CSA) with over 20 million people living across portions of Connecticut, New Jersey, New York, and Pennsylvania. It is the largest CSA by population in the United States. The NYC metropolitan area and surrounding regions continue to persistently exceed federal health-based air quality standards for ground-level ozone. The chronically persistent high concentrations compromise the health and welfare of the citizens living in the NYC CSA and throughout the Northeast Corridor. While ozone is largely a summertime issue, NOx emissions are a year-round problem. NOx emissions contribute to acid deposition, eutrophication, and visibility impairment in the NESCAUM and OTC regions. During colder seasons, NOx emissions play a role in producing secondary PM2.5 through the formation of nitrates. [EPA-HQ-OAR-2022-0829-0584, p. 3]

B. Proposed LDV and MDV Criteria Pollutant Emissions Standards

NESCAUM and the OTC also strongly support EPA's proposal to establish more stringent emissions standards for criteria pollutants for both LDVs and MDVs for MYs 2027–2032. EPA should adopt the standards proposed in the NPRM. [EPA-HQ-OAR-2022-0829-0584, pp. 9-10]

EPA is proposing non-methane organic gas (NMOG) plus NOx standards for LDVs that would phase-down to a fleet average level of 12 mg/mi by MY 2032, representing a 60 percent reduction from the existing standards for MY 2025 established in the Tier 3 rule in 2014. EPA is proposing NMOG plus NOx standards for MDVs that would require a fleet average level of 60 mg/mi by MY 2032, representing a 66–76 percent reduction from the Tier 3 standards for Class 2b and Class 3 vehicles. EPA is proposing cold temperature NMOG plus NOx standards for LDVs and MDVs to ensure robust emissions control over a broad range of operating conditions. [EPA-HQ-OAR-2022-0829-0584, pp. 9-10]

EPA's modeling shows that these proposed standards would reduce NOx emissions by 66,000 tons in 2055, representing a 41 percent reduction compared to the no action scenario. EPA also estimates reductions of 220,000 tons of VOCs, representing a 50 percent reduction, and 12,000 tons of sulfur dioxide, representing a 42 percent reduction, compared to no action. [EPA-HQ-OAR-2022-0829-0584, pp. 9-10]

The NESCAUM and OTC jurisdictions need the greatest possible reductions in NOx emissions from all sectors to meet federal air quality standards. Modeling conducted by NESCAUM and the OTC has demonstrated that, even with a 90 percent reduction in emissions of all regulated pollutants from all on-road mobile sources, the NYC CSA would still benefit from additional NOx reduction strategies to achieve ozone reductions.25 NESCAUM and the OTC believe substantial NOx reductions from transportation can be achieved through the application of ZEV technologies. NESCAUM and the OTC believe EPA's proposed standards are necessary and technologically feasible and we urge EPA to adopt them. [EPA-HQ-OAR-2022-0829-0584, pp. 9-10]

25 See OTC, Modeling Committee Update for OTC and MANEVU Stakeholders Meeting at 10 (Apr. 21, 2023), https://otcair.org/upload/Documents/Meeting%20Materials/3%2020230421%20OTC_Modeling_Comm_final.pdf.

Organization: Porsche Cars North America (PCNA)

1. Porsche seeks to confirm NMOG+NOx fleet average credits continue to act as a single averaging set. [EPA-HQ-OAR-2022-0829-0637, pp. 8-9]

Porsche seeks to confirm it's understanding of the NMOG+NOx credit flexibilities under the default phase-in scenario for vehicles >6000 pounds defined in 86.1811-27(b)(6)(ii). Under this scenario, Porsche recognizes that all Tier-4 and Interim Tier-4 light-duty program vehicles (LDV, LDT1, LDT2) below 6000 pounds would be averaged together to assess compliance with the declining NMOG+NOx fleet average outlined in Table 3 of 86.1811-27(b)(6)(ii) and that this averaging set would only include vehicles below 6000 pounds. Porsche further understands that the default scenario would create a second averaging set for Interim Tier-4 vehicles over 6000 pounds (LDT3, LDT4, and MDPVs) and that these vehicles would be assessed against the Tier-3 fleet average NMOG+NOx standard of 30mg for model years 2027-2029. Porsche recognizes that EPA is not proposing changes to the credit operations outlined in 86.1861- 17(b)(1)(ii) which states that: [EPA-HQ-OAR-2022-0829-0637, pp. 8-9]

“Except as specified in paragraph (b)(1)(iii) of this section, LDV and LDT represent a single averaging set with respect to all emission standards.” [EPA-HQ-OAR-2022-0829-0637, pp. 8-9]

Because EPA is continuing to view the LDV and LDT as a single averaging set for NMOG+NOx fleet average compliance, Porsche seeks to confirm that credits generated within a model year (i.e., for MY2027-2029) in either the under 6000 pound or over 6000 pounds averaging set can be used between the two averaging sets should manufacturers have a deficit in either set. Furthermore, Porsche seeks to confirm that manufacturers can apply carry-forward Tier-3 credits within both the under and over 6000 pounds averaging sets (setting aside the MDV restriction) to also cover any deficits. Finally, Porsche seeks to confirm that any deficit in either the over or under 6000 pounds averaging set would have to be covered with credits earned in the same model year from the other averaging set prior to utilizing banked, carry- forward credits from earlier model years. [EPA-HQ-OAR-2022-0829-0637, pp. 8-9]

3. Porsche supports flexibility to include zero emission vehicles within NMOG+NOx fleet averages as an option

As described within III.C.2.iii. of the preamble,2 EPA has proposed that the declining NMOG+NOx fleet average should continue to include all vehicle types, including BEVs and other Bin 0 powertrains. Consistent with comments from the AFIA, Porsche recognizes that there is value in aligning the Tier-4 structure with CARB’s LEV-IV, which excludes ZEVs from the LEV-IV fleet average, but maintains a consisten annual target of 30mg/mile. Porsche recommends that should EPA considering aligning the Tier-4 fleet average approach with CARB, that EPA offer manufacturers the option to include BEVs within the fleet average and use the declining annual targets similar to as it is proposed in the NPRM. The two options would provide additional flexibility for manufacturers without disrupting the requested alignment with LEV- IV. [EPA-HQ-OAR-2022-0829-0637, p. 10]

2 88 FR 29261

Organization: Reginald Modlin and B. Reid Detchon

3. In fact, EPA’s Phase I testing results showed that NOx and PM “have significant decreases in emissions as ethanol levels increase from E0 to E10” – and EPA then “decided to drop the Phase 1 test fuels … from the Phase 3 fuel matrix.” [EPA-HQ-OAR-2022-0829-0570, p. 30]

150 Adam R.F. Gustafson, Boyden Gray & Associates, “EPA Emails Show the Agency Relied on the Oil Industry to Design Anti-Ethanol Fuel Effects Study,” memo to Urban Air Initiative, Nov. 4, 2016: pp. 15, 17: http://cleanfuelsdc.org/wp-content/uploads/2019/04/BGA-FOIA-EPA-EPact-Emails-Nov-4-2016.pdf (accessed Sept. 14, 2021)

4. At a meeting in June 2015 with the Energy Future Coalition, EPA Administrator Gina McCarthy erroneously asserted that her hands were tied on mid-level ethanol blends because they would increase NOx – a comment probably based on the flawed tests and the MOVES model. [EPA-HQ-OAR-2022-0829-0570, p. 30]

151 Reid Detchon, Energy Future Coalition, personal recollection.

ii. Emissions tests by the U.S. Department of Energy have confirmed that “even though ethanol is more catalytically reactive than other gasoline components, ethanol will likely neither help nor hinder compliance with NOx, non-methane organic gases (NMOG), and CO regulations in realistic fuel blends.” [EPA-HQ-OAR-2022-0829-0570, p. 30]

152 Daniel Gaspar, Pacific Northwest National Laboratory, “Top Ten Blendstocks For Turbocharged Gasoline Engines: Bioblendstocks With Potential to Deliver the Highest Engine Efficiency.” PNNL-28713 (2019): p. 34: https://www.osti.gov/servlets/purl/1567705 (accessed June 22, 2021).

iii. Despite repeated calls to fix this clear error, EPA has not done so. [EPA-HQ-OAR-2022-0829-0570, p. 30]

i. Automakers can readily adjust the engine’s air-fuel ratio to keep NOx emissions within permissible levels: A 2014 Ford study of a flexible fuel vehicle found that NOx emissions decreased by approximately 50% as the ethanol content increased from zero to E30-E40. The study pointed to the importance of engine calibration: “Upon sensing greater ethanol content in the fuel, the calibration prescribed different engine operating conditions.” [EPA-HQ-OAR-2022-0829-0570, p. 46]

253 Carolyn P. Hubbard et al., “Ethanol and Air Quality: Influence of Fuel Ethanol Content on Emissions and Fuel Economy of Flexible Fuel Vehicles,” Environmental Science & Technology (2014): 48(1): p. 865: https://web.math.princeton.edu/~sswang/es404041v.pdf (accessed Feb. 24, 2021).

ii. Aldehyde emissions can be controlled with a conventional oxidation catalyst. [EPA-HQ-OAR-2022-0829-0570, p. 46]

254 Matthew Brusstar et al., U.S. Environmental Protection Agency, “High Efficiency and Low Emissions from a Port-Injected Engine with Neat Alcohol Fuels” (2002): p. 6: “Earlier work at EPA with DI [direct-injection] methanol engines demonstrated the ability to control [PM and aldehyde emissions] to very low levels with a conventional oxidation catalyst.” https://archive.epa.gov/otaq/technology/web/pdf/sae-2002-01-2743-v2.pdf (accessed Feb. 24, 2021).

Organization: Renewable Fuels Association (RFA)

X. Criteria Pollutant Emissions

Sustained efforts to reduce emissions from vehicles and other sources have been highly successful in improving the air quality of cities throughout the U.S., as shown below in plots based on CARB and EPA data.42 Ambient levels of all major pollutants have gone down dramatically, despite large increases in population and GDP. The average values (and in most cases the 90th percentile values) now meet the National Ambient Air Quality Standards. [EPA-HQ-OAR-2022-0829-0602, pp. 19-20]

42 Wallington et al., "Vehicle Emissions and Urban Air Quality: 60 Years of Progress", Atmosphere 2022; https://doi.org/10.3390/atmos13050650.

EPA is proposing new NMOG+NOx standards that are 60% stricter than the 2025 standards. However, vehicles meeting the 2025 standards are already so clean that they do not make any meaningful contribution to air quality problems. Thus, additional reductions required beyond the 2025 levels are unlikely to yield significant air quality benefits but would come at an excessive cost to automakers and ultimately consumers. [EPA-HQ-OAR-2022-0829-0602, pp. 19-20]

A Ford study concluded that “ICE vehicle emissions may be approaching a ZEV- equivalent level...Future vehicle emission-reduction efforts might be more profitably targeted on reducing the effect of gross emitters, which represents 2–5% of the fleet but can produce up to half the emissions.” 43 [EPA-HQ-OAR-2022-0829-0602, pp. 19-20]

43 Winkler et al., "Vehicle criteria pollutant (PM, NOx, CO, HCs) emissions: how low should we go?" Climate and Atmospheric Science (2018); https://doi.org/10.1038/s41612-018-0037-5.

Further tightening of criteria emissions standards on new vehicles is not only ineffective at improving air quality, it also potentially discourages changes that can help meet GHG emissions reductions goals. For example, FFVs are a key enabler for allowing low-carbon E85 to displace gasoline in some applications. But overly restrictive criteria emissions standards may make it more difficult to design engines, cold start strategies, and catalytic aftertreatment that can handle the wide range of fuel properties required for FFVs. [EPA-HQ-OAR-2022-0829-0602, pp. 19-20]

Organization: Satya Consultores

Satya began its DEP work with the goal of solving the tradeoff between reducing diesel soot and NOX emissions. At higher temperatures, diesel engines achieve more complete combustion, and emit less soot and other fine particulate matter as a result. However, under these conditions NOX emissions increase. In turn, lower engine temperatures result in lower NOX emissions but cause soot emissions to increase. This tradeoff is well known among fuel scientists.1 Both pollutants have significant adverse environmental impacts and health effects. [EPA-HQ-OAR-2022-0829-0602, pp. 19-20]

Satya’s DEP resolves this conundrum. We call the resulting fuel “Next Diesel.”

1 See, e.g., Narayan et al., Combustion Monitoring in Engines Using Accelerometer Signals, J. VIBROENGINEERING, Sep. 2019, at 4; Tie Li & Hideyuki Ogawa, Analysis of the Trade-Off between Soot and Nitrogen Oxides in Diesel- Like Combustion by Chemical Kinetic Calculation.

In DEP, two proprietary additives are mixed into the diesel fuel. The first additive (“A1”) is an ethoxylated fatty acid ester, made with a mixture of stearic and palmitic acid esters of sorbitol and its mono- and dianhydrides. The second additive (“A2”) is a complex water-based blend of aromatic solvents with methyl radicals mixed with ethoxylated phenol-derived surfactants. [EPA-HQ-OAR-2022-0829-0602, pp. 19-20]

Diesel fuel flows from a tank at the end of the refining process in a continuous stream through piping to a Shock Wave Power Reactor. En route, A1 is metered into the diesel fuel stream via a Progressive Cavity Injection Pump, and the combination is blended using a static mixer. Once the fuel/A1 mixture is homogenous, A2 is metered in, and that combination is blended in a second static mixer. The resulting diesel fuel/A1/A2 mixture then flows into the Shock Wave Power Reactor where it is subjected to controlled cavitation, a process which creates vapor bubbles in the fuel mixture. As a liquid passes through the SPR it is subjected to “controlled cavitation.” The heart of the reactor is a specially designed rotor. The spinning action generates hydrodynamic cavitation in the rotor cavities away from the rotor to prevent damage to metal surfaces. As microscopic cavitation bubbles are produced and collapse, shockwaves are given off into the liquid which can heat and/or mix.2 [EPA-HQ-OAR-2022-0829-0602, pp. 19-20]

2 Hydro Dynamics, Inc. (n.d.). Retrieved from Harnessing the Power of Cavitation: https://www.hydrodynamics.com/cavitation-technology/.

The resulting diesel fuel exhibits improved properties, including significantly improved ignition characteristics. Its electrical conductivity is more than 1,000 times greater than regular diesel fuel, and the lubricity value is more than 100 times greater. These and other upgraded properties of Next Diesel enable more complete fuel combustion, which in turn results in less soot production and also reduces NOX emissions. The corresponding loss of fuel power, if any, is negligible. [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

The pilot- scale test results, which followed EPA-specified federal test procedures (or "FTPs"), demonstrated significant reductions in soot with accompanying reductions in NOX emissions. All Next Diesel emissions test results were compared to ultra-low sulfur diesel ("ULSD") emissions tests on the same engines. Only the fuels were changed; all other test parameters were identical. All tests were "engine out;" there was no after-treatment or particulate filtering. Combustion map parameters for both Next Diesel and ULSD were the same. [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

Satya and SwRI compared Next Diesel with ULSD in extensive tests. Two of the many test results illustrate Next Diesel's potential. As illustrated in Figure 1 below, transient cycle tests on a newer model diesel engine, the Navistar N13, documented a 14% reduction in soot emissions and an 8.6% reduction in NOX: [See original attachment for Navistar N13 Transient Tests] [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

As shown in Figure 2, on an older model DDC Series 60 engine, the reductions in soot were even more dramatic: a 29% reduction of soot, with no increase in NOX emissions. [See original attachment for DDC Series 60 Transient Tests] [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

The modified fuels produced by this pilot-scale plant conform to physical, mechanical, rheological, thermal, and chemical fuel standards promulgated by the American Society for Testing and Materials ("ASTM"), including ASTM-D975. The fuel has been tested in real-scale heavy duty certification engines. Based on the success of these evaluations, Satya has worked with SwRI and other internationally recognized research organizations to design a production-scale facility. The facility design meets ASTM and American National Standards Institute ("ANSI") standards and would be capable of processing 12,000 barrels of diesel fuel per day, or 150 million gallons per year. SwRI has concluded (Link: https://www.swri.org/press-release/swri-engineers-help-develop-cleaner-burning-diesel-fuels) that DEP and Next Diesel are ready for commercial development. [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

All of the testing conducted to date by Satya and SwRI has been conducted with ultra- low sulfur diesel ("ULSD") that meets current EPA fuel composition requirements. The introduction of ULSD in 2006 has led to dramatic reductions in particulate matter and NOX emissions from diesel engines, and the diesel engine requirements proposed by EPA in the current rulemaking promise additional reductions. Satya's DEP demonstrates that even more air quality gains are possible with additional diesel fuel controls. [EPA-HQ-OAR-2022-0829-0687, p. 5]

Emissions of pollutants like soot and NOX are generally highest immediately following a cold engine start because after-treatment systems tend to be inefficient during and just after ignition. Next Diesel reduces emissions during and after a cold engine start, and reductions continue to be achieved even after the engine and after-treatment systems reach steady operating temperatures.

Engine manufacturers may choose to modify or reprogram new engines to maximize benefits of Next Diesel, but such modifications are not necessary. Next Diesel is an improved fuel that does not require modification of any part of a new or existing engine. [EPA-HQ-OAR-2022-0829-0687, p. 5]

Organization: South Coast Air Quality Management District

There are five key issues we request U.S. EPA address before finalizing the rule.

1. Extend the phase-in period and adopt more stringent standards to align with California's ACC II regulation. The proposed standards will be phased in over a six-year period from model year (MY) 2027 through 2032 with increasing stringency each year. We recommend that the phase-in period be extended to 2035 and later model years to better align with the ACC II implementation schedule which extends out to MY 2035 and subsequent years. [EPA-HQ-OAR-2022-0829-0659, p. 2]

In terms of stringency, the proposed non-methane organic gases plus nitrogen oxides (NMOG+NOx) standard would phase down to 12 mg/mi by MY 2032 for light-duty vehicles (LDVs), a 60 percent reduction from the Tier 3 standard of 30 mg/mi. For medium-duty vehicles (MDVs), the NMOG+NOx standard would phase down to 60 mg/mi by MY 2032, representing 66 percent to 76 percent reduction from the Tier 3 standard of 178 mg/mi for Class 2b and 247 mg/mi for Class 3 vehicles, respectively. While these standards represent substantial progress, we urge U.S. EPA to consider more stringent standards for CO2 and criteria pollutants to help our region achieve the national ambient air quality standards. We therefore support the adoption of the Alternative 1 stringency level for greater reductions of emissions, including NOx (47,000 tons vs 44,000 tons in 2055) as well as a higher BEV (Battery Electric Vehicle) penetration rate compared to the proposed standards (69% vs 67% in MY 2032). [EPA-HQ-OAR-2022-0829-0659, p. 2]

Furthermore, U.S. EPA should consider additional measures that are technically and economically feasible. For example, the ACC II requires manufacturers to comply with an annual zero emission vehicle (ZEV) sales percentage requirement that scales up from 35 percent in MY 2026 to 100 percent by MY 2035 (including up to 20% PHEVs). CARB's analysis supports this requirement to be both technically and economically feasible based on projected technology advancements. In comparison, the projected 69 percent BEV penetration rate in MY 2032 for Alternative 1 falls short of the ACC II requirements. We understand the proposed standards are performance-based without any mandate on ZEV sales percentages, however, U.S. EPA should conduct an additional feasibility analysis for more stringent standards that will achieve higher BEV penetration rates. [EPA-HQ-OAR-2022-0829-0659, p. 2]

Organization: Stellantis

Structure of Fleet Average NMOG + NOx Standard Acting as De facto ZEV Mandate [EPA-HQ-OAR-2022-0829-0678, p. 16]

EPA is proposing increasingly stringent light-duty vehicle NMOG+NOx standards for the sales weighted average inclusive of all LDV, LDT and MDPV. The proposed fleet average standards are only feasible if aggressive BEV technology penetration rates are achieved, like those discussed in the GHG section of our comments. [EPA-HQ-OAR-2022-0829-0678, p. 16]

This exposes the criteria emissions compliance to the same market feasibility risks discussed earlier in the context of GHG compliance. Overly optimistic projected policy solutions lead to unrealistic assumptions of BEV market acceptance, along with resource redeployment to electrification and long lead times for ICE hardware changes, creating risk for compliance in the criteria emissions space that is untenable. Additionally, EV technology significantly increases the weight of electric models compared to their ICE counterparts which means that the emissions benefits of EVs may be pushed into higher weight classes, and therefore we are prevented from offsetting the emissions of comparable ICE models in lower weight classes. These issues were discussed and addressed recently during development of ACC II LEV IV criteria emissions rules established by CARB where the ICE fleet complies with criteria emissions requirements independent of BEV sales, allowing manufacturers to maintain compliance regardless of BEV penetration rates and weight class complexities. [EPA-HQ-OAR-2022-0829-0678, p. 16]

EPA should adopt CARB's ACC II LEV IV 30 mg/mi ICE fleet average with BEV phasing out at declining rates, so that compliance is not dependent on BEV market penetration. In addition, one method of compliance (both testing and fleet management) can achieve the same (cleaner air) result and is more efficient. [EPA-HQ-OAR-2022-0829-0678, p. 16]

Organization: Tesla, Inc.

Tesla supports the proposed Alternative 1 with added stringency so that the final performance standards achieves a fleet BEV penetration rate greater than 69% in MY 2032.2 Alternative 1 is estimated to provide greater CO2 emissions reduction of -51% from no action by 2050 compared to -46% under EPA's proposal, and the additional stringency will result in even greater emission reductions.3 Accordingly, Tesla asserts the EPA should amend its proposal with a more stringent version of Alternative 1 and take, inter alia, the following additional steps to increase the performance and overall stringency of the proposed standards: [EPA-HQ-OAR-2022-0829-0792, p. 2]

2 See, 88 Fed. Reg. 29332-33, Table 96.

3 Id., at 29348 (comparing Tables 135 and 136).

- Eliminate off-cycle crediting for all types of vehicles; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Revisit the plug-in hybrid electric vehicle (PHEV) utility factor to accurately reflect real world emissions; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Amend the proposal to create parity in promoting motor vehicle air conditioning (MVAC) efficiency adoption; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Maintain the existing zero emissions upstream approach for BEVs; [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Eliminate credit multipliers for all vehicles; and [EPA-HQ-OAR-2022-0829-0792, p. 2]

- Ensure BEVs continue to be accounted for, and participate in, the NMOG + NOx reduction standard. [EPA-HQ-OAR-2022-0829-0792, p. 2]

BEVs Continue to Be the Most Effective NMOG+ NOx Emission Reduction Technology

An overarching goal of the proposed emission standards regime should be to continue to design them in a manner that incents, accelerates, and rewards the deployment of the best performing vehicles. As noted previously, BEVs represent the best vehicle technology for eliminating tailpipe criteria air pollutants. Tesla believes that the agency should continue to recognize BEVs for this best- in-class performance and the emission reduction contributions. Accordingly, Tesla supports EPA's decision to maintain ZEVs in the baseline of the NMOG + NOx emissions standards.182 Failure to continue this approach would unfairly penalize BEVs by eliminating their NMOG credit generation and the incentive for ZEV adoption that averaging, banking, and trading creates. [EPA-HQ-OAR-2022-0829-0792, p. 29]

182 88 Fed. Reg. at 29257.

Organization: Volkswagen Group of America, Inc.

Criteria Emissions

Volkswagen is in full agreement with AFAI's comments regarding Criteria Emissions, harmonization between EPA regulations and California's Low Emission Vehicle (LEV) regulation to enable manufactures to focus on a single technical solution for the U.S. market. Volkswagen recommends harmonization of EPA regulation with the fully adopted California LEV IV emission regulations. [EPA-HQ-OAR-2022-0829-0669, p. 6]

Harmonization of Bin Structure (Section III.C.2.i.) [EPA-HQ-OAR-2022-0829-0669, p. 6]

Volkswagen suggests inclusion of Bin 15 and Bin 25 stages as implemented in CARB's LEV IV regulation. The NPRM Bin structure does not contain Bin 15 and Bin 25 stages. These emission standards are relevant for the development of future concepts. Smaller increments between Bin 30 and Bin 10 are required to provide manufacturers the flexibility to maximize their fleet's emission performance. Incremental steps below Bin 30 could be implemented in a quick and cost effective manner and will not cause serious challenges in the measurement process at test sites. This suggestion would also solve the challenge of mutual recognition of Tier and LEV certificates and avoid the requirement to certify to a Clean Air standard for the same vehicle test group. [EPA-HQ-OAR-2022-0829-0669, p. 6]

Bin 70 Bin 60 Bin 50 Bin 40 Bin 30 Bin 25 Bin 20 Bin 15 Bin 10 Bin 0

FTP (20-30°C) NMOG+NOx Fleet Average Standard [EPA-HQ-OAR-2022-0829-0669, p. 6]

Volkswagen supports the continuous reduction of the NMOG+NOx fleet average standard to ensure the transition from combustion engines to electrification. The continuous reduction of NMOG+NOx between MY2027 and MY2032 will promote increased offerings of electrified vehicles. If the EPA does not fully adopt CARB's LEV IV for criteria pollutants, Volkswagen recommends that the fleet average targets be adjusted to account for the final changes realized in the GHG PEV final curve. The inclusion of PEV (BEV and PHEV) in the calculation is rational and purposeful. Volkswagen further supports the flexibility to carry-over Tier 3 credits to the Tier 4 program, as well as a Tier 3 credit lifetime of 5 years for all vehicle categories (LDV, LDT1, LDT2, LDT3, LDT4, and MDPV). [EPA-HQ-OAR-2022-0829-0669, p. 6]

FTP -7°C NMOG+NOx Fleet Average Standard (Section III.C.2.iii) [EPA-HQ-OAR-2022-0829-0669, p. 6]

The EPA's proposed transition from -7°C NMHC to a NMOG+NOx fleet requirement will lead to challenges related to measurement processes. The sensitivity of NOx to condensation is very high under such low temperatures. Volkswagen has concerns over test validity due to condensation. This being a cold soak test may significantly increase our testing burden. Volkswagen requests this be taken into account as an increased burden to the manufacturers. [EPA-HQ-OAR-2022-0829-0669, p. 6]

Please also note, if the FTP -7°C NMHC Fleet Average becomes NMOG+NOx requirement, Volkswagen supports the 1:1 transfer of Tier 3 NMHC credits to Tier 4 NMOG+NOx credit account. [EPA-HQ-OAR-2022-0829-0669, p. 6]

Volkswagen agrees with AFAI comments and proposes taking the fleet average of 300 mg/mi target for LDV/LDT1 and a fleet average of 400 gm/mi for LDT2/HLDT, and does not support a 400 mg/mi vehicle cap as EPA had requested comment on this alternative. [EPA-HQ-OAR-2022-0829-0669, p. 6]

Organization: Wisconsin Department of Natural Resources

This rule is critical to improving Wisconsin's air quality. The on-road mobile sector is the largest contributor of nitrogen oxides (NOx) emissions in Wisconsin. The 2020 National Emissions Inventory reported that the on-road mobile sector accounted for 41% of the total NOx inventory in Wisconsin, with light- and medium-duty vehicles constituting at least 30% of those emissions. Wisconsin continues to have multiple areas in nonattainment of the 2015 ozone standard, with NOx emissions from passenger vehicles (especially in the larger metro areas) being a significant contributor. Given limited state authority over this sector, Wisconsin relies upon timely and impactful EPA action to reduce the effect vehicle emissions have on nonattainment. [EPA-HQ-OAR-2022-0829-0507, p. 1]

However, as the emissions benefits from this rule will not begin to accrue until model year 2027, this proposal will not help Wisconsin meet its near-term (2023 and 2026) ozone attainment dates for the 2015 ozone standard. While this rule will be critically important over the long term, it does not relieve EPA of its responsibility as a co-regulator to ensure needed reductions in emissions from the on-road mobile sector sooner. The WDNR expects EPA to take further action to reduce on-road emissions in the next few years to support these upcoming ozone attainment deadlines. [EPA-HQ-OAR-2022-0829-0507, p. 1]

EPA Summary and Response

Summary:

EPA received several comments regarding the proposed NMOG+NOx standards. The comments fall into three broad categories: Comments that support the proposed standards and program architecture, comments that oppose the proposed standards and architecture, and comments which recommended specific changes to the NMOG+NOx program.

EPA received strong support for the proposed standards from the Alliance for Vehicle Efficiency (AVE), the American Lung Association (ALA), California Air Resources Board (CARB), Environmental Defense Fund (EDF), Interfaith Power and Light, International Council on Clean Transportation (ICCT), Lucid Group, Manufacturers of Emissions Controls (MECA), National Association of Clean Air Agencies (NACAA), National Tribal Air Association (NTAA), Northeast States for Coordinated Air Use Management (NESCAUM), Energy Innovation and Tesla. Both CARB and MECA noted the importance of strong criteria pollutant emission standards in the absence of a ZEV mandate, while EDF commented that EPA should adopt standards more stringent than proposed, based on the anticipated BEV penetrations.

CARB provided several focused comments regarding the NMOG+NOx program, stating the proposed Tier 4 standards are appropriate and largely consistent with their recently adopted ACC II program. CARB also commented that they did not anticipate the need for development or deployment of any new technologies to meet the proposed standards and noted that ZEV penetrations as the result of compliance with the California ACC II program would also help contribute to a manufacturer's federal compliance. Overall, CARB commented that they projected that LEV IV and Tier 4 would result in similar emissions reductions. CARB also commented on air quality and human health impacts and noted NMOG and NOx contribute to smog, especially near-roadways and disadvantaged neighborhoods. CARB asked the Agency to clarify the risk of excessive MDV NMOG+NOX credit generation under the default MDV phase-in that may require additional measures such as restricting credits or changing the stringency of the standards.

Vehicle manufacturers provided a wide range of comments. AAI did voice support for reductions in NMOG+NOx emissions that could be gained solely through software and calibration changes. AAI also feels that the proposed program goes "far beyond [CARB's] LEV IV" program. Both AAI and Stellantis commented that proposed NMOG+NOx standards assume a high BEV penetration rate and Kia and Volkswagen, along with AAI and Stellantis, recommended that the NMOG+NOx standards should better align with the Administration's goals. AAI provided further comments with respect to the proposed NMOG+NOx program saying that it represented substantial changes to the CARB ACC II program and that EPA had failed to indicate to stakeholders that it intended to propose a program different from ACC II. AAI also commented that EPA had failed to consider adopting ACC II in lieu of the proposed program, the incremental benefits of adopting the proposal instead of the ACC II requirements and had not considered the lead-time required to develop and deploy the technologies required to meet the revised NMOG+NOx standards. AAI also commented on PHEV compliance contributions and the potential impacts of the expanded MDPV definition on MDV criteria pollutant compliance.

AAI also urged EPA to update sulfur limits for gasoline to provide a downstream retail cap of 10 ppm (versus the current limits of 10 ppm average with 95 ppm cap). They assert that this is necessary to optimize catalyst efficiency and would align with sulfur caps in the European Union and China.

Regarding the effects of electrification on NMOG+NOx standards, AAI recommended removing BEV's from the fleet average while Porsche North America commented that they support the inclusion of BEVs in the NMOG+NOx fleet average. Both AAI and Mitsubishi recommended that EPA adopt a similar criteria pollutant strategy for PHEVs as that adopted by CARB, where NMOG+NOx emissions are discounted using the PHEV utility factor.

AAI, Hyundai North America, Kia Corporation and Mercedes Benz all commented that the proposed high altitude NMOG+NOx standards would require significant additional development and burden as compared to CARB ACC II. AAI recommended that EPA adopt the CARB ACC II high altitude standards in lieu of the program proposed by EPA.

AAI also commented on a variety of related topics and recommended alternatives for the NMOG+NOx cold FTP fleet average, interim standards for US06 NMOG+NOx, higher US06 standards for vehicles certified to Bin 30 and cleaner, and OBD thresholds aligned with ACC II. Both BMW and Volkswagen commented that they supported the AAI comments overall.

Cummins comments regarding a tradeoff between oxides of nitrogen (NOx) and carbon dioxide (CO2) reductions may have been historically true prior to the introduction of catalytic NO_x controls, e.g., SCR, between 2007 and 2010, when the primary NO_x controls relied on combustion phasing and charge dilution. This tradeoff has decreased substantially as diesel applications rely more upon catalytic controls for NO_X emissions. In EPA's 2022 analysis of modern dual-SCR systems and other technologies in support of 2027 and later heavy-duty standards, we found that the combination of active and passive thermal management anticipated for meeting the final 2027 and later heavy-duty standards can be designed and developed in a manner that does not pose an additional burden for meeting heavy-duty engine GHG standards. (U.S. EPA. Regulatory Impact Analysis: Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards Regulatory Impact Analysis, December 2022, EPA-420-R-22-035, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1016A9N.pdf). Similarly, as such technologies are applied to light- and medium-duty diesel applications to comply with 2027 and later standards, we do not anticipate any significant impact on GHG emissions from these applications.

EPA also received comments on the proposed bin structure for both light and medium duty vehicles. AAI recommended that EPA adopt the same bin structure as ACC II for both light and medium duty vehicles and noted a lack of overlap between the EPA proposal and ACC II. The SVM Ad Hoc group and Mitsubishi echoed a similar statement and commented that the proposed bin structure was overly restrictive. The SVM Ad Hoc group also specifically recommended that EPA retain Bin 125 throughout the phase-in applied to their standards.

The American Petroleum Institute (API) commented on the final NMOG+NOx fleet average and noted that only a portion of the existing fleet is certified at or below 15 mg/mile. API also commented that EPA had failed to demonstrate the technical feasibility of the final fleet average. On a similar note, Ford Motor company also commented that the proposed NMOG+NOx standards were not feasible and should include a “safety factor”. The National Farmers Union and Renewable Fuels Association (RFA) disagreed with the need or effectiveness of more stringent NMOG+NOx standards. RFA commented further that more stringent NMOG+NOx standards could discourage technologies that reduce CO_2 emissions.

MECA made several comments regarding the proposed NMOG+NOx standards, recommending that EPA adopt a 300 mg/mile cap at -7 degrees C instead of a fleet average. They also noted that ICE-based vehicles could adopt electrically heated catalysts as a means of meeting more stringent NMOG+NOx standards.

Modlin & Detchon, raised concerns with the data and modeling EPA uses to assess emission impacts of ethanol blends, and suggested this has influenced EPA's willingness to promote higher-octane or lower-carbon fuels in the market. This comment is very similar to another in Section 12.5.1 of this RTC document, and we direct the reader there for a response.

Green Diesel Engineering and Cummins recommended that EPA adopt less stringent NOx standards for diesels as a means of reducing CO_2 emissions.

Response:

EPA appreciates all the comments regarding the level of NMOG+NOx standards. As a result of these comments and additional technical analysis performed by EPA to inform both the GHG and criteria pollutant programs, EPA has made several changes to NMOG+NOx standards for the FRM.

EPA is finalizing revised final NMOG+NOx standards for both light and medium duty vehicles that are less stringent than those proposed. There are several factors and comments that have contributed to EPA's decision. EPA received strong support from many commenters recognizing the need and the feasibility of lower emissions standards. As a portion of the fleet moves to zero emission vehicles the Agency believes it is important to also reduce the emissions from the millions of ICE-based vehicles that will continue to be a significant portion of new vehicles sold, and a majority of the on-road fleet, for decades to come. Recognizing that both the GHG and criteria pollutant standards are performance-based, EPA has adjusted the final fleet average NMOG+NOx standards to reflect the anticipated penetration of ICE-equipped and BEV vehicles. The agency believes that the final NMOG+NOx standards strike the appropriate balance between those commenters that noted the importance of strong NMOG+NOx standards to protect human health and those commenters which expressed concern regarding the feasibility of the final fleet average. For additional information regarding the final fleet average standards refer to Sections III.D.2 and V of the preamble.

In finalizing a higher NMOG+NOx final fleet average of 15 mg/mile, EPA is also addressing comments, such as those from Ford, that the proposed fleet average of 12 mg/mi is not feasible and should include a safety margin. EPA, however, disagrees with API's comment that the agency failed to demonstrate that the proposed standards are feasible. Both the NPRM and the FRM note a number of vehicles that are already certified to 15 mg/mi or less NMOG+NOx. In addition, the agency has described in detail technologies that are already being applied by vehicle manufacturers to meet Tier 3 standards and can continue to be developed to result in even lower emissions (see RIA Chapter 3.2.5). EPA's technical judgment is that OEMs can comply with the NMOG+NOx standards using a variety of compliance pathways. The standards are feasible for ICE-based vehicles without taking into consideration the possibility of averaging with zero-emitting vehicles. However it is more likely that manufacturers will sell vehicles with a variety of technologies, including some with improvements in ICE powertrains and at least modest levels of BEVs, and the standards are certainly feasible for manufacturers with such a strategy. AAI recommended that EPA adopt a provision to discount PHEV criteria pollutant emissions based on the utility factor. EPA disagrees with this recommendation and provides the technical basis for the Agency's decision in preamble Section III.D.2.

AAI commented that bin structure and OBD thresholds should align with ACC II. EPA is finalizing a bin structure that is comprehensive of all the bins adopted by CARB in ACC II. The response on OBD is available in RTC Chapter 5.

EPA has decided to not make changes in response to the comment from AAI, Hyundai North America, Kia Corporation and Mercedes Benz regarding high altitude NMOG+NOx standards.

EPA believes that vehicle manufacturers can meet the same standard at altitude. As a result, EPA did not adopt the CARB ACC II high altitude standards in lieu of the program proposed by EPA.

EPA disagrees with AAI's comments regarding the effects on NMOG+NOx compliance of the expanded MDPV definition. EPA is adopting the recommendations from AAI to adjust the work factor and GVWR thresholds for the final MDVP definition. Most of the vehicles currently captured by the final MDPV definition are light-duty EVs with utility that is not representative of medium-duty vehicles. AAI also commented that EPA did not provide a technology pathway for MDVs to comply with the final NMOG+NOx standards. EPA did provide a pathway based on an anticipated growing penetration of electric cargo vans in the MDV fleet. Furthermore, given that the MDV NMOG+NOx standards are performance based, vehicle manufacturers may decide which technologies are best suited for their customers, which may mean improvements in ICE emissions in lieu of electrification.

Regarding the issue of tighter gasoline sulfur limits, EPA believes the proposed emission standards are feasible with current sulfur limits. Moreover, as discussed in RTC Section 19.1, changes to fuels controls are beyond the scope of this rulemaking,

Finally, regarding Cummins and Green Diesel Engineering's recommendation that EPA adopt less stringent NOx standards for diesels as a means of reducing CO_2 emissions, EPA does not believe that it is appropriate or necessary to trade off one pollutant for the other. Many technologies exist in the market today which have low CO_2 emissions and low NOx emissions.

With respect to CARB's comments regarding the potential for excessive MDV NMOG+NO_x credit generation, that concern was shared by the Agency during the development of the MDV program and was taken into consideration for both the proposal and within the final rule. The early compliance program finalized does not allow carry over of Class 2b and Class 3 Tier 3 NMOG+NO_x credit into the new program unless a manufacturer chooses the optional early compliance program for criteria pollutants. Manufacturers would not build large credit banks under Tier 3 by opting for default phase-in since those credits would retire at the beginning of the 2031 model year. The early compliance program does allow Tier 3 NMOG+NO_x credits to be used, but the program also begins to phase-in significantly more stringent standards beginning in 2027, and the declining NMOG+NO_x standards within the early compliance program fully take into consideration year-over-year increases in MDV BEV sales in order to meet MDV criteria pollutant and GHG standards.

4.1.3 - Particulate matter (PM)

<u>Comments by Organizations</u>

Organization: Ad Hoc Small OEM Group

. PARTICULATE MATTER

-EPA's proposed PM reduction to 0.5mg/mi across FTP, US06 and Cold Testing goes too far too soon for Small OEMs [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

EPA's proposed PM reduction to 0.5mg/mi across FTP, US06 and especially Cold Testing is an enormous increase in stringency over a short period of time. This is a regulatory combination that Small OEMs simply cannot meet. We recognize that the regulation of PM is headed towards necessitating the use of Gasoline Particulate Filters (GPF), but further research and development is needed with respect to GPF aging and monitoring for purposes of California OBD. This issue is not yet fully understood and requires more lead-time under the CAA section 202(a). [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

In addition, there are also technical issues and costs associated with measuring PM emissions below 1 mg/mile, and specialized, expensive test facilities may be needed to reliably measure PM at such a low level. [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

It is thus unreasonable to impose the proposed PM standards and timetable on Small OEMs, especially considering the minimal environmental benefit obtained together with how drastic the proposed change is compared to existing Tier 3 levels and the CARB ACCII PM standards, as shown in the graph below. [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

[See original attachment for graph "Tailpipe PM Limit [mg/mi]] [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

-In sum, as regards SVMs and PM, EPA should harmonize with the CARB ACCII SVM PM approach as follows:

-FTP

-- For MY 2027-2028 -- 3 mg/mile.

-- For MY 2029 and later — 1 mg/mi. [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

-SFTP

-- For 2027 – 2029 – 6 mg /mi

-- For 2030 and later – 3 mg/mi [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

-No Cold Testing for SVMs given that it is not yet fully understood what is needed to meet the 0.5mg standard at 20F with high-performance engines. [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

We further note the above levels and timetable are consistent with the EU regulation of PM. GPFs will be necessary on all European engines in 2030 with the implementation of EU7's mandating PM measurement for both Port Fuel Injection Engines and Gasoline Direct Injection Engines. [EPA-HQ-OAR-2022-0829-0563, pp. 13-14]

Organization: Ad Hoc Tier 4 Light-Duty Small Manufacturer Group

4. PARTICULATE MATTER

EPA's proposed PM reduction to 0.5mg/mi across the FTP and US06 and Cold Testing also goes too far too soon [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

EPA's proposed PM reduction to 0.5mg/mi across the FTP and US06 and Cold Testing is an enormous increase in stringency over a short period of time. So much so that it is over-reach, especially considering Tier 3 levels and that CARB has tightened PM standards without going to the extent that EPA proposes, as shown in the graph below. [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

[See original attachment for "Tailpipe PM Limit [mg/mi]"] [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

More and more stringent PM standards will lead to the need for Gasoline Particulate Filters (GPFs) as an aftertreatment. One GPF issue which is not currently understood fully is GPF aging and monitoring for purposes of OBD. [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

In addition, there are also technical issues and costs associated with measuring PM emissions below 1 mg/mile, and specialized, expensive test facilities may be needed to reliably measure PM at such a low level. [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

In sum, as regards PM, EPA should

- Follow the CARB ACCII SVM PM approach as follows:

- FTP

-For MY 2027 -- 3 mg/mile.

-For MY 2029 and later—1 mg/mi. [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

We note this is consistent with the EU approach to PM and GPFs: GPFs will be necessary on all engines in 2030 with the implementation of EU7's mandating PM measurement for both Port Fuel Injection Engines and Gasoline Direct Injection Engines [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

-SFTP

-For MY 2027 – 2029 – 6mg /mi

-For MY 2030 and later – 3mg/mi [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

-No Cold Testing – no PM standard for cold testing, or at a minimum an SVM exemption (note that what will be needed to meet the 0.5mg standard at 20F has not yet been fully understood). [EPA-HQ-OAR-2022-0829-0509, pp. 9-10]

Organization: Alliance for Automotive Innovation

Criteria Emission Standards

Automakers will spend $1.2 trillion by 2030 as a down payment on a net-zero future, but far more will be needed. If we hope to succeed, automakers must focus resources on the EV transformation rather than incremental changes to existing, very near-zero (criteria) emission ICE vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 5-6]

This should not be interpreted as automakers requesting no criteria emission reductions or regulations. We support changes that can be made cost-effectively through software calibration changes to the vehicle. For example, we support and recommend EPA adopt the criteria emission standards California adopted under Advanced Clean Cars II (i.e., LEV IV). We worked with California over several years to develop these standards that substantially reduce real- world criteria pollutants (nonmethane organic gas (NMOG), nitrogen oxides (NOx), particulate mater (PM)), as rapidly as possible without stranding technology or diverting resources from electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 5-6]

However, some of the changes proposed in the NPRM go far beyond California's LEV IV program and would require large human and capital resources. For example, all-new engine designs, retooling of engine and vehicle production facilities, new hardware on vehicles, and additional testing laboratories are required at the same time the EPA expects 67% of new vehicles to be BEVs. These simultaneous ICE-focused activities will distract from efforts to electrify light-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 5-6]

PM Standards

Auto Innovators and our members understand the importance of particulate mater (PM) standards. In fact, we've worked with both California and EPA to develop and adopt standards as part of ACC II that result in a 90% reduction in PM emissions (from 10 mg/mile to 3 mg/mile to just 1 mg/mile when fully phased in (2028 model year)). However, the NPRM proposes a new standard of 0.5 mg/mile, which will effectively necessitate a gasoline particulate filter (GPF) system with on-board monitoring that is unique to the U.S. on every ICE vehicle. This new standard also takes place in the middle of the phase-in for California's new PM standards. [EPA-HQ-OAR-2022-0829-0701, pp. 6-7]

The NPRM rightly notes that GPFs are not new technology and have been used in China and the EU. However, this is not an apples-to-apples comparison. China and EU PM standards are based on particle count instead of mass. Their NMOG+NOx standards and on-board diagnostic (OBD) requirements are also not as stringent as EPAs (or California's). Moreover, the GPF used elsewhere cannot simply be pulled off the shelf and installed; rather capital resources would be required for re-tooling, redesign, testing and other requirements, including inventing a new sensing technology to address the proposed filtration efficiency monitor requirement and lab testing capabilities at the proposed levels. The significant development time, resources and investment required to meet the proposed PM standard will disrupt the focus on electrification, particularly when adoption of California's LEV IV 1 mg/mile PM standard will provide substantial nationwide benefits. [EPA-HQ-OAR-2022-0829-0701, pp. 6-7]

IV. Light-Duty Criteria and Toxic Pollutant Standards

Automakers are committed to ultimately achieving net-zero transportation carbon emissions and electrification of the light-duty vehicle fleet. However, this transformation requires massive investment in EV technology and supporting mechanisms such as infrastructure, all involving many stakeholders. To be successful, automakers must primarily focus resources on the transformation rather than incremental changes to existing internal combustion engine (ICE) vehicles, which are already very near zero. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

The focus of EPA and the automakers is and should be on electrification. Thus, Auto Innovators supports changes to traditional criteria emission (e.g., NMOG, NOx, and PM) standards that measurably reduce emissions, but do not add substantial additional hardware or capital costs to ICE vehicles that will soon be retired. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

Unfortunately, EPA proposes to adopt new requirements that will divert resources from our shared goal of widespread electrification. Prohibiting enrichment could require complete engine redesigns and possibly larger displacement engines to provide customers with the capability they demand. The proposed PM standards substantially increase costs and vehicle development complexity in addition to adding testing requirements. Finally, in several cases, EPA provides less flexibility and/or chooses not to align with ACC II. This lack of alignment is particularly troubling as automakers and suppliers have already developed product plans and spent resources toward meeting the ACC II regulations, and in some cases, EPA's proposal would require substantial changes during the middle of ACC II regulatory phase-ins. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

To reduce costs while still providing similar (and substantial) environmental benefits, the EPA regulations should seek to align with criteria emissions regulations already adopted by California in ACC II. We worked closely with the California Air Resources Board (CARB) and with EPA staff in attendance and participating,255 for the past several years to develop standards that substantially reduce real-world criteria emissions (including NMOG+NOx and PM), as rapidly as possible without stranding technology or diverting resources from electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

255 At no time did EPA staff indicate a different or more stringent pathway was under development federally, while the auto industry provided input, feedback, and technical data to CARB. The California process provided an ideal forum for alignment, even if EPA could not commit to alignment at that stage.

We recommend that EPA adopt the ACC II criteria emission regulations in place of its proposal. This adoption would provide substantial environmental benefits, streamline the regulations, and allow automakers to focus resources on electrification rather than developing and deploying changes to ICE vehicles specific to EPA's proposed new requirements. At a minimum, EPA should align with ACC II through the end of the ACC II phase in periods; in most cases, ACC II regulations are fully phased in by MY 2030. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

A. Consideration of the California ACC II Criteria Pollutant Regulation as an Alternative

EPA failed to consider adopting various California ACC II criteria pollutant provisions, and in so doing has also failed to demonstrate the incremental costs and benefits of its proposed program relative to this existing and logical alternative. EPA has also failed to consider the appropriate time to develop and deploy the additional ICE technologies to meet its proposal, particularly in the context of an overlapping and different final state regulation. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

It is no defense to say that EPA has yet to approve a Clean Air Act waiver for these provisions. EPA has yet to reject a waiver request from California, and included the California ACC II program as a sensitivity case to the proposed greenhouse gas regulations. Unfortunately, to the extent that the ACC II sensitivity case provides estimates of criteria emission benefits, it has been challenging, if not impossible, to separate benefits associated with the GHG program from those associated with the criteria pollutant program, and even more difficult to separate the impacts from individual components of the proposed criteria pollutant program. These challenges have been exacerbated by the limited time available to comment on the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

If EPA proceeds with its own misaligned proposal to the logical alternative of California's ACC II program, it should at a minimum demonstrate the incremental benefits and costs of each of its unique program aspects relative to the ACC II program. In addition, if EPA proceeds with its own proposal, EPA should also align with ACC II through the end of the ACC II phase in periods before starting new requirements on top of those already under implementation. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

D. PM Standards

EPA is proposing PM standards that exceed the stringency of CARB's recently adopted PM standards, to phase them in at the same time as CARB's standards are phased in (creating conflicting state and federal requirements), and to apply them to additional test cycles. EPA's proposed standards would add significant direct costs to vehicles for additional hardware, laboratory test cells (and potential upgrades and/or new build outs), calibration, monitoring, warranty, and customer repair and maintenance. Further, with additional test cycles, stringent OBD requirements, and absence of consideration of additional implementation costs, EPA inappropriately considers the technology additions as a drop-in with little to no cost. [EPA-HQ-OAR-2022-0829-0701, pp. 150-151]

EPA has inadequately considered the exceedingly low contribution of light-duty vehicles to PM emission inventories, has failed to consider adoption of the California standards as an alternative to its proposal, and has not fully assessed costs associated with upgrading laboratories and laboratory practices to precisely and accurately measure PM emissions with statistical certainty. [EPA-HQ-OAR-2022-0829-0701, pp. 150-151]In light of these significant issues, and as described more fully below, we are concerned that EPA has fallen short of its rulemaking obligations to engage in reasoned decision-making and articulate a "rational connection between the facts found and the choice made"266 with regard to the Proposed Rule's PM standards. "[W]hen an agency decides to rely on a cost-benefit analysis as part of its rulemaking, a serious flaw undermining that analysis can render the rule unreasonable."267 Moreover, an agency must undertake a "rational consideration of alternatives," and provide an "adequate explanation when these alternatives are rejected."268 [EPA-HQ-OAR-2022-0829-0701, pp. 150-151]

266 Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43, 53 (1983); see also Nat'l Ass'n of Clean Air Agencies v. E.P.A., 489 F.3d 1221, 1229 (D.C. Cir. 2007).

267 Nat'l Ass'n of Home Builders v. E.P.A., 682 F.3d 1032, 1040 (D.C. Cir. 2012); see also City of Portland v. E.P.A., 607 F.3d 706, 713 (D.C. Cir. 2007) (noting that the D.C. Circuit "will [not] tolerate rules based on arbitrary and capricious cost-benefit analyses").

268 Int'l Ladies' Garment Workers' Union v. Donovan, 722 F.2d 795, 817 (D.C. Cir. 1983); see also, e.g., Yakima Valley Cablevision, Inc. v. F.C.C., 794 F.2d 737, n.36 (D.C. Cir. 1986) ("The failure of an agency to consider obvious alternatives has uniformly led to reversal.").

Here, based on the record, we believe that EPA has failed to adequately justify the Proposed Rule's PM standards, failed to ensure that the relevant facts support this proposed standard, and failed to ensure that it has considered all reasonable alternatives, including adoption of the California standards as an alternative to its proposal. Moreover, we believe that the proposed PM standards will impose an extremely high cost, but result in little corresponding air quality benefits. [EPA-HQ-OAR-2022-0829-0701, pp. 150-151]

We encourage EPA to carefully evaluate its proposed PM standards and the evidence underlying them, and to ensure that it is adequately accounting for the relevant costs and benefits and fulfilling its statutory obligation to engage in reasoned, evidence-based decision-making. [EPA-HQ-OAR-2022-0829-0701, pp. 150-151]

2.PM Standard Concerns

Increasing stringency for 25 ºC FTP will add additional cost and development work with minimal air quality and will divert OEM resources from fleet electrification. The technical issues are magnified for the US06 proposal because of the necessity of both reductions in engine out emissions and the development of GPF designed for high temperature/high flow rate conditions. In particular: [EPA-HQ-OAR-2022-0829-0701, pp. 153-154]

- Automakers must account for the higher engine out PM (soot) compared to FTP. [EPA-HQ-OAR-2022-0829-0701, pp. 153-154]

- US06 is high flow, and PM collection rate of GPF is lower than FTP. [EPA-HQ-OAR-2022-0829-0701, pp. 153-154]

- US06 is high temperature, and collected PM on GPF is lower. Therefore, the PM collection rate of GPF is lower than FTP. [EPA-HQ-OAR-2022-0829-0701, pp. 153-154]

- US06 has many accelerations and decelerations, PM (SOF) tends to be larger than LA#4. [EPA-HQ-OAR-2022-0829-0701, pp. 153-154]

a) PM Development Burden

To balance both stringent emission level and PM regeneration, the following should be considered: [EPA-HQ-OAR-2022-0829-0701, p. 154]

- EPA has not designed a program that allows for GPF technology from other regions to be simply "dropped in" and thus will require additional development and resources. [EPA-HQ-OAR-2022-0829-0701, p. 154]

- To comply with PM 0.5 mg/mile standard, it takes long lead-time to develop the exhaust system that includes a GPF to balance emission reductions and PM collection/regeneration. It also takes a long lead time to design GPF location on the vehicle. [EPA-HQ-OAR-2022-0829-0701, p. 154]

b) - The lead time for large pickup trucks will be even longer. [EPA-HQ-OAR-2022-0829-0701, p. 154]PM Recommendation

As EPA recognizes in the NPRM, the proposed PM standard will mandate a technology response; namely, installation of a GPF. Effectively mandating a GPF on all gasoline vehicles will require additional costs associated with development, testing, labs, monitoring, warranty, and consumer repair, all of which divert resources away from electrification. Auto Innovators recommends EPA adopt the PM standards in ACC II, shown below, using the ACC II phase-in schedule. [EPA-HQ-OAR-2022-0829-0701, pp. 154-155]

SEE ORIGINAL COMMENT FOR Figure 44: Recommended PM Standards [EPA-HQ-OAR-2022-0829-0701, pp. 154-155]

California's LEV IV includes interim in-use compliance standards of 2 mg/mi for the first two model years that a test group is certified to the LEV IV 25ºC FTP standard. We recommend EPA align with California. [EPA-HQ-OAR-2022-0829-0701, pp. 154-155]

3.PM Measurement Considerations

The following data from laboratories which are ISO 17025 accredited and fully compliant to test procedure requirements and best practices defined in 40 C.F.R. §1066 demonstrates that uncertainty in the PM measurement process can exceed the proposed 0.5 mg/mi standard. [EPA-HQ-OAR-2022-0829-0701, pp. 154-155]

We recommend eliminating the -7 °C FTP PM requirement, because it adds to test burden, requires large investments / upgrades to test facilities, and reduces test validity rate. [EPA-HQ-OAR-2022-0829-0701, pp. 154-155]

a) We also recommend considering laboratory PM measurement variability and allowing re-tests for exceedances during certification, confirmatory or in-use testing, especially for vehicles equipped with diesel or gasoline particulate filters. [EPA-HQ-OAR-2022-0829-0701, pp. 154-155]Challenges in PM Measurement at 0.5 mg/mile

The proposed Tier 4 PM standard of 0.5 mg/mile is a completely new venture beyond the expectations of automotive manufacturers and was not anticipated in the design of their emissions laboratories. The emission laboratories across the industry are still learning how to accurately measure PM at the Tier 3 PM limit of 3 mg/mile due to the uncertainty involved in all of the processes leading to final PM results in mg/mile. 40 C.F.R. Part 1065 and 1066 added many new requirements and recommendations to improve measurement of PM and to reduce variability. Even with all the Part 1065/1066 requirements and recommendations, the PM gravimetric measurement technique at 0.5 mg/mile will still require further scrutiny and refinement to further reduce measurement uncertainty and to improve measurement resolution as the net mass on the filter will approach tunnel background levels especially with larger vehicles that must run at higher constant volume sampler (CVS) flowrates. Test procedure updates may be needed, such as the reference filter validity criteria of +/-10 micrograms, as we demonstrate below is clearly not adequate at this low level. It may be adequate for heavy-duty vehicles, but not for light- or medium-duty vehicles at the 0.5 mg/mile where the net mass on the filter will be less than 10 µg at larger CVS flow rates. The potential sources of variability which contribute to the gravimetric measurement uncertainty include: [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

- Microbalance stability in weighing PM filters and artifacts at this level; [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

- Static charge removal from filters at such low mass levels; [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

- Filter handling by the operators; [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

- Filter weight gain due to artifacts during transportation from weigh room to test cell; [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

- Tunnel contamination due to prior testing on the test cell and background correction; [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

- Test to test and cell to cell variability; [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

- Laboratory to laboratory offset. [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

All these individual factors add to the uncertainty and the errors involved can either stack up and lead to large errors or cancel each other and result in lower errors. Unfortunately, manufacturers have no control over the direction of these errors and how they interact throughout the measuring process. It is also noteworthy that even following EPA's regulations, these sources of uncertainty will remain. [EPA-HQ-OAR-2022-0829-0701, pp. 155-156]

In efforts to minimize the impact of these sources of variability, some countermeasures have been identified to reduce the PM measurement uncertainty, but they are not sufficient to ensure that vehicles will pass the proposed PM limit of 0.5 mg/mile with confidence, especially on the US06 and the cold -7 °C FTP test on larger vehicles. Some of the countermeasures being pursued to minimize the uncertainty include using robotic auto handlers to minimize filter handling by the operators; segregating clean, dirty, and cold testing in dedicated test cells; using special lint free laboratory coats; special powder-free gloves; using Polonium strips in the weighing chambers of the microbalance and replacing them regularly every 6 months; and regular cleaning of the weighing room and PM sampling system. [EPA-HQ-OAR-2022-0829-0701, pp. 156-157]

At the 0.5 mg/mile level, the net mass of PM on the filter will be approaching tunnel background levels especially on larger light-duty vehicles and light-duty trucks, which must meet the same 0.5 mg/mile standard. These larger vehicles must run with higher CVS flow rates to meet the C.F.R. dilution factor requirements between 7:1 and 20:1. These larger CVS flowrates dictate large sample ratios which the net mass on the filter is then multiplied by. Any error involved in the process of weighing the filter such as tunnel contamination, filter handling or static charge removal is magnified a few hundred times by the sample ratio. [EPA-HQ-OAR-2022-0829-0701, pp. 156-157]

This will be even worse for medium-duty vehicles, which will need larger CVS flow rates than light-duty vehicles (beyond 1,000 cubic feet per minute (CFM) or 30 m3/min). As a result, medium-duty vehicles will have larger sample ratios, requiring the net mass on the filter to be even lower in order to pass the proposed PM standard. This requires that medium-duty vehicles only emit a few micrograms of PM when the artifact present in the tunnel by itself, when multiplied by the high sample ratio, can exceed the 0.5 mg/mile standard. In this case, the tunnel background might be higher than the net mass of PM on the filter. When net mass on the filter and tunnel background are close in magnitude, the accuracy becomes very poor, making the measurement method inadequate. Correction for tunnel background in this case may lead to negative mass. At this low level, correction is not feasible, pushing the limits and going beyond the capability of the gravimetric measurement technique. [EPA-HQ-OAR-2022-0829-0701, pp. 156-157]

b) Range of Net PM Mass on Filter at 0.5 mg/mile and lower

Figures 45 and 46 provide FTP PM data below 0.5 mg/mile from all test cells capable of PM measurement at an OEM laboratory over four months. It is obvious that as the CVS flow rate increases, the net PM mass on the filter decreases, approaching about 7.5 µg or lower at 550 CFM. Minimal data is available above 550 CFM because the larger vehicles that require higher

CVS flowrates typically exceed the proposed 0.5 mg/mile level. [EPA-HQ-OAR-2022-0829-0701, pp. 157-160]

SEE ORIGINAL COMMENT FOR Figure 45: Net mass on PM filters for FTP tests with results below 0.5 mg PM/mile at various flowrates. [EPA-HQ-OAR-2022-0829-0701, pp. 157-160]

SEE ORIGINAL COMMENT FOR Figure 46: Relationship between net filter mass and CVS flow rate for vehicles with less than 0.5 mg/mile FTP emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 157-160]

c)FTP PM Variability within the Same Laboratory (Test to Test and Cell to Cell)

Figure 47 presents weekly internal cross check data set for all PM measurement-capable test cells within an OEM certification laboratory over a 10-week period. As shown, the overall laboratory average for the tested vehicle is 0.2853 mg PM/mile, represented by the black dotted line in the middle. The upper and lower red lines represent +/- 2 standard deviations around the laboratory mean and the upper and lower pink doted lines represent +/- 3 standard deviations around the laboratory mean. For this data set, 2-standard deviations is: 0.2677 mg/mile (0.553 - 0.2853 mg/mile), or 94% of the mean, which represents the variability with 95% confidence. This is more than 53% of a 0.5 mg/mile standard. The data is corrected for the tunnel background and the tunnels are cleaned regularly to minimize the tunnel background influence with the data. There are also some other measures such as shutting out of intrusive particles by maintenance of dilution air filter to minimize the tunnel background influence. [EPA-HQ-OAR-2022-0829-0701, pp. 157-160]

SEE ORIGINAL COMMENT FOR Figure 47: Intercell correlation of PM results for a singe vehicle over a 10-week period at an OEM emissions laboratory. [EPA-HQ-OAR-2022-0829-0701, pp. 157-160]

d)FTP PM Variability on Round Robin with Industry (Lab to Lab)

Figure 48, below, provides FTP PM data from the first quarter 2023 round robin correlation program between light-duty automaker laboratories and EPA's National Vehicle and Fuel Emissions Laboratory (NVFEL). Within the same laboratory, test-to-test variability seems to be within a reasonable range, but the laboratory-to-laboratory offset is obviously large, ranging from 2.877 to 4.445 mg/mile with a difference of 1.568 mg/mile, which is more than 50% of the current 3 mg/mile standard. These are all certification laboratories that are 40 C.F.R. Part 1066 compliant and ISO 17025 accredited. These laboratories follow very rigorous test procedures and quality checks as recommended by the C.F.R. These laboratories also often go beyond what the C.F.R. recommends for quality assurance, for example by using robotic auto-handlers and regular cleaning of dilution tunnels and sampling systems. [EPA-HQ-OAR-2022-0829-0701, pp. 157-160]

SEE ORIGINAL COMMENT FOR Figure 48: PM data from the 1Q2023 automaker / EPA interlaboratory correlation program. [EPA-HQ-OAR-2022-0829-0701, pp. 157-160]

Below is PM data from another round robin program from 2022 run by the same certification laboratories and EPA (Figure 49). The 2-standard deviation limit around the EPA mean is 0.56 mg/mile. The all-laboratory average 2-standard deviation is 0.48 mg/mile. The variability from laboratory to laboratory at a 95% confidence level is almost as high as the proposed FTP PM standard of 0.5 mg/mile. The offset between the initial baseline tests' average and the confirmatory tests' average is more 0.37 mg/mile, or more than 25% change within the same laboratory. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

SEE ORIGINAL COMMENT FOR Figure 49: FTP PM test results from a 2022 automaker/EPA interlaboratory correlation program. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

Results from another recent interlaboratory round robin program from 2022 are shown in Figure 50 for a vehicle with a FTP PM emission level below 1 mg/mile. The lab to lab offset is evident here, which cannot be explained. The average 2-standard deviation from all labs is 0.065 mg/mile, or about 13% of the 0.5 mg/mile standard. The offset between Laboratory 2 and Laboratory 1 confirmatory testing at the end is is 0.27 mg/mile, or 54% of a 0.5 mg/mile standard. The offset between the initial baseline tests' average and the confirmatory tests' average is about a 21% change within the same laboratory. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

SEE ORIGINAL COMMENT FOR Figure 50: FTP PM test results from a 2022 automaker/EPA interlaboratory correlation program using a vehicle with less than 1 mg/mile PM emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

e) US06 PM Testing at 0.5 mg/mile

The US06 test, being an aggressive high speed high load cycle, requires larger CVS flowrates than the FTP to maintain the dilution factor between the required 7:1 and 20:1 ratio. In order to meet the same 0.5 mg/mile standard on the US06, the net PM mass on the filter must be lower than the net mass of PM with the FTP. Below, in Figures 51 and 52, are US06 PM data below 0.5 mg/mile from all PM measurement-capable test cells at an OEM laboratory over four months. It is obvious that as the CVS flow rate increases (going from left to right on the figure below), the net mass of PM on the filter decreases, approaching about 5 µg at 1000 CFM where larger light- duty vehicles and trucks will need to run. There is not much US06 data below 0.5 mg/mile available at CVS flow rates higher than 1000 CFM because the larger vehicles needing those higher CVS flowrates generally have PM emissions higher than 0.5 mg/mile. The US06 data ranges from a CVS flowrate of 400 to 1000 CFM. Medium-duty vehicles, which are not represented here because there is no data available and which must run at higher CVS flow rates above 1000 CFM, will have lower net mass on the filter; lower than the tunnel background on some vehicles, which will likely result in net negative calculated mass. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

SEE ORIGINAL COMMENT FOR Figure 51: Net mass on PM filters for FTP tests with results below 0.5 mg PM/mile at various flowrates. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

SEE ORIGINAL COMMENT FOR Figure 52: Relationship between net filter mass and CVS flow rate for vehicles with less than 0.5 mg/mile US06 emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

f)Variability on US06 from Industry Round Robin (1st Quarter of 2022)

Figure 53 presents PM data from a recent round robin program from 2022 with US06 testing. Most of the laboratories' three-test average fell in between 0.6 and 0.95 mg/mile, except for one laboratory which had two tests between 0.5 and 1.0 mg/mile and one very high test of 3.25 mg/mile. Previous round robin correlation programs have shown that almost all automaker and government emission test laboratories occasionally experience this type of unusually high PM results on US06 tests. The three-test US06 average at the laboratory with the high US06 results was 1.6933 mg/mile and the 2-standard deviation was 2.6864 or 158% variability. The overall laboratories' average was 0.913, the average 2-standard deviation between the labs was 0.862 mg/mile and the variability is 94% in this case. EPA should take this into consideration and allow a re-test in the case when this occasional and exceedingly high US06 test PM result happens during certification or confirmatory testing. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

SEE ORIGINAL COMMENT FOR Figure 53: US06 PM test results from the 1Q2022 automaker/EPA interlaboratory correlation program. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

g) Variability in Microbalance Filter Weighing

Figure 54, below, shows 25 repeat-weighing of a 100 mg metal mass by a microbalance using a robotic auto-handler. The standard deviation is 0.4 µg and the range between the highest and lowest measured values is 1.5 µg. The uncertainty due to microbalance instability in weighing metal weights can be approximated as 0.8 µg (2-standard deviations), assuming that effects of ambient environmental conditions are negligible, the static charge effect is minimal since the metal weight is made of stainless steel, and the Polonium strips within the weighing chamber are effective at removing any static charge on the metal weight. Removing any static charge on the metal weight is important, but there are ways other than the Polonium strips such as neutralization by ionizer. Any operator handling is not relevant here since these are automatic weight measurements performed by the robotic auto-handler independent of any operator intervention. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

A similar test was performed of 25 repeat measurements of the mass of a clean blank filter (Figure 55). The filter was stationed inside the robotic auto-handler, did not leave the weighing room, and was not handled by operators like is typically done on reference filters. The test resulted in a 1.1 µg standard deviation and a range of 4.6 µg. The measurement of the clean PM filter had almost three times the variability as the metal mass and almost three times the standard deviation and range of measured values. This is evidence of the organic artifact compounds present in ambient air which are adsorbed and desorbed by the filter and reported in many studies by several researchers. The two-standard deviation in weighing a clean PTFE filter was 2.2 µg. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

SEE ORIGINAL COMMENT FOR Figure 54: Repeated measurements of a 100 mg metal weight. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

SEE ORIGINAL COMMENT FOR Figure 55: Repeated measurements of a clean PM measurement filter. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

h) PM Testing at -7 °C

The proposed Tier 4 PM standard of 0.5 mg/mile at -7 °C is unprecedented, and was not considered in automaker emissions test laboratory designs. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

There are several complications in implementing PM testing at -7 degrees C; measuring PM in an environmental test cell at -7 °C is not an easy task. This may require updated test procedures to prevent condensing water vapor from depositing on the filter face, which can result in high filter weight, leading to invalid tests. The number of invalid tests is expected to increase, resulting in additional testing burden. In addition, -7 °C PM testing requires upgrades to testing facilities to include full dilution tunnels, which were not designed for. In addition, these existing test cells may not have enough space to add a full dilution tunnel, requiring major capital upgrades to build new test cells. Also, commercially available PM samplers are not designed to operate at below freezing temperatures, which will create another complication. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

The following Figure 56 shows PM data from five -7 °C FTP tests, collected on a vehicle with a new GPF. The error bar is based on two standard deviations, representing a 95% confidence level. Variability is quite high in the testing, with the two standard deviation error exceeding the average of the five tests. The two standard deviation error is equivalent to 114% of the five test average, which is quite significant. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

SEE ORIGINAL COMMENT FOR Figure 56: Results from five FTP tests at -7 °C for the same vehicle with a new GPF. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

In addition, five FTP tests at 25 °C and five US06 tests were also run on the same vehicle, in the same test cell, and with the same driver as shown in Figures 57 (FTP) and 58 (US06), below. On the FTP, the two standard deviation level is 48% of the five-test average, which is significant. The US06 data shows a two standard deviation level equivalent to 90% of the five-test average. It is obvious from the three sets of data that the -7 °C testing had the largest amount of variability (114%), followed by the US06 (90%) compared to their respect five-test averages. The data also demonstrates that vehicles equipped with a GPF that pass the 25 °C FTP and US06 mg/mile proposed PM standards are also likely to pass the same standard at -7 °C as shown in the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

SEE ORIGINAL COMMENT FOR Figure 57: Results from five FTP tests at 25 °C for the same vehicle, same driver, same test cell. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

SEE ORIGINAL COMMENT FOR Figure 58: Results from five US06 tests for the same vehicle, same driver, same test cell. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

Assuming the purpose of the proposed -7 °C FTP PM standard is to mandate the use of GPFs to minimize PM emissions on all vehicles, vehicles passing the 0.5 mg/mile standard on the 25 °C FTP and US06 tests should also have PM emissions below 0.5 mg/mile on the -7 °C FTP test. Requiring PM testing at -7 °C will add unnecessary and substantial testing burden on OEMs at a time when industry resources are focused on the transitioning to electric vehicles. PM testing -7 °C is very demanding with a low validity rate, and would require most laboratories to undertake expensive test cell upgrades. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]In summary,

- A -7 °C FTP PM standard will require major laboratory upgrades that EPA has not considered in its proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

- A -7 °C FTP PM standard is not necessary and will not provide additional information or emission reductions beyond what the 25 °C FTP and US06 provide. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

- PM Testing at -7 °C has a high test-to-test variability and will significantly increase test burden. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

We recommend that EPA discard its proposed -7 °C FTP PM standard. If EPA decides to adopt such a standard, we recommend that EPA exempt vehicles with GPFs from the standard. [EPA-HQ-OAR-2022-0829-0701, pp. 164-169]

i) Tunnel Blank Data

Tunnel blank particulate mass tests are performed in the laboratory without a vehicle to characterize the background PM level of the test cell sampling systems as well as the variability caused by artifacts weighed on the filter due to handling, static charge and other factors. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

Laboratories following 40 C.F.R. Part 1066 test procedures and PM best practices typically observe average PM filter weight changes of less than 5 µg for tunnel blank tests. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

The following Figure 59 shows the results from 836 tunnel blank particulate mass tests from one ISO 17025 accredited laboratory following the 40 C.F.R. Part 1066 PM requirements and best practice recommendations. The overall average tunnel blank filter weight change is 2.6 µg. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

While 85% of the filter net weight change are less than 5 µg, 12% were between 5 and 10 µg and 3% were between 10 and 20 µg. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

SEE ORIGINAL COMMENT FOR Figure 59: Tunnel blank PM tests for a single laboratory, Feb. 5, 2021 to Apr. 15, 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

Other automaker laboratories have similar trends of tunnel background, but with a higher average and with backgrounds exceeding 25 µg as shown in Figure 60, with each bar representing one background test. The figure shows the range of variability of the tunnel background. There are also a few background tests with negative mass which could be due to filter handling by the operators, static charge removal or microbalance instability. The average background is 6.63 µg, and the standard deviation is 4.9 µg which is quite high. The test cells run different types of testing including gasoline, diesel, SCO3 and OBD testing. It is clear whenever there was a high background above 5 µg followed by a lower one below 5 µg, a tunnel cleaning test was run in between and brought the background level down below 5 µg. The buildup of PM background may take a few vehicle tests or may reach very high value in a single test depending on the test type and vehicle. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

SEE ORIGINAL COMMENT FOR Figure 60: Tunnel blank PM tests for another laboratory. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

j)Constant Volume Sampler (CVS) Flow by Test Weight and its Impact on PM Filter Net Weight Change [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

40 C.F.R. Part 1066 requires a CVS time-weighted dilution factor between 7:1 and 20:1 for particulate mass sampling. The lower limit of 7:1 is required, in part, to prevent condensation in the sampling system during testing. The upper limit of 20:1 is required to prevent over-dilution, improving the signal to noise ratio for particulate mass measurements. In order to meet the Part 1066 requirements to prevent aqueous condensation and reduce the risk of invalid tests, a mid-point dilution factor of ~ 14:1 is often targeted. The actual dilution factor for each test is difficult to precisely control as it is impacted by many factors such as the actual exhaust flow during the test, CVS flow rates available, CFV inlet temperature during the test and other factors. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

FTP test data at 20-30 °C demonstrates CVS flow rates can range from 200 CFM to 800 CFM for light-duty vehicles and 300 CFM to 1100 CFM for medium-duty vehicles. (See Figure 61.) A flowrate of 200 CFM is a typical minimum flow rate supported by laboratory systems. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

SEE ORIGINAL COMMENT FOR Figure 61: CVS Flow Rate Data for Light- and Medium-Duty FTP Tests. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

CVS flow rates on US06 tests are higher than those of the FTP. Data at 20-30 °C demonstrates CVS flow rates can range from 300 cfm to 1600 cfm for light-duty vehicles (Figure 62). There is limited US06 test data available for medium-duty vehicles >############################ 10,000 lbs. These vehicles are currently required to perform the LA92 cycle instead of the US06 cycle. By using US06 test data available through 9,000 lb. ETW and extrapolating to 14,000 lbs. it is expected that CVS flow rates for medium-duty vehicles on the US06 cycle may range from 600 cfm to over 2000 cfm. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

SEE ORIGINAL COMMENT FOR Figure 62: CVS Flow Rate Data for Light- and Medium-Duty US06 Tests. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

The particulate filter net weight change at the 0.5 mg/mi standard decreases as the CVS flow rate increases. The following Figure 63 illustrates the filter net weight change at the 0.5 mg/mi standard for the FTP and US06 by CVS flow rate with the following assumptions: (1) for the FTP test, the 40 C.F.R. Part 1066 single filter method with a filter face velocity during phase 2 of 135 cm/sec; (2) for the US06 test, a single particulate mass filter over the test with a filter face velocity of 100 cm/sec. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

For the FTP test at the 0.5 mg/mi standard, the filter net weight can be as low as ~13 µg for light-duty vehicles and below 10 µg for medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

For the US06 test at the 0.5 mg/mi standard, the filter net weight can be as low as ~6 µg for light-duty vehicles and approaches 4 µg for medium duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

SEE ORIGINAL ATTACHMENT FOR Figure 63: Assessment of net PM filter weight change by CVS flowrate at a 0.5 mg/mile standard. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

The tunnel blank PM data above demonstrates that variability in the PM sampling, handling, and weighing process without a vehicle can contribute up to, and periodically exceed, 20 µg to the PM filter. As shown in Figure 64, the tunnel blank PM net weight contribution alone at high CVS flow rates can cause a compliant vehicle to exceed the 0.5 mg/mi standard. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

SEE ORIGINAL COMMENT FOR Figure 64: Overlay of tunnel blank PM testing and net filter weight change at a 0.5 mg/mile standard for various by flowrate. [EPA-HQ-OAR-2022-0829-0701, pp. 169-175]

K) Suggestions and Recommendations Based on Analysis of PM Measurement Capability

We recommend that that EPA adopt California LEV IV PM standards in whole. If EPA proceeds with a different standard, then at a minimum, EPA should adopt 1 mg/mi until it is fully phased in under LEV IV. In addition:

- EPA eliminate the requirement for PM testing at -7 °C. [EPA-HQ-OAR-2022-0829-0701, pp. 175-176]

- We recommend considering laboratory measurement variability and allowing re-tests for exceedances during certification, confirmatory and in-use testing, especially for vehicles equipped with diesel particulate filters or gasoline particulate filters. [EPA-HQ-OAR-2022-0829-0701, pp. 175-176]

- Tunnel blank tests or background should be measured weekly. Dilution tunnel conditioning and cleaning should be required to be performed whenever the tunnel blank or background exceeds 5 µg.276 Tunnel contamination and background will be very significant and can be higher than the net mass of PM on the filter, which will affect the PM test results adding to the uncertainty in measurement. Tunnel cleaning is typically a process of using high temperature gasoline exhaust to remove PM entrained on the tunnel surfaces. For example, this can be accomplished by operating a higher mass gasoline vehicle at steady state speeds (e.g., 80 mph) for a period of time. [EPA-HQ-OAR-2022-0829-0701, pp. 175-176]

276 Cleaning could entail running a low emission gasoline vehicle on repeated US06test cycles to heat the tunnel, thereby removing entrained particulate matter.

- Tunnel Background correction should be required given the significant difference it can make on test results, particularly at very low standard levels. [EPA-HQ-OAR-2022-0829-0701, p. 176]

- More appropriate reference filter limits should be required for light- and medium-duty vehicles, for example +/- 5 µg. The current Part 1065 reference filter validity limit of +/- 10 µg may be adequate for heavy-duty vehicles, but it is not adequate for testing at the 0.5 mg/mile standard level for light- and medium-duty vehicles where the net mass on the filter can be less than 10 µg. [EPA-HQ-OAR-2022-0829-0701, p. 176]

- Consider making Robotic auto handlers a requirement to minimize filter handling by operators. This is important, particularly at independent laboratories that perform in- use testing. Requirements should take effect after the appropriate lead time. [EPA-HQ-OAR-2022-0829-0701, p. 176]

- Consider requiring single filter collection with flow weighing on the FTP to minimize the impact of artifacts and to collect more mass on the filter. Requirements should take effect after the appropriate lead time. [EPA-HQ-OAR-2022-0829-0701, p. 176]

- Finally, EPA should adopt interim in-use standards for the first two model years after a test group certifies to a new EPA PM standard. [EPA-HQ-OAR-2022-0829-0701, p. 176]4. PM certification Test Requirements

EPA requests comment on whether pre-production PM certification testing should be performed at the durability group level after lower PM standards are fully phased in.277 Auto Innovators supports this proposal as a common-sense adjustment to test requirements following demonstration of PM control at lower levels across the fleet during the phase-in. With the increasing laboratory burden associated with testing electric vehicles, actions that reduce ICE vehicle test burden while still ensuring emission control system efficacy are appreciated. [EPA-HQ-OAR-2022-0829-0701, p. 176]

277 NPRM at 29269

F. Interim In-Use Standards

Auto Innovators recommends EPA provide interim in-use compliance standards for PM, early drive-away, and US06 NMOG+NOx standards, consistent with the approach taken by CARB in its LEV IV program.280 [EPA-HQ-OAR-2022-0829-0701, p. 178]

280 See 13 C.C.R. § 1961.4(d)(2)(A)3., (2)(C)3., (3)(A)5.a., and (3)(A)5.b.

Notwithstanding our comments opposing EPA's proposed PM standards, we recommend that test groups first certified to Tier 4 PM standards in the first four years of the program meet an in-use standard 1 mg/mile higher than the certification standard. [EPA-HQ-OAR-2022-0829-0701, p. 178]

For early drive-away and US06 NMOG+NOx standards, we recommend that test groups first certified to these Tier 4 standards in the first two years of the program meet an in-use standard 1.2 times their certification standard. [EPA-HQ-OAR-2022-0829-0701, p. 178]

Vehicles will still certify to the new standards, but the interim in-use standards reduce the jeopardy associated with new technology and more stringent standards. [EPA-HQ-OAR-2022-0829-0701, p. 178]

H. -7°C CO standard

EPA proposes a 10.0 mg/mi CO emissions cap for the -7°C FTP. This differs from the current standards in that the same cap applies to all light-duty vehicles. For larger vehicles, CO emission mass is larger and it takes more time to warm up the catalyst. Therefore, we request that EPA maintain the current CO cap of 12.5 mg/mile for LDT2-4 and MDPV. We also note that there are no CO non-attainment areas in the U.S., and vehicle CO emissions are declining.281 [EPA-HQ-OAR-2022-0829-0701, p. 180]

281 U.S. Environmental Protection Agency, Green Book Carbon Monoxide (1971) area information. https://www.epa.gov/green-book/green-book-carbon-monoxide-1971-area-information.

C. Particulate Matter (PM) Requirement for MDVs

4. Standard Alignment

Particulate mater requirements found in the Proposed Rule are misaligned and differ with CARB Advanced Clean Cars II (ACC II) regulation both in standard level and required test cycles. ACC II sets a particulate mater limit of 8 mg/mi and 10 mg/mi for Class 2b and Class 3 vehicles, respectively, on the FTP75 test cycle, whereas the proposed EPA standard is 0.5 mg/mi across the same cycle. The jump in stringency from 8 mg/mi to 0.5 mg/mi represents a 16-20 times jump in stringency, depending on the weight category of vehicle. [EPA-HQ-OAR-2022-0829-0701, pp. 194-195]

Manufacturers have been developing products and product plans to meet the ACC II pPM standard levels since that rulemaking process began in September of 2020. Investments and development are already underway, and these costs should not be stranded. The lack of alignment between standards will waste three years of development work, leaving it largely abandoned. During a time of rapid industry transition, EPA's proposal would siphon funds away from electrification efforts in the MDV segment. [EPA-HQ-OAR-2022-0829-0701, pp. 194-195]

EPA should align the PM stringency for MDVs with the ACC II rules already promulgated by California across the same timeframe of MY2027 to MY2032. This would provide for a reasonable level of stringency in the requirements while allowing investment to continue to be focused on increasing MDV electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 194-195]

Alternatively, if EPA chooses not to align with ACC II PM standards, an alternate standard is needed, because the application of the same stringency level as LDVs for MDVs is neither appropriate nor feasible. As documented in the PM Section above, EPA must recognize the lab measurement limitations (lab-to-lab and test-to-test variability) for larger, heavier vehicles with much higher exhaust flow rates is limited to 4 or 5 mg/mile for Class 2b and 3, respectively. Because vehicles in the Medium-Duty segment are much heavier than LDV vehicles and are used in different ways than their LDV counterparts, it makes sense to have a separate standard level rather than apply one standard to every vehicle from a 2,000-pound subcompact passenger car to a 7,000-pound Class 3 dually pickup truck with a 20,000-pound towing capacity. [EPA-HQ-OAR-2022-0829-0701, pp. 194-195]

5. Test Cycle Alignment

To minimize unnecessary test burden, EPA should align its test cycles with those of ACC II and allow manufacturers to use US06 Bag 2 in place of the full US06 test for Particulate Mater testing. This significantly reduces test burden without impacting environmental benefit. [EPA-HQ-OAR-2022-0829-0701, p. 195]

2. IUMPR Systems with Active Regeneration

For active regeneration of a GPF, we believe that a special denominator is necessary. In addition to the general denominator criteria, the denominator for monitors associated with active regeneration of a GPF should only be incremented if, and only if, an active regeneration event is commanded for a time greater than or equal to ten seconds, where "Active regeneration" of a gasoline particulate filter is defined as the active control of the exhaust system (e.g., to increase the exhaust system temperature) for the purpose of the regeneration of the particulate filter. [EPA-HQ-OAR-2022-0829-0701, pp. 249-250]

Also, we would also like to work with EPA staff to clarify the de-greening process and the starting mileage when the GPF is expected to achieve compliant filtration efficiency. The de-greening of a GPF is directly linked to the clear definition of a proper regeneration (frequency) and the proper detection of defective sensing systems. [EPA-HQ-OAR-2022-0829-0701, pp. 249-250]

3. GPF Monitoring Requirements

a) Detection Requirements

When developing a GPF monitor, manufacturers often target six-sigma separation between worst performing acceptable (WPA or “good parts”) and best performing unacceptable (BPU or “bad parts”). To achieve this separation, there needs to be enough separation in systems that meet the emission standard and those that should turn on the MIL for the OBD threshold. As the emission standards decrease, the OBD threshold multiplier needs to increase to provide necessary separation for a robust monitor. [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

We propose to revise the language found in (§ 86.1806–27 (h)(2)(i), to read: [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

If there is no failure or deterioration of the PM filter that could cause a vehicle to exceed the specified PM emission level, [Strikethrough: the system must detect a malfunction if the PM filter allows free flow of exhaust through the PM filter assembly where 30 percent or less of the normal filtration is occurring] [In Red: [Underline: the OBD II system shall detect a malfunction when no detectable amount of PM filtering occurs . . .]] [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

This revision aligns with CARB’s long-standing precedent for detection requirements and this revision is the only option that is feasible with today’s commercially available sensing technology. Figure 81 below shows delta pressure curves as a function of exhaust flow from a completely intact substrate and completely missing substrate. For a robust diagnostic, manufacturers require at least six-sigma separation between these curves. At low exhaust flows (of the Worldwide Harmonized Light Vehicles Test Procedure (WLTP) or FTP drive cycle), there is practically no separation between a fully intact substrate and a missing substrate. There is more separation at higher exhaust flows, as shown, but most of the higher exhaust flows are off cycle (i.e., higher exhaust flow than a US06). [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

The below example data with a delta pressure sensor shows the lack separation between an intact and missing substrate. Requiring detection of a filter flowing 30% of normal would further reduce the limited separation between “intact substrate” and “missing substrate”. Therefore, robust detection with this sensing technology is not possible for any partial failure modes of the GPF. [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

As demonstrated in the graph below, the delta pressure versus exhaust flow curves also illustrates the challenge for meeting In-Use Monitor Performance Ratio (IUMPR) minimum ratios for missing substrate detection. One way to address this could be by defining a special denominator for this monitor. Following previous and current examples from both CARB and European Union (EU) regulations regarding monitoring of Diesel Particulate Filter (DPF), the following special denominator criteria are needed to ensure that the IUMPR requirements can be met. We recommend that EPA add the following GPF special denominator criteria: [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

- Minimum of 500 miles [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

- High enough exhaust flow rate is achieved for a specified amount of time, and [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

- Alternate or additional denominator criteria, with Administrator approval. [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

[See original for graph. “Figure 81: Delta Pressure vs Exhaust Flow Rate”] [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

c) Passive Regeneration

As it pertains to regeneration, if a manufacturer designs their GPF system to not require periodic active regenerations (or to not have a “periodically active regenerating system”), then the manufacturer should not be subject to § 86.1806–27(h)(2)(ii), (iii), or Infrequent Regeneration Adjustment Factors (IRAF) during emission demonstration. Auto Innovators proposes to add a definition of a “Periodically regenerating system” to be defined as a system that requires active regeneration less frequently than 4,000 km/2,500 miles on a 25 deg C FTP. [EPA-HQ-OAR-2022-0829-0701, pp. 252-253]

Regen frequency monitoring is required for major monitors for diesel particulate filter (DPF) systems due to infrequent active regeneration, or periodically regenerating system. Diesel aftertreatment systems typically experience much lower exhaust gas temperatures, which limits passive regeneration. GPF systems, on the other hand, often experience exhaust gas temperatures of 600-650 deg C, which promotes passive regeneration. Passive regeneration is a physical phenomenon, not a control strategy or design feature. Passive, or continuous, regeneration is non-intrusive and occurs naturally due to operating conditions without any intervention from the control system and has no emissions impact. This occurs when the temperature inside the GPF is at or above 600C, which is not equal to the inlet temperature of the after-treatment system. As shown in Figure 82 below, the catalytic process increases exhaust temperature so that values greater than 600C commonly occur inside the after- treatment on all regulated driving cycles. In OEMs’ experience, significant passive regeneration occurs not just on the US06, but also on the FTP (i.e., “on all regulated drive cycles”). GPF systems can be regenerated passively (without active regeneration) for thousands of standard drive cycle miles. [EPA-HQ-OAR-2022-0829-0701, pp. 252-253]

[See original for graph, “Figure 82: Exhaust Gas Temperature vs Speed”] [EPA-HQ-OAR-2022-0829-0701, pp. 252-253]

Auto Innovators proposes that manufacturer systems without “periodic regeneration systems” not be subject to § 86.1806–27 (h)(2)(ii) and (iii) since passive regeneration cannot be monitored for too frequent occurrence or inefficiency because it is not intrusive and is not commanded by the control strategy. Additionally, for (iii), because GPFs rely on passive regeneration without intervention from the control system, GPF overloading or clogging is the result of vehicle operation or some other fault, not the regeneration strategy failing to adequately regenerate the filter. [EPA-HQ-OAR-2022-0829-0701, pp. 252-253]

For vehicles that use periodic regeneration, we recommend replacing the "1.5x the applicable FTP standard" with the multipliers that vary based on the certification level (e.g., a Bin15 would have a multiplier of 3.33x the FTP standard) consistent with CARB OBD II thresholds in 13 CCR 1968.2 which are shown in Figures 83-86 below. [EPA-HQ-OAR-2022-0829-0701, pp. 252-253]

Organization: American Fuel & Petrochemical Manufacturers

As previously mentioned, EPA did not fully consider the impact of the rule on fleet turnover. The Agency is aware that the higher purchase price of new ZEVs will keep older cars and trucks on the road longer and that new ZEVs will increase particulate matter ("PM") emissions through increased tire and road wear. In another example of EPA's biased analysis, EPA estimated the value of health benefits from reductions in PM2.5 emissions by multiplying PM2.5-related benefit- per-ton ("BPT") values by the annual reduction in tons of directly emitted PM2.5 and PM2.5 precursor emissions (NOx and SO2) from displaced ICEVs.206 However, EPA ignored the fleet turnover benefit that would result from replacing older ICEVs with new, more efficient, ICEVs. EPA also ignored its own National Emissions Inventory, which shows that roadway dust contributes more PM2.5 emissions than the tailpipe. Roadway dust emissions, including particles from tire wear, are correlated with vehicle weight, so increases in fleet average vehicle weight would be expected to increase roadway dust PM2.5 emissions.207 Converting ICEs to ZEVs under the Proposal would significantly increase the average vehicle weight on U.S. roadways, which in turn would increase the entrained road dust emissions. Yet EPA did not include these PM sources or increases in the analysis. There also exist overall medium-duty truck weight restrictions, which could require a greater number of ZEVs to move the same tonnage of cargo, thus increasing the number of vehicles needed to haul the same amount of freight, vehicle miles traveled, and resulting PM emissions. EPA also ignores the GHG emissions associated with manufacturing more, less dense, remotely located intermittent generation sources and battery back-up, plus the need for more natural gas peaking capacity and massive transmission, substation, and transformer investment to integrate these technologies into the power grid. Those emissions are significant and may offset or eliminate the benefits that EPA calculates. [EPA-HQ-OAR-2022-0829-0733, p. 45]

206 DRIA at 7-36.

207 EPA, "2020 National Emissions Inventory (NEI) Data," available at https://www.epa.gov/air-emissions- inventories/2020-national-emissions-inventory-nei-data.

Organization: American Honda Motor Co., Inc.

B. Particulate Matter Standards

One of the more surprising aspects of the NPRM is the deviation between proposed federal criteria emissions standards and the C alifornia Air Resources Board's LEV IV emissions standards finalized for the state of California just last year. While news coverage of the latter was largely focused on the state's zero emission vehicle requirements, air quality advocates widely hailed California's LEV IV program as a challenging but achievable set of new emissions requirements. Notably, those included phased-in 25°C FTP 1.0 mg/mi particulate matter (PM) standards from LEV III along with US06 3.0 mg/mi PM standards. [EPA-HQ-OAR-2022-0829-0652, p. 10]

Automakers, including Honda, maintained strong dialogue with California regulators during the development of LEV IV, and had a robust understanding of CARB's decision for maintaining 25°C FTP 1.0 mg/mi PM standards. Given the ongoing open dialogue between CARB and EPA technical staff, and traditional close coordination between the two agencies, Honda believed it was reasonable to assume that federal PM emission standards would likely align with CARB's latest program. Development activities for Honda's internal combustion engine products were based on that assumption. [EPA-HQ-OAR-2022-0829-0652, pp. 10-11]

As it turns out, EPA proposed federal PM standards that far exceed even CARB's recently adopted LEV IV requirements. As shown in Table 1 below, not only has the agency proposed a standard that is nominally twice as stringent as California's, but moreover, EPA calls for that stringency to be met under the 25°C FTP test and two additional significantly more challenging test procedures – the US06 high-speed/high- load test cycle, and the -7°C FTP cold test. [EPA-HQ-OAR-2022-0829-0652, pp. 10-11]

SEE ORIGINAL COMMENT FOR Table 1. Comparison of California and Federal PM Standards, including EPA Proposal [EPA-HQ-OAR-2022-0829-0652, pp. 10-11]

Note: The above table is a high-level comparison of PM emissions standards and test procedures across regulatory programs. It should not be considered a comprehensive summary of emissions requirements. [EPA-HQ-OAR-2022-0829-0652, pp. 10-11]

Relative to the meaningful emissions improvements that could be driven by a nationwide adoption of California's LEV IV PM requirements, EPA's proposed PM standards represent a highly disruptive distraction to Honda as we seek to focus our resources on vehicle electrification. Honda strongly urges the agency to reconsider its proposed federal PM requirements, and instead align with California's LEV IV requirements [EPA-HQ-OAR-2022-0829-0652, p. 11]

Difficulty of measuring 0.5 mg/mi using gravimetric filter-based techniques [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

The exceedingly low PM mass levels proposed by the agency in this rulemaking raise significant concern over whether compliance with such requirements can even be meaningfully ascertained, given the high potential for test-to-test variability. As noted in comments submitted into this rulemaking Docket by our trade association, Auto Innovators, numerous possible sources of variability exist that could contribute to increased measurement uncertainty, including: [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Operator filter handling [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Filter weight gain during movement from weigh room to test cell [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Tunnel contamination due to prior testing in the test cell [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Static charge removal from filters at extremely low mass levels [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Cell-to-cell variability [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Lab-to-lab offsets [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Vehicle variability [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Driver variability [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

- Fuel differences [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

With respect to the final bullet above, the lack of a particulate matter index (PMI) standard for certification fuel (see PMI discussion below) means EPA and OEM laboratories could each be using a certification fuel with very different PM-forming propensities. [EPA-HQ-OAR-2022-0829-0652, pp. 11-12]

These concerns notwithstanding, the agency suggests that 0.5 mg/mi standards would not represent a challenge from a measurement and repeatability standpoint: [EPA-HQ-OAR-2022-0829-0652, p. 12]

Current test procedures, as outlined in 40 CFR part 1066, allow robust gravimetric PM measurements well below the proposed PM standard of 0.5 mg/mi. Repeat measurements in EPA laboratories, at different levels of PM below 0.5 mg/mi, are shown in Figure 17. The size of the error bars relative to the measurement averages at and below 0.5 mg/mi demonstrates that the measurement methodology is sufficiently precise to support a 0.5 mg/mi standard. Other than selecting test settings appropriate for quantifying low PM, no test procedure changes are needed.18 [EPA-HQ-OAR-2022-0829-0652, p. 12]

18 88 Fed. Reg. 29268 (May 5, 2023)

The figure referenced in the above quote shows measurements as low as 0.1 mg/mi with extremely tight standard deviations, though based on the agency's explanatory text, it is not even clear an actual vehicle was tested.19 In Honda's view, the agency downplays challenges associated with PM measurement levels this low. An interlaboratory study (ILS) was conducted in 2021 by ASTM under real- world conditions in multiple automaker labs, in which inter- and intra-laboratory precision was investigated for the 1065/66 test methods.20 That is, reproducibility (R) and repeatability (r) were determined. In virtually every instance, the R and r values of the four tested vehicles greatly exceeded the proposed 0.5 mg/mi standard for both the FTP75 and US06 test cycles. [EPA-HQ-OAR-2022-0829-0652, p. 12]

19 The title of Figure 17 suggests the chart may have been generated with tests using an aerosol generator, as opposed to actual vehicle testing. No additional detail is provided by the agency.

20 ASTM, 2021. "Interlaboratory Study to Establish Precision Statements for ASTM D8108-21, Standard Test Method for Determination of Particulate Matter Mass from Light Duty Mobile Sources (Gravimetric Method)." Research Report: D22-2001.

Beyond measurement challenges, the agency's proposed PM standards also present a number of practical challenges. While state-of-the-art research laboratories may be able to yield an exceedingly low emissions measurement (setting aside the accuracy of that measurement), the agency does not appear to recognize that industry labs must have the flexibility to test a range of vehicles. Once dirtier vehicles are tested in a laboratory, the accuracy of any subsequent hyper-stringent PM test would be called into question. The updating of all industry laboratories to achieve such capabilities is unreasonable, particularly within the accelerated compliance timeline proposed by the agency. [EPA-HQ-OAR-2022-0829-0652, pp. 12-13]

Similarly, it is unreasonable for EPA to assume that automakers could dedicate entire laboratories solely to ultra-low PM measurement. [EPA-HQ-OAR-2022-0829-0652, pp. 12-13]

The agency's proposed PM standard would prompt additional system on-cost and require OBD for vehicles containing GPFs. This would require significant investment and coordination with suppliers to achieve a product that meets OBD requirements of light duty vehicles during a time when OEMs are reducing investment and workforce developing vehicles with ICE powertrains. A specific technology is not required to meet 0.5 mg/mi, but it is well known in the industry that GPFs would be required to meet this standard for the three test cycles proposed (-7°C FTP, 25°C FTP, and US06). In addition, the cost analysis done by EPA does not appear to include GPF post-warranty consumer costs, where the consumer may be responsible for an entire GPF replacement later in a vehicle's life. Metallic ash builds up in a GPF (from engine oil, etc.) and cannot be removed via regeneration. This cost may fall to subsequent owners of the vehicle, including used vehicle purchasers. [EPA-HQ-OAR-2022-0829-0652, p. 14]

Further, the agency appears to have ignored many of the costs associated with GPF application on vehicles. The process of applying a GPF to a vehicle for which it was previously not designed requires far more than simply affixing a device on a car or truck. A re-examination of the emissions system must be undertaken, including possible engine redesign, software changes, OBD modifications, and even potential exhaust plumbing modifications, the latter of which would potentially incur frame-related costs as well. Finally, the added exhaust back pressure of adding a GPF will reduce engine output and degrade vehicle performance. [EPA-HQ-OAR-2022-0829-0652, p. 14]

Recommendation: Honda respectfully requests the agency re-examine the full breadth of costs and vehicle performance impacts associated with GPF application as part of its Final Rule. [EPA-HQ-OAR-2022-0829-0652, p. 14]

Proposed federal PM standards would only marginally benefit non-attainment areas [EPA-HQ-OAR-2022-0829-0652, p. 15]

As noted in EPA's Proposed Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (reproduced here as Figure 1), counties still needing reductions to meet 10/35 µg/m3 levels reside almost exclusively in California.25 That state, of course, has an implementation plan to address PM emissions, including the LEV IV emissions package and aggressive electrification mandates. [EPA-HQ-OAR-2022-0829-0652, p. 15]

25 U.S. EPA, "2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document," February 2021. Interactive data queries available online at https://www.epa.gov/air-emissions-inventories/2017- national-emissions-inventory-nei-data

SEE ORIGINAL COMMENT FOR Figure 1. Counties that Still Need PM2.5 Emissions Reductions for Proposed Alternative Standard Level of 10/35 µg/m3. Source: EPA. The 2022 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975, p. 71. [EPA-HQ-OAR-2022-0829-0652, p. 15]

Would a nationwide federal 0.5 mg/mi standard help California achieve its PM2.5 emissions reductions needs? Mathematically, only marginally so: assuming industry compliance with California's ZEV regulation, which calls for EVs to make up 50% of the state's new vehicle sales by 2028, a shift of PM requirements in California from 1.0 mg/mi to 0.5 mg/mi for the remaining ICE fleet (600,000 units) would yield just 65 additional tons over the life of those vehicles – less than 1% of the amount needed to address the state's PM2.5 emissions reduction shortfall, as identified by EPA.26 27 Given the near ubiquitous PM2.5 attainment across the rest of the nation, and the fact that LEV IV will already meaningfully help address PM2.5 emissions in California and elsewhere, it is not clear why EPA is choosing to pursue this costly and highly disruptive policy. [EPA-HQ-OAR-2022-0829-0652, p. 15]

26 EPA, 2023. Reconsideration of the National Ambient Air Quality Standards for Particulate Matter. Available online at https://www.govinfo.gov/content/pkg/FR-2023-01-27/pdf/2023-00269.pdf

27 EPA, 20022. Regulatory Impact Analysis for the Proposed Reconsideration of the National Ambient Air Quality Standards for Particulate Matter, Table ES-4. Available online at https://www.epa.gov/system/files/documents/2023-01/naaqs-pm_ria_proposed_2022-12.pdf

Marginal benefit of PM standards beyond LEV IV is exceedingly limited] [EPA-HQ-OAR-2022-0829-0652, p. 17]

Improving the PM performance of new vehicles from 1.0 mg/mi to 0.5 mg/mi would have a limited, perhaps undetectable, marginal benefit on the PM inventory, which is largely impacted by non-road sources. As shown in Figure 2 below, EPA's own data show that on-road non-diesel light duty vehicles account for less than one percent of PM2.5 emissions in the United States, a level dwarfed by other sources such as wildfires, agriculture and unpaved road dust.30 [EPA-HQ-OAR-2022-0829-0652, p. 17]

30 U.S. EPA, "2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document," February 2021. Interactive data queries available online at https://www.epa.gov/air-emissions-inventories/2017- national-emissions-inventory-nei-data

SEE ORIGINAL COMMENT FOR Figure 2. 2017 National PM2.5 Emissions, by Source - PM2.5 [EPA-HQ-OAR-2022-0829-0652, p. 17]

By our math, a decision to finalize PM standards as proposed, instead of setting a nationwide standard aligned with California's LEV IV PM requirement, would further improve the PM2.5 inventory a mere 0.05% – even after full turnover of the vehicle fleet. In intervening years, benefits would be even lower, as emissions standards only deliver an improvement on the emissions performance of new vehicles subject to the updated standards. By contrast, a nationwide standard aligned with California's LEV IV PM requirement would deliver reasonable (albeit still modest) PM reductions from vehicles but do so in a far more efficient and less costly manner. [EPA-HQ-OAR-2022-0829-0652, p. 17]

Recommendation: Honda strongly urges the agency to reconsider its decision regarding federal PM stringency and the inclusion of a -7°C FTP PM test requirement, and instead align federal PM emission standards and test procedures with existing California LEV IV requirements. Doing so would deliver continued PM emissions reductions across the country without forcing unnecessary ICE development and test cell upgrade costs upon manufacturers that are seeking to more efficiently direct resources toward vehicle electrification [EPA-HQ-OAR-2022-0829-0652, pp. 17-18]

-7°C FTP 0.5 mg/mi proposed limit [EPA-HQ-OAR-2022-0829-0652, pp. 13-14]

As noted above, EPA proposes that OEMs comply with a 0.5 mg/mi standard not just under the 25°C FTP test, but also under the high-speed US06 and cold -7°C FTP tests. With respect to the latter, there are presently only a modest number of laboratories with a cold chamber test cell capable of testing vehicles at -7°C, and even fewer that are also able to test exceedingly low PM levels. With EPA now proposing stringent PM measurement under these cold temperature test conditions, the availability of those laboratories will be even more limited. Further restricting testing resources is the question of whether such a lab is configured with the dilution tunnel inside or outside the cold chamber. For labs with tunnels inside the chamber, significant investment must be made to reconfigure/insulate/heat the dilution tunnel, and – if not already configured in this manner for PM sampling – possibly add heating and dehumidification to the dilution air to ensure condensation-free dilute exhaust. It does not appear that the agency has quantified the costs associated with industry-wide laboratory and testing upgrades necessary to meet its proposed cold -7°C FTP PM testing regimen. [EPA-HQ-OAR-2022-0829-0652, pp. 13-14]

In order for an engine to have stable combustion at -7°C and avoid misfire, a calibration for slightly rich operation during cold start is required. This is well understood by the agency, as illustrated by the regulation requirements for this test to encompass evaluation of CO and NMHC. During rich operation, particle mass (filter) measurements will include the excess fuel and SVOCs from the cold engine start. This stands in contrast to the European Union's (EU) process for measuring particle number (PN), in which SVOCs are first stripped off, prior to measurement of PN using highly reproducible electronic instrumentation. Significantly, the current (Euro 6d) standard for particle mass is 4.5 mg/km (7.2 mg/mi),21 using a filter method similar to that used in the U.S. in which the SVOCs are not stripped off. As such, EPA's proposal goes well beyond the EU regulation. [EPA-HQ-OAR-2022-0829-0652, pp. 13-14]

21 Euro standards use the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), generally regarded as less onerous than U.S. test procedures.

To be clear, the agency's inclusion of a -7°C FTP PM test amounts to a de facto gasoline particulate filter (GPF) requirement; the proposed stringency, at that temperature, simply cannot be met without such a device. It appears the agency is keenly aware of the presence of GPF technology on vehicles elsewhere in the world and has proposed a testing regimen to force the inclusion of GPFs in the United States as well. Indeed, in the proposal, EPA points to "GPF-forcing" requirements of other countries' regulations: "All pure GDI vehicles in India also have to meet similar GPF-forcing standards starting in 2023."22 Recognizing, as noted above, that regulatory programs around the world have distinct structural and test procedure differences, the presence (or lack) of a technology elsewhere should not be a basis upon which to set emissions standards. [EPA-HQ-OAR-2022-0829-0652, pp. 13-14]

22 88 Fed. Reg. 29268 (May 5, 2023)

Organization: American Lung Association (ALA) et al.

EPA has proposed important reductions in fine particles from new vehicles across various testing cycle to better respond to — and control for — real-world driving conditions. The EPA standards are estimated to result in widespread use of gasoline particle filters to meet the standards. Filters are currently standard equipment on some vehicle models sold in European and Chinese markets and should be the norm to control this carcinogenic pollutant on equivalent models sold in American communities. We support EPA's robust approach to controlling fine particle emissions from new engines and encourage EPA to consider accelerating the phase-in to require 100% of the new vehicle fleet in MY 2027 to use gasoline particle filters and set strong assurances for ongoing function and maintenance of these critical emission controls. [EPA-HQ-OAR-2022-0829-0745, p. 3]

Organization: American Petroleum Institute (API)

EPA has also not demonstrated that a particulate matter (PM) 0.5 mg/mi limit is technologically feasible on the basis of measurement capabilities and test procedure. EPA has stated that the agency is not reopening the test procedures, nor does the agency believe that test procedure changes are required, to PM for the proposed PM standards. The agency fails in justifying this decision. The EPA needs to reconsider if it is possible to measure PM emissions of 0.5 mg/mile accurately with current methods. The test set utilized in the NPRM to suggest that test-to-test repeatability is sufficiently precise to support a 0.5 mg/mile standard was noted to use an aerosol generator, presumably to generate PM. In contrast an actual engine will produce PM with more composition and concentration variability, which could impact repeatability. Further, FCA reported32 the challenges of measuring 1 mg/mile of PM. It can be assumed that these uncertainties would only increase for a PM target of 0.5 mg/mile "[a]s the PM standard is transitioning to 1 mg/mile, this study showed that the net PM mass on the filter will be approaching tunnel ambient background levels. At these net filter PM mass levels, the sources of errors in measurement are numerous. If these sources of errors are not mitigated, the uncertainty can be substantial exceeding the PM limit of 1 mg/mile." It is important to highlight that the 2023 EPA certification vehicle test data shows that there were approximately 83 carline models (out of approximately 376 carlines tested on US06) that achieved a certification level of emissions of 0 gm/mile (and a rounded emission test results level below 0.5 mg/mile) of PM on the US06 drive cycle. [EPA-HQ-OAR-2022-0829-0641, p. 12]

32 Yassine, M., "Challenges in PM Measurement at 1 mg/mile and Tunnel Background Correction," SAE Technical Paper 2023-01-0370, 2023, https://doi.org/10.4271/2023-01-0370.

EPA fails to properly account for all of the cost increases associated with the enforcement of gasoline particulate filter (GPF) technologies. The GPF cost model is described in DRIA Chapter 3.2 and GPF cost is included in the OMEGA model. The model anticipates the direct manufacturing cost (DMC) for a bare downstream GPF, which ranges from $51 dollars for a 1.0-liter engine using a relatively low GPF 249 volume to engine displacement ratio, up to $166 dollars for a 7.0 liter engine using a relatively high GPF volume to engine displacement ratio. In the DRIA (page 3-60) GPF cost is based on the ICCT 2011 work, which is now over 10 years old. Further, the EPA assumes that the GPFs that OEMs will utilize to meet more stringent PM and GHG targets will be those new generation of MY 2022 GPFs with "high filtration efficiencies generally over 95 percent" and low backpressure. The assumed costs for MY 2022 GPF with higher efficiency appear to be unreasonably low and caused the modeling to overestimate feasibility. Furthermore, it is not clear if the associated equipment for effective operation of the GPF such as associated sensors and controllers are included in the cost assessment performed by EPA. The agency should reevaluate its assessment based on more realistic efficiency levels to avoid arbitrary and capricious action. [EPA-HQ-OAR-2022-0829-0641, p. 13]

Another issue with the proposed PM standards is related to the new testing requirement at -7°C in the Federal Test Procedure (FTP) cycle. In the NPRM EPA states "as was the case for light-duty vehicles, the -7°C FTP cycle is crucial because it differentiates Tier 3 levels of PM from GPF-level PM and because -7°C is an important real-world temperature that addresses uncontrolled cold PM emissions in Tier 3.” The temperature selection of -7°C (19.4°F) is arbitrary and capricious because it is not a real-world temperature applicable to a large portion of the U.S. National Oceanic and Atmospheric Administration (NOAA) data of winter temperature averages for every state from 1971 to 2000 33 suggests that only Alaska, North Dakota, Minnesota, Maine, Wisconsin and Vermont have average winter temperatures below -7°C. 34 The winter average of all 50 states is 0.1 °C (32. °F), which further suggests that a temperature of -7°C is not a real-world temperature. [EPA-HQ-OAR-2022-0829-0641, p. 12]

33 “Winter Temperature Averages for Every State”: https://www.currentresults.com/Weather/US/average-state- temperatures-in-winter.php.

34 According to the U.S. Census Bureau, these states account for less than 5% of the population of the United States (“State Population Totals and Components of Change: 2020-2022”: https://www.census.gov/data/tables/time- series/demo/popest/2020s-state-total.html).

Organization: Arizona Department of Environmental Quality (ADEQ)

Additionally, given Arizona's climate, ADEQ is particularly interested in EPA's plans to adopt proven technologies such as Gasoline Particulate Filters (GPF) as part of its proposed pathways for industries. As Arizona has several particulate matter nonattainment areas, ADEQ supports adoption of GPF technology that is proven to reduce combustion engine tail pipe particulate emissions by over 95 percent.2 [EPA-HQ-OAR-2022-0829-0533, p. 1]

2 88 FR 29184, 29197 (May 5, 2023)

Organization: Aston Martin Lagonda (AML)

4. PARTICULATE MATTER

EPA's proposed PM reduction to 0.5 mg/mi across the FTP and US06 and Cold Testing goes far beyond what SVMs are able to achieve in a short period of time [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

EPA's proposed PM reduction to 0.5 mg/mi across the FTP and US06 and Cold Testing is an enormous increase in stringency over a short period of time. This is a regulatory combination that SVMs simply cannot meet. We recognize that the regulation of PM is headed towards necessitating the use of Gasoline Particulate Filters (GPF), but further research and development is needed with respect to GPF aging and monitoring for purposes of California OBD. This issue is not yet fully understood and requires more lead-time under the CAA section 202(a). [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

In addition, there are also technical issues and costs associated with measuring PM emissions below 1 mg/mile, and specialized, expensive test facilities may be needed to reliably measure PM at such a low level. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

It is thus unreasonable to impose the proposed PM standards and timetable on SVMs, especially considering the minimal environmental benefit obtained together with how drastic the proposed change is compared to existing Tier 3 levels and the CARB ACCII PM standards, as shown in the graph below. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

[See original attachment for bar graph of Tailpipe PM Limit [mg/mi]] [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

In sum, as regards SVMs and PM, EPA should harmonize with the CARB ACC/1 SVM PM approach as follows:

- FTP

-- For MY 2027-2028 -- 3 mg/mile.

-- For MY 2029 and later - 1 mg/mi. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

- SFTP

-- For MY 2027 - 2029 - 6 mg /mi

-- For MY 2030 and later - 3 mg/mi [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

- No Cold Testing for SVMs given that it is not yet fully understood what is needed to meet the 0.5mg standard at 20F with high-performance engines. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

We further note the above levels and timetable are consistent with the EU regulation of PM. GPFs will be necessary on all European engines in 2030 with the implementation of EU7's mandating PM measurement for both Port Fuel Injection Engines and Gasoline Direct Injection Engines. [EPA-HQ-OAR-2022-0829-0566, pp. 11-12]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Criteria Air Pollutant Standards

CARB supports U.S. EPA’s proposal to tighten criteria air pollutant emission standards, particularly given the continued role that internal combustion engine vehicles will play in the national fleet over the regulatory timeframe and beyond. Reducing exposure to harmful air pollution is a key element of the proposed standards, and the proposals to tighten criteria air pollutant emissions are needed to protect public health, especially in communities with disproportionate exposure to air pollution. Because U.S. EPA’s proposal does not require ZEV sales, as California’s rules do, the tightening of criteria air pollutant emission standards is even more critical to ensure that the internal combustion engine vehicles that will continue to be sold are becoming cleaner. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

As part of its ACC II rulemaking, CARB adopted its fourth iteration of its Low Emission Vehicle (LEV) standards, referred to as LEV IV. CARB finds that U.S. EPA’s proposals are appropriate and largely consistent with the LEV IV standards. CARB has documented our analysis and recommends strengthening the proposal to realize the greatest degree of emission reductions achievable, considering cost and technology availability, to further protect public health. As described further below, CARB recommends that U.S. EPA adopt its proposed NMOG+NOx and PM standards, adopt elements of CARB’s evaporative emission standards program, and eliminate the use of commanded enrichment as proposed while collecting additional information on the use of auxiliary emissions control devices to further improve emission standards in the future. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

Particulate Matter Emission Standards

CARB supports U.S. EPA's proposal to lower the PM emission standards for light- and medium-duty vehicles for all test cycles to ensure robust PM control under broad operating conditions. CARB's ACC I PM standards are lower than U.S. EPA's Tier 3 standards for the FTP cycle, and the ACC II regulations expanded lower PM standards to more test cycles to achieve the same desired outcome of robust PM control. [EPA-HQ-OAR-2022-0829-0780, pp. 33-34]

At the time of CARB's original adoption of its standards in 2012, the gasoline particulate filter technology that U.S. EPA is now relying on was not as well developed to support such stringent levels. Since that time, however, the technology has matured and been deployed industry-wide in the European vehicle fleet, confirming its technology readiness. But under the ACC II regulations, the ZEV requirements necessarily reduce the fraction of conventional vehicles at a pace that minimized the additional benefit from a further reduction in the PM FTP standards in California. [EPA-HQ-OAR-2022-0829-0780, pp. 33-34]

On a national level, in contrast, CARB supports the proposed PM standards given that the proposed standards as a whole do not have a parallel path to effectively eliminate emissions from new vehicles. In the absence of this certainty of future zero-emission standards, the proposed PM standards will ensure over the long term that PM emissions are reduced to the maximum extent feasible from vehicles driven in California (and elsewhere, especially in cold climates) even if they were not originally sold here. U.S. EPA's proposed PM standards are appropriate for protecting public health and reducing exposure to PM, especially for residents of disadvantaged communities that are in close proximity to busy roadways. [EPA-HQ-OAR-2022-0829-0780, pp. 33-34]

Further, on the issue of measurement capabilities of low levels of PM, CARB previously addressed the technical feasibility as part of its LEV III MTR. 44 As a part of the MTR, staff conducted a technical review to determine if the gravimetric PM mass measurement method was appropriate for the 1 mg/mi standard. The technical review was conducted by CARB in collaboration with U.S. EPA, industry, and other stakeholders. The review process included extensive studies, testing, and laboratory evaluation of PM emissions at 1 mg/mi and below. The results of the technical review of the PM standards were presented by staff to the Board in October 2015. [EPA-HQ-OAR-2022-0829-0780, pp. 33-34]

44 CARB. ACC PM Measurement Feasibility. October 2015. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2015/102215/15-8-9pres.pdf.

As a result of these studies, CARB concluded that the gravimetric method prescribed for the FTP driving cycle, in conjunction with appropriate laboratory practices, has a measurement precision of 0.1 mg/mi, even when measuring emission rates less than 1 mg/mi. This method can precisely measure PM emissions to determine compliance with a standard of 0.5 mg/mi. 45 It should also be noted that such analysis was conducted on low-PM-emitting vehicles that had a higher level of vehicle test-to-test variability than what is observed in U.S. EPA's test data for vehicles equipped with a gasoline particulate filter. As this technology is a mechanical wall-flow filtering device with a high trapping efficiency, it inherently dampens variations in engine-out

PM emissions and produces more consistent results at very low PM levels, thereby reducing one element of concern regarding measurement precision at low PM levels. This further demonstrates that the proposed PM standard is feasible and appropriate. [EPA-HQ-OAR-2022-0829-0780, pp. 33-34]

45 CARB. An Update on the Measurement of PM Emissions at LEV III Levels. October 2015. p. 23. https://ww2.arb.ca.gov/sites/default/files/2020-01/lev_iii_pm_measurement_feasibility_tsd_20151008_ac.pdf

Organization: David Pedersen

I agree with and support the agency's objective of reducing air-pollutant emissions from internal combustion engines in automobiles. Since there is no safe level of air pollution ("As the author of the Clean Air Act, Senator Edmund Muskie, later admitted, “[o]ur public health scientists and doctors have told us that there is no threshold, that any air pollution is harmful." Susan E. Dudley and Marcus Peacock, "Improving Regulatory Science: A Case Study of the National Ambient Air Quality Standards", https://www.journals.uchicago.edu/doi/full/10.1086/696956), it is critical that emissions from automobiles be reduced as much as possible. [EPA-HQ-OAR-2022-0829-0518, p. 1]

However, I strongly disagree with the proposed standards that would require the use of gasoline particulate filters (GPFs). Back around 2001, the agency promulgated particulate-matter (PM) standards for compression-ignition (i.e. diesel) engines that essentially triggered the use of diesel particulate filters (DPFs), which have been nothing short of disastrous. Independent laboratory testing by Transport and Environment - a renowned European non-governmental organization and environmental group - found that PM emissions from DPFs themselves exceed legal limits by a factor of 1000 (see "New diesels’ particle emissions spike to 1,000 times normal levels in tests", https://www.transportenvironment.org/discover/new-diesels-particle-emissions-spike-1000-times-normal-levels-tests/, or see attachment "New-diesels-new-problems-filters.png"). I myself experienced this firsthand when I was engulfed by a thick plume of smoke from a regenerating particulate filter while walking home one day last year (see screenshot, attachment "Screenshot 2023-06-20 at 16-43-08 Ford Transit 2013 DPF Regen part 2.png", for example). [EPA-HQ-OAR-2022-0829-0518, p. 1]

Additionally, a 2023 study found that exhaust particulate filters don't remove ultrafine particles (UFPs), which are far more hazardous than coarse, fine, and very-fine particulate matter ("Ultrafine particle concentrations remain in the “high” category as defined by WHO." Damayanti et al., Limited impact of diesel particle filters on road traffic emissions of ultrafine particles, https://www.sciencedirect.com/science/article/pii/S0160412023001617). DPFs were also found to increase MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) cytotoxicity compared to non-DPF sources (https://www.sciencedirect.com/science/article/abs/pii/S0269749118332135) - see attachment "CytotoxicityPAHsVariousSources.png". [EPA-HQ-OAR-2022-0829-0518, p. 1]

Multiple vehicle owners have also reported frequent breakdowns as a result of clogged or otherwise-defective particulate filters, while others have experienced vehicle fires (https://dieselnet.com/news/2011/10cleaire.php) and even explosion hazards (https://www.worksafebc.com/en/resources/health-safety/risk-advisory/explosion-or-fire-from-diesel-particulate-filter-dpf-systems?lang=en) as a result of them. This should trigger a prohibition on the use of such filters, as the Clean Air Act prohibits the EPA from considering any control technologies that pose safety hazards; this rule may be struck down if such controls are considered in light of their safety hazards. [EPA-HQ-OAR-2022-0829-0518, p. 1]

It is also worth mentioning that exhaust filters do nothing to address emissions from tires, which are not covered by this proposed rulemaking. [EPA-HQ-OAR-2022-0829-0518, p. 1]

Once again, I reiterate my stance that while PM emissions can and must be reduced as much as possible, the agency should NOT consider - let alone mandate - the use of exhaust particulate filters on new internal-combustion engines. The agency should explore alternative methods for reducing PM emissions instead, including mandatory electric-vehicle sales quotas and tire-design requirements in future rulemakings. [EPA-HQ-OAR-2022-0829-0518, p. 1]

Organization: District of Columbia Department of Energy and Environment (DOEE)

Ultimately, none of the proposed EPA standards are sufficiently protective to promote the health and safety of District residents or achieve clean air in the District as there is no safe level of exposure to vehicle emissions and particulate matter (PM). The Union of Concerned Scientists (UCS) states that, [EPA-HQ-OAR-2022-0829-0550, p. 2]

Passenger vehicles are a major pollution contributor, producing significant amounts of nitrogen oxides, carbon monoxide, and other pollution. In 2013, transportation contributed more than half of the carbon monoxide and nitrogen oxides, and almost a quarter of the hydrocarbons emitted into our air.1 [EPA-HQ-OAR-2022-0829-0550, p. 2]

1 Union of Concerned Scientists. Vehicles, Air Pollution, & Human Health. https://www.ucsusa.org/resources/vehicles-air- pollution-human-health

Organization: Environmental. and Public Health Organizations

B. Emissions of criteria pollutants from light- and medium-duty vehicles harm the public health.

EPA's proposed reductions of non-methane organic gases ("NMOG") plus NOx, as well as particulate matter, are crucial to protecting the public from harmful air pollutants. As EPA notes, "[e]mission sources impacted by [its] proposal, including vehicles and power plants, emit pollutants that contribute to ambient concentrations of ozone, PM, NO2, SO2, CO, and air toxics."67 These pollutants are linked to premature death, respiratory illness (including childhood asthma), cardiovascular problems, and other adverse health impacts. In particular, NOx emissions increase levels of ozone, because ground-level ozone forms when there are high concentrations of ambient NOx and VOCs, and when solar radiation is high.68 NOx emissions also impact particulate matter by forming secondary particles through atmospheric chemical reactions.69 Reductions in NOx emitted from LDVs will therefore result in reduced ambient levels of ozone and PM and improved health and environmental outcomes. [EPA-HQ-OAR-2022-0829-0759, p. 17]

67 88 Fed. Reg. at 29211.

68 Am. Lung Ass'n, State of the Air 2023 Report (2023) at 26, https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf.

69 DRIA at 7-10.

Air pollution has become so significant that the public health burdens attributable to air pollution are "now estimated to be on a par with other major global health risks such as unhealthy diet and tobacco smoking, and air pollution is now recognized as the single biggest environmental threat to human health."70 Researchers at the University of Chicago studied the impact of air pollution on life expectancy and found that "the impact of particulate pollution on life expectancy is comparable to that of smoking, more than three times that of alcohol and unsafe water and sanitation, six times that of HIV/AIDS, and 89 times that of conflict and terrorism."71 [EPA-HQ-OAR-2022-0829-0759, p. 17]

70 World Health Organization (WHO), WHO Global Air Quality Guidelines (2021) at xiv, https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf.

71 Michael Greenstone, Christa Hasenkopf, & Ken Lee, Air Quality Life Index Annual Update, Energy Policy Institute at the University of Chicago (2022) at 6-7, https://aqli.epic.uchicago.edu/wp-content/uploads/2022/06/AQLI_2022_Report-Global.pdf/.

There is consistent evidence showing the relationship between short-term exposure to PM and mortality, particularly cardiovascular and respiratory mortality. Short- and long-term exposure to PM2.5 can cause harmful health impacts such as heart attacks, strokes, worsened asthma, and early death.72 In addition, short-term PM exposure has been linked to increases in infant mortality, hospital admissions for cardiovascular disease, hospital admissions and emergency visits for chronic obstructive pulmonary disease, and severity of asthma attacks and hospitalization for asthma in children. Year-round exposure to PM is associated with elevated risks of early death, primarily from cardiovascular and respiratory problems such as heart disease, stroke, influenza, and pneumonia.73 These findings show the critical need for EPA to minimize the harmful emissions from the transportation sector. Doing so will only improve public health and the environment. [EPA-HQ-OAR-2022-0829-0759, pp. 17-18]

72 See EPA, Supplement to the 2019 Integrated Science Assessment for Particulate Matter (Final Report, 2022), at ES-ii, 2-3, 2-4, https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=354490; EPA, Integrated Science Assessment (ISA) for Particulate Matter (Dec. 2019), https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=347534.

73 Am. Lung Ass'n, State of the Air 2023 Report (2023) at 25, https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf.

2. The proposed PM2.5 requirements are appropriate.

EPA is also proposing to set a limit on the allowable particulate matter (PM2.5) emissions from all LDVs. This is an appropriate step under the Agency's authority and is well-grounded in both the need for additional emissions reductions and technical feasibility. [EPA-HQ-OAR-2022-0829-0759, p. 55]

Stoichiometric gasoline direct-injection is deployed in over half the new vehicle fleet in the United States and supports the deployment of turbocharged, downsized engines as well as high-compression ratio engines, both of which are key technologies to reduce GHG emissions.142 At the same time, moving from port-fuel injection to direct-injection leads to an increase in both the amount of PM2.5 and the particle count.143 Addressing PM2.5 emissions from the vehicles deploying these technologies is critical as they become a larger share of the on-road fleet. [EPA-HQ-OAR-2022-0829-0759, p. 56]

142 See U.S. EPA, The 2022 Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology Since 1975, EPA-420-R-22-029 (Dec. 2022), Chapter 4, available at https://www.epa.gov/automotive-trends/download-automotive-trends-report.

143 Omar I. Awad, et al, Particulate emissions from gasoline direct injection engines: A review of how current emission regulations are being met by automobile manufacturers, Sci. Total Env. 718, 137302 (2020), at https://doi.org/10.1016/j.scitotenv.2020.137302 (subscription required).

Gasoline particulate filters (GPFs) have been successfully deployed globally for years to address these emissions, as EPA has documented in the Draft Regulatory Impact Analysis (DRIA).144 Additionally, in-cylinder strategies can help mitigate emissions, including through the design of both the injector and the cylinder surface.145 Aftertreatment design can also be used to mitigate cold-start emissions, in particular.146 All of the technology developments described above are well-established, and many are analogous to technologies that have been deployed to limit PM2.5 emissions from diesel engines. [EPA-HQ-OAR-2022-0829-0759, p. 56]

144 DRIA, Section 3.2.5.

145 See Awad. et al. 2020 for a review.

146 Id.

As part of its Advanced Clean Cars program, California finalized a PM2.5 standard of 1 mg/mile, to begin phasing in with the 2025 model year.147 As part of its review, the California Air Resources Board (CARB) conducted tests demonstrating the feasibility of achieving this standard, including data on particle count, GPF effectiveness, and the ability to measure sub-mg quantities of PM2.5.148 While these standards have not gone into effect, the underlying data support EPA's proposed PM2.5 program. [EPA-HQ-OAR-2022-0829-0759, p. 56]

147 Cal. Code of Regs. Tit. 13, § 1961.2(a)(2)(A).

148 For measurement capability, see CARB, An Update on the Measurement Of PM Emissions at LEV III Levels, (2015), available at https://ww2.arb.ca.gov/sites/default/files/2020-01/lev_iii_pm_measurement_feasibility_tsd_20151008_ac.pdf. For additional tests on GPF capability, see CARB, California[']s Advanced Clean Cars Midterm Review, Appendix K: PM Emission Testing Results (Jan. 8, 2017), available at https://ww2.arb.ca.gov/sites/default/files/2020-01/appendix_k_pm_test_results_ac.pdf.

The benefits of the PM2.5 standards are significant—depending on the assumed rate of deployment, EPA's Proposed Standards could cut tailpipe PM2.5 emissions by up to 90% by 2050.149 This could lead to cumulative health benefits of $85 to $160 billion over that same timeframe, at a 3% discount rate.150 Importantly, it could also lead to measurable improvements in near-roadway air quality,151 which could be significant for the more than 41 million people living within close proximity of high-traffic roadways.152 [EPA-HQ-OAR-2022-0829-0759, pp. 56-57]

149 Oak Leaf Envtl., Impacts Analysis of a Revised Federal Light-Duty On-Road Particulate Matter Standard, Prepared for the Manufacturers of Emissions Controls Association (MECA) (June 2023), at 20, Fig. 7, available at https://www.meca.org/wp-content/uploads/2023/06/LDV_PM_Standard_Final_Report_06272023.pdf.

150 Id. at 22-23, Figs. 9, 10 & "9" [Fig. 11 appears to be incorrectly labeled as Fig. 9].

151 Id. at 24, Tbl. 5.

152 88 Fed. Reg. at 26060.

2.The proposed PM2.5 requirements are appropriate.

As discussed in Section VI.F.2, proven and cost-effective technology exists to reduce tailpipe PM2.5 levels to the levels required by EPA's proposed standards. MDVs with GCWR over 22,000 pounds (see the section immediately below) will already be required to achieve similar levels of reductions under EPA's proposal to certify these vehicles under the heavy-duty engine requirements, and the data supporting the finalization of those standards include an assessment of technology improvements for both compression-ignition and spark-ignition engines supporting a technology neutral achievement of PM2.5 reductions.211 The test protocols and targets for EPA's proposed PM2.5 standards are achievable, as discussed in Section VI.F.2, and will provide significant health benefits.). [EPA-HQ-OAR-2022-0829-0759, p. 77]

211 U.S. EPA, Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards: Regulatory Impact Analysis, Sections 3.1 & 3.2, EPA-420-R-22-035 (Dec. 2022

Organization: Environmental Defense Fund (EDF) (1of 2)

Passenger vehicles also emit harmful pollutants, including fine particulate matter (PM2.5) and oxides of nitrogen (NOx). These pollutants contribute to the formation of soot and smog and contribute to elevated concentrations of pollution near roadways, where millions of people live and go to school, and people of color and people with low income are disproportionately exposed to air pollution from vehicles. [EPA-HQ-OAR-2022-0829-0786, p. 6]

Please see EDF's comments on the Proposed Rule, Revised 2023 and Later Model Year Light- Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 43726 (August 10, 2021) dated September 27, 2021, and resubmitted to this docket, for a more thorough discussion of the substantial health and environmental harms associated with the pollution and GHG emissions from passenger vehicles.1 [EPA-HQ-OAR-2022-0829-0786, p. 6]

1 EDF's comments on the Proposed Rule, Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 43726 (August 10, 2021) dated September 27, 2021, at 4-6. Accessible at https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0208-0688. (Attachment A)

B. Standards that result in use of Gasoline Particulate Filters are vital.

EDF supports the proposed PM standard of 0.5 mg/mi for light-duty vehicles and medium-duty vehicles that must be met across three test cycles (-7 °C FTP, 25 °C FTP, US06), a requirement for PM certification tests at the test group level, and a requirement that every in-use vehicle program (IUVP) test vehicle is tested for PM. EPA must ensure that the 0.5 mg/mi standard is a per-vehicle cap, not a fleet average. [EPA-HQ-OAR-2022-0829-0786, pp. 62-63]

EPA correctly relies on the availability of Gasoline Particulate Filters (GPFs) in setting its PM standard. GPFs are a highly feasible demonstrated technology with a proven track record at reducing pollution. They are already widely available, and are being put to use in other markets, including the European Union, India and China, where more stringent emissions standards have made them necessary.173 [EPA-HQ-OAR-2022-0829-0786, pp. 62-63]

173 Corning, What Emissions Regulations and Standards are Currently in Place?, https://www.corning.com/worldwide/en/products/environmental-technologies/emissions-control/emissions-regulations.html.

i. Additional reductions in PM pollution are urgently needed, especially in communities that have long faced elevated pollution burdens.

Continuing to drive criteria pollutant reductions is particularly important for low-income communities and communities of color, which have historically faced significant and elevated harms from health-harming transportation pollution. As a result of housing discrimination and other unjust policies, communities of color and low-income communities constitute a higher percentage of the population near our roads and highways and therefore suffer disproportionately from associated harmful pollution.174 According to the American Lung Association's 2023 State of the Air report, people of color are almost four times more likely to breathe the most polluted air when compared to white people.175 A report by Moving Forward Network also found that, on average, Asian and Black Americans are exposed to PM2.5 pollution that is 56 and 44 percent higher, respectively, than white Americans.176 And an EDF analysis of the Bay Area in California found that neighborhoods with higher percentages of residents of color experienced double the rate of asthma from nitrogen dioxide (NO2) –a pollutant often used as a marker for transportation-related pollution.177 Moreover, as described above, recent studies have found light- duty vehicles, including light-duty trucks are responsible for a significant share of pm- attributable premature mortalities. [EPA-HQ-OAR-2022-0829-0786, p. 63]

174 Gregory M. Rowangould, A Census of the US Near-Roadway Population: Public Health and Environmental Justice Considerations, Transportation Research Part D 25, 59-67 (2013), https://www.sciencedirect.com/science/article/abs/pii/S1361920913001107.

175 American Lung Association, State of the Air Report 2023 (2023), https://www.lung.org/getmedia/338b0c3c- 6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf. (Attachment C)

176 Jimmy O'dea, Zero-Emissions Technology for Freight: Heavy-Duty Trucks, Tools to Advocate for Zero- Emissions Technology, Moving Forward Network (2020), http://www.movingforwardnetwork.com/wp- content/uploads/2020/10/MFN_ZeroEmissionToolkit-1.pdf. (Attachment X)

177 EDF, Air Pollution's Unequal Impacts in the Bay Area (2021), https://www.edf.org/airqualitymaps/oakland/health-disparities.

Accordingly, finalizing the criteria standards EPA has proposed, including setting the PM standard at a level that will encourage the use of GPFs, is critical to protecting health and combatting environmental injustice. [EPA-HQ-OAR-2022-0829-0786, p. 63]

Organization: Ferrari N.V. and Ferrari North America, Inc.

b) Other Criteria Pollutant Standards

Under EPA's proposal, SVMs are no longer eligible for special provisions and must meet the criteria emission standards of LVMs with the same phase-in. Ferrari is concerned about the complete elimination of flexibilities granted in current US legislation (which has historically expressed EPA's recognition of the SVM challenges), and the introduction of very demanding PM standard limits. EPA is indeed proposing an 83% reduction in the PM standard (i.e. 0.5 mg/mi rather than 3 mg/mi), while also increasing the number of test procedures for which this limit is applicable. [EPA-HQ-OAR-2022-0829-0572, p. 6]

Ferrari's commitment to reducing PM emissions dates back in 2019, when Ferrari included the GPF (developed also to ensure compliance with European Regulation) in the US, gaining leadership among other manufacturers in this regard. In support of this, the best GPF technologies have already been implemented on our models, and innovative exhaust system configurations are currently being developed to meet the 1 mg/mi PM requirement in MY 20285, as required by California ACC II regulation. [EPA-HQ-OAR-2022-0829-0572, p. 6]

5 as defined in CCR, Title 13, §1961.4(d)(2)(A)(2)(c)

However, we are deeply concerned about the effectiveness of this configuration with a stricter 0.5 mg/mi PM limit, also considering the short time provided by EPA's proposal. Moreover, the measurement variabilities related to the current state of the art of certification testing measurement equipment should also be taken into account. [EPA-HQ-OAR-2022-0829-0572, p. 6]

Therefore, Ferrari suggests that EPA aligns with the current California's emission standards and related phase-in provisions for SVMs. These SVM specific flexibilities should include the possibility for small volume manufacturers to: [EPA-HQ-OAR-2022-0829-0572, p. 6]

- meet alternate fleet-average standards of 0.051 g/mi for model years 2027 through 2032; [EPA-HQ-OAR-2022-0829-0572, p. 6]

- benefit from an alternative phase-in, which allows SVMs to defer 100% compliance with regulatory requirements at the end of the phase-in period granted to LVMs; [EPA-HQ-OAR-2022-0829-0572, p. 6]

- certify vehicles according to BIN 125 until MY 2032. [EPA-HQ-OAR-2022-0829-0572, p. 6]

We strongly believe that an alignment with ACC II criteria emissions standards would allow manufacturers to focus appropriate resources on zero emissions technologies. [EPA-HQ-OAR-2022-0829-0572, p. 6]

Organization: Ford Motor Company

Second, to ensure the final rule does not go too far and too fast, especially in 2027 – 2029, the EPA should adjust two aspects of the proposal regarding criteria emissions: fuel enrichment and particulate matter testing obligations. Although fuel enrichment can lead to higher emissions during brief and infrequent conditions which are disclosed to the EPA, fuel enrichment has been critical for overall emissions reductions. The practice enables automakers to downsize engines while also meeting consumer needs for some of the toughest jobs, without compromising powertrain durability. Removing fuel enrichment, as EPA has proposed, will directly impact customers' acceptance of new products, especially trucks, and they may keep their existing vehicle longer or opt for a larger (i.e., higher emitting) vehicle to be sure they can get the job done. Major powertrain redesigns would be needed to recover this lost utility, and these are not possible within the timeframe defined by the enrichment phase-out proposed by EPA. Next, although Ford supports aspects of EPA's proposed particulate matter (PM) standards which will necessitate the use of gasoline particulate filters, the proposed PM standard will challenge current laboratory equipment and procedures. Ford requests that the EPA eliminate the need to measure PM on the -7°C FTP for vehicles that are equipped with gasoline particulate filters. [EPA-HQ-OAR-2022-0829-0605, p. 3]

Light- and Medium-Duty PM Standards

Ford understands EPA's rationale in proposing a 0.5 mg/mi PM exhaust emission standard across the light-duty and medium-duty vehicle classes that would require gasoline particulate filters (GPFs). Ford does not oppose such a requirement if properly timed and implemented in a way that avoids undue test burden and costs, particularly during the early years of the transition to electrification. [EPA-HQ-OAR-2022-0829-0605, p. 13]

Ford does not support the newly proposed -7°C FTP PM testing requirement. Ford does not believe that the real-world environmental benefits justify the added development and certification test burden that accompanies such a requirement. Environmental test cells are already a facility bottleneck for OEMs, are prohibitively expensive to construct, and are not typically designed or instrumented to conduct gravimetric particulate matter testing. [EPA-HQ-OAR-2022-0829-0605, p. 13]

Furthermore, Ford believes that the benefit of requiring such testing on vehicles equipped with GPFs is de minimis given that the effectiveness of a given GPF technology will be sufficiently demonstrated on the 25°C FTP and US06 test cycles. Therefore, Ford recommends that EPA exempt GPF-equipped vehicles from the -7°C FTP testing requirement. [EPA-HQ-OAR-2022-0829-0605, p. 13]

Additionally, the proposed EPA standard will be at the edge—if not beyond—the capability of existing laboratory equipment and test processes capability. We recommend that EPA consider instituting additional measures to mitigate laboratory measurement variability including allowing re-tests for exceedances during certification, confirmatory and in-use testing. Ford would also like to work with EPA to determine if there is a role for limited application of particulate number measurements to help reduce the variability and test burden concerns related to the new PM standards. [EPA-HQ-OAR-2022-0829-0605, p. 13]

Finally, Ford recommends that EPA defer the phase-in requirement of the new PM standards to starting in 2029MY, consistent with the Ford recommendation for the new fuel enrichment requirements. [EPA-HQ-OAR-2022-0829-0605, p. 13]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG emphasizes hardware changes will be necessary for the proposed 0.5mg/mi PM standard, and there will be packaging modification of after-treatment hardware to allow the addition of GPF and pressure sensors. Engine calibration will be required to account for increased backpressure. In fact, HMG estimates that just the additional hardware (cc-GPF, catalyst, sensors, valves, etc.) needed to comply with Tier 4 requirements will range from $500-$800 USD per vehicle. This estimated increase solely accounts for material costs, and does not include the additional costs involved with investments in technology development of the new hardware. The resources required to develop Tier 4 compliant hardware for ICE vehicles will unfortunately be moved away from ZEV development, and the vehicle cost increases caused by these additional components will undoubtedly increase ICE vehicle prices and delay advances in

ZEVs. This is a significant unintended negative consequence of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0554, p. 5]

Finally, HMG is concerned that the global GPF market will be unable to meet increased demand for all original equipment manufacturers (OEMS) to meet this proposed PM requirement, with downstream consequences not for just HMG and other manufacturers, but also for customers and the market more broadly. [EPA-HQ-OAR-2022-0829-0554, p. 5]

Finally, the presence of accumulated PM in the vehicle exhaust system poses a significant challenge in demonstrating regulatory compliance during in-use emission tests. HMG' s thorough investigations have revealed that PM deposits in the vehicle exhaust systems accumulate over time and are subsequently released during aggressive in-use emission tests (US06 for example), resulting in an appearance of a non compliance condition. In-use PM testing without pre-conditioning will yield results that are not representative of the actual PM generated by combustion. [EPA-HQ-OAR-2022-0829-0554, p. 8]

In order to meet the increasingly stringent Tier 4 PM regulations, we strongly recommend that EPA incorporate an additional optional preparation driving mode, such as performing the US06 mode multiple times, prior to conducting the emission testing. This proposal is based on extensive testing and repeated experiments that have consistently demonstrated a noteworthy reduction in PM levels when this approach is implemented. By adopting this crucial change in the testing procedure, we can mitigate inaccurate and unreliable results, thus better confirming compliance with the regulations. [EPA-HQ-OAR-2022-0829-0554, p. 8]

HMG is concerned about the measurement accuracy and repeatability of the proposed 0.5 mg/mi for PM, and therefore opposes the PM requirements at -7°C conditions, or, in the alternative, proposes that at a minimum, vehicles equipped with gasoline particulate filters (GPF) should be exempt from the requirement. There is limited data available on the feasibility of accurately and repeatedly measuring PM at less than 0.5 mg/mi. HMG's own study reveals a test-to-test variation of up to 0.2 mg/mi in PM measurement repeatability, indicating that the proposed standard of 0.5 mg/mi is overly strict. [EPA-HQ-OAR-2022-0829-0554, p. 5]

Additionally, the environmental chamber needed for -7°C FTP testing presents several challenges that will render complying with the proposed PM standard extremely difficult. One major difficulty is that a test facility suitable for the -7°C FTP testing requirements would not be ready before CY2025, one year after the start of development of software and hardware that would comply with the new PM standard. Other issues related to the -7°C FTP are: [EPA-HQ-OAR-2022-0829-0554, p. 5]

Only a fraction of HMG's emission test cells are climate chambers capable of running the -7°C FTP [EPA-HQ-OAR-2022-0829-0554, p. 5]

Under low-temperature conditions, phenomena such as condensation, freezing, and contamination in the sample line and dilution tunnel can reduce accuracy and repeatability of PM filter weighing capability . [EPA-HQ-OAR-2022-0829-0554, p. 5]

It is very difficult to measure PM reliably. Compared to the 25°C FTP, measuring PM on the -7°C FTP test has greater test-to-test variability and will reduce dyno usage efficiency with frequent cleaning to prevent PM accumulated in the equipment from biasing the vehicles ' results. [EPA-HQ-OAR-2022-0829-0554, p. 5]

Significant investment would be required to update measurement systems required to determine compliance with the -7°C FTP testing, with extended lead-time required to complete the changes that are not available given the Proposed Rule's current compliance schedule. Again, these investments will also divert funds and chambers from electrification for little short-term gain. [EPA-HQ-OAR-2022-0829-0554, p. 5]

Due to the higher exhaust temperatures in gasoline engines, HATCI expects active regeneration frequency to be much lower than on diesel engines. As a result, the Infrequent Regeneration Adjustment Factor (IRAF) will be insignificant relative to the baseline emissions. EPA should provide exemption allowances with specific guidance on how to determine if gasoline IRAF is needed and requirements for calculating it to ensure clarity. [EPA-HQ-OAR-2022-0829-0554, p. 9]

Organization: International Council on Clean Transportation (ICCT)

For particulate matter emissions, ICCT strongly support's EPA's proposed PM limit. Fine particulate matter (PM2.5) emissions from vehicles are a major environmental health hazard, and setting a more stringent PM emissions limit is critical for protecting public health. We support EPA's proposed multipollutant rule that sets the PM limit at 0.5 mg/mile on all test cycles with the addition of the cold temperature FTP test cycle, which would help to greatly reduce tailpipe PM emissions from new gasoline vehicles. Based on our review of recent evidence of increasing PM emissions from recent model year gasoline light-duty vehicles and trucks, we find an urgent need to implement a stronger PM standard. Due to the urgent need to address the rise in PM emissions with recent gasoline vehicles, we recommend EPA adopt the accelerated phase-in pathway for the PM standard. [EPA-HQ-OAR-2022-0829-0569, p. 5]

Particulate matter emission [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

Recent trends in gasoline light-duty PM emissions [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

ICCT strongly support's EPA's proposed PM limit. Fine particulate matter (PM2.5) emissions from vehicles are a major environmental health hazard, and setting a more stringent PM emissions limit is critical for protecting public health. EPA's proposed multipollutant rule sets the PM limit at 0.5 mg/mile on all test cycles with the addition of the cold temperature FTP test cycle, which would help to greatly reduce tailpipe PM emissions from new gasoline vehicles. In this section, we review recent evidence of increases in PM emissions from recent model year gasoline light-duty vehicles and trucks, highlighting the urgent need to implement a stronger PM standard. [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

A recent ICCT analysis looking at remote sensing data shows that, for recent model years, light- duty vehicles and trucks show an increase in UV smoke, a proxy for PM.117 While gasoline light- duty vehicles' and trucks' tailpipe carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NOx) measured by remote sensing show clear and consistent downwards trends, UV smoke averages increase starting from model years 2015–2020 (Figure 13). For 2020 model year vehicles, the UV smoke fleet average is similar to that of 2005 model year vehicles, compared to the other three pollutants, which show a 66%–86% decrease from 2005 to 2020 model year vehicles. [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

117 Particulate matter mass emissions are not measured directly by remote sensing systems; instead, a measurement of UV smoke is recorded as a ratio of exhaust plume opacity measured at a wavelength of 230nm to fuel burned. UV smoke measurements are then used as a proxy for PM emissions to assess long-term relative trends. More detail is available in Meyer, M., Khan, T., Dallmann, T., Yang, Z. Particulate matter emissions from U.S. gasoline light-duty vehicles and trucks: TRUE Initiative U.S. remote sensing database case study. ICCT, June 2023. https://theicct.org/publication/true-pm-emissions-jun23/

SEE ORIGINAL COMMENT FOR Figure 13. Percent change in distance-specific emissions for various pollutants by model year for LDV and LDT combined, compared to model year 2005. Shaded region shows the 95% confidence interval. [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

The observed increase in model year average UV smoke levels is connected to a shift in fuel injection technologies. Gasoline Direct Injection (GDI) technology was first introduced to the U.S. LDV market in 2008 and gained momentum relatively quickly, largely due to the higher fuel efficiency and power compared to conventional port fuel injection (PFI) vehicles.118 As of 2021, GDI vehicles represent approximately 53% of the US LDV market. [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

118 U.S. EPA. (2022, December). The 2022 EPA Automotive Trends Report. https://www.epa.gov/system/files/documents/2022-12/420r22029.pdf

Early GDI vehicles (model years 2008-2014) showed at least 2 times higher PM emissions compared to PFI vehicles.119 This issue of elevated PM emissions from GDI vehicles and the need for more stringent regulation of PM emissions has been identified since before EPA finalized its Tier 3 standards in 2014.120 Recent analysis of remote sensing data adds to this evidence, showing that for 2015–2020 model year vehicles, the models showing UV smoke levels above the fleet average are predominantly GDI vehicles.121 [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

119 Georges Saliba et al Comparison of Gasoline Direct-Injection (GDI) and Port Fuel Injection (PFI) Vehicle Emissions: Emission Certification Standards, Cold-Start, Secondary Organic Aerosol Formation Potential, and Potential Climate Impacts. (2017).Environmental Science & Technology 51, no. 11: 6542–52, https://pubs.acs.org/doi/10.1021/acs.est.6b06509

120 Gladstein, Neandross & Associates. (2013). Ultrafine Particulate Matter and the Benefits of Reducing Particle Numbers in the United States. https://cdn.gladstein.org/pdfs/MECA_UFP_White_Paper_0713_Final.pdf.

121 Meyer, M., Khan, T., Dallmann, T., Yang, Z. (2023) Particulate matter emissions from U.S. gasoline light-duty vehicles and trucks: TRUE Initiative U.S. remote sensing database case study. International Council on Clean Transportation. https://www.trueinitiative.org/data/publications/particulate-matter-emissions-from-us-gasoline-light- duty-vehicles-and-trucks

Additionally, chassis dynamometer measurements based on the U.S. EPA's certification tests database122 combined with information from the U.S. Department of Energy fuel economy test database123 demonstrate that PM emissions from GDI vehicles are higher than the PFIs on FTP cycle. An analysis by manufacturer for model years 2019–2023, shows that for most of the manufacturers that have sales for both GDI and PFI vehicles, GDIs have significantly higher PM emissions than PFIs on average (Table 9). On the FTP cycle, GDI vehicles emitted 62%–490% higher average emissions than PFI vehicles of the same manufacturer; on the US06 cycle, GDI vehicles emitted 16% lower to 130% higher average emissions than PFI vehicles of the same manufacturer.124 [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

122 U.S. EPA. Annual Certification Data for Vehicles, Engines, and Equipment Data and Tools. https://www.epa.gov/compliance-and-fuel-economy-data/annual-certification-data-vehicles-engines-and-equipment

123 U.S. Department of Energy, Fuel Economy Guide Datafile. (2022) https://www.fueleconomy.gov/feg/download.shtml

124 Meyer, M., Khan, T., Dallmann, T., Yang, Z. (2023). Particulate matter emissions from U.S. gasoline light-duty vehicles and trucks: TRUE Initiative U.S. remote sensing database case study. International Council on Clean Transportation. https://www.trueinitiative.org/data/publications/particulate-matter-emissions-from-us-gasoline-light- duty-vehicles-and-trucks

SEE ORIGINAL COMMENT FOR Table 9. Average PM emissions (mg/mile) for GDI and non-GDI vehicles by manufacturer for 2019-2023 model year vehicles [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

Additionally, an analysis of certification test data across all light-duty vehicles shows that PM emissions from GDI vehicles have been reducing over the years; however, they still emit higher PM than PFI vehicles on FTP cycle (Figure 14). For 2023 model year vehicles, GDI vehicles emit on average about 3 times more PM emissions than the PFI vehicles on FTP cycle. For both cycles, the trajectory of average PM emissions for GDI vehicles flattens out over the last few years, suggesting that PM emissions from GDIs will not likely reduce substantially any further without the adoption of more stringent emission standards. [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

SEE ORIGINAL COMMENT FOR Figure 14. Trend of average PM emissions for US LDV based on EPA certification database for GDI and PFI vehicles under the FTP and US06 regulatory cycles. [EPA-HQ-OAR-2022-0829-0569, pp. 47-50]

Evaluation of proposed PM standard [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

The real-world and laboratory test data analyses presented above show the issue of increased PM emissions from GDI vehicles, highlighting the need for a more stringent standard than the current Tier 3 standard to prevent a continued increase in PM emissions. EPA’s proposal for PM standards aligns with this finding; we strongly support the proposed stringency level of 0.5 mg/mile on all test cycles and the addition of the cold temperature FTP test cycle for regulating PM emissions. [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

Table 10 shows that EPA’s proposed limit for PM emissions is more stringent than the California’s most recently enacted LEV IV standards and, also, numerically lower than the proposed Euro 7 standards in EU and the existing standards in China and India. However, EU, China, and India have the additional particle number (PN) standards to regulate the ultrafine particulates. [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

SEE ORIGINAL COMMENT FOR Table 10. Existing or proposed particulate emissions regulations across regions for gasoline vehicles. [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

125 Bui, A., Hall, D., and Searle, S. (2022). Advanced Clean Cars II: The next phase of California’s Zero-Emission Vehicle and Low-Emission Vehicle regulations. International Council on Clean Transportation. https://theicct.org/publication/accii-zev-lez-reg-update-nov22/

126 Dornoff, J. (2023). How to make Euro 7 more effective: an analysis of the European Commission’s proposal for light- and heavy-duty vehicles. International Council on Clean Transportation. https://theicct.org/publication/euro7-analysis-recommendations-jan23/

127 TransportPolicy.net. China: Light-duty: Emissions. https://www.transportpolicy.net/standard/china-light-duty- emissions/

128 TransportPolicy.net. India: Light-duty: Emissions. https://www.transportpolicy.net/standard/india-light-duty- emissions/

The PN limits in the EU, China, and India regulations, combined with the particle mass limit, effectively regulate both fine particulates (PM2.5) as well as ultrafine particulates (PM0.1).129 These particles, less than 100 nm in size, have been found to be even more dangerous to human health than PM2.5, as they can be inhaled deeper into the lungs, increasing the chances of particles to entering the bloodstream.130 Part of the motivation for the stringent particulate regulations in the EU and China has been the uptake of GDI vehicles, as GDIs have been found to emit more ultrafine particulates down to a size of 23 nm and can emit even smaller particles (sub 23 nm).131 [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

129 Felix Leach et al. (2021). A Review and Perspective on Particulate Matter Indices Linking Fuel Composition to Particulate Emissions from Gasoline Engines. SAE International Journal of Fuels and Lubricants 15, no. 1: 3–28 https://doi.org/10.4271/04-15-01-0001

130 https://doi.org/10.1038/s12276-020-0403-3

131 Barouch Giechaskiel, Urbano Manfredi, and Giorgio Martini. (2014). Engine Exhaust Solid Sub-23 Nm Particles: I. Literature Survey," SAE International Journal of Fuels and Lubricants 7, no. 3: 950–64, https://saemobilus.sae.org/content/2014-01-2834/ https://op.europa.eu/en/publication-detail/-/publication/6fd483af-5f1a-11ed-92ed-01aa75ed71a1/language-en

While EPA's proposed standard does not include a particle number limit, the stringency of the PM emission standard will help address both PM2.5 and PM0.1 through the implementation of gasoline particulate filters (GPFs). EPA suggests that the proposed PM emissions limit, particularly for the cold FTP test, will likely force the installation of gasoline particulate filters (GPF).132 Studies have demonstrated the effectiveness of GPFs for reducing both PM and PN emissions, showing that GPFs can reduce PM emissions by 97% to 100% and PN emissions by 80% to 99% compared to vehicles without GPFs.133 Other major vehicle markets, including the EU and China, have already begun adopting GPFs to meet stringent particulate emission standards, and the proposed standard would help the US vehicle market follow suit. The European Commission (2022) reported that the Euro 6d standards, which has led to the near-universal adoption of GPFs to meet the PN limits for GDI vehicles, reduced the real-world emission factors of exhaust particles by about 86% compared to Euro 5 compliant vehicles.134 The assessment also reported a typical reduction level of PN emissions by 70% to 80% for a Euro 6 GDI installed with a GPF and tested on the Real-Driving Emissions (RDE) test route. [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

132 Felix Leach et al. (2021). A Review and Perspective on Particulate Matter Indices Linking Fuel Composition to Particulate Emissions from Gasoline EnginesSAE International Journal of Fuels and Lubricants 15, no. 1: 3–28, https://doi.org/10.4271/04-15-01-0001

133 Felix Leach et al. (2021). A Review and Perspective on Particulate Matter Indices Linking Fuel Composition to Particulate Emissions from Gasoline Engines," SAE International Journal of Fuels and Lubricants 15, no. 1: 3–28, https://doi.org/10.4271/04-15-01-0001.; Jiacheng Yang et al. (2018). Gasoline Particulate Filters as an Effective Tool to Reduce Particulate and Polycyclic Aromatic Hydrocarbon Emissions from Gasoline Direct Injection (GDI) Vehicles: A Case Study with Two GDI Vehicles. Environmental Science & Technology 52, no. 5: 3275–84. https://doi.org/10.1021/acs.est.7b05641

134 European Commission. (2022, October). Euro 6/VI evaluation study: Annexes 1-6.

GPFs are cost-effective devices, with per vehicle manufacturing cost of $51–$166 based on EPA estimates and $50–$184 based on other independent studies.135 Based on the European Commission's Euro 6/VI assessment, the incremental increase in technology cost per vehicle for Euro 6 standards compared to Euro 5 was estimated at $92–$113 for the addition of GPF along with lambda and pressure sensors (currency converted to U.S. dollars, 1 Euro = 1.10 US$ as of June 21, 2023).136 Thus, EPA's proposed PM standard would provide large health benefits through reduced fine and ultrafine particulate matter emissions with a relatively low added manufacturing cost. This is in line with the European Commission's finding that the Euro 6 benefits from PM and PN emissions reduction were significantly higher than the added cost for GPF per vehicle.137 [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

135 Minjares, R and Posada Sanchez, F. (2011). Estimated cost of gasoline particulate filters. International Council on Clean Transportation. https://theicct.org/publication/estimated-cost-of-gasoline-particulate-filters/; Steininger. (2011). Particle number emission limits for Euro 6 positive ignition vehicles. https://www.nanoparticles.ch/archive/2011_Steininger_PR.pdf

136 European Commission. (2022, October). Euro 6/VI evaluation study: Annexes 1-6. https://op.europa.eu/en/publication-detail/-/publication/a9a2eadb-5f1d-11ed-92ed-01aa75ed71a1/language-en

137 ibid

Testing of recent European petrol cars provides evidence that the proposed PM limit is achievable. Cars certified to recent Euro standards have showed PM levels close to the proposed US 0.5 mg/mile limit. ADAC, a German automobile association, conducted laboratory tests, which showed that out of 177 gasoline vehicles certified to Euro 6d-TEMP and Euro 6d standards, 74 vehicles, or 42%, showed PM emissions below 0.5 mg/mile.138 Additionally, the UK Department for Transport conducted laboratory testing of five 2019 model year petrol vehicles.139 Under the hot start Worldwide Harmonized Light Vehicles Test Cycle (WLTC) test, the cars emitted 0.09–0.28 mg/km (0.14–0.45 mg/mile), all below 0.5 mg/mile. Under the cold start WLTC test, the cars emitted 0.16–0.446 mg/km (0.26–0.72 mg/mile); two cars emitted under 0.5 mg/mile, and the other three showed PM emissions of no more than 44% above 0.5 mg/mile. Although these results are not directly comparable to the US standard due to differences in test cycles (WLTC instead of FTP and US06), this evidence demonstrates that there already exist vehicles with PM emissions levels similar to the proposed US PM limit. [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

138 These results are based on averages of three tests: hot start Worldwide Harmonized Light Vehicles Test Cycle (WLTC), cold start WLTC, and BAB 130, which is ADAC's highway cycle. Data was kindly provided by ADAC via email correspondence (2023).

139 Department for Transport. (2023). Vehicle Market Surveillance Unit: Results of the 2020 programme. (London, UK). https://www.gov.uk/government/publications/vehicle-market-surveillance-unit-programme-results- 2020/vehicle-market-surveillance-unit-results-of-the-2020-programme#results-petrol-cars

We support the EPA's accelerated phase-in option for PM standards relative to other pollutants, particularly considering evidence of rising gasoline light-duty vehicle and truck PM levels. Analysis of remote sensing UV smoke measurements as a proxy for PM shows that reductions since 2005 model year vehicles have been virtually eliminated due to an increase from 2015 to 2020 model year vehicles. Therefore, it is critical that a more stringent PM standard is implemented as soon as possible to drive the uptake of GPFs. GPFs are at a mature phase and in large-scale production in several vehicle markets and thus would be feasible to implement according to EPA's outlined accelerated timeline, which would phase-in the proposed PM standards for 50% or 80% of the manufacturer's fleet by 2027 and 100% by 2028. Due to the urgent need to address the rise in PM emissions with recent gasoline vehicles, we recommend EPA to adopt the accelerated phase-in pathway for the PM standard. [EPA-HQ-OAR-2022-0829-0569, pp. 50-53]

Health benefits and environmental justice modeling recommendations [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

In evaluating the health benefits of the proposed rule, it is critical to consider the evidence of increases in PM from recent model year vehicles. The health benefits assessment included in EPA's proposal uses emission factors from MOtor Vehicle Emission Simulator (MOVES), which likely underestimates PM emissions from recent model year vehicles. Figure 15 shows a comparison between EPA MOVES emission factors and remote sensing UV smoke averages by model year, shown as a percent change from each sources respective model year 2005 averages.140 From model years 2006–2015, year-to-year changes, shown in the slopes of the lines, are relatively consistent between EPA MOVES and remote sensing data. However, from model year 2015 on, the trends diverge. For light-duty passenger trucks, the EPA MOVES PM emission factors sharply decline while the remote sensing data show an increase in UV smoke averages.141 Though less significant, a similar trend is observed for passenger cars, with the EPA MOVES PM emission factor continuing to decline after 2015 and remote sensing UV smoke averages showing a slight increase. These findings suggest that the modeled air quality and health benefits of the proposed rule may be underestimated when considering the large benefits of replacing 2015–2020 model year vehicles with future vehicles meeting the proposed PM emission limits. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

140 EPA MOVES emission factors are converted from fuel-specific to distance-specific emission factors for this comparison. This is done using real-world fuel economy data from EPA Automotive Trends report, the same source used to convert the remote sensing emissions from fuel-specific to distance-specific.

141 Light-duty passenger truck emission trends from EPA MOVES are compared to light-duty truck (LDT) emission trends from remote sensing data. Similarly, passenger car emission trends from EPA MOVES are compared to light-duty vehicle (LDV) emission trends from remote sensing data.

SEE ORIGINAL COMMENT FOR Figure 15. Percent change in distance-specific PM emission factor from EPA MOVES and remote sensing (RS) UV smoke measurements from Colorado (CO) and Virginia (VA) sources by model year, compared to model year 2005. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

Additionally, a full assessment of relative air quality and health benefits across demographics, as done for the heavy-duty multi-pollutant rule, is recommended for this light-duty and medium-duty multi-pollutant rule. It is widely understood that heavy-duty vehicles contribute to racial disparities in exposure to air pollution, and EPA reported the projected air quality impacts across demographics in their finalized heavy-duty multi-pollutant rule. Inequities in air pollution exposure exist for light-duty vehicle emissions as well. One study finds that on a national level, people of color are exposed to 46% more ambient PM2.5 from light-duty gasoline vehicles than White people.142 This is a greater disparity than that of HDVs; the same study finds that people of color exposed to 35% higher ambient PM2.5 levels from heavy-duty diesel vehicles compared to White people. Additionally, the health benefits from the heavy-duty multipollutant rule, as projected by the EPA, are on similar scales to that of the proposed light-duty and medium-duty vehicle rule.143 Thus, as the environmental justice and health implications of the light-duty and medium-duty vehicle rule are significant, a full assessment of the projected distribution of changes in PM2.5 and ozone concentrations by geography, race/ethnicity, and income is recommended for the finalized rule. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

142 Tessum, C et al. (2021). PM2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States," Science Advances 7, no. 18: eabf4491, https://doi.org/10.1126/sciadv.abf4491.

143 EPA's proposed light-duty and medium-duty rule is estimated to result in $63 billion and $280 billion (for 7% and 3% discount rates, respectively) in total monetized health benefits from 2027 to 2055. EPA's finalized heavy-duty multipollutant rule is projected to result in $53–150 billion and $91–260 billion (for 7% and 3% discount rates, respectively) in total monetized health benefits from 2027 to 2045.

Organization: John Graham

The heavier weight of BEVs not only increases cost, but also generates higher tire wear and brake wear particulate emissions. These impacts were not considered in the proposed rule.32 [EPA-HQ-OAR-2022-0829-0585, p. 21]

32 DRIA Section 9.6 page 9-26 states only, "Using the miles traveled (for tailpipe, tire wear and brake wear emissions) and liquid fuel consumed (for evaporative and fuel spillage emissions), we can then generate sets of emission rates for use in OMEGA." This suggests that weight was not a factor in evaluating tire wear and brake wear emissions.

Organization: Kia Corporation

Kia Urges PM Standards to Align with CARB's PM Emissions Standards Under ACC II

Kia does not support a more stringent PM standard of 0.5 mg/mi that must be met across three test cycles (25 °C Federal Test Procedure (FTP), US06, -7 °C FTP) and is required to be met as a per-vehicle cap, not a fleet average.17 EPA's proposal of 0.5 mg/mi per-vehicle cap will require a gasoline particulate filter (GPF) on every vehicle. Because GPF technology will be necessary for meeting the proposed PM standard, OBD monitoring of the GPF system will be required to detect GPF malfunctions, store trouble codes, and alert operators.18 [EPA-HQ-OAR-2022-0829-0555, pp. 10-11]

17 88 Fed. Reg. 29,264.

18 88 Fed. Reg. 29,269.

Kia strongly urges EPA to align with CARB's PM standards adopted under the ACC II (i.e., LEV program. Kia recommends eliminating the -7°C FTP requirement because it unnecessarily adds to automakers' testing burden, requires large investments, and upgrades, and reduces test validity rate. [EPA-HQ-OAR-2022-0829-0555, pp. 10-11]

Kia understands the importance of PM standards and has invested significantly over the years to ensure our vehicles meet the PM standards that result in 90 percent reduction in PM emissions – from 10 mg/mi to just 1 mg/mi in MY2028. CARB evaluated for years increasing the stringency of their PM standard but decided against it when finalizing a PM standard for ACC II. EPA's proposed PM standard of 0.5 mg/mile is beyond expectation for automotive manufacturers and emissions labs. The emissions labs across the industry are still learning how to accurately measure PM at the 3 mg/mile standard due to the uncertainty involved in all the processes leading to final PM results in mg/mile. [EPA-HQ-OAR-2022-0829-0555, pp. 10-11]

Kia is concerned about the feasibility and repeatability of the measurement accuracy of the proposed 0.5 mg/mi standard. Because of these challenges there will also be challenges and additional cost of OBD-II diagnostic development, implementation, and calibration for meeting the standards. Consequently, Kia recommends considering laboratory PM measurement variability and allowing re-test for exceedances during certification, confirmatory or in-use testing, especially for vehicles equipped with Diesel or GPFs. We urge EPA to finalize reasonable PM standards to allow automakers to focus new capital investments on the transition to vehicle electrification. [EPA-HQ-OAR-2022-0829-0555, pp. 10-11]

Kia urges EPA to adopt CARB's criteria emission standards under the ACC II (i.e., LEV IV) and, similarly, to fully harmonize its OBD-II requirements with CARB's OBD-II requirements. It is critical that the criteria emissions regulatory framework is streamlined. Again, since EPA is requiring a 10-fold increase in EV sales, EPA needs to harmonize and streamline its criteria pollutants standards as much as possible. Resources should not be diverted away from the ultimate goal – transitioning successfully to electrification. [EPA-HQ-OAR-2022-0829-0555, p. 15]

Organization: Marathon Petroleum Corporation (MPC)

EPA should better understand Particulate Matter Index (PMI) correlation by fully researching fuel distillation properties of gasolines available today to consumers. If EPA were to proceed with changes to gasoline distillation properties, this change will limit gasoline production resulting in financial impacts to consumers and refiners. [EPA-HQ-OAR-2022-0829-0593, p. 2]

Organization: Mazda North American Operations

Criteria

Mazda anticipated some changes to EPA's light duty vehicle criteria emissions (i.e., NMOG, CO, NOx, PM) requirements, particularly to align with the new changes in the California Air Resources Board's (CARB) recent Advanced Clean Cars II regulation. However, we did not expect two of the new requirements included in the proposal: the reduction of the PM standard to 0.5 mg/mile, and the ban of enrichment during normal engine operation. [EPA-HQ-OAR-2022-0829-0595, p. 3]

Reducing the PM standard to 0.5 mg/mile is excessive. There was already considerable difficulty and effort put into meeting CARB's planned 1mg/mile PM standard, and there is still uncertainty that the 0.5 mg/mile standard will be measurable using current laboratory technology. It will also make it necessary to have all vehicles equipped with Gasoline Particulate Filters (GPF) and the resulting cost and development resources that come with new hardware. CARB evaluated the PM standards in its ACC II regulation and only reduced them to 1 mg/mile for the US06 cycle. While GPFs are required in some other markets, CARB set the standards with the intention that they would only be necessary for some limited cases. [EPA-HQ-OAR-2022-0829-0595, p. 3]

The enrichment ban will significantly impact the power and robustness of current internal combustion engines and Mazda strongly opposes it. This could force manufacturers such as Mazda to develop new engine designs, or to eliminate certain powertrain or vehicle designs entirely, making it even more difficult to remain profitable at a time when exceptional investment is needed to fuel the transition to EVs and to satisfy consumer needs. Controlling unnecessary or excessive enrichment is already sufficiently covered by EPA's existing AECD certification processes. [EPA-HQ-OAR-2022-0829-0595, p. 3]

For these reasons, Mazda feels that the best course is for EPA to adopt CARB's current LEV IV requirements. Long a leader in regulations that reduce tailpipe emissions, CARB's regulation is challenging on its own and will lead to further improvements in the vehicle fleet. Taking this course will also better align EPA's regulations with CARB's. Since CARB regulations already impact about 40% of nationwide sales, this will also create economies by Mazda having to develop vehicles to only one standard for criteria emissions. In this way, more resources can be focused on the development of EV and PHEV products. [EPA-HQ-OAR-2022-0829-0595, p. 3]

Organization: MECA Clean Mobility

PM requirements should be implemented at a faster pace based on the combination of the predicted rate of electrification alongside a feasible rate of PM emission control technology implementation. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

On January 6, 2023, EPA announced its proposed decision to revise the primary (health-based) annual PM2.5 standard from its current level of 12.0 µg/m3 to within the range of 9.0 to 10.0 µg/m3. In September 2021, both the United Nations World Health Organization2 (WHO) and the Health Effects Institute (HEI) concluded that there is no identified safe threshold for PM2.5 or black carbon, at which no damage to health is observed. In particular, the HEI announced3 that a recent European study using state-of- the-art exposure methods and large cohorts in high income countries found that health impact risks were still evident at levels lower than current ambient standards for PM2.5, NO2 and O3. In particular, the study reported that the hazard ratios for natural-cause mortality remained elevated and significant for PM2.5 even when the analyses were restricted to observations below 12 µg/m.3 [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

2 World Health Organization. (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. World Health Organization. https://apps.who.int/iris/handle/10665/345329.

3 https://www.healtheffects.org/announcements/hei-study-europe-finds-evidence-health-effects-lower-levels-air-pollution

University researchers in the U.S. have reported that light duty gasoline vehicle emissions remain prominent amongst the emission source sectors that cause the largest absolute disparities for persons of color communities (POCs include Blacks, Hispanics, and Asians).4 These latest developments highlight the importance of continued tightening of the PM2.5 standards to further reduce exposure and the impacts of the remaining light duty gasoline fueled vehicles on underserved communities. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

4 https://www.science.org/doi/10.1126/sciadv.abf4491.

To meet tightening particulate standards in other global regions, including Europe, China and India, fuel injection and gasoline particulate filter (GPF) suppliers have continued to improve their commercially available technologies. In fact, nearly every European GDI engine car is currently certified with a GPF, and LDVs in Europe have been required to meet the approximate equivalent of a 0.5 mg/mile standard since 2017 due to the implementation of a particle number standard. This standard applies to nearly all driving conditions and cycles. China has gone as far as requiring all diesel and gasoline cars to be equipped with the best available control technology, based on wall flow filters, that diesels have used in the US since 2007. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

By 2023, four years ahead of the start of EPA's proposed PM limit implementation phase-in, two-thirds of the major automotive producing regions of the world will be meeting tighter PM emission standards similar to those now proposed by EPA. Recent in- use particle mass measurements made from four equivalent vehicle pairs compliant with current U.S. and U.K. standards5 illustrate the potential particulate mass reductions that could be obtained from adopting equally protective standards as those in Europe, China and India (Figure 1) [See original comment for Figure 1. In-use Particle Mass Comparison from four equivalent vehicle pairs compliant with current U.S. and U.K.]. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

5 https://www.emissionsanalytics.com/news/the-septillion-particle-problem-literally

In addition, future Euro 7 standards are expected to further tighten the particle number limit to 1x10^11 per km (ca. <0.5 mg/mile) and regulate solid ultrafine particles down to 10 nm in diameter7 to reflect the feasibility of the control technologies. Euro 7 regulations will likely also expand the operating window to include lower temperature operation, higher altitude and towing. In anticipation of these tighter limits over extended duty operation, suppliers have improved fuel injection6,7 as well as diesel and gasoline particulate filters8 and some OEMs are already achieving these tighter limits in Europe as presented by the CLOVE consortium to the Advisory Group on Vehicle Emission Standards in 2020.9 [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

6 Yamaguchi, A., Dillner, J., Helmantel, A., Koopmans, L. et al., SAE 2023-01-0239.

7 LOW-KAME, J., Oung, R., Meissonnier, G., Da Graca, M. et al., SAE 2023-01-0284.

8 Obata, S., Furuta, Y., Ohashi, T., and Aoki, T., SAE 2023-01-0394.

9 https://circabc.europa.eu/sd/a/fdd70a2d-b50a-4d0b-a92a-e64d41d0e947/CLOVE%20test%20limits%20AGVES%202020-10-27%20final%20vs2.pdf

To highlight the air quality benefits of more stringent PM requirements, MECA funded a study10 to model the benefits of a national 0.5 mg/mile PM standard that is approximately equivalent in mass to the particle number standard in other global regions. The environmental impact of the modeled standards was evaluated for the 49-state plus District of Columbia modeling domain using EPA references and tools. The domain was divided into separate certification regions of seventeen Section 177 states (i.e., those that have adopted California standards) and thirty-two states plus DC11 subject solely to federal certification requirements. Importantly, the magnitude of the emission inventory impact of the modeled standards is significantly influenced by the degree to which the light-duty fleet becomes electrified. The rate of future-year electrification, an uncertain modeling variable, was handled as a range by defining the following 3 scenarios. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

10 https://www.meca.org/wp-content/uploads/2023/06/LDV_PM_Standard_Final_Report_06272023.pdf

11 DC enacted California standards by December 2022, after the impact assessment had commenced.

- Low range electrification was defined by the electrification forecast of new vehicle sales as completed in the Energy Information Agency (EIA) Annual Energy Outlook 2022 (AEO2022). This represents approximately 17% new vehicle sales in 2050. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

- Mid range electrification was defined by a 10 to 15-year delay in achieving the high range scenario targets (by sector) with 100% electrification of all on-road sales by model year 2060. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

- High range electrification was defined by the electrification rate if all California zero emission vehicle regulations as well as all federal executive orders and memoranda of understanding were achieved. This scenario achieves 100% electrification of all on-road sales by model year 2050 with key sector sales becoming fully electrified as early as model year 2035 (i.e., light-duty vehicles sold in the California certification region). [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

Figure 2 [See original comment for Figure 2. Annual Emission Inventory Impact] summarizes the annual PM2.5 and BC inventory impacts for the modeling domain for the years 2025 to 2060. Up to an estimated 7 and 10 thousand tons/year of BC and PM2.5 exhaust from internal combustion engine (ICE) vehicles would be eliminated in each year. In the fully phased-in fleet (i.e., CY2060), the pollutant benefits are equal to reductions in the light-duty fleet of 91 and 85% for exhaust BC and PM2.5, respectively. Moreover, the continuation of benefits to CY2060 results indicate that the environmental impact of emission controls on internal combustion engines will be significant well into the future – independent of the electrification rate scenario. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

Cumulative heath impact valuations, based on recently updated EPA data from the 2012 PM National Ambient Air Quality Standards (NAAQS) revision, are summarized in Figures 3, 4 and 5 [See original comment for Figure 3: Cumulative Impact, Low Range Electrification; Figure 4: Cumulative Impact, Mid Range Electrification; and Figure 5: Cumulative Impact, High Range Electrification] for the low, mid and high electrification scenarios, respectively. The total health valuation, due to the reduced frequency of health incidences under the modeled regulatory case, results in estimated health cost savings of between 18 billion and 163 billion dollars (cumulative through 2050). The range in total valuation is due to (1) incidence rates defined as a range, (2) the discount rate defined as a range, (3) monetary benefits by incidence defined as a range, and (4) the range in PM2.5 benefit realized by electrification rate scenario. These health cost savings come from the estimated 58 to 112 thousand tons of cumulative PM2.5 benefits under the modeled regulatory case. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

Within these PM2.5 benefits, an estimated 42 to 81 thousand tons of black carbon would be eliminated. Another way to look at the comparative cumulative benefits presented in Figures 2 and 4 suggests that deploying a regulatory control strategy that includes a combination of electric vehicle penetration and best available exhaust controls on the remaining combustion vehicles approximately doubles the PM2.5 reductions achievable by electrification alone (112 versus 58 thousand tons of PM2.5 or 81 versus 42 thousand tons of BC). [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

Given the majority of the global vehicle market has, for many years, been deploying commercially available technologies to achieve PM standards more stringent than those proposed by EPA, MECA recommends a more rapid phase-in schedule than EPA's proposed rate of 40%/80%/100% in MY 2027/2028/2029. Rather, we support a schedule of 60% in MY 2027, 90% in MY 2028 and 100% in MY 2029. The basis for this phase in rate is a combination of EPA's assumed rate of electric vehicle penetration and EPA's proposed phase-in rate for the remainder of the ICE sales fleet. In MY 2027, EPA assumes 37% BEV sales. If the remaining ICE vehicle share (63%) is multiplied by the 40% phase-in and added to the 37% BEV share, the total feasible rate of PM standard phase-in is 62.2%. In MY 2028, EPA assumes 45% BEV sales. If the remaining ICE vehicle share (55%) is multiplied by the 80% phase-in and added to the 45% BEV share, the total feasible rate of PM standard phase-in is 89%. [EPA-HQ-OAR-2022-0829-0564, pp. 5-11]

Organization: Mercedes-Benz AG

EPA has proposed to issue a near-zero Particulate Matter ("PM") standard of 0.5 mg/mile. This standard goes beyond the already challenging CARB ACCII rule which phases-in to 1.0 mg/mile. A requirement set at this level would force the incorporation of Gas Particulate Filters ("GPFs") in all vehicles, as well as required On-Board Diagnostic ("OBD") GPF monitoring. [EPA-HQ-OAR-2022-0829-0623, p. 4]

Mercedes-Benz is already developing vehicles that will meet the CARB 1.0 mg/mile PM standard and will need to pivot to design to the 0.5 mg/mile standard. Mercedes-Benz recognizes and supports EPA's goal for emissions reductions but are concerned EPA's proposed PM standard will draw funding and attention away from the electrification of our fleet. In particular, it does not allow for a GPF drop-in solution, as EPA suggests, because EPA's proposed standard, OBD requirements, and new testing requirements will require new and additional research and development in order to comply. [EPA-HQ-OAR-2022-0829-0623, p. 4]

Beyond the additional effort needed to incorporate this new GPF hardware on vehicles, there is also a challenge presented from the measurement uncertainty for PM readings during test cycles. It is also worth noting that it is difficult if not impossible to replicate EPA's test conditions, because our dynamometers and test facilities are under high usage, for multiple scenarios (i.e., development, compliance and in-use). The following diagram illustrates this difficulty with PM readings and design thresholds. The figure on the left shows constraints on vehicles' emissions under the CARB ACCII 1.0 mg/mile standard. The background noise and measurement uncertainty take up 0.19 mg/mile at the bottom of the figure while a necessary 30% engineering buffer to the standard claims another 0.3 mg/mile from the top. This leaves just 0.51 mg/mile PM that the vehicle can emit and still confidently comply with a 1.0 mg/mile standard. [EPA-HQ-OAR-2022-0829-0623, pp. 4-5]

The diagram on the right shows how this challenge is magnified under EPA's proposed 0.5 mg/mile standard. The 0.19 mg/mile variability and 30% buffer remain, but the vehicle is now left with only 0.16 mg/mile PM that it can emit and still confidently comply with the standard. Even with application of a GPF that significantly lowers PM emissions, the variability and capabilities of our laboratories to measure to 0.16 mg/mi is likely problematic without significant investments in laboratory facilities, and even new test cells. This type of investment is counter to

EPA's goals to encourage electric vehicles or the intent to provide a drop-in technology. [EPA-HQ-OAR-2022-0829-0623, pp. 4-5]

[See original for graphic on the impact of EPA's 0.5mg/mile standard on vehicles] [EPA-HQ-OAR-2022-0829-0623, pp. 4-5]

Given the difficulty of designing and testing to such a low standard, Mercedes-Benz recommends the EPA align with the CARB ACCII standards for light-duty vehicles. The LEV IV LDV PM standard provides regulatory uniformity between the agencies and aligns with industry efforts, and investments already underway to develop to this standard. [EPA-HQ-OAR-2022-0829-0623, pp. 4-5]

At such a low standard level, high dynamics of some tests and the resulting high exhaust gas mass flow can lead to other particles, such as humidity, diesel exhaust fluid (DEF), and hydrocarbon particles, collecting on the filter plate in addition to soot particles. Due to the amorphous property of soot, the highly volatile particles do not outgas during conditioning. EPA should not apply the -7°C test, which significantly increases test burden and introduces concerns with the influence of humidity on particulate matter detection. Also, this requirement does not provide any additional emissions benefits. [EPA-HQ-OAR-2022-0829-0623, pp. 18-19]

Finally, EPA should not apply the -7°C test, which significantly increases test burden but does not additional emissions benefits. [EPA-HQ-OAR-2022-0829-0623, pp. 5-6]

EPA should adopt the PM limits already established by CARB during their ACCII rulemaking. This adoption would align with research and development dollars already committed in this space, ensure inclusion of all MDV powertrains, and provide real and significant PM reductions in the MDV segment. As importantly, this alignment would also ensure MDV funding for electric vehicle development is not diverted. [EPA-HQ-OAR-2022-0829-0623, pp. 18-19]

If the agency still pursues a GPF requirement, then additional flexibility with the standard level and testing conditions is needed. First, the agency should allow manufacturers to optionally perform multiple tests to determine compliance. For example, using statistical confidence a manufacturer might run five certification tests. If the average of these five tests is below the 0.5 mg/mile standard then the vehicle is considered compliant. Outlier tests may be rejected, considered resulting from the high variability of this testing and measurement process. [EPA-HQ-OAR-2022-0829-0623, pp. 5-6]

Second, EPA should reconsider the level of the standard, taking into consideration testing variability and necessary compliance margins. The agency could also consider incorporating a Conformity Factor ("CF") into the regulation to provide flexibility accounting for the background emissions and variability in testing. As seen in the figure below, the background contamination and inherent process variability could be added to the standard, bringing the requirement up from 0.5 mg/mile + 0.19 mg/mile to ~ 0.7 mg/mile. This adjustment would provide critical compliance room in the standard, avoid costly laboratory upgrades, and more closely align to the drop-in technology solution EPA envisions. At the same, this requirement will still push GPF technologies into the U.S. market. [EPA-HQ-OAR-2022-0829-0623, pp. 5-6]

[See original for graphic on the proposed revisions to the rule] [EPA-HQ-OAR-2022-0829-0623, pp. 5-6]

Vehicles produce extra emissions during a regeneration as the filter is being purged, but this regeneration process does not occur every time a vehicle is driven. For vehicles with infrequent regeneration events, the EPA provides for the use of an Infrequent Regeneration Adjustment Factor ("IRAF"). This factor is calculated by determining the vehicle regeneration interval, or average miles driven between regenerations, and the amount of additional emissions produced during a regeneration event. Those additional emissions are then distributed across the regeneration interval to develop an emissions result for certification purposes. [EPA-HQ-OAR-2022-0829-0623, pp. 11-12]

The situation is more challenging for GPFs. The majority of PM emissions are produced during the cold start portions of testing. And in systems with close-coupled catalysts, the filter temperature is high enough to allow passive regeneration during fuel cut-off. Putting these two conditions together, a standard road cycle can result in negative soot accumulation instead of positive. Negative soot accumulation makes regenerations very rare, and thereby makes it particularly challenging to perform OBD regeneration diagnostics. [EPA-HQ-OAR-2022-0829-0623, pp. 11-12]

Mercedes-Benz requests the agency provide an exemption from both the regeneration diagnostic requirement, as well as the Additive Adjustment Factor ("AAF") for vehicles with passive infrequent regenerations. The EPA might consider reviewing the EU Commission Regulation 2017/1151,9 which exempts vehicles with regeneration intervals exceeding 4000 km from providing an AAF. It is important to note that this European requirement allows for an attestation up to 4000 km. [EPA-HQ-OAR-2022-0829-0623, pp. 11-12]

9 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02017R1151-20200125.

EPA should define IRAF for infrequently regenerating gasoline systems. This definition is critical to recognizing GPF technology functionality and providing clear direction for OBD implementation. [EPA-HQ-OAR-2022-0829-0623, p. 12]

-The agency should also provide clear definitions for both passive and active regeneration for gasoline systems, and details on how to distinguish the two. Mercedes-Benz is currently developing suggested language to provide at a later time. [EPA-HQ-OAR-2022-0829-0623, p. 12]

-While a denominator for regeneration is not needed for gasoline engines, the agency should include one for diesel engines. We suggest the agency include a 500-mile denominator for diesel engines. [EPA-HQ-OAR-2022-0829-0623, p. 12]

-EPA should provide a definition of the difference between periodically regenerating and infrequently regenerating systems, whether this be in number of miles or number of FTPs. [EPA-HQ-OAR-2022-0829-0623, p. 12]

Leaving the testing procedures to each manufacturer to define adds unnecessary complexity and may result in an unlevel playing field if different manufacturers' processes diverge. Therefore, clear definitions and procedures are essential. [EPA-HQ-OAR-2022-0829-0623, p. 12]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

6. Tier-4 criteria Pollutant Emissions

Mitsubishi echoes Auto Innovators' support for EPA's adoption of the California ACC II (i.e., LEV-IV) criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 9]

Mitsubishi supports cost-effective reductions in criterial pollutant emission from Internal Combustion Engines (ICE). However, some of EPA's proposed changes to the criteria emission standards - like the more stringent Particulate Mass (PM) and NMOG+NOx requirements and the enrichment prohibition - go above and beyond those adopted by CARB in ACC II standards. If finalized as proposed, these changes would require OEMs to divert large resources in time and capital (resources that could otherwise be directed to accelerate EV technology deployment) towards further ICE technology development and additional testing facilities. Mitsubishi believes that allowing OEMs to focus their finite R&D investments on developing EV technologies, rather than having to continue to invest in technology that is being phased out, is the most effective way to reach our shared goal to transition to electrification. [EPA-HQ-OAR-2022-0829-0682, p. 9]

Organization: National Association of Clean Air Agencies (NACAA)

Criteria Pollutant Emission Standards and Related Issues

For reasons cited above, NACAA strongly supports EPA's proposal of more protective emission standards for non-methane organic gas (NMOG)+NOx and for PM. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

With respect to PM, EPA proposes a standard of 0.5 mg/mi for LDVs and MDVs, with a requirement that this standard be met across three duty cycles, including a cold-temperature (-7°C) cycle. Such a standard will appropriately drive the use of gasoline particulate filters, which are readily available. EPA projects that making these revisions to the standards set by the agency in the 2014 Tier 3 rule would reduce PM emissions from ICE vehicles by more than 95 percent and also yield reductions in toxic air pollutants. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

Organization: National Automobile Dealers Association (NADA)

EPA also proposes non-methane organic gases plus nitrogen oxides (NMOG+NOx) standards that represent a 60 percent reduction from the existing MY 2025 light-duty standards and a 66 to 76 percent reduction for medium-duty vehicles.7 And for both light- and medium-duty vehicles, EPA's proposed standards project to reduce particulate matter emissions by more than 95 percent.8 [EPA-HQ-OAR-2022-0829-0656, p. 2]

7 88 Fed. Reg. at 29197.

8 Id.

Organization: National Tribal Air Association (NTAA)

Criteria Pollutant Emissions Standards

Many residents in Indian country continue to be exposed to concentrations of ozone and particulate matter that exceed current National Ambient Air Quality Standards. With a few exceptions, the sources of this pollution are outside the jurisdiction and control of Tribal governments. It is imperative that the EPA and applicable state and local authorities take all necessary measures to return Tribal communities to healthy air quality. [EPA-HQ-OAR-2022-0829-0504, p. 2]

The proposed emissions standards for new light-duty and medium-duty vehicles for non-methane organic gases plus nitrogen oxides (NMOG+NOx) constitute one key step in reducing the impacts from the largest source of these ozone-precursor pollutants. Concurrently, reduced emissions of NMOG+NOx will reduce ambient air concentrations of particulate matter, and PM2.5 more specifically. The NTAA supports the proposed standards for these pollutants across the applicable vehicle categories and looks forward to healthier air quality in our many impacted communities. [EPA-HQ-OAR-2022-0829-0504, p. 2]

Organization: North American Subaru, Inc.

On criteria pollutants, the agency proposes changes to emissions standards that could be better addressed through alignment with the California Advanced Clean Cars II (i.e., LEV IV) program. Of note is the NPRM’s requirement to add new gasoline particulate filters starting in MY27. CARB's regulations still call for challenging reductions in PM emissions while not requiring a particulate filter for gasoline vehicles. The NPRM requirement to install new technology (including on-board diagnostic sensors, hardware, vehicle testing) would add cost to the vehicle for minimal gain in already low emission vehicles. [EPA-HQ-OAR-2022-0829-0576, p. 2]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

Decades of research confirms that exposure to criteria pollutant emissions from motor vehicles, including NOx, PM2.5, and air toxics, worsens asthma and other cardio-respiratory illnesses, especially in children and older adults, leading to additional trips to doctors and emergency rooms, missed days of school and work, and thousands of premature deaths each year. Exposure to PM2.5 can trigger heart attacks and strokes, exacerbate obesity and diabetes, and contribute to cognitive challenges.8 This air pollution affects people nationwide, but especially those who live or work near transportation hubs and corridors, often residents of low-income communities and communities of color affected by decades of cumulative impacts of air pollution from mobile and other sources.9 EPA estimates that, in 2023, LDVs and MDVs will account for approximately 20 percent of NOx emissions, 19 percent of direct PM2.5 emissions, and 41 percent of VOC emissions in the United States.10 [EPA-HQ-OAR-2022-0829-0584, p. 3]

8 See, e.g., American Lung Association, State of the Air 2023 (2023), https://www.lung.org/research/sota; Health Effects Institute, Systematic Review and Meta-analysis of Selected Health Effects of Long-Term Exposure to Traffic- Related Air Pollution, Special Report 23 (2022), https://www.healtheffects.org/system/files/hei-special-report- 23_1.pdf; G. Thurston, et al., Outdoor Air Pollution and New Onset Airway Disease. An Official American Thoracic Society Workshop Report, Annals of the American Thoracic Society, Vol. 17, No. 4 (2020), https://www.atsjournals.org/doi/full/10.1513/AnnalsATS.202001-046ST; R. Sheer and D. Moss, Breathe

Wheezy: Traffic Pollution Not Only Worsens Asthma, but May Cause It, Scientific American (2013), https://www.scientificamerican.com/article/traffic-pollution-and-asthma/.

9 D. Reichmuth, Air Pollution from Cars, Trucks, and Buses in the US: Everyone is Exposed, But the Burdens are not Equally Shared, Union of Concerned Scientists (2019), https://blog.ucsusa.org/dave-reichmuth/air-pollution- from-cars-trucks-and-buses-in-the-u-s-everyone-is-exposed-but-the-burdens-are-not-equally-shared/; see also A. Jbaily, et al., Air Pollution Exposure Disparities Across U.S. Population and Income Groups, Nature (2022), https://www.nature.com/articles/s41586-021-04190-y.

10 NPRM, 88 Fed. Reg. at 29186.

EPA is proposing particulate matter (PM) standards for both LDVs and MDVs of 0.5 mg/mi for three test cycles, including cold temperature. EPA projects the new standards will reduce PM2.5 emissions from ICE vehicles by 95 percent and substantially reduce emissions of air toxics. As discussed in the NPRM, the technology needed to achieve these standards is readily available. The NPRM demonstrates both that PM can be controlled down to near zero levels, and also that emissions well below the proposed limit of 0.5 mg/mi can be measured with existing certification procedures.26 [EPA-HQ-OAR-2022-0829-0584, p. 10]

26 As noted in the NPRM, the majority of the global vehicle market outside of the U.S. is subject to more stringent PM standards. Gasoline passenger cars have been regulated on the number of particles they emit since 2015 in Europe and since 2020 in China and India. As a result, the best available PM emission control technologies like gasoline particulate filters (GPF) and high-pressure fuel injectors have been incorporated into vehicles sold in these regions for several years. In fact, nearly identical vehicles produced in the U.S. without a GPF and shipped to Europe can be sold only after a GPF is installed.

We support EPA's inclusion of both standard and cold temperature testing for criteria pollutants across all vehicle categories, as these tests better represent real world operation across much of the United States. [EPA-HQ-OAR-2022-0829-0584, p. 10]

Organization: Porsche Cars North America (PCNA)

8. No projected need for Infrequent Regeneration Adjustment Factor (IRAF) for gasoline particulate filters

Within the DRIA, EPA made mention of adopting IRAF for gasoline combustion GPF equipped vehicles like what is currently required for diesel vehicles. Porsche does not believe at this time that an IRAF is necessary due to the unique characteristics of gasoline versus diesel and the higher control of soot through passive regeneration. Due to the higher exhaust temperature of gasoline otto-cycle engines, the anticipated frequency of active regenerations for gasoline particulate filter (GPF) equipped vehicles is significantly less than diesel fueled compression engines equipped with diesel particulate filters (DPF). Porsche provides confidential test data in Appendix-B to demonstrate anticipated soot loading and burn off over a variety of test cycles for an example GPF equipped vehicle. [EPA-HQ-OAR-2022-0829-0637, p. 15]

Porsche anticipates that active regeneration for gasoline GPF equipped vehicles will be very infrequent, and through vehicle operation on highways and with potential staged regeneration strategies, Porsche does not believe that the heightened emissions released during an active regeneration will occur sufficiently to warrant the need for gasoline GPF IRAF. Porsche recommends EPA continue to monitor the topic as more GPF equipped vehicles enter the US market. [EPA-HQ-OAR-2022-0829-0637, p. 15]

Organization: Reginald Modlin and B. Reid Detchon

The Clean Air Act Amendments of 1990 required control of toxic emissions from motor vehicles. EPA responded in 2001 with standards based on the technologies and understanding of health effects at that time. However, time and science have moved on. Vehicle engine technologies have advanced, the composition of gasoline has changed, and the public health effects of aromatics have become better understood: Carburetors and port fuel injection have largely been replaced by gasoline direct injection (GDI) technology. More than half of the vehicles entering the market use this technology to enhance fuel economy performance. Unfortunately, GDI technology greatly increases emissions of ultrafine particles when using today's gasoline. [EPA-HQ-OAR-2022-0829-0570, p. 5]

It doesn't have to be this way. Technologies and products have come together to define a new solution for what the Clean Air Act requires: "the greatest degree of emission reduction achievable through the application of technology which will be available." Along with a rapid transition to electric vehicles, a complementary program should include adoption of higher ethanol blends, which have been shown by U.S. National Laboratories to enable higher fuel economy and vehicle performance. Such blends would enable a 40% reduction in the use of toxic aromatics in gasoline. An important recent study, co-authored by the Nobel Prize winner Mario Molina, concluded that reducing the smallest (ultrafine) particles "without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem." [EPA-HQ-OAR-2022-0829-0570, p. 5]

I. Emissions from the use of toxic chemicals in gasoline – aromatic hydrocarbons – are causing thousands of premature deaths annually in the United States and harming the cognitive development of children. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

1. The effect on public health in brief [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

a. Incomplete combustion of the aromatics in gasoline (comprising 20% of every gallon) results in tailpipe emissions of fine particles. Inhalation of fine particles from fossil fuel combustion is the leading cause of premature death in the world, killing more than 8 million people annually. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

1 Karn Vohra et al., "Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem," Environmental Research (2021): 195(110754): https://www.sciencedirect.com/science/article/abs/pii/S0013935121000487 (accessed Feb. 24, 2021).

b. A recent study found that reducing the smallest (ultrafine) particles without simultaneously limiting organics from automobile emissions "is ineffective and can even exacerbate the problem." [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

2 Song Guo et al., "Remarkable nucleation and growth of ultrafine particles from vehicular exhaust," Proceedings of the National Academy of Sciences of the United States of America (2020): 117(7): pp. 3427-32: https://www.pnas.org/content/117/7/3427 (accessed June 11, 2021).

c. Once inhaled, ultrafine particles reach the deepest part of the lungs and enter the bloodstream, where they can cross biological membranes, even the placental barrier, and reach the brain. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

3 C. Vyvyan Howard, “Particulate Emissions and Health” (2009): pp. 13-16: http://www.durhamenvironmentwatch.org/Incinerator%20Health/CVHRingaskiddyEvidenceFinal1.pdf (accessed Feb. 24, 2021).

4 Russell A. Morales-Rubio et al., “In utero exposure to ultrafine particles promotes placental stress-induced programming of renin-angiotensin system-related elements in the offspring results in altered blood pressure in adult mice,” Particle and Fibre Toxicology (2019): 16(7): https://particleandfibretoxicology.biomedcentral.com/articles/10.1186/s12989-019-0289-1 (accessed Feb. 24, 2021).

5 Dean E. Schraufnagel, “The health effects of ultrafine particles,” Experimental & Molecular Medicine (2020): 52: pp. 311-17: https://www.nature.com/articles/s12276-020-0403-3 (accessed Feb. 24, 2021).

d. Not all particles are alike – some may be benign, while others are clearly toxic. Among the worst are polycyclic aromatic hydrocarbons (PAHs), which mix and combine with other gasoline emissions to persist over longer times and distances than previously thought possible. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

6 Alla Zelenyuk et al., “The Effect of Gas-Phase Polycyclic Aromatic Hydrocarbons on the Formation and Properties of Biogenic Secondary Organic Aerosol Particles,” Faraday Discussions (2017): 200: pp. 143-164: https://pubs.rsc.org/en/content/articlelanding/2017/FD/C7FD00032D#!divAbstract (accessed Feb. 24, 2021).

e. Fetal exposure to extremely low levels of PAHs – levels that are common in dense urban areas – has been associated with developmental delay at age 3 years and reduced IQ at age 5 years, similar to the effects reported for children with elevated concentrations of lead in their blood. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

7 Frederica P. Perera et al., “Prenatal Airborne Polycyclic Aromatic Hydrocarbon Exposure and Child IQ at Age 5 Years,” Pediatrics (2009): 124(2): pp. e195-e202: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2864932/ (accessed Feb. 24, 2021).

g. EPA has determined that, for vehicles from model year 2001 on, “E15 will not cause or contribute to a failure to achieve compliance with the emissions standards to which these vehicles were certified over their useful lives.” [EPA-HQ-OAR-2022-0829-0570, p. 34]

178 U.S. EPA, “Modifications to Fuel Regulations To Provide Flexibility for E15,” op. cit., supra note 173: pp. 26989-90.

2. Aromatics

a. Aromatics are hydrocarbons built around one or more benzene rings. Often referred to by the acronym BTEX, they include not just benzene itself, a known carcinogen, but also toluene, ethylbenzene, xylenes, and other compounds similar to benzene in their behavior in the environment. People are exposed to BTEX primarily through emissions from motor vehicles and cigarette smoke. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

8 Emma P. Popek, “Environmental Chemical Pollutants” in Sampling and Analysis of Environmental Chemical Pollutants (second edition), Elsevier (2018), p. 36: https://www.sciencedirect.com/science/article/pii/B9780128032022000021 (accessed Feb. 24, 2021).

9 Queensland (Australia) Department of Environment and Science, “BTEX chemicals”: https://environment.des.qld.gov.au/management/activities/non-mining/fraccing/btex-chemicals (accessed Feb. 24, 2021).

b. Aromatics are derived from petroleum during the refining process and blended into gasoline to increase octane. Their use increased dramatically during the 1980s when the previously used additive, tetraethyl lead, was phased out due to health concerns. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

10 Francesca Lyman, “The Gassing of America,” in The Washington Post, April 13, 1990: https://www.washingtonpost.com/archive/lifestyle/1990/04/13/the-gassing-of-america/bce94f4d-c8a1-47e5-8c9c-d0a6befd8b80/ (accessed Feb. 24, 2021).

11 U.S. Environmental Protection Agency, “Examples of Successful Lead Phaseouts: United States,” in Implementer’s Guide to Phasing Out Lead in Gasoline (1999), pp. 10-11: https://archive.epa.gov/international/air/web/pdf/epa_phase_out.pdf (accessed Feb. 24, 2021).

i. Octane is needed in gasoline to prevent premature combustion of the fuel mixture (“knock”), which can damage engines. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

12 “Engine knocking,” in Wikipedia: https://en.wikipedia.org/wiki/Engine_knocking (accessed Feb. 24, 2021).

ii. The level of aromatics in gasoline is capped at 25% in regions required to use reformulated gasoline (areas that have high levels of ozone pollution, roughly 30% of the U.S. market). On average, aromatics comprise 20% of the gasoline sold in the U.S. Levels elsewhere (e.g., in Europe and China) have been as high as 40%, worsening air pollution and public health in those regions. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

13 42 U.S. Code, sec.?7545, “Regulation of fuels,” at (k)(3)(A)(ii): P.L. 101-549, sec. 219, enacted Nov. 15, 1990: https://www.law.cornell.edu/uscode/text/42/7545 (accessed June 17, 2021).

14 U.S. Environmental Protection Agency, “Fuel Trends Report: Gasoline 2006 - 2016” (2017), Table 6: Summary of Annual Average Gasoline Properties Between 1997 and 2016: EPA-420-R-17-005: p. 27: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100T5J6.pdf (accessed Feb. 24, 2021).

15 Guiqian Tang et al., “Organic composition of gasoline and its potential effects on air pollution in North China,” Science China: Chemistry (2015): 58(9): pp. 1416-25: http://engine.scichina.com/publisher/scp/journal/SCC/58/9/10.1007/s11426-015-5464-0?slug=abstract (accessed Feb. 24, 2021).

iii. In the decade from 1997 to 2006, aromatics made up roughly 25% of the U.S. gasoline pool. That level fell to 20% over the next 10 years as ethanol’s share of the market rose from 3% to nearly 10%. This 20% level equates to 25.3 billion gallons of aromatics used in cars and light trucks per year. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

16 U.S. EPA, “Fuel Trends Report,” op. cit., supra note 14.

17 U.S. Energy Information Administration, “Gasoline explained – use of gasoline”, online fact sheet: “Light-duty vehicles (cars, sport utility vehicles, and small trucks) account for about 92% of all gasoline consumption in the United States”: https://www.eia.gov/energyexplained/gasoline/use-of-gasoline.php (accessed Feb. 24, 2021). EIA projects gasoline use in 2021 to total 137.5 billion gallons, or 126.5 billion gallons for light-duty vehicles: U.S. Energy Information Administration, “Annual Energy Outlook 2021,” Table 11. Petroleum and Other Liquids Supply and Disposition (Reference case): https://www.eia.gov/outlooks/aeo/data/browser/#/?id=11-AEO2021®ion=0-0&cases=ref2021&start=2019&end=2050&f=A&linechart=ref2021-d113020a.3-11-AEO2021&chartindexed=0&sourcekey=0 (accessed Feb. 24, 2021).

iv. Aromatics have a much higher ratio of carbon to hydrogen than other typical hydrocarbons do, driving up the carbon content of gasoline and producing higher greenhouse gas emissions. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

18 U.S. Energy Information Administration, "Emissions of Greenhouse Gases in the United States 1987-1994" (1995), DOE/EIA-0573(87-94), p. 77: https://www.osti.gov/servlets/purl/122288 (accessed Feb. 24, 2021).

v. Aromatics contribute about 10% of global anthropogenic emissions of non-methane organic gases (NMOG), the major source being car exhaust from gasoline-powered vehicles. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

19 I. Barnes and K.H. Becker, "Aromatic Hydrocarbons," in Tropospheric Chemistry and Composition, Encyclopedia of Atmospheric Sciences (2003): p. 2376: https://www.sciencedirect.com/science/article/pii/B0122270908004243 (accessed Feb. 24, 2021).

vi. Aromatics are also responsible for an estimated 30-40% of the ozone and other photooxidants in urban atmospheres, making them the most important class of hydrocarbons with regard to photochemical ozone formation. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

20 Ibid

c. The BTEX chemicals are characterized as hazardous air pollutants "known or suspected to cause cancer or other serious health or environmental effects." They are identified as mobile source air toxics and formed in four ways, of which the first two are most pertinent. According to EPA: [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

21 U.S. Environmental Protection Agency, "What are Hazardous Air Pollutants?", online fact sheet: https://www.epa.gov/haps/what-are-hazardous-air-pollutants (accessed Aug. 29, 2021).

22 U.S. Environmental Protection Agency, "Control of Emissions of Hazardous Air Pollutants from Mobile Sources; Final Rule," Federal Register (2001): 66(61): pp. 17235-39: https://www.govinfo.gov/content/pkg/FR-2001-03-29/pdf/01-37.pdf (accessed Feb. 24, 2021).

i. "First, some air toxics are present in fuel and are emitted to the air when it evaporates or passes through the engine as unburned fuel. Benzene, for example, is a component of gasoline. Cars emit small quantities of benzene in unburned fuel, or as vapor when gasoline evaporates. [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

ii. "Second, mobile source air toxics are formed through engine combustion processes. A significant amount of automotive benzene comes from the incomplete combustion of compounds in gasoline such as toluene and xylene that are chemically very similar to benzene." (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

d. According to a review of the literature by a Health Effects Institute panel, "It is estimated that about 50% of the benzene produced in the exhaust is the result of decomposition of aromatic hydrocarbons in the fuel. … [Two] studies showed that lowering aromatic levels in gasoline significantly reduces toxic benzene emissions from vehicle exhausts." [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

23 Health Effects Institute, Panel on the Health Effects of Traffic-Related Air Pollution, "Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects" (Special Report 17): Chapter 2, "Emissions from Motor Vehicles," Appendix B: "Fuel Composition Changes Related To Emission Controls" (2010): pp. 3-4:

https://www.healtheffects.org/system/files/SR17TrafficReviewChapter2AppendixB.pdf (accessed Aug. 24, 2021).

e. Gasoline-powered vehicles accounted for 69% of all U.S. emissions of single-ring aromatic hydrocarbons, based on source-specific speciation in the 2005 National Emissions Inventory. [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

24 Katherine von Stackelberg et al., "Public health impacts of secondary particulate formation from aromatic hydrocarbons in gasoline," Table 3, National emissions inventory of single-ring aromatic hydrocarbons, Environmental Health (2013): 12(19): https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-12-19/tables/3 in https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-12-19 (accessed Feb. 24, 2021).

3. Emissions from aromatics: Particulate matter (PM) and ultrafine particles (UFPs) [EPA-HQ-OAR-2022-0829-0570, pp. 9-10]

a. When a fuel is burned in a vehicle, its molecules break apart and create particulate matter (PM). PM is usually characterized according to its size – in three categories: [EPA-HQ-OAR-2022-0829-0570, pp. 9-10]

25 Mohsin Raza et al., "A Review of Particulate Number (PN) Emissions from Gasoline Direct Injection (GDI) Engines and Their Control Techniques," Energies (2018): 11(6), 1417: p. 3: https://www.mdpi.com/1996-1073/11/6/1417/htm (accessed Feb. 24, 2021).

i. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. These larger particles (2.5 to 10 micrometers in diameter) are called PM10 and are mostly derived from soil and sea salts. Fine particles (PM2.5, 0.1 to 2.5 micrometers in diameter) and ultrafine particles (UFPs, less than 0.1 micrometer) are predominantly derived from combustion of fossil fuel. [EPA-HQ-OAR-2022-0829-0570, pp. 9-10]

26 Andre Nel, "Air Pollution-Related Illness: Effects of Particles," Science (2005): 308(5723): pp. 804-06: https://science.sciencemag.org/content/308/5723/804 (accessed Feb. 24, 2021).

ii. Exposure to PM2.5 from fossil fuel combustion was recently shown to be the leading cause of premature death in the world, killing more than 8 million people annually – double the previous estimate – based on a new risk assessment model that found a higher mortality rate for long-term exposure to fossil fuel emissions, including at lower concentrations. [EPA-HQ-OAR-2022-0829-0570, pp. 9-10]

27 Vohra, op. cit., supra note 1, updating Dean E. Schraufnagel et al., "Air Pollution and Noncommunicable Diseases – A Review by the Forum of International Respiratory Societies' Environmental Committee, Part 1: The Damaging Effects of Air Pollution," CHEST Journal (2019): 155(2): pp. 409-16: https://journal.chestnet.org/article/S0012-3692(18)32723-5/pdf (accessed Feb. 24, 2021).

28 Leah Burrows, "Deaths from fossil fuel emissions higher than previously thought," news release, Harvard John A. Paulson School of Engineering and Applied Sciences, Feb. 9, 2021: https://www.seas.harvard.edu/news/2021/02/deaths-fossil-fuel-emissions-higher-previously-thought (accessed Feb. 24, 2021).

iii. EPA recently announced that it will reconsider its national standards for PM2.5, stating: "The strong body of scientific evidence shows that long- and short-term exposures to fine particles (PM2.5) can harm people's health, leading to heart attacks, asthma attacks, and premature death. Large segments of the U.S. population, including children, people with heart or lung conditions, and people of color, are at risk of health effects from PM2.5." [EPA-HQ-OAR-2022-0829-0570, pp. 9-10]

29 U.S. Environmental Protection Agency, "EPA to Reexamine Health Standards for Harmful Soot that Previous Administration Left Unchanged," news release, June 10, 2021: https://www.epa.gov/newsreleases/epa-reexamine-health-standards-harmful-soot-previous-administration-left-unchanged (accessed June 11, 2021).

1. Children's exposure to air pollution is of special concern because their immune system and lungs are not fully developed. [EPA-HQ-OAR-2022-0829-0570, p. 10]

30 Joel Schwartz, "Air Pollution and Children's Health," Pediatrics (2004): 113(4): pp. 1037-43: https://pediatrics.aappublications.org/content/pediatrics/113/Supplement_3/1037.full.pdf (accessed Feb. 24, 2021).

2. Long-term exposure to PM2.5 has also been associated with a large increase in the COVID-19 death rate. [EPA-HQ-OAR-2022-0829-0570, p. 10]

31 Xiao Wu et al., "Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study," medRxiv preprint (2020): https://www.medrxiv.org/content/10.1101/2020.04.05.20054502v2 (accessed Feb. 24, 2021).

iv. As EPA notes, "While some PM is emitted directly from sources such as construction sites, unpaved roads, fields, smokestacks or fires, most particles form in the atmosphere as a result of complex reactions of chemicals such as sulfur dioxide and nitrogen oxides, which are pollutants emitted from power plants, industrial facilities and vehicles." [EPA-HQ-OAR-2022-0829-0570, p. 10]

32 U.S. EPA, "EPA to Reexamine Health Standards for Harmful Soot," op. cit., supra note 29.

1. A recent General Motors study found that nearly 96% of the PM emissions from gasoline are caused by the aromatics in the fuel. Due to an increase in heavy aromatics in the U.S. gasoline pool in the last three years, the gasoline particulate index has increased by more than 30% since 2016 and now is worse than in the EU and China. The authors observed: "Fuel quality improvements are not only important for new vehicles, which are designed for it, but also will benefit the whole fleet of legacy vehicles in the market and off-highway engines." [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

33 Elana Chapman et al., "Global Market Gasoline Quality Review: Five Year Trends in Particulate Emission Indices," SAE International (2021): SAE Technical Paper 2021-01-0623: https://saemobilus.sae.org/content/2021-01-0623/ (accessed June 17, 2021).

v. Ultrafine particles (UFPs) are so small that they can only be detected with an electron microscope, and they are more usefully measured by particle number, not mass. They comprise more than 80% of the particles in urban air but are a negligible fraction of PM2.5 mass. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

34 Christina H. Fuller et al., "Indoor and outdoor measurements of particle number concentration in near-highway homes," Journal of Exposure Science and Environmental Epidemiology (2013): 23: p. 506: https://www.nature.com/articles/jes2012116.pdf (accessed Feb. 24, 2021).

1. Studies have shown associations between UFPs and increased asthma symptoms, cardiovascular disease markers, and decreased cognitive function. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

35 Ibid.

a. In a recent U.S. study, prenatal UFP exposure was linked to asthma development in children: Children whose mothers were exposed to high levels of UFPs during pregnancy were four times more likely to develop asthma than those whose mothers were exposed to lower levels – roughly the difference between a quiet street and a busy road. Most of the diagnoses occurred just after three years of age, and overall 18% of the infants developed asthma. The researchers took account of other factors, including the age of the mothers and obesity, as well as other air pollutants. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

36 Rosalind J. Wright et al., "Prenatal Ambient Ultrafine Particle Exposure and Childhood Asthma in the Northeastern United States," American Journal of Respiratory and Critical Care Medicine (2021): https://www.atsjournals.org/doi/abs/10.1164/rccm.202010-3743OC (accessed June 11, 2021).

37 Damian Carrington, "Asthma in toddlers linked to in-utero exposure to air pollution, study finds," The Guardian (May 21, 2021): https://www.theguardian.com/environment/2021/may/21/asthma-in-toddlers-linked-to-in-utero-exposure-to-air-pollution-ufps-study-finds (accessed June 11, 2021).

2. UFPs contain large amounts of toxic components, and their adverse health effects potential would not be predicted from their mass alone. Particle number, surface area, and chemical composition are more important than mass as a health-relevant metric. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

38 Paul A. Solomon, U.S. Environmental Protection Agency, "An Overview of Ultrafine Particles in Ambient Air," EM: The Magazine for Environmental Managers (2012): 5: pp. 20-21: https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NERL&dirEntryId=241266 (accessed Feb. 24, 2021).

3. There is a growing concern in the public health community about the contribution of UFPs to human health. Despite their modest mass and size, they dominate in terms of the number of particles in the ambient air. A particular concern about UFPs is their ability to reach the most distal lung regions (alveoli) and circumvent primary airway defenses. Moreover, UFPs have a high surface area and a capacity to adsorb a substantial amount of toxic organic compounds. Harmful systemic health effects of PM10 or PM2.5 are often due to the UFP fraction. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

39 Hyouk-Soo Kwon et al., "Ultrafine particles: unique physicochemical properties relevant to health and disease," Experimental & Molecular Medicine (2020): 52: pp. 318-28: https://www.nature.com/articles/s12276-020-0405-1.pdf (accessed June 11, 2021).

5. The ability of inhaled particles to be captured within the human body, called the deposition efficiency, is a function of particle size, with the particle deposition efficiency rapidly increasing as the particles become smaller and smaller. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

40 Felipe Rodriguez et al., "Recommendations for Post-Euro 6 Standards for Light-Duty Vehicles in the EU" (2019), International Council on Clean Transportation, p. 8: https://theicct.org/sites/default/files/publications/Post_Euro6_standards_report_20191003.pdf (accessed June 11, 2021).

6. UFPs can cross biological membranes, and their mobility within the body is thought to be high. There is considerable evidence to show that inhaled UFPs can gain access to the bloodstream and are then distributed to other organs in the body. They can even cross the placental barrier. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

41 Howard, op. cit., supra note 3, pp. 12-15.

7. UFPs have been shown to directly translocate to the brain along the olfactory nerves. In addition, they can pass intact into cells, where they can have direct access to cytoplasmic proteins and organelles – for example, the mitochondria impacting the respiratory chain and DNA in the nucleus – enhancing the toxic potential of these particles. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

42 Solomon, op. cit., supra note 38, p. 21.

8. Results indicating that particles may contribute to the overall oxidative stress burden of the brain are particularly troublesome, as these long-term health effects may accumulate over decades. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

43 Annette Peters et al., "Translocation and potential neurological effects of fine and ultrafine particles a critical update," Particle and Fibre Toxicology (2006): 3(13): https://pubmed.ncbi.nlm.nih.gov/16961926/ (accessed Feb. 24, 2021).

vi. Research also suggests that the introduction of excessive UFPs into the atmosphere results in surprising side effects, such as changes in the distribution and intensity of rainfall, causing either drought or flooding in extreme cases. Such drastic climate change affects the global hydrological cycle and thereby affects global public health both directly and indirectly. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

44 Kwon et al., op. cit., supra note 39.

vii. In most urban areas, on-road vehicles are the primary source of UFP emissions. These areas observe a peak in UFPs in the morning during rush hour associated with motor vehicle emissions and a second peak during the afternoon, enhanced during the summer, associated with photochemistry, or one slightly later in the afternoon due to rush hour traffic that is enhanced during cooler conditions. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

45 Ibid.

46 Solomon, op. cit., supra note 38, p.19.

viii.. An important recent study co-authored by Nobel Prize winner Mario Molina found "remarkable formation of UFPs from urban traffic emissions": [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

47 Guo et al., op. cit., supra note 2.

1. Photooxidation of vehicular exhaust yields abundant UFP precursors, and organics dominate formation of UFPs under urban conditions. Measurements of gaseous species inside the chamber showed high levels of aromatics, including toluene and C8 and C9 aromatics. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

48 Ibid.

2. The authors concluded: "Recognition of this source of UFPs is essential to assessing their impacts and developing mitigation policies. Our results imply that reduction of primary particles or removal of existing particles without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem." (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

49 Ibid.

b. The newest generation of efficient engine technology, gasoline direct injection (GDI), increases public exposure to gasoline PM, and thus to UFPs, including PAHs. Uncontrolled GDI engines have been found to emit 10 times more particles (by mass) than previous engines and more than 100 times the number of particles. [EPA-HQ-OAR-2022-0829-0570, pp. 13-14]

50 John M. Storey et al., Oak Ridge National Laboratory, “Novel Characterization of GDI Engine Exhaust for Gasoline and Mid-Level Gasoline-Alcohol Blends,” SAE International Journal of Fuels and Lubricants (2014): 7(2): pp. 571-79: https://www.eenews.net/assets/2014/10/02/document_cw_01.pdf (accessed Feb. 24, 2021).

51 Transport & Environment, “Gasoline particulate emissions: The next auto scandal?” (2016), p. 2: https://www.transportenvironment.org/sites/te/files/publications/2016_10_Gasoline_particulate_emissions_briefing_0.pdf, citing the European Commission’s Joint Research Centre: A. Mamakos et al., “Assessment of particle number limits for petrol vehicles” (2012): https://publications.jrc.ec.europa.eu/repository/handle/JRC76849 (accessed Aug. 18, 2021).

i. Vehicle exhaust, in particular that of gasoline direct injection (GDI) engines, contains copious amounts of particles in the size ranges with high deposition efficiency. GDI engines emit UFPs and PM at levels comparable to diesel engines that do not use diesel particulate filters. [EPA-HQ-OAR-2022-0829-0570, pp. 13-14]

52 Rodriguez et al., op. cit., supra note 40.

53 Rich Kassel et al., Gladstein, Neandross & Associates, “Ultrafine Particulate Matter and the Benefits of Reducing Particle Numbers in the United States,” A Report to the Manufacturers of Emission Controls Association (MECA) (2013): p. 8: http://www.meca.org/resources/meca_ufp_white_paper_0713_final.pdf (accessed Feb. 24, 2021).

54 Kwon et al., op. cit., supra note 39.

1. Unlike conventional port fuel injection engines, which mix fuel and air prior to injection into the engine cylinders, GDI technology involves spraying the fuel directly into the cylinders, allowing for higher compression ratios – which enable higher combustion efficiencies, enhanced fuel economy and reduced CO2 emissions. However, similar to diesel engines, the direct injection of fuel in GDI engines creates fuel-rich pockets near the injection zone, conducive to formation of carbonaceous PM, especially black carbon. GDI engines emit larger amounts of black carbon than conventional engines, as has been confirmed by several laboratory studies [EPA-HQ-OAR-2022-0829-0570, pp. 14-15]

55 Soroush E. Neyestani et al., “Direct Radiative Effect and Public Health Implications of Aerosol Emissions Associated with Shifting to Gasoline Direct Injection (GDI) Technologies in Light-Duty Vehicles in the United States,” Environmental Science & Technology (2020): 54(2): pp. 687-96: https://pubs.acs.org/doi/full/10.1021/acs.est.9b04115 (accessed Feb. 24, 2021), quoted in Green Car Congress, “UGA study finds black carbon aerosols from GDI engines will worsen public health, climate; need for GPFs”: https://www.greencarcongress.com/2020/01/20200125-uga.html (accessed Feb. 24, 2021).

ii. GDI was used in fewer than 3% of vehicles as recently as model year 2008 but was projected to be used in more than 55% of vehicles in model year 2020. [EPA-HQ-OAR-2022-0829-0570, pp. 14-15]

56 U.S. Environmental Protection Agency, “Manufacturers continue to adopt a wide array of advanced technologies,” in “Highlights of the Automotive Trends Report,” online fact sheet:

https://www.epa.gov/automotive-trends/highlights-automotive-trends-report#Highlight5 (accessed Feb. 24, 2021).

This shift to GDI engines is predicted to nearly double annual deaths in the U.S. from gasoline-vehicle particulate emissions – according to one estimate, from 855 to 1,599 deaths a year. [EPA-HQ-OAR-2022-0829-0570, pp. 14-15]

57 Raza et al., op. cit., supra note 25: p. 5.

iii. Emissions from GDI engines can be mitigated by changes in operating parameters, by the addition of gasoline particulate filters (both with potential costs to vehicle efficiency), or by a reduction in aromatic content. [EPA-HQ-OAR-2022-0829-0570, pp. 14-15]

59 Xin He et al., "Effects of Gasoline Direct Injection Engine Operating Parameters on Particle Number Emissions," Energy & Fuels (2012): 26(4): pp. 2014-27: https://pubs.acs.org/doi/pdf/10.1021/ef201917p (accessed Feb. 24, 2021).

59 Ray J Minjares and Francisco Posada Sanchez, The International Council on Clean Transportation, "Estimated Cost of Gasoline Particulate Filters" (2011): p. 1: https://theicct.org/sites/default/files/publications/GFPworkingpaper2011.pdf (accessed Feb. 24, 2021).

c. There is a strong link between PM emissions from GDI engines and the composition and properties of the gasoline, chiefly the aromatic content of the fuel: High levels of aromatics lead to a higher level of PM emissions. [EPA-HQ-OAR-2022-0829-0570, p. 15]

60 Raza et al., op. cit., supra note 25: p. 13.

i. Aromatic compounds are harder to evaporate and slower to decompose than other hydrocarbons. Aromatics also may decompose into compounds such as acetylenes which serve as precursors for the formation of a benzene ring. [EPA-HQ-OAR-2022-0829-0570, p. 15]

61 Mohammad Fatouraie et al., "Investigation of the Impact of Fuel Properties on Particulate Number Emission of a Modern Gasoline Direct Injection Engine," SAE Technical Paper 2018-01-0358 (2018), p. 9: https://www.nrel.gov/docs/fy18osti/71483.pdf (accessed Feb. 24, 2021).

ii. High levels of aromatic components in fuel have been conclusively shown to increase PM emissions measured by particle number, an aromatic ring being an early stage of the fundamental particulate formation process. [EPA-HQ-OAR-2022-0829-0570, p. 15]

62 Raza et al., op. cit., supra note 25: p. 18.

4. Emissions from aromatics: Secondary organic aerosol (SOA)

a. Organic aerosol is a major component of fine particle pollution. Primary organic aerosol (POA) is directly emitted from fossil fuel combustion and other sources, while secondary organic aerosol (SOA) is formed from the oxidation of these emissions in the air. [EPA-HQ-OAR-2022-0829-0570, p. 15]

63 J. L. Jiminez et al., "Evolution of Organic Aerosols in the Atmosphere," Science (2009): 326(5959): pp. 1525-29: https://science.sciencemag.org/content/326/5959/1525 (accessed Feb. 24, 2021).

i. Tailpipe emissions from on-road gasoline vehicles are an important source of SOA in urban environments, where SOA concentrations often exceed POA levels. For most vehicles, SOA formation exceeds POA emissions after a few hours of atmospheric oxidation. Controlling

SOA precursor emissions is necessary to reduce human exposure to fine particulate matter. [EPA-HQ-OAR-2022-0829-0570, p. 15]

64 Yunliang Zhao et al., "Reducing secondary organic aerosol formation from gasoline vehicle exhaust," Proceedings of the National Academy of Sciences of the United States of America (2017): 114(27): pp. 6984–89: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5502599/ (accessed Feb. 24, 2021).

ii. A study of SOA formation during a severe photochemical smog event in Los Angeles found that exhaust from gasoline engines represented the single-largest anthropogenic source of SOA, and SOA in turn has been shown to be a large fraction, if not the largest, of gasoline vehicular PM. [EPA-HQ-OAR-2022-0829-0570, p. 15]

65 Michael J. Kleeman et al., "Source apportionment of secondary organic aerosol during a severe photochemical smog episode," Atmospheric Environment (2007): 41(3): pp. 576-91: https://www.sciencedirect.com/science/article/abs/pii/S1352231006008582?via%3Dihub (accessed Feb. 24, 2021).

b. According to EPA's 2011 National Air Toxics Assessment,: secondary formation is the largest contributor to cancer risks nationwide, accounting for 47% of the risk. On-road mobile sources contribute the most cancer risk from directly emitted pollutants (about 18%) and the most to non-cancer risks (34%). [EPA-HQ-OAR-2022-0829-0570, pp. 15-16]

66 U.S. Environmental Protection Agency, "Overview of EPA's 2011 National Air Toxics Assessment," online fact sheet (2015): https://www.epa.gov/sites/production/files/2015-12/documents/2011-nata-fact-sheet.pdf (accessed Feb. 24, 2021).

i. A recent study found higher toxicity in combustion aerosols than non-combustion aerosols, with emissions from vehicle engine exhaust scoring higher on overall toxicity than even those from coal combustion. [EPA-HQ-OAR-2022-0829-0570, pp. 15-16]

67 Minhan Park et al., "Differential toxicities of fine particulate matters from various sources," Nature, Scientific Reports (2018): 8(17007): https://www.nature.com/articles/s41598-018-35398-0 (accessed Feb. 24, 2021).

b. In the 30 years since the law was enacted, EPA has issued specific regulations on the subject of mobile source air toxics (MSATs) only twice – putting modest limits on benzene emissions in 2001 and on the benzene content of gasoline in 2007, but largely deferring action on the others. [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

i. The 2001 rule did list the BTEX aromatics as mobile source air toxics and noted that mobile sources accounted for more than 75% of total national emissions in each instance. Also listed was polycyclic organic matter: A group of seven PAHs, "which have been identified by EPA as probable human carcinogens" – including BaP – were used as surrogates for the larger group of POM compounds. Mobile sources were said to account for only 6% of total national emissions – but as measured by mass, not particle number. [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

129 U.S. EPA, "Control of Emissions of Hazardous Air Pollutants from Mobile Sources" (2001), op. cit., supra note 22.

c. Congress reiterated its 1990 mandate in the Energy Policy Act of 2005: "Not later than July 1, 2007, the [EPA] Administrator shall promulgate final regulations to control hazardous air pollutants from motor vehicles and motor vehicles fuels ... as authorized under section 202(l) of the Clean Air Act." [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

130 Energy Policy Act of 2005, P.L. 109-58, "Elimination Of Oxygen Content Requirement For Reformulated Gasoline," sec. 1504(b)(1)(vi): https://www.congress.gov/109/plaws/publ58/PLAW-109publ58.pdf (accessed Feb. 24, 2021). Codified at 42 U.S. Code, sec.?7545(k)(1)(B)(vi), "Regulation of fuels": https://www.law.cornell.edu/uscode/text/42/7545 (accessed Feb. 24, 2021).

i. EPA issued its 2007 mobile-source rule in response to this congressional directive. It acknowledged that "Recent studies have found that maternal exposures to PAHs in a population of pregnant women were associated with several adverse birth outcomes, including low birth weight and reduced length at birth, as well as impaired cognitive development at age three." [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

131 U.S. Environmental Protection Agency, "Control of Hazardous Air Pollutants From Mobile Sources; Final Rule," Federal Register (2007): 72(37): p. 8439: https://www.govinfo.gov/content/pkg/FR-2007-02-26/pdf/E7-2667.pdf (accessed Feb. 24, 2021).

1. But EPA took no action, saying that, according to its model, emissions of polycyclic organic matter "correlate directly with VOC emissions" and thus would decline as VOC emissions decline – failing to anticipate the contrary effect of new GDI engine technology, noted above. [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

132 Ibid., p. 8478.

ii. In proposing the rule, the agency also acknowledged "limited data that suggest that aromatic compounds (toluene, xylene, and benzene) react photochemically in the atmosphere to form secondary particulate matter (in the form of secondary organic aerosol (SOA)), although our current modeling tools do not fully reflect this" (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 25-26]

133 U.S. Environmental Protection Agency, "Control of Hazardous Air Pollutants From Mobile Sources; Proposed Rule," Federal Register (2006): 71(60): p. 15864: https://www.govinfo.gov/content/pkg/FR-2006-03-29/pdf/06-2315.pdf#page=62 (accessed Feb. 24, 2021).

1. The rule's Regulatory Impact Analysis said: "The issue of SOA formation from aromatic precursors is an important one to which EPA and others are paying significant attention. Due to the large contribution of mobile source emissions to overall aromatic levels in the atmosphere, this issue is a crucial one for assessing what further reductions are possible in mobile source PM." (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

134 U.S. Environmental Protection Agency, "Control of Hazardous Air Pollutants from Mobile Sources: Regulatory Impact Analysis" (2007): p. I-29: https://nepis.epa.gov/Exe/ZyPdf.cgi?Dockey=P1004LNN.PDF (accessed Feb. 24, 2021).

iii. In the final rule, EPA said: "There may be compelling reasons to consider aromatics control in the future, especially regarding reduction in secondary PM2.5 emissions, to the extent that evidence supports a role for aromatics in secondary PM2.5 formation. Unfortunately, there are limitations in both primary and secondary PM science and modeling tools that limit our present ability to quantitatively predict what would happen for a given fuel control. … [M]ore work is underway on how fuel aromatics, including toluene, affect secondary PM formation, and how aromatics control should be incorporated into air quality predictive models. … Thus, we have concluded that additional aromatics control for MSAT purposes is not warranted at this time." (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

135 U.S. EPA, “Control of Hazardous Air Pollutants From Mobile Sources” (2007), op. cit., supra note 131: p. 8479.

1. The final rule stated, in summary: “EPA believes that the emission reductions from the standards finalized today for motor vehicles and their fuels, combined with the standards currently in place, represent the maximum achievable reductions of emissions from motor vehicles through the application of technology that will be available, considering costs and the other factors listed in section 202(l)(2).” (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

136 Ibid., p. 8460.

- Note: EPA’s conclusion that it had required “the maximum achievable reductions” was wrong then and is even more clearly wrong today, as shown in Section III, below. Additionally, more than 13 years after issuing the 2007 rule, EPA has still not taken action on “assessing what further reductions are possible in mobile source PM” or on “how aromatics control should be incorporated into air quality predictive models.” [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

d. EPA missed another opportunity to act in 2014, in its rule on Tier 3 Motor Vehicle Emission and Fuel Standards, which it said would result in “significant reductions in pollutants such as ozone, particulate matter, and air toxics.” [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

137 U.S. Environmental Protection Agency, “Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards,” Federal Register (2014): 79(81): p. 23414: https://www.govinfo.gov/content/pkg/FR-2014-04-28/pdf/2014-06954.pdf (accessed Feb. 24, 2021).

i. EPA acknowledged that “the majority of Americans continue to be exposed to ambient concentrations of air toxics at levels which have the potential to cause adverse health effects. … According to the National Air Toxics Assessment (NATA) for 2005, mobile sources were responsible for 43% of outdoor toxic emissions and over 50% of the cancer risk and noncancer hazard associated with primary emissions. Mobile sources are also large contributors to precursor emissions which react to form secondary concentrations of air toxics.” [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

138 Ibid., p. 23437.

ii. Yet the agency took no direct action to reduce air toxics or even to estimate the benefits of the action it did take: “While there would be impacts associated with reductions in air toxic pollutant emissions that result from the final standards, we do not attempt to quantify and monetize those impacts…. This is primarily because currently available tools and methods to assess air toxics risk from mobile sources at the national scale are not adequate for extrapolation to incidence estimations or benefits assessment.” (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

139 Ibid., p. 23608.

iii. The Tier 3 rule lowered the maximum sulfur content in gasoline to avoid the poisoning of emissions catalysts and make emission control systems more effective, but the sulfur reduction produced no benefit for PM emissions: “Unlike the gaseous pollutants, there was no effect of sulfur level found for PM. … As a result, sulfur would not be expected to have a significant effect on directly-emitted PM (other than very small amounts of sulfate).” [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

140 Ibid., pp. 23420, 23441.

141 U.S. Environmental Protection Agency, “Fuel Effects on Exhaust Emissions from On-road Vehicles in MOVES2014: Final Report” (2016): p. 47: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100O5W2.PDF?Dockey=P100O5W2.PDF (accessed Feb. 24, 2021).

1. In fact, the rule may have had a contrary consequence: For many refiners, operating strategies that reduce sulfur also reduce octane. According to one analysis, “the majority of refiners are meeting the regulations by increasing hydrotreating severity,” which negatively impacts octane – potentially leading to increased use of aromatics to compensate. [EPA-HQ-OAR-2022-0829-0570, pp. 26-28]

142 Andy Huang et al., Grace Catalysts Technologies, “Driving Octane in an Ultra?Low Sulfur Gasoline Market,” AFPM 17?75 (2017), summarized at https://www.catalystgrp.com/driving-octane-ultra%E2%80%90low-sulfur-gasoline-market/ (accessed Aug. 23, 2021).

e. In December 2020 EPA issued a “Fuels Regulatory Streamlining” rule that relieved refineries of their responsibility to report regularly on the aromatics levels in reformulated gasoline (approximately 30% of the national gasoline pool). An industry-led annual sampling program will be used instead. Refineries also are no longer required to estimate emissions of air toxics, including polycyclic organic matter. [EPA-HQ-OAR-2022-0829-0570, pp. 28-29]

143 U.S. Environmental Protection Agency, “Fuels Regulatory Streamlining,” Federal Register (2020): 85(234), “Program Design,” p. 78414, and “Key Differences Between Part 1090 and Part 80,” p. 78436: https://www.govinfo.gov/content/pkg/FR-2020-12-04/pdf/2020-23164.pdf (accessed June 17, 2021).

f. In August 2021, EPA proposed revised greenhouse gas emissions standards for new cars that again failed to address the importance of vehicle fuels. EPA noted only that “in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet – especially important considerations during the transition to zero-emission vehicles.” [EPA-HQ-OAR-2022-0829-0570, pp. 28-29]

144 U.S. EPA, “Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards,” op. cit., supra note 128: p. 43730.

i. Indeed, the very basis on which EPA proceeded, according to the Proposed Rule, was the requirement in Section 202(a) “to establish standards for emissions of air pollutants from new motor vehicles which, in the Administrator’s judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.” The requirements of Section 202(l)(2), cited above, were enacted concurrently and explicitly based on that same provision of Section 202(a). [EPA-HQ-OAR-2022-0829-0570, pp. 28-29]

145 Ibid., p. 43728.

146 42 U.S. Code, sec.?7521, op.cit.,supra note 125.

Organization: Stellantis

Particulate Matter Standards Should Not Drive All New GPF Systems and Diagnostics

The proposed 0.5 mg/mi particulate matter (PM) standard is twice as stringent as California’s recently adopted ACCII LEV IV requirement – a state with the largest number of nonattainment areas for PM 2.5 in the U.S.6 EPA's proposal will force gasoline particulate filters (GPF), driving significant investments in vehicle/engine assembly plants and increasing the cost of vehicles. This incredibly expensive proposal only offers modest reductions in PM compared to the gains that will be achieved with market transition to electrification. The proposed Cold FTP standard will require all new test cells to robustly measure PM at the required low levels. Since the FTP and US06 will already force GPF, the Cold FTP PM standard becomes a very costly requirement that essentially delivers no environmental gain. [EPA-HQ-OAR-2022-0829-0678, pp. 15-16]

6 Counties Designated Nonattainment for PM-2.5 (1997), PM-2.5 (2006), and/or PM-2.5 (2012) | Green Book | US EPA, accessed 06/26/2023

EPA also adds a diagnostic requirement that goes beyond the industry standard detection of a "missing GPF" to solve a theoretical tampering concern. This filtering efficiency requirement will drive sensing technology that does not exist in the market today and will require years to develop. [EPA-HQ-OAR-2022-0829-0678, pp. 15-16]

In lieu of this costly proposal, we recommend that the EPA adopt the PM standards and phase-in schedule that CARB promulgated with the ACC II LEV IV rule. As described in Auto Innovators' comments, PM emissions reductions of 90% will be achieved (from 10 mg/mi to 1 mg/mi) by 2028MY under ACC II LEV IV. In sum, CARB's ACC II LEV IV requirements provide a significant emissions reduction without driving the need for ongoing investments in a shrinking ICE fleet. [EPA-HQ-OAR-2022-0829-0678, pp. 15-16]

Adopt a more realistic PM standard that does not drive invention and development of all- new GPF systems, diagnostics and test requirements that cannot be certified without new facilities [EPA-HQ-OAR-2022-0829-0678, pp. 24-25]

Organization: Volkswagen Group of America, Inc.

Particulate Matter (PM) 0.5 mg/mi standard (Section III.C.1)

EPA is proposing a 0.5 mg/mile standard for light-duty vehicles that must be met across three test cycles (-7°C FTP, 25°C FTP, US06), a requirement for PM certification tests at the test group level, and a requirement that every in- use vehicle program (IUVP) test vehicle is tested for PM. The 0.5 mg/mile standard is a per-vehicle cap, not a fleet average. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

In alignment with AFAI, Volkswagen requests EPA adopt CARB's LEV IV PM Standards. AFAI comments include a significant body of work, from multiple manufacturers, which supports the high variability and sensitivities of gravimetric filter measurement systems. Volkswagen agrees with the AFAI statement, "PM measurement at 0.5 mg/mile is approaching noise levels and will not be feasible or technically sound to give reliable PM results with high confidence". [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Particulate Matter (PM) Lab Comparisons

Volkswagen produced data on 3 mg/mile FTP75 compliant GPF equipped vehicles at four separate ISO 17025 accredited and fully compliant to test procedure requirements defined in 40 C.F.R. §1065/§1066 compliant test labs. The data represents over 200 vehicle tests and demonstrates our concern over repeatability. This overall variation will likely increase when applied to the US06 test cycle. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Laboratory location: Volkswagen (Wolfsburg)

Standard deviation [mg/mi]: 0.117

2σ Repeatability as described in §1065.305: 0.234 [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Laboratory location: Audi (Ingolstadt)

Standard deviation [mg/mi]: 0.125

2σ Repeatability as described in §1065.305: 0.250 [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Laboratory location: Audi (Neckarsulm)

Standard deviation [mg/mi]: 0.146

2σ Repeatability as described in §1065.305: 0.297 [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Laboratory location: Porsche (Weissach)

Standard deviation [mg/mi]: 0.133

2σ Repeatability as described in §1065.305: 0.266 [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

The average standard deviation (σ) was determined to be approximately 0.15 mg/mile for the Volkswagen's labs. For a vehicle to comply with the limit of 0.5 mg/mile, it is not to emit more than 0.2 mg/mile due to the uncertainty analysis. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

The detection sensitivity of the PM measuring technique is close to the proposed limit of 0.5mg/mile (FTP75). To guarantee (> 95% confidence level) vehicle compliance at 0.5mg/mile, the test result needs to be 2σ below the limit. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

The average standard deviation (σ) was determined to be 0.15 mg/mile for the Volkswagen Group's labs. For a vehicle to comply with the limit of 0.5 mg/mi, it is not to emit more than 0.2 mg/mile due to the uncertainty analysis. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

SEE ORIGINAL COMMENT FOR GRAPH [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

EPA anticipates that the PM standards in the NPRM will require the application of a GPF. Volkswagen believes that CARB's LEV IV US06 3 mg/mile PM Standard already implies a GPF requirement. Volkswagen requests EPA to adopt CARB's LEV IV PM Standards and furthermore allow use of a compliance statement for all cycles, not just for FTP75 (20-30°C) and US06 if ICE vehicles are equipped with a GPF. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Particulate Number (PN) and Particulate Matter (PM) Data Comparison [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Volkswagen performed six FTP75 tests at 73°F under standard lab test conditions on a conventional combustion vehicle equipped with GPF to fulfill LEV IV requirements. The vehicle was LEV IV compliant to the 1.0 mg/mile standard. Data results show wide variability with respect to the particulate mass (up to 50%) while PN integration data shows high correlation and high repeatability. CO2 results were repeatable for the six tests in a range of ± 1%.[EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

SEE ORIGINAL COMMENT FOR BAR GRAPH Of MY25 NAR project (development test results) [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

GPF Infrequent Regeneration Adjustment Factor (IRAF) [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Volkswagen supports AFAI's position with respect to the infrequent regeneration adjustment factors. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Volkswagen believes that lower stage active regeneration modes will not result in non-compliance on any prescribed test cycle. Volkswagen supports the adoption of the European "Ki-Factor approach" for IRAF determination. If soot accumulation over a 2485 miles (4000 km) does not trigger a fully active regeneration, the standard "SI-IRAF" of 1 (multiplicative factor) is assigned (reference European regulation: « VO (EU) 2017/1151 in current version VO (EU) 2023/443 Article 2 », Annex XXI, Sub-annex 6, Appendix 1). [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Volkswagen requests use of waiver statement: "Based on our GPF passive regeneration strategies, we attest that no fully active regeneration will take place within 2485 miles (4000 km) during normal vehicle operation based on good engineering judgement. Exemptions will be listed on the AECD document." [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

OBD Monitoring Requirements [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Volkswagen supports the AFAI's recommendation for EPA to harmonize with CARB on OBD Gasoline and Diesel monitor thresholds as written in 13 CCR 1968.2, by revising the 86.1807-27 (a) to reference CARB LEV IV (version November 30, 2022). AFAI recommends that EPA adopt the CARB OBD emission thresholds that allow robust detection while allowing IUMPR requirements to be met. Due to uncertainty about how lower level standards will be affected by OBD monitoring capability, AFAI recommends that EPA include the interim OBD threshold multipliers for Bin20 and below. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

With respect to PM monitoring, Volkswagen believes that a PM diagnostic of 30% filtration efficiency threshold is not technically feasible with current technology. Diagnosis of a missing substrate has been demonstrated to be feasible by Volkswagen in other markets. [EPA-HQ-OAR-2022-0829-0669, pp. 8-10]

Organization: Porsche Cars North America (PCNA)

7. Porsche recommends aligning with the PM standards of California's Advanced Clean Cars I and II regulations. [EPA-HQ-OAR-2022-0829-0637, pp. 13-15]

Porsche does not support the adoption of EPA's proposal for 0.5mg PM standard starting in MY2027. As outlined in AFAI comments, Porsche does not understand the basis for this acceleration in Federal PM policy especially given California's recent LEV-IV rulemaking which reaffirmed and retained California's previously adopted LEV-III PM roadmap of 1.0mg. Relative to the potential costs and implementation challenges that this all-new proposal could create, it is unclear of the incremental value that EPA's proposal seeks to achieve by surpassing standards that California confirmed as being effective and appropriate in reducing PM. This is especially important considering California being the state which has the most prevalent challenges with PM emissions nationwide. Considering the overall transition towards electrification, the long-standing 1.0mg policy of California, the uncertainty regarding measurement and certification reliability, and in the minority role that new light-duty vehicles play in the overall PM inventory, Porsche is not supportive of EPA's PM proposal. Instead, Porsche recommends EPA transition to adopt the LEV-III 1.0mg in the timing and context of Tier-4. [EPA-HQ-OAR-2022-0829-0637, pp. 13-15]

As shown in Figure 8.1 of the DRIA (captured below in Figure 1), EPA illustrates the counties which are in nonattainment with the variety of PM standards. EPA makes note of the estimated populations that live within these various counties, however as shown in in the illustration below, the vast majority of that population likely reside in California and in several States that already follow California motor vehicle emissions regulations (i.e., Pennsylvania, Oregon, Washington State). Very few of the states with counties highlighted below are in Federal emissions states. As noted previously, the states who are shown in this figure as having the highest proportion of challenges with PM attainment, were the States who maintained the 1.0mg PM roadmap in LEV-III. [EPA-HQ-OAR-2022-0829-0637, pp. 13-15]

[See original attachment for Figure 1 EPA designated PM nonattainment zones (From Section 8 DRIA)] [EPA-HQ-OAR-2022-0829-0637, pp. 13-15]

Over 10 years ago, CARB finalized their landmark Advanced Clean Cars I regulation which included an all-new PM reduction update for light-duty vehicles. The 1.0mg standard was approved by the Board and waived by EPA, thus establishing the 1.0mg roadmap with a 2025MY start date. The timing for the standard was again reviewed as part of a technical assessment by CARB to determine if an accelerated timeline was appropriate. CARB maintained the 2025MY start date and phase-in to provide additional, cost-effective opportunities to develop PM control technologies. In 2022, CARB finalized their Advanced Clean Cars II regulation and once again the 1.0mg PM standard was maintained as being an appropriate balance of air quality improvement, cost and feasibility especially in light of the States roadmap towards electrification. [EPA-HQ-OAR-2022-0829-0637, pp. 13-15]

Considering CARBs leadership and stability in PM requirements for the US, Porsche created a PM control technology roadmap that incorporated CARB's requirements together in consideration with other global PM requirements. CARB's regulatory timeline has influenced the product development timelines for PM control. This is important in light of EPA's previous Tier-3 rulemaking where EPA specifically did not adopt the CARB 1.0mg FTP PM standard at that time. While EPA concluded Tier-3 with the 3.0mg standard, the agency provided clear indication that future work would continue to assess lower standards. EPA concluded that looking ahead "We will continue to work closely with CARB in this area."4 As such, Porsche recommends that EPA can best deliver on the stated intention to "work closely with CARB" by fully align with CARB on a nationwide implementation of the 1.0mg FTP standard for PM. This alignment would maintain the established PM control roadmaps and provide meaningful, cost-effective PM control for the portions of the US who continue to face challenges with PM inventories. [EPA-HQ-OAR-2022-0829-0637, pp. 13-15]

4 79 FR 23454 Tier-3 Final Rule

When looking across the sources of PM emissions within the total inventory, light duty vehicles are by far a minority contributor. As both EPA and CARB have noted in previous rulemakings, achieving broad reductions of PM inventory requires a vast collection of policies aimed at reducing PM emissions from other mobile sources (e.g., heavy-duty and I/M programs) and from non-transportation sectors, such as agriculture. CARB has implemented a broad suite of policies aimed at reducing PM emissions within their state and for light-duty vehicles, recognizes that beyond the 1mg standard from LEV-III, most additional PM reductions will be derived from their aggressive electrification policy. Given that EPA's MPR proposal generally follows California's electrification ambitions, it would make sense for EPA to align on California's 1mg roadmap in the final rule for the MPR. Even if EPA were to finalize lower levels of electrification, the 1mg roadmap continues to make sense given that most of the PM non-attainment areas are in California. EPA does not appear to have provided sufficient evidence that aiming for reductions on a Nationwide basis beyond the reductions sought in California, is cost effective and practicable, and whether after ten years of PM regulatory stability in LEV-III and LEV-IV, that it now makes sense to disrupt the implementation pathway that industry has been aiming for. This sudden acceleration from EPA creates significant compliance risk with many measurement and test repeatability issues still being questioned. California has determined that the 1mg standard, combined with growth in electrification, reflects a good balance in PM air quality improvements and cost-effective control. Porsche recommends EPA align with CARB. [EPA-HQ-OAR-2022-0829-0637, pp. 13-15]

Organization: Volvo Car Corporation (VCC)

VCC estimates that our current product plan likely complies with the GHG stringency requirements proposed in this NPRM. However, the NPRM's proposed requirement on particulate matter could negatively impact our electrification plans. Some of the proposed requirements are extremely challenging and could impact our electrification plans for the USA. VCC is especially concerned about the potential negative impact to our US plant in South Carolina (our only all electric plant globally). [EPA-HQ-OAR-2022-0829-0624, p. 2]

Particulate Matter (PM)

For several reasons, VCC is opposed to EPA's proposal on particulate matter. Implementing the PM requirements as proposed in the NPRM is just not feasible. The EPA proposal differs from the CARB approach on PM and it is also more stringent than ACCII. Therefore, it will cause a lot of additional burden on manufacturers that are spending most of their resources on electrification. It is not just a matter of adding the gasoline particulate filter, rather it includes substantial development and investments. Such massive hardware changes are just not possible by 2027MY. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

If CARB and EPA are not harmonized then VCC would need to have two sets of hardware in the US market, one Federal and one California + S177 states. This would be very costly for a small OEM like VCC. In 2027MY VCC will only have few engine families in production according to our current plan, but this approach would mean VCC needs to double its engine programs. In addition, VCC has already decided on a hardware technical solution that meets CARB ACCII for 2026 MY and beyond but a final EPA rule is not expected until spring 2024. So it will be very difficult to implement an EPA specific hardware technical solution in time for the 2027 MY. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

VCC's recommendation is that EPA align with CARB with regards to PM. EPA should follow the CARB ACCII PM-regulations and the CARB phase-in plan that is already in effect. This is fully consistent with the way that CARB ACC1 (LEV III) and EPA Tier3 was synchronized in the prior set of regulations. So, there is a precedent for this approach, and given that California and 177 states make up over 40% of the US car market, this approach is efficient and consistent with those regulations already in place. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

EPA's proposal on particulate matter would create a stringent standard that requires additional hardware which is much worse for a small OEM like VCC due to our small fleets. This means investment costs need to be split on much smaller fleets. In addition, there are major development costs which would put VCC at a significant disadvantage. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

VCC has invested substantially to upgrade our dynos used for US certification testing to the latest 1066 standard. VCC did not anticipate any further upgrades to these dynos because VCC will be all electric in 2030MY. Therefore, the EPA proposal would require upgrades for one market (USA) for only 3 model years and then VCC would discontinue the whole emission measurement system in 2030. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

The proposal would also necessitate additional test capacity and different separate tests for EPA and CARB. So, it would mean doubling the number of the tests and this would create additional administrative burden in order to implement. Increasing test cells does not happen overnight and it would likely not be feasible for VCC to get the additional test cells needed for MY 2027 testing. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

In addition to separate tests, the EPA proposal differs from CARB requirements on emission and OBD certifications. If CARB and EPA are not harmonized VCC must submit two OBD applications for each engine, one for CARB and one for EPA. Many OEMs are likely in a similar position, but the implication to small volume manufacturers is much more significant than it is to the larger OEMs. VCC encourages EPA to harmonize with CARB and not require separate EPA certifications. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

New certification and compliance programs will likely be costly, especially with new tightened criteria that is proposed. VCC believes measurement accuracy is a concern at this low level. See the section on tunnel blank PM testing contained in the Alliance for Auto Innovation comments. In addition, it is not feasible with current existing sensor technology to monitor and detect the proposed requirement of 30% efficiency (See appendix for technical comments on the OBD proposal). It is also important to note that active regeneration is very infrequent on petrol engines and happens only during extreme conditions. This would make it problematic to consistently detect frequent or incomplete regeneration (See appendix for technical comments on the OBD proposal). [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

The NPRM proposed PM standard alone would mean the few remaining HEVs in Volvo Cars' cycle plan 2027MY-2029MY would likely need new hardware to accommodate a new gasoline particulate filter (GPF). For a small manufacturer like VCC, this would be necessary for 3 years only for vehicles with short life span and it would be challenging and costly. It would result in very little environmental benefit. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

EPA should consider requiring more stringent fuel requirements which would have a more significant environmental impact at a lower cost. Although changes to fuel standards are outside the scope of this NPRM, VCC believes that fuels which contain reduced particulate formation can be utilized in today's vehicles and future vehicle fleets. This would have faster and greater environmental benefit without all the burden and investment of PM filters which would be utilized for future vehicles only. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

Rather than the EPA proposed particulate matter requirements in the NPRM, VCC strongly encourages EPA adopt the CARB PM1 Regulation and allow for a Phase-In for these requirements. This is best pathway for harmonization and will deliver environmental benefits without unnecessary additional costs. [EPA-HQ-OAR-2022-0829-0624, pp. 2-4]

Other Concerns and Uncertainties

Given the short lead time until 2027 model year, we urge EPA to include an alternate phase-in or interim standards, etc. An alternate phase-in for light duty vehicles should allow for PM In-use interim standards for the first year. This was done for Tier3 so there is precedent for setting interim standards at the outset. Given that the alternate in-use FTP standard for PM is 0.006 g/mile for 2021 and earlier model years, VCC encourages EPA to adopt an alternate in use FTP standard for PM of 0.001 g/mile for 2029 and earlier models. [EPA-HQ-OAR-2022-0829-0624, p. 4]

Organization: Wisconsin Department of Natural Resources

EPA estimates that these standards will result in approximately a 95% reduction in particulate matter (PM) emissions from the covered vehicles. This is significant, and will help states attain and maintain both the current PM standard as well as any revised, more stringent standard EPA may set in the future. It will also help states address near-road PM emissions, which will mitigate localized impacts, improve the air quality in near-road communities, and assist agencies with satisfying transportation conformity regulatory requirements. [EPA-HQ-OAR-2022-0829-0507, p. 1]

EPA Summary and Response

Summary of Particulate Matter Comments

The proposed PM standard for LDV and MDV is the subject of myriad supportive, adverse, and nuanced comments from many stakeholders. Stakeholder comments are broadly grouped into four areas: 1) Comments that reference the CARB ACC II PM standard, 2) Comments about the justification of the EPA PM standard including costs and benefits, 3) Comments about technical issues of the EPA PM standard, and 4) Comments about lead time and phase-in of the EPA PM standard.

1) Comments that reference the CARB ACC II PM standard

AAI commented that EPA failed to consider adopting the CARB ACC II PM standard or other alternatives to the EPA PM standard and a number of commentors, including AAI, Stellantis, VW, Mercedes-Benz, Toyota, Honda, AML, Ferrari, and others, recommended that EPA adopt the ACC II PM standard instead. AAI asserted that the EPA PM standard would create conflicting state and federal requirements.

CARB provided strong support for the EPA's federal PM standard, commenting that EPA's proposals are appropriate and largely consistent with the overall CARB standards. CARB pointed out that EPA's rulemaking does not require ZEV sales, as California's rules do, so the tightening of federal PM standards is critical to ensure that internal combustion engine vehicles that will continue to be sold, become cleaner.

Several manufacturers raised concerns that EPA's PM standard is more stringent than CARB's ACC II standard. CARB pointed out that at the time of CARB's original adoption of its standards in 2012, the gasoline particulate filter technology that EPA is now relying on was not as well developed to support such stringent levels. Since that time, however, the technology has matured and been deployed industry-wide in the European vehicle fleet, confirming its technology readiness. Under ACC II regulations, the ZEV requirements necessarily reduce the fraction of conventional vehicles at a pace that minimize the additional benefit from a further reduction in the PM FTP standards in California.

CARB supported the proposed PM standards because EPA's proposed standards as a whole do not have a parallel path to effectively eliminate emissions from new vehicles. "In the absence of this certainty of future zero-emission standards, the proposed PM standards will ensure over the long term that PM emissions are reduced to the maximum extent feasible from vehicles driven in California (and elsewhere, especially in cold climates) even if they were not originally sold here. U.S. EPA's proposed PM standards are appropriate for protecting public health and reducing exposure to PM, especially for residents of disadvantaged communities that are in close proximity to busy roadways." CARB comments that EPA's PM standard is needed to protect public health, especially in communities with disproportionate exposure to air pollution.

2) Comments about the justification of the EPA PM standard including costs and benefits

EPA received strong support for the PM standard from ALA, ADEQ, CARB, EDF, ICCT, MECA, NACAA, NTAA, NESCAUM and OTA, and the Wisconsin Department of Natural Resources. These commenters stressed the importance of the PM standard to human health, and some discussed the need for a strong PM standard since the EPA rule lacks a ZEV mandate, which CARB uses to greatly reduce PM standards.

For example, ALA commented that filters like GPFs should be the norm to control fine particulate, a carcinogenic pollutant, on vehicles sold in American communities. ADEQ commented that Arizona has several PM nonattainment areas and ADEQ supports the adoption of GPF technology that is proven to reduce combustion engine tailpipe emissions by over 95 percent. EDF supported the PM standard as proposed: a 0.5 mg/mi cap for light-duty vehicles and MDV across three test cycles (-7°C FTP, 25°C FTP, US06), PM certification tests at the test group level, and every in-use vehicle should be tested for PM.

ICCT supported the PM standard including the -7°C FTP test. ICCT described a recent remote sensing study performed by ICCT that shows that for recent model years, light-duty vehicles and trucks show an increase in UV smoke, a proxy for PM. While gasoline light-duty vehicle and truck tailpipe CO, HC, and NOx measured by remote sensing show clear and consistent downwards trends, UV smoke averages increase starting from model years 2015–2020. For 2020 model year vehicles, the UV smoke fleet average is similar to that of 2005 model year vehicles, compared to the other three pollutants, which show a 66%–86% decrease from 2005 to 2020 model year vehicles. Further analysis shows the increase is due to increased market fraction of GDI vehicles, which tend to emit more PM than PFI vehicles. An analysis of certification test data shows that PM emissions from GDI vehicles have been reducing over the years; however, they still emit higher PM than PFI vehicles on FTP cycle. For 2023 model year vehicles, GDI vehicles emit on average about 3 times more PM emissions than the PFI vehicles on FTP cycle. For both cycles, the trajectory of average PM emissions for GDI vehicles flattens out over the last few years, suggesting that PM emissions from GDIs will not likely reduce substantially any further without the adoption of more stringent emission standards.

ICCT further comments that while EPA's proposed standard does not include a particle number limit, the stringency of the PM emission standard will address both PM2.5 and PM0.1 through the implementation of GPFs, which can reduce PM emissions by 97% to 100% and PN emissions by 80% to 99%. ICCT also comments that remote sensing data suggest the EPA MOVES model underestimates PM emissions and if the model were improved, the benefits of the rule would increase.

MECA commented that in 2021 the WHO and HEI concluded that there is no identified safe threshold for PM2.5 or black carbon, at which no damage to health is observed; EPA is poised to revise the primary annual PM2.5 standard from 12.0 to within the range of 9.0 to 10.0 $\mu g/m^3$; and that a recent European study using state-of- the-art exposure methods and large cohorts found that health impact risks were still evident at PM levels lower than current ambient standards for PM2.5. In particular, the study reported that the hazard ratios for natural-cause mortality remained elevated and significant for PM2.5 even when the analyses were restricted to observations below 12 μg/m. A MECA study found that deploying a PM regulatory control strategy that includes a combination of electric vehicle penetration and best available exhaust controls on the remaining combustion vehicles approximately doubles the PM2.5 reductions achievable by electrification alone, and cumulative health cost savings from PM2.5 reduction would be between 18 and 163 billion dollars through 2050.

NESCAUM and OTA commented that PM2.5 exposure can trigger heart attacks and strokes, exacerbate obesity and diabetes, and contribute to cognitive challenges.

CARB, EDF, ICCT, MECA, NTAA, NESCAUM and OTA, and the Wisconsin Department of Natural Resources commented on the importance of the PM standard for low-income communities, communities of color, and people that live or work near transportation hubs and corridors. These commenters note that these groups have historically faced significant and elevated harms from transportation pollution and recent studies found that light-duty vehicles and light-duty trucks are responsible for a significant share of PM-attributable premature mortalities. MECA comments that university researchers in the U.S. have reported that light duty gasoline vehicle emissions remain prominent amongst the emission source sectors that cause the largest absolute disparities for persons of color communities. NTAA comments that many residents in Indian country continue to be exposed to concentrations of PM that exceed current National Ambient Air Quality Standards. With a few exceptions, the sources of this pollution are outside the jurisdiction and control of Tribal governments.

ICCT commented on the cost of GPF technology asserting that GPFs are cost-effective devices, with per vehicle manufacturing cost of $51–$166 based on EPA estimates and $50–$184 based on other independent studies. Based on the European Commission's Euro 6/VI assessment, the incremental increase in technology cost per vehicle for Euro 6 standards compared to Euro 5 was estimated at $92–$113 for the addition of GPF along with lambda and pressure sensors. ICCT concludes that EPA's proposed PM standard will provide large health benefits through reduced fine and ultrafine particulate matter emissions with a relatively low added manufacturing cost.

AAI commented that EPA failed to adequately justify the PM standard and failed to ensure that relevant facts support the standard. AAI, Stellantis, Hyundia and AML asserted the PM standard will impose high cost and several of these commentors stated the standard will result in little corresponding air quality benefits. API commented that EPA did not use the most recent cost estimates for GPF technology and questioned whether EPA's cost estimates include associated sensors and controllers. AAI states that the PM standard will add development work, cost, and divert OEM resources from fleet electrification. Mercedes-Benz also commented that the PM standard and proposed OBD requirements would divert resources from fleet electrification. AAI encouraged EPA to adequately account for the relevant costs and benefits to fulfill its statutory obligation to engage in reasoned, evidence-based decision-making. Stellantis and an SVM manufacturer group commented that expensive test facilities will be needed to measure PM for the standard. Stellantis commented that the PM standard offers only modest reductions in PM compared to the gains that will be achieved with market transition to electrification.

3) Comments about technical issues of the EPA PM standard

Many comments focused on technical issues of the EPA PM standard. These comments discuss challenges of PM testing using -7°C FTP and US06 test cycles, the need for the -7°C FTP standard, concern that the PM standard may not allow manufacturers to "drop-in" GPF technology used in other markets, measurement challenges, challenges of OBD monitoring of GPF technology, and challenges of certification test requirements.

CARB, ICCT, NESCAUM and OTA commented on the importance of requiring 0.5 mg/mi PM over three test cycles, including the -7°C FTP but AAI and Ford commented that applying the PM standard to the -7°C FTP adds to test burden and may requires upgrades or investments to test facilities. AAI provided examples which it says may complicate implementing PM testing in the -7°C FTP, like water condensing on the sample filter face or increased variability. An SVM manufacturer group asserted there are technical issues associated with measuring PM below 1 mg/mi and EPA should not require cold testing or exempt SVMs from cold temperature testing. AML commented that it is not yet fully understood what is needed to meet the 0.5 mg standard at -7°C with high-performance engines.

Ford commented that the benefit of requiring the PM standard in the -7°C FTP is de minimis given that GPF technology will be demonstrated on the 25°C FTP and US06 test cycles, and recommends that GPF-equipped vehicles be exempt from the -7°C FTP. Mercedes-Benz commented on the test burden and justification of the -7°C FTP. Stellantis asserted that the 25°C FTP and US06 test cycles will force GPF adoption without needing the -7°C FTP test. API commented that only six states have average winter temperatures below -7°C.

AAI commented that applying the PM standard to the US06 test cycle may require both engine-out emissions reductions and development of GPF technology for high temperature and flow conditions. AAI suggested that EPA should align its test cycles with those of ACC II and allow manufacturers to use US06 bag 2 in place of the full US06 test for PM testing of MDV to reduce test burden.

AAI and Mercedes-Benz commented that EPA has not designed a program that allows GPF technology from other regions to be “dropped in” and this difference to other regions requires additional development and resources. Mercedes-Benz also noted the challenge of the proposed GPF OBD requirements. Stellantis asserted that the PM standard will require all new GPF systems. Industry commenters pointed to challenges of some current vehicle models not having sufficient room to package GPFs today. Ferrari expressed concern about the effectiveness of their existing GPF configuration that was designed to meet the CARB 1 mg/mi standard in meeting the more stringent EPA 0.5 mg/mi standard considering the proposed lead time.

Numerous comments were submitted on the topic of measurement challenges. AAI, Ford, VW, Mercedes-Benz, Honda, API, an SVM small manufacturer group and others wrote that uncertainty in the PM measurement process is too large and AAI explains how measurement challenges increase for large vehicles. Ferrari comments that measurement variabilities should be considered. AAI and Ford recommend allowing re-tests for exceedances during certification, confirmatory or in-use testing, especially for vehicles equipped with diesel or gasoline particulate filters and Mercedes-Benz suggests that EPA allow averaging of PM measurements and including a conformity factor. AAI provides example data from a laboratory where a US06 test resulted in a PM result that was several times higher than other testing in that lab and other labs. AAI also provided data showing greater variability in repeat robot weighings of a clean blank filter to a stainless steel weight of similar mass. Ford commented it would like to work with EPA to determine if there is a role for limited application of PN measurements to help reduce variability and test burden.

CARB commented that it has previously addressed the technical feasibility of gravimetric PM mass measurement at 1 mg/mi and below with a technical review presentation to the Board in October 2015. CARB concluded that the gravimetric method prescribed for the FTP driving cycle, in conjunction with appropriate laboratory practices, has a measurement precision of 0.1 mg/mi, even when measuring emission rates less than 1 mg/mi. The method can precisely measure PM emissions to determine compliance with a standard of 0.5 mg/mi. It should also be noted that such analysis was conducted on low-PM-emitting vehicles that had a higher level of vehicle test-to-test variability than what is observed in U.S. EPA’s test data for vehicles equipped with a gasoline particulate filter. As this technology is a mechanical wall-flow filtering device with a high trapping efficiency, it inherently dampens variations in PM emissions and produces more consistent results at very low PM levels, thereby reducing one element of concern regarding measurement precision at low PM levels.

AAI recommended that EPA require that all labs adopt certain test procedure changes to support measuring PM below 0.5 mg/mi. EPA should require tunnel blanks to be measured weekly. EPA should require that runnel conditioning/cleaning be performed when tunnel background exceeds 5 µg. EPA should require tunnel background correction given the significant difference it can have on test results at low levels of PM. EPA should require the limit of reference filter validity be reduced from 10 to 5 µg. EPA should require that robotic auto handlers should be required especially at independent laboratories that perform in-use testing. EPA should require that single filter collection with flow weighting be used in FTP testing.

Some commenters requested that EPA continue to cooperate with industry to affirm and improve best practices that are not overly burdensome.

ALA commented on the importance ensuring that critical emission controls like GPFs exhibit ongoing functionality. While not disputing the importance of ensuring ongoing functionality, VW, Stellanis and other commenters expressed concern that proposed GPF OBD requirements would be difficult to achieve with currently available sensing technology. An SVM manufacturer group and AML commented that GPF aging and monitoring for OBD purposes is not currently fully understood.

AAI supports pre-production PM certification testing reverting to the durability group level after the lower PM standard is fully phased in, as a common-sense adjustment that would reduce test burden.

4) Comments about lead time and phase-in of the EPA PM standard

Commenters expressed opposing views on the phase-in of the PM standard. ALA encouraged EPA to accelerate the phase-in of the PM standard to require all new vehicles to use GPFs in MY 2027 for the health benefits that this would provide. ICCT recommended that EPA adopt an accelerated phase-in of the PM standard that EPA requested comment on (50 or 80% in 2027 and 100% in 2028 for vehicles at or below 6000 lb GVWR) because GPF is a mature technology in widespread use in other markets. MECA commented that the PM standard should be implemented at a faster pace than proposed based on the combination of the predicted rate of electrification (BEVs count toward compliance) alongside a feasible rate of PM emission control technology implementation. MECA recommended a phase-in for vehicles at or below 6000 lb GVWR of 60/90/100% in 2027/2028/2029.

Other commenters urged EPA to adopt a phase-in that is slower than what was proposed. AAI commented that long lead-time is necessary to develop exhaust systems that include a GPF and that balance emissions reduction and PM collection/regeneration. Ford and other industry commenters requested more time to apply GPF technology across all ICE models than the 40/80/100 percent phase in that was proposed. An SVM small manufacturer group, AML and Ferrari commented that the proposed PM standard goes too far too soon, going farther than the CARB ACC II PM standard and not providing additional lead time for SVMs. The SVM group suggested a phase-in approach that is consistent with Euro 7. AAI recommended that EPA adopt an interim in-use standard for the first two model years after a test group certifies to a new PM standard.

5) Comments about the role of gasoline aromatics in particulate formation

Modlin and Detchon describe how aromatics in gasoline are known air toxics as well as major drivers of direct PM emissions and formation of secondary PM in the atmosphere. They suggest EPA should phase down aromatic content in gasoline, with the expectation that aromatics can be replaced with additional ethanol. They also discuss ultrafine particles and PAHs, noting that GDI-powered vehicles produce much higher levels of these than older technology vehicles, and that these pollutants in combination pose a serious danger to public health. They suggest that reducing gasoline aromatics content and requiring particulate filters on new vehicles will be important mitigation strategies.

Summary of Particulate Matter Responses

1) Responses to comments that reference the CARB ACC II PM standard

EPA carefully considered adopting alternatives to the PM standard, including CARB standards, European standards, and other alternatives not proposed. The CARB ACC II program provides PM reductions relative to Tier 3 through a more stringent PM standard from ICE-based vehicles and very significantly, PM reductions from a ZEV mandate. As noted in RTC Section 4.1, EPA is not adopting a ZEV mandate, as the CARB standards use, and instead allows manufacturers greater flexibilities in the types of vehicles they may produce. Therefore it is important and appropriate for EPA to finalize a PM standard that is aligned with a performance-based standard, i.e., the EPA performance-based standard requires a more protective PM standards, consistent with our expectations that vehicles with ICE will be the majority of the fleet for decades to come. Areas outside of California will likely have many more ICE vehicles than California will, and therefore greater PM control from ICE vehicles is very important. As compared to the CARB PM standard, the EPA PM standard covers more operating conditions (e.g., the CARB standard does not have PM requirements for cold temperatures like -7°C, which is common in many regions). Colder temperatures are common is many regions outside of California and new GPF technology enables effective PM control under all operating conditions, including high load and cold temperatures, as explained in preamble Section III.D.3.iii. As described in RIA Chapter 3.2.6.2, typical reductions in tailpipe emissions from MY 2022 GPF technology are greater than 95% reduction in PM, greater than 98% reduction in EC (elemental carbon), and greater than 99% reduction in filter-collected PAH.

EPA agrees with CARB's comment that EPA's proposals are appropriate and largely consistent with overall CARB standards. CARB pointed out that EPA's rulemaking does not require ZEV sales, as California's rules do, so the tightening of federal PM standards is critical to ensuring that internal combustion engine vehicles that will continue to be sold, become cleaner.

Several manufacturers raised concerns that EPA's PM standard is more stringent than CARB's ACC II standard. EPA agrees with CARB's point that at the time of CARB's original standards adoption in 2012, the gasoline particulate filter technology that EPA is now relying on was not as well developed to support such stringent levels. Since that time, however, the technology has matured and been deployed industry-wide in the European vehicle fleet, confirming its technology readiness. Under ACC II regulations, ZEV requirements necessarily reduce the fraction of conventional vehicles at a pace that minimizes the additional benefit from further reduction in the PM FTP standards in California.

EPA agrees with CARB's comment that because EPA's proposed standards as a whole do not have a parallel path to effectively eliminate emissions from new vehicles, a more protective PM standard is necessary. In the absence of this certainty of future zero-emission standards, EPA's proposed PM standards ensure over the long term that PM emissions are reduced to the maximum extent feasible from vehicles driven in California even if they were not originally sold there. EPA also agrees with CARB's comment that EPA's proposed PM standards are appropriate for protecting public health and reducing exposure to PM, especially for residents of disadvantaged communities that are in close proximity to busy roadways.

After considering submitted comments referencing CARB ACC II PM standard and performing additional analysis, EPA has decided not to finalize the ACC II PM standard, and is finalizing the 0.5 mg/mile PM standard described in the Preamble. EPA believes that the 0.5 mg/mi standard is feasible, both technologically and with respect to measurement. The 0.5 mg/mi standard applied to the FTP, -7°C FTP and US06 test cycles will ensure low PM emissions over the broadest range of environmental and operating conditions. In addition, a mass-based standard is appropriate both because the measurement technology is well-demonstrated and because it will help areas attain and maintain the mass-based PM NAAQS.

EPA disagrees with AAI's suggestion that adopting this standard will create a conflict with state (i.e., CARB) requirements. It is true that this standard is more stringent than the current CARB standard, for the reasons described above, but EPA does not find that in itself creates a conflict. Any vehicle which satisfies EPA's PM standard will also satisfy California's PM standard.

2) *Responses to comments about the justification of the EPA PM standard including costs and benefits*

EPA is setting standards for vehicles under 6,000 lb GVWR pursuant to CAA section 202(a)(1)-(2), and is subject to the requirements of CAA 202(a)(3) for heavier vehicles, including the requirement that standards reflect the greatest degree of emissions reduction achievable, giving appropriate consideration to cost, energy and safety and requirements for lead time and stability. As discussed in Section V of the preamble, EPA finds these standards are appropriate and consistent with these requirements, and will reduce PM emissions over the broadest range of vehicle operating and environmental conditions.

In the Preamble and RIA, EPA documents strong technical support for the PM standard, including feasibility of the standard and comprehensive analyses of benefits, and costs. EPA updated the GPF direct manufacturing cost model for the FRM using the latest information. As described in the RIA, the cost model considers the GPF substrate, housing, accessories, pressure sensor, labor and overhead, machinery, and warranty costs. The updated model uses a larger GPF swept volume ratio (GPF volume to engine displacement volume) of 0.80 instead of 0.55 in the NPRM, and uses 2022 dollars instead of 2021 dollars. The larger swept volume ratio is based on an expanded GPF/vehicle database, input from a GPF supplier, and an ICCT PM/GPF fact sheet released in November 2023.

EPA performed years of vehicle testing with various GPF installations, including PM, EC, PN, filter-collected and gas-phase PAH emissions and documented that in the Preamble, RIA, and publications. EPA performed inventory and air quality modeling. EPA also engaged with stakeholders, suppliers, and reviewing the literature. EPA considered cost, flexibility to manufacturers, public health, and legal requirements of the Clean Air Act. The EPA PM standard is expected to result in more than a 95% reduction in tailpipe PM from over 100 million vehicles and will bring US PM emissions closer to those that have already been established in other areas of the world such as Europe (2017), China (2020), and India (2023).

EPA accounts for relevant benefits and costs of the PM standard and is fulfilling its statutory obligation to protect human health and the environment in a reasoned, evidence-based approach, as documented in the Preamble and RIA.

EPA's justification of the PM standard is bolstered by comments and analyses by ALA, ADEQ, CARB, EDF, ICCT, MECA, NACAA, NTAA, NESCAUM and OTA, and the Wisconsin Department of Natural Resources, who comment on the need for the PM standard with respect to health benefits for all Americans and especially for low-income communities, communities of color, and people that live or work near transportation hubs and corridors and in nonattainment areas, and on the attractive benefit to cost ratio of the standard.

In response to comments from manufacturers about the challenges of integrating GPFs into vehicle designs, EPA recognizes that GPFs are not a drop-in technology and that the PM standard may require some labs to change test practices that were previously sufficient for measuring higher levels of PM. Manufacturers require lead time to adopt GPF technology across U.S. applications and make changes to testing practices and so EPA has lengthened the phase-in schedule for PM and other criteria pollutants as described in preamble Section III.D.3.ii and more generally in preamble Section III.D.1, as compared to our proposal.

The PM standard will deliver large benefits and a high benefit to cost ratio, which justify manufacturers' expending development resources. As described in RIA Chapter 3.2.6.2, typical reductions in tailpipe emissions are greater than 95% reduction in PM, greater than 98% reduction in EC (elemental carbon), and greater than 99% reduction in filter-collected PAH. New GPF technology enables such reductions under all operating conditions and temperatures. These reductions directly benefit drivers using roadways or living near roadways. Reductions total annual PM emissions resulting from the LMDV rule are shown in preamble Section VII.A and decreases in annual average PM2.5 concentrations and population-weighted average annual PM2.5 concentrations are shown in preamble Section VII.B.1. As discussed in Preamble Section V, the cost of GPF technology, which is explained in preamble Section III.D.3.viii and RIA Chapter 3.2.6.4, is justified by the benefits to public health and welfare. Similarly, for those vehicles with GVWR over 6,000 lbs, EPA finds that the final standards based on GPF technology are appropriate because they reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator has determined will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology.

Stellantis and an SVM manufacturer group commented that expensive test facilities will be needed to measure PM for the standard. EPA did not propose any changes to PM test procedures because the Agency does not believe that test procedure changes are required to measure PM at the final PM standard. Current test procedures outlined in 40 CFR parts 1066 and 1065 allow robust gravimetric PM measurements well below the PM standard of 0.5 mg/mi, as demonstrated by EPA and other laboratories and described in Preamble Section III.D.3.iv-v and RIA Chapter 3.2.6.2. Although changes to Part 1065 and 1066 procedures are not required, it is important to use good engineering judgment when transitioning to measuring PM below 0.5 mg/mi. This includes consideration of filter media selection, effective removal of static charge from filter media, dilution factor, filter media flow rate, using a single filter for all phases of a test cycle, robotic weighing, and minimizing contamination from filter handling, filter screens and cassettes. EPA appreciates that changes to test practices may be needed, that PM sampling equipment may need to be installed in some cold test facilities, but EPA does not anticipate that the new PM standards will require manufacturers to build entirely new test facilities. We note that many manufacturers have submitted, and certified the validity of, PM test data below 0.5 g/mile to date. Over 20 percent of MY 2021-2024 light-duty vehicle federal PM certification test results are below 0.5 mg/mi. We recognize that test-to-test variability may be of greater concern to manufacturers for the revised standard, but based on our round robin test results we conclude that should not be a significant issue for certification. EPA has provided additional lead-time for SVMs to transition to PM lower measurements with the phase in schedules described in preamble Section III.D.1.

EPA disagrees with Stellantis' assertion that the PM standard only offers modest reductions in PM compared to gains achieved with only a market transition to electrification. Over 100 million ICE-powered vehicles are expected to be sold during the transition to more BEVs, even with new EPA standards requiring strong reductions in GHG emissions. EPA expects that even in 2055 a majority of the light- and medium-duty fleet will have internal combustion engines. An analysis by the Manufacturers of Emissions Control Association (MECA) shows that a regulatory control strategy that includes a combination of electric vehicle penetration and best available exhaust controls for PM (i.e., GPF) on the remaining ICE vehicles results in approximately double the PM2.5 reduction achievable the electrification alone, during the period from 2025 to 2060.

3) Responses to comments about technical issues of the EPA PM standard

AAI, Ford, Stellantis, Mercedes-Benz and API commented on the need for the -7°C FTP test cycle. Specifically, Ford stated it believes the benefit of the -7°C FTP PM standard is de minimis considering the effectiveness of GPF technology will be sufficiently demonstrated in the 25°C FTP and US06 test cycles. Stellantis asserted that the 25°C FTP and US06 test cycles will force GPF adoption without needing the -7°C FTP test. EPA disagrees with these assertions and CARB, ICCT, NESCAUM and OTA specifically commented on the importance of requiring all three PM test cycles (-7°C FTP, 25°C FTP, and US06). The -7°C FTP test cycle is crucial to the final PM standard because it addresses high and uncontrolled cold PM emissions from vehicle operation at cold temperatures. Tier 3 PM standards for both the FTP and US06 are only for 25°C. Absent the -7°C FTP test, vehicles would not achieve PM reductions commensurate with GPF technology across the widest range of environmental and vehicle operating conditions. As demonstrated in Preamble III.D.3.iii, some vehicles without GPFs satisfy the 0.5 mg/mile standard in the 25°C FTP and US06 cycles but exhibit dramatically higher PM emissions at -7°C (an important real-world temperature), with the same being true at other important off-cycle vehicle operating points. Without the -7°C FTP test cycle, vehicles would not be required to have low PM emissions under all operating conditions.

For many years, manufacturers have been certifying vehicles at -7°C for the FTP test cycle for NMHC and CO standards. The final PM standard requires vehicle manufacturers to measure PM in the same existing test cycle. EPA anticipates that some vehicle manufacturers will require installation of PM sampling equipment into their cold facilities, although some of the required measurement equipment, such as dilution tunnel, should already be in place. Manufacturers also have the option to use a contract lab to perform cold PM testing.

In response to the API comment that only six states have average winter temperatures that are below -7°C, EPA notes that vehicles are often started in the morning, when the temperatures are often below the average temperature of the day, and that some days are colder than the average winter temperature. -7°C is not an extreme temperature in much of the United States and has been used for CO and NMHC standards for some time.

Several commenters noted concern with increased test to test variability with a more stringent PM standard. The PM standard being finalized requires PM emissions to be at or below 0.5 mg/mi. Manufacturers typically design their vehicles to have emissions below a standard to protect for test and vehicle variability. High test-to-test variability normalized by the testing mean is not a concern for certification if the mean plus variability is low enough. For example, 0.1 mg/mi with a standard deviation of 0.1 mg/mi has high normalized variability yet provides high confidence of resulting in a measurement below 0.5 mg/mi on any given test. In conducting testing to support the feasibility of the final standard, EPA, and the labs with which we collaborated, demonstrated reduced test to test variability with good measurement practices.

CARB submitted comments supporting the technical feasibility of low PM gravimetric measurements. CARB explains that it has previously addressed the technical feasibility of gravimetric PM mass measurement at 1 mg/mi and below with a technical review presentation to the Board in October 2015. CARB concluded that the gravimetric method prescribed for the FTP driving cycle, in conjunction with appropriate laboratory practices, has a measurement precision of 0.1 mg/mi, even when measuring emission rates less than 1 mg/mi. The method can precisely measure PM emissions to determine compliance with a standard of 0.5 mg/mi. It should also be noted that such analysis was conducted on low-PM-emitting vehicles that had a higher level of vehicle test-to-test variability than what is observed in U.S. EPA’s test data for vehicles equipped with a gasoline particulate filter. As this technology is a mechanical wall-flow filtering device with a high trapping efficiency, it inherently dampens variations in PM emissions and produces more consistent results at very low PM levels, thereby reducing one element of concern regarding measurement precision at low PM levels. EPA own experience corroborates these comments and EPA agrees with these conclusions.

There should not be any special concern about designing vehicles to the -7°C FTP standard for vehicles produced by SVMs or for vehicles with high-performance engines. GPF suppliers work with SVMs and large manufacturers to design GPFs for mass produced vehicles and vehicles that are produced in small numbers. At least one SVM is already selling GPF-equipped vehicles in the United States. Large manufacturers build some vehicles with high-performance engines as well, and GPFs have been successfully applied to those applications.

Based on comments from manufacturers, EPA is providing test burden reduction by finalizing an option for manufacturers to attest to meeting the -7°C FTP PM standard for MY 2027 and MY 2028 vehicles. This option applies to vehicles at or below 6000 lb GVWR, early phase-in schedule vehicles between 6001-8500 lb GVWR, and early phase-in schedule vehicles between 8,501-14,000 lb GVWR, and provides manufacturers with extra time to integrate PM samplers into their cold test cells if they do not already have them. Manufacturers are still responsible for ensuring that vehicles comply with the -7°C FTP PM standard, and EPA may conduct testing to confirm whether vehicles meet the standard, so manufacturers must have confidence in their attestation.

A round robin test program spanning three organization and five test cells showed meeting the -7°C FTP PM standard is feasible with MY 2022 GPF technology and the test procedures described in detail in preamble Section III.D.3.iii-iv and RIA Chapter 3.2.6, with an excellent test validity rate. EPA has the same requirements on dilution factor, filter face velocity, filter sampling temperature, and filter conditioning and weighing in the -7°C FTP, as in other test cycles. As required by the CFR, sample filters must be maintained between 47 and 52°C to avoid or greatly minimize water condensation on the sample filter face and as shown in the Preamble and RIA, test to test variability was sufficiently low.

In response to the comment from the SVM manufacturer group about there being technical issues associated with measuring PM below 1 mg/mi and EPA should not require cold testing or exempt SVMs from it, EPA did not propose any changes to PM test procedures because the Agency does not believe that test procedure changes are required to measure PM at the final PM standard. Current test procedures outlined in 40 CFR parts 1066 and 1065 allow robust gravimetric PM measurements well below the PM standard of 0.5 mg/mi, as demonstrated by EPA and other laboratories and described in preamble Section III.D.3.iv-v and RIA Chapter 3.2.6.2. Although changes to Part 1066 procedures are not required, it is important to use good engineering judgment when transitioning to measuring PM below 0.5 mg/mi. This includes consideration of filter media selection, removal of static charge from filter media, dilution factor, filter media flow rate, using a single filter for all phases of a test cycle, robotic weighing, and minimizing contamination from filter handling, filter screens and cassettes. EPA is finalizing additional time for SVMs to transition to PM lower measurements with the phase in schedules described in preamble Section III.D.1.

After consideration, EPA is requiring that SVMs meet the PM standard in -7°C FTP test cycle because as explained above, the -7°C FTP is crucial to the final PM standard in that it addresses uncontrolled cold PM emissions in Tier 3, and absent the -7°C FTP test, vehicles would not achieve PM reductions commensurate with what GPF technology offers across a wide range of operating conditions. SVMs may perform -7°C FTP testing themselves or work with a contracting lab to do the testing. SVMs currently certify CO and NMHC in the same -7°C FTP test cycle and Euro 6 includes RDE solid PN standards down to -7°C.

EPA agrees that meeting the PM standard in the US06 on ICE-powered vehicles typically requires attention to both engine-out emissions and GPF designs that possess good filtration under normal conditions and high temperature, high flow conditions. Good engine controls must be used to avoid high engine-out SVOC that may contribute to PM emissions. GPFs must be used that have high filtration even without the benefit of soot loading, such as during or immediately after a GPF regeneration. However, newer GPF technology (e.g., the MY 2022 GPFs tested in round robin testing, preamble Section III.D.3.iii and RIA Chapter 3.2.6) has very high filtration even during and immediately after a GPF regeneration, and easily meets the final PM standard in the US06 as shown in preamble Section III.D.3.iii and RIA Chapter 3.2.6, for all of the test vehicles including turbocharged pickup trucks and a Class 2b truck. Even the oldest test vehicle, a 2011 F150 3.5L Ecoboost, which has high engine-out PM, uses a turbocharged downsized engine that is more likely to use enrichment, and was tested with a somewhat undersized GPF, easily met the 0.5 mg/mi standard.

AAI suggested that EPA should allow manufacturers to use US06 bag 2 in place of the full US06 test for PM testing of MDV to reduce test burden. EPA considered this suggestion but is finalizing the requirement to use the full US06, as was proposed, because only using only bag 2 of the US06 would mean that only high load highway driving would be represented, ignoring high load city driving, which all vehicles experience. The high load city driving portion of the US06 has some of the highest rates of vehicle acceleration of the US06, leading to significant passive GPF regeneration on GPF-equipped vehicles. Using the full US06 ensures good PM control even during and immediately after GPF regenerations.

The US06 test results in higher tunnel flow rates and temperatures than other cycles. If vehicles with high emissions were previously tested in that lab or if a great deal of low load operation occurred, the US06 may cause a release of stored emissions from prior use. EPA recommends that if a lab notices this in their testing, they consider running a high load conditioning test before performing a US06 test with low PM.

Regarding AAI and Mercedes-Benz' comments that the PM standard was not designed to allow GPF technology from other regions to be "dropped in" and Stellantis' comment that the PM standard requires all-new GPF systems, we appreciate that existing GPFs cannot simply be bolted onto vehicles. Applying GPFs to a vehicle is not trivial and does require development and resources. In recognition of this, EPA is finalizing a more gradual phase-in and is providing other concessions to give industry additional time for development. We judge the additional time provides manufacturers with sufficient time for GPF sizing, packaging, OBD monitoring, GPF regeneration control, and durability. Packaging GPFs into small vehicles poses challenges due to there being less space, but all manufacturers have been applying GPFs to vehicles in Europe and China for some time (approximately 100 million vehicles have already been sold with GPFs). Some large vehicles sold in the U.S. are not sold overseas so there may be fewer examples to use in the design process, but large vehicles tend to have more packaging space, which somewhat mitigates this challenge. However, in developing the feasibility of a more stringent PM standard, EPA retrofit several vehicles with MY 2022 GPFs currently in mass production in Europe. The measured PM emissions were well below 0.5 mg/mi across three test cycles, three test facilities and five test cells. Details are provided in preamble Section III.D.3.iii and RIA Chapter 3.2.6. Current MY 2022 GPFs are being used to meet current European particle number (PN) standards, but they were also more than sufficient in meeting EPA's 0.5 mg/mi PM standard.

Ferrari expressed concern about the effectiveness of their existing GPF configuration designed to meet the CARB 1 mg/mi standard in meeting the more stringent EPA 0.5 mg/mi standard considering the proposed lead time. In response to Ferrari's concern and comments from other SVMs, EPA is finalizing a criteria pollutant phase-in that provides SVMs with significantly more time, until 2032, to update vehicle GPF configurations and meet the PM standard. The round robin GPF program described in preamble Section III.D.iii and RIA Chapter 3.2.6 demonstrates that MY 2022 GPFs are able to meet the EPA 0.5 mg/mi PM standard with large compliance margins.

Various comments were submitted regarding measurement challenges. AAI, Ford, VW and Mercedes-Benz commented that uncertainty in PM measurements is too large and AAI commented that measurement challenges increase for large vehicles. As described in Preamble Section III.D.3.iii-if and RIA Chapter 3.2.6.2, EPA has shown that current test procedures outlined in 40 CFR Parts 1066 and 1065 allow robust gravimetric PM measurement well below 0.5 mg/mi across a range of vehicle sizes from passenger cars to Class 2b/3 trucks, across three organizations and five test cells. EPA also notes MECA's comment that based on over 15 years of experience with diesel emission controls, medium-duty diesel vehicles that implement DPFs will be able to meet the stringent PM requirements proposed in this rule. EPA acknowledges that minimal compliance with 40 CFR parts 1066 and 1065 does not guarantee success in measuring PM below 0.5 mg/mi and vehicle manufacturers and laboratories must still use good engineering judgement and robust measurement techniques to achieve consistent results. EPA appreciates that laboratories may have to change current practices that were sufficient for measuring PM below 3 and 6 mg/mi to reliably measure PM below 0.5 mg/mi. EPA also acknowledges that the 0.5 mg/mi standard is different from how Europe, China and India control PM emissions to a level that has driven GPFs onto vehicles, primarily with particle number (PN) standards. When any emissions standard is reduced, manufacturers must re-evaluate their current practices, and changes may have to be made. In response to these considerations, EPA is providing a more gradual phase-in, temporary relief on the criteria that trigger an IUCP, and that manufacturers may attest to meeting the -7°C FTP PM standard for MY 2027 and MY 2028 to provide manufacturers with additional time to make measurement procedure changes to achieve the ability to measure below 0.5 mg/mi. EPA has detailed the procedures used by the round robin laboratories, has met repeatedly with many manufacturers to discuss measurement practices during the rulemaking, and is willing to continue to do so to help manufacturers improve their PM measurement capability.

AAI identified several important aspects of PM measurement below 0.5 mg/mi, which along with what EPA describes in preamble Sections III.D.3.iii-iv and RIA Chapter 3.2.6.2, should be helpful to manufacturers in measuring below the 0.5 mg/mi standard. Measuring PM below 0.5 mg/mi begins with simple practices like requiring operators in PM measurement clean-rooms to use power-free gloves, avoiding clothing that sheds lint or dust, not leaning over exposed filters on workbenches, using sticky pads in clean room entranceways, wearing shoe covers to reduce dirt being tracked into the clean room, and regular clean room cleaning. Other elements may be less obvious, like grounding technicians while they handle filters, grounding work benches, etc. These practices are important not just in the PM clean room, but anywhere that filters are handled, such as when they are loaded and unloaded into PM sampling equipment.

Some important elements that EPA-manufacturer discussions have focused on include using PTFE membrane filters with PMP or similar support rings to minimize gas-phase artifact (Part 1065.170) and using sufficient static charge removal before and during filter weighing using, for example, alpha-emitter static charge removal (Part 1065.190). Discussions included improving signal-to-noise ratio by using the lower half of the allowable dilution factor range (Part 1066.110), elevating filter face velocity (FFV) to a velocity approaching the maximum allowable 140 cm/s and loading one filter per test instead of one filter per phase (Part 1066.815). Further elements of good measurement procedure include control of temperature, dewpoint, grounding, using HEPA-filtered dilution air, using an effective coarse particle separator (Part 1065.145) and good filter handing procedures (Part 1065.140/190). Laboratories may also consider using robotic auto-handling for weighing (Part 1065.190) and background correction (Part 1066.110), although the tests demonstrating the ability to measure below 0.5 mg/mile in the test program summarized in preamble Section III.D.3.iii did not use background correction and only one of three organizations used robotic auto-handling.

AAI comments that large vehicles with high exhaust flows must be tested with higher CVS flowrates (to maintain dilution factor requirements) than small vehicles with small exhaust flows. That means that tunnel contamination, filter handling contamination, and filter static charge may be magnified more for large vehicles, when converted to a mg/mi basis, than for small vehicles, due to larger vehicles using larger sample ratios. This observation applies not only to PM, but also to gaseous pollutants including NMOG, NOx and CO, when two vehicles with different exhaust flow rates must meet the same standard. LDV, LDT1-4, and MDPV had to meet the same PM standard in Tier 3, and this observation applies there as well. That is the nature of using a dilution tunnel instead of undilute (raw) tailpipe measurements. The 0.5 mg/mi PM standard now applies to light-duty vehicles and MDV, which extends this effect across a greater range of vehicle sizes than before. However, testing an MDV at EPA showed it to have PM emissions well below the 0.5 mg/mi standard, with very low variability, even without background subtraction, which is allowed by the CFR. Results and test procedures are detailed in preamble Section III.D.3.iii and RIA Chapter 3.2.6.2.3. Based on these data, we consider the 0.5 mg/mi standard to be feasible for MDV and, particularly considering the above-described sample ratio effect.

AAI comments that at the 0.5 mg/mi level, net mass on the sample filter approaches tunnel background levels. For certification purposes, this does not signify a problem so long as vehicle PM is below the 0.5 mg/mi standard. While tunnel background measurements are a useful metric to track, a tunnel background measurement is different from a vehicle measurement in a variety of ways because tunnel background measurements lack the temperature increase provided by vehicle exhaust and lack the water and hydrocarbon content of vehicle exhaust. The dry, clean gas flowing through the dilution tunnel during a background measurement may draw material from tunnel walls that was deposited during prior testing. During a vehicle test, the material on tunnel walls may be in more of an equilibrium state with the gas flowing through the tunnel. Thus, it is possible that tunnel blanks are artificially high. What really matters is the result from the vehicle test.

AAI provides data from a manufacturer that shows that when a vehicle was tested across different test cells at the manufacturer, it resulted in an average PM of 0.2853 mg/mi and two standard deviations of 0.2677 mg/mi. From the description, it isn't clear what the test cycles were, what vehicle was tested, whether it used a GPF, what GPF technology was used if the vehicle used a GPF, and what measurement procedures were followed. Thus, EPA is unable to consider what, if any, specific difficulties this example illustrates with respect to measuring GPF performance below 0.5 mg/mi. EPA has demonstrated ability to measure well below 0.5 mg/mi with low variability across multiple test cells using the procedures described in the Preamble and RIA, and is happy to continue engaging with manufacturers to work toward improved practices in measuring PM.

AAI also provides data from several round robin programs, including EPA NVFEL, at PM levels at, above, and below Tier 3 levels and points to high lab-to-lab variability. EPA suggests that data from vehicles equipped with MY 2022 or newer vehicles is used, and that the measurement procedure issues discussed above be applied. Another issue to consider is how the dilution tunnel was used before low PM testing. If vehicles with high emissions were tested, or if prolonged operation at low load was tested, running a high load cycle may help.

While recognizing that some manufacturer labs will have to make changes, these changes are reasonable, as demonstrated by that in 2023, all five test cells included in the round robin test program detailed in preamble Section III.D.3.iii and RIA Chapter 3.2.6 had no problem measuring PM to well below 0.5 mg/mi in any of the test cycles, and EPA had no problem measuring PM to well below 0.5 mg/mi using a Class 2b truck. The PM standard begins to phase in in 2027 for LDV (20% of vehicles, including BEVs), and manufacturers have until 2030 under the default phase-in schedule for LDT3-4 and MDPV, and have until 2031 under the default phase-in schedule for MDV. EPA is happy to continue to engage with manufacturer labs to share best practices and help improve PM measurement capability.

In response to API's question about whether the test-to-test repeatability demonstrated by EPA only used an aerosol generator to produce PM, the first figure in Preamble Section III.D.3.iv now shows which measurements used a vehicle and which measurements used an aerosol generator. EPA notes that only one example used an aerosol generator and the lowest bars were all from GPF-equipped vehicles.

AAI and Ford commented about allowing PM re-tests and Mercedes-Benz commented on averaging PM tests and allowing for a conformity factor. EPA already allows certification, confirmatory or in-use tests to be designated void and the test re-run if the test is determined to be invalid, e.g., the vehicle was incorrectly fueled or a loaded PM sample filter was dropped onto the floor. EPA regulations currently allow re-tests during manufacturer and EPA conducted certification and confirmatory testing if an emission data vehicle fails an emission standard, including PM. EPA does not allow re-tests for in-use testing unless the test is determined to be invalid, but in-use compliance is determined based on a statistical sample of vehicles. To reduce PM outliers, labs should use best practices described in Preamble III.D.3.iv. Labs may perform triplicate filter sampling (from the same test) and average the results. EPA is providing temporary relief on the criteria that trigger an IUCP, temporarily raising the failure rate that triggers an IUCP to 80 percent of vehicles in a test group. EPA considered laboratory PM measurement variability in developing the 0.5 mg/mi PM standard. RIA Chapter 3.2.6.2.4 quantifies test-to-test and lab-to-lab variability for two vehicles tested repeatedly across three organizations. The vehicle equipped with a MY 2022 GPF produced PM measurements well below the 0.5 mg/mi standard in all three test cycles with low variability.

AAI provided data showing more variability in repeat robot weighings of a clean blank filter as compared to a stainless-steel weight of similar mass. EPA thanks AAI for sharing these data. It is not clear to EPA which type of filter was used. PTFE membrane filters tend to have less susceptibility to organic artifact than glass fiber filters coated in PTFE. Unfortunately, there will generally be more variability in a filter than a metal weight. Labs should use best practices like using PTFE membrane filters, good static charge removal, good control of temperature and humidity, buoyancy correction, and robotic weighing to minimize variability as much as possible. AAI attributes the greater variability in filter weight to organic artifact. EPA agrees this may be part of the variability, but static charge may also play a role.

Ford commented it would like to work with EPA to determine if there is a role for limited application of PN measurements to help reduce variability and test burden. After considering alternatives to a PM mass standard, EPA decided to continue regulating based on PM mass in this rulemaking. However, EPA is willing to discuss the use of PN as a future regulatory measurement with Ford and others.

AAI recommended that EPA require all labs to adopt certain test procedure changes to support measuring PM below 0.5 mg/mi. EPA agrees that it is good practice to monitoring tunnel blanks weekly and to perform tunnel conditioning/cleaning when tunnel background becomes elevated (perhaps above 5 µg) or whenever switching from running low load for many tests or running tests at high emissions levels to running tests with GPF-equipped vehicles. At this time, however, EPA is providing laboratories with flexibility to ensure they are collecting quality data in a way that is best for that organization. If a lab has confidence that it can collect quality PM data without weekly blank tests for example (e.g., it may rely on another type of reference test), then EPA does not want to require that the lab perform weekly tunnel blanks. EPA will continue to participate in measurement procedure discussions to continue to affirm and improve best practices that are not overly burdensome and will adjust measurement requirements as needed.

In Tier 3, EPA allows but does not require tunnel background correction. EPA did not propose to make tunnel background correction mandatory and results from internal test programs and the round robin PM test program described in the Preamble and RIA indicate that tunnel background correction is not required for the 0.5 mg/mi standard being finalized. EPA will continue to participate in measurement procedure discussions and is open to adjusting requirements as needed in the future.

EPA agrees that labs should consider reducing their reference filter validity limit from 10 μg in light of the significantly lower PM limit. At this time, however, EPA is providing laboratories the flexibility as they determine what measures are needed to reliably measure PM below 0.5 mg/mi. EPA is happy to continue participating in measurement procedure discussions, including new requirements on reference filter validity limit.

EPA agrees that robotic autohandlers are one way to reduce PM measurement variability in that they reduce human handling of filters and associated issues with contamination and static charge. However, after consideration, EPA is not mandating that any labs use robotic autohandlers in this rulemaking. Two of the three labs used in the round robin testing described in the Preamble and RIA did not use robotic handling and achieved PM results that are adequate for measuring PM well below 0.5 mg/mi, including very low test-to-test variability. Human weighing of filters, if proper procedures are followed, can be perfectly satisfactory. While autohandlers can save time and reduce variability, they are costly to purchase and install, and EPA does not find it necessary to require their use to support the PM standard being finalized.

EPA agrees that in the 25°C FTP and -7°C FTP, collecting PM onto a single filter with flow weighting increases filter loading relative to sampling PM onto one filter per phase, and the higher filter loading can reduce signal to noise ratio and improve the measurement. This is discussed in preamble Section III.D.3.iv and has been an option in 40 CFR Part 1066.815. However, the largest amount of PM in an FTP is typically from the cold engine start at the beginning of Phase 1, meaning the amount of PM on the sample filter is only moderately increased by using one filter for all phases. After consideration, EPA has decided not to change test procedure requirements at this time to allow labs flexibility in their procedures.

ALA commented on the importance ensuring that critical emission controls like GPFs exhibit ongoing functionality. While not disputing the importance of ensuring ongoing functionality, VW, Stellantis, Mercedes-Benz and other commenters expressed concern that proposed GPF OBD requirements would be difficult to achieve with current sensing technology or would require additional development. In response to these comments, EPA is not finalizing the proposed GPF OBD requirements and is instead finalizing that manufacturers follow the latest CARB OBD requirements. Presently that means that manufacturers propose GPF OBD plans and CARB reviews the manufacturer plans on a case-by-case basis. Some manufacturers have already certified GPF diagnostics with CARB. Harmonizing with CARB's current requirements resolves potential conflicts of having two sets of GPF OBD requirements and addresses manufacturer concerns about the difficulty of achieving the EPA-proposed diagnostics. Further discussion is provided in preamble Sections III.D.3.vii and III.H.

An SVM manufacturer group raised concern that GPF aging and monitoring for OBD purposes is not currently fully understood. In response to this, EPA notes that GPFs have been in widespread use in other markets for some time (2017 in Europe, 2020 in China, 2023 in India) and manufacturers and suppliers already have significant experience with the technology, including GPF aging and monitoring. Also, at least one SVM already uses GPFs in the U.S. GPFs accumulate ash throughout the vehicle's life and ash improves GPF filtration, but GPFs must be sized to accommodate the accumulated ash. SVMs have until 2032 to meet the final PM standard on light-duty vehicles and MDPVs, which is more than a decade after their introduction into mass production in Europe.

EPA solicited comment on whether to revert to pre-production PM certification at the durability group level after PM control technologies have been demonstrated across a range of ICE technology and AAI was supportive of this concept. EPA thanks AAI for their input but after consideration, EPA decided that it would be appropriate to review PM certification relief if it were part of a comprehensive review of certification test burden for all criteria pollutants. Such a review in the future would appropriately consider how to select worst-case vehicles for certification testing if manufacturers demonstrate compliance based on testing vehicles from every test group for some standards and testing vehicles only based on the durability group for other standards.

4) Responses to comments about lead time and phase-in of the EPA PM standard

Commenters expressed opposing views on the phase-in of the PM standard. ALA encouraged EPA to accelerate the phase-in of the PM standard to require all new vehicles to use GPFs in MY 2027 for the health benefits that this would provide. ICCT recommended that EPA adopt an accelerated phase-in of the PM standard that EPA requested comment on (50 or 80% in 2027 and 100% in 2028 for vehicles at or below 6000 lb GVWR) because GPFs are a mature technology in widespread use in other markets. MECA commented that the PM standard should be implemented at a faster pace than proposed based on the combination of the predicted rate of electrification (BEVs count toward compliance) alongside a feasible rate of PM emission control technology implementation. MECA recommended a phase-in for vehicles at or below 6000 lb GVWR of 60/90/100% in 2027/2028/2029.

Other commenters urged EPA to adopt a slower phase-in. AAI commented that it takes time and resources to design exhaust systems that incorporate a GPF that address gaseous emissions reduction and also control PM and enable GPF regeneration. Ford and other industry commenters requested more time to apply GPF technology across all ICE models than the 40/80/100 percent phase in that was proposed. EPA appreciates that incorporating GPFs into exhaust systems is not as simple as bolting on an additional part. Vehicles must meet CO_2 standards, gaseous criteria pollutants, and the PM standard. In some applications, manufacturers may find it best to use a close-coupled catalyzed GPF. This approach can use the same number of substrates and aftertreatment cans but may be more challenging from a packaging perspective. The GPF washcoat may not warm up as quicky as it would on a TWC with lower thermal mass. In other applications, an underfloor bare GPF may work best. This requires an additional substrate but leaves all of the washcoat on TWCs and may relieve packaging challenges on some applications. Current GPF-equipped vehicles sold in Europe, China and India use a variety of configurations and EPA expects that to continue in the near term in the U.S. In recognition of these challenges, EPA is finalizing a more gradual phase-in, temporary relief on the criteria that trigger an IUCP, and an allowance to attest to meeting the -7°C FTP PM standard for MY 2027 and MY 2028 vehicles. These measures provide manufacturers with additional time for designing, manufacturing, and certifying vehicles with GPF-equipped exhaust systems, or convert more vehicles to BEVs.

An SVM small manufacturer group, AML and Ferrari commented that the proposed PM standard goes too far too soon, faster than the CARB ACC II PM standard and not providing additional lead time for SVMs. The SVM group suggested a phase-in approach consistent with Euro 7. EPA considered the SVM group's comments and in response, is finalizing a criteria pollutant phase-in schedule for SVMs, including for PM, that ends in the same place as for large manufacturers but provides SVMs with significantly more time. For example, the phase in for SVM LDV, LDT1-4 and MDPV steps from 0 to 100 percent in MY 2032 instead of the proposed 40/80/100 percent phase in for MY 2027/2028/2029 for LDV and LDT1-2. Details are provided in preamble Section III.D.1. This phase in provides SVMs with more time than the SVM small manufacturer group's characterization of Euro 7 PM phase-in and provides SVMs with ample time to apply GPFs to ICE-powered vehicles and transition some vehicles to BEVs. GPF technology is mature and has been in widespread use in other markets since 2017 and can be readily applied to SVM vehicles as well. A major GPF supplier indicated to EPA that they work with SVMs and are happy to provide GPFs that meet EPA's PM standard. Further details are provided in preamble Section III.D.3 and RIA Chapter 3.2.6.

EPA considered AAI's recommendation for an interim in-use standard for the first two model years after a test group certifies to the 0.5 mg/mi standard but ultimately decided against an interim standard because the PM standard can be met with existing MY 2022 GPF technology and manufacturers and suppliers have extensive experience in applying GPFs to vehicles in the European market since 2017, in China since 2020, and India since 2023. Application of these GPFs has gone very smoothly without major failures, recalls, deteriorating performance, or other issues. Since measuring PM below 0.5 mg/mile may require measurement procedure adjustments in some laboratories, EPA is finalizing a temporary increase in the criteria that trigger an IUCP (in-use confirmatory testing program). The temporary increase in the IUCP criteria is described in preamble Section III.G.5.ii.

5) Responses to comments about gasoline aromatics and particulate formation

We are finalizing stringent PM standards for gasoline vehicles covering a range of operating conditions, including wintertime temperatures. We expect these standards to result in widespread adoption of particulate filters (GPFs) on new light-duty vehicles by 2030 and on medium-duty vehicles by 2031.

Modlin and Detchon cite the requirements for mobile source air toxics standards issued under Section 202(l) to reflect the greatest degree of emissions reduction achievable (taking into account several factors specified in the statute) as support for more stringent PAH controls. As discussed in Section III.D.3 of the preamble, emission characterization of GPF-equipped vehicles meeting the PM standards found that filter-based PAHs were reduced by more than 99%. As such, the PM standards are expected to also reduce PAH and other toxics very well. More detailed characterization of GPF benefits is described in Chapter 3.2.6.2 of the RIA. Furthermore, air quality modeling representing the net impacts of the standards on air toxics show average net reductions in all air toxics modeled.

In light of the fact that EPA did not propose PAH standards and EPA anticipates that the PM standards will result in very effective control of PAHs, EPA finds that it would not be appropriate to finalize PAH standards in this rulemaking. However, EPA will continue to consider the need for, and appropriate means of, further reductions in PAH by continuing to investigate costs and benefits of updated standards for market gasoline that would reduce the content of heavy aromatic compounds (including PAHs) that contribute most potently to PM and PAH emissions.

Modlin and Detchon also suggest that EPA could achieve emissions reductions by requiring changes to fuel composition that displace aromatics with additional ethanol. Imposing limits on gasoline aromatics content would force refiners to reformulate their gasoline to use other high-octane components. Understanding the impact of such reformulations on overall air quality would necessarily include changes in a broad range of vehicle emissions (including refueling and evaporative processes), as well as changes in petroleum refining and increases in ethanol production and agricultural intensity. These changes may reduce the overall air quality benefits significantly. We are not aware of any analyses integrating all these pieces at this time, and such work is beyond the scope of this final rule. The CAA imposes a significantly different regulatory regime for regulating fuels under 211(c), and as a result EPA solicited comment on potential changes to fuels regulations but did not propose changes. Comments in response to EPA's request for comment on potential future fuel controls are contained in Appendix D to this document and will be further considered for a potential future rulemaking. Additional comments related to fuels issues can be found in section 19 of this document.

4.1.4 - Carbon monoxide (CO) and formaldehyde (HCHO)

Comments by Organizations

Organization: Alliance for Automotive Innovation

E. US06 CO Standards

Similar to CARB's LEV IV rule, EPA is proposing to revise the SFTP CO requirement from a composite to a stand-alone standard for Tier 4. However, unlike the CARB LEV IV rule, EPA is proposing to use the 25ºC FTP CO cap of 1.7 g/mi for LDV and 3.4 g/mi for MDV for the US06 requirement. In Table 139 in section VII of the NPRM, EPA uses the OMEGA model to estimate criteria emission impacts of the proposed standards relative to the No Action scenario, light- duty and medium-duty in tons/day. While this is an interesting mathematical exercise, what is important is whether the Proposed Rule is needed for air quality attainment. Such a drastic increase in stringency would have a big impact on engine design in a similar manner as the proposed enrichment prohibition, but this change does not have any basis in air quality attainment as noted in section 8.1.5 of the DRIA.278 [EPA-HQ-OAR-2022-0829-0701, pp. 177-178]

278 There are two primary NAAQS for CO: an 8-hour standard (9 ppm) and a 1-hour standard (35 ppm). There are currently no CO nonattainment areas; as of September 27, 2010, all CO nonattainment areas had been redesignated to attainment."

- difficulty in the high-load region of US06: There is more variability in US06 emission results associated with differences in driving at high-load. Consequently, the standard must be adjusted to account for this difference. (Even with the same vehicle speed tolerance as FTP±2mph@± 1sec, the increase in workload when running at the upper and lower tolerance limits is large. The increase in the amount of intake air also increases, and the emission impact is large). [EPA-HQ-OAR-2022-0829-0701, pp. 177-178]

- Heavy development Burden: To meet the proposed US06 CO standard, automakers would need to expand the λ=1 region. This would result in redesign to increase the heat resistance of exhaust system parts including, but not limited to air/fuel sensors, catalysts, and turbochargers. Engine changes would also likely be needed to lower combustion temperatures. [EPA-HQ-OAR-2022-0829-0701, pp. 177-178]

- Reduction in Engine Output: EPA's proposal may require limiting engine power under high loads to protect the engine. This will impact marketability, especially for vehicles needing towing capacity. [EPA-HQ-OAR-2022-0829-0701, pp. 177-178]

Furthermore, there is no need for additional reductions in CO emissions since the entire country is in attainment with National Ambient Air Quality CO standards.279 [EPA-HQ-OAR-2022-0829-0701, pp. 177-178]

279 U.S. Environmental Protection Agency, Green Book Carbon Monoxide (1971) Area Information. https://www.epa.gov/green-book/green-book-carbon-monoxide-1971-area-information. ("As of September 27, 2010, all Carbon Monoxide areas have been redesignated to maintenance.")

Auto Innovators recommends EPA align with ACC II LEV IV requirements as shown in below, which provide reductions in CO emissions, but without requiring substantial development effort, which would unnecessarily divert resources away from electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 177-178]

[See original attachment for Figure 65: US06 CO Recommendation] [EPA-HQ-OAR-2022-0829-0701, pp. 177-178]

Organization: Kia Corporation

Kia Recommends EPA Align with CARB's Carbon Monoxide (CO) US06 Standard [EPA-HQ-OAR-2022-0829-0555, pp. 11-12]

Similar to CARB's LEV IV rule (in ACC II), EPA is proposing to revise the Standard Federal Testing Procedure (SFTP) US06 CO requirement from a composite to a stand-alone standard for Tier 4. However, unlike the CARB LEV IV rule, EPA is proposing that the CO cap for the US06 test cycle match the CO cap for the 25ºC FTP of 1.7 g/mi for light-duty vehicles. This change has no basis in air quality attainment as noted in section 8.1.5 of the Draft Regulatory Impact Analysis,19 as of September 27, 2010, all CO nonattainment areas had been redesignated to attainment." Kia recommends that EPA follow CARB's LEV IV rule for CO US06 that sets a standard of 9.6 g/mi cap, which delivers a meaningful reduction without substantial ICE investment. [EPA-HQ-OAR-2022-0829-0555, pp. 11-12]

19 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis (DRIA).

Organization: Lucid Group, Inc

Under section 202 of the Clean Air Act, EPA has clear authority to regulate sources of air pollutants from all mobile sources, including carbon dioxide (CO2), non- methane organic gases (NMOG) plus oxides of nitrogen (NOx) or NMOG+NOx, particulate matter (PM), carbon monoxide (CO), and formaldehyde (HCHO) from vehicle tailpipes. Lucid applauds EPA's continued efforts under this authority to improve the nation's air quality. [EPA-HQ-OAR-2022-0829-0664, p. 2]

Organization: MCS Referral & Resources (MCSRR)

In the Executive Summary at A.2.i regarding the

“Need for Continued Emissions Reductions Under 202(a) of the Clean Air Act,” EPA claims: [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

“Addressing the public health impacts of criteria pollutants (including particulate matter (PM), ozone, nitrogen oxides (NOX), and carbon monoxide (CO)) will require continued reductions in these pollutants from the transportation sector.” [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

But EPA acknowledges in section II.B.5 that: “There are currently no CO nonattainment areas; as of September 27, 2010, all CO nonattainment areas have been redesignated to attainment.” And this is despite EPA requiring since 2011 that CO monitors “be operated near roads in Core Based Statistical Areas (CBSAs) of 1 million or more persons.” [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

So given that:

1) EPA has not identified any non-attainment areas for CO in over 12 years; [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

2) ambient CO levels in all US monitoring areas average less than 10% of the EPA NAAQS 1-hour and 8-hour average limits for CO of 35 and 9 ppm, respectively; [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

3) none of the health benefits that EPA estimates will result from the adoption of this rule are based on estimated reductions in CO emissions, but only on estimated reductions in particulate matter emissions; [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

4) the EPA Administrator decided in the last CO NAAQS review in 2011, based on the same Integrated Science Assessment (ISA) on CO that EPA now cites in this proposed rule at II.C.5 as the justification for lowering current CO emission limits by more than half, that no changes were needed in either of the two primary CO standards to further protect the public from any of the health effects associated with CO emissions from any sources; it appears there are no compelling regulatory or health reasons for EPA to lower the maximum allowed CO emissions of light duty gasoline vehicles and trucks in the FTP test by more than 60%, from up to 4.2 to 1.7 g/mile, or those of heavier medium duty vehicles from 7.3 to 3.2 g/mi, while leaving the SFTP limits for CO emissions unchanged at 4.2 g/mile. [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

We note that EPA first committed to studying these lower CO limits in the 1990 revisions to the Clean Air Act. Congress at the time gave the EPA until June 1, 1997, to prepare a report on this option and until December 31, 1999 to propose a rule that would lower the CO limit to 1.7 g/mile starting in model year 2006. [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

But EPA missed these deadlines and left in place higher Phase 1 CO limits that EPA first required in model year 1996. These limited CO emissions to 3.4 g/mile at 50,000 miles and 4.2 g/mile at 100,000 miles, as shown below in Tables 3, G, and H (reprinted from the 2013 edition of 42 CFR 85 §7521.i.3.A, online at https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapII- partA-sec7521.htm) [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

EPA had another opportunity to lower CO emissions when it adopted Phase 2 limits for light-duty vehicles and trucks that took effect in model year 2001. But the EPA Administrator chose to keep the Phase 1 CO limits unchanged. [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

Unless EPA can now show some need to reduce CO emissions to protect public health and/or welfare, or to reduce greenhouse gases, it should not require vehicle manufacturers to lower CO emissions any further. With US monitoring stations now reporting 8-hour ambient CO averages below 1 ppm or at most 2 ppm, no further clinically relevant reductions in CO emissions are possible or needed. [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

[See original for Table 3 – Pending Emission Standards for Gasoline and Diesel Fueled Light-Duty Vehicles and Light-Duty Trucks 3,750 LBs, LVW or Less] [EPA-HQ-OAR-2022-0829-0615, pp. 1-2]

At III.C.4.ii, EPA proposes a "CO emissions cap for the −7 °C FTP" of 10.0 g/mi. But in the same section, EPA acknowledges that "Testing of a 2022 F250 7.3L in the −7 °C FTP at EPA showed average CO emissions of 2.7 g/mi CO." Although EPA concluded that this result demonstrates that a 10.0 g/mi standard is feasible for MDVs, this result also demonstrates that a separate standard for cold starts is not necessary. [EPA-HQ-OAR-2022-0829-0615, p. 3]

The test vehicle was able to meet the lower 3.4 g/mi limit proposed for other (non-cold) CO tests of MDVs, as well as the 4.3 g/mi allowed under SFTP conditions. For comparison, EPA should have reported the average CO emissions of an LDV during a similarly cold start at −7 °C. If the average CO level that LDVs emit from a cold start is already below the 4.3 g/mile that EPA allows under SFTP conditions, there is no need for a separate cold start limit of 10 g/mi. [EPA-HQ-OAR-2022-0829-0615, p. 3]

That said, if EPA decides to include a cold temperature CO emission standard in section 86.1811, it should apply for a useful life of "10 years or 120,000 miles" (like the NHMC limits in the same section), not for only "5 years or 50,000 miles." [EPA-HQ-OAR-2022-0829-0615, p. 3]

EPA Summary and Response

Summary of Carbon Monoxide Comments

EPA received a number of comments regarding the proposed carbon monoxide standards. The Alliance for Automotive Innovation (AAI), Kia and MCSRR noted that there are currently no CO non-attainment areas in the United States. AAI went on to note that some vehicles would require significant engineering changes to meet the proposed standards and that some of the changes may result in reduced engine power. AAI also commented that many vehicles demonstrate more variability in US06 emission as the result of driving at higher speed and load.

MCSRR noted that there is no need for a -7°C FTP standard that is separate from other non-cold CO standards for MDV. MCSRR also commented that if EPA decides to set a -7°C FTP MDV CO standard that is higher than the 25°C CO standard, it should apply for a useful life of 10 years or 120,000 miles, not for only 5 years or 50,000 miles.

Summary of Carbon Monoxide Responses

EPA considered submitted comments and our own analysis in setting the appropriate US06 CO standards and the environmental benefits of finalizing a standard that is lower than the Tier 3 US06 CO. We also considered the CARB US06 CO standards in the context of current vehicle performance. The environmental benefits are specifically addressed in RTC Sections 7 and 8. In response to the comments received and as the result of the technical analysis performed by EPA, EPA is finalizing US06 standards for both LDVs and MDVs 9.6 g/mi and 25 g/mi, respectively. Refer to preamble Section II.D.4 for a detailed discussion of our rationale.

After consideration, EPA disagrees with MCSRR's comment that there is no need for a -7°C FTP standard that is separate from other non-cold CO standards for MDV. Without a separate standard at -7°C, the final standard of 6.4 g/mi would apply at -7°C, and that would be significantly lower than the new standard of 10.0 g/mi for -7°C FTP MDV. While a MY 2022 F250 7.3L vehicle tested by EPA showed average CO emissions of 2.7 g/mi, other MDVs emit at higher rates and EPA has not performed a comprehensive study of the feasibility of setting the same standard at -7°C and 25C for CO. The 10.0 g/mi standard is the first -7°C FTP standard or cold test standard of any kind for MDV and our intent at this time is just to set an upper bound on what MDV may emit at this cold temperature that is common during winter months across much of the United States. Because cold CO standards have not previously been applied to MDV, we do not have certification data on cold CO emissions, which would include data from a broad range of MDV applications. Once cold CO standards are implemented for MDV, we will continue to monitor their emissions from certification testing and we will also continue monitor technologies for improving cold CO emissions in order to inform future decision making.

MCSRR commented that EPA should set an MDV -7°C FTP CO useful life of 10 years or 120,000 miles, not just 5 years or 50,000 miles. EPA is finalizing an MDV -7°C FTP CO useful life of 15 years or 150,000 miles and thus is consistent with the useful life that we have finalized for other criteria pollutants for both MDV and LDVs over 6,000 pounds GVWR. EPA is finalizing the same useful life for MDV -7°C FTP NMOG+NOX and PM. Final useful life standards for light-duty vehicles and MDV are described in 40 CFR 86.1805-17.

EPA appreciates Lucid for acknowledging EPA's CAA authority to regulate CO.

4.1.5 – Refueling incomplete spark-ignition vehicles

Comments by Organizations

Organization: Alliance for Vehicle Efficiency (AVE)

AVE supports EPA's proposal to extend On-board Refueling Vapor Recovery (ORVR) requirements to all incomplete light-duty and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0631, p. 9]

AVE supports the proposed extension of the requirements for control of refueling emissions to all incomplete spark-ignition light-duty and medium-duty vehicles for the 2030 model year. [EPA-HQ-OAR-2022-0829-0631, p. 9]

Cost-effective ORVR technology is available to control refueling emissions for all new incomplete vehicles at the proposed emission standard of 0.20 grams per gallon, supported by the EPA's draft regulatory impact analysis for this proposed rule. ORVR is an available and proven technology to significantly reduce evaporative and refueling emissions, resulting in meaningful emission reductions of volatile organic compounds that lead to the formation of ozone and secondary particulate matter (PM2.5), as well as emissions of hazardous air pollutants. [EPA-HQ-OAR-2022-0829-0631, p. 9]

With regulatory developments since ORVR technology was first introduced in 1994, primary and secondary manufacturers have gained significant experience with ORVR technology on all categories of complete gasoline vehicles, including light-, medium-, and heavy-duty vehicles. The recent 2027 heavy-duty final rule added a refueling standard (ORVR) for incomplete vehicles over 14,000 pounds Gross Vehicle Weight Rating (GVWR), leaving incomplete light- and medium-duty gasoline vehicles as the only remaining class of vehicles currently not required to meet refueling standards. [EPA-HQ-OAR-2022-0829-0631, p. 9]

AVE believes that the refueling emission control technologies used for the complete versions of light- and medium-duty vehicles are equally applicable to their corresponding incomplete versions. [EPA-HQ-OAR-2022-0829-0631, p. 9]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Refueling Emission Standards for Incomplete Vehicles

U.S. EPA's proposed standards would newly apply onboard refueling emission standards to incomplete medium-duty vehicles, which CARB supports. U.S. EPA requested comment regarding whether it would be cost-effective, feasible, and appropriate to also apply the proposed refueling emission standard to incomplete light-duty vehicles. Like U.S. EPA's assessment of incomplete medium-duty vehicles in the proposal, CARB anticipates that any future incomplete light-duty vehicle would be configurable to feasibly meet the refueling emission standard. One manufacturer already makes incomplete light-duty vehicles that have been certified in California to the refueling emission standard that U.S. EPA has proposed. 48, 49 To meet the refueling emission standard in this class of vehicle, manufacturers would be expected to use the existing design practices for controlling refueling emissions as outlined in the proposal, including optimizing fuel vapor line routing, fill pipe orientation, and position. Including incomplete light-duty vehicles in the refueling standard will help ensure that this requirement is applied evenly across all classes of vehicles that have the capability to generate refueling emissions. [EPA-HQ-OAR-2022-0829-0780, pp. 36-37]

48 General Motor's Document for Incomplete Vehicle, Applicable to the 2023 MODEL YEAR Cadillac XT5 B9Q – Funeral Coach, OR V4U – Limousine https://www.gmupfitter.com/wp-content/uploads/2022/10/IVD_2023_C1UL_85116239-XT5.pdf.

49 CARB. Executive Order A-006-2337. https://ww2.arb.ca.gov/sites/default/files/classic/msprog/nvepb/executive_orders/EO%20Web%20Files/PC - LDT-MDV/2023/0001/pc-ldt-mdv_ldt_a-6-2337 sdt–20220324.pdf.

Organization: Ingevity Corporation

Response to specific requests for comments:

14. Extension of the requirements for control of refueling emissions to incomplete SI MDVs and to other gasoline-fueled incompletes (LDV/LDT/MDPV) [EPA-HQ-OAR-2022-0829-0545, pp. 3-4]

Ingevity fully supports the proposed extension of the requirements for control of refueling emissions to incomplete SI MDVs (i.e., 8,501-14,000 lb. GVWR) for the 2030 model year (MY). The proposed emission standard is 0.20 g/gal for a certification useful life of 15yrs./150,000 miles using the provisions of 40 CFR 86 Subpart B. Control of refueling emissions from complete versions of vehicles in this proposed sub-category of HDVs was required for the 2006 MY; for MDPVs and complete vehicles of 8,501-10,000 lbs., GVWR phasing for 80% in 2005 and 100% in 2006 and in the 2018 MY for vehicles of 10,001-14,000 lbs. GVWR. We believe that the refueling emission control technologies used for the complete versions of the vehicles in these GVWR weight categories are equally applicable to their corresponding incomplete versions. [EPA-HQ-OAR-2022-0829-0545, pp. 3-4]

Technically, the current ORVR requirements do not cover "incomplete" LDVs, LDTs, and MDPVs. The EPA's NPRM (p. 29275) would extend the ORVR requirement to any or all incomplete gasoline- powered LDVs, LDTs, and MDPVs not covered by the past rulemakings. Ingevity supports this portion of the proposal and sees no issues with technical feasibility, cost, in-use effectiveness, or safety. Very similar vehicles have incorporated ORVR starting in the 1998 MY. The NPRM did not specify elements related to items such as test procedure, the refueling emission standard, certification useful life, other certification requirements and model year. It seems clear that the test procedures of Subpart B and the emission standards and other requirements for certification from Subpart S would apply. To avoid complications and the creation of inequities among the manufacturers due to the differences in their product lines, we recommend that these lighter vehicles be grouped within the certifications for their similar complete vehicles rather than providing them the option to be grouped in with incomplete MDVs and incomplete HDVs. Toward that end, EPA needs to specify the applicable model year. [EPA-HQ-OAR-2022-0829-0545, pp. 3-4]

Model Year:

We note that the NPRM proposes control for the 2030 MY, citing the need for four MY years lead time as called for in section 202(a)(3)(C) of the Clean Air Act. At this time the promulgation date for a final rule is not known. However, since the MY for heavy-duty vehicles coincides with the calendar year, we expect that a start year of MY 2028 or MY 2029 is possible and thus a revision of this mandatory start year should be considered. [EPA-HQ-OAR-2022-0829-0545, pp. 3-4]

Optional Phase-in with Other Incomplete SI HDVs:

We support providing the certifying manufacturers the flexibility of combining the sales of their incomplete SI MDVs and heavier incomplete SI HDVs for purposes of meeting the sales requirements in the alternative phase-in provided in the recently promulgated heavy-duty final rule which included an ORVR requirement for incomplete SI HDVs with a GVWR over 14,000 lbs.2 Under a provision of that rule, the certifying manufacturers can phase-in controls using the schedule of 40% for the 2026& 2027 MYs, 80% for the 2028 & 2029 MYs, and 100% for the 2030 MY in lieu of 100% in the 2027 MY.3 [EPA-HQ-OAR-2022-0829-0545, pp. 3-4]

2 US EPA, "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 88 FR 4296, January 24, 2023.

3 Note that page 29272 of the NPRM preamble discusses the option to group incomplete SI MDVs and incomplete SI HDVs for sales purposes of meeting the alternative phase-in schedule of §86.1813-17 (b)(1)(iii). The preamble should say 2026-2030, not 2027-2030.

2. The cost, feasibility, and appropriateness of the proposed refueling emission standard for all incomplete LDVs and MDVs

Primary/Secondary Manufacturers:

We agree with EPA that any concerns of the past regarding the relative roles and responsibilities of the primary manufacturers (OEMs) and secondary manufacturers with regard to certification and completion of the fuel/emission control systems on incomplete vehicles (those involving multi-stage manufacturing) have long been resolved. Evaporative emission controls were first required on these vehicles in the 1985 MY (earlier in California) and the techniques used for these earlier evaporative emissions control, and subsequently refined over several sets of more stringent and comprehensive requirements since that time, are equally applicable for refueling emissions control through ORVR for incomplete SI MDVs.4. [EPA-HQ-OAR-2022-0829-0545, pp. 4-5]

4 US EPA, "Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines; Evaporative Emission Regulation and Test Procedure for 1985 and Later Model Year Gasoline- Fueled Heavy-Duty Vehicles," 48 FR 1429, January 12, 1983.

Refueling Emission Families for Certification:

Incomplete SI MDVs are to be certified to the refueling emission standards using the requirements of 40 CFR §86 Subpart B. The same is true for complete SI MDVs which have been subject to the requirements since the 2018 MY. Refueling emission family language in 40 CFR §86.1821-01 requires that the certifying manufacturer use good engineering judgement for grouping vehicle models for purposes of emission testing for certification based on similar evaporative and/or refueling emission characteristics throughout their useful life. Provided that the manufacturers use good engineering judgment in the creation of families, there should be no up-front restriction on combining complete and incomplete SI MDVs in families. [EPA-HQ-OAR-2022-0829-0545, pp. 4-5]

Conversely, heavier complete and incomplete SI HDVs (>## 14,000 lbs. GVWR) are subject to the provisions of 40 CFR §1037.103 for purposes of evaporative/refueling emission certification and should not be grouped into families with complete and/or incomplete SI MDVs certified under 40 CFR§86 Subpart B. [EPA-HQ-OAR-2022-0829-0545, pp. 4-5]

Scope of Applicability:

In the preamble to the final rule, EPA should indicate that the refueling emission control requirements for incomplete SI MDVs are applicable in all 50 states. [EPA-HQ-OAR-2022-0829-0545, pp. 4-5]

Technical Feasibility and Cost:

Ingevity believes that the control of vehicle refueling emissions for incomplete SI MDVs is technically feasible. As mentioned above, ORVR has been used to control refueling emissions on all complete MDPVs and Class 2b SI HDVs since the 2006 MY and since 2018 MY for complete Class 3 SI HDVs. With appropriate lead time, the application of good engineering practice, and proper coordination with secondary manufacturers, it seems clear that ORVR can be applied to incomplete SI MDVs effectively and safely. In fact, it may well be that ORVR is already installed on many of these vehicles since both complete and incomplete SI MDVs already meet Tier 3 evaporative emission requirements and the annual SI MDV vehicle sales are in some cases not large enough to justify a multiple fuel system design. [EPA-HQ-OAR-2022-0829-0545, pp. 4-5]

EPA's system description and cost analysis as presented in the preamble to the NPRM and draft RIA are reasonable and consistent with previous analyses for similar vehicles. Note that this portion of the NPRM provides a cost estimate of $17-21 per vehicle but does not address markups. Elsewhere in the draft RIA a Retail Price Equivalent (RPE) markup of 1.5 is used for other components and component systems which if applied to ORVR would give an RPE cost range of $26-32 per vehicle. In regulatory analyses it is common to assess the cost effectiveness of control in at least the terms of $/ton per vehicle over its average life. To do so, information on vehicle operating characteristics is needed to calculate emission reductions, future fuel price, and fuel recovery credits. Using values derived from the current and a recent EPA RIA,5,6 for a 2030 model year incomplete MDV, the Net Present Value (NPV) of the fuel recovery credits for ORVR over a 30-year survival-weighted lifetime of 182,777 miles at 14.5 mpg7 is about $63 (3% discount) and $53 (7% discount). The NPV of the fuel recovery credits at both 3% and 7% exceed the projected ORVR cost, so the per vehicle cost effectiveness value in $/ton is a negative value and thus a net savings. [EPA-HQ-OAR-2022-0829-0545, pp. 4-5]

14 Information on projected gasoline costs for 2030 and later and on survival fractions by age was taken from Tables 2-47 and 2-34, respectively, of the draft RIA for this rulemaking.

14 Information on Class 2b/3 mileage accrual by age was derived using the depiction in Figure 10-4 of the EPA report "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles – Phase 2 Regulatory Impact Analysis." August, 1016, EPA420-R-16-900..

7 The 14.5 mpg value is taken from page 8-18 of the EPA/DoT-NHTSA Joint Final RIA for the HDGHG Phase 2 rule: "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles – Phase 2, Regulatory Impact Analysis," EPA-420-R-16-900, August 2016. This also includes an upward adjustment for the energy content of butane and pentane vapor which are the dominant species in refueling vapor to the energy content of E10 whole gasoline vapor.

Organization: MECA Clean Mobility

EPA should extend the refueling emission requirements to all incomplete SI vehicles as proposed.

EPA's regulatory framework offers the most comprehensive evaporative/refueling control program in the world for chassis certified vehicles. To meet the refueling emission limits, Onboard Refueling Vapor Recovery (ORVR) has been successfully implemented in the U.S. and Canada for over 25 years, and most recently has been implemented in China and Brazil. Within EPA's IUVP program, there have been over 4500 tests conducted on in-use vehicles equipped with ORVR with an average reduction efficiency of 98%.13 The odometer readings on a large fraction of these vehicles exceeded 100,000 miles. U.S. Tier 2 or California LEV II have reduced evaporative emissions by 90%, and U.S. Tier 3 or California LEV III are 98% effective in reducing evaporative VOC emissions. [EPA-HQ-OAR-2022-0829-0564, pp. 12-13]

13 G. Passavant, "Summary and Analysis of 2000-2015 Model Year IUVP Evaporative and Refueling Emission Data," 2017.

Consistent with EPA's proposal, MECA supports extending the refueling emission requirements to all incomplete medium-duty vehicles at a refueling emission standard of 0.20 grams hydrocarbon per gallon of liquid fuel dispensed as now applies to complete LDVs, LDTs, MDPVs, LHDGVs, and HHDGVs. Furthermore, in response to EPA's specific request to comment, MECA suggests EPA extend this requirement to include all incomplete light-duty vehicles in order to prevent any future removal of ORVR from any liquid fueled vehicles. The OEMs have twenty-five model years of experience with the design and certification of ORVR systems, which together with the EPA IUVP data mentioned above, clearly demonstrate the feasibility. MECA believes that the refueling emission control technologies used for the complete version of all vehicles are equally applicable to their corresponding incomplete vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 12-13]

Consistent with the current requirements for evaporative emission and refueling emission controls for all lighter weight vehicles, MECA supports EPA's proposal to apply a useful life of 15 years/150,000 miles to the MDV refueling emission standard, consistent with existing evaporative emission standards for these vehicles and for complete versions. Given that integrated ORVR/evaporative control system designs share hardware such as the activated carbon canister and purge valve and functions such as vapor transport and canister purge, a common requirement for evaporative and refueling emission standard useful life is logical and necessary. [EPA-HQ-OAR-2022-0829-0564, pp. 12-13]

MECA believes the implementation of ORVR is feasible and practical for primary and secondary manufacturers. OEMs and secondary manufacturers now have decades of experience in working together on measures to ensure that any actions taken by the secondary manufacturer to complete the vehicle do not violate the certificate of conformity or create in-use issues for on-vehicle fuel vapor control systems. In addition, there are now several regulatory provisions within 40 CFR §1037 which provide guidelines on how OEMs and secondary manufacturers may work together under EPA's certification programs.14 This extensive experience together with these recent regulatory provisions suggest that any concerns have been addressed and there is no need for added regulatory measures. Regarding testing for refueling emissions certification, the ORVR test procedures promulgated in 1994 are fully fit for purpose and, perhaps with minor changes or clarifications, should be applied to medium-duty gasoline vehicles using the driving cycles and SHED-test procedures currently specified in 40 CFR Part 86 Subpart B. MECA supports a compliance demonstration through a full vehicle emission testing and certification as contained in Subpart B plus continuation of the manufacturers' certification option using the compliance demonstration flexibility provided in 40 CFR §1037.103©. [EPA-HQ-OAR-2022-0829-0564, pp. 12-13]

14 40 CFR Part 1037.130, 1037.621, 1037.622.

Organization: National Association of Clean Air Agencies (NACAA)

EPA also proposes some changes related to evaporative emissions, including eliminating the exemption of MDV incomplete vehicles from onboard refueling vapor recovery requirements. NACAA supports the proposed changes and recommends that EPA also eliminate this exemption for incomplete LDVs. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

EPA Summary and Response

Summary:

AVE believes that refueling emission control technologies used for complete vehicles are equally applicable to corresponding incomplete vehicles, and accordingly supports applying the proposed refueling standards to all incomplete spark-ignition light-duty and medium-duty vehicles starting with model year 2030.

CARB, MECA, and NACAA also support applying the proposed refueling standards to incomplete light-duty and medium-duty incomplete vehicles. CARB, MECA, and NACAA further emphasized that incomplete light-duty vehicles needed no separate treatment relative to refueling emission standards.

MECA further supported applying a useful life of 15 years or 150,000 miles for the new refueling standards to align with existing evaporative and refueling emission standards that apply for other complete light-duty and medium-duty vehicles, and applying the same SHED-based testing procedures that apply under 40 CFR part 86, subpart B. MECA also supported applying the design-based option to demonstrate compliance with emission standards from 40 CFR 1037.103©.

Ingevity fully supports the proposed extension of the requirements for control of refueling emissions to incomplete SI MDVs (i.e., 8,501-14,000 lb. GVWR) for the 2030 model year (MY), but also suggests that EPA consider applying the ORVR standards for medium-duty vehicles starting in model year 2028 or 2029 (based on the need to allow four years of lead time). Ingevity supports keeping the option of a combined phase-in for medium-duty vehicles and heavy-duty vehicles (above 14,000 pounds GVWR). Ingevity supports applying ORVR standards to incomplete light-duty program vehicles and sees no issues with technical feasibility, cost, in-use effectiveness, or safety. To avoid complications and the creation of inequities among the manufacturers due to the differences in their product lines, Ingevity recommends that these lighter vehicles be grouped within the certifications for their similar complete vehicles rather than providing them the option to be grouped in with incomplete MDVs and incomplete HDVs And accordingly specify the applicable model year. Ingevity stated that there should be no up-front restriction on combining complete and incomplete SI MDVs in families, as long as manufacturers use good engineering judgment in creating families. At the same time, Ingevity recognized that complete and incomplete SI HDV above 14,000 lbs. GVWR should not be grouped into families with MDV. Ingevity recommends that EPA indicate in the preamble to the final rule that refueling emission control requirements for incomplete SI MDVs apply in all 50 states.

Ingevity commented that EPA's system description and cost analysis is reasonable and consistent with previous analyses for similar vehicles. Ingevity noted that the cost estimated did not include markups that would allow for presenting costs as Retail Price Equivalent. Ingevity also observed that fuel savings from containing refueling vapors would lead to a cost savings from reduced fuel consumption, which would more than offset the up-front costs for an overall net savings resulting from the new standards.

Response:

EPA appreciates the broad affirmation of the proposal to adopt refueling standards for incomplete medium-duty vehicles. We are accordingly finalizing the standards as proposed, including the specifications for useful life and test procedures.

We note that the design-based certification provisions in 40 CFR 1037.103© are limited to vehicles above 14,000 pounds GVWR based on the limited facilities available to test those larger vehicles. As a result, we are not applying that certification option for the vehicles at or below 14,000 pounds GVWR that are subject to the refueling standards in this final rule.

We proposed to apply the refueling standard starting in model year 2030 to meet the four-year lead time requirement in the Clean Air Act. As we most commonly do, we proposed to apply the new standards for the first full model year following that four-year reference point. Model year 2029 may start as early as January 2, 2028. Given that this rule is finalized in spring 2024, the first full model year for setting standards is 2030. We are therefore finalizing, as proposed, the requirement to meet the new refueling standards starting with model year 2030. We are additionally finalizing, as proposed the alternative phase-in schedule based on combined implementation for vehicles above and below 14,000 pounds GVWR.

As noted in the comments, the proposed rule included a request for comment on applying refueling standards to incomplete light-duty vehicles and light-duty trucks. After more carefully reviewing of the regulations, it became clear that refueling standards have applied for those vehicles for many years. The regulatory text as adopted in the Tier 3 rulemaking stated: "Light-duty vehicles, light-duty trucks, and complete heavy-duty vehicles must meet the refueling emission standards in this paragraph (b) when measured over the procedure specified in § 86.150." (79 FR 23719, April 28, 2014) This establishes that the complete vs. incomplete vehicle distinction applies only for heavy-duty vehicles. As a result, we are clarifying the regulatory text in this final rule to describe the phase-in of the new refueling standards as applying only for incomplete heavy-duty vehicles. The Tier 3 refueling requirements for incomplete light-duty vehicles and light-duty trucks remain in place.

The provisions of 40 CFR 86.1821-01 describe how to divide vehicles into families based on the characteristics of evaporative canister and other vehicle characteristics. There is no reference to complete or incomplete vehicles, so that has not been and will not be relevant for combining vehicles into families. Since complete and incomplete vehicles of any size would presumably have the same or very similar emission control hardware and settings, those vehicles can be expected to be certified together in a single family. We modified those evaporative/refueling family provisions recently to state clearly that vehicles above and below 14,000 pounds GVWR should never be in the same family, regardless of any similarity in emission control hardware or settings (88 FR 4479, January 24, 2023). EPA did not reopen this issue in this rulemaking, and the existing requirements remain in place.

We expect all manufacturers to meet the new refueling standards and all requirements for EPA certification for vehicles sold in all 50 states, as well as the District of Columbia and the five U.S. territories named in the definition of "United States" in 40 CFR 1068.30.

EPA recognizes and appreciates the additional cost information provided by Ingevity. We have adjusted the cost discussion in RIA Chapter 3.2.7 to indicate that the tabulated values do not include a markup representative of Retail Price Equivalent values.

4.1.6 - Enrichment for power or component protection

Comments by Organizations

Organization: Ad Hoc Small OEM Group

3. COMMANDED ENRICHMENT AECD

EPA is proposing to eliminate the use of commanded enrichment as an AECD on engines used in light-duty vehicles for either power or component protection during normal operation and use. Normal operation is defined at 40 CFR 86.1803-01 to include vehicle speeds and grades of public roads, and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently. [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

EPA requests comment on the proposed prohibition of commanded enrichment including benefits and costs, and additional exceptions where brief rich operation should be allowed. In response, the Ad Hoc Group states as follows:

-Commanded enrichment should continue to be permitted for Small OEMs in high-performance engines [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

Small OEMs urge EPA to continue to allow commanded enrichment in high-performance Small OEM engines beyond the limited, brief permissible circumstances permitted in the NPRM based on the following considerations: [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

-Small OEM high-performance engines primarily use enrichment as a failure avoidance strategy and it is not employed during 97% of normal driving (and remember that the number of miles travelled during normal driving by Small OEM vehicles is drastically lower than the VMT by the vehicles of large volume manufacturers). We emphasize that enrichment is essential to protecting Small OEM high-performance engines. [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

-At present, there are no viable technical alternatives to enrichment for high-performance engines (i.e., alternatives that are reasonable in cost and timeframe). [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

-Enrichment allows high-performance engines to be downsized and thereby made more efficient [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

-In sum, as regards Commanded Enrichment EPA should [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

-At a minimum, allow commanded enrichment on Small OEM vehicles meeting both of the following two criteria: [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

-having a power-to-weight (mass) ratio clearly indicative of high-performance (e.g., > 200 kW/ton (based on curb weight)6, and also [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

-using high-power output engines (e.g., engines > 100 ps (pferdestärke) per liter or > 600 hp).7 [EPA-HQ-OAR-2022-0829-0563, pp. 11-12]

6 Determine a vehicle's power-to-weight ratio by dividing the engine's rated power by the vehicle's GVWR (in hp/pound). If a test group includes multiple configurations, use the vehicle with the highest power-to-weight ratio to characterize the test group

7 We also note that CARB does not have commanded enrichment rules like those proposed in the NPRM.

Organization: Alliance for Automotive Innovation

Enrichment Prohibition Outright and Using US06 CO Standards

Automakers use enrichment only as needed, and its use must be reported as an auxiliary emissions control device (AECD) during certification. EPA proposes to eliminate enrichment both outright and by setting such stringent US06 CO standards that no vehicle could use enrichment and meet the US06 CO standards even if allowed. Both changes lead to the same end – elimination of enrichment. EPA errs in stating that it is no longer needed for component protection. Under limited circumstances, enrichment is needed for component protection. The alternative is to derate the engine and reduce the vehicle’s capability, not by a small amount as asserted by EPA, but by a large amount, which would have a profound impact on consumers. [EPA-HQ-OAR-2022-0829-0701, p. 6]

EPA’s enrichment proposal effectively prohibits modern, high specific output engines. [EPA-HQ-OAR-2022-0829-0701, p. 6]

Manufacturers would need to either build a larger displacement engine that could provide the capability needed by the vehicle, or the customer could just opt for a larger engine (if available). Both cases result in higher overall GHG and criteria emissions to prevent minimal NMOG+NOx and CO emission increases in limited circumstances. [EPA-HQ-OAR-2022-0829-0701, p. 6]

I. Enrichment

EPA proposes to “eliminate commanded enrichment for ICE-powered vehicles for power and component protection.” 282 The proposed fuel enrichment restriction would apply to all Tier 4 certified gasoline spark ignition ICE vehicle applications. [EPA-HQ-OAR-2022-0829-0701, pp. 180-181]

282 NPRM at 29197. EPA asserts that during enrichment events, aftertreatment conversion efficiency drops and hydrocarbon (HC) and carbon monoxide (CO) emissions can increase by 10-fold, or greater.283

283 NPRM at 29277.

EPA claims:

Modern vehicles have sufficient power without the use of enrichment . . . The use of enrichment only has the potential to incrementally increase power . . . [and] Technologies exist that can prevent thermal damage of engine and/or exhaust system components without the use of enrichment during normal operation and use.284 [EPA-HQ-OAR-2022-0829-0701, pp. 180-181]

284 NPRM at 29277.

And,

Modern engines have also added technologies such as VVT, cylinder deactivation, turbo boost control and other technologies that effectively allow the manufacturer designed controls, when used in conjunction with electronic throttle and transmission control to operate the engine in nearly any manner they determine to be optimal for the customer and manufacturer drivability expectations and durability goals. The agency believes that these same technologies, only available in recent years, could also be used for limiting operation in areas described previously as requiring enrichment that result in substantial increases in emission levels in normal operation including high acceleration rates, high loads. The reasons for the original allowances for enrichment discussed in the SFTP FRM can easily be addressed in modern engine and transmissions by utilizing existing controls to limit or avoid operation in areas that require enrichment for any normal vehicle operation.285 [EPA-HQ-OAR-2022-0829-0701, pp. 180-181]

285 DRIA at 3-45

Automakers use enrichment only as needed, and its use must be reported as an auxiliary emissions control device (AECD) during certification. EPA errs in stating that it is no longer needed for component protection. Under limited circumstances, enrichment is needed for component protection. The alternative is to derate the engine and reduce the vehicle's capability, not by a small amount as asserted by EPA, but by a large amount. EPA's enrichment proposal effectively prohibits modern, high specific output engines. [EPA-HQ-OAR-2022-0829-0701, p. 181]

Alternatively, manufacturers would need to either build a larger displacement engine that could provide the capability needed by the vehicle, or the customer could just opt for a larger engine (if available). Both cases result in higher GHG and criteria emissions all of the time to prevent minimal NMOG + NOx emission increases in limited circumstances. [EPA-HQ-OAR-2022-0829-0701, p. 181]

1. Concerns with EPA's Enrichment Proposal

a) Necessity of Enrichment for Modern High Specific Output Engines

EPA's assertion that modern vehicle design makes enrichment unnecessary is in error. Although EPA describes several technologies that it believes can enable modern engines to operate without enrichment, it provides no further technical basis for these claims besides its general beliefs. These unsupported claims are particularly concerning given the broad range of operation that EPA proposes to define as "normal"286 during which it proposes to generally prohibit enrichment. [EPA-HQ-OAR-2022-0829-0701, p. 181]

286 NPRM at 29415. (Proposed definition of normal operation to include “any operator demand that is allowable for engine and vehicle calibrations that are available to the operator for vehicle operation within the manufacturer’s specifications fuel and load (GVWR and GCWR).

For naturally aspirated engines that are not thermally constrained, enrichment only incrementally increases maximum torque and power by about 5%. However, most naturally aspirated engines are thermally constrained and require enrichment for component protection due to their high specific output. [EPA-HQ-OAR-2022-0829-0701, p. 181]

Moreover, manufacturers have generally responded to the increasing stringency of GHG and CAFE regulations by adopting downsized and boosted engines to reduce pumping losses at part load. These improvements are achieved by operating an engine at very high specific output, and thus rely on enrichment to control exhaust temperatures and protect engine and exhaust system components from damage. Additionally, in these modern engines, enrichment is necessary to cool the combustion chamber and control abnormal combustion such as knock and pre-ignition. [EPA-HQ-OAR-2022-0829-0701, pp. 181-182]

EPA describes that the powertrain control system can be used to limit or avoid operation that requires enrichment during any normal vehicle operation. While it is true that the powertrain control system determines the operating state of an engine, it is only in response to the driver demand (accelerator pedal). If the driver floors the pedal, then the driver is demanding the maximum power output from the engine. As the exhaust heats up during this maneuver, it reaches a thermal limit due to material durability of various components, and enrichment is used to maintain the exhaust temperature at the thermal limit. The risk of knock or pre-ignition also increases under these conditions. Without enrichment, the engine control system would have to reduce mass flow through a reduction in boost and/or by closing the throttle to control the exhaust temperature to avoid damaging components. Reducing boost and/or closing the throttle reduces the power output of the engine. Knock and pre-ignition are controlled by retarding spark advance, which also decreases power output and has the additional effect of adding even more heat to the exhaust system. Due to these factors, high specific output engines without enrichment would experience 30-50% power loss when controlling exhaust temperatures. Such a large power reduction would not satisfy customer requirements, and could potentially impact safety in real-world driving situations. [EPA-HQ-OAR-2022-0829-0701, pp. 181-182]

EPA bases its claims of enrichment’s minimal impact on power and torque on the study of one large, 6.4 liter heavy-duty naturally aspirated engine.287 EPA has not provided data on any modern, downsized and boosted engines to support its contention that enrichment only incrementally increases torque / power by 5%. The projected 5% impact on power does not reflect the potential loss of power for these types of engines, which could far exceed 5%.[EPA-HQ-OAR-2022-0829-0701, p. 182]

287 DRIA at 3-47.

b) Market Concerns

The premise that “Modern vehicles have sufficient power without the use of enrichment”288 is highly subjective and ultimately decided by the customer and their increasing demand for vehicle utility. Such a broad declaration gives the impression that EPA believes that vehicle utility has reached a practical zenith or that any incremental utility can and should now be capped in order to facilitate a new, narrow emissions reduction strategy through the elimination of enrichment. This is in contrast with EPA's historical practice of setting performance-based standards that generally assume at least maintaining current levels of performance (i.e., not negatively affecting a vehicle's utility). [EPA-HQ-OAR-2022-0829-0701, pp. 182-183]

288 NPRM at 68.

New vehicle purchasers generally desire increased vehicle features, including power, not less. Power, and the enhanced utility and driving dynamics it enables, are core customer-demanded functional attributes of a vehicle and engine combination. The preference of customers for improved features transcends all price points and vehicle segments. New vehicle purchasers consistently raise the bar on what they decide to be sufficient. [EPA-HQ-OAR-2022-0829-0701, pp. 182-183]

In the past, customers who sought greater vehicle utility or higher performance did so through selection of optional engines with greater displacement. However, industry, driven in part by GHG and fuel economy regulations, has developed entire families of downsized engines that have proven capable of meeting customer demands for power while simultaneously increasing efficiency and lowering GHG emissions. This is exactly the strategy that EPA previously identified as the technological pathway to meeting increasingly stringent GHG emissions regulations while maintaining existing performance levels. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Enrichment is a critical strategy that has enabled this technological shift to lower displacement engines, ensuring their safe and durable operation in transient high-power demand situations. Manufacturers use enrichment to ensure that when customers demand high power, they can do so without the risk of costly damage or interrupted performance. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Customer needs for power include, but are not limited to, the ability to tow a large trailer up an occasional steep grade, to operate the vehicle with a full load of passengers and cargo, and to rapidly accelerate on a short freeway entrance ramp to safely merge into traffic. Other customers, for example those purchasing supercars, expect superior performance and racetrack i. In each case, the power requirement from the engine depends on the customer's usage, and if its "sufficient power" is inadequate to accomplish their task, then the customer may be exposed to potentially unsafe and inadequate operation and will be dissatisfied with their vehicle's utility. A sudden reduction or interruption of power in the midst of a driving maneuver (e.g., passing on a grade) could be disruptive to the driver and confusing to other drivers. In some cases, this may create an unsafe traffic condition if the vehicle suddenly loses power, forcing other drivers to take evasive actions. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Customers who seek specific power levels and are dissatisfied with the reduced power of downsized engines due to prohibitions on enrichment would likely revert to seeking out higher displacement engines or shift into larger vehicle segments. Worse yet, customers may simply reject new offerings and remain in older vehicles longer, further increasing the rising average age of vehicles on the road and delaying rollouts of other technologies. Any of these outcomes would detract from achieving the agency's overall goals of reduced emissions and improved fuel economy. [EPA-HQ-OAR-2022-0829-0701, p. 183]

c) De Minimis Emissions Impact of Enrichment

Although CO emissions increase during fuel enrichment due to the physics of three-way catalyst chemistry, this operation is infrequent and only occurs when high load capability is needed. (For example, maintaining minimum safe speeds when towing up steep grades to avoid damaging components.) These events make up a relatively small portion of on-road use and are typically short in duration. [EPA-HQ-OAR-2022-0829-0701, pp. 184-185]

EPA has not provided any event and time-weighted analysis of the overall emissions impact of generally prohibiting enrichment to justify its proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 184-185]

The following data in Figure 67 provides a sample for real-world driving conditions from a limited test program conducted by a member company on a set of European vehicles operating under a mix of normal driving conditions, including high-speed highway operation and occasional towing. The data, details of which will be provided by the member company under confidential submission, provides estimated cumulative duration of travel at different engine operating conditions. This sample data indicates that for the vast majority of conditions encountered in on-road use, enrichment is used infrequently and for only a short duration. This sample dataset indicates that the cumulative time in the operating zone of this particular vehicle where enrichment may occur is much less than 0.1% in total. This specific example included over 4500 instrumented vehicles and over 370,000 individual trips. While representative of European driving conditions, Auto Innovators contends that a similar pattern would likely be exhibited in the U.S. [EPA-HQ-OAR-2022-0829-0701, pp. 184-185]

[See original attachment for Figure 67: Example of limited use of enrichment in on-road operation.] [EPA-HQ-OAR-2022-0829-0701, pp. 184-185]

Also, in general, carbon monoxide emissions are no longer the concern that they once were. There are currently no areas in non-attainment with National Ambient Air Quality Standards for CO.289 This is, in part, a testament to the efficacy of modern vehicle emission control systems including when enrichment is allowed as an auxiliary emission control device. [EPA-HQ-OAR-2022-0829-0701, pp. 184-185]

289 U.S. Environmental Protection Agency, Green Book Carbon Monoxide (1971) Area Information, available at https://www.epa.gov/green-book/green-book-carbon-monoxide-1971-area-information (retrieved June 1, 2023).

2. Recommendations on Enrichment

Auto Innovators opposes the proposal to broadly eliminate enrichment and believes that EPA's proposal could reverse the holistic environmental and energy success we have achieved in customer adoption of downsized engines. [EPA-HQ-OAR-2022-0829-0701, pp. 185-186]

As noted throughout these comments, the projected increases in vehicle electrification will deliver the bulk of the pollutant reductions being sought by EPA. The majority of the benefits achieved will be from the phasedown of ICE vehicles. Enrichment may appear to provide a narrow pathway for incremental gains, but as Auto Innovators has outlined above, these potential gains may disrupt other holistic gains from downsized engines overall. Benefits would likely be very small relative to the disruption this could pose in the phasedown of ICE powertrains. [EPA-HQ-OAR-2022-0829-0701, pp. 185-186]

Auto Innovators recommends that EPA leverage the existing AECD process to continue the dialogue with OEMs on concerns with enrichment. The AECD process already includes agency review of the need for controls such as commanded power and thermal protection enrichment. We recommend that EPA continue to use the existing AECD process to review strategies with OEMs and that EPA not finalize the elimination of enrichment as proposed in the NPRM. In order for enrichment to be managed through the AECD process, the proposed CO standards will also require adjustment as they also serve as a de facto enrichment ban. [EPA-HQ-OAR-2022-0829-0701, pp. 185-186]

To the extent that additional data could be helpful in informing EPA it of enrichment in the future, we recommend EPA convene a stakeholder group to review options that could be used to gather data. Data on a broad range of vehicles could be used to better understand the actual real-world impact of enrichment on emissions, including the frequency of AECD commanded fuel enrichment. This process, conducted over a range of driving conditions and engine types, could serve as a basis for a future proposal. Once the data is collected and analyzed, then EPA could better determine if there is a need (or not) to address enrichment in a future regulatory rulemaking. Without such data, it is difficult to understand the opportunity for reduction that can then be weighed against the implementation challenges. [EPA-HQ-OAR-2022-0829-0701, pp. 185-186]

Auto Innovators wants to ensure that while the transition to electric vehicles is ongoing, customers of ICE vehicles continue to experience the benefits of high specific power engines and not be forced to reconsider their purchase decisions should future options no longer meet their utility needs. [EPA-HQ-OAR-2022-0829-0701, pp. 185-186]

3. Recommendations on the Definition of “Normal Operation”

Auto Innovators has significant reservations about EPA’s proposal to generally prohibit enrichment. However, if EPA does finalize such provisions, it should revise the definition of “normal operation” to be workable. [EPA-HQ-OAR-2022-0829-0701, pp. 185-186]

The text at the proposed 40 C.F.R. § 86.1809-12(d)(1) defines “normal operation” to include all operating conditions of a vehicle such as trailer tow, altitude and ambient conditions. Also, the proposal requires similar effectiveness in emission control compared to the levels demonstrated in the test cycles (or that the vehicle design does not incorporate strategies that unnecessarily reduce emission control effectiveness exhibited during the certification test procedures). This is not feasible because the demonstrated test cycle conditions operate at different mass flow and temperatures which affects the space velocity or residence time of the species in the converter which in turn affects the conversion efficiency or effectiveness of the emission control system. Hence, maintaining similar effectiveness under all operating conditions is not practical from an emissions control perspective. [EPA-HQ-OAR-2022-0829-0701, pp. 185-186]

We recommend that EPA modify the proposed 40 C.F.R. § 86.1809-12(d)(1) text as follows:

The manufacturer must show to EPA’s satisfaction that the vehicle design does not incorporate strategies that unnecessarily reduce emission control effectiveness exhibited during the certification test procedures specified in this subpart, the fuel economy test procedures in 40 CFR part 600, or the air conditioning efficiency test in 40 CFR 1066.845, when the vehicle is operated under conditions that may reasonably be expected to be encountered in normal operation and use, unless allowed as an AECD. During normal operation, operating at stoichiometry or near stoichiometric conditions should not be considered as reducing the effectiveness of the emissions control system. [EPA-HQ-OAR-2022-0829-0701, pp. 186-187]

Organization: American Honda Motor Co., Inc.

Further, there appears to be a disconnect between the agency's position on PM stringency and commanded enrichment. GPF regeneration will be necessary to avoid damage to the engine and exhaust system. While passive regeneration can occur under certain high load conditions, in many cases it will not occur under lighter load operation. The agency itself acknowledges that no significant passive regeneration would occur during -7°C FTP and 25°C FTP cycles, and that a US06 test cycle would be required to reach the necessary 600°C temperature needed for passive regeneration.23 Consumers who generally operate their vehicles under lighter load conditions would likely need some degree of active regeneration. Unfortunately, by proposing to disallow commanded enrichment for the purpose of engine and aftertreatment protection, the agency has effectively prohibited active regeneration. Other potential strategies such as spark retard and air fuel ratio modulation have been examined as potential solutions, but the technical effectiveness of those approaches remains inadequate.24 [EPA-HQ-OAR-2022-0829-0652, pp. 14-15]

23 88 Fed. Reg. 29267 (May 5, 2023)

24 Van Nieuwstadt, et al., 2019. Regeneration Strategies for Gasoline Particulate Filters. SAE 2019-01-0969.

D. Enrichment

One of the more surprising elements included in the NPRM is the agency's proposed elimination of commanded enrichment for ICE-powered vehicles for power and component protection. By our read, three high-level arguments are posited by the agency in support of this position:

1. "Technologies exist that can prevent thermal damage of engine and/or exhaust system components without the use of enrichment during normal operation and use" [EPA-HQ-OAR-2022-0829-0652, pp. 19-20]

2. "The use of enrichment only has the potential to incrementally increase power" [EPA-HQ-OAR-2022-0829-0652, pp. 19-20]

3. "Modern vehicles have sufficient power without the use of enrichment"37 [EPA-HQ-OAR-2022-0829-0652, pp. 19-20]

37 88 Fed. Reg. 29277 (May 5, 2023).

While Honda respects the agency's desire to minimize excess criteria emissions, we believe the arguments put forth by the agency on this topic are not sufficiently supported. As such, we believe the enrichment-related aspect of the proposal should be omitted from the Final Rule and reconsidered at a future date pending additional supporting evidence. [EPA-HQ-OAR-2022-0829-0652, pp. 19-20]

Argument #1. Technologies exist that prevent the need for such enrichment [EPA-HQ-OAR-2022-0829-0652, p. 20]

EPA addresses this point in the Draft RIA:

Technologies exist today which can prevent thermal damage of exhaust system components without the use of commanded enrichment during normal operation and use, and modern vehicles have sufficient power without the use of commanded enrichment. The use of commanded enrichment only has the potential to increase power by approximately 5 percent on a naturally aspirated engine but significantly reduces the effectiveness of three-way catalytic converter systems, resulting in increases of NMOG, CO and air toxics, in some cases by orders of magnitude.38 [EPA-HQ-OAR-2022-0829-0652, p. 20]

38 EPA, 2023. Draft RIA, p. 3-46. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

The agency's subsequent elaboration on these technologies, however, simply points to "modern engine technologies" and cites examples such as VVT and cylinder deactivation as providing sufficient control "to limit or avoid operation in areas that require enrichment for any normal vehicle operation"39: [EPA-HQ-OAR-2022-0829-0652, p. 20]

39 EPA, 2023. Draft RIA, p. 3-45. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Modern engines have also added technologies such as VVT, cylinder deactivation, turbo boost control and other technologies that effectively allow the manufacturer designed controls, when used in conjunction with electronic throttle and transmission control to operate the engine in nearly any manner they determine to be optimal for the customer and manufacturer drivability expectations and durability goals. [EPA-HQ-OAR-2022-0829-0652, p. 20]

The agency believes that these same technologies, only available in recent years, could also be used for limiting operation in areas described previously as requiring enrichment that result in substantial increases in emission levels in normal operation including high acceleration rates, high loads. The reasons for the original allowances for enrichment discussed in the SFTP FRM can easily be addressed in modern engine and transmissions by utilizing existing controls to limit or avoid operation in areas that require enrichment for any normal vehicle operation. Vehicles can "drive" through these areas but quickly exit by changing the engine airflow control, ignition timing, valvetrain settings, speed, or other parameters that would avoid this unnecessary increase in emissions.40 [EPA-HQ-OAR-2022-0829-0652, p. 20]

40 EPA, 2023. Draft RIA, p. 3-45. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

The agency provides no technical research or real-world examples to support the position that customer and manufacturer drivability expectations and durability goals can be maintained while "driving through" problematic areas of the engine map. Automakers have spent years refining and finessing internal combustion engine performance to deliver today's drivers a satisfying and compelling product; the insinuation that automakers have willfully been eschewing potential emissions reductions and fuel savings is illogical and wholly inconsistent with our commitment to the customer. [EPA-HQ-OAR-2022-0829-0652, pp. 20-21]

As an example, Honda's cylinder deactivation systems can only activate in conditions with reduced engine output demand, due to having fewer firing cylinders. Enrichment during high load is used during conditions when the vehicle requests higher engine output demand. It is therefore impossible to use cylinder deactivation to operate in the same conditions as when enrichment is demanded. [EPA-HQ-OAR-2022-0829-0652, pp. 20-21]

Additionally, Honda's cylinder deactivation may or may not reduce the catalytic converter temperatures, depending on the engine operating conditions. It is therefore not a robust method to control exhaust temperatures. [EPA-HQ-OAR-2022-0829-0652, pp. 20-21]

Argument #2. The use of enrichment only has the potential to incrementally increase power [EPA-HQ-OAR-2022-0829-0652, p. 21]

The agency claims that "the use of commanded enrichment only has the potential to increase power by approximately 5 percent on a naturally aspirated engine,"41 citing, as proof, an analysis conducted for the recently finalized 2027 and later heavy-duty vehicle and engine standards. As we understand it, that analysis utilized a single 6.4L heavy duty engine, hardly representative of today's passenger car and light duty truck fleet as a whole. To our knowledge, EPA did not examine the peak power loss that would occur in smaller naturally aspirated and/or downsized turbocharged designs that are more reflective of today's passenger car and light truck market. As noted in comments submitted to this Docket by our trade association, today's engines could lose roughly 30-50% of peak power as a result of enrichment elimination. While results would of course vary, the range provided by Auto Innovators is generally consistent with our engineering understanding. [EPA-HQ-OAR-2022-0829-0652, p. 21]

41 EPA, 2023. Draft RIA, p. 3-45. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Argument #3. Modern vehicles have sufficient power without the use of enrichment [EPA-HQ-OAR-2022-0829-0652, pp. 21-22]

The definition of "sufficient" is highly subjective and, as such, is difficult to either prove or disprove. In our view, the agency's rationale supporting Argument #3 is lacking. Although commanded enrichment for the purpose of power and component protection occurs relatively infrequently on Honda products, it does occur and therefore reflects a genuine need for at least a portion of our customers – be it power for towing, a temporary need for urgent acceleration, or other customer applications. Honda has taken great care in right-sizing our powertrains to provide the best balance of efficiency, customer drivability expectations/requirements and regulatory compliance. [EPA-HQ-OAR-2022-0829-0652, pp. 21-22]

Should commanded enrichment be eliminated as proposed, a paradoxical but logical outcome of that decision could be that – to ensure continued performance associated with those customers' needs – application of a larger, less efficient internal combustion engine is deemed warranted. The agency's proposed handling of enrichment is unnecessarily disruptive and, as such, we recommend that EPA maintain the current AECD process to ensure emissions system effectiveness, durability and fundamental vehicle utility. [EPA-HQ-OAR-2022-0829-0652, pp. 21-22]

Recommendation: Omit proposed changes regarding commanded enrichment from the Final Rule and reconsider them at a future date pending additional supporting evidence. Maintain the current AECD process to ensure emissions system durability and fundamental vehicle utility. [EPA-HQ-OAR-2022-0829-0652, p. 22]

Organization: Aston Martin Lagonda (AML)

3. COMMANDED ENRICHMENT AECD

EPA is proposing to eliminate the use of commanded enrichment as an AECD on engines used in light-duty vehicles for either power or component protection during normal operation and use. Normal operation is defined at 40 CFR 86.1803-01 to include vehicle speeds and grades of public roads, and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently. [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

EPA requests comment on the proposed prohibition of commanded enrichment including benefits and costs, and additional exceptions where brief rich operation should be allowed. [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- Commanded enrichment should continue to be permitted for SVMs in high performance engines We urge EPA to continue to allow commanded enrichment in high performance SVM engines beyond the limited, brief permissible circumstances permitted in the NPRM based on the following considerations: [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- Aston Martin high performance engines use enrichment as a failure avoidance strategy and it is therefore employed only in extreme circumstances, accounting for as little as 3% of all normal driving. Aston Martin can provide its EU findings on the subject of enrichment to EPA, if required. [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- At present, there are no viable technical solutions for alternatives to enrichment for high performance engines (i.e., alternatives that are reasonable in cost and timeframe). [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- Enrichment allows high-performance engines to be downsized and thereby made more efficient. [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- To conclude, as regards Commanded Enrichment EPA should: [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- At a minimum, allow commanded enrichment on SVM vehicles meeting both of the following two criteria: [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- having a power-to-weight (mass) ratio clearly indicative of high-performance (e.g.,> 200 kW/tonne (based on curb weight),3 and also [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

- using high-power output engines (e.g., engines> 100 hp per liter or> 600 hp).4 [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

3 Determine a vehicle's power-to-weight ratio by dividing the engine's rated power by the vehicle's GVWR (in hp/pound). If a test group includes multiple configurations, use the vehicle with the highest power-to-weight ratio to characterize the test group

4 We also note that CARB does not have commanded enrichment rules like those proposed in the NPRM

[See original attachment for table of engine descriptions] [EPA-HQ-OAR-2022-0829-0566, pp. 10-11]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Criteria Air Pollutant Standards

CARB supports U.S. EPA's proposal to tighten criteria air pollutant emission standards, particularly given the continued role that internal combustion engine vehicles will play in the national fleet over the regulatory timeframe and beyond. Reducing exposure to harmful air pollution is a key element of the proposed standards, and the proposals to tighten criteria air pollutant emissions are needed to protect public health, especially in communities with disproportionate exposure to air pollution. Because U.S. EPA's proposal does not require ZEV sales, as California's rules do, the tightening of criteria air pollutant emission standards is even more critical to ensure that the internal combustion engine vehicles that will continue to be sold are becoming cleaner. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

As part of its ACC II rulemaking, CARB adopted its fourth iteration of its Low Emission Vehicle (LEV) standards, referred to as LEV IV. CARB finds that U.S. EPA's proposals are appropriate and largely consistent with the LEV IV standards. CARB has documented our analysis and recommends strengthening the proposal to realize the greatest degree of emission reductions achievable, considering cost and technology availability, to further protect public health. As described further below, CARB recommends that U.S. EPA adopt its proposed NMOG+NOx and PM standards, adopt elements of CARB's evaporative emission standards program, and eliminate the use of commanded enrichment as proposed while collecting additional information on the use of auxiliary emissions control devices to further improve emission standards in the future. [EPA-HQ-OAR-2022-0829-0780, pp. 26-27]

Commanded Enrichment

U.S. EPA requested comment on eliminating commanded enrichment for vehicles with engines for power and component protection. Commanded enrichment involves control of the fuel system to achieve a richer air fuel ratio mixture during combustion and in the exhaust stream for various desired outcomes that may include increased engine output power, decreased exhaust temperature, or a different composition of unburned fuel or oxygen in the exhaust stream. Most current vehicles incorporate auxiliary emission control devices (AECD) that utilize enrichment for the purpose of protecting components in the exhaust system from thermal damage during specific driving and ambient conditions that can occur in some routinely encountered in-use conditions. Some vehicles incorporate similar strategies for the purpose of increasing the power output of the engine under specific driving conditions. Such strategies significantly reduce the effectiveness of the aftertreatment system during their operation and cause significantly increased tailpipe emissions. [EPA-HQ-OAR-2022-0829-0780, pp. 37-38]

CARB agrees with U.S. EPA's findings that the need for enrichment to temporarily boost engine power levels is no longer necessary given the state of electronic controls and advanced powertrains such as turbocharged engines, variable valve timing and lift systems, and advanced multi-speed transmissions that have allowed manufacturers to introduce vehicles with higher power levels and performance than ever before. CARB also agrees the elimination of enrichment for engine component protection would better ensure that manufacturers, despite U.S. EPA and CARB prohibitions, are not using such strategies to protect frail designs in lieu of using more robust components that can better withstand the temperatures and exhaust environment. Even with full disclosure by manufacturers at the time of certification, AECDs that result in enrichment can utilize a complex set of enabling criteria that make it difficult to review and assess the likely frequency and duration of activation during in-use vehicle operation. [EPA-HQ-OAR-2022-0829-0780, pp. 37-38]

CARB supports U.S. EPA's proposal to eliminate the allowance of the use of commanded enrichment as an AECD on spark ignition engines used in light- and medium-duty vehicles for either power or component protection during normal operation and use. CARB also agrees with U.S. EPA that the use of frequent or prolonged enrichment can significantly increase tailpipe emissions to levels far above the emission standards and the current approach of relying on U.S. EPA (and CARB) staff review to identify strategies that are being used in lieu of appropriate robust emission controls is insufficient to catch all of the inappropriate implementations. Because of this issue, CARB recommends that U.S. EPA require standardized data to be stored onboard vehicles to track AECD activation that adversely impacts emissions so that the agency will be better informed as to the frequency, duration, and cumulative emission impact of such strategies even beyond those that trigger enrichment for component protection. Manufacturer-required collection and reporting of such data to the agency could also better ensure that all manufacturers are being held to a more consistent implementation and enable U.S. EPA to consider alternative regulatory approaches in the future such as setting maximum allowable activation limits for AECDs of concern. [EPA-HQ-OAR-2022-0829-0780, pp. 37-38]

Organization: Ferrari N.V. and Ferrari North America, Inc.

FERRARI POSITION

Among the new requirements introduced in EPA's proposal, Ferrari identified the following main challenges. [EPA-HQ-OAR-2022-0829-0572, pp. 4-5]

Fuel Enrichment Ban

EPA proposes to eliminate commanded enrichment for ICE-powered vehicles for component protection or power increase in any driving condition, considering it unnecessary for modern vehicles. However, Ferrari is deeply concerned by this statement, especially given the wide range of operation that EPA proposes to define as "normal". [EPA-HQ-OAR-2022-0829-0572, pp. 4-5]

The necessity of the enrichment strategy is strictly dependent on the driver power demand (e.g. towing conditions, rapid acceleration for safety purpose), aggressiveness of the driver (e.g. aggressive acceleration) and vehicle capabilities. Moreover, to address stricter GHG and CAFE Regulations, there has been a trend over the years to downsize and boost engines to reduce pumping losses. These improvements are achieved by operating an engine at very high specific output, relying on enrichment to control exhaust temperatures and protect engine and exhaust system components from damage. [EPA-HQ-OAR-2022-0829-0572, pp. 4-5]

This is even more true for high-performance vehicles with track capabilities. Our vehicles are designed to reach clients racetrack expectations to preserve Ferrari DNA, resulting in a very limited use well beyond the restrictions of the US Highway Code. Under these circumstances, the proposed ban of enrichment as protection strategy would inevitably lead to increased exhaust gas temperatures that would severely damage and compromise the engine and related emission control system. [EPA-HQ-OAR-2022-0829-0572, pp. 4-5]

Therefore, Ferrari suggests maintaining the current Auxiliary Emission Control Device (AECD) approach that leaves room for discussion on the need for enrichment as protection strategy. [EPA-HQ-OAR-2022-0829-0572, pp. 4-5]

Organization: Ford Motor Company

Second, to ensure the final rule does not go too far and too fast, especially in 2027 – 2029, the EPA should adjust two aspects of the proposal regarding criteria emissions: fuel enrichment and particulate matter testing obligations. Although fuel enrichment can lead to higher emissions during brief and infrequent conditions which are disclosed to the EPA, fuel enrichment has been critical for overall emissions reductions. The practice enables automakers to downsize engines while also meeting consumer needs for some of the toughest jobs, without compromising powertrain durability. Removing fuel enrichment, as EPA has proposed, will directly impact customers' acceptance of new products, especially trucks, and they may keep their existing vehicle longer or opt for a larger (i.e., higher emitting) vehicle to be sure they can get the job done. Major powertrain redesigns would be needed to recover this lost utility, and these are not possible within the timeframe defined by the enrichment phase-out proposed by EPA. Next, although Ford supports aspects of EPA's proposed particulate matter (PM) standards which will necessitate the use of gasoline particulate filters, the proposed PM standard will challenge current laboratory equipment and procedures. Ford requests that the EPA eliminate the need to measure PM on the -7°C FTP for vehicles that are equipped with gasoline particulate filters. [EPA-HQ-OAR-2022-0829-0605, p. 3]

Light- and Medium-Duty Fuel Enrichment [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

EPA is proposing to eliminate commanded enrichment for ICE-powered vehicles for power and component protection. Fuel enrichment protects engine components during infrequent and/or short duration high-power demand events, such as freeway on-ramps or towing on steep grades. The ability to employ limited commanded enrichment has allowed downsized engines to meet customer performance demands across a broad range of real-world driving condition, resulting in considerable CO2 savings. If left unmitigated, the elimination of commanded enrichment would result in performance degradations that would be unacceptable to most customers, forcing many to retain older models or to upgrade to larger, more capable vehicle classes. Either result would run counter to EPA's intention to reduce on-road emissions. [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

In order to meet customer needs without enrichment, Ford will need to implement expensive, long-lead time engine development actions, such as increasing component sizes (turbos and heat exchangers) and adding more expensive engine and manifold materials. Under the EPA proposal, this would need to be accomplished and during a timeframe when we are already stretching our capital and engineering resources to their limits in order to transition to electrification. The proposal would also not provide the lead-time needed to undertake such engine redesign programs. For these reasons, Ford does not consider the proposed phase-in for the enrichment prohibition to be feasible. For recommends that EPA shift the phase-in requirements to at least 2029MY for vehicles below 6,000lb GVWR. [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

[See original comment for Table 2: Ford Recommended Enrichment Phase-in] [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

Regarding EPA's proposed enrichment exception allowances under 40 CFR 86.1811-17(d)(2), Ford requests that EPA include the following additional conditions to account for sporadic pre- ignition and other potential future technologies that may be deemed acceptable for agency approval through the AECD review process: [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

- Temporary and infrequent enrichment following sporadic pre-ignition events (used to prevent follow-on events which are prone to causing engine damage), [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

- Enrichment conditions substantially demonstrated during emissions testing, or [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

- Enrichment conditions otherwise approved by the EPA. [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG opposes removal of commanded enrichment as an AECD [EPA-HQ-OAR-2022-0829-0554, p. 3]

EPA is proposing to eliminate the allowance of commanded enrichment as an AECD on spark ignition engines used in light-duty vehicles (LDV) and medium-duty vehicles (MDV) for either power or component protection during normal operation and use. Normal operation is defined at 40 CFR § 86.1803-01 to include vehicle speeds and grades of public roads and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently. Commanded enrichment includes lean best torque enrichment. EPA requested comment on the proposed prohibition of commanded enrichment as an AECD, including analyses of benefits and costs, and additional exceptions where brief rich operation should be allowed. [EPA-HQ-OAR-2022-0829-0554, p. 3]

HMG supports AFAI's public comment position to oppose enrichment prohibitions in the Proposed Rule. HMG appreciates the current Tier 3 enrichment exceptions allowed by the EPA and asks that all be included in the final rule. HMG believes EPA's proposed enrichment prohibitions will require the diversion of resources and time that would be better invested in the long-term goal of deploying 100% ZEVs in exchange for little short-term gain [EPA-HQ-OAR-2022-0829-0554, p. 3]

HMG believes exceptions for enrichment are needed for consumer-requested performance and vehicle component protection because excessive exhaust temperatures quickly damage the after-treatment system. The catalyst and sensors are critical for maintaining effective emission control shift conditions , pre ignition conditions, and excessive ignition timing retarding due to fuel condition. The shift conditions mentioned earlier refer to specific safety and performance conditions, including terrain, snow, towing, and climbing grades. During shifting and engine torque reduction, there is a concern about a rapid increase in exhaust temperature by retarding the ignition timing. Accordingly, HMG recommends the following specific exceptions: [EPA-HQ-OAR-2022-0829-0554, p. 3]

For the shift conditions, engine torque should be adjusted to reduce shift shock. In this case, ignition timing is retarded/adjusted to around 20-25 degrees for a fast response. The exhaust temperature rises by this control, and in order to prevent this, there is more fuel injected when the ignition timing is over delayed. [EPA-HQ-OAR-2022-0829-0554, p. 3]

Pre-ignition can damage an engine very quickly. When the knock sensor detects vibrations caused by pre ignition, additional fuel is injected as a countermeasure. This enrichment lowers temperature in the combustion chamber and stops the pre-ignition. [EPA-HQ-OAR-2022-0829-0554, p. 3]

The vehicle monitors for low-quality and low-octane fuel because it can easily cause knocking across the engine operating range. To prevent this, the timing is retarded, which increases exhaust temperature. [EPA-HQ-OAR-2022-0829-0554, p. 3]

Enrichment is used to counteract the rising temperature [EPA-HQ-OAR-2022-0829-0554, p. 3]

The EU has several upcoming regulations with enrichment provisions to be passed within the next few years, including Euro-6e (2024) and Euro 7 (2025). Euro-6e limits enrichment but allows for several exceptions including towing, uphill, and at very high speeds. Euro-7 eliminates enrichment completely with no exceptions, which more closely aligns with Tier-4. HMG is currently focused on meeting Euro- 6e. Further, compliance with EU regulations cannot be directly compared to Tier 4 given the difference between the EU and U.S. markets . R&D efforts and cost spent to meet Euro-6e or 7 cannot be used to justify Tier 4's elimination of enrichment because the Euro-6e engines being developed more closely align with Tier 3 requirements for enrichment, and thus would not be compliant with Tier 4. The Euro-7 engines to be developed will also not be transferable as the European market does not have the larger engines demanded by the U.S. market. [EPA-HQ-OAR-2022-0829-0554, pp. 3-4]

The Tier 4 proposed elimination of enrichment would also require a large amount of R&D, specific to the U.S. market and ICE vehicles. These added costs and resources will only result in potential short-term gain given the overall drive to ZEV development, and deployment and will undoubtedly impact the funding and resources available for ZEV development. HMG's goal is to prioritize ZEV development, but the proposed Tier 4 requirements will require sharing resources and funding between ICE and ZEVs, which will slow the ability to develop the long-term technologies necessary to fully transition to ZEVs. [EPA-HQ-OAR-2022-0829-0554, pp. 3-4]

Additionally, if the enrichment prohibitions are finalized, Tier 4's proposed durability requirements will be difficult to meet because enrichment is an important part of component protection. The Tier 4 proposed durability requirements for electric powertrain components and major emission control components is 8 years/100,000 miles. Component protection is needed to maintain integrity of after treatment hardware. Indeed, this is one of the main benefits of enrichment. Without additional enrichment exceptions, there are certain situations that will damage the catalyst, making it difficult for the vehicle to reach 100,000 miles before there are unnecessary costs associated with repairs and warranty claims. [EPA-HQ-OAR-2022-0829-0554, p. 4]

HMG supports AFAl's public comment position to oppose new enrichment prohibitions. HMG believes the proposed enrichment prohibitions would necessitate a large manufacturing investment, completely re-organizing new engine development, and result in rising costs that are not beneficial to our customers or the ultimate goal of 100% ZEV deployment. HMG also supports AFAl's recommendation to maintain the current AECD process to ensure emissions system durability, safe vehicle operation, and fundamental vehicle utility demanded by customers . HMG agrees with AFAl's recommendation that EPA gather data across a broad range of vehicles covered by this regulation to better understand the actual real-world impact on emissions and purported benefits, including the frequency of AECD commanded fuel enrichment. In addition, HMG believes it is necessary to set clear criteria for detailed test conditions about enrichment restriction. [EPA-HQ-OAR-2022-0829-0554, p. 4]

Organization: Kia Corporation

- Kia supports EPA continuing to allow Auxiliary Emission Control Devices (AECDs) for enrichment to satisfy our customers' requirements and maintain vehicle utility.4 Kia does not support EPA's proposal to eliminate commanded enrichment for ICE-powered vehicles for power and component protection. Elimination of enrichment will require a large amount of research and development specific to ICE vehicles in the U.S. market. [EPA-HQ-OAR-2022-0829-0555, p. 3]

4 88 Fed. Reg. 29,258.

Kia Supports Continuing to Allow Auxiliary Emission Control Devices

Kia does not support EPA's proposal to eliminate commanded enrichment for ICE-powered vehicles for power and component protection. Elimination of enrichment will require a large amount of research and development specific to ICE vehicles in the U.S. market. EPA must allow automakers to focus resources on the transition to EVs, not incremental emissions improvement to ICE vehicles. Kia proposes that the EPA continue to allow Auxiliary Emission Control Devices (AECDs) for enrichment to satisfy our customers' requirements and maintain vehicle utility.20 [EPA-HQ-OAR-2022-0829-0555, p. 12]

20 88 Fed. Reg. 29,258.

There are specific driving circumstances that enrichment is still needed for component protection such as challenging terrain or snow mode operation. automakers use enrichment only as needed and it is always reported as an AECD during certification. The conflicting need for higher efficiency and lower emissions comes as consumer demand for towing remains unchanged. [EPA-HQ-OAR-2022-0829-0555, p. 12]

Kia is concerned that derating the engine's performance in high load operations will prolong the use of older, less efficient, and higher emitting GHG and criteria emissions vehicles. Further, EPA's proposed prohibition on enrichment would encourage automakers to build larger displacement engines that could provide the capability needed by the vehicle, or the customer could just opt for a larger engine. This would be counterproductive as it could increase GHG and criteria emissions just to prevent minimal NMOG+NOx emission increases in limited circumstances. [EPA-HQ-OAR-2022-0829-0555, p. 12]

Organization: Mazda North American Operations

Criteria

Mazda anticipated some changes to EPA's light duty vehicle criteria emissions (i.e., NMOG, CO, NOx, PM) requirements, particularly to align with the new changes in the California Air Resources Board's (CARB) recent Advanced Clean Cars II regulation. However, we did not expect two of the new requirements included in the proposal: the reduction of the PM standard to 0.5 mg/mile, and the ban of enrichment during normal engine operation. [EPA-HQ-OAR-2022-0829-0595, p. 3]

Reducing the PM standard to 0.5 mg/mile is excessive. There was already considerable difficulty and effort put into meeting CARB's planned 1mg/mile PM standard, and there is still uncertainty that the 0.5 mg/mile standard will be measurable using current laboratory technology. It will also make it necessary to have all vehicles equipped with Gasoline Particulate Filters (GPF) and the resulting cost and development resources that come with new hardware. CARB evaluated the PM standards in its ACC II regulation and only reduced them to 1 mg/mile for the US06 cycle. While GPFs are required in some other markets, CARB set the standards with the intention that they would only be necessary for some limited cases. [EPA-HQ-OAR-2022-0829-0595, p. 3]

The enrichment ban will significantly impact the power and robustness of current internal combustion engines and Mazda strongly opposes it. This could force manufacturers such as Mazda to develop new engine designs, or to eliminate certain powertrain or vehicle designs entirely, making it even more difficult to remain profitable at a time when exceptional investment is needed to fuel the transition to EVs and to satisfy consumer needs. Controlling unnecessary or excessive enrichment is already sufficiently covered by EPA's existing AECD certification processes. [EPA-HQ-OAR-2022-0829-0595, p. 3]

Organization: Mclaren Automotive, McLaren Group

Enrichment

EPA is proposing to eliminate the use of commanded enrichment as an AECD on engines used in light-duty vehicles for either power or component protection during normal operation and use. [EPA-HQ-OAR-2022-0829-0748, pp. 4-5]

We appreciated the EPA requesting comment on the proposed prohibition of commanded enrichment including benefits and costs, and additional exceptions where brief rich operation should be allowed. As we have already outlined, our vehicles have exceptionally low mileage and that mileage is often not driven on public roads. Use cases of our vehicles compared to mass market is very different, given the high-performance nature of our cars that are often driven on private racetracks where they are driven outside of 'normal operation'. Enrichment in McLaren vehicles for power or component protection is a rare/exceptional occurrence which we do not expect to occur in normal driving conditions. Enrichment is essential in to protecting our high-performance engines in the exceptional limited circumstances in normal operation. [EPA-HQ-OAR-2022-0829-0748, pp. 4-5]

It should also be noted that supercars typically have a relatively small difference between curb weight and maximum gross weight, given that they are usually two-seaters, with very limited luggage capacity. As such, McLaren vehicles do not exhibit any significant difference in emissions control when in fully laden weight condition. [EPA-HQ-OAR-2022-0829-0748, pp. 4-5]

In addition, at present there are no viable technical alternatives to enrichment for deployment in lightweight high-performance supercars. Enrichment has enabled high-performance supercar engines to be downsized making them more efficient and emitting lower CO2. We believe that command enrichment should be allowed in high-performance supercars. [EPA-HQ-OAR-2022-0829-0748, p. 5]

We understand the concerns of the EPA and would therefore recommend that enrichment should be allowed in the following:

- having a power-to-weight (mass) ratio clearly indicative of high-performance (e.g., >## 250 bhp/ ton (based on curb weight) 2 [EPA-HQ-OAR-2022-0829-0748, p. 5]

2 Determine a vehicle's power-to-weight ratio by dividing the engine's rated power by the vehicle's GVWR (in hp/pound). If a test group includes multiple configurations, use the vehicle with the highest power-to-weight ratio to characterize the test group

Organization: MCS Referral & Resources (MCSRR)

At III.C.8, EPA "requests comment on the proposed prohibition of commanded enrichment as an AECD, including analyses of benefits and costs, and additional exceptions where brief rich operation should be allowed." [EPA-HQ-OAR-2022-0829-0615, p. 3]

EPA says it is "proposing to eliminate the allowance of the use of commanded enrichment as an AECD on SI engines used in light-duty vehicles and MDV for either power or component protection during normal operation and use. Normal operation is defined at 40 CFR 86.1803–01 to include vehicle speeds and grades of public roads, and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently." [EPA-HQ-OAR-2022-0829-0615, p. 3]

Regardless of whether EPA lowers the limits for CO emissions, the proposed prohibition of command enrichment as an AECD for power or component protection is appropriate and should be adopted. [EPA-HQ-OAR-2022-0829-0615, p. 3]

When AECDs are used during routine accelerations, they typically allow vehicles to release 10s to 100s of times more CO than when not in use. These CO emissions pose little risk to vehicle occupants, but in urban traffic, pedestrians, bicyclists, and motorcyclists may be repeatedly exposed to CO concentrations coming from the tailpipes of accelerating vehicles in the range of 100 to 1000 ppm, which is much higher than considered safe by the US EPA (9 ppm), US NIOSH (35 ppm), US OSHA (50 ppm), and US CPSC (70 ppm). [EPA-HQ-OAR-2022-0829-0615, p. 3]

Since "normal operation" is not actually defined at 40 CFR 86.1803-01, WE recommend that EPA define normal operation in this rule to include cold starts. Cold starts are expected, predictable, and common since they occur at least once every day that a non-EV vehicle is started. [EPA-HQ-OAR-2022-0829-0615, p. 3]

CO data from cold starts published by 3DATX in 2022 from a PEMS study of various makes of light-duty petrol and diesel vehicles tested in Sweden show several manufacturers are already making at least one model that achieves low CO emissions–under 500 ppm—throughout the entire cold start phase. These data are online at https://3datx.com/wp-content/uploads/3DATX_Enhanced-PTI-Pilot_Opus-Sweden_TimeSeries_221014.pdf. There is thus no technical need for EPA to exempt cold starts from CO emission limits. [EPA-HQ-OAR-2022-0829-0615, p. 3]

Organization: MECA Clean Mobility

Commanded enrichment should be phased-out for all MDVs. [EPA-HQ-OAR-2022-0829-0564, pp. 25-26]

MECA supports the elimination of commanded enrichment for all MDVs under the phased schedule proposed by EPA. Heavier medium-duty and heavy-duty gasoline vehicles can operate at higher loads and exhaust temperatures (i.e., due to towing) which can impact catalyst durability. Moving the catalytic converter closer to the exhaust manifold to improve cold start performance can result in increasing the time it is exposed to higher temperatures under higher load conditions. Manufacturers may use fuel enrichment modes to ensure cylinder head, exhaust manifold and catalyst temperatures are maintained below design durability thresholds. Using fuel enrichment to control catalyst temperature while effective, can cause significant increases in both criteria pollutant emissions and fuel consumption. [EPA-HQ-OAR-2022-0829-0564, pp. 25-26]

Catalyst manufacturers have continued to improve the thermal stability of supporting catalyst washcoats and performance of precious metal catalysts under higher exhaust temperatures that occur when converters are close coupled to reduce the need to employ fuel enrichment modes. Modern gasoline engines also have several design, calibration and advanced technologies that could be used to reduce the occurrence of higher exhaust temperatures by modifying combustion or load characteristics. Examples of engine-based technologies include exhaust gas recirculation (EGR), modified valve timing, electronic throttle airflow, cylinder heads with improved cooling and exhaust manifolds which are partially integrated into the cylinder head, and cooled exhaust manifolds. [EPA-HQ-OAR-2022-0829-0564, pp. 25-26]

In addition, engine down-speeding or governing of the engine operating range can reduce exhaust temperatures and the need to employ enrichment for thermal protection. This strategy will allow the emission controls to remain in stoichiometric air-fuel control (i.e. closed loop) where the catalysts can maintain peak emissions reduction efficiency for a broader range of operation. [EPA-HQ-OAR-2022-0829-0564, pp. 25-26]

Finally, it is possible to replace a close-coupled catalyst with an electrically heated three-way catalyst (EHC) or electric heater located in front of a three-way catalyst in a downstream location farther from the engine in order to protect it from thermal exposure during times of high engine load. These commercially-available technologies employ electrically generated heat to improve catalyst light-off, especially at cold start and times of low exhaust temperature. This configuration is further enabled by 48-volt system architectures described in more detail above. [EPA-HQ-OAR-2022-0829-0564, pp. 25-26]

In 2005, MECA applied some of the above-mentioned strategies to two full-sized 2004 pick-up trucks equipped with a 5.4L and 6.0L engine.35 The aftertreatment systems were packaged with dual-wall insulated exhaust systems and fully aged to represent 120,000 miles of real-world operation. Even with 15-year-old engine technology and limited engine calibration on one of the vehicles, both vehicles achieved FTP NMHC+NOx emissions of 60-70 mg/mile. Although the cast-iron exhaust manifolds on these vehicles were retained, an OEM likely would take advantage of such cost effective passive thermal management strategies, including dual-wall insulated exhaust or integrated exhaust manifolds, to further reduce cold-start emissions. [EPA-HQ-OAR-2022-0829-0564, pp. 25-26]

35 J. W. Anthony and J. E. Kubsh, SAE 2007-01-1261, 2007.

MECA would like to note that although the technology (described above) is ready, we support a phase-in of this requirement as many engine applications require component modifications that take time to industrialize and apply to market, including full consideration of durability and emission development. Therefore, retention of a phased approach consistent with the phase-in of other new requirements is appropriate. [EPA-HQ-OAR-2022-0829-0564, pp. 25-26]

Organization: Mercedes-Benz AG

EPA is proposing “to eliminate the allowance of the use of commanded enrichment as an AECD [Auxiliary Emissions Control Device] on SI [Spark Ignition] engines used in light-duty vehicles and MDV [Medium-Duty Vehicles] for either power or component protection during normal operation and use.”3 The EPA states that current vehicles use enrichment for component protection and to increase engine power, and that enrichment is no longer needed, because “[t]echnologies exist that can prevent thermal damage of engine and/or exhaust system components without the use of enrichment during normal operation and use (see DRIA Chapter 3 for technology discussion). Modern vehicles have sufficient power without the use of enrichment.”4 While today’s engines have made vast improvements, these assertions overstate the situation, and at the same time, lack important detail to ensure a level-playing field if this provision is finalized. [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

3 NPRM at 29197.

4 NPRM at 29277.

The EPA is proposing to allow enrichment only in a few select circumstances, namely:

1) engine start, [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

2) lambda dithering or slight lambda biasing to achieve optimal three-way catalyst (TWC) conversion efficiency of criteria emissions, [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

3) catalyst re-wetting after deceleration fuel cut off (DFCO), [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

4) brief lambda excursions during engine transients, [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

5) intrusive OBD monitoring of aftertreatment, evaporative canister purge valve, etc., and[EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

6) in vehicle “limp-home” operation where the malfunction indicator light (MIL, commonly known as the “check engine light”) or other warning systems are triggered. [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

The agency should clarify these intended exceptions and also expand the list of allowable circumstances for the use of enrichment to include: [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

7) Confirm that lambda biasing in general is allowed for optimum emissions control, particularly before the catalyst has reached 400 deg F, and for engine operation at cold ambient temperatures below -15 deg F for stable combustion [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

8) Confirm that OBD-related enrichment is allowed, for example to account for the parallel diagnostic which checks for proper catalyst function and oxygen storage levels by running rich and lean briefly. [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

9) Extend allowable enrichment circumstances to allow for prevention of continued low speed pre-ignition that leads to severe knocking conditions that will result in catastrophic engine failures [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

These confirmations and additional allowance would permit calibrations for optimal emissions controls and component protection. They also ensure that allowable uses are more clearly defined and therefore provide more certainty when designing new engines to meet this provision; it is unlikely that current engines can or will meet this requirement without redesign. [EPA-HQ-OAR-2022-0829-0623, pp. 6-7]

Under EPA’s proposed enrichment restrictions, many engines will need to reduce power as soon as the temperature in the exhaust system is too high. Certification of power is currently voluntary in the United States. As a result, the question arises: how should net power be measured in the future? [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

A uniform measurement method is critical for net power determination:

- Ensures comparability for the customer [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

- Power of the engine influences pricing [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

- Provides a level-playing for automakers [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

European regulations currently require testing to the UN-R 85 6 steady-state test to determine the net engine power. There is a similar procedure, SAE J1349 7, which could provide the same level-playing field in the US. [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

SAE J1349 steady-state testing requires torque, speed and temperatures to be held substantially constant at multiple, different levels for at least one minute each. The diagram below depicts an example of how the test operates. [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

6 https://op.europa.eu/en/publication-detail/-/publication/44471446-bc46-44f0-bc97-0de997b18106/language- en.

7 https://www.sae.org/standards/content/j1349_201109/.

[See original for diagram on how the test operates] [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

If EPA adopts its proposal to eliminate enrichment, the agency should also add a requirement to test all internal combustion engine vehicles to SAE J1349 steady-state for declaration of net engine power. Any such requirement would, of course, add to testing burden across the entire industry and therefore be appropriately considered in any updated costs associated with this rulemaking. [EPA-HQ-OAR-2022-0829-0623, pp. 7-8]

§ 86.1809-12 Prohibition of Defeat Devices

As mentioned in the Enrichment section, EPA proposes to allow commanded engine enrichment in limp-home operation mode when the check engine light is on. This language forces a 1-trip failure, while OBD typically uses 2-trip Malfunction Indicator Light ("MILs"). [EPA-HQ-OAR-2022-0829-0623, p. 12]

Mercedes-Benz requests that EPA align their language with CARB OBD and change the requirement from "when check engine light is on" to "when OBD failure is present". This change will align with the OBD standard of a 2-trip MIL. [EPA-HQ-OAR-2022-0829-0623, p. 12]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

6. Tier-4 criteria Pollutant Emissions

Mitsubishi echoes Auto Innovators' support for EPA's adoption of the California ACC II (i.e., LEV-IV) criteria test procedures and standards. [EPA-HQ-OAR-2022-0829-0682, p. 9]

Mitsubishi supports cost-effective reductions in criterial pollutant emission from Internal Combustion Engines (ICE). However, some of EPA's proposed changes to the criteria emission standards - like the more stringent Particulate Mass (PM) and NMOG+NOx requirements and the enrichment prohibition - go above and beyond those adopted by CARB in ACC II standards. If finalized as proposed, these changes would require OEMs to divert large resources in time and capital (resources that could otherwise be directed to accelerate EV technology deployment) towards further ICE technology development and additional testing facilities. Mitsubishi believes that allowing OEMs to focus their finite R&D investments on developing EV technologies, rather than having to continue to invest in technology that is being phased out, is the most effective way to reach our shared goal to transition to electrification. [EPA-HQ-OAR-2022-0829-0682, p. 9]

Organization: National Association of Clean Air Agencies (NACAA)

Criteria Pollutant Emission Standards and Related Issues

For reasons cited above, NACAA strongly supports EPA's proposal of more protective emission standards for non-methane organic gas (NMOG)+NOx and for PM. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

The proposed 12-milligrams-per-mile (mg/mi) NMOG+NOx fleet average standard for LDVs, to be phased in by MY 2032, will reduce emissions by 60 percent relative to the existing 30-mg/mi (Tier 3) MY 2025 standard set in 2014. The proposed 60-mg/mi NMOG+NOx fleet average standard for MDVs, also to be phased in by MY 2032, will reduce emissions by 66 to 76 percent from the Tier 3 standards of 178 mg/mi for Class 2b vehicles and 247 mg/mi for Class 3 vehicles. EPA's proposed cold temperature (-7°C) NMOG+NOx standards will ensure that emissions are controlled over a wide range of operating conditions. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

With respect to PM, EPA proposes a standard of 0.5 mg/mi for LDVs and MDVs, with a requirement that this standard be met across three duty cycles, including a cold-temperature (-7°C) cycle. Such a standard will appropriately drive the use of gasoline particulate filters, which are readily available. EPA projects that making these revisions to the standards set by the agency in the 2014 Tier 3 rule would reduce PM emissions from ICE vehicles by more than 95 percent and also yield reductions in toxic air pollutants. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

NACAA also supports EPA's proposal to eliminate commanded enrichment as an auxiliary emission control device on ICE engines used in LDVs and MDVs. Commanded enrichment is an engine operation that overrides the engine management feedback control system by applying extra fuel in order to provide additional power or protect engine or exhaust system components, thereby producing very high levels of excess emissions. This strategy is deployed during normal operation and use (e.g., vehicle speeds, grades of public roads and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently). However, as EPA explains in the proposal," Technologies exist that can prevent thermal damage of engine and/or exhaust system components without the use of enrichment during normal operation and use Modern vehicles have sufficient power without the use of enrichment. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

The use of enrichment only has the potential to incrementally increase power but significantly reduces the effectiveness of the catalytic aftertreatment system, resulting in a ten-fold or greater increase of CO and HC emissions."27 NACAA recommends that in addition to eliminating commanded enrichment EPA require that vehicle data related to enrichment be collected and analyzed. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

27 Id at 29,277

Organization: Nissan North America, Inc.

Eliminating the commanded enrichment allowance for component protection will require new engine development without sufficient lead time. Automakers already understand the importance of minimizing the use of such commanded enrichment strategies and report the use of these strategies as part of their certification documentation. While the need for such strategies may be narrower, there are still legitimate circumstances in which enrichment is needed for component protection, particularly to maintain safe operation during high capacity use. To avoid significant engine de-rating without such strategies, a larger capacity engine would be needed. As a result, eliminating the narrow use of commanded enrichment for component protection could indirectly result in GHG and criteria pollutant emissions increases as larger engines would be needed to compensate. EPA should continue to allow manufacturers to use commanded enrichment for narrow component protection purposes so long as such use is disclosed in corresponding certification documentation, which is subject to EPA review. Nissan requests that EPA align with California's LEV IV exhaust and evaporative emission standards, allowing the industry to work towards a cohesive set of standards. Nissan also requests that EPA consider prioritization of the ultimate goal of electrification of the US fleet, allowing manufacturers to focus their resources on developing and rolling out safe, reliable, and affordable EVs. [EPA-HQ-OAR-2022-0829-0594, p. 7]

Organization: North American Subaru, Inc.

The NPRM also proposes to "eliminate commanded enrichment for ICE-powered vehicles for power and component protection." Enrichment is an infrequently occurring engine strategy to help improve engine performance at critical times when demanded by the driver and protects the engine from emission control degradation and/or component damage. The Proposed Rule suggests that enrichment is unnecessary and vehicles already have the capabilities to overcome the need for commanded enrichment. As noted In Auto Innovators comments, this is incorrect. Modern light-duty engines would require significant investment and development time to achieve EPA's proposal. Considering the transition away from ICE through heavy investment in EV production, this proposal is counter to the Administration intended, long-term goals. [EPA-HQ-OAR-2022-0829-0576, p. 2]

Organization: Porsche Cars North America (PCNA)

5. Porsche recommends continuity for current enrichment strategies.

Porsche recommends that EPA not adopt the proposal to broadly eliminate enrichment for Tier-4 vehicles. Porsche maintains the current approach used by industry and the agency to consider enrichment strategies within current certification processes should continue to be sufficient to provide the opportunity to review the appropriateness of commanded enrichment. Porsche, like many manufacturers, has evolved its powertrain offerings in response to greenhouse gas and fuel economy goals to adopt a range of highly charged, downsized engines that provide increased efficiency and customer demanded power. These highly charged, downsized motors continue to utilize enrichment to limit the potential for thermal damage from elevated exhaust temperatures. In addition, customers continue to demand increasing levels of performance and enrichment can enable customers to have their needs met with an efficient downsized engine rather than otherwise having to revert to larger, less efficient engines. [EPA-HQ-OAR-2022-0829-0637, pp. 11-12]

Porsche supports comments from the AFAI specific to this topic and provides additional information, found in Appendix- A (section marked confidential). This data illustrates that the potential opportunity for overall emissions reductions from eliminating enrichment may be very narrow given that the cumulative operation of sample vehicles driving under real- world conditions in which enrichment may be triggered is infrequent. Porsche recognizes that the data set is limited in the range of models and total trips and that the vehicles that were instrumented reflect European driving conditions. However, Porsche contends that the variation in overall driving conditions is not that significant, and that this data provides a reasonable proxy for expected US conditions. [EPA-HQ-OAR-2022-0829-0637, pp. 11-12]

Porsche recommends that EPA convene a test program to instrument vehicles in the US to gather similar data across a wider range of vehicle types, powertrains, and driving environments. The benefits of this broad data program would be to provide estimates on the overall opportunity for emissions reductions and to weigh this against the impacts of eliminating enrichment. Porsche contends that without such US specific data, it is unclear what the potential benefits may be against the potential negative side effects of increased cost, reduced power, and possible consumer backsliding on the adoption of downsized engines. [EPA-HQ-OAR-2022-0829-0637, pp. 11-12]

Porsche supports the position outlined in the AFAI comments regarding EPA’s arbitrary declaration that “Modern vehicles have sufficient power without the use of enrichment”. Most Porsche models marketed in the US are made available with an assortment of engines spanning a wide range of power options that customers can choose from. Porsche has been successful in the past several years in expanding the offering of high power, downsized engine options for our customers. These downsized engines are becoming increasingly prevalent within the overall sales mix as customers have responded positively to the balance of power and improved fuel economy. This trend has also been positive in contributing to improved greenhouse gas emissions and aligns with previous agency analysis that projected the benefits of highly charged downsized engines. [EPA-HQ-OAR-2022-0829-0637, pp. 11-12]

Porsche, like many manufacturers, is in the midst of a broad shift towards electrification. Developing new engineering solutions to achieve the goal of this proposal from EPA would be difficult to implement and not deliver significant emissions reductions relative to the cost and complexity. Porsche is concerned that consumers who continue to seek out combustion vehicles would reduce their consideration of downsized engine options if those engines are unable to meet the customers desired power level. The elimination of enrichment and the infrequent emissions benefits may outweigh the daily benefits of reduced GHG emissions and improved fuel economy from downsized engines if customers end up shifting back into larger displacement options. [EPA-HQ-OAR-2022-0829-0637, pp. 11-12]

6. Porsche seeks to clarify the intended scope of the proposed definition for ”Normal Operation” to reflect expected operation on US public roads.

Within the NPRM, EPA proposes to add the definition of “Normal Operation” to 86.1803-01. Porsche seeks to clarify the intended scope of this definition with respect to the conditions expected to be seen in US operation on public roads. In the preamble for the NPRM,3 EPA describes their intent to eliminate the use of commanded enrichment “during normal operation and use”. EPA then describes normal operation “…to include vehicle speeds and grades of public roads, and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently”. [EPA-HQ-OAR-2022-0829-0637, pp. 12-13]

3 88 FR 29277

Given the focus on enrichment, Porsche understands the reasoning from EPA to define more clearly the term “Normal Operation”. Porsche supports the term reflecting operation that can reasonably be expected on public roadways in the United States as described in the preamble. Specific to acceleration, Porsche recognizes that certain models may have acceleration capabilities that very quickly will approach speed limits for most US roadways. Porsche also recognizes that the maximum vehicle velocity for many models far exceeds the legal limits on most US highways. Many of the high acceleration and high-speed operation may only be used by customers on closed tracks or off-highway events. [EPA-HQ-OAR-2022-0829-0637, pp. 12-13]

Porsche seeks to clarify that the definition proposed for “Normal Operation” in 86.1803-01 is intended to reflect “vehicle speeds and grades of public roads”, meaning that the range of speeds and grades of US roadways would generally define boundary conditions on the new definition. The purpose for this clarification is related to the DRIA which seems to indicate a more expansive view than what is expressed by EPA in the preamble. In the DRIA, EPA states that the agency “…considers normal operation and use to include … driving at sustained high speeds, maximum acceleration at wide open throttle”. For example, Porsche would view the term “sustained high speeds” as referenced in the DRIA as indicating sustained high speeds on US roadways, not for example extreme speeds far in excess of legal limits that would likely only ever be seen on closed racing tracks. [EPA-HQ-OAR-2022-0829-0637, pp. 12-13]

To help with clarity, Porsche recommends that EPA modify the proposed definition for Normal Operation in 86.1811- 03 to include the following amendment to (3). [EPA-HQ-OAR-2022-0829-0637, pp. 12-13]

Normal operation means any vehicle operating modes meeting all the following conditions:

(3) Any ambient conditions during any season for operation at allowable vehicle speeds and grades commonly found on public roads in the United States [EPA-HQ-OAR-2022-0829-0637, pp. 12-13]

Organization: Stellantis

EPA Should Not Ban Enrichment or Set CO Standards Resulting in a Ban on Enrichment Thermal enrichment is a necessary strategy to maintain the utility and safe operation of nearly all ICE vehicles currently being sold today. This critical control strategy has also enabled the proliferation of more efficient (lower emitting) down-sized turbocharged engines in applications that have typically been dominated by large displacement powertrains – a technology transition EPA itself has driven and supports. An enrichment strategy enables as much as a 50% increase in engine output, enabling a much lower displacement engine with much greater efficiency to meet the needs of a vehicle typically equipped with a large displacement, lower efficiency V8. This strategy allows for significant emissions savings during every-day driving where the down-sized engine can meet driving demands easily, relying on enrichment only for the infrequent times significantly more capability is needed by the customer. [EPA-HQ-OAR-2022-0829-0678, p. 15]

Similarly, EPA proposes an infeasible US06 CO standard which is effectively a secondary ban on enrichment, as this CO standard can likely only be met at stoichiometric operation. [EPA-HQ-OAR-2022-0829-0678, p. 15]

By banning enrichment outright (and setting an overly stringent US06 CO standard), EPA is eliminating the feasibility of using highly efficient down-sized turbocharged engines in these larger, more capable vehicle applications and markets. This forces OEMs to either invent new technology or revert back to larger displacement, less efficient engines that cannot use enrichment for peak output. Due to GHG requirements, reverting to larger displacement naturally aspirated engines is not possible. EPA should continue to allow enrichment enabled by the existing and robust AECD process and collect data to better understand if and where further emissions benefits could be gained by constraining (vs. banning) enrichment without compromising the progress industry has made, with any future changes being phased in over an adequate lead time to industry. We agree with Auto Innovators that the proposed prohibition on commanded enrichment is inappropriate. [EPA-HQ-OAR-2022-0829-0678, p. 15]

EPA Should Adopt Stringent CARB ACCII LEV IV Criteria Emissions Standards

Stellantis fully supports AAI's comments and the recommendation to align to CARB ACC II LEV IV criteria emissions requirements. EPA should either adopt or align with California's stringent ACCII LEV IV criteria requirements, avoiding the unnecessary development of all new technology to apply to a shrinking ICE fleet (distracting from EV focus). As highlighted in the examples above, the California standards still provide significant improvements over EPA's Tier 3 standards. EPA must also continue to allow enrichment for component protection which is critically needed for continued use of highly efficient downsized turbocharged powertrains and avoid PM requirements that mandate development of all-new GPF systems and/or extraneous new testing. [EPA-HQ-OAR-2022-0829-0678, pp. 16-17]

Avoid a wholesale prohibition on enrichment – whether by design requirement or unrealistic CO threshold – and continue to allow infrequent enrichment that enables proliferation of highly efficient down-sized engines to displace larger and much less efficient powertrains (a GHG and emission reduction strategy endorsed by the EPA) [EPA-HQ-OAR-2022-0829-0678, pp. 24-25]

Organization: Volkswagen Group of America, Inc.

Enrichment (Section III.C.8)

Normal Operation Definition: “normal operation” in 40 CFR §86.1803-01 [EPA-HQ-OAR-2022-0829-0669, pp. 6-8]

It is Volkswagen’s concern that the NPRM recognizes an implied definition for normal vehicle operation. The NPRM states that normal operation is defined in 40 CFR 86.1803-01 and is further described to include vehicle speeds and grades of public roads, and vehicle loading and towing within manufacturer recommendations, even if the operation occurs infrequently. [EPA-HQ-OAR-2022-0829-0669, pp. 6-8]

EPA’s proposed definition of “normal” operation drastically changes the calibration and engine design requirements for manufacturers. As shown in the 4-cylinder Small Compact, Compact and Midsize SUV engine maps, the vehicles already use their maximum potential in terms of power output to meet customer demands and GHG requirements at the same time. Broadening the definition of “normal” to include infrequent operation with elimination of fuel enrichment will result in engine power loss and loss of vehicle utility to the customer. As noted in the AFAI comments, this could potentially require larger engine displacements, which is counterproductive to the goal of reduced emissions and GHG. Based on recent measurements on Portable Emission Measurement Systems (PEMS) including test routes in LA (city, highway, and hard effort Mount Baldy), the graphs below represent the findings and use of enrichment on production vehicles. [EPA-HQ-OAR-2022-0829-0669, pp. 6-8]

Small Compact SUV

SEE ORIGINAL COMMENT FOR Cumulative run duration to total duration (%)

Compact SUV

SEE ORIGINAL COMMENT FOR Cumulative run duration to total duration (%)

Mid-Size SUV

SEE ORIGINAL COMMENT FOR Cumulative run duration to total duration (%) [EPA-HQ-OAR-2022-0829-0669, pp. 6-8]

As referenced by the EPA DRIA, a light-heavy duty gasoline spark-ignited (SI) engine operating over the Supplemental Engine Test had shown only a 4% reduction in power when enrichment was disabled. This is not the same when compared to a light-duty downsized turbocharged vehicle. Light-duty vehicle utility will be greatly affected and may realize up to a 20% power reduction in some cases. [EPA-HQ-OAR-2022-0829-0669, pp. 6-8]

The popularity of SUVs as all-purpose family vehicles, which are typically used for daily commuting, results in infrequent heavy-load towing operational use. Most families do not have the resources to own a specialized vehicle for occasional heavy-load towing. Decreased engine power on smaller displacement engine vehicles would decrease vehicle utility (e.g., trailer towing) in a way that customers would either keep driving their old cars as long as possible or upgrade to a larger, but less fuel efficient, displacement engine. Neither option benefits the environment. [EPA-HQ-OAR-2022-0829-0669, pp. 6-8]

Enrichment for Smaller-Volume Vehicles

Volkswagen consists of iconic brands, which span from our popular utility "People's Car" to the exotic supercars featured by brands Audi, Lamborghini, Bentley and Bugatti. These supercars are fully compliant to the requirements for on-road use; however, the enthusiast customer base may utilize these vehicles in a track environment. Datasets show that while catalyst protection and power enrichment is not demonstrated on regulated cycles and normal driving, extreme off-road/track usage results in significant need to protect the catalysts for compliance when re- entering the roadways. The removal of the enrichment zones for these vehicles would require technologies, which have yet to be demonstrated for production use and may require more adjustable parameters (e.g., water injection) than currently productionized. [EPA-HQ-OAR-2022-0829-0669, pp. 6-8]

Organization: Volvo Car Corporation (VCC)

Enrichment

VCC supports the EPA proposal to prohibit fuel enrichment for any type of performance increase or component protection. This prohibition will eliminate any unnecessary pollution where the catalyst will be unable to operate at its best due to unnecessary rich air/fuel ratio. And, there is available technology to achieve the EPA proposed enrichment requirements. [EPA-HQ-OAR-2022-0829-0624, p. 2]

EPA Summary and Response

Summary:

EPA received many comments regarding the proposed elimination of command enrichment. Most vehicle manufacturers commented in opposition to the proposal and noted the significant impact that the elimination of enrichment might have on the designs of their existing powertrains. CARB, NACAA, and MECA all commented in support of the proposed elimination of enrichment.

Vehicle manufacturers commented that enrichment is used judiciously and within the bounds of the current AECD provisions. They also commented that there are no alternatives to enrichment in many current powertrain designs. Manufacturers also noted that one alternative to enrichment would be to increase engine displacement which could potentially increase CO2 emissions. Honda commented that EPA's proposal would create a conflict between our proposed PM standards and the elimination of enrichment, noting that enrichment would be required under some circumstances to regenerate gasoline particulate filters. Several manufacturers also commented on EPA's definition of "normal operation" and provided recommendations regarding how normal operation should be defined.

One vehicle manufacturer, Volvo Car Corporation, supported EPA's proposal to eliminate command enrichment and noted, "This prohibition will eliminate any unnecessary pollution where the catalyst will be unable to operate at its best due to unnecessary rich air/fuel ratio. And, there is available technology to achieve the EPA proposed enrichment requirements."

Comments from Mercedes-Benz AG noted, "While today's engines have made vast improvements, these assertions overstate the situation, and at the same time, lack important detail to ensure a level-playing field if this provision is finalized." Mercedes included comments regarding the specific conditions for when rich operation might be allowed, even within a broader prohibition and made recommendations on how a level playing field might be achieved within the industry.

CARB commented in support of the elimination of command enrichment and supported EPA's conclusion that control technologies do exist that would eliminate the need for enrichment as a means of protecting powertrain components. CARB also noted that vehicle manufacturers could make different design decisions when developing powertrains: "CARB also agrees the elimination of enrichment for engine component protection would better ensure that manufacturers, despite U.S. EPA and CARB prohibitions, are not using such strategies to protect frail designs in lieu of using more robust components that can better withstand the temperatures and exhaust environment." CARB also agreed with EPA that enrichment does result in significantly higher emissions and "can occur in some routinely encountered in-use conditions." CARB recommended that "… U.S. EPA require standardized data to be stored onboard vehicles to track AECD activation that adversely impacts emissions so that the agency will be better informed as to the frequency, duration, and cumulative emission impact of such strategies even beyond those that trigger enrichment for component protection."

NACAA commented similarly to CARB in its support for the elimination of command enrichment. They stated, "The use of enrichment only has the potential to incrementally increase power but significantly reduces the effectiveness of the catalytic aftertreatment system, resulting in a ten-fold or greater increase of CO and HC emissions. NACAA recommends that in addition to eliminating commanded enrichment EPA require that vehicle data related to enrichment be collected and analyzed."

MECA also commented in support of the elimination of enrichment and confirmed EPA's conclusions that "Examples of engine-based technologies include exhaust gas recirculation (EGR), modified valve timing, electronic throttle airflow, cylinder heads with improved cooling and exhaust manifolds which are partially integrated into the cylinder head, and cooled exhaust manifolds."

<u>Response:</u>

EPA thanks all the commenters that provided their relative positions in support of and in opposition to the proposed restrictions on command enrichment. EPA recognizes both the potential substantial environmental benefits of reducing or eliminating enrichment as well as the substantial level of effort that would be required by vehicle manufacturers to eliminate enrichment in many of their current powertrain designs. While EPA stands by its initial assessment that there are many more options available to vehicle manufacturers other than enrichment to protect powertrain components, we also recognize that these control alternatives could potentially result in a reduction in available engine power and/or a deterioration in vehicle drivability in certain current vehicle designs. In their efforts to reduce CO_2 emissions, vehicle manufacturers have made design decisions in their ICE powertrains that have resulted in the need for command enrichment for component protection, with CARB noting that vehicle manufacturers have adopted designs that require “strategies to protect frail designs in lieu of using more robust components that can better withstand the temperatures and exhaust environment.” Comments from MECA and Volvo also confirm EPA’s initial assessment. The comments from Mercedes further show that enrichment can be reduced or even eliminated with additional collaboration between vehicle manufacturers and EPA. Despite the potential for significant emission reductions as the result of eliminating enrichment, EPA has decided not to finalize any new provisions for the control of enrichment as part of this final rule. At this time the agency will continue to rely on existing requirements for Auxiliary Emission Control Devices (AECD) to ensure that vehicle manufacturers use AECD in a manner dictated by the existing AECD process.

EPA plans to revisit this issue, potentially in a future rulemaking, as outlined in Preamble III.D.8. EPA recognizes the value of tracking AECD usage, as recommended by both CARB and NACAA, and will consider a monitoring provision as we consider potential future controls on enrichment.

4.1.7 - Averaging, banking, and trading provisions

Comments by Organizations

Organization: American Fuel & Petrochemical Manufacturers

And even for criteria pollutants emitted from ICEVs, the Clean Air Act says nothing about averaging across fleets or banking and trading credits across different model years, different vehicle classes, and OEMs. While EPA previously adopted fleetwide averaging, it has also acknowledged that “Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act.”91 And “[j]ust as the statute does not explicitly address EPA’s authority to allow averaging, it does not address the Agency’s authority to permit banking and trading.”92 By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading in a manner that mandates electrification of the national vehicle fleet of motor vehicles and motor vehicle engines. Instead, as EPA acknowledges, even if its authority to use averaging, banking, and trading could be inferred, such programs are limited to compliance flexibilities rather than setting the standards with which vehicles must comply or phasing out ICEVs on a national scale.93 [EPA-HQ-OAR-2022-0829-0733, p. 23]

91 48 Fed. Reg. 33,456, 33,458 (July 21, 1983)

92 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same).

93 Proposed Rule at 29,196-97 (describing averaging, banking, and trading provisions as “help[ing] manufacturers to employ a wide range of compliance paths”).

Organization: Valero Energy Corporation

a) The statutory structure confirms EPA lacks statutory authority to use fleetwide averaging to mandate ZEVs.

EPA’s proposal would require electrification by setting average emission standards for manufacturers' nationwide fleets and "averaging" in more and more zeros to represent the electric vehicles it wants to see in future years. Manufacturers that exceed the standards may bank credits and trade them to other manufacturers that fall short. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

EPA relies on NRDC v. Thomas, 805 F.2d 410 (D.C. Cir. 1986), for the proposition that it is authorized to average vehicles. That case found EPA could average a manufacturer’s different engine families. Id. at 425. It did so, however, with some caveats. First, its reasoning was based on a deference to EPA’s interpretation of the statute “in the absence of clear evidence Congress meant to prohibit averaging.” This standard, of course, is directly contrary to the standard applicable in this case in which EPA is proposing regulations that affect a major question—clear Congressional authority to permit averaging to mandate electric vehicles. Second, the parties failed to raise a textual argument against averaging. Id. at n.24 (“Although it was not raised by any party before the agency, and accordingly cannot be dispositive here … there is an additional argument against emissions averaging. The Act’s testing and certification provision, 42 U.S.C. § 7525 [Link: https://1.next.westlaw.com/Link/Document/FullText?findType=L&pubNum=1000546&cite=42USCAS7525&originatingDoc=I80714eef94d311d9a707f4371c9c34f0&refType=LQ&originationContext=document&transitionType=DocumentItem&ppcid=0591cc222593448083058c4608d3c583&contextData=(sc.UserEnteredCitation)], speaks of ‘any,’ ‘a,’ or ‘such’ motor vehicle or engine being tested and certified. With averaging, some vehicles or engines would not be required to comply with the standards and would not be subject to NCPs for failing to so comply. This practice appears inconsistent with the requirement that ‘any,’ ‘a,’ or ‘such’ vehicle or engine be tested and required to comply with emissions standards.”). [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

On the other hand, EPA has previously acknowledged that the Act is silent on the mechanisms of averaging, banking, and trading (ABT). When EPA first adopted fleetwide averaging, it recognized that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act." 48 Fed. Reg. 33,456, 33,458 (July 21, 1983). And "[j]ust as the statute does not explicitly address EPA's authority to allow averaging, it does not address the Agency's authority to permit banking and trading." 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); see 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same). By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading to electrify the Nation's vehicle fleet. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

That should be the end of the analysis. Section 202 of the Clean Air Act does not itself "direct [conventional vehicles] to effectively cease to exist." West Virginia, 142 S. Ct. at 2612 n.3. EPA has instead relied on mechanisms that are not themselves spelled out in the statute and that have never before been used to mandate LD and MD electric vehicles. Just as in West Virginia, EPA has nothing "close to the sort of clear authorization" necessary for such a transformational policy shift. 142 S. Ct. at 2614. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

But in truth, the problem is far worse for EPA than that. As explained below, the Act unambiguously precludes fleetwide-average emission standards under Section 202(a). And even if the statute permitted some fleetwide averaging, it does not allow EPA to take the additional step of incorporating non-emitting vehicles into emission averages and thus forcing the market toward electric vehicles. The proposal is not merely stretching vague statutory language. It is defying clear statutory text. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

The text and structure of Section 202, and of Title II more broadly, unambiguously require that emission standards under Section 202(a) apply to individual vehicles, not manufacturers' fleets on average. EPA claims to find authority for fleetwide averaging in Section 202(a), which authorizes EPA to issue "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles ... which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a). [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

On its face, that provision authorizes EPA to set standards for vehicles that emit harmful air pollutants. It says nothing about averaging across fleets. As noted, when EPA first adopted fleetwide averaging, it acknowledged that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act." 48 Fed. Reg. at 33,458. EPA claimed to have the authority because the Act "does not explicitly preclude standards" based on averaging. 54 Fed. Reg. at 22,666 (emphasis added). EPA was wrong. "[T]he broader context of the statute as a whole," Robinson v. Shell Oil Co., 519 U.S. 337, 341 (1997), makes clear that Section 202(a) does not permit fleetwide averaging. And, even if EPA could somehow show that the statute tacitly or implicitly allows (or does not expressly preclude) averaging, that would still be insufficient to meet the necessary clear congressional authority to use fleetwide averaging as a means to force a transition from internal-combustion engines to ZEVs. [EPA-HQ-OAR-2022-0829-0707, pp. 78-80]

a. Other provisions in Section 202 demonstrate that emission standards may not be based on averaging.

Title II is replete with provisions that necessarily apply to vehicles individually, not to fleets on average. That is evident first in the emission standards prescribed by Section 202 itself. For example, in Section 202(b), the Act sets forth specific light-duty vehicle emission standards that EPA must promulgate in "regulations under" Section 202(a). 42 U.S.C. § 7521(b). For vehicles in model years 1977 to 1979, the standards must provide that "emissions from such vehicles and engines may not exceed 1.5 grams per vehicle mile of hydrocarbons and 15.0 grams per vehicle mile of carbon monoxide." Id. § 7521(b)(l)(A). [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Those provisions require that the "regulations under [Section 202(a)]" apply to "vehicles and engines," not "vehicles and engines on an average basis across a fleet." Construing those provisions to allow averaging would, in effect, add words to the statute that change its meaning. Neither courts nor agencies may "supply words ... that have been omitted." Antonin Scalia & Bryan Garner, Reading Law: The Interpretation of Legal Texts 93 (2012); accord Rotkiske.v. Klemm, 140 S. Ct. 355, 360-361 (2019). And supplying the extra words "on average" would have a significant substantive effect: "roller coaster riders must be 48 inches tall" means something very different from "roller coaster riders must be 48 inches tall on average." [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

The testing requirements accompanying the Section 202(b) standards confirm that those standards apply to all vehicles. In particular, EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine ... to determine whether such system enables such vehicle or engine to conform to the standards required to be prescribed under

[Section 202(b) of the Act]." 42 U.S.C. § 7525(a)(2). If the system complies, EPA must issue a "verification of compliance with emission standards for such system." Id. Those requirements plainly contemplate standards that apply to individual vehicles and their emission-control systems. Not only does the statutory text frame the inquiry as whether an individual "vehicle" or "engine" conforms to the emission standards, but the provision's foundational premise-that an emission-control system can enable a vehicle to meet emission standards depends on individually applied standards. [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Other parts of Section 202 further demonstrate that emission standards under Section 202(a) cannot rely on averaging. Section 202(b)(3), for example, authorizes EPA to grant waivers from certain nitrogen-oxide emission standards—which, again, are standards "under" Section 202(a), see 42 U.S.C. § 7521(b)(l)(B)—for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater." Id. § 7521(b)(3). This provision would be nonsensical under a fleetwide-averaging regime. It contemplates a default under which every vehicle meets a standard, then gives manufacturers a waiver from that default for up to 5% of the fleet. But under fleetwide averaging, no waiver is needed. Instead, a vast proportion of a manufacturer's fleet—perhaps 50% or more— effectively has a "waiver" so long as a sufficient number of vehicles outperform the standard. Likewise, Section 202(g), which specifies an increasing "percentage of each manufacturer's sales volume" of each model year's vehicles that must comply with specified emission standards, is fundamentally incompatible with averaging. Id. § 7521(g)(l). [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

Similarly, under Section 202(m), EPA must require manufacturers to install on "all" new light-duty vehicles and trucks "diagnostic systems" capable of identifying malfunctions that "could cause or result in failure of the vehicles to comply with emission standards established under this section." Id. § 7521(m)(l). As this requirement makes clear, individual vehicles must "comply with emissions standards established under [Section 202]." Id. Otherwise, requiring diagnostic equipment on "all" vehicles makes no sense. In a fleetwide-averaging regime, this requirement would be pointless, as the deterioration or malfunction of an individual vehicle's emission-related systems would provide virtually no information about whether the fleet as a whole is compliant. [EPA-HQ-OAR-2022-0829-0707, pp. 80-81]

b. Title II's compliance and enforcement provisions for emission standards confirm that EPA cannot use fleetwide averaging.

Fleetwide averaging also clashes with "the design and structure of [Title II] as a whole." Utility Air, 573 U.S. at 321 (citation omitted). Title II sets forth a comprehensive, interlocking scheme for enforcing emission standards through testing, certification, warranties, remediation, and penalties. Fleetwide-average standards are incompatible with these provisions, which are "designed to apply to" individual vehicles and "cannot rationally be extended" to fleets. Id. at 322. [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

Testing and Certification. Under Title II, EPA must "test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer to determine whether such vehicle or engine conforms with the regulations prescribed under [Section 202]." 42 U.S.C. § 7525(a)(l). If the "vehicle or engine conforms to such regulations," EPA must issue the manufacturer a "certificate of conformity." Id. EPA may later test a manufacturer's vehicles and engines, and if "such vehicle or engine does not conform with such regulations and requirements, [EPA] may suspend or revoke such certificate insofar as it applies to such vehicle or engine." Id. § 7525(b)(2)(A)(ii). A manufacturer may not sell a vehicle or engine not "covered by a certificate of conformity." Id. § 7522(a)(l). [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

Fleetwide averaging is incompatible with these requirements in at least two respects. First, by using the singular terms "vehicle" and "engine," along with "any" and "such," the statute contemplates that individual vehicles may be tested, determined to "not conform" with the standards, and have their certificates of conformity suspended or revoked. In a fleetwide-averaging regime, testing an individual vehicle or engine does not enable EPA to determine whether it "conforms with the regulations prescribed under [Section 202]," 42 U.S.C. § 7525(a)(l), because conformity turns not on an individual vehicle's emissions but on the fleet's average performance overall. Second, fleetwide averaging also makes it impossible to determine compliance with applicable emission standards before a vehicle is sold, as required to obtain the certificate of conformity needed for a sale. See 42 U.S.C. § 7522(a)(l). Under fleetwide-average standards, a vehicle's "conform[ity] with the regulations prescribed under [Section 202]" cannot be determined until the manufacturer calculates its production-weighted average at "the end of each model year," when the manufacturer knows the quantity and model of "vehicles produced and delivered for sale." 40 C.F.R. §§ 86.1818-12(c)(2)(2), 86.1865-12(i)(l), (j)(3). [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

For similar reasons, fleetwide averaging is inconsistent with the statutory definition of an "emission standard," which "limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis." 42 U.S.C. § 7602(k). It is impossible to know on a "continuous basis" whether a manufacturer's fleet complies with EPA's proposed average standards, because a manufacturer cannot calculate its production-weighted average until the end of the year. Simply put, an after-the-fact compliance regime is incompatible with the Act's testing and certification scheme. [EPA-HQ-OAR-2022-0829-0707, pp. 81-82]

c. The broader text and history of Title II confirm that the rule exceeds EPA’s authority through fleetwide averaging.

Other indicia of statutory meaning demonstrate that the proposed rule exceeds EPA's statutory authority under Section 202(a). Elsewhere in Title II, Congress showed that it knew how to legislate with respect to "average annual aggregate emissions." 42 U.S.C. § 7545(k)(l)(B)(v)(II) (directing EPA to take certain actions if "the reduction of the average annual aggregate emissions of toxic air pollutants in a [designated district] fails to meet" certain standards). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

Thus, "if Congress had wanted to adopt an [averaging] approach" for motor vehicle standards under Section 202(a), "it knew how to do so." SAS Inst., Inc. v. Iancu, 138 S. Ct. 1348, 1351 (2018); see Rotkiske, 140 S. Ct. at 360-361 ("Atextual judicial supplementation is particularly inappropriate when, as here, Congress has shown that it knows how to adopt the omitted language or provision."). It did not choose that approach in Section 202(a). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

The Energy Policy Conservation Act, enacted just two years before the 1977 Clean Air Act amendments, reinforces that conclusion. There, Congress directed the Secretary of Transportation to issue regulations setting "average fuel economy standards for automobiles manufactured by a manufacturer" in a given model year. 49 U.S.C. § 32902(a). That Congress has not used similar language in Section 202(a) of the Clean Air Act is a "telling clue" that the Act does not permit fleetwide averaging. Epic Sys. Corp. v. Lewis, 138 S. Ct. 1612, 1626 (2018). [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

The Clean Air Act's history also reflects Congress's understanding that emission standards would apply to all vehicles individually. Congress was so focused on reducing emissions at the level of the individual vehicle that, in the 1970 amendments, Congress permitted EPA to test any individual vehicle as it comes off the assembly line. See Pub. L. No. 91-601, § 8, 84 Stat. 1676, 1694-1696. Such a vehicle-by-vehicle test was meant to supplement the pre-1970 testing of prototypes. Congress explained that while testing of prototypes "will continue," "tests should require each prototype rather than the average of prototypes to comply with regulations establishing emission standards." H.R. Rep. No. 91-1146, at 6 (1970). And if Congress forbade averaging across prototypes, it certainly did not permit averaging across entire fleets. [EPA-HQ-OAR-2022-0829-0707, pp. 83-84]

d. Related provisions confirm that Section 202(a) does not authorize averaging of non-emitting electric vehicles.

Other provisions of the Clean Air Act drive home the lack of statutory authorization to mandate electrification as well. In the Clean Air Act Amendments of 1990, Congress spoke directly to the phase-in of electric vehicles on America's roads. Congress instructed EPA to establish standards for "clean-fuel vehicles" operating on "clean alternative fuel," including "electricity." Pub. L. No. 101-549, § 229, 104 Stat. 2399, 2513 (codified at 42 U.S.C. §§ 7581(2), (7), 7582(a)). Congress required that certain areas of the country with the worst pollution would have to "phase-in" a "specified percentage" of "clean-fuel vehicles" using "clean alternative fuels" (defined to include "electricity") in certain fleets. 42 U.S.C. § 7586; see id. § 758l(a). The 1990 amendments highlight that Congress knows how to clearly establish standards that apply to electric vehicles, and to directly require that such vehicles be phased into a particular fleet. But Congress chose to do so only on a targeted, regional basis. The contrast between the 1990 amendments and Section 202(a) highlights the absence of any statutory authority for EPA's rule. [EPA-HQ-OAR-2022-0829-0707, p. 84]

Other related statutes also suggest the same. In the Energy Policy Act of 1992, Congress directed NHTSA to set fuel-economy standards based on averages, but prohibited NHTSA from setting fuel-economy standards that average in the fuel economy of electric vehicles. See Pub. L. No. 102-486 §§ 302, 403, 106 Stat. 2776, 2870-2871, 2876 (later codified at 49 U.S.C. § 32902(h)). This prohibition bars NHTSA from doing exactly what EPA is doing here: misusing its regulatory authority to force a transition from conventional vehicles to electric vehicles by artificially tightening the "average" standard a fleet must meet. Of course, when Congress finalized the language of Section 202(a)(l) in 1977, it had no need to explicitly block EPA from considering electric vehicles, because it did not contemplate that EPA would set emission standards using averaging in the first place (or that EPA would be setting standards for greenhouse gases). The prohibition on NHTSA nevertheless underscores just how far EPA is reaching here: it is straining statutory language to seize a power that Congress expressly denied to a sister agency that actually has authority to promulgate fleetwide-average standards. [EPA-HQ-OAR-2022-0829-0707, p. 84]

e. EPA’s lack of authority for a credit-trading scheme further confirms its lack of authority to set fleetwide averages.

The proposal’s credit banking and trading program is critical to EPA's electrification mandate. But the agency also lacks authority under Title II to establish a credit scheme as part of its emission standards under Section 202(a). [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

As with fleetwide averaging, EPA has previously acknowledged that Title II says nothing about banking and trading credits in connection with motor-vehicle emission standards. See 54 Fed. Reg. at 22,665. What EPA has ignored, however, is that Title II is not silent regarding banking and trading in other contexts. Indeed, in multiple other provisions under Title II, Congress expressly authorized the use of bankable and tradable credits. See, e.g., 42 U.S.C. § 7545(k)(7) (reformulated gasoline credits); § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(i) (renewable fuel credits); id. § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(ii) (biodiesel credits); id. § 7545(o)(2)(A)(ii)(II)(cc), (5)(A)(iii) (small refineries credits); id. § 7586(f) (clean- fuel fleet-operator credits); id. § 7589(d) (California pilot test program's clean-fuel vehicle manufacturer credit). [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Under EPA's proposed approach, those provisions would all be superfluous, because EPA already had the discretion to adopt a credit-trading regime for any program. If Congress had wanted to permit credits in connection with emission standards under Section 202(a), it knew how to and would have done so expressly. See SAS Inst., 138 S. Ct. at 1351. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

For all these reasons, courts have cast substantial doubt on EPA's authority to set fleetwide-average emission standards. As the D.C. Circuit Court of Appeals explained in NRDC v. Thomas, 805 F.2d 410 (D.C. Cir. 1986), the "engine specific thrust" of Title II's "testing and compliance provisions" is evident both in Congress's choice to "spea[k] of 'any,' 'a,' or 'such' motor vehicle or engine" in the text of the statute and in the "troubling" legislative history recounted above. Id. at 425 n.24. The arguments were not dispositive in Thomas only because the parties there had failed to present them. Id. But the Court nevertheless recognized that the arguments were relevant to "future proceedings." Id.. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

f. At a minimum, EPA may not use fleetwide averaging to require electrification.

Despite the absence of statutory authorization for fleetwide averaging, EPA has long employed that mechanism without significant industry pushback. That is likely because fleetwide averaging has generally been offered as an accommodation to regulated parties, allowing them flexibility that the statute does not in fact permit. In its current proposal, however, EPA is not offering an extrastatutory accommodation. It is taking an additional step away from the statutory text by using fleetwide averaging to mandate electrification. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

To be clear, in prior rules EPA set an average emission standard and allowed manufacturers to make some vehicles that emitted more and some that emitted less. Here, EPA has set tailpipe emission standards at a level so stringent that manufacturers must incorporate an increasing percentage of LD and MD electric vehicles—which EPA treats as zero-emission vehicles—into their averages in order to comply with the "standards." See p. 13, supra. Put differently, the agency is proposing an emission standard that is artificially low because it incorporates electric vehicles, which EPA treats as emitting zero pollutants for averaging purposes. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Whatever the permissibility of fleetwide averaging, the text and structure of Title II make plain that EPA cannot manipulate averaging as a means to force production of an increasing market share of electric vehicles. Section 202 does not grant EPA the power to make the internal-combustion engine go the way of the horse and carriage. At the very least, Section 202 is hardly clear in granting that awesome power—which is what matters under West Virginia. For automobiles as for power plants, EPA has purported to discover in the Clean Air Act the authority to "forc[e]" manufacturers to "cease making" a particular type of energy "altogether." 142 S. Ct. at 2612. We have seen that play recently before, and it should end the same way. [EPA-HQ-OAR-2022-0829-0707, pp. 84-86]

Penalties. Finally, EPA' s fleetwide-averaging regime is inconsistent with the statute's penalty provision. Under Section 205, any violation "shall constitute a separate offense with respect to each motor vehicle or motor vehicle engine," with each offense subject to its own civil penalty of up to $25,000. 42 U.S.C. § 7524(a) (emphasis added). Under EPA's approach, however, no individual vehicle or engine violates the applicable standard, only the fleet as a whole. The statute provides no method for calculating penalties when a fleet fails to meet its fleetwide-average standard-because it does not authorize fleetwide-average standards. [EPA-HQ-OAR-2022-0829-0707, p. 83]

EPA Summary and Response

Summary:

EPA received a number of comments regarding EPA's authority to adopt standards with averaging, banking and trading (ABT) from stakeholders including the American Fuel and Petrochemical Manufacturers (AFPM) and Valero Energy Corporation.

Response:

For EPA's complete response on EPA's authority to adopt standards with ABT, refer to Section 2 of this document.

4.1.8 - MDV criteria emissions certification requirements

Comments by Organizations

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Feasibility of Proposed Medium-duty Vehicle Emission Levels

Based on U.S. EPA's analysis, medium-duty vehicles under 22,000 lbs. GCWR consist mainly of vans and gasoline trucks, and U.S. EPA certification data shows that 75 percent of 2022 and 2023 MY gasoline vehicles were already below 120 mg/mi. For CARB's ACC II regulations, as part of the Initial Statement of Reasons, Appendix H, ACC II LEV Technology Appendix, CARB had shown FTP NMOG+NOx certification data for the 2021 MY medium-duty vehicles in both classes. 43 CARB's assessment is similar to U.S. EPA's analysis, which shows many gasoline medium-duty vans have emission levels under 120 mg/mi. Because many gasoline medium-duty vehicles are already at levels close to meeting both standards and many light-duty vehicles, some of which use similar or the same engines, are also at or below these levels, it is clear that the technology exists for manufacturers to clean up their higher emitting vehicles and bring their emission levels closer to the lower emitting vehicles. Additionally, as the fleet average emission standard declines over time, it will likely allow manufacturers to introduce improvements across their conventional fleet concurrent with scheduled redesigns or updates to their models in a resource-efficient manner. [EPA-HQ-OAR-2022-0829-0780, p. 32]

43 CARB. ACC II ISOR. Appendix H: ACC II LEV Technology Appendix, p. H-44. Available at: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/apph.pdf.

Conclusion

While CARB's LEV IV fleet average standard and U.S. EPA's proposed standards are structured differently, precluding side-by-side comparisons, CARB has determined based on the above analysis that the proposed standards are similar in stringency for the same category of conventional vehicles. Because these vehicles are required to meet similar emission levels in both programs, manufacturers would be able to use the same technologies to meet both standards. Additionally, many gasoline medium-duty vehicle test groups are close to or already emitting under 120 mg/mi, which allows manufacturers to make minimal changes to their gasoline fleets while focusing on increasing deployment of zero-emission technology in their fleets to meet both CARB and U.S. EPA requirements. As discussed previously, CARB also notes that the requirements under CARB's ACT and ACF regulations are promoting technological advancement of medium-duty ZEVs, providing a strong foundation for U.S. EPA's ZEV projections. CARB supports U.S. EPA's proposed standard, which will ensure conventional medium-duty vehicles continue to make modest improvements to their emission control systems and rely on ZEVs in combination with their cleaner conventional medium-duty vehicles to meet the proposed fleet average standard. [EPA-HQ-OAR-2022-0829-0780, pp. 32-33]

Organization: Cummins Inc.

Tier 3 credits from high GCWR MDV should carry over into the HD engine program

In contrast to the proposals for averaging, banking, and trading (ABT) for light-duty vehicles and low GCWR MDV, EPA has not proposed any opportunities for transferring non-methane organic gases (NMOG) + NOx credits (or debits) from the Tier 3 program into the HD engine program for high GCWR MDV vehicles. Manufacturers already certifying in the HD engine program likely have developed their engine compliance strategies, including use of ABT, for MY 2027 and later HD engines without knowledge of EPA's proposal to move high GCWR MDV into the same program. With no mechanism to carry pre-existing Tier 3 credits rightfully earned by high GCWR MDV into the engine program, and no mechanism to earn early credits on engine-dynamometer certified high GWCR MDV, manufacturers looking to smooth the transition to new standards may be forced to use engine credits already earmarked for other HD engines. There is also a level playing field concern where manufacturers with a broader product line which includes both high and low GCWR MDV would still get the benefit of using their Tier 3 high GCWR MDV credits for Tier 4 early compliance of their low GCWR MDV, but for manufacturers whose product line consists of only high GCWR MDV, those Tier 3 credits would be forfeited. [EPA-HQ-OAR-2022-0829-0645, pp. 8-9]

There are precedents in past regulations which could inform the conversion of Tier 3 credits into credits for the HD engine program, such as converting non-methane hydrocarbons (NMHC) + NOx credits to NOx credits via a discount factor and adjusting for different emissions useful life periods. EPA should consider this history and create a pathway for Tier 3 credits from high GCWR MDV to transfer into the HD engine program. [EPA-HQ-OAR-2022-0829-0645, pp. 8-9]

Cummins supports fungibility of high GCWR MDV NOx credits in the appropriate HD engine averaging set.

If EPA finalizes the requirement for high GCWR MDV to certify criteria pollutant emissions in the HD engine program, Cummins supports allowing those engines to participate in the 40 CFR Part 1036 ABT program within the appropriate averaging set with other HD engines. [EPA-HQ-OAR-2022-0829-0645, pp. 8-9]

Organization: Environmental. and Public Health Organizations (EPHO)

VIII. Stronger GHG and Criteria Pollutant Standards for Medium-Duty Vehicles Are Feasible.

We now turn to EPA's proposed emission standards for medium-duty vehicles. Below, we examine the combustion vehicle and zero-emission technologies that can further reduce GHG emissions from the medium-duty fleet, comment on EPA's modeling, address economic considerations, and make suggestions on certain aspects of EPA's regulatory program. We also offer recommendations for the Tier 4 NMOG+NOx standards and PM requirements. As detailed below, strong GHG and criteria pollutant emission standards for MDVs are feasible and cost-reasonable. [EPA-HQ-OAR-2022-0829-0759, p. 64]

3.EPA's proposed change to criteria pollution requirements for MDVs with a gross combined weight rating of more than 22,000 pounds is likely appropriate, but should be monitored for manipulation and efficacy. [EPA-HQ-OAR-2022-0829-0759, p. 77]

EPA is proposing to require that vehicles with a GCWR greater than 22,000 pounds be certified to the heavy-duty engine standards, rather than to the proposed MDV standards.212 EPA's logic here is sound: these vehicles' powertrains are often more powerful than the Class 4 and Class 5 vehicles in which related engines may be deployed, and they have a GCWR comparable to vehicles currently covered by the heavy-duty engine rules. [EPA-HQ-OAR-2022-0829-0759, p. 77]

212 88 Fed. Reg. at 29257.

Table VIII.B-1. Market share of MDVs above and below the 22,000-pound gross combined weight rating213[EPA-HQ-OAR-2022-0829-0759, p. 77]

[See original attachment for Table VIII.B-1.].

213 Taken from EPA OMEGA2 modeling inputs: vehicles_mdv_20230208.csv (MY 2020 MDV fleet).

MY 2020 data indicates that this change could require more than half of the MDV fleet to certify to the heavy-duty engine standards (Table VIII.B-1).214 Based on the emissions and warranty requirements for such engines, certifying the engines in these MDVs to such standards will likely yield emissions reductions at least as strong as if they were instead required to meet the proposed MDV standards. However, these standards apply solely to combustion engines and are not influenced by the share of deployed ZEVs. [EPA-HQ-OAR-2022-0829-0759, p. 78]

214 In the Proposal, EPA notes: "Based on an analysis of the MY 2022 and MY 2023 emissions certification data, most MDV complete and incomplete diesel pickup trucks would be required to switch to engine dynamometer certification; MY 2022 vans would not be required to use engine dynamometer certification; and only a small number of gasoline pickup trucks would be required to switch to engine certification." 88 Fed. Reg. at 29270. However, the data are not provided.

In contrast, ZEV deployment affects the required emissions reductions for medium-duty combustion vehicles with a GCWR less than or equal to 22,000 pounds, as illustrated above in Section VIII.B.1. It is possible that manufacturers could try to shift more of their sales to vehicles with a GCWR over 22,000 pounds in order to reduce the required improvements to their remaining combustion fleet. If this change is finalized, the Agency should monitor future data from the MDV and heavy-duty engine in-use testing program to assess the nature of any difference between the emissions performance of MDVs above and below the 22,000-pound GCWR, and should commit to releasing a report on its findings. [EPA-HQ-OAR-2022-0829-0759, p. 78]

Organization: MECA Clean Mobility (MECA)

Commercially Available Technologies Support Tighter Medium Duty Standards

Both gasoline and diesel engines feature prominently amongst medium duty vehicles which often share many attributes and powertrain platforms also certified as light- duty trucks or medium duty passenger vehicles. MECA would highlight that the proposed MDV Class 2b and Class 3 NMOG+NOx fleet averages of SULEV150 (Class 2b: 8500 to 10,000lbs) and SULEV175 (Class 3: 10,000 to 14,000lbs) still reflect fleet averages of 5 to almost 6 times higher than that proposed for light duty trucks and SUVs <8500lbs, as well as medium duty passenger vehicles. This despite the fact that Class 2b and 3 vehicles have gross vehicle weights that are equivalent to no more than 18% to 65% heavier. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Regarding Class 2b and 3 gasoline-fueled vehicles, MECA's review of available EPA FTP NMOG+NOx certification data,17 shown in Table 2, [See original comment for Table 2. EPA Certified Levels of Class 2b and 3 Medium-Duty Vehicles] indicates ranges in certification level value (corresponding to the actual test results combined with the deterioration factors) of 9 to 192 mg/mile (average ca. 92 mg/mile) for Class 2b and 74 to 120 mg/mile (average ca. 102 mg/mile) for Class 3. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

17 US EPA Light-Duty Vehicle Certification Database, https://www.epa.gov/compliance-and-fuel-economy- data/annual-certification-data-vehicles-engines-and-equipment

Our review of available EPA FTP certification data for Class 2b and 3 diesel-fueled vehicles finds current reported ranges in certification level value (corresponding to the actual test results combined with the deterioration factors) of 113 to 180 mg/mile (average ca. 147 mg/mile) for Class 2b and 136 to 190 mg/mile (average ca. 163 mg/mile) for Class 3 vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Given the proportional vehicle weights, reported NMOG+NOx certification values of best-in-class performers, as well as the need to provide further air quality benefits, MECA believes gasoline and diesel fueled medium-duty vehicles are capable of complying with the lower NMOG+NOx standards proposed by EPA. Furthermore, the removal of the highest certification bins (i.e., >160 mg/mile NMOG+NOx) will provide significant emission benefits by removing the highest emitting vehicles from the fleet. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

With respect to proposed PM standards for medium-duty vehicles, MECA supports EPA's proposed limits that match light-duty vehicles. The combination of advanced fuel injection and gasoline particulate filters on medium-duty gasoline vehicles can enable compliance with proposed standards. Based on over 15 years of experience with diesel emission controls, medium-duty diesel vehicles that implement DPFs will be able to meet the stringent PM requirements proposed in this rule. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Medium-duty vehicles with Gasoline Engines

Historically, spark-ignition engine FTP tests have shown that the majority of NMHC, CO, and NOx emissions occur during the cold start phase; however, emissions during warmed-up and hot operation, specifically during high-load operation, can also significantly contribute to emissions, especially with heavier MD and HD vehicles. There are a variety of measures that can be utilized on spark-ignition gasoline engines to further reduce emissions. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Engine Mapping and Calibration

In order to comply with lower NMOG+NOX and PM emissions standards over certification cycles such as the FTP, US06, SC03, and LA92, manufacturers will employ improved engine maps and calibration strategies of existing engines and emission control related systems. Other design changes to system architecture can be deployed to manage engine-out emissions and exhaust flows, reduce catalyst light-off times, increase exhaust temperatures during periods of low-load or idle and reduce excessive warmed-up and hot running emissions to protect engine and emission control components which are susceptible to deterioration from extended exposure to severe exhaust temperatures. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Exhaust Emission Control Technologies

Several emission control choices can be made to improve and optimize emission control performance. For gasoline engines, the technology base of advanced three-way catalysts deposited on high cell density (as high as 1200 cells/in2), thin-walled substrates (approaching 0.05mm) have evolved dramatically for light- and medium-duty chassis certified vehicles to comply with Tier 3/LEV 3 standards. Recent advances have yielded high porosity, low thermal mass substrates with narrow pore size distributions, which enable high emission reduction efficiency with less precious metal loading.18,19 Catalyst manufacturers have also developed coating techniques based on layered or zoned architectures to strategically deposit precious metals in ways that optimizes their performance and cost. These advanced catalysts are then packaged using specially designed matting materials and passive thermal management strategies which can be used to allow chassis certified medium-duty trucks to meet the stringent Tier 3 emission fleet average limit of 30 mg/mile or approximately 100 mg/bhp-hr. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

18 T. Asako, D. Saito, T. Hirao and E. Popp, SAE 2022-01-0543.

19 J. Warkins, T. Tao, M. Shen and S. Lyu, SAE 2020-01-0652.

Reducing Cold Start Emissions

Close-coupled catalyst exhaust architectures (with or without a secondary underfloor converter) have been used on light-duty vehicles starting with Tier 2 LDV standards and are an effective strategy for addressing cold-start or low-load operation. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Secondary air injection can also be used to accelerate catalyst activation under cold-start conditions in spark ignition engines. Using a richer air/fuel ratio via intake air throttling, retarding fuel injection, or post combustion in-cylinder fuel additions during the exhaust stroke while injecting air directly into the exhaust port of the engine, results in excess fuel combustion within the exhaust manifold, creating additional heat that results in increasing catalyst temperatures to achieve faster catalyst light-off. These strategies can also be coupled with exhaust gas recirculation. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Spark-ignition engines that employ a richer cold start calibration used in combination with a secondary air injection system experience improved combustion stability. In addition, the richer calibration is less sensitive to variations in fuel volatility since less volatile fuels may lead to poor start and idle performance on engines calibrated to run lean during cold operation20,21 (Serrano, et al., 2009) (Lee & Heywood, 2010). [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

20 Serrano, D., Lavy, J., Kleeman, A., Zinola, S., Dumas, J., Le Mirronet, S., & Heitz, D., SAE 2009-01-2706.

21 Lee, D., & Heywood, J., SAE 2010-01-2124.

In support of the Tier 3 light-duty regulation,22 EPA tested a 2011 LDT4 pick-up truck with a 5.3L V8 engine that included a MECA supplied aftertreatment system. The aftertreatment package consisted of advanced catalyst coating on 900 cpsi substrates in the close-coupled location as well as underfloor catalysts and was aged to 150,000 miles. The system was combined with cylinder deactivation and achieved an FTP NMHC+NOx level of 18 mg/mile. We believe that these same technology approaches can be deployed on medium-duty gasoline engines to meet more stringent emission levels than those being currently proposed. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

22 https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-and-related-materials-control-air-pollution

Medium-duty Vehicles with Diesel Engines

With regards to diesel engine emissions, MECA members have been developing and commercializing a full suite of technologies to help medium and heavy-duty engine manufacturers to comply with the MY 2027 heavy-duty engine standards and these technologies can be readily applied to medium-duty chassis certified vehicles as well. Exhaust and emission control technologies include next generation close coupled and under chassis selective catalytic reduction (SCR), oxidation and diesel soot ignition catalysts with high porosity, low thermal mass substrates with heated catalyst and urea dosing strategies. These can be combined with engine thermal management strategies such as cylinder deactivation and advanced forms of turbocharging and EGR. These technologies already exist on some passenger car applications in Europe where real driving emission test procedures demand them. We further elaborate on these technologies below. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Cylinder Deactivation and Variable Valve Actuation

Cylinder deactivation (CDA) is an established technology on light-duty gasoline vehicles, with the primary objective of reducing fuel consumption and CO_2 emissions. This technology combines hardware and software computing power to, in effect, “shut down” some of an engine’s cylinders, based on the power demand, and keep the effective cylinder load in an efficient portion of the engine map without burning more fuel. Based on decades of experience with CDA on gasoline passenger cars and trucks, CDA is now being adapted for diesel engines. On a diesel engine, CDA is programmed to operate differently than on gasoline engines, with the goal of the diesel engine running hotter in low-load situations by having the pistons that are firing do more work. This programming is particularly important for vehicles that spend a lot of time in creep and idle operation modes. During low-load operation, CDA has resulted in exhaust temperatures increasing by 50°C to 100°C when it is most needed to maintain effective conversion of NOx in the selective catalytic reduction (SCR) catalyst bed. In some demonstrations, CDA has been combined with a 48V mild hybrid motor with launch and sailing capability to extend the range of CDA operation over the engine, and this may deliver multiplicative CO_2 reductions from these synergistic technologies.23 [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

23 https://www.meca.org/wp-content/uploads/resources/MECA_2027_Low_NOx_White_Paper_FINAL.pdf

The use of variable valve actuation (VVA) is another approach for active thermal management. VVA approaches include: early exhaust valve opening (EEVO), early intake valve closing (EIVC) or late intake valve closing (LIVC), all considered active thermal management strategies. Both EIVC and LIVC reduce the amount of air trapped at valve closing. Both methods reduce the effective compression ratio and volumetric efficiency, resulting in lower NOx emissions and reduced air-fuel ratio, and in turn, hotter exhaust temperature. EEVO results in hotter exhaust gas to heat-up aftertreatment; however, more fueling is needed to maintain brake power output. This results in a CO_2 emissions penalty that must be accounted for in calibrating for better fuel economy and higher engine-out NOx during hot operation when the SCR can be used to remediate NOx emissions. VVA offers some potential cost savings and is therefore used in some medium- duty applications as a fast heat-up strategy. OEMs will have multiple pathways at varying costs to achieve their thermal management objectives and achieve ultra-low NOx emissions in low-load and low-speed operation. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Modern Turbochargers

Modern turbochargers have a variety of available design options enabling lower CO_2 emissions by improving thermal management capability, such as: i) state of the art aerodynamics, ii) electrically-actuated wastegates that allow exhaust gases to by-pass the turbocharger to increase the temperature in the aftertreatment, and iii) advanced ball bearings to improve transient boost response. These and other technologies are available to support further reductions in CO_2 and other emissions. More advanced turbochargers are designed with a variable nozzle that adjusts with exhaust flow to provide more control of intake pressure and optimization of the air-to-fuel ratio for improved performance (e.g., improved torque at lower speeds) and fuel economy. These variable geometry turbochargers (VGT), also known as variable nozzle turbines (VNT) and variable turbine geometry (VTG), also enable lower CO_2 emissions through improved thermal management capability to enhance aftertreatment light-off. Finally, modern turbochargers have enabled engine and vehicle manufacturers the ability to downsize engines, resulting in fuel savings without sacrificing power and/or performance. The latest high-efficiency turbochargers are one of the more effective tools demonstrated in the DOE SuperTruck program.24 In addition to affecting the power density of the engine, turbochargers play a significant role in NOx and CO2 regulations compliance. Continuous improvement in turbocharger technology is making it possible to run very lean combustion (high air/fuel ratios), which increases efficiency. This improvement allows for very low particulate generation and even lower engine-out NOx. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

24 Navistar, "Final Scientific/Technical Report for SuperTruck Project: Development and Demonstration of a Fuel-Efficient, Class 8 Tractor & Trailer Engine System," 2016.

Turbo-compounding

Turbo-compounding is a variant of turbocharger technology that allows for the energy from the exhaust gas to be extracted, converted to mechanical or electrical energy and either mechanically added to the engine crankshaft through a transmission or stored electrically for opportunistic use in other driving conditions. Mechanical turbo- compounding has been employed on some commercial diesel engines, and EPA estimated penetration to reach 10% in the U.S. by the time the Phase 2 GHG Regulation is fully implemented in 2027.25 An early 2014 version of a turbo-compound-equipped engine was used during the first stage of testing at SwRI under the HD Low NOx Test Program, and the results from this engine with advanced aftertreatment have been summarized in several SAE technical papers.26,27,28 While turbo-compounding has the potential to reduce fuel consumption, it can result in lower exhaust temperatures that can challenge aftertreatment performance. Therefore, it is important to consider turbo-compound designs that incorporate bypass systems during cold start and low load operation or electrically driven turbo-compounding systems where the unit can be placed after the aftertreatment system. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

25 U.S. EPA, "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles -- Phase 2," Federal Register, pp. 73478-74274, 25 October 2016.

26 C. Sharp, C. C. Webb, G. Neely, J. V. Sarlashkar, S. B. Rengarajan, S. Yoon, C. Henry and B. Zavala, SAE 2017-01-0958.

27 C. Sharp, C. C. Webb, G. Neely, M. Carter, S. Yoon and C. Henry, SAE 2017-01-0954.

28 C. Sharp, C. C. Webb, S. Yoon, M. Carter and C. Henry, SAE 2017-01-0956.

Driven Turbochargers

Driven turbochargers can be used to control the speed of the turbomachinery independently of the engine's exhaust flow and vary the relative ratio between engine speed and turbo speed. Driven turbochargers may be utilized for several reasons, including performance, efficiency, and emissions. Considered an 'on-demand' air device, a driven turbocharger also receives transient power from its turbine. During transient operation, a driven turbocharger will behave like a supercharger and consume mechanical or electrical energy to accelerate the turbomachinery for improved engine response. At high-speed operation, the driven turbocharger will return mechanical or electrical power to the engine in the form of turbo-compounding, which recovers excess exhaust power to improve efficiency. This cumulative effect lets a driven turbocharger perform all the functions of a supercharger, turbocharger, and turbo-compounder. NOx emission control uniquely benefits from the application of driven turbochargers in several ways, including the ability to decouple EGR from boost pressure, reduce transient engine-out NOx, and improve aftertreatment temperatures during cold start and low load operation. Bypassing a driven turbine can provide quick temperature rises for the aftertreatment while still delivering the necessary boost pressure to the engine through supercharging, which also increases the gross load on the engine to help increase exhaust temperature.29 Testing has shown that routing engine exhaust to the aftertreatment by bypassing a turbocharger is one of the most effective methods to heat up the aftertreatment.30 [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

29 J. Brin, J. Keim, E. Christensen, S. Holman and T. Waldron, SAE 02-14-03-0032.

30 Navistar, "Final Scientific/Technical Report for SuperTruck Project: Development and Demonstration of a Fuel-Efficient, Class 8 Tractor & Trailer Engine System," 2016.

Hybridization

Mild Hybridization

48-volt mild hybrid electrical systems and components are expected to make their way onto commercial diesel vehicles in the near future. These 48-volt systems can be found on many light-duty vehicle models (primarily in Europe) from Mercedes, Audi, VW, Renault and PSA. In the U.S., Stellantis is offering a 48-volt system on the RAM 1500 pick- up and the Jeep Wrangler under the eTorque trademark. Because the safe voltage threshold is 60 volts, which is especially important when technicians perform maintenance on the electrical system, 48-volt systems are advantageous from an implementation standpoint. From a cost perspective, 48-volt systems include smaller starter and wire gauge requirements, offering cost savings from a high voltage architecture of a full hybrid. The U.S. Department of Energy's SuperTruck II program teams employed 48-volt technologies on their vehicles to demonstrate trucks with greater than 55% brake thermal efficiency. A recent study demonstrated through model-based simulations that a 48-volt technology package combined with advanced aftertreatment can achieve a composite FTP emission level of 0.015 g/bhp-hr.31 [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

31 F. Dhanraj, M. Dahodwala, S. Joshi, E. Koehler, M. Franke and D. Tomazic, 2022-01-0555.

Similar to the passenger car fleet, truck OEMs are considering replacing traditionally mechanically-driven components with electric versions to gain efficiency. Running accessories off 48-volt electricity rather than 12-volts is more efficient due to reduced electrical losses and because components that draw more power, such as pumps and fans, have increased efficiency when operating at higher voltages. The types of components that may be electrified include, electric turbos, electronic EGR pumps, AC compressors, electrically heated catalysts, electric cooling fans, oil pumps and coolant pumps, among others. Another technology that 48-volt systems could enable is electric power take-offs rather than using an engine powered auxiliary power unit or idling the main engine during hoteling while the driver rests. MECA members supplying commercial 48V components for commercial vehicles believe that the technology may be feasible to apply to a limited number of engine families by 2024, and it is likely to see greater penetration by 2027, especially on Class 8 line-haul where full hybridization is less practical. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Mild hybridization covers a range of configurations, but a promising one includes an electric motor/generator, regenerative braking, electric boost and advanced batteries. Stop/start deployment also provides a thermal management benefit to the aftertreatment by preventing cooling airflow through the aftertreatment during hot idle conditions. In this way, 48-volt mild hybridization is complementary technology to CDA and start-stop capability, allowing the combination of multiple technologies on a vehicle to yield synergistic benefits and justify the cost. By shutting off the engine at idle or motoring using start/stop, micro hybrid technology can help to maintain aftertreatment temperature by avoiding the pumping of cold air through the exhaust. Capturing braking energy and storing it in a small battery for running auxiliary components when the engine is off offers another CO2 reducing strategy for OEMs to deploy. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

In lighter medium-duty applications, advanced start-stop systems have been developed that use an induction motor in a 48-volt belt-driven starter-generator (BSG). When the engine is running, the motor, acting as a generator, will charge a separate battery. When the engine needs to be started, the motor then applies its torque via the accessory belt and cranks the engine instead of using the starter motor. The separate battery can also be recharged via a regenerative braking system. In addition to the start- stop function, a BSG system can enhance fuel economy even during highway driving by cutting off the fuel supply when cruising or decelerating. Such systems can also be designed to deliver a short power boost to the drivetrain. This boost is typically 10 to 20 kW and is limited by the capacity of the 48V battery and accessory belt linking the motor to the crankshaft. New designs are linking the BSG directly to the crankshaft and allowing additional power boost of up to 30kW to be delivered, giving greater benefits to light and medium commercial vehicles.32 [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

32 https://www.meca.org/wp-content/uploads/resources/MECA_2027_Low_NOx_White_Paper_FINAL.pdf

Full hybridization and plug-in hybrids

Full hybrid configurations are currently found on several models of light-duty passenger cars and light trucks in the U.S. and a limited number of medium-duty trucks. These include PHEV models that can also be plugged-in to enable all-electric operation over a defined all-electric range (AER). A full hybrid can enable electrification of many of the components described above for mild hybrid vehicles, but the higher voltages allow for more parts to be electrified and to a larger degree of efficiency. Full hybrids implementing larger electric motors and batteries, can also support greater acceleration capability and regenerative braking power. Full hybrid vehicles have made the highest penetration into parcel delivery, beverage delivery and food distribution vehicles because they can take advantage of regenerative braking in urban driving.33 We expect to see some application of full hybrids combined with low NOx engines to reduce CO2 emissions in several vocational and local delivery applications. Integrated electric drivetrain systems, consisting of a fully qualified transmission, motor and power electronics controller, are now commercially available. With power levels of over 160kW and the ability to meet high torque requirements, these systems enable electrification of medium-duty commercial vehicles. There is also an increasing number of electric drivetrain solutions up to 300kW that are suitable for medium and heavy-duty vehicles that can be used with either battery or fuel cell power sources.30 [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

33 CARB, "Draft Technology Assessment: Heavy-Duty Hybrid Vehicles," 2015.

30 Navistar, "Final Scientific/Technical Report for SuperTruck Project: Development and Demonstration of a Fuel-Efficient, Class 8 Tractor & Trailer Engine System," 2016.

Plug-in hybrids (PHEVs) can be practical for light and medium- duty trucks (e.g., Class1 through 3) that do not travel long distances or operate for long periods of time without returning to a central location. In addition, serial plug-in hybrids which employ an engine operating only as a generator to charge the traction battery to extend range, offer operational flexibility for commercial vehicles while full electric vehicles and their needed infrastructure are established. It is worth noting that both HEVs and PHEVs are able to achieve significant GHG benefits compared to their conventional vehicle counterparts by employing relatively low-capacity batteries. Further discussion on efficient use of battery critical materials is presented below and displayed in Table 1. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Organization: Mercedes-Benz AG (M-B)

Diesel-Powered MDVs Are Not Considered in EPA's NPRM PM Feasibility Analysis [EPA-HQ-OAR-2022-0829-0623, p. 17]

Decarbonization of the Medium Duty segment is not an easy path and requires huge investments in development, manufacturing, supply chains, and infrastructure – for customers, the public, and for industry. The adjustment proposed to the emission limits should remain feasible and obtainable for diesel-powered vehicles to avoid negative economic impacts to the MDV segment. [EPA-HQ-OAR-2022-0829-0623, p. 17]

Today's Mercedes-Benz diesel-powered Sprinters form the benchmark for CO2 emissions when compared to other MDVs. A diesel Sprinter van has between a 23%-27% MPG advantage when compared to a competitor vehicle in terms of fuel economy, and CO2 emissions can be up to 20% lower based on the efficiency of a diesel powertrain: [EPA-HQ-OAR-2022-0829-0623, p. 17]

[See original for graph on CO2 Comparison Between MDVs in Class 2b Segment (g/mi)] [EPA-HQ-OAR-2022-0829-0623, p. 17]

These benefits, however, must be balanced with other portions of EPA's proposal for criteria emissions. Regarding EPA's proposed PM standards, existing ACCII standards have formed the basis of development work and internal goals since the beginning of CARB engagement in 2020. Significant work and investment is already underway to design to CARB's LEV IV PM standards for MDVs. In stark contrast to the already finalized CARB LEV IV standards, EPA's proposed PM standards are 16-20x more stringent than EPA's current MDV PM standards. [EPA-HQ-OAR-2022-0829-0623, p. 17]

In proposing these aggressive PM standards, EPA's rationale is focused on MDV gasoline engines, with the potential to match the capabilities of light-duty vehicle emissions levels once GPFs are applied. This logic is problematic, but our main concern is that EPA has not considered diesel specifications or technical limits as part of its analysis, leaving out a notable technology pathway in this segment. The chart below depicts the significantly higher reduction burden EPA proposes to apply to MDV, when compared to the proposed reduction in the light-duty segment. Also illustrated below is the discrepancy in stringency between the NPRM proposed PM standard and the PM standard adopted by EPA in December of 2022 in their Heavy-Duty Engine Rule. The proposed PM limit of 0.5mg/mi is from 8 to 18 times more stringent than EPA's rule promulgated just last year, after conversion from mg/bhp-hr standards to mg/mi across a typical Class 2b/3 MDV vehicle. [EPA-HQ-OAR-2022-0829-0623, pp. 17-18]

[See original for graph on Existing PM vs New PM Stringency Comparison (mg/mi)] [EPA-HQ-OAR-2022-0829-0623, pp. 17-18]

EPA's proposed jump in PM stringency in the MDV segment will pose a challenge for MDVs, including diesel powertrains. Cutting edge technology and the best-known methodology is already in use, in diesel-powered MDVs on the road today. [EPA-HQ-OAR-2022-0829-0623, pp. 17-18]

Additional MDV Criteria Emissions Considerations

Mercedes-Benz is also concerned with the overall Tier 4 criteria emissions requirements for MDVs. As such, our primary recommendation is that EPA align to CARB's ACCII LEV IV requirements for MDVs, including but not limited to additional emissions bins, decoupling BEV from the fleet average, and application of US06 testing. The emissions bins are necessary to assist with reduction of burden and complications from the two differing approaches. They are also useful for providing flexibility while Mercedes begins electrifying MDVs. [EPA-HQ-OAR-2022-0829-0623, p. 19]

Decoupling BEVs from the NMOG+NOx fleet average simplifies compliance planning, but if EPA does not apply this approach then the fleet average standards need to be adjusted (or at least adjustable) to account for potential changes in BEV projections during the time this rule is in effect. [EPA-HQ-OAR-2022-0829-0623, p. 19]

Organization: North Dakota Farmers Union (NDFU)

Criteria Emissions

Further tightening criteria emissions standards on new vehicles may not be effective at improving air quality, and it also discourages technologies that can help meet GHG emissions reductions goals – and meet them today. For example, flexible fuel vehicles allow use of greater ethanol blends, which provide increasing GHG emissions reductions. However, overly restrictive criteria emissions standards make it more difficult to design engines, cold start strategies, and catalytic aftertreatment which can handle the wide range of fuel properties required for flex-fuel vehicles. Moreover, higher ethanol blends would reduce air toxic emissions that may be more important to focus on with respect to light-duty and medium-duty vehicles that will continue to use gasoline well into the future. [EPA-HQ-OAR-2022-0829-0586, p. 6]

<u>EPA Summary and Response</u>

<u>Summary:</u>

CARB, MECA, and EPHO were generally supportive of our proposed MDV criteria pollutant emissions standards. CARB referenced their analysis of certification emissions data which was consistent with EPA's certification emissions data for MDV. The LEV IV fleet average standards and U.S. EPA's proposed standards, while structured differently, were determined to be of similar stringency for the same category of conventional ICE MDV, and because the vehicles are required to meet similar emission levels in both programs, manufacturers would be able to use the same technologies to meet both federal and California standards. EPHO characterized the proposed MDV criteria pollutant standards as "…feasible and cost-reasonable." EPHO characterized the proposed requirement for engine-certification of high-GCWR MDV as

"...likely appropriate, but should be monitored for manipulation and efficacy." EPHO also asked the Agency to monitor future data from MDV and from the heavy-duty engine in-use testing program in order to assess emissions differences between high-GCWR MDVs and other MDVs, and requested that the Agency commit to releasing a report any pertinent findings.

MECA provided a significant level of detail regarding specific technologies that are already commercially available for reducing NMOG+NOx emissions. These included a description of technologies similar to those currently used for light-duty truck applications, including both passive (system design) and active (engine controls) thermal management of exhaust catalyst systems; new, more advanced three-way catalyst coatings and substrate designs; and close-coupling and use of secondary air injection for cold-start emissions control. MECA referenced a report submitted to the docket for this rule detailing an integrated approach to criteria pollutant emissions control applied to a gasoline/spark-ignition pickup truck. With respect to diesel criteria pollutant and GHG emissions control, MECA referenced work from the U.S. DOE Supertruck II program, in particular achieving FTP NOx emissions of 0.015 g/bhp-hr. MECA commented that based on over 15 years of experience with diesel emission controls, medium-duty diesel vehicles that implement DPFs will be able to meet the stringent PM requirements proposed in this rule.

Cummins submitted comments regarding the lack of program to carry Tier 3 MDV NMOG+NOX credit into the new program for certifying engines installed in high-GCWR engines under part 1036. Cummins also supported fungibility of engine-certified high GCWR MDV NOX credits within the heavy-duty ABT program.

M-B expressed concern that the Agency's assessment of the feasibility of the proposed MDV PM standards was focused solely on spark-ignition gasoline engines equipped with GPF. M-B asserted that the EPA "…has not considered diesel specifications or technical limits as part of its analysis…" for the proposed rule. Similar to comments received with respect to our light-duty criteria pollutant standards, M-B requested alignment with California ACCII LEV IV standards including the decoupling of BEVs from NMOG+NOX fleet average standards, the approach to US06 testing and standards, and additional emissions certification bins.

NDFU expressed a concern that tightening criteria emissions standards on new vehicles may not improve air quality and that such standards would discourage technologies, such as flexible fuel vehicles, that help meet GHG emissions reductions goals. In particular, they were concerned that more stringent emissions standards would make it more difficult to design engines, cold start strategies, and catalytic aftertreatment for flex-fuel vehicles. NDFU also asserted that reducing air toxic emission by using higher ethanol blends may be more important for medium-duty vehicles than reducing criteria pollutant emissions.

Response:

EPA agrees with CARB that LEV IV fleet average standards[366] and U.S. EPA's final standards, while structured differently, are of similar stringency for the same category of conventional ICE MDVs. The emissions standards applicable to MDV are of comparable levels of stringency in California programs and under the Federal program, and manufacturers would thus be able to use the same MDV technologies to meet both Federal and California standards.

[366] EPA has not at this time approved the waiver that would allow California to follow the ACC II program, including the LEV IV requirements.

With respect to EPHO's comments regarding high-GCWR MDV, EPA has not finalized a requirement for engine dynamometer certification. Instead, EPA has finalized in-use standards for high-GCWR MDV comparable to the California ACC II in-use standards for MDV with GCWR above 14,000 pounds. Please refer to § III.D.5 "Requirements for Medium-Duty Vehicles With High GCWR" within the preamble to this rule. With respect to EPHO's concern that EPA monitor MDV and LHDE emissions, it should be noted EPA regularly conducts confirmatory testing and other compliance testing, including surveillance testing, to ensure manufacturer's full compliance with Federal emissions standards. The Agency also periodically issues progress reports on vehicle and engine compliance activities. The latest report covering the 2014-2017 model years was issued in April of 2019 (https://www.epa.gov/ve-certification/compliance-activity-reports-vehicles-and-engines).

We greatly appreciate the level of detail provided by MECA regarding criteria pollutant emissions control technologies for both spark-ignition and compression-ignition MDV. MECA's detailed comments on MDV criteria pollutant emissions control technologies is broadly consistent with EPA's analysis of MDV criteria pollutant emissions, emissions controls and feasibility within Chapter 3.2 of the RIA.

Regarding Cummins comments about Tier 3 NMOG+NO_X credit carry over, the Agency did not finalize a requirement for high GCWR MDV engine certification, although engine certification is still available as an option for high GCWR MDV (see Preamble § III.D.5 and Response to Comments § 6.4). Chassis-certified high GCWR MDV may optionally choose early compliance with the MDV criteria pollutant standards. Manufacturers choosing early compliance may carry over Tier 3 Class 2b and Class 3 NMOG+NO_X credits subject to the limits for carrying forward NMOG+NO_X credit within the Tier 3 program. With respect to Cummins comments regarding averaging, banking and trading and fungibility of engine-certified MDV NO_X credit within the HD program, manufacturers opting to engine-certify high GCWR MDV to LHD engine criteria pollutant standards under 40 CFR part 1036 would be fully eligible to participate in averaging, banking and trading, including fully exchanging credits with other engine families certified under 40 CFR part 1036, subject to the various credit provisions that apply under 40 CFR part 1036, subpart H. Credits earned under 40 CFR part 86, subpart S, before model year 2027 are not available for certifying engines under 40 CFR part 1036 for the same reasons that 40 CFR part 1036 restricts the transfer of banked engine credits for certifying model year 2027 and later engines. For example, engines installed in vehicles certified under 40 CFR part 1036, subpart S, have not been designed to control emissions for towing heavy payloads, for low-load operation, or for other off-cycle operation. As such, allowing the suggested use of credits would overstate the value of credits earned under 40 CFR part 86, subpart S, and accordingly reduce the environmental benefits associated with the standards adopted under 40 CFR part 1036.

In response to M-B comments regarding the feasibility of the proposed diesel PM standards, EPA conducted a statistical analysis of composite FTP test results from 32 distinct MY 2022 through MY 2024 MDV test groups certifying to Federal Tier 3 emissions standards. Composite FTP PM test results are shown using a box plot within the figure below. The horizontal line represents the median MDV PM emissions test results (approximately 0.35 mg/mi). The "x" within the box represents mean MDV PM emissions test results (approximately 0.5 mg/mi). The upper and lower bounds of the box represent the first through third quartile of MDV PM emissions test results. The "whiskers" above and below the box represent 1.5 times the interquartile range (IQR). Of the test groups above 1 mg/mi, 4 were MY 2022 M-B Class 2b and Class 3 test groups and one was a MY 2024 GM test group. All of the MY 2022 M-B test groups had PM emissions test results above the median and mean for all MDV and ranged from 0.6 to 1.1 mg/mi. It is notable, however, that the M-B test results for MY 2023 and MY 2024 were considerably lower, with all test groups having PM test results at or below the mean and 4 of the 5 test groups having PM test results lower than the median for all MDV test groups. M-B introduced both engine changes and exhaust aftertreatment changes for MY 2023 that likely resulted in the considerable PM emissions reductions observed within FTP certification test results.

In following with the analysis outlined below, the agency believes that the final PM standard for diesel MDVs of 0.5 mg/mi is feasible. The analysis of recent model year MDV diesel PM emissions shows that the average manufacturer reported PM emissions for this segment is already at the 0.5 mg/mi standard, and the median PM emissions is 0.35 mg/mi, which is below the final standard. In other words, half of the reported values are below the final MDV PM standard with a compliance margin. However, EPA recognizes that vehicles within this regulatory class may not undergo redesigns as often as light-duty vehicles and the powertrains with which they are equipped may have an equally long design life. As such, the agency has decided to provide an additional year of lead-time relative to the proposal, for both the default and early compliance. However, this additional lead-time is not reflective of the agencies assessment of the feasibility of the 0.5 mg/mi standard for diesel MDVs, but rather the recognition of the requisite redesign cycles for this regulatory class. In light of the above, including this leadtime consideration, as well as our consideration of the statutory and other relevant factors as described in sections III and V of the preamble, we find that the MDV PM standard reflects “the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply.” CAA section 202(a)(3)(A)(i).

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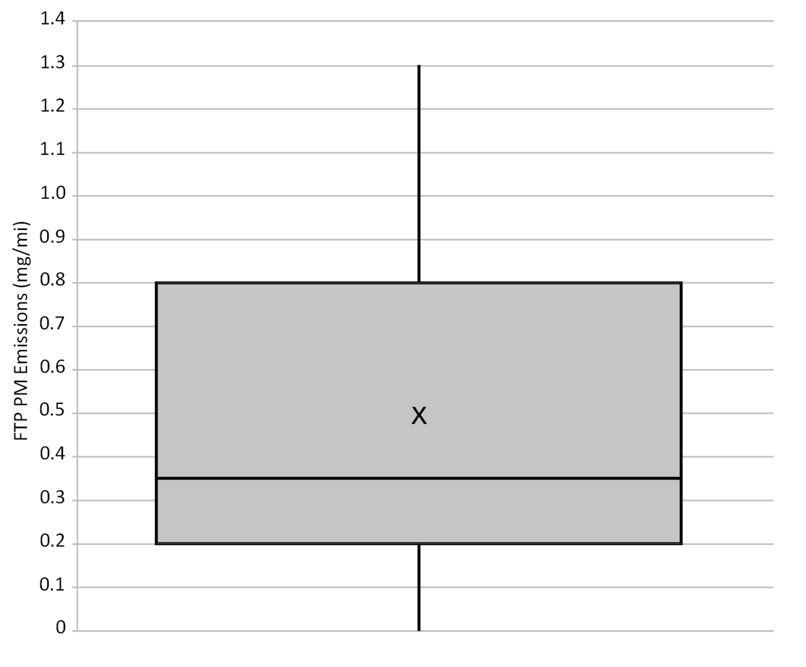

Figure 1: Box plot of FTP composite PM emissions test results for 32 MY 2022 through MY 2024 MDV test groups.

EPA also notes MECA's comment that based on over 15 years of experience with diesel emission controls, medium-duty diesel vehicles that implement DPFs will be able to meet the stringent PM requirements proposed in this rule.

M-B's comment requesting decoupling MDV BEVs from the MDV NMOG+NOx fleet average and adoption of California ACC II LEV IV MDV criteria pollutant standards is similar to comments received by the Agency with respect to light-duty criteria pollutant emissions standards. EPA is not finalizing a wholesale adoption of the California ACC II LEV IV program. The ACC II program includes synergistic elements for both greenhouse gas and criteria pollutant emissions, with the foundation of the ACC II program being a ZEV sales requirement. M-B did not recommend adopting the ZEV standards provisions of ACC II and instead recommended that EPA only adopt the criteria pollutant elements of ACC II. This ala carte approach to emissions standards fails to consider the synergistic nature of California's ACC II program. The treatment of ICE-based vehicles under ACC II is premised on an increasing penetration of ZEVs and their associated emission reductions. EPA's 2027 and later MDV program, being performance-based for both GHG and criteria pollutant emissions, relies on increasingly stringent performance-based standards to achieve substantial emissions reductions nationwide. EPA is, however, finalizing additional provisions in the FRM which are responsive to requests for greater alignment with ACC II. These include:

- Alignment with all ACC II MDV NMOG+NOx emissions bins at or below Bin 170
- Adoption of in-use standards for high-GCWR MDV comparable to California ACC II in-use standards for MDV above 14,000 pounds GCWR
- Alignment with California MDV OBD

4.1.9 - Small volume manufacturer alternative criteria standards

EPA addresses comments related to small volume manufacturers for both GHG and criteria emissions in Section 3.1.7 of this document.

4.1.10 – CARB's ACC II supplemental NMOG+NOx standards

Comments by Organizations

Organization: Alliance for Automotive Innovation

4. Mid-Temperature Intermediate Soak Standard

In the NPRM, EPA describes that manufacturers are required to submit data for three separate standards: 9–11 minutes for the 10-minute requirement, 39–41 minutes for the 40-minute requirement, and 5–7 hours for the 3–12 hour requirement.263 Conversely, CARB's ACC II regulations allow for manufacturers to use attestation to meet the respective requirement.264 Therefore, we request that EPA align with California's approach and allow attestation to meet the mid-temperature intermediate soak requirement. Laboratory test burden will be significantly reduced by omitting the requirement for manufacturers to provide test data at three different soak times. [EPA-HQ-OAR-2022-0829-0701, pp. 148-149]

263 NPRM at 29276.

264 13 C.C.R. § 1961.4(d)(2)(B).

5. Early Drive-Away

a) Early Drive-Away Attestation

We request that EPA allow attestation to meet the quick drive-away requirement. [EPA-HQ-OAR-2022-0829-0701, p. 149]

b) Early Drive-Away Speed Tolerance specification [EPA-HQ-OAR-2022-0829-0701, p. 149]

Due to the sensitivity of the early drive-away standard to variation and transients during the initial part of the test cycle, Auto Innovators recommends a tighter speed trace tolerance for the first seven seconds of the test to ensure the vehicle is fully stopped while the transmission is placed in drive mode. A 0.3 mile per hour tolerance was proposed to CARB during the ACC2 rulemaking, but CARB did not incorporate the change due to lack of precedence for tolerance variation in the other test cycles. Auto Innovators encourages EPA to fully evaluate the necessity of a 0.3 mile per hour speed tolerance, and to adopt this change for the first seven seconds of the cycle to address the unique nature and stringency of this requirement. [EPA-HQ-OAR-2022-0829-0701, p. 149]

6.PHEV High-Power Cold Start Standard

EPA is proposing to implement the CARB LEV IV high-power cold start (HPCS) standard for light- and medium-duty vehicles. "EPA requests comment on Step 2 of the PHEV HPCS standard, Specifically whether the Step 2 standard should 1) be finalized as proposed, 2) have a start date later than MY 2029, 3) have an alternative stringency, either for all light-duty vehicles or just for LDT3 and LDT4, or 4) should be removed, leaving Step 1 to apply indefinitely."265 Auto Innovators believes that for larger vehicles, especially those needing large towing capacity, Step 1 of the PHEV HPCS standard should be extended through the end of the Tier 4 rule period. [EPA-HQ-OAR-2022-0829-0701, pp. 149-150]

265 NPRM at 29276.

PHEVs will be an especially important technology for use cases in which charging or hydrogen refueling infrastructure isn't readily available, in particular for larger body-on-frame vehicles that are designed for towing large loads. Due to the nature of these vehicles, the amount of battery needed to meet the Step 2 provisions is difficult to achieve for the foreseeable future. In addition, larger vehicles such as P/U and large SUVs tend to have a longer model life, making it very expensive to modify if it needs to be done mid-model life. [EPA-HQ-OAR-2022-0829-0701, pp. 149-150]

Therefore, we believe that for GVWR > 6,000 lbs, extending the Step 1 provision through MY 2032 is important to allow those vehicles time for market development. EPA should extend Step 1 HPCS provision for GVWR > 6,000 lbs through 2032MY. [EPA-HQ-OAR-2022-0829-0701, pp. 149-150]

Finally, we recommend EPA allow OEMs to certify to this standard using attestation. The vehicles would meet the standards, and be held to the standard, this would simply reduce the upfront certification test. [EPA-HQ-OAR-2022-0829-0701, pp. 149-150]

Organization: Ford Motor Company

Adoption of CARB ACC2 NMOG+NOx Provisions

The EPA has proposed adoption of three NMOG+NOx provisions for light-duty vehicles aligned with the CARB ACC2 program (PHEV High Power Cold Starts, Early Driveaway and Intermediate Soak Mid-Temperature Starts). [EPA-HQ-OAR-2022-0829-0605, p. 14]

Ford supports EPA adopting these requirements using the existing CARB ACC2 bin-specific standards. EPA's proposed alterations to the California requirements, including applying a different bin structure, are unnecessary and add unwarranted complexity. In addition, Ford seeks confirmation that the PHEV High Power Cold Starts mileage exemption requirement is tied to the unadjusted all-electric range on the cold-start US06 driving cycle. [EPA-HQ-OAR-2022-0829-0605, p. 14]

Organization: International Council on Clean Transportation (ICCT)

ICCT supports EPA's inclusion of the new provisions on vehicles' operating conditions for light- duty vehicles that align with the CARB ACC II program. The additional operating conditions include high power cold starts in plug-in hybrid vehicles, SFTP early drive-away, and SFTP intermediate soak mid-temperature starts (called partial soak standard in ACC II). The bin-specific standards are mostly congruent with those in the ACC II program with some slight difference. Instead of having Bin 125, 25 or 15, the proposal includes Bin 10 which has more stringent NMOG + NOx standards compared to CARB's. [EPA-HQ-OAR-2022-0829-0569, pp. 44-45]

Organization: Kia Corporation

Kia Urges EPA's NMOG+NOx Emissions Standards Align with ACC II

EPA proposes adoption of a NMOG+NOx standard of 12 mg/mi by 2032 over four operating conditions. These three conditions are not currently captured in test procedures and could result in significant criteria pollutant emissions: high power cold starts in plug-in hybrid vehicles (HPCS), cold FTP, and mid-temperature intermediate soak starts. The proposal represents a 60 percent reduction for light-duty vehicles that include a fleet average that declines from MYs 2027 - 2032, the elimination of higher certification bins, and a requirement for the same fleet average emissions standard to be met across four test cycles (FTP, HFET, US06, SC03). However, EPA proposes to keep all ZEV and non-ZEV vehicles in the fleet average. [EPA-HQ-OAR-2022-0829-0555, p. 11]

Kia urges EPA to align its criteria pollutant regulation with the California ACC II program. Kia supports EPA's proposal of requiring automakers to attest to meeting the three specific CARB- defined test procedures: HPCS, cold FTP, and mid-temperature intermediate soak starts. However, because California's ACC II NMOG+NOx fleet averaging standard applies to a non-ZEV fleet average (in a phasing out ZEVs in the average), Kia does not support keeping all ZEVs and non-ZEVs in one fleet average. [EPA-HQ-OAR-2022-0829-0555, p. 11]

Organization: MECA Clean Mobility

EPA should align with CARB's ACC II requirements for PHEV high power cold starts, early drive-away, and mid-temperature engine starts. Similar to CARB, EPA should allow PHEVs with all electric range greater than or equal to 40 miles to be exempt from the high-power cold start requirement. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

MECA supports EPA's proposed alignment with CARB ACC II provisions to address emissions from operation previously not considered by certification testing, including high power cold starts of plug-in hybrid electric vehicles, shortened idle and early drive-away after start-up, and short to intermediate soak times in between engine starts. MECA believes that emissions after engines are restarted after intermediate soak time, between three and eight hours, can be readily addressed with engine calibration revisions without the need for additional technology, and this is a cost-effective way to reduce these off- cycle emissions that are found during real world operation. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

Regarding drive-away emissions, we believe that faster system warm-up can be achieved through improvements in calibration as well as the use of commercially available engine technologies, such as turbochargers, exhaust gas recirculation (EGR), and cylinder deactivation (CDA). Extensive engine calibration and combustion strategies, such as the use of variable valve timing (VVT), have been developed to enable faster exhaust heat-up in order to increase catalyst performance. Higher voltage hybrid architectures ranging from 48V mild to full hybrids also create opportunities to incorporate electrically-heated catalysts (EHCs) to address these shorter cold-start idle times. Additional aftertreatment efficiency gains have been and continue to be developed through improvements in catalyst materials to enable higher performance at lower exhaust temperatures. Furthermore, new system architectures, more robust thermal management controls and advanced thermal insulation materials facilitate faster heat-up and heat retention during real world operation. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

MECA acknowledges the need to better control PHEV high power demand engine cold start emissions. In particular, MECA is aware of published work highlighting the use of engine and exhaust emission control strategies to address high power starting emissions used in other electrified hybrid powertrains.36 Several of the technologies and strategies listed above to address "quick drive-away" emissions can also be employed to address emissions from off-cycle high power starts. MECA believes that the proposed PHEV minimum requirements in CARB ACC II address the shortcomings of some earlier generation PHEVs. To that end, EPA should be finalized as proposed to harmonize with CARB ACC II on the Step 2 PHEV high power cold start standard that exempts PHEVs with a cold start US06 all electric range of at least 40 miles. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

36 Kawaguchi, B., Umemoto, K., Misawa, S., Hirooka, S. et al., SAE 2019-01-2217.

Organization: Mercedes-Benz AG

Intermediate Soak Mid-Temperature Starts

EPA's proposal states that manufacturers are required to submit data for three separate standards:

1. 9–11 minutes for the 10-minute requirement [EPA-HQ-OAR-2022-0829-0623, p. 15]
2. 39–41 minutes for the 40-minute requirement, and [EPA-HQ-OAR-2022-0829-0623, p. 15]
3. 5–7 hours for the 3–12 hour requirement [EPA-HQ-OAR-2022-0829-0623, p. 15]

Testing at three different points triples the amount of testing required for each vehicle group. [EPA-HQ-OAR-2022-0829-0623, p. 15]

In contrast, CARB's ACCII LEV IV regulation allows for manufacturer attestations under Section 1961.4(d)(2)(B). This attestation provides testing relief and reduces the cost of implementation, without any impact on emissions. [EPA-HQ-OAR-2022-0829-0623, p. 15]

Mercedes-Benz requests that EPA align with CARB ACC II LEV IV and allow attestation to meet this requirement. Lab test burden and certification time will be significantly reduced by omitting the requirement for manufacturers to provide test data at three different soak times. [EPA-HQ-OAR-2022-0829-0623, p. 15]

EPA Summary and Response

Summary

EPA received comments on the proposed light-duty vehicle standards aligned with the CARB ACC II program that range from supportive to those recommending changes to specific parts of the program. Comments and EPA's responses for each of the three provisions are provided below.

1) PHEV High Power Cold Starts

ICCT and MECA supported the high power cold starts (HPCS) provision. MECA noted that emissions from HPCS were not previously considered by certification testing and describes commercially available technologies that can be employed to address these emissions, including technologies described in published work. MECA recommends that EPA finalize the HPCS provision, including exempting PHEVs with a cold start US06 all electric range of at least 40 miles in Step 2 of the program. Ford requested confirmation that the all-electric range exemption is tied to the unadjusted all-electric range on the cold-start US06 driving cycle.

Ford commented that it supports EPA adopting the light-duty provisions aligned with the ACC II program using CARB's ACC II bin structure, not the different structure proposed by EPA, to avoid unnecessary complexity. Manufacturers requested that EPA should finalize more bins to provide additional resolution in certifying test groups. AAI and Kia recommended that manufacturers be allowed to attest to the standard to reduce test burden.

AAI commented that for larger vehicles, especially those needing large towing capacity, Step 1 of the PHEV HPCS standard should be extended through the end of the Tier 4 rule period and Step 2 should not be adopted. A major manufacturer also requested that EPA not adopt Step 2 for vehicles above 6000 lb GVWR.

2) Early Driveaway

ICCT and MECA submitted supportive comments for the early driveaway provision. MECA noted that emissions from early driveaway were not previously considered by certification testing and describes calibration strategies and several commercially available technologies that can reduce early driveaway emissions.

Ford supported EPA adopting the early driveaway standard using CARB's ACC II bin structure, not the different structure proposed by EPA, to avoid unnecessary complexity. Manufacturers commented that EPA should finalize more bins to provide additional resolution in certifying test groups. AAI and Kia recommended that manufacturers be allowed to attest to the standard to reduce test burden.

AAI recommended a tighter speed tolerance for the first seven seconds of the early driveaway test to ensure a test driver does not drive off much before 8 seconds.

3) Intermediate Soak Mid-Temperature Starts

ICCT and MECA submitted supportive comments for the intermediate soak mid-temperature start provision. MECA identified that emissions from intermediate soak times were not previously covered by certification testing and comments that elevated emissions from intermediate soak times can be readily addressed with engine calibration revisions without the need for additional technology.

Ford commented that to avoid unnecessary complexity, EPA should adopt CARB's ACC II bin structure for the intermediate soak mid-temperature start provision. Manufacturers commented that EPA should finalize more bins to provide additional resolution in certifying test groups. AAI, Kia and Mercedes-Benz requested that manufacturers be allowed to attest to the standard to reduce laboratory test burden.

<u>Response</u>

1) PHEV High Power Cold Starts

After considering the comments on HPCS, EPA is finalizing Step 1 and Step 2 of the HPCS standard and is requiring manufacturers to provide data demonstrating compliance (instead of entirely relying on attestation) because according to EPA's modeling of the future fleet and input from AAI and manufacturers, PHEVs may play a significant role in the future vehicle fleet and that would make PHEV HPCS an significant operating mode.

EPA agrees with MECA that technologies can be employed to meet the HPCS standards but also recognizes that manufacturers need time to implement these design changes, especially on some models. To address that concern, the Agency is providing manufacturers with an extra year to comply with Step 1 and Step 2, relative to the CARB program, to give manufacturers more time to comply. The criteria pollutant phase in schedules described in preamble Section III.D.1.i also provide additional lead time. EPA is finalizing the exemptions to Step 1 and Step 2 of the standard as proposed.

In response to requests from Ford and other manufacturers for EPA to not adopt a bin structure different from CARB's ACC II bin structure and to add more bins for additional resolution, EPA is finalizing a bin structure that includes all CARB ACC II bins except Bin 125 and includes bins from 0 to 70 in increments of 5. EPA is not finalizing Bin 125 because EPA is eliminating this bin from the list of bins available to light-duty vehicles (Preamble Section III.D.2.i). The inclusion of bins from 0 to 70 is to provide manufacturers with additional resolution in certifying test groups to meet the standard.

As noted in CARB's ACC II requirements, PHEVs with a minimum US06 all-electric range value greater than 40 miles are exempt from the High Power Cold Start Standards for Plug-in Hybrid Electric Vehicles. PHEVs achieving this minimum all electric range on a charge-depleting cold start US06 test qualify for the exemption. The California regulations do not specify applying any adjustments to the charge depleting US06 result when determining the all-electric US06 range value. As EPA is adopting the California exemption from the High Power Cold Start requirements for PHEVs with a minimum US06 all-electric range, EPA will also use the unadjusted cold start US06 all-electric range for this determination.

2) Early Driveaway

EPA considered the submitted comments on early driveaway and is finalizing an early driveaway standard with several changes from what was proposed. EPA is finalizing an early driveaway standard and is requiring manufacturers to provide data (instead of relying on attestation) demonstrating compliance. Field data indicates that there is a propensity of drivers to drive off sooner than the delay represented in the FTP, making early driveaway a significant operating mode. In addition, there are commercially available technologies that can reduce early driveaway emissions and vehicle manufacturers have demonstrated that they are able to reduce the emissions associated with this event.

EPA is finalizing a bin structure that includes all CARB ACC II bins except Bin 125 and includes bins from 0 to 70 in increments of 5. EPA is not finalizing Bin 125 because EPA is eliminating this bin from the list of bins available to light-duty vehicles (preamble Section III.D.2.i). The inclusion of bins from 0 to 70 is to provide manufacturers with additional resolution in certifying test groups to meet the standard.

In response to AAI's request for a tighter speed tolerance for the first seven seconds of the early driveaway test, EPA is finalizing an early driveaway test in which vehicle speed may not exceed 0.0 mph until 7.0 seconds and vehicle speed between 7.0 and 7.9 seconds may not exceed

2.0 mph. This reduces the possibility of a test driver driving off significantly earlier than 8 seconds without setting unrealistic requirements on the test driver and doesn't significantly skew the trace to drive-off times larger than 8 seconds. Details are provided in Preamble Section III.D.7.ii.

3) Intermediate Soak Mid-Temperature Starts

EPA is finalizing an intermediate soak mid-temperature starts standard similar to what was proposed but with several changes. EPA is finalizing an intermediate soak mid-temperature starts standard because many current vehicles emit at elevated levels after an intermediate soak start, intermediate soak starts occur frequently, and the issue can be readily addressed with engine calibration revisions without the need for additional technology.

In response to comments from Ford and other manufacturers, EPA is finalizing a bin structure that includes all CARB ACC II bins except Bin 125 and includes bins from 0 to 70 in increments of 5. EPA is not finalizing Bin 125 because EPA is eliminating this bin from the list of bins available to light-duty vehicles (preamble Section III.D.2.i). The inclusion of bins from 0 to 70 is to provide manufacturers with additional resolution in certifying test groups to meet the standard.

EPA proposed that manufacturers provide certification test data at three intermediate soak times and attest to meeting the standard at all other times between 10 minutes and 12 hours. The purpose of manufacturers supplying test data is to ensure compliance with the standard. EPA considered requests from AAI, Kia and Mercedes-Benz to allow attestation to the standard at all soak times and appreciates that intermediate soak testing takes time. To achieve a balance between high confidence in compliance and minimizing test burden, EPA is finalizing that manufacturers submit certification test data at a minimum of one intermediate soak time (between 39 and 41 minutes) and attest to meeting the standard at other times between 10 minutes and 12 hours.

5 - On board diagnostics (OBD)

Comments by Organizations

Organization: Alliance for Automotive Innovation

IX. OBD

A. Gasoline Particulate Filter (GPF) § 86.1806-27 Onboard diagnostics. Section (h)

1. PM Filter Threshold

EPA proposes adding monitoring requirements for GPFs installed on vehicles with spark-ignition engines in §86.186-27(h). These are new requirements for GPFs that do not exist in either California's OBD II regulations (see 13 CCR §1968.2) or EPA's regulations. The proposed regulation requires the OBD system to detect a malfunction before any of the following thresholds are exceeded (§86.1806-27(h)(2): [EPA-HQ-OAR-2022-0829-0701, p. 249]

- (i) Filtering decreases to the point that PM exceeds 10 mg/mile. If no malfunction of the GPF can cause emissions to exceed 10 mg/mile, the OBD system must detect when free flow through the filter such that 30% of less of the normal filtration is occurring. [EPA-HQ-OAR-2022-0829-0701, p. 249]

- (ii) When excessive GPF regeneration frequency would cause HC, CO, or NOx to exceed 1.5x the applicable FTP standard. If no malfunction could cause emissions to exceed 1.5x the applicable standard, the OBD system must detect when PM filter regeneration exceeds the design limits for allowable regeneration. [EPA-HQ-OAR-2022-0829-0701, p. 249]

- (iii) When regeneration does not restore the GPF when regeneration is designed to occur. [EPA-HQ-OAR-2022-0829-0701, p. 249]

With respect to the 10 mg/mile standard, we note the California OBD threshold for diesel particulate filters is 17.5 mg/mile though MY28, and while the California diesel PM threshold drops to 10 mg/mile starting in MY29, no vehicles have currently certified to a 10 mg/mile threshold. [EPA-HQ-OAR-2022-0829-0701, p. 249]

We would also like to work with EPA to clarify whether EPA intends to apply the 10 mg/mi standard to every emission correlated major monitor, or only for GPF monitoring. We recommend a GPF monitoring threshold of 10 mg/mi or higher and harmonizing all other monitors with CARB OBD requirements of 17.5 mg/mi. See Section VIII.C. (Figures 83-85) below. [EPA-HQ-OAR-2022-0829-0701, p. 249]

3. GPF Monitoring Requirements

a) Detection Requirements

When developing a GPF monitor, manufacturers often target six-sigma separation between worst performing acceptable (WPA or “good parts”) and best performing unacceptable (BPU or “bad parts”). To achieve this separation, there needs to be enough separation in systems that meet the emission standard and those that should turn on the MIL for the OBD threshold. As the emission standards decrease, the OBD threshold multiplier needs to increase to provide necessary separation for a robust monitor. [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

We propose to revise the language found in (§ 86.1806–27 (h)(2)(i), to read:

If there is no failure or deterioration of the PM filter that could cause a vehicle to exceed the specified PM emission level, [Strikethrough: the system must detect a malfunction if the PM filter allows free flow of exhaust through the PM filter assembly where 30 percent or less of the normal filtration is occurring] [In Red: [Underline: the OBD II system shall detect a malfunction when no detectable amount of PM filtering occurs . . .]] [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

This revision aligns with CARB’s long-standing precedent for detection requirements and this revision is the only option that is feasible with today’s commercially available sensing technology. Figure 81 below shows delta pressure curves as a function of exhaust flow from a completely intact substrate and completely missing substrate. For a robust diagnostic, manufacturers require at least six-sigma separation between these curves. At low exhaust flows (of the Worldwide Harmonized Light Vehicles Test Procedure (WLTP) or FTP drive cycle), there is practically no separation between a fully intact substrate and a missing substrate. There is more separation at higher exhaust flows, as shown, but most of the higher exhaust flows are off cycle (i.e., higher exhaust flow than a US06). [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

The below example data with a delta pressure sensor shows the lack separation between an intact and missing substrate. Requiring detection of a filter flowing 30% of normal would further reduce the limited separation between "intact substrate" and "missing substrate". Therefore, robust detection with this sensing technology is not possible for any partial failure modes of the GPF. [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

As demonstrated in the graph below, the delta pressure versus exhaust flow curves also illustrates the challenge for meeting In-Use Monitor Performance Ratio (IUMPR) minimum ratios for missing substrate detection. One way to address this could be by defining a special denominator for this monitor. Following previous and current examples from both CARB and European Union (EU) regulations regarding monitoring of Diesel Particulate Filter (DPF), the following special denominator criteria are needed to ensure that the IUMPR requirements can be met. We recommend that EPA add the following GPF special denominator criteria: [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

- Minimum of 500 miles [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

- High enough exhaust flow rate is achieved for a specified amount of time, and [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

- Alternate or additional denominator criteria, with Administrator approval. [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

[See original for graph. "Figure 81: Delta Pressure vs Exhaust Flow Rate"] [EPA-HQ-OAR-2022-0829-0701, pp. 250-251]

b) Thresholds for Detection

Additionally, we request that EPA harmonize with CARB as it pertains to (h)(2)(ii). EPA and CARB should harmonize on GPF monitoring requirements to allow manufacturers to have one OBD system for all 50 states. For the 1.5x multiplier for the regeneration frequency requirement (§ 86.1806–27 (h)(2)(ii)), EPA should harmonize with CARB's OBD II Gasoline Thresholds, which allow higher multipliers of the vehicles certifying to lower emission standards. For example, as noted below in Figure 83, the SULEV30 OBD multiplier is 2.5x rather than 1.5x. Industry and CARB agreed to these higher multipliers at lower standards to allow for robust detection (i.e., no false passing or false failing) while still achieving the required In-Use Monitor Performance Ratio minimums. [EPA-HQ-OAR-2022-0829-0701, pp. 251-252]

Auto Innovators agrees with EPA's proposal which harmonizes with CARB's gasoline three-way catalyst requirements that allow partial volume monitoring such that the rear brick is unmonitored. For systems that employ a catalyzed rear GPF, harmonization with CARB OBD II requirements would only require PM emission correlation (not NMHC, NOx, and CO). Auto Innovators' understanding of the proposal in (h)(2)(i) aligns with this recommended harmonization, but we would like to confirm EPA's intention. [EPA-HQ-OAR-2022-0829-0701, pp. 251-252]

B. Incorporation by Reference

Section 86.1806-27 (a) references CARB's OBD-II regulation (13 CCR 1968.2) dated November 22, 2022. However, 86.1(d)(2) Incorporation by Reference (d)(2) refers to 13 CCR 1968.2 dated November 30, 2002. Auto Innovators recommends revising the 86.1806-27 (a) to reference the November 30, 2022 version of the regulation, as that version incorporates revisions specific to LEV IV. Auto Innovators recommends revising the language as follows: [EPA-HQ-OAR-2022-0829-0701, pp. 253-254]

(a) Vehicles must comply with the 2022 OBD requirements adopted for California as described in this paragraph (a). California's 2022 OBD–II requirements are part of Title 13, section 1968.2 of the California Code of Regulations, approved on November 3022, 2022 (incorporated by reference, see § 86.1). We may approve your request to certify an OBD system meeting a later version of California's OBD requirements if you demonstrate that it complies with the intent of this section. The following clarifications and exceptions apply for vehicles certified under this subpart: [EPA-HQ-OAR-2022-0829-0701, pp. 253-254]

C. OBD Monitor Thresholds

Auto Innovators recommends EPA harmonize with CARB on OBD Gasoline and Diesel monitor thresholds as written in 13 CCR 1968.2. OEMs and CARB worked together to develop OBD emission thresholds that will allow robust detection while allowing IUMPR requirements to be met. OBD systems require separation between WPA and BPU systems for robustness. False MILs are a burden to all stakeholders, from the government agency to the customer and auto repair shops. Therefore, separation between WPA and BPU is needed. [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

86.1806-27 (a)(8) says "for Tier 4 standards that have no corresponding bin standards from the California LEV III program, use the next highest LEV III bin." Applying the SULEV15 multipliers to Bin 10 would require manufacturers to detect faults when NMOG+NOx exceeds 0.033 grams/mile which is much more stringent than what is required for LEV IV. Manufacturers do not have experience with certifying vehicles at this emission standard and have not demonstrated capability of detecting malfunctions robustly at this malfunction threshold. Auto Innovators recommends that EPA adopt the same strategy CARB used for SULEV20 and SULEV15 for the Tier 4 Bin 10 category. Due to uncertainty about how the lower standards will affect OBD monitoring capability, this strategy includes interim OBD threshold multipliers for the first 3 model years that SULEV20 and SULEV15 vehicles are introduced by manufacturers (no later than 2030 model year). [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

SULEV20 and SULEV15 interim threshold multipliers are defined to correspond to detection of malfunctions before emissions exceed 0.065 g/mi NMOG+NOx. Final thresholds are defined at 0.050 g/mi NMOG+NOx. We recommend EPA adopt this same strategy and define an interim NMOG+NOx monitor threshold multiplier for Tier 4 Bin 10 of 6.50 (for first three model years a vehicle is certified to Bin 10, no later than 2030MY) and a final multiplier of 5.00. Figures 83 and 86below show the recommended thresholds. [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

CARB has provisions in 13 CCR 1968.2 (e)(17.1.6)(B)(i) and (f)((17.1.8)(B)(i) that define alternate malfunction criteria for engine cooling system thermostat monitor for LEV IV vehicles. Therefore, we recommend that EPA allow the same alternative malfunction criteria for Tier 4 Bin 10 as is applied to the LEV IV SULEV15 category. [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

Similarly, CARB has provisions in 13 CCR 1968.2 (e)(17.1.6)(C)(i) and (f)((17.1.8)(C)(i) that define alternate test-out criteria for LEV IV vehicles. Auto Innovators recommends that EPA allow the same test-out provisions for Tier 4 Bin 10 as is applied to the LEV IV SULEV15 category. [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

[See original for table, “Figure 83: Recommended Thresholds Passenger Cars and Light-Duty Trucks”] [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

[See original for table, “Figure 84: Gasoline Chassis-certified MDVs with GVWR ≤ 10,000 lbs”] [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

[See original for table, “Figure 85: Gasoline Chassis-certified MDVs with GVWR between 10,000 lbs and 14,000 lbs”] [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

[See original for table, Figure 86: Diesel Passenger Cars, Light-duty Trucks, and Chassis-certified MDPV's] [EPA-HQ-OAR-2022-0829-0701, pp. 254-258]

D. Vehicle Compliance

In the NPRM, § 86.1806-27 Onboard diagnostics it states that, “Vehicles may optionally comply with the requirements of this section instead of the requirements of § 86.1806-17 before model year 2027.” Auto Innovators proposes EPA amend the language to harmonize with 1036.110 by adding the words “any or all” to the above language. Reference 1036.110, “You may optionally comply with any or all of the requirements of this section instead of 40 CFR 86.010–18 in earlier model years.” [EPA-HQ-OAR-2022-0829-0701, pp. 258-259]

The resulting language in 86.1806-27 would be written, “Vehicles may optionally comply with any or all the requirements of this section instead of the requirements of § 86.1806-17 before model year 2027.” [EPA-HQ-OAR-2022-0829-0701, pp. 258-259]

Organization: Alliance for Vehicle Efficiency (AVE)

AVE is also asking EPA to provide more clarity to its Proposed On-Board Diagnostics (OBD) Program. Current OBD sensors can determine if a GPF has been removed from a vehicle and we support this requirement. AVE also supports requiring OBD systems that can detect emissions above 10mg/mi or a limit that is found measurable by current PM sensor technology. [EPA-HQ-OAR-2022-0829-0631, p. 8]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Onboard Diagnostics

CARB’s current onboard diagnostic requirements ensure that emerging emission control technologies such as PM filters must be monitored and to date, a few manufacturers have already certified vehicles so equipped for sale in California. U.S. EPA’s proposed monitoring requirements are consistent with the type of failure modes CARB already requires to be monitored and CARB expects manufacturers would readily be able to meet CARB’s requirements with diagnostics developed to meet the proposed requirements. [EPA-HQ-OAR-2022-0829-0780, p. 34]

Further, due to the likely widespread use of PM filters across industry to comply with EPA's proposed PM standards, CARB agrees that onboard diagnostic requirements should be amended to explicitly address this technology. However, CARB suggests some modifications to the proposed regulatory requirements. Specifically, in 40 CFR section 86.1806-27(h)(2)(ii), CARB recommends replacing the phrase "HC, CO, or NOx emissions" with "NMOG+NOx or CO emission" to align with how the applicable FTP standards are defined. Additionally, in this same section, CARB recommends adding the PM emission criterion as "PM emissions exceed 2.0 times the applicable FTP standard" as PM emissions will increase if PM filter regeneration frequency increases and a multiplier of 2.0 is consistent with the monitoring thresholds for PM emissions within the onboard diagnostics program. [EPA-HQ-OAR-2022-0829-0780, p. 34]

In 40 CFR section 86.1806-27(h)(2)(iii), CARB recommends replacing the phrase "if regeneration does not properly restore the PM filter when regeneration is designed to occur based on the manufacturer's specified conditions" with "when the PM filter does not properly regenerate under manufacturer-defined conditions where regeneration is designed to occur." The phrase "regeneration does not properly restore the PM filter" lacks clarity unless "properly restore the PM filter" is also separately defined. [EPA-HQ-OAR-2022-0829-0780, pp. 34-35]

Lastly, in 40 CFR section 86.1806-27(h)(3), CARB recommends two clarifications. First, CARB recommends replacing the phrase, "The required minimum ratio for gasoline particulate filters is 0.150" with, "The required minimum ratio for PM filter filtering performance monitors (section (h)(2)(i)) is 0.150." This will clarify the in-use monitoring performance ratio requirement applies to the filtering performance monitors of the PM filter. Second, CARB recommends replacing the sentence, "Manufacturers must track and report the in-use performance of PM filter monitors in accordance with 13 CCR 1968.2(d)(3.2.2)" with, "Manufacturers must track and report the in-use performance of PM filter monitors under paragraph (h)(2)(i) and (ii) in accordance with 13 CCR 1968.2(d)(3.2.2)." This will more explicitly identify that the tracking and reporting requirements apply to filtering performance and frequent regeneration monitors of the PM filter. [EPA-HQ-OAR-2022-0829-0780, p. 35]

Serviceability

Vehicle serviceability is the ability for a driver to be able to repair their vehicle at any repair shop of their choosing and is key to sustaining driver use and maintaining emission benefits from ZEVs. If consumers cannot find suitable repair shops for their ZEVs, there is a risk that they will revert to conventional vehicles, limiting the emission benefits. To service vehicles, repair shops need access to on-board vehicle data and service information defining how to diagnose, repair, and maintain the vehicle, which not only requires some data standardization but also a way to access the data on the vehicle through a standardized means, such as the SAE J1962 compliant diagnostic connector. With the ACC II regulations, CARB added ZEVs to its service information regulation 56 to require the same access and disclosure of repair information and tooling, as well as the requirement that each vehicle be equipped with a standardized data set and equipped with a SAE J1962 diagnostic connector. 57 This regulation requires manufacturers to provide the same information to independent repair shops as they provide to their dealerships as is done for internal combustion engine vehicles today. 58 CARB strongly recommends that U.S. EPA include serviceability requirements for ZEVs in its proposal and, at minimum, a way to access that data through a standardized SAE J1962 compliant diagnostic connector. [EPA-HQ-OAR-2022-0829-0780, p. 42]

56 Cal. Code Regs., title 13, section 1969.

57 Cal. Code Regs., title 13, section 1962.5.

58 For additional background on CARB's inclusion of ZEVs in the service information regulation as part of ACC II, see ACC II Final Statement of Reasons for Rulemaking (FSOR), Including Summary of Comments and Agency Response Appendix D Summary of Comments to ZEV Assurance Measures and Agency Response, pp. 59 – 65 https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/fsorappd.pdf and ACC II ISOR, Appendix F-7, pp. 1, 10-13, 16.

Organization: Cummins Inc.

VII. Onboard Diagnostics

9. Cummins suggests revisions to the proposed LD and MDV onboard diagnostics requirements for consistency with the HD OBD requirements in 40 CFR Part 1036

Cummins requests the following revisions to the proposed onboard diagnostics regulatory language in 40 CFR 86.1806-27: [EPA-HQ-OAR-2022-0829-0645, pp. 10-11]

- Cummins requests to revise the last sentence of the opening paragraph as follows: "Vehicles may optionally comply with any or all of the requirements of this section instead of the requirements of § 86.1806-17 before model year 2027." The addition of "any or all" would align OBD for LD and MDV with the same flexibility given to manufacturers in 40 CFR 1036.110 to optionally pull ahead EPA 2027 HD OBD requirements before MY 2027. [EPA-HQ-OAR-2022-0829-0645, pp. 10-11]

- To facilitate 50-state certification and avoid the potential for doubling the OBD demonstration testing for manufacturers (i.e., demonstration to engine OBD thresholds for EPA plus demonstration to chassis OBD thresholds for CARB), Cummins requests to add a new paragraph (a)(10) similar to 40 CFR 1036.110(b)(11) and (i)-(iii), plus the underlined text: "If you have an approved Executive order from the California Air Resources Board for a given engine family, we may rely on that Executive order to evaluate whether you meet federal OBD requirements for that same engine family or an equivalent engine family. Engine families are equivalent if they are identical in all aspects material to emission characteristics; for example, we would consider different inducement strategies, different OBD demonstration test procedures/cycles, and different warranties not to be material to emission characteristics relevant to these OBD testing requirements…" This addition would confirm that EPA would accept CARB OBD certification for an equivalent family, including with different OBD demonstration test cycles. [EPA-HQ-OAR-2022-0829-0645, pp. 10-11]

- Cummins requests to add a new paragraph (a)(11), aligned with EPA 2027 HD OBD requirements in 40 CFR 1036.110(b)(6) to remove the in-use compliance/production vehicle evaluation (PVE) requirements as applicable. Note the new paragraph (a)(10) described above would align with the EPA 2027 HD OBD requirement for manufacturers to submit to EPA any PVE test results executed on an equivalent CARB family. [EPA-HQ-OAR-2022-0829-0645, pp. 10-11]

Organization: Ferrari N.V. and Ferrari North America, Inc.

On-Board Diagnostic Requirements

EPA is requiring new monitoring requirements for Gasoline Particulate Filters (GPFs) assuming that CARB OBD II Regulation does not have a requirement for GPF diagnostic. However, according to CCR §1968.2 (d) (7.2), CARB is already requiring GPFs to meet malfunction requirements of sections (f) (9) (i.e. diesel PM filter) and (e) (1.2.1) (B) (i.e. catalyst partial volume monitoring), which includes filtering performance, frequent regeneration, Incomplete regeneration and catalyst function. [EPA-HQ-OAR-2022-0829-0572, pp. 6-7]

We already implemented all the GPF diagnostics required by CCR 1968.2 to obtain CARB approval back in 2019, when we integrated GPF technology on US vehicles, gaining the leadership among other manufacturers. In support of our commitment to CARB monitoring requirements, the best technologies compatible with our applications have already been implemented (e.g. pressure sensors). [EPA-HQ-OAR-2022-0829-0572, pp. 6-7]

Moreover, as stated in §86.1806-27 (h) (2) (i), EPA is proposing a different GPF monitoring approach compared to CARB OBD II regulation. On the counter side, California requires OBD systems to detect a malfunction only when no detectable amount of PM filtering occurs. In this regards, the only technology commercially available for GPF monitoring consists in a couple of pressure sensors, which sensing capabilities do not allow to fulfill EPA's proposal requirements. [EPA-HQ-OAR-2022-0829-0572, pp. 6-7]

Therefore, Ferrari suggests that EPA align with CARB's OBD II requirements for GPF monitoring to avoid different OBD system architectures across the United States. [EPA-HQ-OAR-2022-0829-0572, pp. 6-7]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG further recognizes there will be an additional cost of OBD-II diagnostic development, implementation , calibration, and validation required to meet the proposed the PM standard. Moreover, new engine hardware development would be required to meet the PM target without GPF. For example, engines would require increased tumble, central mount injector, and high-pressure fuel systems. [EPA-HQ-OAR-2022-0829-0554, p. 5]

HMG has a number of additional comments. Regarding the 10mg/mi OBD emission limit, there might be real-world driving maneuvers that generate higher PM at the diagnostic threshold; further research is needed to ascertain their prevalence and impact. However, HMG suggests that EPA conduct comprehensive studies to understand the prevalence and significance of these driving maneuvers which would contribute to a more robust and well-informed decision-making process. [EPA-HQ-OAR-2022-0829-0554, pp. 9-10]

HATCI further believes the EPA's assumption that every manufacturer will utilize a pressure sensor and be capable of monitoring the 30% functional threshold is inappropriate. Temperature sensors are an effective method for satisfying emission and diagnostic requirements in Europe and China. They can only be effective at detecting failures such as missing, cracked, or tampered with GPFs. Even with switching to a pressure sensor, conditions such as ash buildup can make diagnosing 30% GPF efficiency infeasible due to a high risk of false-fail or false-pass outcomes.

Fault threshold requirements for GPF would ensure consistency and avoid unnecessary complexity in the regulatory framework. HMG suggests that instead of 30% efficiency EPA use the CARB wording for diagnostics where no malfunction exceeds the OBD emission threshold, i.e. set a GPF malfunction when the system has no detectable amount of PM filtering capability. Linking the threshold to the sensing capability of the system will reduce false-failure. It is essential to consider these practical challenges and explore alternative approaches to ensure accurate and reliable diagnostics. Collaborative efforts between manufacturers and regulatory bodies can help identify innovative solutions that address the limitations associated with pressure sensors and improve the overall effectiveness of OBD diagnostics. [EPA-HQ-OAR-2022-0829-0554, pp. 9-10]

Like other diagnostics, TIJMPR performance depends on customer driving styles, necessitating further evaluation. Conducting thorough data analysis, including studying customer driving styles and their impact on the TIJMPR, would provide valuable insights into the feasibility of this proposal. Including additional denominator conditions to the ratio, with approval, for minimum exhaust flow or vehicle soak time can help to reduce concerns with feasibility. Delta pressure diagnostics usually struggle with robust monitoring at exhaust flow levels found on the FTP. [EPA-HQ-OAR-2022-0829-0554, pp. 9-10]

HMG also shares industry concerns regarding uncertainty surrounding the impact of the Proposed Rule on the OBD approval process. It remains unclear whether OEMs must obtain separate CARB OBD approval before undergoing another OBD review by the EPA for GPF alone . Clear and unambiguous guidelines regarding the impact to the OBD approval process and the interplay between CARB and EPA requirements would eliminate confusion and ensure a smoother certification process for manufacturers. [EPA-HQ-OAR-2022-0829-0554, pp. 9-10]

Finally, HMG shares concerns with industry regarding the proposed IUMPR value, which mirrors the one set for Diesel Particulate Filter (DPF) in the existing CARB OBD diesel regulation. Meeting this value has proven challenging for manufacturers in the past, underscoring the need for a thorough assessment and potential adjustments to the Proposed Rule . Conducting a comprehensive assessment of the feasibility and impact of the proposed IUMPR value for GPF, accounting for the challenges faced by manufacturers in meeting the IUMPR value, would help determine an appropriate and realistic parameter for GPF. [EPA-HQ-OAR-2022-0829-0554, pp. 9-10]

Organization: Kia Corporation

Kia does not support a more stringent PM standard of 0.5 mg/mi that must be met across three test cycles (25 °C Federal Test Procedure (FTP), US06, -7 °C FTP) and is required to be met as a per-vehicle cap, not a fleet average.17 EPA's proposal of 0.5 mg/mi per-vehicle cap will require a gasoline particulate filter (GPF) on every vehicle. Because GPF technology will be necessary for meeting the proposed PM standard, OBD monitoring of the GPF system will be required to detect GPF malfunctions, store trouble codes, and alert operators.18 [EPA-HQ-OAR-2022-0829-0555, pp. 10-11]

17 88 Fed. Reg. 29,264.

18 88 Fed. Reg. 29,269.

Kia is concerned about the feasibility and repeatability of the measurement accuracy of the proposed 0.5 mg/mi standard. Because of these challenges there will also be challenges and additional cost of OBD-II diagnostic development, implementation, and calibration for meeting the standards. Consequently, Kia recommends considering laboratory PM measurement variability and allowing re-test for exceedances during certification, confirmatory or in-use testing, especially for vehicles equipped with Diesel or GPFs. We urge EPA to finalize reasonable PM standards to allow automakers to focus new capital investments on the transition to vehicle electrification. [EPA-HQ-OAR-2022-0829-0555, pp. 10-11]

Kia Supports Harmonized On-Board Diagnostics Requirements with California

EPA proposes to adopt California's OBD-II standards CARB approved in November 2022 and proposes to put in a few more requirements that are not included in the 2022 CARB regulation. EPA will add a new monitoring requirement for GPFs.27 [EPA-HQ-OAR-2022-0829-0555, p. 15]

27 88 Fed. Reg. 29,293.

Kia urges EPA to adopt CARB's criteria emission standards under the ACC II (i.e., LEV IV) and, similarly, to fully harmonize its OBD-II requirements with CARB's OBD-II requirements. It is critical that the criteria emissions regulatory framework is streamlined. Again, since EPA is requiring a 10-fold increase in EV sales, EPA needs to harmonize and streamline its criteria pollutants standards as much as possible. Resources should not be diverted away from the ultimate goal – transitioning successfully to electrification. [EPA-HQ-OAR-2022-0829-0555, p. 15]

EPA's proposed 10 mg/mi OBD emission limit seems reasonable for PM and NMOG+NOx, but further research is needed on stringent PM emissions scenarios.28 Kia also recommends EPA clarify in the final rule the OBD approval process and differing mission thresholds between CARB and EPA. [EPA-HQ-OAR-2022-0829-0555, p. 15]

28 88 Fed. Reg. 29,417.

Organization: MECA Clean Mobility

MECA supports technologically feasible OBD requirements that enable monitoring of technologies for achieving EPA's proposed PM standard. [EPA-HQ-OAR-2022-0829-0564, pp. 11-12]

MECA supports EPA's on-board diagnostic (OBD) concepts, with some suggested changes, related to GPF monitoring in response to the likely increase in implementation of PM emission control technologies to meet the more stringent proposed PM standards. OBD is an essential part of emission standards and provides vital information to drivers when repairs are needed in order to maintain vehicle emission performance. [EPA-HQ-OAR-2022-0829-0564, pp. 11-12]

EPA has proposed that for vehicles with engine-out emissions that never exceed 10 mg/mile and which use a GPF, the OBD system must monitor and alert if filtration performance drops below 30% of "normal" filtration. MECA requests that EPA define the term "normal" for these purposes and conduct testing with currently available PM sensors, including those that employ pressure drop, resistive and electrostatic mechanisms for sensing, to set a level to be monitored.

At a minimum, the OBD system should detect if a filter has been removed from the vehicle, which is possible to monitor via currently available sensors. [EPA-HQ-OAR-2022-0829-0564, pp. 11-12]

EPA has proposed that for vehicles with engine out emissions that exceed 10 mg/mile and use a GPF, the OBD system must monitor and alert if emissions exceed 10 mg/mile on the FTP. We support this requirement and believe that advanced electrostatic PM sensors being commercialized are able to meet these requirements. Furthermore, we support EPA working with CARB to continually review the OBD monitoring requirements and determine where thresholds may be lowered as sensor technology develops. [EPA-HQ-OAR-2022-0829-0564, pp. 11-12]

Sensor technology commercialization has a long cycle, including testing, design and real-world deployment across many vehicles in the field to make sure sensors are reliable and durable. This cycle is why stringent and predictable standards are an important signal to industry to make investments today for technologies that will be needed in the future. Subsequently reversing adopted standards leaves technology and investments stranded and creates a level of uncertainty in the need for technology innovation. MECA members are engaged in developing a portfolio of sensor options that can be installed on a vehicle to monitor emission performance. [EPA-HQ-OAR-2022-0829-0564, pp. 11-12]

Specifically related to this proposal on GPF monitoring, several advancements in PM sensor technology have been demonstrated in the past few years. Some of this work was completed (unpublished data) as part of the ongoing Particle Sensor Performance and Durability Consortium (https://www.swri.org/consortia/particle-sensor-performance- durability-pspd-consortium) managed by Southwest Research Institute. In addition, a 2020 study.12 highlights the potential of PM sensors to yield more data and greater sensitivity measurement as low as 1 mg/m^3. These advanced sensors have ben designed to help OEMs comply with the current IUMPR and thresholds adopted by CARB. We encourage EPA and CARB to periodically review the OBD monitoring requirements as PM sensor technologies evolve. [EPA-HQ-OAR-2022-0829-0564, pp. 11-12]

12 SAE 2020-01-0385

Organization: MEMA, The Vehicle Suppliers Associated

Gasoline Particulate Filter (GPF) and On-Board Diagnostics (OBD)

In the proposed rule, the agency calls for the diagnostic requirement to monitor for a removed, missing, or damaged GPF causing the PM value to go above 10 mg/mi over the Federal Test Procedure (FTP). Based on industry experience, even with a removed, non- existent or a strongly damaged GPF, the gasoline vehicle PM-emissions are below 10 mg/mi. [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

Considering the proposal for filtration efficiency monitoring below <30% efficiency, the current available technology (based on a differential pressure [AP] sensor) is not sufficiently accurate to detect the set threshold for filtration efficiency. Therefore, correctly identifying parts a with filtration efficiency of < 30 % would lead to identifying components which still having a significantly higher filtration efficiency as "Bad" (False Fail). [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

The proposal puts a restriction on "frequent regeneration" of the GPF. However, the specific tolerance for regeneration frequency is not mentioned. The limit for allowable regeneration frequency is not adequately defined and is expected to be sensitive to the application. [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

Monitoring incomplete regeneration of the GPF would be very difficult due to part/part-dispersion in a fresh state and increasing GPF differential pressure owing to ash loading over lifetime as well as other related issues. [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

MEMA urges:

• EPA to align with the CARB On Board Diagnostic (OBD) Il requirements according to current regulation 13CCR1968.2 listed below and as announced by CARB during the SAE OBD Symposia during March 14th to 16th this year in Prague, Czech Republic: [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

• Filtering Performance: "the OBD II system shall detect a malfunction when no detectable amount of PM filtering occurs".[EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

• Regeneration: Limitation of any regeneration monitoring requirement to active regenerations, while passive regenerations do not need any monitoring. [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

• Infrequent Regeneration: Required to be monitored only for sensor-based regenerations, but not for soot-load model-based regenerations. [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

• Incomplete Regeneration: Postpone requirement until enough data is collected to clarify details of active regeneration, including frequency of active regenerations which is expected to be low. [EPA-HQ-OAR-2022-0829-0644, pp. 10-11]

Organization: Mercedes-Benz AG

Mercedes-Benz is requesting EPA align with CARB’s ACCII approach; EPA should harmonize its OBD emissions threshold criteria with CARB’s. [EPA-HQ-OAR-2022-0829-0623, p. 11]

In regard to the Regeneration (“regen”) Frequency OBD Requirements, current OBD emission threshold criteria evaluates NMOG and NOx as a combined threshold (i.e., NMOG+NOx). However, EPA’s NPRM is proposing to include individual multipliers for HC, NOx and CO. Since the OBD threshold multipliers are designed to work in concert with emissions standards themselves, it is important to harmonize threshold multipliers to emissions standard constituents (i.e., NMOG+NOx, CO, PM, etc.). [EPA-HQ-OAR-2022-0829-0623, p. 11]

In addition, an OBD emissions threshold is proposed to detect a malfunction when emissions exceed

1.5 times the applicable FTP standard for all emission Bins. CARB OBD regulations have allowed higher multipliers as the emission standards become more stringent. Mercedes proposes EPA adopt a similar approach for Regen Frequency OBD as other OBD monitors (e.g., provide

2.5 times multiplier for Bin30/SULEV30 instead of 1.5 times). [EPA-HQ-OAR-2022-0829-0623, p. 11]

A vehicle will regenerate, or purge, the particulate filter when the soot accumulation reaches a certain level. This regeneration process has been historically used for diesel vehicles which utilize Diesel Particulate Filters ("DPFs"). As discussed above, EPA's proposed PM standards will force the incorporation of GPFs for many gasoline vehicles. GPFs behave differently than DPFs, and the EPA should incorporate language in the final rule that provides clear direction for OBD test procedures and definitions related to GPFs. [EPA-HQ-OAR-2022-0829-0623, p. 11]

The EPA adoption of CARB OBD revealed some gaps in CARB's OBD definitions. While EPA should address these gaps in the final rule, it is equally important that EPA work with CARB, and the auto industry, to ensure CARB will also adopt the provisions as finalized [EPA-HQ-OAR-2022-0829-0623, p. 12]

Organization: Volvo Car Corporation (VCC)

Appendix- Technical comments on the OBD proposal.

1. GPF Monitoring Requirements

§ 86.1806-27, section (h)(2)(i) in the NPRM proposal requires the OBD system to "detect a malfunction if the PM filter allows free flow of exhaust through the PM filter assembly where 30 percent or less of the normal filtration is occurring" [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

OBD systems require separation between worst performing acceptable (WPA or "good parts") and best performing unacceptable (BPU or "bad parts") systems. Manufacturers often target six-sigma separation between WPA and BPU for robustness. False MILs are a burden to all stakeholders, from the government agency to the customer and workshop. Therefore, separation between WPA and BPU is needed. [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

Today, monitoring detection of a "removed GPF" (empty can or straight pipe) is challenging with existing sensor technology. See GPF test results below utilizing a delta pressure sensor. This illustrates that separation between an intact and missing substrate is challenging. The data also shows that requiring detection of a filter flowing 30% of normal would even further reduce the limited separation between a normal system and "removed GPF". Separation between an intact and a partial GPF failure is not feasible, and the data illustrates that robust detection with existing sensing technology is not possible for any partial failure modes of the GPF. [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

[See original for graph on GPF test results FTP75] [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

[See original for graph on GPF test results FTP75 – trendline] [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

[See original for graph on GPF test results FTP75+UC cycle] [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

[See original for graph on GPF test results FTP75 + UC cycle – trendline] [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

[See original for pictures on delta pressure curves as a function of exhaust flow from an intact substrate, completely missing substrate, unplugged rear surface, drilled 20mm and drilled 50mm.] [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

The pictures above show delta pressure curves as a function of exhaust flow from an intact substrate (base line 100% normal filtration), completely missing substrate, unplugged rear surface (30% of normal filtration), drilled 20mm (88% of normal filtration) and drilled 50mm (43% of normal filtration). [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

a. VCC proposes revising the language found in (§ 86.1806–27 (h)(2)(i), to only require detection "if the PM filter substrate is completely destroyed, removed, or missing, or if the PM filter assembly is replaced with a muffler or straight pipe". [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

b. Another option would be to revise the EPA language to be consistent with the CARB language for PM filtering performance. [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

"If there is no failure or deterioration of the PM filter that could cause a vehicle to exceed the specified PM emission level, the OBD II system shall detect a malfunction when no detectable amount of PM filtering occurs" [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

The CARB language is not defining a specific amount of flow and it considers the monitoring technology by referring to the minimum detectable flow the system can detect. [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

The proposed revisions a. and b. are believed to be the only options that are feasible with today's commercially available sensing technology. [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

c. The PM filtering performance monitoring is more robust at higher exhaust flow. There is more separation at higher exhaust flows, as shown, but most of the higher exhaust flows are off cycle. This would also be a challenge for meeting In-Use Monitor Performance Ratio (IUMPR) minimum ratios for PM filtering performance monitoring. To address this, VCC proposes defining a special denominator for the monitor. In addition, VCC recommends referencing the exhaust flow rate to the special denominator and only allowing it to increment if a high enough exhaust flow rate is achieved for a specified amount of time. [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

VCC respectfully requests feedback from EPA on proposal 1a.,1b and 1c. [EPA-HQ-OAR-2022-0829-0624, pp. 7-10]

2. Active regeneration requirements

§ 86.1806-27, section (h)(2)(ii) and section (h)(2)(iii) in the NPRM proposal requires the OBD system to monitor too frequent and incomplete regeneration, respectively. [EPA-HQ-OAR-2022-0829-0624, pp. 10-11]

Active regeneration is very infrequent on petrol engines and happens only during extreme conditions. For most systems it never happens on a legislative drive cycle (e.g., FTP, UC). This would make it problematic to detect too frequent or incomplete regeneration. [EPA-HQ-OAR-2022-0829-0624, pp. 10-11]

At a meeting between EPA and Volvo, EPA staff indicated that active regen would probably never be needed on a vehicle with a close coupled GPF or would only be needed very infrequently for an under floor GPF application. However, the OBD system should identify active regenerations and access if they are not working properly by the manufacturer's own specifications. In principle the vehicle should monitor the regeneration and make sure that it is happening correctly. [EPA-HQ-OAR-2022-0829-0624, pp. 10-11]

a. If a manufacturer designs their GPF system without a "periodically active regenerating system", then the manufacturer should not be subject to § 86.1806–27 (h)(2)(ii) or (iii). VCC proposes adding a definition of a "Periodically active regenerating system" which is as a system that requires active regeneration in less than 4,000 km/ 2,500 miles on a 25 deg C FTP. [EPA-HQ-OAR-2022-0829-0624, pp. 10-11]

b. VCC has a concern with requiring OEMs to monitor infrequent events. If such monitors are required by EPA, Volvo would need additional insight and clarification on how the monitors shall meet IUMPR requirements, and when to report monitor "pass" and "readiness". All this would be important for the service technician and the customer to be able to pass the I/M stations. [EPA-HQ-OAR-2022-0829-0624, pp. 10-11]

c. A third proposal would be to skip the monitoring and have active regen in the AECD description. If required, the manufacturer could provide a run time tracker (PID $8B). At the last SAE OBD Symposium in March 2023, CARB indicated similar thoughts. Currently, CARB is contemplating not requiring active regeneration monitors (only tracking through PID $8B). [EPA-HQ-OAR-2022-0829-0624, pp. 10-11]

VCC requests feedback from EPA on 2a, 2b and 2c. [EPA-HQ-OAR-2022-0829-0624, pp. 10-11]

EPA Summary and Response

EPA received OBD comments on several topics including the proposed GPF diagnostic, monitoring thresholds, suggested regulation language changes, and accepting California Executive Order chassis approval for vehicles using the same powertrains that are dyno certified for Federal use.

EPA received many comments on its GPF monitoring requirement. Some comments supported EPA's proposed GPF monitoring provisions. Other comments recommended that we remove these requirements altogether. Additional comments suggested either specific changes to regulator text and/or changes to specific requirements. Some manufacturers commented that since they had already certified GPF's with CARB using the CARB OBD regulation, they believed the CARB OBD requirement was sufficient to create a diagnostic. Commentors were also concerned that EPA's separate OBD requirement would add significant certification burden, requiring them to deal with both agencies for OBD approval. In response, EPA decided based on the comments received to not finalize a separate federal GPF requirement and instead rely on the CARB regulation for the needed GPF monitoring requirements. After working with stakeholders who have created diagnostics using CARB's OBD regulation, EPA believes the CARB provisions are sufficient to verify the integrity of the GPF system to ensure the federal emissions standards.

EPA received comments that based on the NMOG+NOx bin structure it was not clear what the correct OBD thresholds for each bin would be. Based on the comments received EPA has expanded the bins and added to the regulatory text clarifying language regarding what OBD thresholds apply.

The Alliance for Automotive Innovation commented that we had incorrect dates for the CARB OBD regulations incorporation by reference (IBR). EPA has corrected the IBR dates to match the CARB regulation releases.

The Alliance for Automotive Innovation and Cummins both requested that EPA revise the regulations to accept “any or all” of provisions of 40 CFR 86.1806-27 for vehicles certified prior to MY 2027. In response, EPA disagrees with this change since the regulations of § 86.1806-17 already allow for manufacturers to request approval of new versions of the California OBD regulations. If a manufacturer makes a request for such approval, a manufacturer must comply with the new version in its entirety. EPA does not agree that it is appropriate to mix and match different versions of the California OBD.

Cummins commented that there could be engine families that would be required to demonstrate compliance to engine-based OBD thresholds for EPA plus demonstration to chassis-based OBD thresholds for CARB, doubling the OBD demonstration work required of manufacturers. Cummins requested to add a new paragraph (a)(10) to 40 CFR 86.1806-27 similar to 40 CFR 1036.110(b)(11) and (i)-(iii) to facilitate 50-state certification and avoid the potential for doubling the OBD demonstration. EPA is not finalizing the proposal to require vehicles with GCWR greater than 22,000 lbs to comply with engine-dynamometer-based criteria pollutant emissions standards under the heavy-duty engine program. However, engine-dynamometer-based certification will be optional for such vehicles. EPA disagrees that a 50-state engine family (i.e., an engine family certified to engine dyno standards for both EPA and CARB) would be subject to engine OBD demonstration for EPA and chassis OBD demonstration for CARB.

However, EPA agrees that a 50-state engine family which fully complies with the CARB OBD requirements and has received an Executive order from CARB should not require a separate OBD demonstration for EPA certification. EPA added a reference to 40 CFR 1036.110(b)(11) in 40 CFR 86.1806-27 for the final rule to make it clear that these provisions apply to engine families intended to be installed in heavy-duty vehicles at or below 14,000 pounds GVWR.

Cummins also requested EPA align with EPA 2027 HD OBD requirements in 40 CFR 1036.110(b)(6) to remove the in-use compliance/production vehicle evaluation (PVE) requirements as applicable. EPA agrees with this comment and has added the appropriate reference to 40 CFR 1036.110(b)(6) in 40 CFR 86.1806-27.

EPA received comments from CARB’s requesting it add serviceability requirements for ZEVs similar to ACCII. EPA did not propose or solicit comment on this change, and thus it is out of scope for this rulemaking.

6 - Test procedures

6.1 – EV test procedures

Comments by Organizations

Organization: Alliance for Automotive Innovation

VIII. Certification and Compliance Procedures

A. Electric Vehicle Test Procedures

As a result of the proposed battery durability and warranty requirements referenced in section III.F.2 and section III.F.3, [323] EPA is proposing to update their BEV and PHEV testing requirements outlined in section III.F.1 of the NPRM. Based on what is outlined in this section, we have a number of concerns. [EPA-HQ-OAR-2022-0829-0701, pp. 215-216]

323 NPRM at 29286

1. BEV (SAE J1634) and PHEV (SAE J1711) Test Procedures

Our first concern relates to EPA's reference of the 2010 version of SAE J1711 for determining UBE in PHEVs, as well as the 2017 version of SAE J1634 for determining Usable Battery Energy (UBE) for class 2b and 3 BEVs. There currently are more recent versions of both standards available - SAE J1711-2023 and J1634-2021. Under EPA's most recent Heavy-Duty NPRM – "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," Auto Innovators proposed to adopt the 2021 version of SAE J1634. EPA rejected this due to concerns with the SMCT and SMCT+ tests enabled by the 2021 version. We continue to encourage EPA to adopt the most recent versions of both SAE J1711 and SAE J1634. [EPA-HQ-OAR-2022-0829-0701, pp. 215-216]

Auto Innovators recently outlined our strong support for the adoption of SMCT/SMCT+ testing and harmonization with CARB under EPA's most recent heavy-duty NPRM. In those comments, we said the following:

"We request the option to allow use of the Short Multi-Cycle Test (sMCT) and the Short Multi-Cycle Test Plus Steady State (sMCT+) procedures. Allowing these procedures would also harmonize with the CARB proposed test procedures and significantly reduce laboratory test burden associated with BEV testing while providing equivalent test results. [EPA-HQ-OAR-2022-0829-0701, pp. 215-216]

EPA's current proposal prohibits manufacturers from using thermal conditioning during cold soak periods. Unlike vehicles with internal combustion engines, managing battery temperature in BEV vehicles is critical to battery durability, vehicle performance, and energy efficiency. Thermal conditioning of the BEV propulsion battery can provide real-world benefits in these areas. We would like to request for EPA to remove requirements explicitly prohibiting thermal conditioning in order to not restrict emerging technologies that could improve real-world performance and efficiency, for example under extreme cold start conditions during short trip city driving. [EPA-HQ-OAR-2022-0829-0701, pp. 215-216]

We would also request for the use of thermal conditioning to be considered as part of the 5-cycle test procedure approval process. Keeping in mind that the industry is still learning about customer behavior related to BEV thermal conditioning, and any allowance of thermal conditioning should be customer representative, either by default operation, manufacturer instruction, or demonstrated real-word usage, we urge the EPA to allow manufacturers to incorporate new technologies such as this one, when sufficient justification is provided." [EPA-HQ-OAR-2022-0829-0701, pp. 215-216]

We stand by these comments and continue to argue for the adoption of SMCT/SMCT+ testing, as well as the allowance of thermal conditioning during cold soak periods, and to be considered as a part of the 5-cycle test procedure approval process. Additionally, we would like to request additional flexibility to allow EPA to run confirmatory tests to verify accuracy of any of the three tests (MCT, SMCT, SMCT+) that it so chooses. That would eliminate any uncertainty from EPA regarding the accuracy of the new SMCT/SMCT+ testing. [EPA-HQ-OAR-2022-0829-0701, pp. 215-216]

Finally, the test procedure such as the MCT for BEVs will create extremely long test duration, especially for longer electric range vehicles, as well as other complications. [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

CREE Requirements

The Environmental Protection Agency has proposed to adopt battery durability requirements for battery electric vehicles and plug-in hybrid electric vehicles. The proposal includes measurement of usable battery energy for PHEVs during charge-depleting (CD) operation to ensure battery durability. [EPA-HQ-OAR-2022-0829-0701, p. 222]

However, EPA regulations already include a requirement for PHEVs to calculate carbon related exhaust emissions (CREE) using fleet utility factors (FUFs) based on CD range per 40 CFR Part 600.116-12. In-use CREE must be considered with the in-use vehicle's CD range. Furthermore, per 40 CFR Part 86.1823-08, PHEVs must also include a deterioration factor (DF) for CO2 or test with aged batteries to reflect the battery deterioration impact. This is in contrast to BEVs, which will have a CREE/CO2 value of 0g/mi regardless of battery deterioration and the change in UBE. The proposed UBE requirements for PHEVs would be in addition to the existing requirements for CREE and DF. We recommend that EPA remove the requirement for PHEVs to calculate CREE/CO2 based on aged batteries, and instead align with BEV requirements to ensure battery durability via the newly proposed UBE requirements. We believe that this approach would be an effective method to ensure the durability of PHEV batteries in a manner consistent with the proposed regulatory framework for BEVs. This would ensure technology neutrality and equitable treatment to PHEVs. Alternatively, if EPA decides to only require the impact of battery deterioration to be included in the CO2 values for PHEVs, we recommend that EPA remove the UBE requirement for PHEVs altogether, as battery deterioration is already accounted for via the in-use CREE requirements. [EPA-HQ-OAR-2022-0829-0701, p. 222]

6. Calculation of UBE

Under this NPRM, EPA is also proposing changes to 40 CFR § 600.116-12.331 The proposed methodology for calculating UBE as stated in 600.116-12(11)(ii) indicates the necessity to calculate the Fleet Utility Factor (FUF). However, the FUF calculation is used to calculate the ratio of Charge Depleting (CD) and Charge Sustaining (CS) driving. This ratio is unnecessary when calculating UBE because it is trying to find the DC discharge energy during charge depletion, and the ratio of CD/CS operation is unnecessary. As such we would recommend deleting 600.116-12(11)(ii). [EPA-HQ-OAR-2022-0829-0701, p. 223]

331 NPRM at 29421.

Additionally, the proposed language in 600.116-12(11)(iii) instructs to use an average of the RESS voltage during FCT, either by averaging continuous measurement or averaging the initial and final voltage measurements. This average voltage is then used in (iv) to calculate the DC discharge energy by multiplying the change in SOC per cycle to the average voltage per cycle. For PHEVs or EVs, voltage can vary during dynamic driving conditions. Voltage should be continuously integrated with current value to ensure accurate DC energy during cycle. The use of average voltage value is appropriate for HEV, but for PHEV and BEV can result in inaccurate DC energy values. Thus, as it pertains to both BEVs and PHEVs, we believe that DC energy should be measured via a continuous integration of current and voltage. If a method to calculate DC energy that allows use of average voltage in a cycle, it should be the average of a continuous voltage measurement during each cycle. [EPA-HQ-OAR-2022-0829-0701, p. 223]

Organization: BMW of North America, LLC (BMW NA)

BMW NA strongly believes that hydrogen technology will play a key role on the path to climate neutrality across all industries and has great potential, particularly for individual mobility. The pilot series of the BMW iX5 Hydrogen, which is currently being presented to the public during various events all around the globe, highlights the possibilities of hydrogen technology in this context. [EPA-HQ-OAR-2022-0829-0677, p. 3]

BMW NA would like to encourage EPA to extend the regulatory guidance for FCEVs by the means of incorporating an official test procedure (e.g., incorporation of SAE J2572). We believe that this will benefit the automotive industry to better evaluate the technology's potential compared to BEV and quantify its contribution to the overall electrification goals. [EPA-HQ-OAR-2022-0829-0677, p. 3]

Furthermore, an additional, maybe time-limited incentive through ATV multipliers - a concept which has shown its effectiveness on EVs in the past - would encourage the industry to go further down this pathway. [EPA-HQ-OAR-2022-0829-0677, p. 3]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Improved Electric Driving Range Information

Currently, the existing BEV label highlights vehicle efficiency in units of miles per gallons of gas equivalent (MPGe) based on testing across five defined drive cycles. The current label also uses this efficiency for the reported electric vehicle driving range. However, driving range based on city cycle usage or the combined cycle usage is not relevant to drivers who are primarily concerned about range for long distance travel which, by definition, is typically conducted at highway-like speeds. CARB notes that some third parties (including AAA, 75 InsideEVs, 76 and a recent SAE paper 77) have also previously assessed BEV range and noted a mismatch between label reported range and what a typical driver would likely experience in-use. [EPA-HQ-OAR-2022-0829-0780, pp. 46-47]

75 American Automobile Association, Inc. ”AAA Electric Vehicle Range Testing.” NewsRoom.AAA.com. February 2019. AAA-Electric-Vehicle-Range-Testing-Report.pdf.

76 Moloughney, T., “What's The Real World Highway Range Of Today's Electric Cars? We Test To Find Out.” InsideEVs.com. April 22, 2023. https://insideevs.com/reviews/443791/ev-range-test-results/. Accessed June 15, 2023.

77 Pannone, G. and VanderWerp, D., "Comparison of On-Road Highway Fuel Economy and All-Electric Range to Label Values: Are the Current Label Procedures Appropriate for Battery Electric Vehicles?," SAE Technical Paper 2023-01-0349, 2023, https://doi.org/10.4271/2023-01-0349.

CARB recommends that U.S. EPA require manufacturers to collect and report some higher speed highway relevant energy consumption information during ZEV certification to supplement the highway drive cycle information currently submitted. To minimize added test burden to vehicle manufacturers, this data could be collected during the constant speed cycle portion of the already required SAE J1634 certification testing procedure to capture energy consumption rates at 65 mph and perhaps 75 mph to sufficiently bracket expected usage and ensure sufficient data exists to inform a future label. [EPA-HQ-OAR-2022-0829-0780, pp. 46-47]

Additionally, based on experience to date as to information consumers are seeking, CARB recommends U.S. EPA require collection and reporting of additional data to enable calculation of range under cold and hot weather conditions. As an example, collection of both highway-speed energy consumption and total usable battery energy while carrying out required testing for the 20-degree Fahrenheit cold temperature cycle could provide sufficient information to derive a consistent cold temperature estimated driving range. Likewise, during the required supplemental test known as SC03 that represents hot weather driving with high solar load and air conditioning usage, collection of this data could provide the necessary information to allow a more meaningful future label that transparently presents range information to a consumer. Many consumers are aware of battery limitations in cold or hot weather but lack accurate information when making purchase decisions as to the likely magnitude of that impact on any particular vehicle. [EPA-HQ-OAR-2022-0829-0780, pp. 46-47]

Organization: Ford Motor Company

Battery Electric Vehicle (BEV) and Plug-In Hybrid Electric (PHEV) Battery Durability and Testing

Adoption of efficient, harmonized test methods and standards will be critical as we rapidly transition to electrified vehicles. Ford requests that EPA consider the following recommendations to streamline and clarify the ever-increasing BEV testing workload. [EPA-HQ-OAR-2022-0829-0605, pp. 15-16]

-The latest versions of SAE J1634 (2021) and J1711 (2023) should be adopted for BEV and hybrid testing across light-duty, class 2b and 3 vehicles. We are aligned on utilizing the loaded vehicle weight (LVW) with these procedures. [EPA-HQ-OAR-2022-0829-0605, pp. 15-16]

Organization: Mercedes-Benz AG

Battery Electric Vehicle (“BEV”) Testing

It currently takes about six hours of lab time to conduct a traditional ICE vehicle 5-cycle certification test sequence. In contrast, 5-cycle testing for a BEV takes more than 30 hours. While this test time will drop to 16 hours starting in 2025 Model Year (“MY”), this is still a significant increase over the time requirements for ICE testing. [EPA-HQ-OAR-2022-0829-0623, pp. 14-15]

There is a solution, a way to significantly reduce testing time and save lab resources while still providing accurate vehicle test results. In EPA's "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards"11 Final Rule, EPA updated from the the 2012 to the 2017 version of SAE J1634. The agency, however, chose not to adopt the most recent 2021 version of this test procedure which includes allowances for the use of the Short Multi-Cycle Test ("SMCT") and SMCT+. These two procedures both significantly reduce testing time, while providing accurate BEV testing results. [EPA-HQ-OAR-2022-0829-0623, pp. 14-15]

11 Final Rule and Related Materials for Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards, govinfo.gov/content/pkg/FR-2023-01-24/pdf/2022-27957.pdf.

In light of the significantly increasing number of BEV tests that will need to occur under this 2027 to 2032 MY rule, Mercedes-Benz requests the agency adopt the 2022 version of SAE J1634 test procedure in this final rule, and allow for early and immediate implementation. [EPA-HQ-OAR-2022-0829-0623, pp. 14-15]

The EPA HD rule also includes an explicit prohibition of thermal conditioning. This prohibition is problematic for innovation of technological strategies that could improve battery durability and performance in cold start conditions. Mercedes-Benz requests allowance of thermal heating during certification in accordance with customer behavior [EPA-HQ-OAR-2022-0829-0623, p. 15]

Organization: Rivian Automotive, LLC

EV Test Procedures

Rivian generally supports EPA's proposed approach to EV test procedures, including the proposed use of the 2017 version of SAE J1634 for determining UBE for Class 2b-3 BEVs and testing Class 2b-3 BEVs at adjusted loaded vehicle weight ("ALVW"). Since the start of production of Rivian's Class 2b-3 electric delivery van, we have used ALVW for testing purposes as opposed to loaded vehicle weight. The EDV carries packages and the range and efficiency estimates generated by testing at ALVW are more representative of real-world driving and the use case for these vehicles. We believe similar logic applies to the full spectrum of Class 2b-3 vehicles, which are overwhelmingly used in utility applications to tow, haul, carry goods for delivery, and so on. Charge-depleting tests should be performed at ALVW across all manufacturers. [EPA-HQ-OAR-2022-0829-0653, p. 13]

EPA Summary and Response

Summary:

EPA received comments from the Alliance for Automotive Innovation, BMW NA, the California Air Resources Board, Ford Motor Company, Mercedes Benz AG, and Rivian Automotive regarding electric vehicle test procedures.

A majority of comments addressed the proposed BEV and PHEV test procedure updates for determining useable battery energy. BMW NA submitted comments encouraging the Agency to adopt test procedures for hydrogen fuel cell electric vehicles. BMW believes hydrogen FCEVs will be a key technology for achieving climate neutrality. BMW requested EPA adopt SAE technical standard J2572, Recommended Practice for Measuring Fuel Consumption and Range of Fuel Cell and Hybrid Fuel Cell Vehicles Fueled by Compressed Gaseous Hydrogen, which defines a procedure for testing FCEVs and possibly adopting a time-limited advanced technology vehicle credit multiplier for hydrogen FCEVs.

The Alliance, Ford Motor Company, Mercedes Benz AG, and Rivian Automotive all provided comments regarding SAE technical standard J1634, Battery Electric Vehicle Energy Consumption and Range Test Procedure. Rivian is supportive of the proposed use of the 2017 version of J1634 for determining useable battery energy for Class 2b and Class 3 BEVs. Rivian also commented that Class 2b and Class 3 BEVs should be tested at adjusted loaded vehicle weight which is the average of a vehicle's curb weight and the vehicle's gross vehicle weight rating.

The Alliance, Ford Motor Company and Mercedes Benz encouraged EPA to adopt the most recent version (2021) of SAE technical standard J1634 for testing BEVs. The Alliance, Ford Motor Company and Mercedes Benz requested EPA adopt the most recent version which includes two new test procedures, the shortened multicycle test (SMCT) and the shortened multicycle plus test (SMCT+), for determining useable battery energy. Both the Alliance and Mercedes Benz noted that the additional tests, the SMCT and SMCT+, reduce testing time and Mercedes Benz also noted the new tests provide accurate BEV testing results. The Alliance also noted that adopting the 2021 version of J1634 would harmonize EPA and California's BEV testing regulations as California has adopted the 2021 version of J1634. The Alliance also commented that adopting the 2021 version of J1634 would provide EPA with an opportunity to verify the accuracy of any of the test procedures, the MCT, SMCT and SMCT+, for determining useable battery energy. The Alliance and Mercedes Benz both commented that they had made similar requests to the Agency when the Agency proposed updating the reference version of J1634 from the 2012 version to the 2017 version as part of the revisions proposed with EPA's notice of proposed rulemaking – "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards". 87 FR 17414 (Mar. 28, 2022).

The Alliance and Mercedes Benz requested EPA adopt the 2021 version of SAE J1634 to allow for BEV battery and cabin pre-heating during testing used for generating BEV 5-cycle data used to determine the 5-cycle adjustment factor for fuel economy labeling. The Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles NPRM, 88 FR 29184 (May 5, 2023), notice of proposed rulemaking did not include any provisions to make revisions to EPA's existing BEV 5-cycle test procedures which were previously updated in the final rulemaking for Heavy-Duty Engines and Vehicle Standards. 88 FR 4296, (Jan. 24, 2023).

The Alliance and Ford Motor Company encouraged EPA to adopt the most recent (2023) version of SAE J1711, Recommended Practice for Measuring the Exhaust Emissions and Fuel Economy of Hybrid-Electric Vehicles, including Plug-In Hybrid Vehicles. The Alliance also stated that when determining the useable battery energy for a PHEV the voltage measurement should be continuously integrated with current to ensure accurate measurements of DC discharge energy during testing; and, if the Agency allows the use of average voltage in the cycle it should be the average of a continuous measurement during each cycle. The Alliance also noted the proposed regulations for determining PHEV useable battery energy required a calculation to determine the fleet utility factor. The Alliance noted the fleet utility factor is not necessary for determining PHEV useable battery energy and recommended deleting § 600.116-12(11)(ii).

The Alliance also noted that EPA currently has regulatory requirements for PHEVs requiring manufacturers to account for battery durability when determining the in-use CREE standard. The Alliance requests that EPA drop the requirement for PHEVs use aged batteries when accounting for the impact of battery deterioration on weighted CREE emissions with the adoption of the battery durability requirement. The Alliance noted that EPA should drop the PHEV battery durability requirement if EPA keeps the requirement to account for battery deterioration when estimating the weighted PHEV CREE emissions.

The California Air Resources Board recommends that U.S. EPA gather additional information during manufacturer testing of fuel economy data vehicles to supplement drive cycle information currently submitted by manufacturers to U.S. EPA. California suggests collecting data during the constant speed cycle of the multi-cycle test and capture energy consumption data at 65 mph and perhaps at 75 mph with intent of using these data to inform a future fuel economy label. California also recommends EPA collect and report additional data to enable calculation of range under cold and hot weather conditions. Collecting additional data during 20°F testing, including highway speed energy consumption and useable battery energy could also be beneficial for deriving a cold temperature driving range. California also recommends collection of similar data during the SC03 test (representative of high ambient temperature with high solar load conditions) to allow a more meaningful future fuel economy label which transparently present range information under different load and ambient conditions to consumers.

Response:

EPA has considered BMW’s comment encouraging the Agency to propose a specific test procedure for hydrogen FCEVs by adopting SAE technical standard J2572. This is beyond the scope of our proposal as the Agency did not address test procedures for fuel cell vehicles or seek comments regarding testing of fuel cell vehicles in the NPRM. We note, however, that manufacturers producing hydrogen FCEVs are eligible to propose special test procedures according to the existing provisions of 40 CFR 1065.10(c)(2). BMW and other hydrogen FCEV manufacturers are eligible to request approval to use SAE J2572 for testing. The request to use the special procedure needs to be made prior to the manufacturer beginning the test program.

Rivian Automotive’s comments addressing the use of the 2017 version of SAE J1634 for testing Class 2b and Class 3 vehicles along with performing these tests at the adjusted loaded vehicle weight are supportive of the Agency’s proposal and adopted regulations. With the issuance of the final rule, the Agency has adopted using the 2017 version of J1634 for testing Class 2b and Class 3 BEVs and performing these tests at the adjusted loaded vehicle weight.

The Alliance, Ford Motor Company and Mercedes Benz suggested that EPA adopt the 2021 version of SAE J1634 which would allow manufacturers to perform the SMCT and SMCT+ in addition to the MCT. The Alliance and Mercedes Benz both noted they had submitted similar comments in a prior rulemaking, “Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards,” 87 FR 17414. EPA previously responded to these prior comments requesting use of the SMCT and SMCT+ in the Final Rulemaking for the Heavy-Duty Engine and Vehicle Standards, 89 FR 4296, and the Response to Comments Document, EPA-420-R-22-036, December 2022. The Agency is not prepared to adopt the 2021 version of SAE J1634. The Agency is continuing its evaluation of the new test procedures to determine if these procedures produce results equivalent to those generated using the existing single cycle tests and MCT test procedures. The Agency is aware that there continues to be minimal publicly available test data that could be used to conclude the procedures produce equivalent test results. The Alliance recommended the Agency adopt the 2021 version of SAE J1634 and use the Agency's confirmatory testing program to generate data which would be used to evaluate the newer procedures to determine their equivalence with the existing single cycle tests and MCT results. The Agency's confirmatory test program tests around 15 percent of all BEV tests submitted to the Agency for fuel economy labeling. The goal of the confirmatory test program is to randomly evaluate the test results provided by manufacturers to ensure the data being generated are representative and appropriate. The Agency does not believe it would be appropriate to adopt these procedures without sufficient data demonstrating equivalence with existing test procedures while using the Agency confirmatory test program to evaluate the equivalence of these procedures.

The Alliance and Mercedes Benz suggested that EPA adopt the 2021 version of SAE J1634 specifically to allow for the use of thermal conditioning when performing BEV 5-cycle test procedures used for determining the 5-cycle fuel economy adjustment factor for fuel economy labeling. The Alliance and Mercedes Benz both noted they had submitted similar comments in a prior rulemaking, "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 87 FR 17414. EPA previously responded to these prior comments requesting the use of thermal conditioning in the Final Rulemaking for the Heavy-Duty Engine and Vehicle Standards, 88 FR 4296, and the Response to Comments Document, EPA-420-R-22-036, December 2022. The Agency is not prepared to adopt the 2021 version of SAE J1634 to allow thermal conditioning of the battery and cabin prior to 5-cycle adjustment factor testing. EPA understands managing propulsion battery temperature is important for battery durability, vehicle performance, and energy efficiency. Current EPA regulations and the 2017 version of SAE J1634 do not allow for the use of thermal conditioning during cold soak periods of EPA test procedures. The function of the cold soak period is to stabilize the vehicle and its components at the desired test procedure ambient temperature prior to beginning the driving portion of the test. While BEVs have technology and operating modes designed to precondition the battery and cabin while the vehicle is soaking, for this technology to function the vehicle must have access to a dedicated EVSE and the operator must enable this operation. The Agency does not expect that a predominance of BEVs will have access to a dedicated EVSE while the vehicle is cold soaking prior to many cold starts and the operator will also have enabled the preconditioning mode. Therefore, the Agency is not prepared to adopt the 2021 version of SAE J1634 to allow for preconditioning of the battery and cabin during the cold soak.

The Alliance and Ford Motor Company encouraged EPA to adopt the most recent version of SAE J1711, Recommended Practice for Measuring the Exhaust Emissions and Fuel Economy of Hybrid-Electric Vehicles, Including Plug-In Hybrid Vehicles. Having reviewed the updates to the 2023 version of SAE J1711, EPA agrees with the Alliance and Ford Motor Company and is updating the reference from the 2010 to the 2023 version of SAE J1711. Updating this reference provides a couple of improvements related to determining the DC discharge energy when performing charge depletion testing on a PHEV. It updates the voltage measurement method to allow for a continuously integrated voltage measurement during each test cycle. In addition, the EPA regulations allow for manufacturers to both integrate voltage and current during each test cycle and calculate DC discharge energy during each cycle.

EPA also agrees with the Alliance's suggestion to delete 40 CFR 600.116-12(11)(ii). EPA concurs that there is no necessity for calculating the fleet utility factor when measuring the useable battery energy of a PHEV during charge depletion testing. Therefore, for the final regulations, paragraph § 600.116-12(11)(ii) from the proposed regulations has been deleted.

EPA does not agree with the recommendation by the Alliance that the Agency should not require PHEVs meet the battery durability requirement if the Agency keeps the requirement to include deterioration when determining weighted PHEV CREE emissions at certification. As noted in the comment, PHEV weighted CREE emissions are a combination of charge depleting CREE and charge sustaining CREE emissions. As the PHEV battery degrades the vehicle will spend more time in charge depletion operation with the engine running. This will lead to increases in CREE emissions which are accounted for at the time of certification either by using a CREE deterioration factor or testing with an aged battery. This increase will occur even with a battery which has degraded yet still meets the battery durability criteria. This accounting is no different than the Agency requiring manufacturers account for the deterioration in the efficiency of catalyst aftertreatment systems at the time of certification. This loss of performance is included in the determination the vehicle will meet the standard as it normally degrades. At this time the Agency believes it is appropriate to maintain the existing PHEV CREE durability requirements in addition to the battery durability requirements being adopted with this rulemaking.

The California Air Resources Board made several recommendations related to gathering additional data for informing a future update to the fuel economy labeling requirements for BEVs. As part of the NPRM, EPA did not make any proposals to revise or solicit comment on revising test procedures or update the fuel economy label values for BEVs, such that this issue is beyond the scope of the rulemaking. EPA concurs with California that the range value listed on the fuel economy label, which is a combined city/highway range value weighted to represent nominal vehicle operation under a variety of city and highway operation at varying speed and accelerations along with different ambient conditions, is not representative of sustained high-speed highway driving during either cold or hot temperature ambient conditions. EPA developed the fuel economy label regulations almost 15 years ago when few electric vehicles in the U.S. market were capable of a combined range in EPA testing approaching 100 miles. The utility of BEVs has improved significantly since the Agency developed the fuel economy label requirements for BEVs. At this time, EPA has not proposed and is not seeking to revise the BEV fuel economy label or to gather additional data or require additional tests to collect data which could be applicable to revising the label at some future date.

6.2 – Testing and certification related to battery durability program

Comments by Organizations

Organization: Alliance for Automotive Innovation

a) On-Board Measurement of Current

SAE J1634 and J1711 [324] allow voltage to be read from the vehicle on-board controller instead of instrumenting vehicles with direct voltage measurements. This allowance is used to reduce test burden by not requiring the installation of direct voltage taps and to improve safety by not exposing test personnel to high voltages. [EPA-HQ-OAR-2022-0829-0701, pp. 216-217]

324 2021 SAE J1634 and 2023 J1711.

We propose allowing the use of vehicle on-board current readings (in addition to on-board voltage readings) for laboratory testing after equivalency is demonstrated by the manufacturer. The use of on-board current data will be especially important for in-use vehicles as it allows for laboratory testing without installing intrusive current sensors. [EPA-HQ-OAR-2022-0829-0701, pp. 216-217]

In order to meet the accuracy of EPA's and CARB's requirements for battery state of health (SOH) monitoring, vehicle on-board current sensors are required to be accurate. The following plot from one manufacturer includes energy (wat-hours) calculated over 712 individual test phases. This data demonstrates that energy calculated using on-board current readings at 10Hz can correlate extremely well with Hioki current measurements integrated at >## 20Hz. [EPA-HQ-OAR-2022-0829-0701, pp. 216-217]

[See original attachment for Figure 80: DC Energy Wat-Hour Comparison] [EPA-HQ-OAR-2022-0829-0701, pp. 216-217]

b) Continuous Voltage Measurement

To calculate UBE for PHEVs, we recommend adopting the latest revision of SAE J1711 FEB 2023.325 The most recent versions of J1634 and J1711 allow the acquisition of voltage from the vehicle network (which we believe is appropriate), but on-board current measurements should also be allowed based on demonstrating equivalence between off-board (i.e. Hioki Power Meter) and on-board current measurements. This is especially important for in-use testing, where it is difficult to instrument customer vehicles to measure the voltage and current without intrusive vehicle modifications. We also recommend that the average cycle voltage be the average of continuous readings over the cycle, or calculated discharge energy by using an integrated measurement of the continuous voltage and current readings. [EPA-HQ-OAR-2022-0829-0701, pp. 216-217]

325 Id.

Additionally, there is a safety concern when breaking out wiring and measuring high voltage DC systems of these electrified vehicles. Therefore, we propose using on-board current and voltage data within our laboratories instead of external testing setups after equivalency is proven. [EPA-HQ-OAR-2022-0829-0701, pp. 216-217]

4. UBE Determination in BEVs and PHEVs

EPA is requesting comment on all aspects of the proposed battery durability standards, particularly with respect to minimum performance requirements, the testing and compliance requirements for Part A and Part B, and the possibility of adopting more stringent or less stringent battery durability standards. Outlined in Section III.F.1,330 EPA is proposing to incorporate SAE Standard J1634 and J1711 as testing methods to determine Usable Battery Energy for both BEVs and PHEVs respectively. [EPA-HQ-OAR-2022-0829-0701, pp. 221-222]

330 NPRM at 29282.

While we support the incorporation of J1634 and J1711 as testing methods to determine UBE for both BEVs and PHEVs respectively, we have major concerns over the versions referenced within the NPRM. Outlined in the NPRM, EPA references the 2017 version of J1634 regarding

BEVs and the 2010 version for PHEVs as the basis for UBE testing methods. As EPA is aware, there is a 2021 version of J1634, as well as a 2023 version of J1711. We believe it is imperative that EPA adopt the most recent versions of both. [EPA-HQ-OAR-2022-0829-0701, pp. 221-222]

When it comes to BEVs, the 2021 J1634 version utilized the most up-to-date testing methods, including the use of SMCT and SMCT+ testing methods. As we have already mentioned in our comments, we support including the alternative testing methods of SMCT/SMCT+. MCT contains a variable length drive cycle while conducting the test with two constant speed sections. This results in having the middle section to be adapted to start the constant speed section at about 20% State of Charge (SOC). With MCT, building adaptive cycles to specific vehicles is overly burdensome for both OEMs and for regulators. Testing with SMCT/SMCT+ procedures does not require the building of specific test cycles, and also reduces labor burdens associated with conducting these tests. We understand that EPA was involved in the development of the 2021 SAE J1635 version, and respectfully request that it implement the updated version. [EPA-HQ-OAR-2022-0829-0701, pp. 221-222]

Additionally, as mentioned above, we are in support of incorporating the 2023 version of J1711 as it pertains to PHEV testing to determine UBE. [EPA-HQ-OAR-2022-0829-0701, pp. 221-222]

EPA proposes to allow manufacturers to utilize any sampling technique to accurately collect data from the number of vehicles mandated in GTR No. 22. [332] For example, manufacturers may choose to physically connect to the required number of vehicles and read the SOCE values directly in lieu of a remote, telematics-based data collection. [EPA-HQ-OAR-2022-0829-0701, p. 224]

332 NPRM at 29421

We have concerns regarding the requirements proposed in this section as it pertains to test sampling criteria. As is currently written, EPA is proposing test sample requirements mandating that OEMs must test 500 vehicles annually under their IUVP program. Out of those 500 test samples, the vehicles' registration must cover at least 10 states, with no particular region making up over 20% of the test sample. While we recognize the importance of achieving a broad test sample representative of the U.S. market, the current proposed thresholds are unrealistic. There are disproportionate EV penetration rates that vary by state, which poses challenges to procure the proposed required amount of vehicles. Therefore, we propose to keep the current 500 test sample size; however, requiring that no more than 50% of vehicles be registered in the same region. This will give manufacturers needed flexibility when it comes to finding, selecting and procuring these in-use test vehicles, thus ensuring that an adequate sample size is attainable. [EPA-HQ-OAR-2022-0829-0701, p. 224]

D. BEV / PHEV Test Groups

Under Section III.F.4, [340] EPA is proposing to introduce a new set of regulations as it pertains to establishing new test group families for BEVs and PHEVs. This proposed section creates both a monitor family, as well as a battery durability family, replacing the current regulatory requirement to define BEV test and durability groups. Additionally, in order to support the proposed monitor accuracy requirement outlined in Section III.F.2, EPA is proposing that OEMs install a battery State of Health (SOH) monitor to estimate, monitor and communicate the State of Certified Energy (SOCE) at the current point in the vehicle's lifetime. Under this section, manufacturers will also be required to evaluate the accuracy of the monitor through in-use testing. [EPA-HQ-OAR-2022-0829-0701, pp. 227-228]

340 NPRM at 29287.

We understand that the use of SOCE data to monitor battery durability is an important part of EPA's approach to determining test groups for application submission under this Proposed Rule. This allows EPA to ensure that each test group is representative of a range of vehicles with similar monitoring strategies and battery durability characteristics. [EPA-HQ-OAR-2022-0829-0701, pp. 227-228]

However, Auto Innovators has serious concerns with EPA's current proposal on the determination of test groups and the incorporation of GTR-22 as a guiding document for establishing monitoring and battery durability families. After careful review, Auto Innovators has been unable to fully understand the details of the methods laid out in this proposal as it pertains to test group determination. We are concerned that these new requirements are different from the method that CARB uses to group their vehicles. Differing requirements for test group determination between EPA and CARB create a large burden for manufacturers and essentially double the work when trying to certify vehicles. In addition to the extra work associated with two requirements, the proposed EPA requirements for battery durability grouping may result in the creation of an increasing amount of test groups, with related administrative and testing burden. [EPA-HQ-OAR-2022-0829-0701, pp. 227-228]

In response to this proposal, Auto Innovators first requests that EPA be open to a meeting with CARB and Auto Innovators. We have made many attempts to meet with EPA to discuss this current proposal, to no avail. Our overall goal is to achieve a singular standard when it comes to criteria determining test groups for both BEVs and PHEVs. Meeting with all three organizations will allow us to openly discuss ideas in the interest of developing one consistent standard. In addition to a singular standard, as a general principle we support the use of vehicle platforms with similar monitoring and battery durability characteristics to serve as the basis for determining test groups. With this current proposal, as well as CARB's anticipated future CARB GHG rulemaking, we believe this is an opportune time to work together to establish a national standard for BEV and PHEV test group determination. [EPA-HQ-OAR-2022-0829-0701, pp. 227-228]

1. Monitor Families

As is stated in the current NPRM, the SOCE monitoring algorithm needs to utilize the same logic and have the same value for all calibration variables used in the algorithm.341 Additionally, the algorithm used to determine UBE needs to utilize the same sampling and integration periods and the same integration technique; the locations of the sensor(s) (i.e. at the pack, module, or battery cell level) for monitoring DC discharge energy need to be the same; and the accuracy of the sensor(s) and the tolerance of the sensor(s) accuracy used for monitoring energy and range need to be the same. [EPA-HQ-OAR-2022-0829-0701, pp. 228-229]

Based on what is presented in this NPRM, we believe that it is overly strict to define different monitor families based on different sensor positions. Therefore, if the performance at differing location (ex: pack level vs cell level) can be shown to be equivalent, then we respectfully request that manufacturers should be allowed to define them as the same monitor family. [EPA-HQ-OAR-2022-0829-0701, pp. 228-229]

2. Definitions of Durability Group, Monitor Family and Battery Durability Family

The EPA proposes in section F.4.iii. Proposed Certification, Compliance, and Enforcement Provisions; Definitions of Durability Group, Monitor Family, and Battery Durability Family; BEV and PHEV Battery Durability Family that "The following powertrain characteristics and design features would be used to determine battery durability families: Maximum specified charging power, method of battery thermal management, battery capacity, battery (cathode) chemistry, and the net power of the electrical machines."342 [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

342 NPRM at 29288.

Auto Innovators proposes the following. [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

The powertrain characteristics and design features that would be used to determine battery durability families are: method of battery thermal management, battery capacity within 20% of the highest capacity within the family, battery chemistry. [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

However, clarification is required as to what defines "battery chemistry," particularly at what level they need to be separated. Auto Innovators proposes that EPA specify that "Li-Ion" (Lithium-Ion) is a sufficient separator for a battery durability family group, and it is possible to group all Li-Ion batteries in the same battery durability family. [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

The entire concept of "grouping" for certification and compliance testing is built around efficiency: logically grouping "like" systems that can be placed together and tested instead of evaluating every single permutation of a technology for very marginal benefits. The grouping criteria suggested by the EPA, containing four criteria that could each have many variants, would potentially lead to a large amount of complexity for durability testing – OEMs would be forced to test potentially hundreds of different combinations resulting in drastically increased workload and data generation for this new regulation. This is especially important considering the rapid technological developments (and associated uncertainty) in next-generation battery chemistries, even within a single nameplate's EV's 6- to 7-year product lifecycle. [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

With this in mind, Auto Innovators recommends simplifying the battery durability grouping criteria to the following characteristics and design features: 1) method of battery thermal management, 2) battery capacity within 20% of the highest capacity within the family (analogous to ICE analytical derivation criteria), and 3) battery chemistry. And by "battery chemistry, Auto Innovators proposes that EPA specify that "Li-Ion" (Lithium-Ion) is a sufficient separator for a battery durability family group, meaning it is possible to group all Li-Ion traction batteries in the same battery durability group. Even if EPA proposes to go "one level down and specify 'high level' chemistries (currently many permutations of NMC, LFP, LMO blends, etc.), given the uncertainty of proliferation of these chemistries in future vehicles, this single criterion could potentially lead to dozens more in-use tests per nameplate. [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

In addition, the measurement of battery durability should be limited to the usable battery energy made available for propulsion; thus, this grouping should be done at the battery pack and not propulsion system level. [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

We believe that maximum specified charging power should not be a pre-defined separator of a unique battery durability family since its influence on battery durability is not significant. We also believe net power of the electrical machines should not be a pre-defined separator of a unique battery durability family since its influence on battery durability is not significant. For example, electric machine net power variations for AWD, FWD, and RWD driveline configurations are not expected to influence the inherent battery durability characteristics significantly (even though the battery usage profile may be impacted). [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

Auto Innovators instead proposes that a vehicle platform with batteries of similar capacity should be possible to place in the same battery durability family, similar to the grouping statistics of the current durability group determination according to §86.1820-01. We therefore propose "within 20% of the highest battery capacity in the family should be eligible to group into the same battery durability family." [EPA-HQ-OAR-2022-0829-0701, pp. 229-230]

Organization: Ford Motor Company

Battery Electric Vehicle (BEV) and Plug-In Hybrid Electric (PHEV) Battery Durability and Testing

-In the NPRM's redline of regulatory text for 40 CFR 86.1844-01(d)(19)(2), EPA proposes that OEMs will need certified Usable Battery Energy (UBE) for each battery durability family for certification. We request confirmation that EV data from fuel economy testing can be fulfill this data requirement in EV certification applications. In the past, Ford has not been able to generate a single dataset for EV certification and FE labels due to timing differences in the processes. Using the provisions in section 86.1829-15(f), we believe that we can submit certification applications without data and supplement the required UBE data after FE testing is complete. This is not only beneficial to test reduction, but we believe using FE data for UBE declaration is more aligned to the intent of the regulation, because the certification framework of EVs is diverting from the ICE framework. Traditionally, certification testing has been done using Emission Data Vehicles (EDVs) as selected using the requirements in section 86.1828-01 (worst-case configuration). Now that EVs will not be certified in test groups, it is apparent that the EDV selection requirements in this section do not apply. That leaves a gap in the proposed regulation of test vehicle selection within a durability family for EV certification. [EPA-HQ-OAR-2022-0829-0605, pp. 15-16]

-Ford does not believe that incorporating GTR No. 22 by reference adequately addresses battery-related requirements for EVs and PHEVs. A most stringent interpretation of GTR No.22 would significantly increase the number of certification fleets (tied to sensor location, weight, trim package, tires, performance packages, driveline configuration etc.), and potentially provide different test group definitions for vehicles certified to CARB's ACC2 standards. This would increase certification workload and potentially create customer confusion. We would like to avoid a situation where OEMs are required to negotiate EV test group definition with both EPA and CARB, which will result in level-playing field issues. EPA could avoid this situation by aligning with CARB on test group definitions and provide clear and concise parameters for EV test groupings. For example, there are already issues with OEMs receiving agency approval for grouping RWD and AWD EV configurations in a single test group (which we think is appropriate), while other OEMs are unaware that this is a possibility based on regulatory language. We strongly request the EPA to provide concise guidance on the certification groups to prevent these issues. [EPA-HQ-OAR-2022-0829-0605, pp. 15-16]

-With proposed Tier IV requirements to test additional electric vehicles in-use and during certification, Ford fully supports the Auto Innovator's proposal to adopt Analytically Derived Fuel Economy (ADFE) for hybrid and xEV products. With additional electric vehicle range/energy consumption data being produced for a variety of new models, Ford is confident that analytical methods to produce FE/Range/Energy Consumption values will meet existing accuracy requirements. [EPA-HQ-OAR-2022-0829-0605, pp. 15-16]

Organization: Mercedes-Benz AG

Geographic Constraints in IUVP Program

The EPA proposes manufacturers procure 500 vehicles annual and from across at least 10 different states with no more than 20% of the test sample coming from any particular region. This is expected to be more challenging for electric vehicle programs than it is for traditional internal combustion engine (“ICE”) programs. [EPA-HQ-OAR-2022-0829-0623, p. 14]

The current distribution of electric vehicles across the country is not uniform and is impacted by many factors, such as state EV sales incentives, the availability of charging infrastructure, and customer interest. Therefore, obtaining an even distribution of electric vehicles across all states for IUVP testing is not feasible at this time. Compliance with this requirement will become more workable as the electric vehicle rollout continues across all states in the US. In the meantime, Mercedes-Benz recommends that EPA provide criteria, at least through 2030, that allows for regional procurement or alternative strategies to procure representative vehicles (but not state-by-state) across the U.S. [EPA-HQ-OAR-2022-0829-0623, p. 14]

Organization: Rivian Automotive, LLC

Test Grouping and Durability/Monitor Families

Rivian requests clarity on proposed changes to BEV test groupings. EPA proposes that for BEVs, “the new monitor family and new battery durability family would replace the current regulatory requirement to define BEV test and durability groups.”43 However, given recent information from the agency that multiple battery chemistries and types have been allowed in the same test group, Rivian requests additional detail on the inputs used to determine the test group (for example, number and type of electric motors). This new approach to defining BEV test and durability groups could also have implications for fuel economy labeling requirements. More detail and discussion by EPA are needed. [EPA-HQ-OAR-2022-0829-0653, pp. 14-15]

43 Id. at 29,287.

Organization: Tesla, Inc.

Tesla believes the proposed minimum performance requirement (MPR) for the SOH are set at reasonable and achievable levels.171 Further, the decision not to implement a MPR for Class 2b and 3 will facilitate greater early adoption in those segments. For testing purposes, defining the battery family definition is best served by allowing manufacturers to utilize the criteria mentioned in the proposed regulation such as maximum specified charging power, method of battery thermal management, battery (cathode) chemistry and the net power of the electrical machines.172 This is far preferred over defining the families based on battery capacity which would create multiple families for the same vehicles with the same battery types and chemistry but different battery capacity. While establishing a 90 percent pass requirement for battery family monitor exceed the passage rates set in the ACC II durability provisions, Tesla agrees with the agency's flexible approach allowing manufacturer to use good engineering judgment in determining the statistically adequate and representative in-use vehicle data for testing.173 [EPA-HQ-OAR-2022-0829-0792, p. 27]

171 88 Fed. Reg. at 29285, Table 64.

172 Id., at 29288. Tesla notes EPA should provide further guidance of the definition of "net power of electrical machines."

173 See 13 CCR § 1962.4 (d).

Organization: Volkswagen Group of America, Inc.

BEV/PHEV Test Groups and Durability Families (Section III.F.4)

Volkswagen aligns and supports AFAI's comments and desire for an industry-wide common solution with respect to PHEV and BEV test groups. We agree with the AFAI comments that an industry solution and clear grouping metrics, similar as those used with ICE grouping statistics, to determine durability families should be developed using good engineering basis. [EPA-HQ-OAR-2022-0829-0669, pp. 11-12]

Based on our understanding of the battery durability group definition found within the NPRM, Volkswagen believes the number of Test Groups may drastically increase. As such, Volkswagen support the EPA's decision to allow requests for alternative groupings of monitors and batteries accompanied by appropriate technical justification. This provision would promote flexibility. [EPA-HQ-OAR-2022-0829-0669, pp. 11-12]

Volkswagen is very familiar with the UN GTR-22 provisions and would be part of the AFAI industry group in collaboration with EPA and CARB in determining an industry-wide solution for PHEV and BEV test group determination. [EPA-HQ-OAR-2022-0829-0669, pp. 11-12]

Organization: Volvo Car Corporation (VCC)

In the NPRM, EPA states that powertrain characteristics and design features be used to determine battery durability families. The NPRM lists the following characteristics: maximum specified charging power, method of battery thermal management, battery capacity, battery (cathode) chemistry, and the net power of the electrical machines. VCC believes that maximum specified charging power and net power of the electrical machines should not determine and define a unique battery durability family because their impact on battery durability is not significant. [EPA-HQ-OAR-2022-0829-0624, pp. 4-5]

VCC believes that it is logical for a vehicle platform with similar batteries and comparable battery capacity be put into the same battery durability family. This is consistent with the grouping statistics of the current durability group determination according to §86.1820-01. VCC believes that EPA should state that “within 20% of the highest battery capacity in the Family should be eligible to group into the same battery durability family”. In addition, EPA should provide guidance on battery (cathode chemistry). Specifically, VCC has questions regarding how to determine separation. For Example: Is “NMC (Nickel Manganese Cobalt)” sufficient separator for a Battery Durability Group where all NMC batteries would be possible to group within the same Battery Durability Family? [EPA-HQ-OAR-2022-0829-0624, pp. 4-5]

EPA Summary and Response

Summary:

EPA received comments from the Alliance for Automotive Innovation (AAI),Ford Motor Company, Mercedes Benz, Rivian Automotive, Tesla, Volkswagen Group of America, and Volvo Car Corporation on aspects of test and certification procedures related to battery monitoring and battery durability requirements.

AAI proposed EPA allow the use of on-board current readings for laboratory testing once equivalency is established by the manufacturer between the on-board current reading and an independent measurement of battery discharge current. The Alliance believes this is important for in-use vehicles as part of the battery monitor accuracy testing program as it will allow for laboratory testing without the need for physical current sensors which are difficult to install.

AAI and Mercedes Benz proposed revisions to the procurement criteria the Agency identified for checking the in-use state-of-certified-energy sampling requirements. The Alliance proposes to maintain the current 500 test sample size, however the Alliance proposes requiring that no more than 50 percent of vehicles be registered in the same region. Mercedes Benz indicates it is not feasible at this time to obtain an even distribution of electric vehicles across all states for gathering SOCE data. Mercedes Benz recommends EPA provide criteria, at least through 2030, that allows for regional procurement or alternative strategies to procure representative vehicles across the United States.

AAI, Rivian Automotive Volkswagen Group of America, and Volvo Car Corporation have concerns with replacing the existing BEV test and durability group definitions with the battery monitor and battery durability families. The Alliance believes it is overly strict to define different monitor families based on different sensor positions. The Alliance requests manufacturers be allowed to define them as the same monitor family if the performance of sensors at different locations can be shown to be equivalent. Rivian is concerned the new battery monitory and durability family could have implications for fuel economy labeling. Rivian requests additional detail regarding the updates to BEV battery monitor and battery durability families. Volkswagen supports the Alliance’s comments and desire for an industry-wide common solution with respect to PHEV and BEV test groups. Volkswagen supports EPA’s decision to allow alternative groupings of monitors and durability families based on appropriate technical justification. Volvo does not believe that maximum charging power and the maximum net power of the electrical machines are appropriate criteria for differentiating battery durability families since their impact on battery durability is not significant. Volvo believes EPA should allow batteries with capacities within 20 percent of the highest capacity be included in the same battery durability family. Volvo also believes EPA should provide guidance on the battery cathode chemistry and how it would differentiate durability families.

AAI proposes using the following powertrain characteristics and design features be used to determine battery durability family: method of battery thermal management, battery capacity within 20 percent of the highest capacity within the family, and battery chemistry. With respect to battery chemistry, the Alliance proposes grouping all lithium-ion batteries in the same battery durability family, independent of cathode chemistry. The Alliance does not believe maximum charging power and net power of the electrical machines should be separators for unique battery durability families as their influence on battery durability is not significant.

Ford Motor Company commented on the proposed regulations in the NPRM that require manufacturers to include BEV UBE data in the application for certification. Ford noted typically fuel economy data vehicle testing does not align with emission data vehicle testing for certification and the capturing of UBE data for different battery durability families is best aligned with fuel economy testing. Ford is also concerned about the adoption of GTR No. 22 and the disconnect between California's ACC II BEV durability program and GTR No. 22. Ford has concerns about additional testing required for the California program based on the California BEV test group definition and the new battery monitor and battery durability family definitions in GTR No. 22. Ford requests EPA provide concise guidance on certification groups to prevent significant divisions between California and Federal requirements creating possible market confusion and increasing unnecessary additional testing. Ford also supports the Alliance's proposal to develop analytically derived fuel economy (ADFE) calculations for hybrids and electrified vehicles.

Tesla believes the flexibility provided in the monitoring family definition provides assurances to manufacturers that deployment of similar monitors across different vehicle lines does not create any undue or repetitive state of certified energy testing burden and costs. Tesla comments that for testing purposes, defining the battery family definition is best served by allowing manufacturers to utilize the criteria in the proposed regulation such as maximum charging power, method of battery thermal management, battery cathode chemistry, and net power of the electrical machines. In a footnote to their comments Tesla notes that EPA should provide further guidance for the definition of "net power of electrical machines."

Response:

AAI requested allowing the use of both on-board current and on-board voltage measurements to be used to determine the useable battery energy during laboratory testing to evaluate the state of certified energy monitor. The Alliance proposed that this option be allowed once a manufacturer had demonstrated the on-board current measurement was determined to be equivalent with the independent measurement of battery discharge current.

EPA believes it is difficult to install current probes on production vehicles to independently monitor the DC discharge current during laboratory testing. SAE J1634 specifies criteria for the instrumentation and the sampling interval to ensure the DC discharge current is accurately measured. Determining equivalence during a specific test or tests does not ensure equivalence for future tests. Allowing the vehicle to report the DC discharge energy is not an independent measurement of the vehicle's performance as the vehicle is self-reporting with no independent verification of the measurement or ability to determine the measurement meets the criteria for current measurement in the 2017 version of J1634. The function of the test procedure is to evaluate the ability of the vehicle to reasonably determine the state of certified energy and to allow this determination to be made without an independent measurement of discharge current does not seem appropriate to EPA. Therefore, the Agency is not willing to allow the use of the on-board current measurement to be used for determining the state of certified energy of the vehicle as proposed by AAI.

Regarding the durability test sample of at least 500 vehicles under Part B of the EPA program, AAI and Mercedes-Benz noted that distribution of some durability groups of PEVs across the U.S. may be insufficient to support the proposed sample characteristics. AAI proposed to keep the current sample size of 500 vehicles, but require that no more than 50 percent of the vehicles in the sample be registered in the same region. EPA agrees that, particularly in the early years of the program, some durability groups may be unevenly distributed across the U.S. and is modifying the sample requirements per this suggestion.

AAI, Rivian Automotive Volkswagen Group of America, and Volvo Car Corporation have concerns with replacing the existing BEV test and durability group definitions with the battery monitor and battery durability families. As noted in preamble section III.G.2, EPA will accept manufacturer compliance with the entirety of the CARB ACC II battery durability program in lieu of the EPA battery durability program. This has led the Agency to reconsider our proposal to define BEV families solely by battery monitor family and battery durability family. The Agency has determined that all BEVs will continue to be grouped using the existing battery test group definition and if the BEV meets EPA's battery durability criteria the manufacturer will also need to define a battery monitor family and battery durability family for the vehicles within the test group. Section III.G.3 of the preamble includes additional information regarding the revisions to the test group, durability group, battery monitor family, and battery durability family for BEVs and PHEVs.

AAI is requesting the Agency allow vehicles with sensors in different monitoring locations to be included in the same monitor family with data demonstrating the performance of the monitor with the sensors in different locations is equivalent. EPA has adopted the monitor family definition based on the monitor family criteria described in GTR No. 22. As noted in the GTR and in the EPA regulations the Agency will allow manufacturers to request including vehicles with sensors in different locations to be included in the same monitor family with appropriate data and technical justification.

AAI, Ford, Mercedes Benz, Rivian, Volkswagen and Volvo all recommended removing or revising a number of battery durability family criteria listed in GTR No. 22 when defining battery durability families. At this time, the Agency does not have sufficient information to conclude the suggested revisions will ensure that all vehicles within a durability family would be expected to degrade in the same manner. As noted in GTR No. 22 and the EPA regulations, EPA is providing manufacturers with the option to include in the same durability family vehicles for which these characteristics would not otherwise allow them to be in the same battery durability family. To include vehicles with characteristics noted in GTR No. 22 that would not be allowed in the same durability family, the manufacturer needs to provide data demonstrating the vehicle differences being included in the same durability family will age similarly and will degrade in an equivalent manner. Section III.G.3.iii of the preamble (BEV and PHEV Battery Durability Family) contains additional response and outlines how the manufacturer can request specific groupings when supported by appropriate data. Specifically in response to comments that all lithium-ion chemistries regardless of sub-chemistry should be eligible to be placed within the same group, EPA clarifies that placement in the same battery durability family is not indicated when chemistry differences exist that would be expected to influence durability. Chemistry differences may include differences such as proportional metal composition of the cathode (for example, NMC811, NMC622, NMC333, etc.), composition of the anode (for example, graphite, graphite with silicon, other forms of carbon), differences in particle size or morphology of cathode or anode active materials, or any other differences that would be expected to influence durability, unless data is provided otherwise as described above.

Ford commented on the requirement for including in the certification application battery UBE test results. This requirement is similar to updating applications as the manufacturer implements a running change during the model year. Manufacturers are allowed to update their applications as needed. There is no change needed to EPA's regulations to allow this current practice to continue. Ford also noted their concern about disconnects between California's ACC II test groupings and EPA's durability test groupings based on GTR No. 22. As described in section 16 of this RTC document and in section III.G of the preamble, EPA will accept compliance with California's ACC II durability program in lieu of the EPA durability program. By this means manufacturers now have the option of developing and offering for sale nationally vehicles complying with the ACC II battery durability requirements. Regarding comments related to analytically derived fuel economy (ADFE) calculations for hybrids and electrified vehicles, at this time the Agency is not proposing to develop analytically derived fuel economy calculations for hybrids and electrified vehicles. This request is beyond the scope of the proposal.

Tesla provided comments generally supportive of the EPA battery durability program and in-use testing to demonstrate compliance with the durability requirements. These comments are addressed in RTC section 16. Tesla did provide a comment in their footnotes seeking additional guidance regarding the definition of the net power of the electrical machines. At this time EPA believes the appropriate value for the net power of the electrical machines is the combined peak power of all the electrical machines used to power the vehicle.

Responses to comments relating to other topics of battery durability and warranty are covered in section 16 this document.

6.3 - Fuel economy testing

Comments by Organizations

Organization: Alliance for Automotive Innovation

5. Test Cycle Basis

We support EPA's intent to continue using the city (Federal Test Procedure or "FTP") and highway (HFET) test cycles as the basis for measuring greenhouse gas emissions. If EPA were to modify or add test cycles, the footprint-based targets would need to be modified to account for such a change. [EPA-HQ-OAR-2022-0829-0701, p. 111]

Although other approaches (for example 5-cycle tests) may yield a result closer to on-road values, it is important to recognize that reductions based on 2-cycle testing also translate to on-road reductions. Therefore, maintaining a consistent "measuring stick" does not detract from the improvements required by the standards. [EPA-HQ-OAR-2022-0829-0701, p. 111]

G.GHG / Fuel Economy Test Fuel

EPA acknowledges that it did not finalize the 2020 proposed rule238 for Tier 3 Test Procedure Adjustment.239 We look forward to working with the agency to ensure that regulatory text properly addresses necessary changes that were proposed in 2020. We reiterate comments that we submitted on the Tier 3 Test Procedure Adjustment proposed rule in 2020.240 In addition to relevant comments on the NPRM, previously submitted comments are summarized below. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

238 85 FR 28564, May 13, 2020

239 NPRM at 29240

240 https://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0087

1.Do Not Adjust the Tailpipe CO2 Value for E10

We appreciate EPA's decision to incorporate the change of GHG test fuel into the GHG standards, rather than pursuing a standalone test procedure adjustment for MY2027 and beyond. However, this approach creates a never-ending cycle of adjustments to GHG standards when a lower carbon certification fuel is established (e.g., E15 cert fuel). In addition, EPA has proposed an adjustment for use of Tier 3 test fuel of 1.0166 if the fuel is used to certify before MY2027. Adjusting measured GHG emissions will disincentivize OEMs from switching to Tier 3 early and will penalize the benefits of low carbon fuels. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

The proposed action would artificially increase the measured tailpipe CO2 emissions on Tier 3 E10 test fuel before MY2027 vehicles by 1.0166. Adding CO2 emissions that are not emitted by the vehicle for the purposes of calculating an adjusted compliance level for vehicles is counter to the goal of reducing carbon emissions from the transportation sector. We recommend that if OEMs use Tier 3 E10 test fuel before MY2027, no adjustments be applied to incentivize OEMs to switch and to recognize the benefits of lower carbon fuels. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

2. Set R-Factor Equal to 1.0 for CAFE Performance on E10

In contrast to GHG emissions, for the purposes of Corporate Average Fuel Economy (CAFE), EPA is required by statute to use test procedures that provide comparable results to those used for MY 1975.241 Also, unlike CO2, fuel economy is a calculated quantity; it is not directly measured. However, EPA's proposed actions in the 2020 proposal fall short in making the statutorily required adjustments. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

241 49 U.S.C. § 32904(c).

One component of the fuel economy calculation is the “R-factor.”242 In simple terms, an R-factor of 1.0 implies that the impact of the energy content of a test fuel relative to that of the 1975 baseline fuel is fully observed in the test results and adjusted for. An R-factor of less than implies that a test vehicle does not fully realize the impact of fuel energy content changes and results in a lower calculated fuel economy for fuels with lower energy content. In the NPRM, EPA proposes a new R-factor of 0.81, an increase from the prior value of 0.6. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

242 In this NPRM, EPA proposes to replace R-factor with Ra for E10. In our comments, Auto Innovators will explain that these terms are equivalent. The use of the terms R-factor and Ra are largely interchangeable in the context of our comments.

Previous studies and theoretical principles regarding ethanol fuel combustion support a conclusion that the new R-factor should be 1.0. These studies are described in greater detail in our previously submitted comments. EPA’s proposal for an R-factor of 0.81 is based solely on its data from a January 2018 study of ten vehicles. In our comments, Auto Innovators identified a number of limitations to the EPA test program, the largest of which are inherent variability issues. Although the EPA study attempted to address emission measurement variability, it did not consider significant variability attributable to laboratory testing procedures for analyzing fuel properties, a key factor in the computation of an appropriate R-factor. Additionally, the measurement of R-factor has also been shown to be highly variable on a vehicle-to-vehicle basis; the average R-factor could have differed considerably had a slightly different mix of vehicles been tested. For example, in EPA’s test program, by replacing one vehicle that should have been excluded with a vehicle that was inappropriately excluded, the R-factor calculated based on EPA’s limited test program would rise from 0.81 to 0.90. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

A much larger test fleet, preferably of the newest vehicles, is needed to reasonably approximate a representative “average R” applicable to the wide variety of vehicles and technologies that will be included in manufacturers’ fleets. In support of a much larger test fleet, in our comments on the Tier 3 Test Procedure Adjustment proposed rule in 2020,243 Auto Innovators prepared a large and newer vehicle dataset comparing tailpipe emission test results on E0 and E10 test fuel. The industry-paired compliance dataset supports an R-factor close to 1.0. Industry compliance data represents the variability that manufacturers have to manage, and the results of EPA’s analysis demonstrate that many vehicles will be penalized if the R-factor is adjusted based solely on EPA’s ten vehicle test program. The 2020 NPRM underestimates the care that is taken in certification testing. Manufacturers take care both to supply good data to the Agency and to be able to track laboratory and model performance. We urge EPA to utilize this new larger dataset and finalize an R-factor of 1.0. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

243 htps://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0087

There are additional practical reasons to set an R-factor of 1.0. This approach would obviate the need for future test programs when the test fuel is changed. With a non-unity R-factor, any future test fuel (e.g., E15) or fleet (with improved fuel economy technologies) would require additional updates to the R-factor, resulting in a need to continue updating the R-factor. The R-factor at 1.0 would eliminate the necessity to reassess the R-factor in the future. [EPA-HQ-OAR-2022-0829-0701, pp. 130-132]

3. Allow Carry-Over Throughout the Duration of the Rule

The NPRM allows a three-year phase in from MY 2027 through MY 2029, but that phase-in is too quick of a transition. Auto Innovators recommends the use of carry-over throughout the duration of the rule. Requiring new data, for a vehicle that is carryover, for MY2030 and beyond adds unnecessary testng burden. [EPA-HQ-OAR-2022-0829-0701, p. 132]

4.Address the Impact of the E10 Transition on 5-Cycle Testing and Litmus Test

The fuel economy label "litmus test" determines whether a manufacturer must test a vehicle model using the full 5-cycle test procedure, or whether it can apply a simplified calculation that only requires two test cycles. In this 2020 NPRM, EPA proposes to move all litmus testing to E10 without determining the impact of using E10 tests in an empirical system founded on E0 testing. [EPA-HQ-OAR-2022-0829-0701, pp. 132-134]

EPA analysis shows that R-factor or Ra is cycle-specific, yet no analysis was conducted for the Cold CO, SC03 or US06 test cycles, all of which are used to determine 5-cycle fuel economy values for use on the consumer-based fuel economy label and to conduct the litmus assessment. Auto Innovators believes requiring the use of E0 regressions and litmus limits for vehicles tested on E10 is inappropriate. Further, this approach can be expected to result in unwarranted litmus failures, causing additional test burden and competitive fuel economy label disadvantages for vehicles that are otherwise very similar to each other. Auto Innovators requests that EPA continue to allow automakers the option to retest on E0 for litmus assessment until the implications of the new E10 test fuel on the complex 5-cycle and litmus methodology can be fully examined and addressed. [EPA-HQ-OAR-2022-0829-0701, pp. 132-134]

5.Consider Fuel Economy and Environmental Performance Labeling Impacts

Auto Innovators believes that continued use of the existing derived fuel economy values is warranted for labeling purposes until proper E10 adjustments are developed. This reasoning does not hold for litmus test, however, since relatively small shifts in the cycle relationships can cause undue litmus failure and a lower label fuel economy for an affected vehicle model. [EPA-HQ-OAR-2022-0829-0701, pp. 132-134]

In Table 30 of the NPRM, EPA includes an adjustment for Fuel Economy and Environment Label Values. We believe that this was an error in drawing, as there should not be an adjustment for CO2 for fuel economy and environment label values. [EPA-HQ-OAR-2022-0829-0701, pp. 132-134]

SEE ORIGINAL COMMENT FOR Figure 39: NPRM Table 30: Proposed fuel-related testing and certification requirements.6.Allow Use of California LEV III Test Fuel [EPA-HQ-OAR-2022-0829-0701, pp. 132-134]

EPA should allow use of California LEV III E10 test fuel for GHG and fuel economy testing. To reduce complexity and streamline operations allow OEMs, who may choose, to use California LEV III test fuel as acceptable fuel alternative to the Tier 3 test fuel. In our 2020 comments and below, we provide carbon weight fraction and net heat of combustion calculations that will enable use of LEV III test fuel in compliance calculations. [EPA-HQ-OAR-2022-0829-0701, pp. 132-134]

7.Net Heating of Combustion (NHC) and Carbon Weight Fraction (CWF) Equations

There are equation issues found in the 2020 NPRM that still must be resolved. Those issues are reiterated below. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

a)ASTM D240, ASTM D4809, and ASTM D5291 should not be used in the calculation of fuel economy and other ASTM test method corrections.

EPA previously requested feedback regarding analytical methods ASTM D5291 for Carbon Weight Fraction (CWF) and ASTM D4809 for Net Heat of Combustion (NHC). These test methods should not be employed for determining CWF and NHC used in the calculation of fuel economy. These test methods have a bias relative to the original test methods, which were used to establish the CWF and NHC of the 1975 baseline fuel. The biases in these test methods will introduce errors in the fuel economy results. In addition, these test methods have higher variability and will introduce unwanted variation into the calculated fuel economy results. Auto Innovators supports using ASTM D3338 and D3343 with modifications for E10 in the calculation of fuel economy. The two legacy trade associations submitted a joint letter to EPA on April 4, 2018, expressing support for using modified ASTM D3338 and D3343 test methods. The letter was included as Appendix D of Auto Innovators' submitted comments on the Tier 3 Test Procedure Adjustment proposed rule in 2020.244 [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

244 htps://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0087

Corrections are also needed to the list of ASTM procedures adopted by reference in §600.011: modified D3338 replaces D240 and D4809 for NHC in §600.113-12(f)(1), and D5580 aromatic content of LEV III fuel should be added to §600.113-12(f)(1) and the list in §600.011. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Auto Innovators agrees with several of the Agency's proposed revisions to §600.113-12. The exception being that fuel sulfur content, water, and aromatic content should also be included in the calculations. For the aromatic content used to determine the NHC and CWF for use in the fuel economy equation when using LEV III fuel, a second alternative method, ASTM D5580-15, can be used as long as the result is first bias-corrected as described in D5580-15 to ASTM D5769-20 and is then bias-corrected as described in ASTM D1319. This second alternative method for bias correcting the aromatic content of LEV III should be added to §600.113–12. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Additional details were provided in Appendix E of Auto Innovators' submitted comments on the Tier 3 Test Procedure Adjustment proposed rule in 2020.245 [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

245 htps://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0087

b) Implement consistent units and rounding procedures for Net Heat of Combustion and other technical amendments.

Paragraph §600.113-12(f)(1)(iii) of the previous NPRM contained inconsistencies of units and rounding instructions. To resolve the inconsistencies, changes are needed and must be made regardless of whether units are going to be retained as MJ/kg or changed to BTU/lb. We request that EPA take the approach of changing to consistent use of BTU/lb rounded to the nearest whole number for both E0 and E10 NHC. Additional details were provided in Appendix F of Auto Innovators' submitted comments on the Tier 3 Test Procedure Adjustment proposed rule in 2020.246 [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

246 htps://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0087

There are also additional changes needed to 600.113-12(f)(1) not related to units:

- NHV and CWF are used in the E0 equation in 600.113-12(h), which is the existing paragraph that addresses computation of mpg for tests still run on E0. This paragraph says to go to 600.113-12(f)(1) to obtain "NHV" and "CWF" for the E0 test fuel. But (f)(1) terminology has been changed from NHV and CWF to NHC and CMF. While this is just a terminology change, the regulations should be clarified such that they mean the same thing with regard to what values are obtained from (f)(1) for use in the equation in (h). [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

- The term vFe needs to be defined as volume fraction of ethanol which is vPe/100. vPe is defined as volume percentage, but steps in the calculations leap directly to use of vFe without definition or explanation. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

- The typo should be fixed where it says NHCf = net neat of combustion of test fuel = NHGH · (1 – mFe) + NHCe· mFe. NHGH should be NHCh. This was shown correctly in the "signature package" version of the NPRM and then the typo appeared in the FR version. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

A clarification is also needed in 600.101(c) to avoid additional test burden and unnecessary confusion to customers due to fuel economy value fluctuations, which are not essential, such as measurement variations. Additionally, the paragraph refers to criteria emission standards, but we believe E10 optional tests for EDV configuration is already allowed. Therefore, this sentence should be revised to refer to fuel economy as follows. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

600.101(c)

"… This requirement starts in model year XX for all fuel economy and certification testing in new test groups that do not use carryover data for criteria emission standards fuel economy…"[EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

5.3.Do not remove sulfur corrections and water correction to modified ASTM

D3338 [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

EPA is requesting feedback regarding removing the sulfur correction from the modified D3338 method for determining Net Heat of Combustion (NHC). The sulfur adjustment in ASTM D3338 lowers the calculated NHC. Eliminating the sulfur adjustment will result in a higher calculated NHC and lower calculated CAFE resulting in an increase in stringency. While the sulfur content in Tier 3 test fuel is very low and the adjustment is small, in some cases the sulfur adjustment will cause the NHC value to round up instead of down. Sulfur is a required parameter for the Tier 3 test fuel and the sulfur value is already known for the test fuel. Eliminating the sulfur adjustment does not reduce burden. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

EPA is also requesting feedback regarding omitting the water adjustments from the modified D3338 method for determining NHC. The water adjustment in ASTM D3338 lowers the calculated NHC. Eliminating the water adjustment will result in a higher calculated NHC and lower calculated CAFE resulting in an increase in stringency. While the water content in Tier 3 and LEV III test fuel is very low and the adjustment is small, in some cases the water adjustment will cause the NHC value to round up instead of down. Water is typically reported in Tier 3 and LEV III certification fuel analyses. Omitting the water adjustment does not reduce burden. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

The required adjustments to include sulfur and water in the various equations follow. Include after (f) (1) (i)

- Water. Determine water using ASTM E1064. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

- Sulfur. Determine Sulfur using ASTM D2622 or ASTM D5453. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (ii)(A) by including the sulfur term in the E0 CMF determination:

- CMF = 1 – 0.01 × hydrogen mass percent – 0.01 × sulfur mass percent. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (ii) (B) by including the water term in the Carbon Mass Fraction:

- CMFf = carbon mass fraction of test fuel = CMFh × (1 – MFH2O – mFe) + CMFe × mFe. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (ii) (B) by including the water term in the aromatic content of the hydrocarbon fraction:

- ?? = aromatic content of the hydrocarbon fraction = vParo,f / (1 – vFe – VFH2O) [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (ii) (B) by including ASTM D5580 as an alternative method for determining aromatic content as long as it is corrected to ASTM D1319. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

- vParo,f = volume percent aromatics in the test fuel as determined by ASTM D1319-15 (incorporated by reference in §600.011). An acceptable alternative method is ASTM D5769-10 (incorporated by reference in §600.011), as long as the result is bias-corrected as described in ASTM D1319. An acceptable alternative method is ASTM D5580-15 (incorporated by reference in §600.011), as long as the result is bias-corrected to ASTM D5769-10 and then bias corrected again to ASTM D1319-15. [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (ii) (B) by including the water term in the specific gravity of the hydrocarbon fraction:

- SGh = specific gravity of the hydrocarbon fraction = (SGf – sGe × vFe – SGH2O × VFH2O) / (1 – vFe – VFH2O) [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (iii) (B) by including the water terms in the net heat of combustion of the test fuel:

- NHCf = net heat of combustion of test fuel = NHCh × (1 – mFe – MFH2O) + NHCe × mFe –

MFH2O × NHV60, H2O

- NHV60, H2O = net heat of vaporization of water at 60F = 1059 BTU/lb [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (iii) (B) by including the water term in the aromatic content of the hydrocarbon fraction:

- ? = aromatics content of the hydrocarbon fraction = vParo,f / (1 – vFe – VFH2O) [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Change (f) (1) (iii) (B) by including the water term in the specific gravity of the hydrocarbon fraction:

- SGh = specific gravity of the hydrocarbon fraction = (SGf – sGe × vFe – SGH2O × VFH2O) / (1 – vFe – VFH2O) [EPA-HQ-OAR-2022-0829-0701, pp. 134-137]

Organization: American Coalition for Ethanol (ACE)

Vehicle incentives/credits are not the only area in which EPA seems to penalize technologies designed to operate efficiently on ethanol-blended fuel, indeed another inequity exists with the Agency's outdated fuel economy formula. In previous statements, EPA has acknowledged part of the fuel economy formula (the R-factor) unfairly penalizes fuel containing ethanol. Consequently, EPA is discouraging automakers from developing efficient engines that require higher octane ratings and higher ethanol content. EPA has previously said the 0.6 R-factor is erroneous and fails to achieve the statutory purpose of evaluating the fuel economy of fuels containing ethanol. The auto industry has asked EPA for an R-factor of 1.0. In response, EPA has suggested the correct value may lie "between 0.8 and 0.9." ACE supports an R-factor of 1.0. [EPA-HQ-OAR-2022-0829-0613, p. 5]

Section 202(a)(3)(A)(ii) of the Clean Air Act authorizes EPA to look beyond the basic engine to set its engine or vehicle emission standards. Specifically, the statute says "in establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors (emphasis added)." To account for the "type of fuel used" EPA needs to conduct a full lifecycle GHG emissions analysis. [EPA-HQ-OAR-2022-0829-0613, p. 5]

Organization: Clean Fuels Development Coalition et al.

VI. The Proposed Rule Should Fix the Problems with Fuel-Related Testing and Certification Requirements.

The proposed rule would also implement several changes to test fuel requirements, including requiring that model year 2027 and later vehicle compliance be demonstrated on Tier 3 test fuel. 88 Fed. Reg. 29,240. EPA explains that "Tier 3 test fuel more closely represents the typical market fuel available to consumers in that it contains 10 percent ethanol" and so EPA is reproposing an adjustment factor to allow demonstration of compliance with the existing standards using Tier 3 test fuel. Id. [EPA-HQ-OAR-2022-0829-0712, p. 45]

Requiring manufacturers to test on Tier 3 fuel and use the resultant tailpipe emissions directly in compliance calculation is a good step towards regulatory realism. But EPA's proposed approach does not fix many of the problems that have been identified in previous rulemakings. Some commentors here provided a full analysis of EPA's 2020 proposal to adjust vehicle test procedures for Tier 3 test fuel in comment submitted on that rulemaking docket. These previous comments should be considered comments on the agency's renewed attempt to finalize this proposal and are thus attached in an appendix to this comment. See Appendix B. EPA states that it "will be reevaluating comments received on the 2020 proposal as well as the comments for this proposal and considering if any corrections and adjustments are required, with any appropriate modifications based on the comments received and on the changing circumstances reflected in the current proposed rule for setting new standards for MY 2027 and later vehicles." 88 Fed Reg. 29,241 (emphasis added). Commentors reiterate that all issues raised in their previous comments apply to EPA's current revival of these same issues here. That the current proposal switches the 1.0166 factor from a multiplier applied to Tier 3 to test results to a divisor applied to Indolene test results does nothing to change the applicability of those comments. [EPA-HQ-OAR-2022-0829-0712, p. 45]

There are two primary issues with the proposed test fuel changes. First, the proposed rule's adjustment factor for carbon-dioxide emissions artificially inflates the carbon-related exhaust emissions for vehicles certified on the Tier 3 E10 test fuel. As a result, the rule penalizes low-carbon fuels like E10 by eliminating their natural advantage as a lower carbon solution. The Clean Air Act does not allow EPA to adjust test procedures to artificially distort CO2 emissions from vehicles. Maintaining the 1.0166 factor for pre-model year 2027 artificially inflates the CO2 emissions of vehicles certified on Tier 3 test fuels by making their CO2 emissions appear 1.66% higher than they are. Similarly, dividing test results for Indolene by 1.0166 for MYs 2027-29 makes those vehicles' CO2 emissions appear lower than they are. And maintaining a CO2 factor at all sets up barriers to future higher ethanol blends. [EPA-HQ-OAR-2022-0829-0712, pp. 45-46]

Second, EPA's proposed R-factor of 0.81 is too low and a more accurate R-factor is closer to 1. The proposed R-factor is flawed because it is based on a test program that EPA has admitted is flawed. This test program did not use representative Tier 3 vehicles or test enough vehicles. Further EPA's analysis of the Tier 3 test program data was flawed because it systematically elected to included unreliable and unrepresentative data. Finally, EPA's conclusions are inconsistent with the results of its own prior studies. [EPA-HQ-OAR-2022-0829-0712, pp. 45-46]

A. The Clean Air Act does not allow EPA to adjust test procedures to artificially distort CO2 emissions.

While EPA has discretion under the Clean Air Act to define and execute appropriate emissions test procedures, EPA's proposed CO2 adjustment, which artificially distorts the CO2 emissions measured on vehicles certified using Tier 3 test fuel, exceeds that discretion. Section 202 directs EPA to "prescribe. . . standards applicable to the emission[s] . . . from any class or classes of new motor vehicles," including CO2 emissions. 42 U.S.C. §7521(a)(1); Massachusetts v. EPA, 549 U.S. 497, 528 (2007). To establish compliance with the prescribed emission standards, Section 206 authorizes EPA to test, or require manufacturers to test, vehicles "in such manner as [the agency] deems appropriate." 42 U.S.C. §§ 7525(a)(1), (a)(3)(B). EPA can further revise those tests "[f]rom time to time . . . as deem[ed] appropriate." 42 U.S.C. §7525(a)(4)(B). [EPA-HQ-OAR-2022-0829-0712, p. 46]

But EPA's authority to adjust emissions test procedures under Section 206 is not unbounded. Congress unequivocally indicated its desire that test procedures reflect actual vehicle emissions, directing EPA to "review and revise" test procedures "to insure that vehicles are tested under circumstances which reflect the actual current driving conditions under which motor vehicles are used, including conditions relating to fuel, temperature, acceleration, and altitude. 42 U.S.C. § 7525(h) (emphasis added); see also Energy Future Coalition v. EPA, 793 F.3d 141, 147 (D.C. Cir. 2015) ("[T]he Clean Air Act provides that EPA's test fuel regulations must 'reflect the actual current driving conditions under which motor vehicles are used, including conditions relating to fuel.'")." [EPA-HQ-OAR-2022-0829-0712, p. 46]

And Section 206 limits EPA to defining test procedures that are "appropriate... to determine whether [a vehicle] conforms with" the emissions standards set under Section 202(a). 42 U.S.C. § 7525(a)(1) (emphasis added). While the term "appropriate" may "leave[] agencies with [some] flexibility," the term still must be "[r]ead naturally in the [] context" of the statute. Michigan v. EPA, 135 S. Ct. 2699, 2707 (2015); see also City of Boerne v. Flores, 521 U.S. 507, 517 (1997) (legislation is "appropriate" if it is "adapted to carry out the objects the amendments have in view") (quoting Ex Parte Virginia, 100 U.S. 339, 345–46 (1879)). The most natural understanding of the term "appropriate" in the context of Section 206 is that test procedures should reflect accurate, actual, real-world vehicle emissions. It is not appropriate to distort measured emissions simply to maintain stringency. [EPA-HQ-OAR-2022-0829-0712, pp. 46-47]

Indeed, EPA itself has historically interpreted its authority to set test procedures as requiring test procedures that reflect actual, not scaled, tailpipe CO2 emissions. For each test fuel that EPA currently allows in certification—gasoline, diesel, methanol, natural gas, ethanol, liquified petroleum gas, and related fuel blends— EPA's procedures for determining CREE reflect the actual—not "adjusted"—vehicle CO2 emissions. See 40 C.F.R. § 600.113-12(h)–(m). EPA's proposed CO2 adjustment, which artificially adjusts CO2 emissions of vehicles by 1.66%, would be unprecedented. It would single out an individual test fuel and perversely penalize it alone for its lower carbon output. [EPA-HQ-OAR-2022-0829-0712, pp. 46-47]

Under the Clean Air Act, changes in vehicle emissions due to changes in test fuels are properly addressed by adjusting emission standards, not by changing test procedures. EPA's contrary arguments in the Tier 3 proposed rulemaking are unpersuasive. In the preamble to that proposed rule, EPA claims, without support, "that for testing for CO2 emissions compliance under the Clean Air Act, the statute allows, but does not require [CO2 emissions] adjustments back to 1975 test procedures, including for changes in test fuel properties." 85 Fed. Reg. 28,567. The relevant provisions, however, make no reference to scaling vehicle emissions test procedures to align with decades-old test procedures. Indeed, as CO2 emissions were first regulated in model year 2012, 40 C.F.R. § 86.1818-12(c), EPA's theory is a pure anachronism: There are no 1975 CO2 test procedures EPA could adjust to. [EPA-HQ-OAR-2022-0829-0712, pp. 47-48]

EPA nevertheless claimed that the CO2 adjustment is necessary "to produce the expected CO2 performance had the vehicle been tested over the same test cycles while operating on Tier 2 fuel." 85 Fed. Reg. 28,573. However, unlike EPCA, which expressly states that compliance with fuel economy standards is tied to the 1975 test fuel, 49 U.S.C. § 32904(c), the Clean Air Act nowhere suggests that the greenhouse gas vehicle emissions used for compliance purposes are tied to a particular (i.e., Tier 2) baseline. Instead, the most natural reading of Section 202's requirement that "emission[s] . . . from any . . . new motor vehicles or new motor vehicle engines" must meet prescribed standards is that actual emissions—not some scaled version of them—must meet the imposed standards. [EPA-HQ-OAR-2022-0829-0712, pp. 47-48]

Had Congress intended EPA to develop test procedures that scale emissions tailpipe measurements to align with some predetermined model year baseline, it could have said so—as it did in the EPCA. The absence of any such language in the Clean Air Act suggests that Congress meant exactly what it said: that emissions test procedures should "reflect the actual current driving conditions under which motor vehicles are used, including conditions relating to fuel," 42 U.S.C. § 7525(h) (emphasis added), meaning the procedures reflect the actual CO2 emissions generated by tested vehicles using a particular test fuel that is representative of market fuel. [EPA-HQ-OAR-2022-0829-0712, p. 48]

Furthermore, the proposed adjustment is based on a fundamental misconception of EPA's statutory role under Section 202(a). EPA asserted that its CO2 adjustment is "predicated on a view of [greenhouse gas] . . . stringency as relating to vehicle efficiency rather than tailpipe emissions in a market representative fuel mix." 85 Fed. Reg. at 28,566; id. at 28,570 (claiming the proposed CO2 adjustment is "necessary to realign test results to maintain efficiency controls at the vehicle manufacturer level."). But unlike with CAFE, the purpose of CO2 regulation is not improving vehicle "efficiency," but protecting the health and welfare of the people of the United States. As the Supreme Court observed in Massachusetts v. EPA, "EPA has been charged with protecting the public's 'health' and 'welfare,' a statutory obligation wholly independent of DOT's mandate to promote energy efficiency." 549 U.S. at 532 (citation omitted). Yet the proposed CO2 adjustment is unlawfully predicated on the notion that Section 202(a) is an energy-efficiency mandate no different from DOT's obligation to increase fuel economy, in contravention of the Supreme Court's interpretation of the Act. [EPA-HQ-OAR-2022-0829-0712, p. 48]

Finally, EPA's interpretation of the scope of Section 206 has no principled limitation. If EPA may conjure up fake carbon molecules to the emissions of E10 simply to "maintain stringency," EPA would also be able to make measured carbon molecules disappear if regulatory changes or other factual circumstances make the standards more difficult to achieve than initially planned. This kind of hocus-pocus has no basis in the statute. EPA has no discretion to bias the test procedures against a test fuel to adjust the stringency of the CO2 standards. It should abandon its novel and flawed view of the Clean Air Act and adopt test procedures that measure real CO2 emissions. [EPA-HQ-OAR-2022-0829-0712, p. 48]

B. The proposed CO2 adjustment is an arbitrary and capricious departure from the agency's policy of fuel neutrality.

EPA's proposed CO2 adjustment is also an arbitrary and capricious departure from the agency's policy of fuel neutrality. When it departs from precedent, an "agency must at least 'display awareness that it is changing position' and 'show that there are good reasons for the new policy.'" Encino Motorcars, LLC v. Navarro, 136 S. Ct. 2117, 2126 (2016) (quoting FCC, 556 U.S. at 515). [EPA-HQ-OAR-2022-0829-0712, pp. 48-49]

By singling out a single test fuel for a CO2 penalty, EPA departs from its historic approach of applying emissions standards and related test procedures in a way that is "fuel neutral," so that "vehicles certified to operate on any fuel (e.g., gasoline, diesel fuel, ethanol blends, compressed natural gas, liquefied natural gas, hydrogen, and methanol) are all subject to the same standards." Cong. Research Serv., Tier 3 Motor Vehicle Emission and Fuel Standards 4 (Apr. 28, 2014); see also Tier 3 Rule, 79 Fed. Reg. at 23,558 ("Consistent with the Tier 2 principle of vehicle and fuel neutrality, the same Tier 3 standards apply to all LDVs, LDTs, or MDPVs, regardless of the fuel they use, as proposed. That is, vehicles certified to operate on any fuel (e.g., gasoline, diesel fuel, E85, CNG, LNG, hydrogen, and methanol) are all subject to the same standards."). In doing so, it eliminates the natural advantage of low-carbon test fuels in the certification process and wipes out the incentive to develop and adopt cleaner, lower-carbon fuels and technologies, cutting-off a promising pathway for achieving lower emissions and lower cost vehicles. [EPA-HQ-OAR-2022-0829-0712, pp. 48-49]

EPA's proposed rule effectively places a thumb on the scale in favor of electrification and against clean, low-carbon fuels, ultimately harming both the environment and the consumer. Moreover, by discouraging adoption of low-carbon fuels like high-octane mid-level ethanol blends as an option to reduce CO2 emissions, EPA's approach only endangers the public health and welfare, contrary to EPA's statutory duty. 42 U.S.C. § 7521(a)(1). To advance its mandate, EPA should encourage all fuel and vehicle low-carbon solutions, not pick winners and losers by erecting barriers to particular fuels. [EPA-HQ-OAR-2022-0829-0712, pp. 48-49]

C. The proposed R-factor exceeds EPA's authority to adjust fuel economy test procedures.

Under the existing statutory framework, Congress granted exclusive authority to DOT to "prescribe by regulation average fuel economy standards for automobiles." 49 U.S.C. § 32902(a). EPA has no authority to change the stringency of standards set by DOT. Rather, EPA is limited to prescribing fuel economy test procedures that give "comparable results" to the procedures used for model year 1975. 49 U.S.C. § 32904(c). [EPA-HQ-OAR-2022-0829-0712, pp. 49-50]

There is ample evidence that EPA's proposed R-factor of 0.81 is too low and that an accurate R-factor is closer to 1. See Appendix B; see also C. Scott Sluder et al., Determination of the R-factor for Fuel Economy Calculations Using Ethanol-Blended Fuels over Two Test Cycles, SAE Tech. Paper 2014-01-1572. Imposing an R-factor that is too low yields adjusted Tier 3 fuel economy results that are too low compared to the results that would be generated under 1975 vehicle test procedures, violating the comparability requirement. Moreover, EPA's improperly low proposed R-factor makes the fuel economy standards harder to meet, effectively raising their stringency and exceeding EPA's limited authority to adjust fuel economy test procedures. See id. [EPA-HQ-OAR-2022-0829-0712, pp. 49-50]

A simple example illustrates this increase in stringency: if the accurate R-factor is 1—a value that is close to values suggested by previous studies—EPA's proposed value of 0.81 results in an adjusted Tier 3 fuel economy that is 0.52% lower than the accurate adjusted fuel economy, effectively increasing the standard that a vehicle certified with a Tier 3 test fuel must meet by the same amount. EPA undertakes no such cost-benefit analysis or consideration of alternatives in its notice of proposed rulemaking, and regardless, EPA has no authority to make any such change. Only DOT has legal authority to promulgate regulations that increase the stringency of fuel economy standards. [EPA-HQ-OAR-2022-0829-0712, p. 50]

EPA's authority in this instance is limited to promulgating an R-factor that gives "comparable results" to the test procedures used for model year 1975. 49 U.S.C.§ 32904(c). Because EPA's proposed R-factor of 0.81 is erroneous, the proposed rule changes fuel economy standards and thus it exceeds EPA's statutory authority to adjust test procedures. [EPA-HQ-OAR-2022-0829-0712, p. 50]

D. EPA's analysis of the test program data was flawed and inconsistent with previous EPA studies.

EPA's analysis of the limited data it had from the test program is also flawed. Specifically, EPA systematically includes outlier data and data from unrepresentative vehicles that lowers the determined R-factor, while needlessly excluding other vehicle data that would increase the R-factor. As documented in Appendix B, the analysis inappropriately includes unreliable, outlier results from a faulty 2013 Chevrolet Malibu test vehicle, which significantly skews EPA's calculations and leads to a proposed R-factor that is far too low. At the same time, EPA arbitrarily excluded from its analysis results from the 2016 Acura ILX test vehicle simply because they were "unexpected." By excluding the Acura results, EPA's determined R-factor was lower than it would have been had it included all Test Program vehicles in its analysis. [EPA-HQ-OAR-2022-0829-0712, pp. 50-51]

EPA's analysis is also questionable because its determined R-factor is inconsistent with the results of numerous other recent EPA studies that have determined R factors much closer to 1. Within the past decade, EPA has sponsored or participated in at least three studies that have generated the data necessary to determine the R factor for vehicles operating using gasoline-ethanol fuel blends: the DOE Immediate Ethanol Effects Study, the EPAct/V2/E-89 Study, and the DOE Catalyst Durability Study. These studies included vehicles spanning model years 1999 to 2009. C. Scott Sluder et al., Determination of the R-factor for Fuel Economy Calculations Using Ethanol-Blended Fuels over Two Test Cycles, SAE Tech. Paper 2014-01-1572. While these studies were not designed specifically to measure R factor, the data they generated is nonetheless appropriate for doing so. [EPA-HQ-OAR-2022-0829-0712, pp. 50-51]

These previous EPA studies also have a significant advantage over the Tier 3 Test Program in that they evaluated a considerably larger number of vehicles and fuel blends, allowing determination of an R-factor with much greater certainty than EPA is able to do based on the Tier 3 Test Program data.25 So, while the vehicle selection and test method varied slightly compared to the Tier 3 Test Program, the results from these studies still provide a valuable reference point for corroborating EPA's conclusions from its Tier 3 Test Program. [EPA-HQ-OAR-2022-0829-0712, p. 51]

25 The Immediate Ethanol Effects Study included measurements on sixteen vehicle models and four fuel blends; the EPAct Study included measurements on fifteen vehicle models and a set of twenty- seven fuels; and the Catalyst Durability Study included 18 matched sets of vehicle models and four test fuels that produced data appropriate for R-factor analysis. The estimated uncertainties (95% confidence) for the R-

factor determinations from these studies ranges from 0.010 to 0.075, significantly smaller than the uncertainty in EPA's analysis for the proposed rule. See Appendix B.

These three previous studies uniformly found higher average R-factors than EPA's proposed R-factor of 0.81. Analysis of the Immediate Ethanol Effects Study results yielded an R-factor ranging from 0.86 to 0.89, the EPAct Study yielded an R- factor of 0.92, and the Catalyst Durability Study yielded an R factor of 0.94 to 0.96. All these studies had significantly lower uncertainties in their determined R-factors than EPA has in its proposed R-factor: the maximum R-factor uncertainty among the three studies of ±0.087, compared to an uncertainty of ±0.39 in EPA's proposal. The R-factor derived from these studies can be compared directly to EPA's proposal, and their uniformly higher values confirm that EPA's Tier 3 Test Program analysis underestimates R. [EPA-HQ-OAR-2022-0829-0712, p. 51]

As a result, the adjustment factors calculated by EPA are arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0712, p. 51]

For all the reasons detailed above, EPA should withdraw the proposed rulemaking and issue another proposed rulemaking that complies with the agency's statutory obligations. To satisfy its obligations under the Clean Air Act, EPA should reconsider its proposed Tier 3 Test Fuel adjustments and instead finalize a rule that eliminates the proposed CO_2 adjustment and that includes an R-factor of not less than 0.95. Commentors strongly urge EPA to use its Section 202 powers effectively and consider the ways in which ethanol and other renewable fuels can improve our nation's light- and medium-duty fleet. [EPA-HQ-OAR-2022-0829-0712, pp. 51-52]

Organization: Environmental. and Public Health Organizations

XIII. EPA Should Finalize the Proposed Test Fuel Change for GHG and Fuel Economy Certification But Not for Labeling Purposes, and It Should Require the Use of Adjustment Factors in Appropriate Circumstances. [EPA-HQ-OAR-2022-0829-0759, p. 96]

We support EPA's proposal to require gasoline-powered vehicles to demonstrate compliance with the MY 2027-2032 GHG standards using Tier 3 test fuel, as well as its proposal to require the use of adjustment factors in certain situations. See 88 Fed. Reg. at 29240-42 & Tbl. 30. In addition to the points made below, we urge EPA to consider the comment letter that many of the undersigned organizations submitted to EPA in August 2020 regarding its related proposal on Tier 3 test fuel (which was never finalized).230 [EPA-HQ-OAR-2022-0829-0759, p. 96]

230 Comment Letter re: EPA-HQ-OAR-2016-0604, Vehicle Test Procedure Adjustments for Tier 3 Certification Test Fuel (Aug. 14, 2020), at https://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0081.

In the 2014 Tier 3 Rule, EPA appropriately decided to transition away from Indolene (also known as "Tier 2") test fuel, which no consumer can purchase, to a test fuel ("Tier 3," which contains 10% ethanol) that represents what consumers can actually purchase at the pump. 79 Fed. Reg. at 23525-26. As part of the Tier 3 rulemaking, EPA committed to assessing the impact of the test fuel change on the GHG emissions and fuel usage of the new vehicle fleet. Id. at 23531-32. The results of the Agency's subsequent research study were conclusive: switching from Indolene to Tier 3 test fuel reduces fuel economy and tailpipe emissions of carbon dioxide.231 As EPA rightly concludes, the "difference in GHG emissions between the two fuels is significant in the context of measuring compliance" with GHG standards. 88 Fed. Reg. at 29241. [EPA-HQ-OAR-2022-0829-0759, pp. 96-97]

231 See U.S. EPA, Tier 3 Certification Fuel Impacts Test Program, EPA-420-R-18-004 (Jan. 2018), at 2, available at https://www.regulations.gov/document/EPA-HQ-OAR-2016-0604-0003.

Because EPA has based the proposed MY 2027-2032 GHG standards on the use of Tier 3 test fuel instead of Indolene, id. at 29240-41, requiring manufacturers to use Tier 3 test fuel to demonstrate compliance in MY 2027 and beyond is appropriate. We agree that compliance testing using Tier 3 fuel in MY 2027-2032 does not require an adjustment factor. [EPA-HQ-OAR-2022-0829-0759, p. 97]

We also agree with EPA's proposal that any manufacturers that use Tier 3 test fuel to certify compliance with pre-MY 2027 GHG standards must apply an adjustment factor of 1.0166. 88 Fed. Reg. at 29241 & Tbl. 30. Since the existing (pre-MY 2027) GHG standards are based on Indolene test fuel, using this adjustment factor is necessary to avoid arbitrarily crediting vehicles tested with Indolene with artificial reductions in GHG emissions. As EPA has recognized, not applying an adjustment factor would effectively (and inappropriately) reduce the stringency of the existing GHG standards. U.S. EPA, Vehicle Test Procedure Adjustments for Tier 3 Certification Test Fuel, 85 Fed. Reg. 28564, 28566 (May 13, 2020) (proposed, never-finalized rule regarding Tier 3 test fuel change). Failing to require an adjustment factor would also impose unwarranted additional costs on consumers at the gas pump. To avoid unnecessary and harmful delays in manufacturers applying the adjustment factor to pre-MY 2027 vehicles tested on Indolene, EPA should also clarify that this provision takes effect 60 days after the rule becomes final. [EPA-HQ-OAR-2022-0829-0759, p. 97]

EPA's approach to adjusting the fuel economy and GHG certification values based on the certified fuel as outlined in Table 30 of the Proposal is appropriate. However, the Agency should begin requiring Tier 3 fuel used for certification for all non-carryover vehicles beginning with the first complete model year following finalization of the rule, in order to avoid manufacturers trying to exploit relative Indolene vs. Tier 3 performance different than the average adjustment factor. Manufacturers already certify vehicles on Tier 3 fuel and are aware of any potential discrepancies that could be used to their advantage, so the Agency should eliminate any opportunity for manipulation of certification results as soon as possible, with no phase in period. Allowing carryover is a sufficient compromise to minimize testing burden. [EPA-HQ-OAR-2022-0829-0759, p. 97]

We do not support EPA's proposal to adjust certification test fuel requirements for purposes of fuel economy and emissions labels. The use of Tier 3 fuel for certification was justified because this fuel more closely aligns with the fuel available to consumers at the pump.232 Thus, Tier 3 fuel is more representative of the fuel a consumer would use to judge their own fuel economy. In contrast, the data collected to support the latest iteration of the fuel economy label was collected in 2004-2005,233 prior to the Renewable Fuel Standard (RFS2) taking effect. Ethanol content in fuel in 2004-2005 was just 2%, on average; MTBE was the more popular oxygenate; and gasoline's oxygen content averaged just over 1%, as opposed to 2014, when Tier 3 (E10) fuel was defined to reflect the 10% ethanol content of the reformulated gasoline available to consumers and oxygen content nearly doubled.234 While Indolene has never been available at the gas pump, many of the average properties for 2004 pump fuel are directionally more similar to Indolene than to Tier 3 fuel: lower gravity, lower ethanol content, lower oxygen, and higher aromatics.235 Thus, the fuel economy labeling tests were, to first order, based on the pump fuel at the time, and now such tests should reflect the updated fuel more representative of today's current pump fuel. Therefore, rather than applying the adjustment factor to Tier 3-certified vehicles, as EPA proposes, it would be more appropriate to apply the inverse adjustment factor to Indolene-certified vehicles. While we appreciate the point made by EPA that "a comprehensive assessment of real world fuel economy is the best process to ensure that all real-world effects are reflected," 85 Fed. Reg. at 28579, such an assessment is a resource-intensive undertaking that has not been attempted in nearly 20 years, and EPA has sufficient data based on its Tier 2/Tier 3 program to account for a shift in the available pump fuel. [EPA-HQ-OAR-2022-0829-0759, pp. 97-98]

232 "E10 most appropriately reflects in-use gasoline around the country today and into the foreseeable future, and thus we are finalizing E10 for the test fuel." 79 Fed. Reg. at 23450.

233 U.S. EPA, Final Technical Support Document–Fuel Economy Labeling of Motor Vehicles: Revisions to Improve Calculation of Fuel Economy Estimates, EPA-420-R-06-017 (Dec. 2006), at Appendix A, available at http://nepis.epa.gov/Exe/ZyPDF.cgi/P1004F41.PDF?Dockey=P1004F41.PDF.

234 U.S. EPA, Fuel Trends Report: 2006-2016, EPA-420-R-17-005 (2017), at 27, Tbl. 6, available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100T5J6.pdf.

235 Compare id. Tbl. 6 with U.S. EPA, Tier 3 Certification Fuel Impacts Test Program, EPA-420-R-18-004 (Jan. 2018), at 5, Tbl. 3.1.

Organization: Ford Motor Company

E10 Fuel Economy & GHG Testing Transition

Ford generally supports EPA's proposal to transition to E10 test fuel for GHG and fuel economy testing. Specifically, we support the ability to conduct E10 testing before 2027MY with appropriate adjustments, and the application of 1.0166 divisor to E0 testing conducted after 2026MY. [EPA-HQ-OAR-2022-0829-0605, p. 9]

Ford also recommends the following clarifications/adjustments to the proposed E10 provisions: [EPA-HQ-OAR-2022-0829-0605, p. 9]

- To ease test burden and provide greater flexibility, E0 carry-over testing should be extended through 2030MY. [EPA-HQ-OAR-2022-0829-0605, p. 9]

- Clarify that re-testing on E0 for 5-cycle litmus determination be permitted until updated derived 5-cycle regression equations are developed using regular-grade octane E10 fuel. [EPA-HQ-OAR-2022-0829-0605, p. 9]

Ford looks forward to working with EPA to help develop the provisions, test procedures and regulatory text related to this test fuel transition that are needed for the final rule. [EPA-HQ-OAR-2022-0829-0605, p. 9]

Organization: Minnesota Corn Growers Association (MCGA)

Update Fuel Related Testing and Certification Requirements

As NCGA recommended to EPA in 2020 comments on Docket EPA–HQ–OAR–2016-0604, actual tailpipe carbon emissions, regardless of the test fuel, must continue to be the only measure of vehicle emissions performance in vehicle testing. CO2 test adjustments would needlessly complicate vehicle test procedures. Relying solely on test results eliminates uncertainty, averaging and potential for inaccuracies in procedures to adjust emission test results for the fuel. [EPA-HQ-OAR-2022-0829-0612, p. 12]

Correct the fuel economy formula by updating the R-Factor to 1.0 to reflect documented operation of modern engine technology.

Correcting the R-Factor in the fuel economy formula would support automakers developing high efficiency engines that require higher octane ratings and a higher ethanol content. EPA has acknowledged that the current EPA- mandated R-Factor of 0.6, originally established in the 1980s, is outdated and fails to achieve the statutory purpose of making fuel economy testing on today's fuel equivalent to fuel economy testing in 1975. An update to 1 from 0.6 would reflect results of analysis by the Department of Energy and EPA using modern engines and fulfill previous observations and commitments from EPA to address this issue. Published studies have shown that R for modern vehicles should be around 0.93 to 0.96.31 [EPA-HQ-OAR-2022-0829-0612, p. 12]

31 Sluder, C., West, B., Butler, A., Mitcham, A. et al. 2014. Determination of the R Factor for Fuel Economy Calculations Using Ethanol-Blended Fuels over Two Test Cycles. SAE Int. J. Fuels Lubr. 7(2):2014, doi:10.4271/2014-01-1572.

Setting the R-factor to 1.0 sets fuel economy results on an energy basis. In application, the R factor equation is a "fuel response factor," adjusting for more than just energy density. An R of 1.0 essentially converts fuel economy to mile per gallon gasoline equivalent (MPGge), which is how other alternative fuels such as propane, natural gas, and electricity have been compared to their gasoline counterparts for decades. Setting R to 1.0 provides equitable treatment to renewable ethanol that other alternative fuels already receive. This change could help speed the transition to certification with Tier 3 fuel as well as encourage vehicle manufacturers to seek certification for even higher ethanol blends, such as E15 or the high octane E30 EPA suggested in its Tier 3 proposal several years ago. Manufacturers are not incentivized to build dedicated high-octane vehicles that reduce GHG emissions when those low carbon benefits are penalized by a low R factor. [EPA-HQ-OAR-2022-0829-0612, p. 12]

Lower GHG emissions from vehicles benefit consumers, our environment, and our energy security. Just as updating the test fuel from E0 to E10 reduced GHG emissions by blending cleaner, renewable ethanol with gasoline, E15 and future clean, high-octane fuels that blend more ethanol will further reduce emissions and improve fuel economy when used with optimized engines. Vehicle test procedures for Tier 3 fuel, or any future certification fuel, must not create impediments to low carbon fuels such as E15 and higher blends and the vehicle technologies that help reach our mutual goal of lower GHG emissions. Stringency of the standards is best maintained through the Administrator's authority to adjust the standards, as EPA is using in this proposal, not by adjusting emission test results. [EPA-HQ-OAR-2022-0829-0612, pp. 12-13]

Update the F-factor in the fuel economy formula to a forward-looking F-factor of at least 0.2. [EPA-HQ-OAR-2022-0829-0612, p. 13]

Organization: National Corn Growers Association (NCGA)

As NCGA recommended to EPA in 2020 comments on Docket EPA–HQ–OAR–2016-0604, actual tailpipe carbon emissions, regardless of the test fuel, must continue to be the only measure of vehicle emissions performance in vehicle testing. CO2 test adjustments would needlessly complicate vehicle test procedures. Relying solely on test results eliminates uncertainty, averaging and potential for inaccuracies in procedures to adjust emission test results for the fuel. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Lower GHG emissions from vehicles benefit consumers, our environment, and our energy security. Just as updating the test fuel from E0 to E10 reduced GHG emissions by blending cleaner, renewable ethanol with gasoline, E15 and future clean, high-octane fuels that blend more ethanol will further reduce emissions and improve fuel economy when used with optimized engines. Vehicle test procedures for Tier 3 fuel, or any future certification fuel, must not create impediments to low carbon fuels such as E15 and higher blends and the vehicle technologies that help reach our mutual goal of lower GHG emissions. Stringency of the standards is best maintained through the Administrator's authority to adjust the standards, as EPA is using in this proposal, not by adjusting emission test results. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Organization: POET, LLC

A. An R-factor of 1.0 Should Be Used by EPA for Fuel Economy Calculations on E10.

POET supports an R-factor equal to 1.0 for EPA's calculation fuel economy performance on E10, as broadly supported by commenters such as the Alliance for Automotive Innovation and Growth Energy. An R-factor of 1.0 implies energy content impact of a test fuel relative to that of the 1975 baseline fuel is fully observed in test results and adjusted for. An R-factor of less than 1.0 implies a test vehicle does not fully realize the impact of fuel energy content changes and results in a lower calculated fuel economy for fuels with lower energy content. In the 2020 NPRM, EPA inappropriately proposed an R-factor of 0.81. For reasons including those outlined by the Alliance for Automotive Innovation and Growth Energy, including the use of more representative data, POET supports an R-factor of 1.0 for an E10 test fuel.129 [EPA-HQ-OAR-2022-0829-0609, p. 28]

129 See Alliance for Automotive Innovation, Comments on Vehicle Test Procedure Adjustments for Tier 3 Certification Test Fuel; Notice of Proposed Rulemaking (August 14, 2020), pp. 5-6, available at https://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0087. See also, Growth Energy, Vehicle Test Procedure Adjustments for Tier 3 Test Fuel (August 14, 2020)(supporting an R-factor of 1.0 and noting that EPA's lower proposed R-factor "fails to reflect real-world numbers or recognize the myriad of advancements in technology and the wealth of research in this area by national laboratories and others"), p.1, available at https://www.regulations.gov/comment/EPA-HQ-OAR-2016-0604-0079.

B. EPA Must Not Use a Carbon Adjustment Factor That Disincentives Using Low- Carbon Fuels.

EPA must not use a "CO2 adjustment" to GHG emission test results to arbitrarily and capriciously eliminate incentives for low carbon fuels. The Proposed Rule suggests use of a "CO2 adjustment" factor of 1.0166 for GHG standards "to demonstrate compliance with a GHG standard referenced to Indolene test fuel" and regarding "fuel economy and environment label values."130 However, the Proposed Rule also states, when determining compliance based on

Tier 3 Test Fuel, that “[t]his proposal does not include an adjustment factor for tailpipe GHG emissions but rather requires manufacturers to test on Tier 3 test fuel and use the resultant tailpipe emissions directly in their compliance calculation.”131 [EPA-HQ-OAR-2022-0829-0609, p. 29]

130 88 Fed. Reg. at 29241 (emphasis added).

131 88 Fed. Reg. at 29240.

The Alliance for Automotive Innovation noted in comments on EPA’s 2020 proposed rule that “Adding CO2 emissions that are not emitted by the vehicle for the purposes of calculating an adjusted compliance level for vehicles is counter to the goal of reducing carbon emissions from the transportation sector” and “will have the unintended consequence of undermining the large potential GHG reduction opportunities low carbon fuels.”132 Similarly, Growth Energy noted EPA’s CO2 adjustment factor in the 2020 proposal would “unnecessarily penalize automakers for the use of low carbon fuels” and the “use of low-carbon biofuels, such as ethanol, should be strongly encouraged given the benefits toward reducing greenhouse gas emissions and improving air quality.” POET agrees that no CO2 adjustment factor should be used that disincentives the use of low carbon fuels.133 [EPA-HQ-OAR-2022-0829-0609, p. 29]

132 August 14, 2020 comments of Alliance for Automotive Innovation, supra, at 3.

133 August 14, 2020 comments of, supra at pp. 1-2.

EPA Summary and Response

Summary:

The Alliance commented on the following items:

1. Do Not Adjust the Tailpipe CO_2 Value for E10
2. Set R-Factor Equal to 1.0 for CAFE Performance on E10
3. Delay E10 Phase-in, Allow Optional E0 Testing and Carryover of E0 Data
4. Address the Impact of the E10 Transition on 5-Cycle Testing and Litmus Test
5. Consider Fuel Economy and Environmental Performance Labeling Impacts

Several commenters advised that adjusting CO_2 measurements from Tier 3 test fuel upward by 1.6% is improper since E10 test fuel represents market fuel. (For example, a commenter states that “It is not appropriate to distort measured emissions simply to maintain stringency.”) They also suggest that the proposed adjusted R-value of 0.81 is too low, stating that values around 0.9 or higher have been published in recent literature, and that a value of 1.0 would be optimal as it avoids penalizing ethanol blends. One commenter took issue with the choice of test vehicles retained in the dataset used to compute the updated R-factor, specifically that the 2013 Malibu was included while the Acura was excluded. Another commenter explained that the computation of the test fuel’s heating value and carbon mass fraction should be done using the original ASTM methods used in characterizing the historical reference fuel rather than updated methods we proposed, and that the values should account for sulfur and water content. It was also suggested that the PM Index and/or heavy aromatics content of Tier 3 certification test gasoline should be adjusted to better match current market gasoline, pointing to a downward shift since the original specification was set.

Some commentors mentioned that they believed EPA was penalizing technologies designed to operate efficiently on ethanol-blended fuel and discouraging automakers from developing efficient engines that require higher octane ratings and higher ethanol content. This disincentivizes the use of low carbon fuels with ethanol.

A commentor suggested that the proposed CO_2 adjustment is an arbitrary and capricious departure from the agency's policy of fuel neutrality. The commenter also stated the Clean Air Act does not allow EPA to adjust test procedures to artificially distort CO_2 emissions, or that it would unnecessarily complicate the compliance calculations.

Another commenter voiced support for the proposed adjustments to CO_2 and fuel economy measurements used for compliance, but opposed the adjustments to Tier 3 fuel results for vehicle labels on the basis that Tier 3 fuel is a reasonably good representation of market fuel.

Response:

The responses to the Alliance's list are available in Section III.C.2.iv.e of the preamble.

We are finalizing GHG standards the stringency of which accounts for E10 test fuel, therefore the 1.6% adjustment is no longer required in most situations. This would have been appropriate broadly when the standards were based on E0 test fuel since that fuel produces higher CO_2 emissions for the same vehicle and test conditions. Adjustments are reasonable when the current test fuel is different from the original test fuel for which the standards were set, but that is not the case with this rule's final GHG standards.

However, we are retaining the updated R_a-factor of 0.81 to represent equivalent fuel economy performance within the CAFE program. This factor was generated from a study carefully designed and rigorously conducted at EPA's lab. The decision to include data from the 2013 Malibu was based on its performance being within the expected range.

In addition, we want to clarify that R-factor values in the literature (e.g., in Sluder, *et al.*) are generally intended to isolate the actual sensitivity of fuel economy to fuel energy content, while the R_a factor here rolls up multiple impacts related to this specific pair of test fuels that include the energy content difference, additional charge cooling due to ethanol's heat of vaporization, and potentially some marginal impacts of the octane change. Thus, we wouldn't expect this R_a value to precisely match other R-factors found in the literature.

We have revised the fuel economy calculations to use ASTM methods D3338 and D3343 with appropriate accommodations for E10 blends and have addressed the inconsistency in heating value units. We did not incorporate water and sulfur adjustments to heating value and carbon content of test fuels. Since the updated R-factor was empirically derived from a study where the test fuels contained typical levels of water and sulfur, the results effectively incorporate impacts of those contaminates on fuel economy. Additional corrections should then be very small if applied as a deviation from our study fuels, or redundant if accounted for in full measure.

We are not adjusting the aromatics content specifications for certification test gasoline at this time, as we did not include any updated ranges in the proposal. We will consider this issue as part of our assessment of a potential heavy aromatic content standard for market gasoline.

A commentor suggested that the proposed CO_2 adjustment is an arbitrary and capricious departure from a policy of fuel neutrality and that the Clean Air Act does not allow EPA to adjust test procedures to artificially distort CO_2 emissions. Another commenter suggests that the adjustment will unnecessarily complicate the compliance calculations. EPA disagrees. The statute confers on the Administrator discretion to promulgate appropriate testing requirements. The commenters fundamentally misunderstand the purpose of the adjustment, which is not meant to artificially distort CO_2 emissions, but rather to account for the effects of different test fuels and accurately represent CO_2 emissions for purposes of compliance with the GHG standards. The adjustments are necessary to produce equivalent stringency of standards between testing that used Tier 2 versus Tier 3 fuels. Having no adjustment would effectively reduce the stringency of the earlier standards when Tier 3 fuel is used. Without this adjustment, manufacturers could reduce the CO_2 emissions of a given vehicle model by simply changing which test fuel was used during GHG certification testing. In any case, the CO_2 adjustment for Tier 3 test fuel is only required through model-year 2026 vehicles. In addition, the exact value of the adjustments are the result of a carefully executed test program using a variety of technologies with a wide cross section of vehicle types represented.

In response to comments opposing the CO_2 adjustments to Tier 3 fuel results for vehicle labels (on the basis that Tier 3 fuel is a reasonably good representation of market fuel), we assert that the adjustment is appropriate because the label calculations, being based on Tier 2 E0 fuel, already apply an adjustment to account for market fuel being E10. Therefore, using the Tier 3 test fuel value directly would effectively be double-counting for the ethanol content.

In response to the comments on penalizing technologies, the revised R-factor and CO_2 adjustments apply only to existing vehicle designs using E10 test fuel. Test fuels and procedures allowing manufacturers to certify vehicles at higher ethanol blend levels do not yet exist (with the exception of E85 fuel, which does not use these adjustment factors).

6.4 – Engine certification for high-GCWR vehicles

Comments by Organizations

Organization: Alliance for Automotive Innovation (Alliance)

E. MDV Certification (Chassis vs Engine Dynamometer)

10. Background on Chassis vs. Engine Dynamometer Certification

Today, emission testing of trucks typically happens on either a chassis dynamometer or an engine dynamometer. Class 2b and 3 complete vehicles are required to test tailpipe emissions on a chassis dynamometer, while Class 4 and above vehicles test the performance of the engine itself. The two test procedures are very different in terms of laboratory hardware and test cycles. EPA is proposing that many MDVs will retain chassis dynamometer testing for GHG emissions and have the additional, new requirements for engine dynamometer testing for criteria emissions beginning in MY 2030. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

Engine dynamometers are useful to assess the performance of engines across a wide range of loads and engine speeds. Emissions typically vary by operating conditions, or set points, and lab measurements across a range of set points can help predict emissions performance across a wide range of engine use cases where engine speed and engine load may vary significantly. In the heavy-duty industry, one engine family may be installed in diverse applications, like school buses, bucket trucks, garbage trucks, and class 8 long haul tractors. For very large vehicles, testing the entire vehicle on a chassis dynamometer is not practical, as there would be size and safety constraints, and many vehicle applications for an engine may be produced in very low volume. Regulators and industry have settled on engine dynamometer testing and engine specific criteria emissions standards for Class 4-8 vehicles, and GHG emissions standards set at the vehicle level, with vehicle GHG performance estimated with computer simulation and representative inputs. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

Chassis dynamometers are used to test tailpipe emissions of complete vehicles. Laboratories run vehicles along predetermined speed cycles and measure the quantity and composition of exhaust mater. Regulators and manufacturers commonly use chassis dynamometers to define standards for emissions test procedures and to measure vehicle performance against emissions standards. Chassis dynamometers are frequently used to test passenger cars, light trucks, and Class 2b and 3 complete vehicles. These vehicles are typically produced in high volume, and test cycles with vehicle speeds over time are broadly representative of real-world use of automotive products. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

11. Proposed New Engine Dynamometer Testing and Standards

Beginning in MY 2030, EPA proposes to require manufacturers to meet engine dynamometer standards (Part 1036) to certify the criteria emissions performance of capable Class 2b and 3 vehicles. EPA proposes that vehicles with a GCWR above 22,000 pounds will be subject to the Part 1036 requirements. The Part 1036 requirements have different useful life and testing requirements than chassis dynamometer standards. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

Requiring these Class 2b and 3 MDVs to engine certify increases testing resources and aftertreatment development as duplicate testing on vehicles. CARB (and EPA today) require certification on a chassis dynamometer, while the NPRM proposes to shift these vehicles to an engine dynamometer certification. This unnecessarily drives costs up as different engine and aftertreatment hardware and separate calibration efforts are needed to meet the disparate requirements (standards, useful life, OBD, etc.). EPA is presumably doing this is to address CO concerns on SI engines, but it is unnecessary since every area in the U.S. reached attainment for CO almost 13 years ago (September 27,2010).311 Since then, automakers have continued reducing CO emissions from SI engines. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

311 U.S. EPA, September 21, 2022, Green Book Carbon Monoxide (1971) Area Information, retrieved from https://www.epa.gov/green-book/green-book-carbon-monoxide-1971-area-information, on June 26, 2023.

12. Recommendations on Class 2b-3 Engine Dynamometer Testing and Standards

Auto Innovators recommends that EPA continue with current MDV testing, namely, continuing to have Class 2b and Class 3 trucks chassis certify, which will provide one common hardware development, testing, and certification method for OEMs. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

EPA requested comment on alternative for high GCWR MDV criteria pollutant emissions standards:312 [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

312 NPRM at 29271

(1) MDV above 22,000 pounds GCWR would comply with the MDV chassis dynamometer standards proposed in Section III.C with the introduction of additional engine dynamometer-based standards over the Supplemental Emissions Test as finalized within the Heavy-duty 2027 and later standards; [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

(2) MDV above 22,000 pounds GCWR would comply with the MDV chassis dynamometer standards proposed in Section III.C with additional in-use testing and standards comparable to those used within the California ACC II; [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

(3) Introduction of other test procedures for demonstration of effective criteria pollutant emissions control under the sustained high-load conditions encountered during operation above 22,000 pounds GCWR. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

Class 2b-3 vehicles can achieve low emissions targets across a range of operating conditions beyond the chassis test cycle, including those at high load, and EPA can confirm this with test procedures adopted by California ACC II. Manufacturers recommend EPA adopt the California ACC II test procedure for in-use testing and standards (Option “2”). Procedurally, this allows manufacturers to continue chassis certification, minimizing disruptions to lab processes, and manufacturers already have hardware designed to meet stringent emissions standards, even in high load in-use requirements. The chassis certification test cycle also aligns well with common use cases for Class 2b-3 vehicles, whereas the engine dyno certification process places much higher emphasis on high load conditions, and places lower emphasis on low load performance. [EPA-HQ-OAR-2022-0829-0701, pp. 203-205]

E. Engine Dynamometer Certification

If EPA finalizes its proposal (outside of OBD requirements) to require Class 2b and 3 vehicles to certify via engine dynamometer certification, Auto Innovators proposes that EPA allow product that is certified by CARB, using chassis certification method, to meet EPA’s OBD requirements. We recommend EPA use the language below from HD OBD § 1036.110(b)(11) in § 86.1806-27: [EPA-HQ-OAR-2022-0829-0701, p. 259]

> (11) If you have an approved Executive order from the California Air Resources Board for a given engine family, we may rely on that Executive order to evaluate whether you meet federal OBD requirements for that same engine family or an equivalent engine family. Engine families are equivalent if they are identical in all aspects material to emission characteristics; for example, we would consider different inducement strategies and different warranties not to be material to emission characteristics relevant to these OBD testing requirements. EPA would count two equivalent engine families as one for the purposes of determining OBD

demonstration testing requirements. Send us the following information: [EPA-HQ-OAR-2022-0829-0701, p. 259]

(i) You must submit additional information as needed to demonstrate that you meet the requirements of this section that are not covered by the California Executive order. [EPA-HQ-OAR-2022-0829-0701, p. 259]

(ii) Send us results from any testing you performed for certifying engine families (including equivalent engine families) with the California Air Resources Board, including the results of any testing performed under 13 CCR 1971.1(l) for verification of in-use compliance and 13 CCR 1971.5(c) for manufacturer self- testing within the deadlines set out in 13 CCR 1971.1. (iii) We may require that you send us additional information if we need it to evaluate whether you meet the requirements of this Paragraph (b)(11). This may involve sending us copies of documents you send to the California Air Resources Board. [EPA-HQ-OAR-2022-0829-0701, p. 259]

Organization: California Air Resources Board (CARB)

CARB also supports U.S. EPA's proposal to change to chassis certification for medium-duty vehicles for GHG emissions, which is a more robust method of determining compliance than the existing process, which combines engine testing with other modeling. [EPA-HQ-OAR-2022-0829-0780, p. 17]

Organization: Cummins Inc.

III. High GCWR MDV Certification

1. Mandatory engine-dynamometer certification of high GCWR MDV for criteria pollutants causes regulatory misalignment, regulatory uncertainty, and increased regulatory burden [EPA-HQ-OAR-2022-0829-0645, pp. 3-4]

In the Multi-Pollutant Proposal, EPA defines a new category called medium-duty vehicles, or MDV, for vehicles with 8,501-14,000 lbs GVWR which are not Medium-Duty Passenger Vehicles (MDPV), and further divides those MDV based on their gross combined weight rating (GCWR), which is an indication of the towing capability of a vehicle. MDV with GCWR >22,000 lbs are considered high GCWR vehicles, and MDV with GCWR <22,000 lbs are considered low GCWR vehicles. EPA proposes significant changes to certification protocols for high GCWR vehicles. [EPA-HQ-OAR-2022-0829-0645, pp. 3-4]

Class 2b and 3 complete vehicles such as HD pickup trucks are currently chassis-dynamometer certified for both criteria pollutant and GHG emissions. Per EPA's proposal at 88 FR 29270, high GCWR vehicles would no longer be allowed to use chassis-dynamometer certification for criteria pollutant emissions and would instead be forced into mandatory engine-dynamometer certification and subject to EPA's recently finalized HD engine 2027 NOx standards and other new HD engine program requirements in 40 CFR Part 1036. However, for GHG emissions, high GCWR complete vehicles would remain subject to chassis-dynamometer certification to 40 CFR Part 86 standards and requirements. This would result in complete high GCWR vehicles such as HD pickup trucks certifying with different test cycles (e.g., the HD Federal Test Procedure, or FTP, vs. the LD FTP, or FTP 75) and different emissions metrics (e.g., brake- specific grams per horsepower-hour NOx standards vs. distance-specific grams/mile CO2 standards) for criteria pollutants vs. GHG emissions, respectively. [EPA-HQ-OAR-2022-0829-0645, pp. 3-4]

While EPA has optionally allowed such dual protocols for limited cases in the past, the Multi-Pollutant Proposal would force it upon some MDV but not others. EPA estimates that based on model year (MY) 2022 and 2023 certification data, "most MDV complete and incomplete diesel pickup trucks would be required to switch to engine dynamometer certification; MY 2022 vans would not be required to use engine dynamometer certification; and only a small number of gasoline pickup trucks would be required to switch to engine certification." Requiring dual certification protocols for high GCWR MDV could lead to misalignment between optimization of criteria pollutant and GHG emissions controls. With different certification cycles covering different engine operating speeds and loads, manufacturers could trade-off GHG improvements at the expense of NOx control, undermining the goals of the regulation. In contrast, using the same protocols for criteria pollutants and GHG ensures linkage across all pollutants and forces manufacturers to address each of them when optimizing engine performance and emissions. [EPA-HQ-OAR-2022-0829-0645, pp. 3-4]

Dual certification and compliance requirements also have the potential to cause lack of clarity and regulatory uncertainty for manufacturers. For example, proposed 40 CFR 85.2101 applies to vehicles subject to the standards of 40 CFR Part 86 Subpart S, which would include high GCWR MDV certified to GHG standards under 40 CFR Part 86 Subpart S, and proposed 40 CFR 85.2103(f) specifies MDV emissions warranty periods for major emission control components, many of which are used to control criteria pollutant emissions. Yet high GCWR MDV certified in the HD engine program for criteria pollutants are subject to the criteria pollutant emissions warranty periods of 40 CFR Part 1036, based upon EPA's intent described in the Preamble at 88 FR 29270. There are likely other similar examples in the proposal where EPA will need to provide better clarity for manufacturers as to which aspects of requirements apply to which pollutants for which categories of vehicles. [EPA-HQ-OAR-2022-0829-0645, pp. 3-4]

Additionally, dual certification and compliance requirements will increase regulatory burden on manufacturers. Manufacturers will need to run the variety of tests required as part of certification (not only certification cycles but deterioration factor (DF) testing, infrequent regeneration adjustment factor testing, onboard diagnostics (OBD) testing, etc.) using two different types of equipment/facilities (chassis dynamometer and engine dynamometer), on two different test articles (vehicle and engine), for certification by two different divisions at EPA (HD and LD), instead of one. For compliance, EPA may require the existing In-Use Verification Program (IUVP) for GHG, while adding the possibility of Heavy- Duty In-Use Testing (HDIUT) for criteria pollutants associated with the HD engine program. For IUVP, manufacturers would be required to procure customer vehicles at low and high mileages for chassis- dynamometer testing to demonstrate GHG compliance. For HDIUT, manufacturers would be required to procure customer vehicles, equip them with Portable Emissions Measurement Systems (PEMS), and measure emissions during customer operation of the vehicles along their normal routes to demonstrate criteria pollutant compliance. Given the different types of testing for IUVP vs. HDIUT, there is no opportunity to combine testing for GHG and criteria pollutants. [EPA-HQ-OAR-2022-0829-0645, pp. 3-4]

If EPA proceeds with finalizing mandatory engine-dynamometer certification of criteria pollutants for high GCWR MDV despite the concerns raised above, additional significant changes are needed in the proposal, as outlined below. [EPA-HQ-OAR-2022-0829-0645, pp. 3-4]

2. Engine-dynamometer certification cycles are not representative of real-world duty cycles for high GCWR MDV and should be modified [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

EPA's purpose in forcing high GCWR MDV into engine-dynamometer certification for criteria pollutants is "to ensure that criteria pollutant emissions are controlled under the sustained high load conditions that many of these vehicles encounter, particularly during heavy towing operation." See 88 FR 29270. [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

EPA considers high GCWR MDV to be work vehicles and finds it more appropriate for them to be tested as HD engines due to their capabilities and use which EPA believes is more closely aligned with Class 4 and above heavy-duty applications than with light-duty trucks. While EPA did not provide any data characterizing the duty cycles of high GCWR MDV in the Multi-Pollutant Proposal, Cummins offers the data shown in Figures 1 and 2 collected from tens of thousands of Class 2b and 3 high GCWR diesel pickups for EPA's consideration. A duty cycle monitor within the engine's electronic control module (ECM) logs 1 Hz data for engine speed and load which is downloaded during service events at the dealer. The data is plotted as percent of time spent in various bins of engine speed and percent of full load. [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

Under EPA's proposal for mandatory engine-dynamometer certification for criteria pollutants, the Supplemental Emissions Test (SET) would be one of the applicable certification cycles. The SET is a continuous cycle with ramped transitions between 13 steady-state modes of operation including 25%, 50%, 75%, and 100% engine loads at each of 3 engine speeds designated as A, B, and C speeds, plus idle. The SET non-idle speeds and loads are calculated from the engine's full load torque curve. The specified amount of time spent in each of the 13 modes determines its weighting within the overall SET cycle results. For example, the 100% load modes are weighted at 9%, 9%, and 2% respectively for A, B, and C speeds. The combined weightings of all the modes at A, B, and C speeds are 45%, 38%, and 5% respectively. [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

For Figures 1 and 2, we have roughly overlaid the calculated A, B, and C speeds, shown as red lines, and the four % load points, shown as black rectangles, for the SET on the duty cycle data. There is a significant mismatch between the SET certification cycle and the vehicles' duty cycle data, with very little time spent (typically <##2%) operating in the real world near each of the 75% and 100% engine load modes of the SET. The time spent by the real-world vehicles in operation corresponding to the 12 non-idle modes, contained within the blue boxes, does not approach the total combined 88% weighting of the A, B, and C speed points in the SET cycle. [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

Modifications will be needed to the SET cycle to better represent the real-world duty cycles of high GCWR MDV. Since the HD FTP, another engine certification cycle, also contains significant operation at high engine speeds and loads, it will need modifications as well. Per 40 CFR 1065.10(c)(1), manufacturers must notify EPA if good engineering judgment indicates the specified procedures cause unrepresentative emission measurements, and EPA will cooperate with manufacturers to establish whether and how the procedures should be changed to be more representative. EPA would generally make the changes applicable through a rulemaking process. Cummins commits to working with EPA through this Multi-Pollutant rulemaking to identify the necessary changes to the HD engine certification cycles. Possible changes could include different torque curve denormalization for the SET and/or FTP, reweighting of SET modes, recalculation of SET speed and load modes, etc. [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

[See original for table titled "Figure 1 – Duty Cycle Data for Class 2b High GCWR Diesel Pickup Trucks with SET Modes Overlaid"] [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

[See original for table titled "Figure 2 – Duty Cycle Data for Class 3 High GCWR Diesel Pickup Trucks with SET Modes Overlaid"] [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

EPA requests comment on several alternatives for high GCWR criteria pollutant emissions standards: 1) complying with EPA's proposed low GCWR MDV chassis-certification standards combined with the SET engine-certification standards recently finalized by EPA, 2) complying with EPA's proposed low GCWR MDV chassis-certification standards combined with in-use testing and standards comparable to CARB's Advanced Clean Cars II (ACC II) regulation, and 3) other test procedures for demonstrating effective criteria pollutant emissions control under sustained high load conditions above 22,000 lbs combined vehicle weight. Per EPA's Draft Regulatory Impact Assessment in Chapter 3.2.1.3, diesel-powered high GCWR MDV were not considered in setting the MDV chassis-certification standards mentioned in alternatives #1 and #2, so EPA would need to do additional work to determine proposed chassis- certification standards appropriate for high GCWR MDV. Adding SET engine-certification standards as in alternative #1 would face the same need already discussed above for modifying the cycle itself to be more representative of real-world operation. Adding CARB's ACC II in-use PEMS testing requirements based on CARB's 20 mg/hp-hr NOx standard as in alternative #2 is not recommended as EPA already determined in its recently finalized HD engine 2027 NOx rule that a 35 mg/hp-hr NOx standard provides the maximum feasible NOx reduction for MY 2027. See 88 FR 4333. Cummins raised additional concerns with CARB's ACC II in-use testing approach in our comments to CARB's rulemaking.4 Finally, Cummins supports the development of other test procedures as suggested in alternative #3, or similarly supports modifications to existing test procedures, to address criteria pollutant emissions control under sustained high load conditions but requests EPA to provide duty cycle data highlighting the operation of concern to support further investigation. [EPA-HQ-OAR-2022-0829-0645, pp. 4-7]

4 See https://www.arb.ca.gov/lists/com-attach/396-accii2022-UDMBcl0xVWsAbwNt.pdf (last accessed June 27, 2023).

3. The MDV work factor should continue to account for high towing capacity in setting CO_2 targets

Phase 1 and 2 GHG standards for HD pickup trucks and vans, the same vehicles considered as MDV for this rulemaking, use a work factor (WF) attribute to set vehicle CO_2 targets. The work factor accounts for payload, towing, and four-wheel drive equipment and is calculated as follows:

WF = 0.75 × [Payload Capacity + xwd] + 0.25 × Towing Capacity, where Payload Capacity = GVWR (lbs) - Curb Weight (lbs)

xwd = 500 lbs if equipped with 4-wheel-drive, otherwise 0 lbs Towing Capacity = GCWR (lbs) - GVWR (lbs) [EPA-HQ-OAR-2022-0829-0645, pp. 7-8]

CO_2 targets in grams/mile are then calculated as [a × WF] + b, where a and b coefficients are specified in the regulations. In the Phase 1 GHG Final Rule, EPA noted that, "Based on analysis of how CO_2 emissions and fuel consumption correlate to work factor, we believe that a straight line correlation is appropriate across the spectrum of possible HD pickups and vans…" See 76 FR 57162. EPA's 2010 analysis of vehicle CO_2 data and the correlation to work factor is available in the Phase 1 rulemaking docket.5 Cummins continues to support the work factor approach to setting standards as necessary for recognizing the work capacity of MDV to haul and tow goods and provide services. [EPA-HQ-OAR-2022-0829-0645, pp. 7-8]

5 See https://www.regulations.gov/document/EPA-HQ-OAR-2010-0162-0334 (last accessed June 27, 2023).

In this rulemaking, EPA proposes to cap the GCWR input to the work factor calculation at 22,000 lbs, citing concerns that chassis-dynamometer GHG testing does not capture GCWR-related loads directly and the higher CO_2 targets may generate windfall credits for high GCWR vehicle configurations. This proposed change by itself has the effect of increasing the stringency of the CO_2 targets. In one example case of a Class 3 diesel pickup with 42,000 lbs GCWR, the stringency of its 2027 CO_2 target would increase by 27% just due to GCWR being capped to 22,000 lbs, even though the CO_2 target coefficients themselves are not proposed to change for diesels in 2027. Additionally, the annual decrease in the "a" coefficient in the CO_2 targets after 2027 already has the effect of "flattening" the CO_2 vs. work factor relationship, lessening the recognition of towing capacity in the CO_2 targets. [EPA-HQ-OAR-2022-0829-0645, pp. 7-8]

Cummins does not agree with changing the WF by arbitrarily capping GCWR. For GHG certification, EPA's proposal would ignore the towing capacity of high GCWR vehicles, which is inconsistent with EPA's proposed criteria pollutant approach of treating high GCWR MDV as HD work vehicles due to their towing capacity. EPA's 2010 analysis found GCWR to be an important attribute in characterizing the work and CO_2 emissions of MDV and confirmed the linear nature of CO_2 vs. work factor well beyond the 5,500 lbs WF level EPA approximately associates with capping GCWR at 22,000 lbs. EPA's proposed change to work factor determination has not been accompanied by an updated analysis of current vehicles or any quantification of the expected windfall credits EPA is attempting to prevent. The MDV work factor should continue to account for high towing capacity in setting CO_2 targets. [EPA-HQ-OAR-2022-0829-0645, pp. 7-8]

Without changes to the proposed certification cycles and proposed work factor cap to better account for the real-world duty cycles and usage of high GCWR MDV, the issues highlighted above could lead to unintended outcomes. For example, if manufacturers are forced to limit ratings or towing capacity to meet the proposed standards, customers who need that towing capability to carry out their daily work may be inclined to keep older vehicles longer or to use larger trucks to do the same work, and the emissions reductions envisioned for the proposal would not be achieved. [EPA-HQ-OAR-2022-0829-0645, pp. 7-8]

IV. Emissions Useful Life and Warranty Periods

4. More representative MDV-specific emissions useful life and warranty periods are needed for criteria pollutants

Moving high GCWR MDV into the HD engine program would drastically increase the emissions useful life and emissions warranty periods for criteria pollutants compared to today's requirements. For example, for a high GCWR MDV diesel engine certified in the light heavy-duty (LHD) diesel engine primary intended service class, the emissions useful life would become 15 years / 270,000 miles / 13,000 hours (whichever occurs first) compared to 15 years / 150,000 miles today. Emissions warranty would become 10 years / 210,000 miles / 10,000 hours compared to 5 years / 50,000 miles today. Increases such as these could have significant impacts on development costs and leadtime due to longer testing associated with DF aging, OBD aging, and mechanical validation, as well as increasing component costs which manufacturers would pass on to the purchasers of these vehicles, but EPA has not provided any analysis to show the HD engine program requirements are appropriate for MDV operational life and applications. EPA should perform an analysis of MDV operational life, and if increases are justified, consider data-based MDV-specific emissions useful life and warranty periods. [EPA-HQ-OAR-2022-0829-0645, p. 8]

VI. Off-Cycle Standards and In-Use Testing

7. 2B-MAW emissions calculations need to be revised for high GCWR MDV since no engine CO2 FTP FCL will be available for GHG chassis-certification

If EPA finalizes mandatory engine-dynamometer certification of criteria pollutants for high-GCWR MDV, the engines will be subject to the off-cycle standards and in-use testing requirements of the HD engine program in 40 CFR Part 1036. HD off-cycle emissions testing uses the Two-Bin Moving Average Window (2B-MAW) protocol (or B-MAW for spark-ignition engines), which uses the engine CO2 FTP Family Certification Level (FCL) determined from engine-dynamometer GHG certification. The engine CO2 FTP FCL is used to normalize CO2 emissions for determining placement of windows into the appropriate bin and for calculating brake-specific emissions. Since high GCWR MDV will be chassis-dynamometer certified for GHG rather than engine-dynamometer certified, there will be no corresponding engine CO2 FTP FCL available to use in the 2B-MAW calculations. The 2B-MAW calculations will need to be revised for use on high GCWR MDV. As discussed next, Cummins recommends the use of engine broadcasted parameters, which EPA has separately proposed for off-cycle testing of engines using non-carbon- containing fuels, instead of determining an FCL outside of certification. [EPA-HQ-OAR-2022-0829-0645, pp. 9-10]

8. Manufacturers should be allowed to use engine broadcasted torque and speed to determine power in 2B-MAW calculations instead of using CO2 as a surrogate

In EPA's recent HD Phase 3 GHG proposal at 88 FR 26021 and in 40 CFR 1036.530(j), EPA is proposing that for off-cycle testing in the field on engines using at least one fuel that is not carbon-containing, manufacturers can use engine broadcasted speed and torque to calculate power in lieu of using CO2 as a surrogate for power. This is because for fuels other than carbon-containing fuels, there will be no fuel- related CO2 emissions to correlate to power. Cummins supports this same approach of using engine broadcasted parameters in lieu of CO2 for off-cycle testing of engines in high GCWR MDV. Although high GCWR MDV running on carbon-containing fuels would emit CO2, and a value analogous to the CO2 FTP FCL could be determined through means other than certification, Cummins shared confidential data with EPA in June 2020 showing inaccuracies between CO2 and power. CO2 does not always correlate well to power produced, such as when excess fuel is burned for thermal management, or for hybrid operation when the battery/motor assists the engine and less or no fuel is burned. Allowing the use of engine broadcasted speed and torque would eliminate the need to use the CO2 FTP FCL to normalize measured CO2 in the 2B-MAW calculations which are used for placing windows into bins and for determining the brake-specific emissions for a bin. The CO2 FTP FCL is not always representative of engine thermal efficiency on other duty cycles such as those encountered during off-cycle testing. Additionally, using the CO2 FTP FCL results in higher emissions calculated for more efficient duty cycles, which penalizes manufacturers with more efficient engines. Cummins supports the use of engine broadcasted parameters such as speed and torque to provide more accurate off-cycle emissions calculations. [EPA-HQ-OAR-2022-0829-0645, pp. 9-10]

Organization: Environmental. and Public Health Organizations (EPHO

3.EPA's proposed change to criteria pollution requirements for MDVs with a gross combined weight rating of more than 22,000 pounds is likely appropriate, but should be monitored for manipulation and efficacy. [EPA-HQ-OAR-2022-0829-0759, p. 77]

EPA is proposing to require that vehicles with a GCWR greater than 22,000 pounds be certified to the heavy-duty engine standards, rather than to the proposed MDV standards.212 EPA's logic here is sound: these vehicles' powertrains are often more powerful than the Class 4 and Class 5 vehicles in which related engines may be deployed, and they have a GCWR comparable to vehicles currently covered by the heavy-duty engine rules. [EPA-HQ-OAR-2022-0829-0759, p. 77]

212 88 Fed. Reg. at 29257.

Table VIII.B-1. Market share of MDVs above and below the 22,000-pound gross combined weight rating213[EPA-HQ-OAR-2022-0829-0759, p. 77]

[See original attachment for Table VIII.B-1.].

213 Taken from EPA OMEGA2 modeling inputs: vehicles_mdv_20230208.csv (MY 2020 MDV fleet).

MY 2020 data indicates that this change could require more than half of the MDV fleet to certify to the heavy-duty engine standards (Table VIII.B-1).214 Based on the emissions and warranty requirements for such engines, certifying the engines in these MDVs to such standards will likely yield emissions reductions at least as strong as if they were instead required to meet the proposed MDV standards. However, these standards apply solely to combustion engines and are not influenced by the share of deployed ZEVs. [EPA-HQ-OAR-2022-0829-0759, p. 78]

214 In the Proposal, EPA notes: "Based on an analysis of the MY 2022 and MY 2023 emissions certification data, most MDV complete and incomplete diesel pickup trucks would be required to switch to engine dynamometer certification; MY 2022 vans would not be required to use engine dynamometer certification; and only a small number of gasoline pickup trucks would be required to switch to engine certification." 88 Fed. Reg. at 29270. However, the data are not provided.

In contrast, ZEV deployment affects the required emissions reductions for medium-duty combustion vehicles with a GCWR less than or equal to 22,000 pounds, as illustrated above in Section VIII.B.1. It is possible that manufacturers could try to shift more of their sales to vehicles with a GCWR over 22,000 pounds in order to reduce the required improvements to their remaining combustion fleet. If this change is finalized, the Agency should monitor future data from the MDV and heavy-duty engine in-use testing program to assess the nature of any difference between the emissions performance of MDVs above and below the 22,000-pound GCWR, and should commit to releasing a report on its findings. [EPA-HQ-OAR-2022-0829-0759, p. 78]

Organization: MECA Clean Mobility

EPA should finalize provisions for all MD engines in MDVs with GCWR > 22,000 lbs to meet MY 2027 heavy-duty engine certification requirements, and compliance should be in accordance with the heavy-duty standards. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

MECA supports EPA's proposal that medium-duty engines in chassis certified medium duty vehicles (MDVs) should be required to meet the same requirements as those EPA finalized in December 2022 for MY 2027 and later heavy-duty engines. We agree with the agency that this is a viable way to address the current disparities between chassis and engine-based standards. [EPA-HQ-OAR-2022-0829-0564, pp. 24-25]

Results from the SwRI Heavy Duty Low NOx demonstration program, included diesel exhaust emission control components that were aged to current (435,000 miles) and future (650,000/750,000 miles) heavy heavy-duty durability requirements and then tested over several field duty cycles and in-use compliance results calculated with the new two bin moving average window (3B-MAW) methodology. Given durability requirements for the light heavy-duty classes are due to increase to 270,000 miles, the results from 435,000 mile aged heavy-heavy duty parts could be used to extrapolate for MY 2027 and later medium-duty engines. [EPA-HQ-OAR-2022-0829-0564, pp. 24-25]

Even in the short time since the latest emission control system was provided to SwRI for the demonstration program, improvements have continued to substrates and catalysts. For example, a recent paper published at the 2022 SAE WCX conference describes development of high-porosity honeycomb substrates with thinner wall thickness and high cell density that can be coated with SCR catalyst. The combination of developments on this substrate enables higher surface area and lower thermal mass, which improves coating efficiency, reduces catalyst heat-up time, and reduces pressure drop. These result in performance improvements that are especially prominent at low temperature operation. At engine exhaust temperatures of 175?, the NOx conversion efficiency improved by 14% compared to earlier generation substrates34 (Ido, et al., 2022). [EPA-HQ-OAR-2022-0829-0564, pp. 24-25]

34 Ido, Y., Kinoshita, K., Goto, C., Toyoshima, H., Hirose, S., Ohara, E., et al., SAE 2022-01-0550.

Catalyst suppliers have already developed a next generation of SCR catalysts with higher NOx reduction efficiency and better durability compared to the Stage 3 parts tested in the SwRI demonstration program. Through the use of sophisticated models that incorporate the latest learnings on both thermal and chemical aging effects, it is possible to project the gains in efficiency provided by these new materials. A similar methodology was used to that discussed in the MECA 2027 white paper, incorporating exhaust information from the latest engine calibration from SwRI and an optimized dosing calibration for the new downstream SCR catalyst. The catalysts were laboratory aged both thermally and chemically using sulfur containing simulated exhaust gas to represent 435,000 miles of equivalent engine aging. The catalysts were modeled over the FTP, RMC and LLC certification cycles and demonstrated lower emissions than the Stage 3 system at SwRI. The not yet published results suggest that the latest generation SCR catalyst would provide OEMs with additional margin to a 0.02 g/bhp-hr standard. [EPA-HQ-OAR-2022-0829-0564, pp. 24-25]

This example of continual improvement and optimization is a testament to the ongoing innovative technology development occurring in the industry between suppliers and their OEM customers. Each time a test is run, new information is obtained and applied to the next iteration. This has been going on continually over the past 15 years of advanced emission controls on trucks. In fact, over the life of the SwRI program, catalyst suppliers have deployed new catalyst formulations and coating techniques to continually improve the durability and performance of the SCR system in order to build greater compliance margin relative to the program targets. Our industry has seen a tremendous amount of innovation on both engines and aftertreatment since the U.S. 2010 on-road diesel standards were implemented. This learning has been applied to improve manufacturing and reduce variability that has allowed systems to be downsized by about 60% and reducing their costs by about 30%. [EPA-HQ-OAR-2022-0829-0564, pp. 24-25]

Organization: Stellantis

Also, vehicles over 22,000 lb. GCWR will be forced to certify on an engine dyno for criteria emissions. Because this is misaligned with California's ACC II LEV IV rules, it forces dual certification efforts, different hardware and uncertain impacts on GHG performance. Stellantis believes the 22,000 lb. GCWR proposed requirement should not be implemented for determination of criteria emissions standards, nor should it be used to alter the GHG stringency. To address EPA concerns, criteria emissions standards should be aligned with CARB's ACC II LEV IV rules instead. [EPA-HQ-OAR-2022-0829-0678, p. 19]

<u>EPA Summary and Response</u>

<u>Summary:</u>

CARB, MECA, and EPHO were supportive of the proposal to move high GCWR MDV to engine-certification. CARB found engine dynamometer certification to be a more robust methodology for determining high GCWR MDV compliance. MECA agreed with the Agency's proposal that such an approach would "…address the current disparities between chassis and engine-based standards." EPHO characterized the proposed requirement for engine-certification of high-GCWR MDV as "...likely appropriate, but should be monitored for manipulation and efficacy." EPHO also asked the Agency to monitor future data from MDV and from the heavy-duty engine in-use testing program in order to assess emissions differences between high-GCWR MDVs and other MDVs, and requested that the Agency commit to releasing a report on any pertinent findings.

The Alliance, Cummins, and Stellantis were all opposed to the Agency proposal to move high GCWR MDV to engine-certification. The Alliance specifically supported high GCWR MDV Option 2 from the proposal and further requested alignment of Federal OBD requirements for OBD with California OBD requirements. Cummins specifically supported high GCWR MDV "Option 3" from the proposal and stated that EPA would "…need to do additional work to determine proposed chassis-certification standards appropriate for high GCWR MDV." Stellantis asked that Agency concerns regarding high GCWR criteria pollutant emissions be addressed via alignment with California ACC II LEV IV standards.

Response:

In response to comments received from the Alliance, Cummins, and Stellantis, the Agency did not finalize the proposed requirements for high GCWR MDV engine certification. Upon further consideration of the public comments, EPA agrees with the Alliance that our specific concerns regarding high GCWR MDV emissions at high loads would be fully addressed by finalizing high GCWR MDV Alternative 2:

- MDV above 22,000 pounds GCWR would comply with the MDV chassis dynamometer standards with additional in-use testing and standards comparable to those used within the California ACC II.

The agency has finalized in-use moving average window standards for high-GCWR MDV (see Section III.D.5 of the preamble). The agency will also allow manufacturers to engine-certify high GCWR MDV as an option. We believe that this is also partially responsive to the request from Stellantis for alignment with ACC II LEV IV standards. The Agency has received numerous comments from both light-duty and MDV manufacturers requesting wholesale adoption of California ACC II LEV IV criteria pollutant emissions standards. As stated elsewhere in Sections 3 and 4 of the RTC, EPA is not finalizing a wholesale adoption of the California ACC II LEV IV program. The ACC II program includes synergistic elements for both greenhouse gas and criteria pollutant emissions, with the foundation of the ACC II program being a ZEV mandate. Stellantis did not recommend adopting the ZEV mandate provisions of ACC II and instead seems to recommend that EPA only adopt the criteria pollutant elements of ACC II. This a la carte approach to emissions standards fails to consider the synergistic nature of California's ACC II program. The treatment of ICE-based vehicles under ACC II is premised on an increasing penetration of ZEVs and their associated emission reductions. EPA's 2027 and later MDV program, being performance-based for both GHG and criteria pollutant emissions, relies on increasingly stringent performance-based standards to achieve emissions reductions. EPA is, however, finalizing additional provisions in the FRM which are responsive to Stellantis and Cummins requests for greater alignment with ACC II. These include:

- Alignment with all ACC II MDV NMOG+NO_X emissions bins at or below Bin 170 (see Section III.D.2.i of the preamble);
- Adoption of in-use standards for high GCWR MDV comparable to California ACC II in-use standards for MDV above 14,000 pounds GCWR (see Section III.D.5 of the preamble);
- Alignment with California MDV OBD (see Section III.H of the preamble).

With respect to Cummins concerns regarding the appropriateness of the proposed chassis-certification standards high GCWR MDV, our understanding of Cummins's concern is that it refers to high GCWR MDV with compression-ignition (diesel) engines in MDV pickup trucks, since these are applications for which Cummins holds certificates of conformity. As discussed within Chapter 3.2.5 of the RIA, the final standards are feasible for high GCWR MDV, including MDV pickup trucks and other MDVs using compression ignition engines. The following factors all play a role in the Agency's determination that the $NMOG+NO_X$ and other criteria pollutant standards are feasible for high GCWR MDV with compression ignition engines:

- 75% of diesel MDV engine families are certifying to $NMOG+NO_X$ emissions below 160 mg/mi, with median $NMOG+NO_X$ emissions below 140 mg/mi.
- MDV diesels can adopt dual-SCR NO_X emission control systems, passive thermal management, and active thermal management comparable to those under development for Class 4/light-heavy-duty compression-ignition applications (see Chapter 3.2.5 of the RIA), which would result in $NMOG+NO_x$ emissions comparable to spark-ignition MDV.
- The Agency has finalized NMOG+ NO_X fleet average standards that are less stringent than originally proposed (see Section III.D.2.iv of the preamble) and that allow an additional year of lead time compared to the proposal (see Section III.D.2.ii of the preamble).
- The NMOG+ NO_X standards are fleet average performance-based standards that can be met through various control technologies, including technologies applicable to spark-ignition and compression ignition vehicles, and BEV MDV. Our analysis projects BEV MDV sales of approximately 30% in 2031 and 32% in 2032 (see Chapter 12.2.3 of the RIA).
- The Agency has finalized a regulatory schedule that includes additional lead time for compliance with MDV NMOG+ NO_X fleet average standards (see Section III.D.2.ii of the preamble).
- The Agency has finalized a flexibility to allow vehicle manufacturers to transfer credits earned on BEV MDPVs to their MDV compliance.
- The Agency has finalized optional engine-certification for high GCWR MDVs (see Section III.D.5.iv of the preamble).

With respect to Cummins's preference for Alternative 3, within the proposed rule the Agency requested comment on three alternatives to high GCWR MDV engine-certification:

1. MDV above 22,000 pounds GCWR would comply with the MDV chassis dynamometer standards with the introduction of additional engine-dynamometer-based standards over the Supplemental Emissions Test as finalized within the Heavy-duty 2027 and later standards;
2. MDV above 22,000 pounds GCWR would comply with the MDV chassis dynamometer standards with additional in-use testing and standards comparable to those used within the California ACC II;
3. Introduction of other test procedures for demonstration of effective criteria pollutant emissions control under the sustained high-load conditions encountered during operation above 22,000 pounds GCWR.

The intent of requesting comment on Alternative 3 was to provide an opportunity for stakeholders to comment on specific test procedures that could address the Agency's stated concerns regarding high levels of in-use emissions during operation that included heavy-trailer towing and other sustained high-load conditions encountered during operation above 22,000 pounds GCWR. While stating a preference for Alternative 3, Cummins did not provide any specific recommendations for test procedures and/or standards that would demonstrate effective criterial pollutant emissions control under the sustained high-load conditions encountered during operation above 22,000 pounds GCWR.

6.5 - Durability test requirements for certification

EPA addresses comments related to durability test requirements for certification in Sections 4.13 and 4.2.3 of this document.

6.6 – Test fuel for PM measurement

Comments by Organizations

Organization: Alliance for Automotive Innovation

8. Emissions Certification Fuel

U.S. emissions certification fuel was designed to represent market fuel characteristics. On this basis, there is justification to adjust the composition of certification fuel today to reduce its PM-forming tendency. [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

EPA recognizes that U.S. market fuels have slowly been improving in their tendency to form PM since the Tier 3 regulations were enacted and the Tier 3 emissions certification fuel was defined.443 [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

443 NPRM Figures 40 at 29399 and Figure 42 at 29401.

[See original for graph titled “Figure 91: PM Index distribution in U.S. gasoline in 2008-12 and 2021-22 (NPRM Figure 42)”] [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

Figure 42 of the NPRM (shown above) indicates the median PMI of U.S. gasoline was approximately 1.5-1.6 in 2021-2022, whereas EPA notes in the NPRM that Tier 3 certification fuel is expected to have a PMI of 1.6-1.7. In practice, Tier 3 regular grade certification fuels from the two major certification fuel suppliers in the U.S. generally have PMI values in the range of 1.48. to 2.58 for Tier 3 regular grade, as shown in Figure 92. [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

Figure 92: Tier 3 Regular Grade Certification Gasoline [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

Tier 3 Regular Grade Certification Gasoline

Average Min Max

Mfr A 1.90 1.48 2.26

Mfr B 2.19 2.05 2.58

Mfr C 2.10 2.10 2.10

Totals 2.03 1.48 2.58 [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

In addition, survey of U.S. market E10 gasoline in 2018/2019 found the following PMI values:444 [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

444 EPA-420-R-23-008 Figure 2.1 and 2.2

Figure 93: 2018 and 2019 Summer Market Gasoline PMI

PMI average Regular E10 Premium E10

2018 Market - Summer 1.65 1.55

2019 Market - Summer 1.44 1.51 [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

The study also showed that the aromatics in U.S. market fuels have lower C10+ content as compared to the requirements in Tier 3 certification fuels:

Figure 94: Aromatic Content of U.S. Market Fuels versus Tier 3 Certification Fuels [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

Tier 3 RUL Spec. Tier 3 PUL Spec. 2018/29

Aromatics, volume%, max Mean (Vol%)

C6 Aromatics (Benzene) 0.5-0.7 0.5-0.7 no data

C7 Aromatics (Toluene) 5.2-6.4 5.2-6.4 6.2

C8 5.2-6.4 5.2-6.4 7.4

C9 5.2-6.4 5.2-6.4 5.5

C10 4.4-5.6 4.4-5.6 2.7

C10+ 4.4-5.6 4.4-5.6 1.3 [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

Based on this, we suggest a revision of Tier 3 certification fuel specifications to reduce the C10+ aromatics content to a range of 3.2 to 4.2 vol% (from the current 4.4-5.6 vol %) to be more representative of U.S. market fuel. [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

After discussing a potential market fuel rulemaking around PM formation tendency, EPA notes that “Depending on the level of a potential limit on heavy material or PMI, the specifications for certification gasoline may or may not need to be adjusted.”445 We agree that any regulation to reduce heavy aromatics in market gasoline should be preceded by or accompanied by an updating of the specification for emissions certification gasoline that yields a lower PM-forming tendency. The rationale for lowering the PM forming tendency before the market fuel rulemaking is that the new vehicles certified with this fuel will be on the road for the next 10-20 years and will see that new market fuel over the majority of their useful life. [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

445 NPRM at 29401

As part of this NPRM, EPA should adjust Tier 3 certification fuel specifications to align with current market fuel composition and enable fuel suppliers to target a PMI value in the range of 1.5-1.6. This can be accomplished by reducing the C10 and higher aromatics specification. We would be happy to work with EPA to determine a set of specifications for Tier 3 certification fuel that is consistent with market fuel composition, certification fuel supplier blending practices, and EPA's intentions prior to issuing a final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 271-273]

EPA Summary and Response

Summary:

Comments from the Alliance for Automotive Innovation describe a mismatch between the PM Index values of market fuel and Tier 3 test (or cert) fuel and provide data on the ranges found in recent market fuel and cert fuel samples. They suggest EPA should adjust the heavy aromatics specifications for cert fuel to better align with market fuel (which has shifted since the specs for Tier 3 cert fuel were originally set).

Response:

We appreciate presentation of the fuel property data and recognize that the average PM Index of market fuel has shifted downward since the Tier 3 rulemaking was finalized. However, we believe that a test fuel with market-representative PM Index can still be produced within the existing specs, so we did not propose revisions and thus are not revising them at this time. As described in the NPRM, we are continuing to assess options for a heavy aromatics standard for market fuel, a potential future action that would provide another opportunity to adjust cert fuel specs.

6.7 – Class 3 test cycle

Comments by Organizations

Organization: Mercedes-Benz AG

EPA should also adopt the test cycles promulgated by ACCII LEV IV for the US06 Bag 2 and UDC cycle for heavier Class 3 vehicles. These test cycles are better aligned with how these vehicles are driven in the real world and will provide additional emissions reductions. [EPA-HQ-OAR-2022-0829-0623, p. 19]

EPA Summary and Response

Response:

The -7°C FTP test cycle is crucial to the final PM standard for MDV including Class 3 vehicles because it addresses uncontrolled cold PM emissions in Tier 3. As EPA explains in preamble Section III, there exists technology (e.g., MY 2022 GPF) that can achieve significant PM reductions in a wide range of operating conditions, including in cold conditions. The -7°C FTP test assures that MDVs are actually achieving these feasible emissions reductions across a wide range of operating conditions, including in cold conditions.

The full US06 cycle is a similarly crucial part of the PM standard. High load operation, which is common on MDVs, induces passive GPF regeneration and GPF regeneration can cause elevated emissions. As EPA explains in preamble Section III, there exists technology (e.g., MY 2022 GPF) that can achieve significant PM reductions notwithstanding high load operation and GPF regeneration. The US06 cycle results in GPF regeneration across different vehicle-GPF combinations, and it thus assures that MDVs are achieving feasible emissions reductions notwithstanding high load operation and GPF regeneration. The LA-92 usually does not induce GPF regeneration, and for this reason the US06 cycle is required for all light-duty vehicles and MDV in the final PM standard. Section III.D.3.iii of the preamble shows measurements indicating that the LA-92 does not cause substantial regeneration of an underfloor GPF on a Class 3 test vehicle.

Class 2b vehicles with power-to-weight ratios at or below 0.024 hp/pound will no longer replace the full US06 component of the SFTP with the second of three phases of the US06 for PM certification. Class 2b vehicles with low power-to-weight ratios will now use the full US06 test cycle. If a vehicle is unable to follow the trace, it should use maximum accelerator command to follow the trace as best it can, and doing so will not result in a voided test. This procedure mimics how vehicles with low power-to-weight tend to be driven in the real world.

7 - Regulatory amendments/additional changes to the regulatory language

7.1 – Voiding certificates and recall

<u>Comments by Organizations</u>

Organization: Alliance for Automotive Innovation

4. GHG IUVP / IUCP

a) Lack of Legal Authority for Certification Enforcement Programs and In-Use Remedies

Separate from the proposed MY 2027 and later multi-pollutant emissions standards, the NPRM proposes extensive and significant revisions to EPA's regulations used to enforce vehicle certification requirements and in-use standards. The NPRM sometimes does not even appear to recognize the significance of the substantive changes it would make to the current regulations and instead purports to merely "clarify" current regulations or restate the Agency's "understanding" of its authority.345 Those changes would expand EPA's current regulatory provisions for use of the void-ab-initio sanction from circumstances that generally involve intentional or reckless noncompliance to nearly any type of noncompliance, including situations involving good-faith error or honest disagreement about how to apply "good engineering judgment" in a specific technical context.346 [EPA-HQ-OAR-2022-0829-0701, pp. 232-234]

345 See, e.g., 88 Fed. Reg. 29184, 29,197, 29289 (May 5, 2023).

346 Auto Innovators does not believe that EPA has adequately explained why these changes are necessary. Section 307(d) of the Clean Air Act requires EPA to provide "a statement of its basis and purpose" for new or revised regulations. 42 U.S.C. § 7607(d)(3). More exacting than the Administrative Procedure Act, section 307(d) "requires EPA to give a detailed explanation of its reasoning at the 'proposed rule' stage" as

well as in the preamble of a final rule. Small Refiner Lead Phase-Down Task Force v. EPA, 705 F.2d 506, 519 (D.C. Cir. 1983); see also Ne. Md. Waste Disposal Auth. v. EPA, 358 F.3d 936, 949 (D.C. Cir. 2004) (apart from section 307(d), EPA is also expected to "satisfy the fundamental requirement of nonarbitrary administrative decisionmaking: that an agency set forth the reasons for its actions"); Ctr. for Biological Diversity v. EPA, 722 F.3d 401, 412 (D.C. Cir. 2013). In particular, Section 307(d) requires that the NPRM provide "the major legal interpretations and policy considerations underlying the proposed rule." 42 U.S.C. § 7607(d)(3)(A), (C). Failure to provide such a rationale thwarts full and effective public participation in the rulemaking and will trigger remand and possibly vacatur. See, e.g., Ne. Md. Waste Disposal Auth., 358 F.3d at 950.

i). Current Certification Enforcement Regulations

The proposal marks a significant change from the way EPA has historically handled certification enforcement. Congress established the basic framework for enforcing EPA's certification regulations almost 40 years ago. The 1970 Clean Air Amendments required new-vehicle certification of compliance with the emissions standards contained either in those Amendments or to be established by EPA, replacing prior provisions for voluntary certification of compliance with emissions limits.347 EPA sought to assist the auto industry in the transition from an earlier voluntary certification program to mandatory testing and certification by issuing "conditional" certificates of conformity, contingent on the successful completion of all required testing.348 In the same early days of implementing the 1970 Amendments the EPA General Counsel recommended that "vehicle[s] that did not conform to [the] description [in a certification application] would be considered uncertified."349 [EPA-HQ-OAR-2022-0829-0701, pp. 232-234]

347 See Pub. L. No. 91-604, §§ 7-8, 84 Stat. 1676, 1693-96 (prohibiting, among other things, distribution or sale of new motor vehicles "unless such vehicle[s] … [are] covered by a certificate of conformity" and authorizing EPA to issue such certificates based on a review of manufacturers' applications and on test results).

348 See 48 Fed. Reg. 33456, 33459 (July 21, 1983) (recounting issuance of conditional certificates in early years of post-1970 program "in an effort to avoid delays in product introduction dates where durability testing would not be completed on schedule").

349 EPA offce of Gen. Couns., 1 A Collection of Legal Opinions: December 1970 - December 1973 185 (1973).

EPA also took steps to ensure compliance with the Agency's nascent certification program. Early EPA regulations provided that the Agency would "deem void ab initio a certificate issued in reliance on information or data submitted by the manufacturer and known by him to be false, incomplete, inaccurate, or invalid."350 Failure to permit inspection of test facilities and records would likewise provide a basis to revoke or suspend a certificate ab initio, as would any action by a manufacturer that "render[ed] inaccurate or invalid any test data … or otherwise circumvent[ed] the intent of the [Clean Air] Act or of this subpart" of EPA's regulations, i.e., its new-vehicle regulations.351 In other cases in which certificates were to be suspended or revoked, the certification regulations provided that the suspension or revocation was to "[e]xtend no further than to forbid the introduction into commerce of vehicles previously covered by the certification which are still in the hands of the manufacturer."352 [EPA-HQ-OAR-2022-0829-0701, pp. 232-234]

350 39 Fed. Reg. 7545, 7545 (Feb. 27, 1974).

351 Id. at 7568.

352 Id. at 7551; see also 40 Fed. Reg. 27590, 27610 (June 30, 1975).

The early rulemakings never explained the origin or basis for EPA's claimed authority to suspend or revoke certificates ab initio—despite the requirements of section 307(d) and bedrock principles of administrative procedure.353 Indeed, it could not have done; such a claim is foreclosed by the text of the Clean Air Act. Section 206, as enacted in 1970 and today, provides that a certificate of conformity has a limited duration ("not in excess of one year"354), and the sole relevant purpose of the certificate is to permit the initial transaction in a vehicle or engine by the manufacturer with another person.355 Congress made no provision for suspending, revoking or voiding a certificate after it has served their purpose. [EPA-HQ-OAR-2022-0829-0701, pp. 232-234]

353 The 1973-1974 rulemaking includes in the final rule preamble a discussion of EPA's claimed authority to suspend or revoke certificates, see 39 Fed. Reg. at 7545-48, but nothing specific on suspension or revocation of certificates ab initio.

354 42 U.S.C. § 7525(a)(1).

355 See id. § 7522(a)(1).

Later revisions to the certification enforcement regulations neither provided an adequate rationale for certificate action reaching back past the year in which the certificate was effective, nor expanded the general circumstances under which EPA claimed authority to void certificates ab initio (with one exception noted below). That said, when EPA has adopted the void-ab-initio enforcement mechanism, the Agency has usually also indicated that its use would be limited to unusual, "egregious" situations.356 In addition, EPA's GHG regulations make the void-ab-initio sanction available when a manufacturer fails to cover a GHG fleet-average emissions deficit in the manner permitted by the regulations.357 [EPA-HQ-OAR-2022-0829-0701, pp. 232-234]

356 See, e.g., 63 Fed. Reg., 926, 960 (Jan. 7, 1998) (stating in preamble to National Low-Emission Vehicle proposed rule that for violations of record-keeping and reporting requirements, "EPA would only void a certificate ab initio for the most egregious … violations, where a manufacturer's records or reporting are so substantially incomplete that EPA cannot determine compliance with the fleet average NMOG standard or other requirements").

357 See, e.g., 40 C.F.R. § 86.1865-12(k)(7)(ii). In such a situation, a manufacturer would have had to decide not to comply with any of section 86.1865(k)'s provisions for covering shortfalls. Similar provisions had been included in earlier rulemakings for programs that permitted or required fleet averaging to demonstrate compliance with emissions standards, or that relied upon the phase-in on a multi-model-year basis of new or increasingly stringent emissions standards. For example, in the program for control of PM emissions from MY 1985 and later light-duty diesel vehicles, EPA's regulations provided for the voluntary use of fleet averaging to demonstrate compliance, which could be enforced (according to EPA) by voiding the certificates ab initio of vehicles that triggered noncompliance with fleet-average standards. See 48 Fed. Reg. at 33456, 33460; see also 54 Fed. Reg. 14426, 14490 (Apr. 11, 1989) (similar provision for "NOx averaging program" for methanol-fueled vehicles); 57 Fed. Reg. 31888, 31890 (July 17, 1992) (similar provision for phase-in of cold CO standards under the 1990 Clean Air Act Amendments); 56 Fed. Reg. 25724, 25734 (June 5, 1991) (similar provision for phase-in of "Tier 1" exhaust emissions standards under the 1990 Amendments); 65 Fed. Reg. 6698, 6714 (Feb. 10, 2000) (similar provision for "Tier 2" emissions standards).

Perhaps the closest that EPA came to offering a rationale for its claimed authority to void certificates ab initio occurred in the 1991 rulemaking to implement the "Tier 1" standards. There, the Agency maintained that "such actions are authorized where, pursuant to EPA's authority under Section 206(a) of the Act to condition certificates upon such terms as the Administrator ‘may prescribe’, EPA has placed a condition in the certificate.”358 Of course, accepting the general notion that the Agency can include some conditions in a certification of conformity does itself not provide a basis for placing arbitrary or capricious conditions on certification, nor does that proposition support a rule that is contrary to the text and structure of sections 203 and 206 of the Clean Air Act. [EPA-HQ-OAR-2022-0829-0701, pp. 232-234]

358 56 Fed. Reg. at 25734.

During the CAP 2000 rulemaking, EPA explained in its notice of proposed rulemaking its intended approach to an “explicit requirement that manufacturers exercise good engineering judgment in making decisions under the [CAP 2000] regulations” as follows: [EPA-HQ-OAR-2022-0829-0701, pp. 234-247]

Failure to apply good engineering judgment may result in EPA overruling the manufacturer’s decision. As long as manufacturers do not deliberately overlook information, use incorrect information, or make decisions without using a rational decision process, EPA is limiting the consequences of making incorrect good engineering judgments to future corresponding decisions. Also, the Agency is proposing that such overruled decisions be applied as soon as practicable. … The Agency is proposing harsher remedies for intentional and deliberate acts or decisions made without a rational basis. Intentional disregard for good engineering judgment could result in voiding certificates ab initio, with provisions for an administrative hearing, in addition to any civil or criminal enforcement actions which may result.359 [EPA-HQ-OAR-2022-0829-0701, pp. 234-247]

359 Control of Air Pollution From New Motor Vehicles; Compliance Programs for New Light-Duty Vehicles and Light- Duty Trucks, Notice of Proposed Rulemaking, 63 Fed. Reg. 39654, 39678 (July 23, 1998).

The CAP 2000 final rule followed through on the Agency’s stated intent in new section 86.1850- 01 of the certification regulations: [EPA-HQ-OAR-2022-0829-0701, pp. 234-247]

§ 86.1851-01 Application of good engineering judgment to manufacturers’ decisions.

(a) The manufacturer shall exercise good engineering judgment in making all decisions called for under this subpart, including but not limited to selections, categorizations, determinations, and applications of the requirements of the subpart.

(b) Upon written request by the Administrator, the manufacturer shall provide within 15 working days (or such longer period as may be allowed by the Administrator) a written description of the engineering judgment in question.

(c) The Administrator may reject any such decision by a manufacturer if it is not based on good engineering judgment, or is otherwise inconsistent with the requirements of this subpart.

(d) If the Administrator rejects a decision by a manufacturer with respect to the exercise of good engineering judgment, the following provisions shall apply:

(1) If the Administrator determines that incorrect information was deliberately used in the decision process, that important information was deliberately overlooked, that the decision was not made in good faith, or that the decision was not made with a rational basis, the Administrator may suspend or void ab initio a certificate of conformity.

(2) If the Administrator determines that the manufacturer's decision does not meet the provisions of paragraph(d)(1) of this section, but that a different decision would reflect a better exercise of good engineering judgment, then the Administrator will notify the manufacturer of this concern and the basis thereof.

(i) The manufacturer shall have at least 30 days to respond to this notice. The Administrator may extend this response period upon request from the manufacturer if it is necessary to generate additional data for the manufacturer's response.

(ii) The Administrator shall make the final ruling after considering the information provided by the manufacturer during the response period. If the Administrator determines that the manufacturer's decision was not made using good engineering judgment, he/she may reject that decision and apply the new ruling to future corresponding decisions as soon as practicable.

(e) The Administrator shall notify the manufacturer in writing regarding any decision reached under paragraph (d)(1) or (2) of this section. The Administrator shall include in this notification the basis for reaching the determination.360

360 Control of Air Pollution From New Motor Vehicles; Compliance Programs for New Light-Duty Vehicles and Light- Duty Trucks, 64 Fed. Reg. 23906. 23971 (May 4, 1999) (emphasis added).

Thus, as indicated in the italicized text, the regulations provide for voiding a certificate of conformity ab initio only when "important information was deliberately overlooked," or a decision "was not made in good faith" or lacked "a rational basis."361 By contrast, when EPA concludes through a final ruling only that "a different decision would reflect a better exercise of good engineering judgment," its ruling takes effect in "future corresponding decisions as soon as practicable," with no effect on a current certificate.362 [EPA-HQ-OAR-2022-0829-0701, pp. 234-247]

361 40 C.F.R. § 86.1851-01(d)(1).

362 Id. § 86.1851-01(d)(2)(ii).

In sum, EPA's prior regulations have generally recognized a distinction between willful or reckless error and misconduct (which can trigger ab initio voiding of certificates of conformity), and good-faith error or honest disagreement (which cannot). While the Agency has never provided a plausible rationale for any retroactive impacts on existing certificates, or explained how such an approach is consistent with sections 203 and 206, at least it adopted a bright- line rule that cabined the void-ab-initio sanction to a limited category of cases.363 [EPA-HQ-OAR-2022-0829-0701, pp. 234-247]

363 Failure to comply with fleet average standards and phase-in requirements, which could trigger the retroactive voiding of certificates for vehicles whose sale caused the exceedances (and not entire engine families or test groups), did not fit the general model, as such exceedances could have resulted from honest error. But such violations could easily be identified and were not likely to be in dispute. Up until the current rulemaking for MY 2027 and later vehicles, only those easily identified violations of conditions of certification, or acts or omissions involving scienter or recklessness, fell into the general category of conditions of certification that could lead to the voiding of certificates ab initio.

ii) The Proposed Revisions to the Certification Enforcement Regulations

The existing panoply of conditions for issuing new-vehicle certificates of conformity are contained in 40 C.F.R. §86.1848-10(c). Under the current version of section 86.1848-10(c), the only certificate conditions that can be enforced by deeming vehicles "not ... covered by the certificate" are those requiring (i) compliance with sales-based implementation schedules or fleet-average and phase-in regulations; 364 (ii) compliance with in-use testing and reporting requirements; 365 and (iii) conformity "in all material respects" with the contents of the certification application. 366 The NPRM here proposes to make failure to comply with any of the conditions listed in section 86.1848-10(c)-including run-of-the-mill failures to meet in-use emissions standards, a basis for determining that "any affected vehicles are not covered by the certificate" that authorized their introduction into commerce. 367 As a result, any such failure to comply with in-use standards, even by vehicles that would not be subject to recall under CAA section 207(c)(1), would create per-vehicle penalty liability. 368 [EPA-HQ-OAR-2022-0829-0701, pp. 237-239]

363 Failure to comply with fleet average standards and phase-in requirements, which could trigger the retroactive voiding of certificates for vehicles whose sale caused the exceedances (and not entire engine families or test groups), did not fit the general model, as such exceedances could have resulted from honest error. But such violations could easily be identified and were not likely to be in dispute. Up until the current rulemaking for MY 2027 and later vehicles, only those easily identified violations of conditions of certification, or acts or omissions involving scienter or recklessness, fell into the general category of conditions of certification that could lead to the voiding of certificates ab initio.

364 40 C.F.R. § 86.1848-10(c)(3), (7), (8), (9).

365 See id. § 86.1848-10(c)(5)).

366 See id. § 86.1848-10(c)(6)).

367 NPRM at 29434. Each of the proposed revisions to section 86.1848-10(c), and those to 40 C.F.R § 86.1850-01 identified in the next paragraph of these comments, is conveniently shown in what EPA staff calls a “Redline Version” of all the proposed changes in regulatory text in the NPRM placed on the docket by EPA. See EPA-HQ- OAR-2022-0829-0314 at 1, 91-96.

368 As explained elsewhere in these comments, the statute limits mandatory recall to situations in which a substantial number of vehicles in a properly defined class or category do not conform with EPA’s regulations and can be brought into compliance by repair.

The NPRM also proposes three important changes in current section 86.1850-01. First, it would delete the requirement in section 86.1850-01 that only "substantial" infractions of regulations can trigger suspension or revocation of a certificate, 369 Second, it would delete the current provision in section 86.1850-01 providing that in the absence of willful or reckless error, "[a]ny suspension or revocation of a certificate of conformity shall extend no further than to forbid the introduction into commerce of vehicles previously covered by the certificate which are still in the possession of the manufacturer.”370 Third, it would add to section 86.1850-01 a provision giving EPA authority to “void” ab initio, as well as to suspend or revoke, certificates of conformity.371 The upshot of all this would be that any infraction of the certification regulation could result in per-vehicle penalties, no matter how insubstantial.372 [EPA-HQ-OAR-2022-0829-0701, pp. 237-239]

369 See 88 Fed. Reg. at 29435.

370 40 C.F.R. § 86.1850-01(f).

371 See 88 Fed. Reg. at 29435; see also 40 C.F.R. § 1068.30 (“void” means “to invalidate a certificate ... ab initio”).

372 This, of course, assumes that EPA’s theory of CAA section 203(a)(1) penalty liability based on retroactive invalidation is credible.

The NPRM’s explanation for these proposed changes in sections 86.1848-10 and 86.1850-01 appears in a single paragraph in the NPRM, which melds discussion of the enforcement of fleet-average GHG requirements with other topics: [EPA-HQ-OAR-2022-0829-0701, pp. 237-239]

The overarching principle of compliance to the fleet average standards is that the calculated fleet average in the GHG report must accurately represent the actual fleet of vehicles a manufacture produced. If a manufacturer provides false, inaccurate, or unrepresentative data as part of their GHG report, the manufacturer may be subject to enforcement and EPA may void ab initio the certificates of conformity which relied on that data. Vehicles are covered by a certificate of conformity only if they are in all material respects as described in the manufacturer’s application for certification (Part I and Part II) including the GHG report. If vehicles generate substantially more CO2 emissions in actual use than what was reported, those vehicles are not covered by the certificate of conformity. EPA is proposing two changes to the regulatory language that are designed to clarify the Agency’s understanding of its authority to void certificates and/or find that vehicles were sold in violation of a condition of a certificate. Currently 40 CFR 86.1850 states that if a manufacturer submits false or incomplete information or renders inaccurate any test data which it submits, or fails to make a good engineering judgment, EPA may deny issuance of, suspend, or revoke a previously issued certificate of conformity. However, suspension or revocation of a certificate of conformity shall extend no further than to forbid the introduction into commerce of vehicles previously covered by the certificate which are still in the possession of the manufacturer. Since the GHG report is not required to be submitted until May 1 of the calendar year after the model year has ended, suspending or revoking a certificate is no longer a relevant remedy. Therefore, because of situations where certificate suspension or revocation is no longer relevant, EPA is proposing to allow the Agency to void ab initio a previously issued certificate of conformity in the list of possible actions the agency may take if a manufacturer commits any of the infractions listed in 40 CFR 86.1850(b). In addition, EPA is proposing edits to 40 CFR 86.1848 to make it clearer that any vehicles sold that fail to meet any condition upon which the certificate was issued are not covered by the certificate and thus were sold in violation of CAA 203(a)(1).373 [EPA-HQ-OAR-2022-0829-0701, pp. 237-239]

373 NPRM at 29289 (emphasis added).

This purported justification is objectionable on several fronts. First, the Agency's explanation does not even correctly identify the actual regulatory changes wrought by the proposed regulation. For instance, it states that the submission of "unrepresentative data" may be a ground for voiding a certificate, even though the proposed regulation itself only mentions "false" or "inaccurate" data. The submission of "unrepresentative" data is not covered by the regulations for enforcement or reporting of GHG fleet-average performance, and the NPRM does not define what the term means, apart from "inaccurate." In any event, statements in preambles cannot be used to alter the meaning of clear regulations. 374 [EPA-HQ-OAR-2022-0829-0701, pp. 237-239]

374 See, e.g., Natl. Wildlife Fed’n v. EPA, 286 F.3d 554, 569-70 (D.C. Cir. 2002) (preambles cannot “enlarge or confer powers on administrative agencies or offcers”).

Second, the timing of GHG reports provides no genuine basis for the Agency to expand the role of the void-ab-initio remedy. That a GHG report is not required until after the end of a model year is nothing new or unique to MY 2027 and later GHG regulations. If the timing of GHG reports were a valid rationale for voiding certificates ab initio, the rationale would have applied to any of the prior GHG regulations and EPA presents no concrete evidence of any newly emergent problems occasioned by the timing of a GHG report. In all events, the timing of a GHG report does not provide a rational basis for expanding section 86.1850-01's use of voiding- ab-initio to cover "any of the infractions listed in 40 CFR 86.1850 (b)."375 The NPRM provides no reason why good-faith differences between a manufacturer and EPA should not be remedied prospectively, without per-vehicle penalty liability. Prospective remedies are particularly appropriate in that context because EPA has offered no useful general definition of what it would consider to be "good engineering judgment." The definition of the term in Part 1068 refers generally to "judgments made consistent with generally accepted scientific and engineering principles and all available relevant information."376 Except in cases of willful error or recklessness, it is impossible to imagine a priori a decision on an engineering issue that would not meet that standard. Tellingly, the NRPM offers no examples of emerging problems with the current program that need to be addressed. It is black-letter administrative law that regulated parties must have “fair warning of [EPA’s] interpretation of [its] regulations.”377 The NRPM falls far short of complying with that principle. [EPA-HQ-OAR-2022-0829-0701, pp. 239-240]

375 NPRM at 29289 (emphasis added).

376 40 C.F.R. § 1068.30.

377 Gen. Elec. Co. v. EPA, 53 F.3d 1324, 1333 (D.C. Cir. 1995); accord United States v. Chrysler Corp., 158 F.3d 1350, 1354 (D.C. Cir. 1998); cf. Morton v. Ruiz, 415 U.S. 199, 231-33 (1974) (one purpose of the APA is “to avoid … inherently arbitrary … unpublished ad hoc determinations” of rights and duties); see also Ethyl Corp. v. EPA, 306 F.3d 1144, 1148-49 (D.C. Cir. 2002) (EPA failed to properly exercise its rulemaking authority in section 206(d) by establishing a framework to determine regulatory compliance rather than specific methods to determine compliance).

Third, the NPRM's one-sentence assertion that the proposed changes in section 86.1848-10 are merely designed to make the existing regulation "clearer" is wholly unconvincing. Unlike the current text of section 86.1848-10, the new text would provide that "any vehicles sold that fail to meet any condition upon which the certificate was issued are not covered by the certificate," as the NPRM preamble itself concedes. 378 In failing to even recognize that it is proposing a substantive change in section 86.1848-10, the NPRM surely fails to justify that proposed change. [EPA-HQ-OAR-2022-0829-0701, pp. 240-241]

378 NPRM at 29289.

The NPRM's failure to set forth a plausible rationale for the proposed changes to the certification enforcement regulations contravenes section 307(d)(3). If the Agency tried to move forward with those changes and if a petition for review was filed, section 307(d) would therefore "require" remand for further consideration of the proposed changes. 379 Additionally, because no such rationale for several of these changes is at all evident, it is far from clear whether EPA could adequately explain its reasons for the proposed changes, so as to avoid vacatur. Indeed, vacatur appears to be the most likely result-given that there isn't any evidence that vacatur would be "quite disruptive" to EPA's plans to set new multi-pollutant standards. 380 [EPA-HQ-OAR-2022-0829-0701, pp. 240-241]

379 See Ne. Md. Waste Disposal Auth., 358 F.3d at 949-50.

380 See id. (quoting Allied-Signal, Inc. v. Nuclear Regul. Comm'n, 988 F.2d 146, 151 (D.C. Cir. 1993)).

That said, because the NPRM's proposed changes to the emissions standards themselves are not inextricably tied to the enforcement-related amendments, the main portion of EPA's regulatory effort likely could proceed with the deficient amendments to the enforcement regulations severed. That would allow EPA and stakeholders to focus energies on the new standards and give them time to discuss and to try to reach agreements on changes to the certification enforcement regulations. Moreover, EPA should not consider any aspect of the void-ab-initio mechanism to be beyond judicial scrutiny. The sweeping changes the NPRM proposes to the Agency's certification enforcement regulations has reopened those issues, and EPA must explain not only its full rationale for including the conditions listed in section 86.1848- 10(c) in its regulations, but also its general endorsement of the entire void-ab-initio concept. After it has done so, EPA must reopen the docket and allow for public comment; failure to do so would, at minimum, not comply with section 307(d)(3).381 [EPA-HQ-OAR-2022-0829-0701, pp. 240-241]

381 See Kennecott Utah Copper Corp. v. Dep't of the Interior, 88 F.3d 1191, 1213-15 (D.C. Cir. 1996) (explaining doctrine of "constructive[]" reopener); see also Bluewater Network v. EPA, 370 F3d 1, 16 (D.C. Cir. 2004) (reopener "is dependent upon the entire context of the rulemaking" (cleaned up)).

iii) In-Use Remedies

The NPRM also includes a proposal to create new regulatory text concerning "recall order[s]." Specifically, the NPRM would add the following text to 40 C.F.R. § 86.1865-12:

(j)(3) EPA will issue a recall order as described in 40 CFR part 85, subpart S, if EPA or the manufacturer determines that a substantial number of a class or category of vehicles produced by that manufacturer, although properly maintained and used, do not conform to in-use CO2 emission standards, or do not conform to the monitor accuracy requirements in § 86.1815. The recall would be intended to remedy repairable problems to bring the vehicle into compliance; however, if there is no demonstrable, repairable problem that could be remedied to bring the vehicles into compliance, the manufacturer must submit an alternative plan for to address the noncompliance. For example, manufacturers may need to calculate a correction to its emission credit balance based on the GHG emissions of the actual number of vehicles produced. EPA may void credits originally calculated from noncompliant vehicles, unless traded, and will adjust debits. In the case of traded credits, EPA will adjust the selling manufacturer's credit balance to reflect the sale of such credits and any resulting credit deficit. Manufacturers may voluntarily recall vehicles to remedy such a noncompliance and submit a voluntary recall report as described in 40 CFR part 85, subpart T.382 [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

382 NPRM at 29438.

This new provision, however, stands in serious tension with longstanding, statutorily embodied principles for recalls. [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

In language unchanged by Congress since the 1970 Amendments, CAA section 207(c)(1) provides for mandatory recalls only when EPA determines that "a substantial number of any class or category of vehicles, although properly maintained and used," do not "conform with regulations prescribed under section 202, when in actual use" during their specified useful life.383 “[S]ection 207(c) provides for classwide remedies of classwide defects.”384 Since the 1980s, EPA has apparently not needed to compel an emissions recall. Yet, tens of thousands of vehicles have nevertheless been recalled voluntarily since that time. That is because the governing principles for recalls pursuant to section 207(c) have been clear for decades. Three such principles are important and relevant in the current rulemaking. [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

383 42 U.S.C. § 7541(c)(1).

384 General Motors Corp. v. Ruckelshaus, 742 F.2d 1561, 1568 (D.C. Cir. 1984) (en banc).

First, while inferences about emissions control performance from a sample of test vehicles is permitted, the test sample must be statistically robust in showing that the class of vehicles under investigation does not conform with the section 202 emissions standards. As Senator Muskie, the lead author of much of the 1970 Amendments, described the recall provision in section 207, “[t]he Administrator can test cars on the road, and can require recall if a representative sample fails the test.”385 Because the nonconformity must exist in a “substantial number” of vehicles, it is imperative for EPA to define the investigatory class no more broadly than the data permit. [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

385 Summary of the Provisions of Conference Agreement on the Clean Air Act Amendments of 1970, reprinted in 116 Cong. Rec. 42,384 (1970) (emphasis added).

Second, a classwide defect subject to recall can be exhibited only in “properly maintained and used” vehicles. In that language, Congress correctly recognized that manufacturers cannot design and provide at reasonable cost to a retail purchaser a vehicle that could meet emissions standards no matter how poor its maintenance and regardless of how it has been operated. “Unless the cause of the nonconformity is within the manufacturer’s control, an imposition of liability would be an unwarranted financial burden on the manufacturers, unrelated to the strategy of forcing technological progress.”386 In fact, attempts to amend section 207(c)(1) to trigger recall liability based on “normal,” rather than “proper[],” maintenance and use, were rejected in the 1990 Clean Air Act Amendments.387 Because of this statutory requirement, for recall testing, EPA is obliged to follow test-vehicle procurement protocol procedures aimed to limit testing to vehicles that could be demonstrated to have been “properly maintained and used.” During the CAP 2000 rulemaking, EPA acknowledged that “[s]ection 207(c) specifies the determination that EPA must make to issue a recall order,” and made it clear that the primary purpose of IUVP testing was “to obtain a randomly procured sample of in-[use] vehicles, not a sample on which to base a recall determination.”388 In IUVP testing, EPA explained, “sample vehicles would be eliminated only if they are found to be obviously tampered, were used for “severe duty (racing, snow plowing etc.), have experienced extensive collision damage, require repairs which to allow the vehicles to be tested would be excessively costly, or are found to be unsafe to test.”389 By contrast, “the purpose of the confirmatory test programs,” (i.e., IUCP) testing, “is to provide data upon which the agency can base a 209(c) recall determination,” which entails a “statutory requirement that such determinations address whether properly maintained and used vehicles conform” with emissions standards.390 [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

386 Chrysler Corp. v. EPA, 631 F.2d 865, 888 (D.C. Cir. 1980). See also id. (“[I]t would make little sense to impose liability on manufacturers for conditions of nonconformity caused by actions of vehicle owners or mechanics.”); Automotive Parts Rebuilders Ass’n v. EPA, 720 F.2d 142, 157 (D.C. Cir. 1983) (agency lacks power to make manufacturer responsible for nonconformities beyond its control). EPA regulations

themselves also acknowledge that in-use compliance with emissions standards depends in part on performance of proper maintenance by vehicle owners. Manufacturers provide instructions on vehicle maintenance to new-vehicle purchasers, and they are required to justify those instructions to EPA in the certification process as necessary, including a demonstration, if needed, that any scheduled maintenance "must have a reasonable likelihood of being performed in-use." 40 C.F.R. § 86.1834-0 1(b)(6)(ii).

387 Work on what became the Clean Air Act Amendments of 1990 began in 1987. Representative Henry Waxman introduced H.R. 3054, which sought to change "properly" to "normally" in the text of section 207(c)(1). Clean Air Act Amendments of 1987, H.R. 3054, 100th Cong., 1st Sess. § 207(d)(1) (1987) 43. The bill was the subject of hearings and went into markup but was not reported. In 1989, Representative Waxman introduced H.R. 2323 which contained the same amendment to section 207(c)(1). Clean Air Restoration Act of 1989, H.R. 2323, 101st Cong., § 505(b)(1) 1st Sess. (1989) 99. H.R. 2323 was replaced by H.R. 3030, which did not contain the same amendment and which, following Conference, provided the text for what became the Clean Air Act Amendments of 1990. The 1990 Amendments were the last major revisions to the statute. Legislative History of the Clean Air Act Amendments of 1990, P.L. 101-549, U.S. Government Accountability Office (GAO), digitized on Westlaw, 100th Congress, H.R. 3054; 101st Congress, H.R. 2323.

388 EPA, Response to Comments, CAP 2000 Final Rule, Mar. 15, 1999, EPA Air Docket No. A-96-50.V-C-01 19-20 (hereinafter "CAP 2000 RPC").

389 CAP 2000 RPC at 20; see 40 C.F.R. Pt. 86, Subpt. S App. II.

390 CAP 2000 RPC at 21. In a decision concerning state-law remedies, the U.S. District Court for the Northern District of California commented in dicta that, "If a manufacturer's vehicles do not pass these [IUVP] tests, or if EPA otherwise determines that 'a substantial number of any class or category of vehicles or engines, although properly maintained and used, do not conform to the regulations prescribed,' EPA has authority to recall those vehicles.." In re Volkswagen "Clean Diesel" Mktg., Sales Pracs., and Prods. Liab. Litig., 310 F. Supp. 3d 1030, 1041 (N.D. Cal. 2018) (quoting 42 U.S.C. § 7541(c)(1)), aff'd in part, rev'd in part, 959 F.3d 1201 (9th Cir. 2020). But the court did not address the distinction between IUVP and IUCP testing, and if taken literally, its dicta would confuse the two types of testing. If EPA takes a different view of the matter than does Auto Innovators, the Agency should explain fully why it does.

Third, the only remedy for in-use nonconformity permitted by section 207(c)(1) is recall, which has two fundamental components: notice to vehicle owners, and performance of a remedy (adjustment or replacement of a part or assembly, or recalibration of powertrain or emissions controls). EPA's recall regulations have properly implemented the statute. Those regulations make it clear that a "plan to remedy" the nonconformity must contain the "description of the proper maintenance and use" on which the manufacturer proposes to condition "eligibility for repair."391 As one court noted, "EPA's regulations … nowhere suggest that any remedy other than recall might be appropriate."392 [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

391 40 C.F.R. §§ 85.1802(a), 85.1803(a)(4) (emphasis added). EPA properly will not approve remedies that would degrade drivability, which would invite widespread tampering and likely reduce the vehicle capture rate.

392 Ctr. for Auto Safety v. Ruckelshaus, 747 F.2d 1, 5-6 (D.C. Cir. 1984) (Scalia, Circuit Judge). See also Gen. Motors Corp., 742 F.2d at 1568 (referring to section 207(c) as the "recall provision" and the "recall scheme"); accord In re Caterpillar, Inc., C13 & C15 Engine Products Liab. Litig., No. 1:14-CV-3722 JBS-JS, 2015 WL 4591236, at *8 (D.N.J. July 29, 2015); Navistar, Inc. v. Jackson, 840 F. Supp. 2d 357, 359 (D.D.C. 2012). Under the rule in Center for Auto Safety, the Administrator can stop short of making a nonconformity determination—a determination which would require him to order a recall—if the Agency and the manufacturer agreed on another method of addressing the nonconformity. The D.C. Circuit acknowledged such an alternative might be "best calculated to achieve the ends sought by Congress and to allocate [EPA's] available funds and personnel in such a way as to execute its policy efficiently and economically." 747 F.2d at 6 (quotation marks and citation omitted). But recall is the "exclusive"

mandatory remedy allowed by the statute, see id., and EPA's regulations permit no alternative to recall and repair.

The proposal in the NPRM concerning the recall remedy is entirely inconsistent with this history and precedent. The first problem with the NPRM's proposal is that the alternative remedy it proposes is disconnected from section 207(c)(1). Despite its good intention, the proposal rests on a "misinterpretation of the statute" because the "recall order" it contemplates would not include or depend upon notice to vehicle owners or any modification of the vehicle.393 To be sure, EPA is entitled to propose solutions to address exceedances of CO2 emission standards when there is no "demonstrable, repairable problem." But that solution cannot be shoehorned within the Agency's limited authority to conduct recalls, and indeed, when there is no "demonstrable, repairable problem" there is not even a nonconformity within the meaning of section 207(c)(1). [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

393 See Ctr. for Auto Safety, 747 F.2d at 6.

Therefore, if EPA has authority to require a correction of a GHG emissions credit balance, it cannot arise under section 207(c)(1). Certainly, the regulation that the NPRM is proposing is not an exercise of the Agency's rulemaking power under section 206(d) of the statute, which requires regulations to "establish methods and procedures for making tests," nor under sections 206(a)(4)(A)&(B) or 206(h), which similarly are concerned with test procedures.394 Nor, looking outside Title II, could EPA rely upon section 301, which is only "a source of procedural not substantive authority—it lets the agency pass rules to carry out powers granted by other provisions of the statute."395 [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

394 See 42 U.S.C. §§ 7525(a)(4)(A)&(B), (h).

395 Heating, Air Cond. & Refrig. Dist. Int'l v. EPA, No. 21-1251, 2023 WL4067167 at *5 (D.C. Cir. June 20, 2023).

That said, Auto Innovators believe that the solution to some exceedances of in-use CO2 emission standards that EPA has suggested is sensible, because it will protect the environment and is unlikely to engender unnecessary disputes with vehicle manufacturers. Even if EPA does not have authority to establish such a GHG-emissions-credit-adjustment mechanism through a legislative rule, it can presumably issue an interpretative rule or policy statement to establish this useful mechanism to address imbalances between GHG emissions control performance demonstrated during certification compared with in-use emissions test results. [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

The second issue with the proposed amendment to section 86.1865(j) is that it leaves open the possibility that an EPA "recall order" might not even take the reasonable approach suggested in its text: the credit-balance correction is offered only as an "example" of what EPA might require. That open-ended deviation from the clear strictures of section 207(c)(1) is objectionable and should be removed. Relatedly, the Agency cannot properly proceed with the proposed revision in section 86.1848-10(c)(2) that would treat as "not covered by the certificate" vehicles that do not comply with any of the "in-use emissions standards contained in subpart S."396 Apart from the lack of any reasoned explanation for the change, see supra pp. [12-15], again, the exclusive remedy for nonconformity of an in-use emissions standard is recall (ordered or voluntary) as provided in section 207(c)(1).397 [EPA-HQ-OAR-2022-0829-0701, pp. 241-245]

396 See NPRM at 29434. A reasonable, and indeed the only sensible, understanding of "comply" in the current version of § 86.1848-10(c)(2) has been that manufacturers must respond to lawful recall orders to bring their vehicles into compliance with applicable emission standards. To "comply" cannot be read to make a certificate conditional on never exceeding an in-use emissions standard in testing such as IUVP testing; such a reading could mean that a single failure by a vehicle inducted into IUVP testing, regardless of whether the vehicle had been properly maintained and used, would violate a condition of certification.

397 See Heating, Air Cond. & Refrig. Dist. Int'l, 2023 WL4067167 at *5.

iv) The IUCP Path to Recall

Finally, the NPRM's proposal to add in-use CO2 emission standards to the In-Use Confirmatory Test Program (IUCP) 398 contains significant ambiguities and does not adequately justify the decision to exclude a threshold such as the 1.3 factor used for criteria pollutants in combination with the 50% trigger for IUCP testing. In particular, it is unclear whether the 50% trigger would apply on a subconfiguration basis for a model year, or across all subconfigurations that used the same carryover data. We assume the former, and if not, EPA should clarify and permit comment after a reasonable period of time. We also assume that any recall based on IUCP testing would only apply to the subconfiguration and model year actually tested in the IUCP, because, for example, in-use factors can affect test results for specific subconfigurations differently. This is consistent with the relevant regulation at 40 C.F.R. § 1818-12(d) that establishes the in-use CO2 exhaust emission standard on a subconfiguration basis. [EPA-HQ-OAR-2022-0829-0701, pp. 245-246]

398 See 88 Fed. Reg. at 29,288-90.

We further assume that a recall could only be compelled based on the results of IUCP tests on a significant number of vehicles in the relevant subconfiguration for in-use CO2 emissions in a given model year, because the statute only allows recalls when the data permit a robust statistical inference. EPA previously determined that testing at least 10 vehicles in an Agency- designated subset (such as the subconfiguration grouping designated by EPA under 40 C.F.R. § 1818-12(d)) is sufficient to meet the testing adequacy requirement, 399 and we assume the same would be applied to any new IUCP program. If those assumptions are mistaken, EPA should so advise, and permit further comment in light of its corrections to those assumptions.400 [EPA-HQ-OAR-2022-0829-0701, pp. 245-246]

399 See 40 C.F.R. § 86.1846-01(d)

400 EPA's IUCP regulations assess criteria emissions test results on an emissions test group basis, but would not do so for CO2 emissions, presumably for physics-based reasons underlying the establishment of the CO2 emission in- use margin at 40 C.F.R. § 1818-12(d).

Organization: Stellantis

Certification Enforcement Programs and In-Use Remedies

Finally, separate from the issues raised regarding the proposed GHG and criteria pollutant standards, Stellantis agrees with the concerns discussed in the Auto Innovators' comments on EPA's proposed revisions to enforce vehicle certification and in-use standards. As detailed by Auto Innovators, EPA has not provided a plausible rationale for its proposed retroactive impacts on existing certificates and other proposed "clarifications." Similarly, it is unclear that EPA has the authority to add the proposed in-use "recall order" regarding CO2 emission standards/monitor accuracy requirements or CO_2 emission standards to the In-Use Confirmatory Test Program. Based on these shortcomings, EPA should not carry forward into the final rule the proposed "clarifications" or revisions to the enforcement programs and in-use remedies. [EPA-HQ-OAR-2022-0829-0678, p. 23]

Organization: Volkswagen Group of America, Inc.

In-Use Program – Fuel Economy and In-Use Verification Test Procedure Streamlining (Section III.F.5.iv) [EPA-HQ-OAR-2022-0829-0669, p. 11]

Volkswagen is in alignment with AFAI's GHG IUVP/IUCP comments. [EPA-HQ-OAR-2022-0829-0669, p. 11]

Volkswagen requests clarification in the language proposed in the NPRM to use its authority to make GHG credit adjustments based on IUVP CO_2 results. "EPA may use its authority to correct a manufacturer's greenhouse gas credit balance to ensure the manufacturer's GHG fleet average is representative of the actual vehicles it produces." Volkswagen feels this would be appropriately handled at the discretion of the regulator; however, future guidance on this topic would be desired to ensure a common understanding for all manufacturers. [EPA-HQ-OAR-2022-0829-0669, p. 11]

EPA Summary and Response

Summary:

The Auto Alliance commented that EPA has never provided a legal basis for voiding certificates. The Alliance states that CAA 206 creates a narrow purpose for certification, which is to facilitate introduction into commerce of qualified vehicles; it believes that the CAA does not authorize suspending, revoking, or voiding certificates after the certification has served its intended purpose. The Alliance further believes EPA implementation has historically limited voiding certificates to "egregious" cases, and it believes that while EPA's Tier 1 rule included a statement supporting voided certificates based on CAA 206(a) allowing EPA to prescribe conditions on certificates, such an argument is contrary to the text and structure of CAA 203 and 206.

The Auto Alliance commented that the CAP 2000 rule added good-engineering-judgment provisions that reinforce an approach that limits voiding certificates to egregious circumstances, such as deliberately overlooking important information, not operating in good faith, or lacking a rational basis. The Alliance claims that this approach still lacks a legal basis, but it at least limits voiding to a limited category of cases.

The Auto Alliance commented that 40 CFR 86.1848-10(c) currently defines specific conditions on certificates, whereas the proposal expands that to cover every emission result and any case of a vehicle not being covered by a certificate. It states that § 86.1850 similarly expands the scope of what may justify voiding certificates.

The Auto Alliance commented that the preamble improperly references "unrepresentative data" rather than the more specific "false or inaccurate data" in the regulation.

The Auto Alliance commented that the timing of a GHG report does not provide a rational basis for voiding certificates. The Alliance believes the NPRM provides no reason why good-faith differences between a manufacturer and EPA should not be remedied prospectively, without per-vehicle penalty liability. It further asserts that, with no examples of emerging problems that need to be addressed, EPA fails to meet the legal standard for giving fair warning of how it interprets its regulations.

The Auto Alliance commented that the preamble claims that the changes are for clarity, without even recognizing the changes are substantive. The NPRM's failure to set forth a plausible rationale for changing the certification enforcement contravenes CAA 307(d)(3).

The Auto Alliance commented that the proposed changes have reopened the general issue of voiding certificates, so the final rule needs to give a rationale both for any specific amendments and for voiding certificates generally. CAA 307(d)(3) would require reopening the docket for public comment.

The Auto Alliance commented that CAA 207(c) relies on several principles, among them: (1) test sample must be statistically robust to show that a substantial number of vehicles do not conform to the regulation; (2) defects for a recall determination must be based on properly maintained and used vehicles (in CAP 2000, EPA recognized that IUVP testing was intended to test vehicles without screening for proper maintenance and use, which leaves IUCP to provide information needed to make recall determinations); and (3) the only remedy for in-use noncompliance under CAA 207(c) is recall, which fundamentally requires notice to vehicle owners and performance of a remedy (the remedy (repair) depends on the manufacturer identifying how to qualify eligible vehicles for repair based on proper maintenance and use).

The Auto Alliance also commented that the changes to EPA's compliance and enforcement programs are severable from the remainder of the proposed rule, including changes EPA is making to the GHG and criteria pollutant standards.

Stellantis and Volkswagen stated that they supported the comments from the Auto Alliance as summarized in the preceding paragraphs. Stellantis concluded that EPA should not finalize the proposed "clarifications" or revisions to the enforcement programs and in-use remedies. Volkswagen further requested clarification to ensure a common understanding among manufacturers regarding the reference in the proposed rule for EPA to use its authority to make GHG credit adjustments based on IUVP CO2 results.

Response:

Without taking a position on the substance of the comments regarding voiding, EPA has decided not to finalize the changes to 40 CFR 86.1850 as proposed.

The Auto Alliance also claims that prior agency rulemakings, including those promulgated as early as 1974, 39 FR 7545, failed to provide a sufficient statutory basis for the agency's voiding authority. Statutory authority challenges to prior agency rulemakings are beyond the scope of the current rulemaking. In any event, the proposed rule here did not reopen EPA's general authority to void certificates, but rather proposed only discrete changes to characterize EPA decision-making with respect to such authority, changes which the agency is not finalizing.

The Auto Alliance commented that the preamble claims that changes to § 86.1848 are for clarity, without recognizing the changes are substantive. It also stated that the NPRM failed to set forth a plausible rationale for these proposed changes. EPA disagrees with these comments.

As explained in the preamble, these changes are simply for clarification. EPA interprets the regulations in § 86.1848 to have the same meaning with or without these changes.

Section 86.1848-01 has appeared in EPA's regulations and contained numerous conditions on certification since the CAP-2000 rule.[367] Additional conditions were added in the 2010 rule for LD GHG standards and codified in § 86.1848-10. The concept that certificates are granted only with certain conditions has been an integral component of EPA's compliance program since the 1970s.[368] The only plausible consequence for a particular vehicle that does not comply with an explicit condition of its certification is that such vehicle is a "misbuild"—it was not built under the terms of the certificate, and thus is not covered by that certificate. This is particularly true when the condition at issue cannot be tested until after many or all of the vehicles produced under that certificate had been sold, such as violations of the in-use standard.

EPA acknowledges that the text of § 86.1848-10 as promulgated in the 2010 rule might cause some confusion, given that certain conditions might have appeared to have explicit consequences while the consequences for others were not as specific. EPA's changes to § 86.1848-10 in the FRM are designed to allay any potential confusion and clarify that consequence for violating any of the conditions of certification is that violating vehicles will not be covered by the certificate. It is important to note that EPA did not propose and is not finalizing any changes to the conditions themselves.

The Auto Alliance commented that "the NPRM here proposed to make failure to comply with *any* of the conditions listed in § 86.1848-10(c) a basis for determining that" violating vehicles are not covered by the certificate. That is an accurate description of the compliance regime already applicable to certified vehicles before the finalization of the rule today, but overstates the impact of this action. The Auto Alliance's interpretation of EPA's current regulations would essentially read certain certificate conditions (which have appeared in EPA's regulations since at least 2000) completely out of the regulations. If the Auto Alliance were correct, EPA would not have been able to enforce any certificate conditions that did not have an explicit enforcement mechanism attached to them. Such an interpretation would also ignore the basic definition of a condition: "a provision making the effect of a legal instrument contingent upon an uncertain event."[369] For each vehicle sold by the manufacturer, a certificate is granted, contingent upon that vehicle meeting each of the conditions listed in § 86.1848. The logical conclusion is that if such vehicle does not meet one of the conditions, that vehicle was not covered by the certificate. The Auto Alliance does not present any alternative consequence for the violation of a condition.

The Auto Alliance also commented specifically that the Agency cannot properly proceed with the proposed revision in § 86.1848-10(c)(2) that would treat as "not covered by the certificate" vehicles that do not comply with any of the "in-use emissions standards contained in subpart S." The Auto Alliance also stated that the exclusive remedy for nonconformity of an in-use emissions standard is recall (ordered or voluntary) as provided in CAA section 207(c)(1). EPA

[367] 64 FR 2306, May 4, 1999.
[368] See, e.g., 39 FR 7545, 7546-7547 (Feb. 27, 1974); EPA Office of Gen. Couns., *A Collection of Legal Opinions: December 1970-1973* 185 (1973) (recommending regulations that would require that a "vehicle that did not conform to [the] description [in its certification application] would be considered uncertified.").
[369] *Condition*, Merriam-Webster.com/dictionary/condition, last accessed November 22, 2023.

disagrees with this assertion, based on both the structure of the statute and decades of EPA compliance and enforcement practice.

Beginning with section 207(c)(1), nothing in that section indicates it is an exclusive remedy for violation of in-use emissions standards. By contrast, section 203 broadly defines prohibited acts. For example, section 203(a)(1) prohibits manufacturers from introducing into commerce "any new motor vehicle or new motor vehicle engine, manufactured after the effective date of *regulations under this part* which are applicable to such vehicle or engine unless such vehicle or engine is covered by a certificate of conformity issued (and in effect) *under regulations prescribed under this part*." The prohibition thus relates to "regulations under this part," that is part A of the statute, section 202-219, which includes the statutory authority for promulgating in-use standards, e.g., section 202(a), (d). To take another example, section 203(a)(3)(A) makes it a prohibited act for "any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this subchapter prior to its sale and delivery to the ultimate purchaser, or for any person knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser." In other words, the statute expressly prohibits tampering with a vehicle that was "in compliance with regulations under this subchapter." An obvious example of this is a vehicle that met all the requirements for certification but then was tampered such that it only no longer meets the standards in-use. Thus, we think that section 203 unambiguously covers violations of the in-use standards.

More concretely, there are numerous examples of situations where EPA could proceed either under its 203 or 207 authority, including the below:

1) A manufacturer uses a vehicle with a defeat device in its certification testing; as such, all vehicles using that certification test (some portion of the test group/vehicle model) are producing significantly more emissions in-use than their certification value, violating the in-use standard. In this situation, EPA could (and likely would) begin an enforcement action under 203(a)(3)(A). However, EPA also has the clear authority to issue a notice of nonconformity under section 207(c)(1).

2) A manufacturer builds vehicles without installing the catalytic converters with which they were certified, causing the vehicles to fail their in-use standard. The vehicles would violate a condition of the certificate listed in § 86.1848-10(c)(6), which means they are explicitly not covered by the certificate. EPA can and has used its authority to prosecute violations of CAA section 203(a)(1) in such misbuild cases; EPA also could also use its authority under section 207(c) to require a recall.

3) A manufacturer produces vehicles with higher weight or greater road-load than that to which they were certified, and so the vehicles exceed the in-use GHG emissions standard. Such vehicles would not be covered by the certificate as stated in § 86.1848-10(c)(6), and may separately be susceptible to recall under CAA section 207(c).

EPA disagrees with the Auto Alliance's comment that EPA's proposed changes to § 86.1865 to make it clear that EPA will use recall authority to remedy GHG non-compliance stands in tension with longstanding, statutorily embodied principles for recalls.

To begin with, despite the Alliance's assertion that EPA is acting in tension with longstanding principles, the final rule is entirely consistent with the agency's position since the beginning of the LD GHG program in 2010. In that rule, the agency asserted authority to remedy GHG non-compliance including through credit adjustments. While stakeholders submitted many comments relating to the in-use standards and remedies for non-compliance, they did not raise any objections to the possible remedy of a credit balance adjustment. See 2010 LD RTC 5-344 ("Remedies for Noncompliance with In-Use Standards"). By contrast, stakeholders then expressed concern with the possibility a recall, noting that there may be no effective repair remedy in many cases. EPA noted, among other things, that "The CAA requires a vehicle to comply with emission standards over its regulatory useful life and affords EPA broad authority for the implementation of this requirement. As such, EPA has authority to require a manufacturer to remedy any noncompliance issues. The remedy can range from adjusting a manufacturer's credit balance to the voluntary or mandatory recall of noncompliant vehicles." 75 FR 25324 and 25474 (May 7, 2010). The final rule maintains this policy and further clarifies the agency's authority in this area and aligns the regulations with EPA's expressed intent in the 2010 rule.

In any event, we think the Alliance's specific allegations of tension are misplaced. The Auto Alliance stated that while inferences about emissions control performance from a sample of test vehicles is permitted, the test sample must be statistically robust to show that a substantial number of vehicles do not conform to the regulation. EPA agrees that a determination of non-compliance can be made based on a sampling of test vehicles, and that sample should be statistically robust. EPA has a longstanding practice to test a sample of 10 vehicle within a class or category of vehicles. For example, when EPA promulgated the CAP 2000 rule in 1999, EPA established the In Use Confirmatory Program (IUCP), which specifies a sample of 10 vehicles be tested when a certain number of vehicles in the In Use Verification Program (IUVP) exceed the applicable emissions standards. EPA does not see any reason for this longstanding practice to change when it comes to GHG non-compliance.

The Auto Alliance also stated that a classwide defect subject to recall can be exhibited only in "properly maintained and used" vehicles. Once again, EPA agrees with the Auto Alliance that a determination of non-compliance must be made based on "properly maintained and used" vehicles. The Auto Alliance further pointed out that in CAP 2000, EPA recognized that IUVP testing was intended to test vehicles without screening for proper maintenance and use, which leaves IUCP to provide information needed to make recall determinations. In this rulemaking, EPA proposed to set IUCP criteria based on the GHG in-use standards. While IUCP is not the only source of data that can be used for determining whether a substantial number of vehicles do not conform to the regulation, EPA agrees that is a useful process to gather such data. Again, EPA does not agree that there is any tension between the final rule and this longstanding principle.

Finally, the Auto Alliance stated that the only remedy for in-use noncompliance under CAA 207(c) is recall, which has two fundamental components: notice to vehicle owners, and performance of a remedy (adjustment or replacement of a part or assembly, or recalibration of powertrain or emissions controls). EPA does not see tension with the requirement to notify owners of a non-compliance issue. In fact, EPA sees the requirement to notify owners as an integral part of a remedy for a GHG non-compliance, and so such a requirement continues to exist in the regulations (albeit with certain modifications for practicality in the credit retirement context) regardless of the form of remedy. EPA believes that vehicle owners and the public in general have a right to know about such non-compliance. The regulations in 40 CFR part 85, subpart S, specify that the notice can be made by such means as approved by the Administrator, so the notification does not necessarily need to be in the form of a letter to each owner.

The Alliance stated that the only remedy for in-use noncompliance under CAA 207(c) is recall which, in the Alliance's view, fundamentally requires a repair to each vehicle. EPA disagrees that the language of CAA section 207(c) requires that a physical repair to each vehicle is the only form of a recall permissible to remedy a non-compliance under that section. The proposed credit-adjustment method would also remedy a GHG non-compliance for each vehicle involved. The Auto Alliance incorrectly asserted that the regulations in 40 CFR part 85, subpart S, require a "plan to remedy" the nonconformity which must contain the "description of the proper maintenance and use" on which the manufacturer proposes to condition "eligibility for repair." The regulation in 40 CFR part 85, subpart S, clearly states "[a] description of the proper maintenance or use, **if any**, upon which the manufacturer conditions eligibility for repair under the remedial plan" (emphasis added) and "[n]o maintenance or use condition may be imposed unless it is, in the judgement of the Administrator, demonstrably related to preventing the nonconformity." In other words, a manufacturer may condition the remedy based on proper maintenance or use but only when necessary, but is not obligated to place any such conditions on the remedy.

The Auto Alliance extensively cites *Center for Auto Safety v. Ruckelshaus*, 747 F.2d 1 (D.C. Cir. 1984), as support for its interpretation of the statute. While that case is relevant, it is not dispositive, and its reasoning is consistent with EPA's regulatory changes. The D.C. Circuit held that EPA could not approve a mandatory recall plan submitted by General Motors that, rather than remedying the nonconformities on the violating vehicles, would instead have required General Motors to over comply with the standard in the future to offset those nonconformities. First, the case is based on a simultaneous reading of the statute and EPA's regulations in place at the time ("the regulations…nowhere suggest that any remedy other than recall might be appropriate", *id.* at 5-6). Here, EPA is not attempting to agree to a novel remedy that does not comply with its own regulations; in fact, EPA is changing the regulations to allow for this remedy.

Second, EPA's interpretation that the statute allows for a remedy that does not explicitly require repair of the affected vehicles directly follows the logic of the case. "Absent evidence of contrary intent, the words in the statute must be presumed to bear their normal meaning of eliminating, rather than merely providing compensation for the effects of, the condition that is to be 'remedied.' Here that means eliminating the nonconformity of the . . . vehicles or engines." *Id.* at 4. And that is exactly what EPA's new regulations would do: eliminate the nonconformity of the specific violating vehicles, not other vehicles in the future. The "nonconformity" is that the vehicles do not comply with their in-use GHG standard, which means that the manufacturer of those vehicles earned more credits than they were due. EPA's remedy is to adjust the credit balances so that they reflect the actual GHG emissions of the vehicles the manufacturers are putting on the road.

It is true that the court's stated conclusion is written more broadly: that CAA section "207(c) requires recall and repair as the only statutory remedy for nonconformity." *Id.* at 6. However, the court reached that result under a different regulatory scheme and different facts. Again, the nature of the conformity here—vehicles not complying with their in-use GHG standard and thus erroneously earning more credits—is specifically addressed by the remedy of a credit balance adjustment. The remedy finalized today by EPA entirely "eliminate[s] the nonconformity of the [violating] vehicles or engines" and thus is consistent with both the statute and D.C. Circuit precedent.

If EPA's interpretations are challenged and a court rules that the Auto Alliance is correct that a vehicle repair is the only remedy for in-use nonconformity permitted by section 207(c)(1), that does not change EPA's authority or EPA's intention to use such authority to remedy GHG non-compliances. It would only change the remedy the manufacturer would need to implement. If under the Auto Alliance's interpretation, a manufacturer with substantial GHG in-use nonconformities is unable or unwilling to repair vehicles to bring them into compliance, then they may be required to buy the vehicles back and remove them from the fleet and/or pay civil penalties, as VW did as a result of the diesel consent decree. See Case No: MDL No. 2672 CRB (JSC) partial consent decree.

The Auto Alliance stated that the second issue with the proposed amendment to section 86.1865(j) is that it leaves open the possibility that an EPA "recall order" might not even take the reasonable approach suggested in its text: the credit-balance correction is offered only as an "example" of what EPA might require. In a strange turn, the Auto Alliance, who first stated that EPA does not have the authority to establish a GHG-emissions-credit-adjustment mechanism and the only possible remedy under section 207(c) is a recall with repair, is now concerned that EPA might actually "require" such a recall. They state that the open-ended deviation from the clear strictures of section 207(c)(1) should be removed. EPA disagrees with the comment. As stated in the proposal, EPA is simply making the intent of the 2010 rule clearer in the regulations. The 2010 rule stated, "The CAA requires a vehicle to comply with emission standards over its regulatory useful life and affords EPA broad authority for the implementation of this requirement. As such, EPA has authority to require a manufacturer to remedy any noncompliance issues. The remedy can range from adjusting a manufacturer's credit balance to the voluntary or mandatory recall of noncompliant vehicles." 75 FR 25324 and 25474 (May 7, 2010). As explained in the 2010 rule and in this rule, EPA anticipated the possibility that vehicles may exceed the GHG emissions standards when there is no obvious repairable cause of the exceedance. EPA explained that the Agency was not likely to pursue a recall unless there is a repairable cause of the exceedance. However, EPA anticipated scenarios where there may be repairable causes of exceedances, e.g., a defective oxygen sensor that causes a vehicle to burn excessive fuel. In such cases, EPA could pursue a recall. That said, EPA recall orders do not require a particular remedy, only that the manufacturer submit a plan. EPA has laid out two potential remedies that manufacturers could use to comply, depending on whether repair is appropriate.

The Auto Alliance also commented that the proposal did not adequately justify the decision to exclude a threshold such as the 1.3 factor used for criteria pollutants in combination with the 50% trigger for IUCP testing. EPA disagrees. EPA explained in detail the reasons why the 1.3 factor used for criteria pollutants was not adopted for GHG emissions. In any case, there is no statutory requirement to provide such a factor in setting the IUCP trigger. The Auto Alliance stated that is unclear whether the 50% trigger would apply on a subconfiguration basis for a model year, or across all subconfigurations that used the same carryover data. EPA disagrees; the proposal was clear that the 50% trigger applies to the vehicles tested within a test group. The Auto Alliance requested more time to comment. EPA does not agree that more time to comment is needed; indeed, the Alliance has sufficient time to submit very detailed comments on these issues. The Auto Alliance also stated that they assume that any recall based on IUCP testing would only apply to the subconfiguration and model year actually tested in the IUCP. This assumption will not always be correct. First, prior to beginning an IUCP, EPA may designate a subset of the test group for testing under this section in lieu of testing the entire test group under the proposed regulations in § 86.1846(j). EPA may designate a single subconfiguration if the data supports the decision to do so. Otherwise, the entire test group would be tested. Second, if a recall is needed, EPA determines the class or category of vehicles to be included in the recall. See § 85.1802. Generally, EPA works with the manufacturer to identify the root cause of the noncompliance and the affected vehicle population. The class or category of vehicles to be included in the recall is generally the population of vehicle affected by the cause of the failure. For example, if the cause of the non-compliance is a defective catalytic converter and that defective catalytic converter is used on multiple test groups over multiple model years, the affected vehicle population and therefore the class or category of vehicles to be included in the recall would be the vehicles which utilize the defective catalytic converter. The same principles would apply to a recall for a GHG non-compliance, so the category of vehicles to be included in the recall would not necessarily be limited to the subconfiguration and model year actually tested in the IUCP.

Stellantis commented that EPA should not carry forward into the final rule the proposed “clarifications” or revisions to the enforcement programs and in-use remedies based largely on the comments from the Auto Alliance. As stated above, EPA largely disagrees with the comments from the Auto Alliance and is finalizing many of the elements of the proposal as discussed above.

EPA agrees with the commenters that the changes to EPA’s regulations relating to compliance and enforcement of EPA’s GHG and criteria pollutant standards in this final rule are severable from the remainder of the rule, including the changes to GHG and criteria pollutant standards themselves. EPA has independently considered and adopted each of these portions of the final rule and each is severable should there be judicial review. If a court were to invalidate any one of these elements of the final rule, we intend the remainder of this action to remain effective, as we have designed the program to function sensibly and find each portion appropriate even if one or more other parts of the rule has been set aside. See Section IX.M of the preamble for further discussion of severability.

7.2 – Warranty

Comments by Organizations

Organization: Alliance for Automotive Innovation

3. Language Clarification on Emission Performance Warranty Section

Auto Innovators requests rewording of § 85.2107(e) and (f) in order to achieve more clarity on what this section is requiring. We recommend the following changes in § 85.2107(e):

(e) A warranty period of two years or 24,000 miles shall apply for light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles, [EPA-HQ-OAR-2022-0829-0701, pp. 226-227]
(1) Except for the following specified major emission control components, which have a warranty period of eight years or 80,000 miles: [EPA-HQ-OAR-2022-0829-0701, pp. 226-227]

Additionally, for § 85.2103(f), we propose the following language:

(f) A warranty period of five years or 50,000 miles shall apply for medium-duty vehicles:
(1) Except for the major emission control components identified in paragraph (e)(1) of this section, which have a warranty period of eight years or 80,000 miles. [EPA-HQ-OAR-2022-0829-0701, pp. 226-227]

Finally, the language in § 85.2103(c)(2) should be clarified such that the warranty minimum performance requirements are at the discretion of the vehicle manufacturer. We propose the modification below:

(2) An electric vehicle or plug-in hybrid electric vehicle fails to meet the manufacturer-defined minimum performance requirement for useable bater energy for the specified period as determined by the vehicle's State of Health monitor, if applicable. [EPA-HQ-OAR-2022-0829-0701, pp. 226-227]

Lastly, § 85.2103(c) states,

"…of this section throughout the warranty period specified in §85.2108 at no cost to the owner if such nonconformity results or will result in the vehicle owner having to bear any penalty or other sanction (including the denial of the right to use the vehicle. [EPA-HQ-OAR-2022-0829-0701, pp. 226-227]

We believe that the reference of §85.2108 was an error. We recommend EPA revise the referred section to §85.2107. [EPA-HQ-OAR-2022-0829-0701, pp. 226-227]

EPA Summary and Response

The Auto Alliance suggested several changes to the regulatory text to achieve more clarity. EPA agrees with the recommended clarifications and has incorporated them into the regulations.

The Auto Alliance also suggested changing the proposed approach of basing the warranty period for battery-related issues on the Minimum Performance Requirement to instead allowing manufacturers to have the discretion to name their own warranty period. The proposed approach was to identify a failure to achieve the specified Minimum Performance Requirement as being covered by the performance warranty. We recognize that the performance warranty is appropriately associated with failing to meet emission standards and have therefore revised the warranty specifications related to battery durability to apply as a matter for the defect warranty. The defect warranty applies broadly for emission-related components, in most cases without any specification in the regulation to define what qualifies a component as being defective. Many times a defective part simply fails to function, but there are also many cases where a part becomes defective as a result of gradual or continuous aging. The final rule accordingly treats battery durability on the same basis as our approach for the defect warranty for other components, without defining an exact threshold for establishing a part as being defective. Market forces create a strong incentive for manufacturers to set a warranty threshold for battery durability that corresponds to what they need to do to conform to standards and requirements for certifying their vehicles. As such, we agree that manufacturers can use their declared values to identify when batteries become defective for purposes of applying warranty requirements.

The declared values apply as described above relative to State of Certified Energy. The warranty period in years is governed by statutory provisions as with all other components. We are therefore not changing the proposed warranty periods for battery durability.

7.3 – IUVP/IUCP/FEDV testing

Comments by Organizations

Organization: Alliance for Automotive Innovation

E. IUVP / FEDV Testing Requirements

1. Evaporative

a) Canister Base Load

As EPA states in this current NPRM, there are some potential issues that may arise when dealing with Non-Integrated Refueling Canister Only Systems (NIRCOS) fuel vapor handling designs.343 EPA goes on further to explain that NIRCOS systems initially release any tank vapors into the canister before the cap removal, and therefore the pressure must be released before the fuel cap is removed during refueling events. It was discovered that the ORVR test procedure does not account for the extra fuel vapor loading prior to the refueling event. As a result, we would like to request that EPA eliminate the requirement of refueling the base load of a canister for both IUVP and FEDV testing. [EPA-HQ-OAR-2022-0829-0701, pp. 230-231]

343 NPRM at 29275

Under the recent ACC II rulemaking by CARB, a design requirement was Specifically included within the regulation to address NIRCOS.344 The rule specifies an updated formula to calculate minimum canister size for vehicles with a NIRCOS fuel system of, as well as other vehicles that have fuel tank pressure exceeding a certain threshold. We therefore request that EPA harmonize with CARB as it pertains to IUVP and FEDV testing procedures, and to eliminate the requirement of refueling the base load of a canister for both IUVP and FEDV testing. [EPA-HQ-OAR-2022-0829-0701, pp. 230-231]

344 htps://ww2.arb.ca.gov/sites/default/files/2023-05/clean_acciifro_orvr_tps_2001%2Bfinal_2_24_23.pdf

b) Canister Load and Purge

Auto Innovators appreciates EPA's proposal to remove the canister loading and purging steps from the preconditioning for FEDVs to reduce butane consumption, time to run the tests, and ultimately the cost of running a test and improvement in fuel economy measurement accuracy. [EPA-HQ-OAR-2022-0829-0701, p. 231]

We request that EPA also remove the canister loading step from IUVP tailpipe emissions testing as an option while retaining canister loading for IUVP 2-Day evaporative and ORVR tests to demonstrate compliance. Due to a much larger number of IUVP test vehicles than FEDVs tested per year, an even more significant amount of butane consumption and time to run the tests could be reduced with this proposal. In addition, the canister loading process for IUVP vehicles is quite intrusive compared to a certification vehicle where quick disconnect lines can be pre- installed before or during vehicle build. Thus, the elimination of the canister loading step from IUVP tailpipe emissions also reduces cost from potential damage to customer vehicles due to accessing the canister. [EPA-HQ-OAR-2022-0829-0701, p. 231]

2. High Altitude IUVP

Additionally, in response to § 86.1845, we support eliminating the high-altitude testing for high mileage vehicles. Modern vehicles are all tuned to perform consistently and efficiently at all altitudes with appropriately set standards. Therefore, the need to conduct high altitude testing creates an undue and unnecessary burden on auto makers. [EPA-HQ-OAR-2022-0829-0701, pp. 231-232]

3. High Mileage IUVP

Likewise, we also request that EPA eliminate the testing of the full useful life of IUVP vehicles. It has become increasingly difficult to locate applicable high mileage vehicles with over 105k that can be used for IUVP testing. This creates another unnecessary burden and as a result, we respectfully request that this requirement be removed. [EPA-HQ-OAR-2022-0829-0701, pp. 231-232]

b) Technical Recommendations Concerning GHG IUVP / IUCP

In the event that EPA disagrees with the significant legal concerns set forth above, Auto Innovators offers the following technical comments on the GHG certification and IUVP / IUCP proposals in the NPRM. [EPA-HQ-OAR-2022-0829-0701, p. 246]

EPA requests comment on whether it should eliminate the 10% compliance factor adjustment for in-use CO2.401 The 10% compliance factor adjustment should not be eliminated. We agree with the agency's conclusion in the 2010 rulemaking that the factor accounts for test-to-test or production variability within a subconfiguration. [EPA-HQ-OAR-2022-0829-0701, p. 246]

401 NPRM at 29289.

We agree with the agency that reported CO2 values should be representative of a vehicle's performance over its useful life. However, the agency is suggesting a specific vehicle subconfiguration should be held to a "do not exceed" threshold established from model type average CO2 emissions. While aligned to criteria emissions requirements, we do not believe comparing an individual vehicle to an overall population average is appropriate for determining a pass/fail condition. By definition, a population average is a single value calculated using a population's individual values that are both higher and lower than the resultant average value. Therefore, comparing a single individual vehicle value to the population average could result in a violation simply because the specific subconfiguration procured for IUVP testing happens to fall above the population average by more than 10% by design. We don't believe that this indicates the model type average CO2 is unrepresentative, as sales weighting addresses these concerns. We simply believe that comparing an individual vehicle to a population average for the purposes of determining a violation would be inappropriate. For model types with high complexity, it is possible for the best to worst variant to have more than 10% CO2 difference. Even when the best and worst variants are tested, it is possible that the second-worst (untested for GHG) vehicle could fail the in-use model type average CO2 requirement even with normal/expected CO2 simply due to sales weighting. If model type average GHG includes an in- use "do not exceed" provision applicable to untested subconfiguration-specific GHG emissions with automatic IUCP escalation and GHG penalties, then the minimum data requirements and therefore overall stringency of the rule must be re-envisioned. We do not believe this is in the best interest of the industry, agency, or consumers. [EPA-HQ-OAR-2022-0829-0701, p. 246]

Further, EPA proposes two options to address their concern:

- Option 1: Maintain the 10% allowance on in-use CREE standards, and set IUCP threshold to be 50% or more of the vehicles for a test group exceed the in-use standard; or [EPA-HQ-OAR-2022-0829-0701, p. 247]

- Option 2: Set in-use standards at the vehicle-level emissions test results or model-type average value (for untested subconfigurations) and set IUCP threshold to be 50% of the test vehicles for the test group exceed the relevant in-use CO2 standard by at least 10%. [EPA-HQ-OAR-2022-0829-0701, p. 247]

Auto Innovators opposes the second of the two options, as it initially determines that any subconfiguration CO2 that exceeds original certification values is a failure. With perfect IUVP performance to certification levels, we would expect 50% of vehicles to exceed the original certification test simply due to test-to-test variation. Granted, most test groups would avoid IUCP given the threshold of 10% exceedance for 50% of the tested vehicles. However, it is not productive to have 50% of all initial tests be identified as failures. Rather, the IUVP program should be designed to find exceptions to expected performance. [EPA-HQ-OAR-2022-0829-0701, p. 247]

Instead, Auto Innovators supports the first of the two options that maintains the 10% allowance. We believe one enhancement is needed, though. Rather than subjecting an untested subconfiguration to a standard that is 110% of the model type CO2, we believe it would be more appropriate to compare the IUVP result of an untested subconfiguration to 110% of its theoretical performance generated using an analytically derived CO2 value (ADCO2). This would result in a more useful comparison of performance and would still be conservative since the ADCO2 method includes confidence factors intended to ensure ADCO2 results produce higher CO2 values than actual testing. This would also be more similar to the method used to assess tested subconfigurations. Also, we agree that the proposed 50% failure rate is a reasonable threshold for escalation to IUCP, and that EPA adjustments to a manufacturer's GHG credit balance to account for failures is one appropriate resolution given that OEMs likely could not resolve a difference via recall. Another option that should be available is for an OEM to take on an emissions-reducing project that offsets the shortfall. [EPA-HQ-OAR-2022-0829-0701, p. 247]

5. IUCP Trigger 40 CFR 1846-01(b)(1)

After careful review, Auto Innovators does not fully understand what EPA is proposing in this section. The language in the proposed NPRM is not clear if the mean is calculated for the entire test group or only for 50% + of vehicles. That would result in a change in the criteria if one were to exclude up to 50% of vehicles that did not exceed the standard. It is also unclear how OEMs are to pick which vehicles are included in the 50%. As a result, we propose the following language changes: [EPA-HQ-OAR-2022-0829-0701, pp. 247-248]

"…show mean exhaust emissions of any criteria pollutant for that test group to be at or above 1.30 times the applicable in-use [Strikethrough: standard for at least 50 percent of vehicles tested from the test group] [In red: when for at least 50 percent of vehicles tested from the test group exceed that standard]."402 [EPA-HQ-OAR-2022-0829-0701, pp. 247-248]

402 NPRM at 29433.

Organization: BMW of North America, LLC (BMW NA)

EPA has proposed to clarify and update the existing provisions related to in-use CO2 compliance to better meet the intention of the 2010 light-duty vehicle GHG rule and has proposed two regulatory options to align with that intent: [EPA-HQ-OAR-2022-0829-0677, pp. 4-5]

- Option 1: Maintain the 10% allowance on in-use CREE standards, and set IUCP threshold to be 50% or more of the vehicles for a test group exceed the in-use standard; or [EPA-HQ-OAR-2022-0829-0677, pp. 4-5]

- Option 2: Set in-use standards at the vehicle-level emissions test results or model-type average value (for untested subconfigurations) and set IUCP threshold to be 50% of the test vehicles for the test group exceed the relevant in-use CO2 standard by at least 10%.[EPA-HQ-OAR-2022-0829-0677, pp. 4-5]

For both above options, EPA proposes to clarify the regulation such that EPA has the authority to correct a manufacturer's GHG credit balance based on CO2 in-use test results that are consistently higher than the reported CO2 values in the fleet average report. [EPA-HQ-OAR-2022-0829-0677, pp. 4-5]

BMW NA understands and supports EPA in its proposal to align with the intent of the 2010 light duty GHG rule and is in favor of the "Option 1" approach listed above. Implementation of "Option 2" would lead to a high percentage of failure notifications reported to the agency even in a scenario where the average in-use test result is exactly in line with the reported CO2 value as some results are expected to be slightly higher and slightly lower. [EPA-HQ-OAR-2022-0829-0677, pp. 4-5]

Furthermore, BMW NA does not agree that the goal of EPA's proposal should be to maintain consistency between the GHG ABT program and other ABT programs. As EPA states in its proposal, Family Emission Limits (FEL) are determined such that manufacturers can establish a compliance margin to certify to a specific bin limit for criteria pollutant standards, but CO2 values for fleet average GHG are calculated on a model type basis and not a bin level and the intent is to determine an accurate CO2 value on a model type granularity. [EPA-HQ-OAR-2022-0829-0677, p. 5]

As stated above, BMW NA supports "Option 1" but also requests that EPA updates the proposal to clarify what is meant by "consistently higher" results with respect to GHG balance correction. BMW NA agrees that a 10% allowance to establish an in-use CREE standard is required to account for vehicle variation within a sub-configuration and test-to-test variability and that a 50% failure of the CREE standard is a reasonable condition to initiate an IUCP. This criteria is also reasonable to determine "consistently higher" CO2 in-use results and, therefore, correction of GHG credit balance should be tied to IUCP criteria and not broadly defined by non-descriptive language. By failing to define criteria for "consistently higher" CO2, EPA creates potential for GHG credit balance correction because of random vehicle selection with a high percentage of customer vehicles which may be worse than the reported CO2 but not exceeding the failure threshold. [EPA-HQ-OAR-2022-0829-0677, p. 5]

Organization: Environmental. and Public Health Organizations

B. EPA should eliminate the 10-percent compliance factor adjustment.

While EPA’s proposed clarifications will help ensure that its regulations better reflect in-use emissions performance, they also illustrate that the current in-use compliance margin is far too high. For EPA to detect systematic deviations in in-use emissions compared to certification, a manufacturer would have to be assured that variability is low enough that its vehicles would not emit above the 10% thresholds, despite certifying to an artificially low emissions level. This inherently means that the test-to-test variability and production variability within a subconfiguration or model type for which the 10% is supposed to account225 is actually much less than 10%.[EPA-HQ-OAR-2022-0829-0759, p. 93]

225 88 Fed. Reg. at 29288-9.

A 10% margin for error in in-use testing is quite high, particularly when considered in the context of the levels of improvement required under the standards: the average 2-cycle tailpipe certification value for a passenger car has decreased by just 19% from 2012-2021 and, for light trucks, just 18%. To put the 10% margin in perspective, take the example of the breadth of configurations of the Ford F-150: it is available in 3 body types, in rear- or four-wheel-drive, in trucks that vary in curb weight by 1600 pounds, with six different engines (including a hybrid), and additional high-payload and high-towing packages. And yet, the certified emissions levels from this vehicle span just 40%. The necessity of a 10% margin for a narrow slice of that spectrum (for one drivetrain, one engine, and one payload package) is implausibly high. [EPA-HQ-OAR-2022-0829-0759, p. 93]

We support EPA eliminating the 10% in-use compliance allowance as part of this rule.226 It is particularly relevant when considering EPA’s clarifications around manufacturers’ voluntary adjustments to certification, which would eliminate the need for such allowance. Shifting to a threshold for which additional testing is required supports the original intent of the allowance (to recognize testing variability) without undermining in-use emissions from vehicles regulated under the light-duty GHG program. [EPA-HQ-OAR-2022-0829-0759, p. 93]

226 Id. at 29289.

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG offers several suggested modifications to the Proposed Rule's in-use requirements [EPA-HQ-OAR-2022-0829-0554, p. 8]

HMG agrees with the AFAI comments regarding proposed in-use requirements. Furthermore, HMG provides additional input focusing on modifications to the Proposed Rule that will increase the feasibility and cost-effectiveness of compliance without negating the Proposed Rule' s sought-after environmental benefits. [EPA-HQ-OAR-2022-0829-0554, p. 8]

First, HMG proposes that EPA lower the 20% response rate requirement outlined in 40 CFR Appendix-I to-Subpart-S-of-Part-86 II. By reducing this requirement, testing can commence earlier, reducing mailing burdens and the consumption of ink and paper. We believe this change would contribute to a more streamlined and efficient compliance process. [EPA-HQ-OAR-2022-0829-0554, p. 8]

Second, HMG draws EPA' s attention to 40 CFR 86.1845-04(c)(2). EPA should consider reducing the mileage requirements for useful life vehicles. Finding adequate vehicles for testing with mileage of 105,000 or higher poses challenges, and adjusting this requirement would help ensure a more practical, realistic, efficient, and cost-effective testing process. [EPA-HQ-OAR-2022-0829-0554, p. 8]

Organization: Kia Corporation

Kia Supports Keeping the 10 Percent In-Use Standard Variability

Kia does not support the Agency's proposal to eliminate the 10-percent compliance factor adjustment for the in-use standard. EPA explains that there is an expectation that in-use vehicles should be designed to perform consistent with the values used to calculate the year end fleet average.25 Keeping this 10-percent variability, a standard that has been allowed for the last decade, is critical as EPA increases the stringency of criteria pollutants and GHG emissions 10-fold. EPA must allow automakers to focus resources on the full transformation to electric vehicles – an expensive and monumental task, not on incremental changes. Further, Kia urges EPA to consider removing the high-altitude requirement from in-use testing or allow a low sales volume threshold as an alternative.26 [EPA-HQ-OAR-2022-0829-0555, p. 15]

25 88 Fed. Reg. 29,289.

Organization*: Volkswagen Group of America, Inc.*

Testing Standards (Section III.C.5.iv)

Volkswagen supports the AFAI comments regarding the removal of carbon canister preconditioning and the second fuel drain/refill procedure for FEDVs. [EPA-HQ-OAR-2022-0829-0669, pp. 10-11]

Volkswagen would like to request, based on good engineering judgement, the optional removal of the 6-hour minimum duration between first fuel drain and fill and starting the fuel economy tests. Volkswagen cannot determine a historical reference for the 6-hour minimum between the first drain/fill and the start of the FE test. Volkswagen can theorize on certain evaporative effects that could be mitigated by the 6-hour soak, however, dyno road load adjustment is already completed and the 12-36 hour regular soak time exists to ensure the vehicle temperatures are thermally stable. Proposing this as optional removal, EPA has the option to confirm test results using the 6-hour minimum soak time. [EPA-HQ-OAR-2022-0829-0669, pp. 10-11]

SEE ORIGINAL COMMENT FOR Figure 1 of Section 1066.801-FTP test sequence [EPA-HQ-OAR-2022-0829-0669, pp. 10-11]

EPA Summary and Response

The Alliance for Automotive Innovation commented to EPA's concern that there are some potential issues that may arise when dealing with Non-Integrated Refueling Canister Only Systems (NIRCOS) fuel vapor handling designs with regard to fuel vapors which are released into the canister before the cap removal. The Auto Alliance also pointed out that CARB implemented a design requirement under the recent ACC II rulemaking to address NIRCOS. They requested that EPA harmonize with CARB as it pertains to IUVP and FEDV testing procedures, and to eliminate the requirement of refueling the base load of a canister for both IUVP and FEDV testing. We address amendments related to puff losses in Section 7.4 of the responses to comments; there is no need to make any corresponding changes to measurement procedures for IUVP or FEDV testing.

The Auto Alliance also requested EPA remove the canister loading step from IUVP tailpipe emissions testing as an option while retaining canister loading for IUVP 2-Day evaporative and ORVR tests to demonstrate compliance. They pointed out that there is a much larger number of IUVP test vehicles than FEDVs tested per year and the canister loading process for IUVP vehicles is quite intrusive. These requests are beyond the scope of the rulemaking as EPA did not propose or otherwise reopen the issue of eliminating the canister loading step for the EDVs or IUVP test vehicles in this rule. These requests can be considered in the future. However, EPA notes at this time that the primary purpose of IUVP testing is to confirm emissions compliance of in-use vehicles, so these tests should be conducted in the same manner as the emissions data vehicles (EDV).

The Auto Alliance also requested EPA eliminate the high-altitude testing for high mileage vehicles and eliminate the testing of the full useful life of IUVP vehicles (EPA understands this request to refer to the requirement to test one vehicle of each test group at the odometer mileage of 105,000 miles or 75 percent of the full useful life mileage, whichever is less). These requests are beyond the scope of the rulemaking as EPA did not propose or otherwise reopen the issue of eliminating the high-altitude testing requirement for high mileage vehicles or eliminating the testing of one vehicle of each test group at 75 percent of the full useful life during IUVP. These requests can be considered in the future.

Volkswagen commented that they support the AFAI comments regarding the removal of carbon canister preconditioning and the second fuel drain/refill procedure for FEDVs.

Volkswagen also requested that, based on good engineering judgment, the option to remove the 6-hour minimum duration between first fuel drain and fill and starting the fuel economy tests. This request is beyond the scope of the rulemaking as EPA did not propose or otherwise reopen the issue of eliminating the 6-hour minimum duration between first fuel drain and fill and starting the fuel economy tests. These requests can be considered in the future.

EPA requested comment on whether it should maintain the 10% allowance on in-use CREE standards, and set IUCP threshold to be 50% or more of the vehicles for a test group that exceed the in-use standard (option 1); or set in-use standards at the vehicle-level emissions test results (eliminating the 10% allowance on the in-use standard) or model-type average value (for untested subconfigurations) and set IUCP threshold to be 50% of the test vehicles for the test group that exceed the relevant in-use CO2 standard by at least 10% (option 2).

Environmental. and Public Health Organizations commented that they support eliminating the 10% in-use compliance allowance.

The Auto Alliance stated that they agree with the agency that reported CO2 values should be representative of a vehicle's performance over its useful life however they oppose the second of the two options. They expect under this option 50% of vehicles to exceed the original certification test simply due to test-to-test variation. They acknowledge that most test groups would avoid IUCP given the threshold of 10% exceedance for 50% of the tested vehicles. EPA does not agree with the Auto Alliance's conclusion that 50% of vehicles would necessarily be identified as failures because the Auto Alliance failed to consider EPA's proposal to allow manufacturers to establish a compliance margin by voluntarily raising the GHG values submitted in the GHG report much like they do when they set a Family Emissions Limit (FEL) for other fleet average emissions standards.

BMW NA commented that implementation of "Option 2" would lead to a high percentage of failure notifications reported to the agency even in a scenario where the average in-use test result is exactly in line with the reported CO2 value as some results are expected to be slightly higher and slightly lower. They also stated that BMW NA does not agree that the goal of EPA's proposal should be to maintain consistency between the GHG ABT program and other ABT programs. They pointed out that CO2 values for fleet average GHG are calculated on a model type basis and not a bin level and the intent is to determine an accurate CO2 value on a model type granularity. EPA does not agree that "Option 2" would necessarily lead to a high percentage of failure notifications reported to the agency because EPA's proposal would allow manufacturers to establish a compliance margin by voluntarily raising the GHG values submitted in the GHG report. EPA does not agree that the additional compliance margin would be less granular than a model type. In fact, manufacturers would have the opportunity to make the compliance margin much more granular than a model type level under EPA's proposal. EPA did not propose to establish bin levels for the GHG in-use standard. EPA proposed allowing manufacturers to set additional compliance margin at the subconfiguration level.

Kia commented that keeping the 10-percent in-use standard is critical as EPA increases the stringency of criteria pollutants and GHG emissions 10-fold.

EPA is not finalizing option 2. If EPA determines that manufacturers are exploiting the 10% allowance for the in-use standard to design and produce vehicles which consistently emit up to 10% more CO2 that accounted for in the fleet average calculations, EPA may revisit this option in the future.

The Alliance for Automotive Innovation commented that they support the first of the two options that maintains the 10% allowance. However, they state that they believe an enhancement is needed to compare the IUVP result of an untested subconfiguration to 110% of its theoretical performance generated using an analytically derived CO2 value (ADCO2) rather than the 110% of the model type CO2.

The Alliance's proposed enhancement was not considered during this proposal. The basis for the in-use standard for untested subconfigurations as being 110% of the model type CO2 was specified in the 2010 rule. EPA did not propose to change the basis for the 10% margin in this rule, only whether it should be applied to the in-use standard or the IUCP criteria. In the 2010 rule, the 10% margin was established in part to account for the variability within a model type. The Alliance's proposal could have been a viable alternative, however since the variability within a model type would essentially be removed and only the test-to-test variability would remain, the 10% margin would have needed reevaluation. At this point, if the process allowed the use of ADCO2 to establish the in-use standard for untested subconfigurations with the 10% margin applied, the result would be effectively to raise the in-use standard for those vehicles.

BMW NA commented that they understand and support EPA in its proposal to align with the intent of the 2010 light-duty GHG rule and are in favor of the "Option 1." However, they requested that EPA update the proposal to clarify what is meant by "consistently higher" results with respect to GHG balance correction.

EPA is finalizing option 1 and has clarified that by "consistently higher" results, EPA meant that a substantial number of vehicles in a class or category of vehicles fail to comply with the in-use GHG standards.

Hyundai America Technical Center, Inc. (HATCI) proposed that EPA lower the 20% response rate requirement outlined in Appendix I to Subpart S of 40 CFR part 86 and reduce the mileage requirements for useful life vehicles. This request is beyond the scope of the rulemaking as EPA did not propose or otherwise reopen this issue. These requests can be considered in the future.

7.4 – Puff losses

Comments by Organizations

Organization: Alliance for Automotive Innovation

J. Evaporative Standards

1. NIRCOS System Design

EPA requests comment on the need to establish engineering design requirements on NIRCOS evaporative systems in place of modifying ORVR test procedures, to ensure that initial pressurized vapor loads are captured while leaving sufficient capacity to handle refueling vapors.290 Auto Innovators supports aligning with the CARB design-based requirement if EPA decides to act in this area. We also recommend against modifying the ORVR test procedure at this time. [EPA-HQ-OAR-2022-0829-0701, pp. 187-188]

290 NPRM at 29275.

Organization: California Air Resources Board (CARB) (Part 1 of 5)

As described further below, CARB recommends that U.S. EPA adopt elements of CARB's evaporative emission standards program. [EPA-HQ-OAR-2022-0829-0780, p. 27]

Evaporative Emission Standards

U.S. EPA has rightly recognized opportunities to achieve reductions from conventional vehicle evaporative emissions. Evaporative emissions, which result from fuel vapors escaping from the vehicle rather than tailpipe emissions from engine combustion, consist primarily of hydrocarbons that contribute to the formation of ozone and contain benzene, a toxic air contaminant. CARB supports U.S. EPA's efforts to adopt more stringent evaporative emission standards and recommends U.S. EPA adopt the following recommendations as it finalizes its proposal. [EPA-HQ-OAR-2022-0829-0780, p. 35]

Minimum Canister Size Requirement

U.S. EPA requested comment on the need for an engineering requirement for canister working capacity for vehicles with Non-Integrated Refueling Canister Only Systems (NIRCOS). California adopted this type of requirement in ACC II to compensate for a small shortcoming in the onboard refueling vapor recovery (ORVR) test procedure, which does not account for the extra fuel vapor loading that can occur with NIRCOS-equipped vehicles prior to the refueling event. CARB estimated that its canister size requirement will likely impact only about 6 percent of new vehicles, primarily PHEVs, and many of those already have canisters of sufficient capacity. 47 CARB expects manufacturers to readily be able to meet these minimum design requirements because all vehicles with combustion engines already have a canister and moderately increasing the size or capacity of this canister requires only minor modifications to existing designs. Rather than revising the ORVR test procedure, which would be a lengthy and complex process, establishing an engineering requirement for canister working capacity is a feasible, cost-effective approach to address the minor shortcoming in the ORVR test procedure. CARB therefore recommends that U.S. EPA adopt CARB's minimum canister size requirement. [EPA-HQ-OAR-2022-0829-0780, p. 36]

47 CARB. Second Notice of Public Availability of Additional Documents, Proposed ACC II Regulations. Estimate of percentage of new vehicles sold in the California which have a Non-Integrated Refueling Canister Only System (NIRCOS), CARB 2022www. August 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/2nd15daynotice.pdf.

Organization: Glenn Passavant

Based on the regulatory language in 40 CFR §86 Subpart B, puff loss control has been required for all gasoline-powered LDVs, LDTs, MDPVs, and HDVs with operating fuel tank pressures equal to or greater than 2.5 kPa since the end of the allowed phase-in period (i.e., the 1999 model year). The value of puff loss control is expressed by the grams HC/gallon of fuel system void volume emitted to the atmosphere as shown in the Ingevity presentation to EPA on July 24, 2023 and in the Ingevity written comments. What may not be clear is that these grams of HC are basically uncontrolled fuel tank headspace emissions. While these are mostly isomers of butane and pentane, they also contain benzene compounds which would be considered air toxics and many other HC compounds which are highly photochemically reactive in the creation of ozone according to its Carter Maximum Incremental Reactivity (MIR) value (see attached). These other compounds often are more reactive than the butanes and pentanes which remain for vehicles meeting Tier 3 evaporative and ORVR requirements. [EPA-HQ-OAR-2022-0829-1136, p. 1]

To illustrate the point, I have attached two different EPA reports which provide HC speciation data for a fuel tank headspace. The reports both use the same title “Hydrocarbon Composition of Gasoline Vapor Emissions from Enclosed Fuel Tanks,” (EPA-420-D-10-001, January 2010 and EPA-420-R- 11-018, December 2011), but the data is different in each report and the HC speciation data from both reports is useful. The speciation profiles show the fraction of the various HC compounds in the headspace for the fuels analyzed (E0, E10, E15) and consideration of these individual HC speciation values shows the value of puff loss control in reducing air toxics and photochemically reactive HC based on the MIR values for the various HC compounds. [EPA-HQ-OAR-2022-0829-1136, p. 1]

Organization: Ingevity Corporation

3. The need for an engineering requirement related to the canister working capacity of Non-Integrated Refueling Canister Only Systems (NIRCOS) for management of fuel vapors from fuel cap removal and refueling (also commonly referred to as puff losses) [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

On page 29275 of the NPRM, EPA discussed the issue of the impact of cap removal emissions on NIRCOS canister capacity and asked for comment on “the need for an engineering requirement related to the canister working capacity that would provide an increase in the capacity in order to properly capture this initial pressurized vapor load and still have the needed capacity to handle the vapors generated during the refueling event.” Generally, Ingevity supports the need for a requirement to help ensure that ORVR canisters have the capacity to handle a refueling emission load immediately after the canister has absorbed a puff loss load just prior to fuel cap removal8. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

8 Note that section 202(k) of the Clean Air Act calls for evaporative emission standards to provide the “greatest degree of emission reduction achievable” The mass values for puff losses discussed in this section are not insignificant.

While the NPRM presents puff loss control as a new issue, the first steps in the consideration of the control of puff losses date back to prior to the 1990 amendments to the Clean Air Act. EPA Identified cap removal emissions (also referred to as “puff losses”) as an issue in the mid-1980s, estimating a value in the range of 3-5 grams per refueling based on the fuel RVP, EPA evaporative emission test procedures, and the low fuel tank pressures at that time.9 EPA proposed a specific test procedure in the Enhanced Evaporative NPRM in Jan 1990.10 The March 1993 EPA Enhanced Evaporative Emissions final rule deferred action on puff loss control, but included language similar to that adopted by the California Air Resources Board (CARB) in 1990 which read: “Fuel tank pressure during the running loss test may not exceed 10 inches of water (2.5 kPa), unless manufacturer shows that fuel vapors, other than refueling emissions, are vented to the evaporative canister when the fuel cap is removed.”11 There were no concrete provisions in terms of specific test procedures or standards to assess effectiveness of implementation of this requirement. A follow-on specific proposal and workshop was promised to address pressurized systems. EPA proposed a specific test requirement for cap removal emission (puff losses) in a May 1993 ORVR Supplemental NPRM.12 This would have involved cap removal after the ORVR preconditioning drive but before refueling test. This was not finalized, but action was promised as part of the workshop discussed in the Enhanced Evaporative rule mentioned above. It seems that successful rollout of Enhanced Evaporative and ORVR programs was more important at the time, and pressurized tanks were disappearing -- so future work on puff loss did not occur. The issue once again became important in the 2010 and later timeframe as some HEVs and PHEVs began to use sealed fuel systems (with higher fuel tank operating pressures) to help manage evaporative emissions generation in the fuel tank. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

9 EPA memorandum: “Significance of 'Popping and Hissing' Emissions from an LDV Gasoline Tank, “Daniel P. Heiser, April 1984. public docket A-84-07, item I-B-19.

10 US EPA, Proposed Rule, “Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines: Evaporative Emission Regulations for Gasoline and Methanol-Fueled Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Vehicles,” 55 FR 1913, January 19, 1990.

11 US EPA, Final Rule, “Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines: Evaporative Emission Regulations for Gasoline and Methanol-Fueled Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Vehicles,” 58 FR 16001, March 24, 1993.

12 US EPA, “Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines; Refueling Emission Regulations for Light-Duty Vehicles and Trucks and Heavy-Duty Vehicles,” Supplemental Proposal. NPRM, 58 FR 30731, May 27, 1993.

Regarding puff losses, Ingevity notes the following issues:

First, EPA is seeking comment on puff loss control for NIRCOS which use sealed fuel systems (nominally >####18.6 kPa absolute), even though the provision for puff loss control by venting to the canister dates back to the EPA’s enhanced evaporative rule in 1993. This calls for control if the tank pressure equals or exceeds 2.5kPa.13 We recommend that in the final rule the threshold for applicability needs to be set at tank pressure >#### 2.5 kPa gauge even if the fuel system design is not a NIRCOS. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

13 The current CARB regulations at III. D. 8.1.10 or 8.2.5 within California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Heavy-Duty Vehicles reads as follows “Manufacturer shall demonstrate in a separate test or an engineering evaluation that vapor would not be vented to the atmosphere if the fuel fill pipe cap was removed at the end of the test.”

There is a second issue related to a lack of a provision which specifies how to demonstrate that puff losses are in fact fully vented to the canister and not even in part to the atmosphere. These provisions should require that the manufacturer demonstrate that puff loss emissions are completely and fully vented to the canister when the fuel cap is removed and that the canister has capacity to control a puff loss and emissions from a refueling event from 10-100%. Such provisions were never adopted. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

The third issue relates to a useful quantification of the puff loss mass if uncontrolled. There is modeling and measurement data available. With regard to modeling, we would refer EPA to work conducted by Sam Reddy. He developed the equation below regarding evaporative and refueling controls.14 Varying the parameters in the equation using values expected in use, the puff loss mass values in grams range from 3.3 to 23 grams at low altitude to 3.4 to 24.9 grams at high altitude. See attached graphic plots for low and high altitude for a full display of sensitivities. Note that the biggest sensitivities are to tank Δp, fuel temperature, tank volume, and tank fill fraction. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

14 “Evaporative and Refueling Emission Control Training/Workshop Manual,” Sam R. Reddy, Ph.D., P.E. Evap Consulting, Inc, Version 8, November 2013.

Sam Reddy Equation: grams HC cap removal = ((Tv+U-F) *(Pt/Pa)-(TV+U-F)) *(Pt/Pa)*(ER); where

ER = [(vapor MW)(25.61)(Tt)(RVP)/(0.3187)(Tt)][exp(-2798.78/Tt)]

Tv = tank capacity (gallons) U = tank ullage (gallons)

F = tank fill fraction at cap removal

Pt = tank pressure (psi); based on tank pressure at cap removal; calculated as Pa + tank ΔP, Pa = atmospheric pressure (psi)

ER=emission rate (g/gal)

MW = vapor molecular weight for certification fuel at tank fuel temperature (Tt) prior to cap removal (g/mole)

Tt = fuel temperature in tank (K)

RVP = tank fuel vapor RVP for certification fuel (psi) [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Vehicle measurements conducted in Japan in 2019 and 2020 show puff loss values at the lower end of the ranges presented in the attached graphics for the vehicle, temperatures and fuels evaluated in these experiments.15 This testing involved only one vehicle over several seasons with varying fuels but did not fully assess the impact of variations in the key parameters identified in the Reddy equation. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

15 Hataa, Hiro, et al, “Evaluation of Gasoline Evaporative Emissions from Fuel-Cap Removal after a Real-World Driving Event,” Atmosphere, 2020, 11, 1110.

Control of puff loss emissions:

Generally, there are two means to address control of puff loss emissions. Each has advantages and disadvantages. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

First, since puff loss emissions are normally associated with a refueling event (the fuel cap is most commonly opened prior to refueling), it would be ideal to assess the performance of a puff loss control system in a SHED as part of a refueling emissions test. Under this approach, any puff loss emissions not captured in the canister would be captured in the SHED and a lack of capacity in the canister could result in a higher level of refueling emissions in the SHED measurement. This approach would inherently address the need for a provision which specifies how to demonstrate that puff losses are controlled that has been lacking since 1996. However, there are two complications with this approach, both related to the current U.S. EPA test procedure. The first is that the procedures for traditional fuel system vehicles and NIRCOS would need to be revised to require removal of the fuel cap after the SHED door is closed and initial HC readings in the SHED are taken. This is doable as it is now required in the China 6 refueling test procedure for NIRCOS. The second complication is that the mass of puff loss emissions anticipated in the current refueling emission test procedure is small. The current U.S. EPA test procedure calls for a drain and 10% fill after the vehicle preconditioning drive followed by a vehicle soak at 80°F for 6-24 hours. Under these conditions only a small amount of puff loss would be expected since the tank Δp would be small.16 This shortcoming could be addressed by modifications to the refueling test procedure. However, it is recognized this approach would involve significant perturbations to otherwise stable and well-established test procedures with potential requirements for vehicle recertification. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

16 US EPA memorandum, “Cap Removal Emissions,” Gary Holladay, November 22,1985 public docket A-84-07, item I-A-97.

Second, is an engineering evaluation approach designed to determine if a canister would have the capacity to control a puff loss and a refueling emission load. CARB recently adopted such an approach in their ACC II final rule based on the equation presented at paragraph D.14 of those test procedures.17 This takes effect for the 2026 MY. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

17 California Evaporative Emission Standards and Test Procedures for 2026 and Subsequent Model Year Passenger Cars, Light-duty Trucks, Medium-duty Vehicles and Heavy-duty Vehicles., August 25, 2022.

The equation adopted by CARB is:

Minimum Canister nominal working capacity (grams) =

1.08 x 1.3 x [5.8 x 14.7/Ptvs x ((Ptvs x Vtvs)/14.7 - Vtvs) + Grefuel x 0.88 x Vfuelcap] [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Where:

Nominal working capacity is as defined in section III.D.3.3.4 of the CARB evaporative emission regulation [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Vtvs is vapor space volume. This is 90% of the total geometric volume of the fuel tank. Geometric volume is the sum of the fuel tank capacity and vapor space (gallons). [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Vfuelcap is the nominal fuel tank capacity, which means the volume of the fuel tank(s), specified by the manufacturer to the nearest tenth of a U.S. gallon, which may be filled with fuel from the fuel tank filler inlet (gallons). [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Grefuel is the vapor generation during refueling (grams/gallon); use 5 grams/gallon as default. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Ptvs is fuel tank’s maximum pressure in-use (absolute pressure in psi) 19 psia is the default pressure to use for Ptvs. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

If EPA is to consider using this equation, we recommend two changes. First, the 0.88 value should be 0.90. That is the nominal fill from 10%-100% in a refueling to automatic shut-off as occurs in the EPA refueling emission test. Second, we believe that the definition for Vtvs adopted by CARB (shown above) underestimates the volume which could hold vapor which would be vented upon cap removal. It seems not to include all of the open fuel tank volume, all of the ullage, the volume of the fill pipe, and any vapor lines of the evaporative control system which may contain vapor when the tank is 10% full. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Specifically, in addition to the change of the 0.88 in CARBs equation to 0.90 we recommend that the definition of Vtvs be revised to read:

Vtvs is vapor space volume. This is 90% of the total geometric volume of the fuel tank, 100% of the tank ullage and 100% of the volume of the fill pipe, the fill pipe external vent line, and any other vent lines between the tank outlet and the canister or the tank outlet and the tank pressure control valve located between the fuel tank and canister. These volumes are to be determined and reported by the manufacturer as part of certification. As a simplification, EPA could offer a default value of 7 percent of Vfuelcap to add to the Vtvs value in the equation. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

With these two changes and assuming the use of the 7 percent adjustment the revised equation would read:

Minimum Canister nominal working capacity (grams) =

1.08 x 1.3 x [5.8 x 14.7/Ptvs x ((Ptvs x 1.07 x Vfuelcap)/14.7 – 1.07 x Vfuelcap) + Grefuel x 0.90 x Vfuelcap] [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

We recommend that the final regulations specify that compliance with this minimum requirement be demonstrated using the tests prescribed at 40 CFR §86.132-96 (h)(1)(iv)(A)-(B). That is, the canister's nominal working capacity measured using those tests must exceed the minimum calculated using the equation for it to be considered as compliant with the requirement. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Finally, if EPA adopts control for puff losses, the regulatory text needs to address the scope of applicability (vehicle classes and fuels), the MY of applicability, and reporting requirements for certification. We recommend that the scope of applicability be the same as for all current evaporative/refueling emission standards after this final rule is promulgated. While the engineering evaluation approach would be more of a design standard than an emission standard, it would be reasonable to provide 3-4 MYs lead time since the use of canister models (of varying designs and capacities) across vehicle models in the various vehicle classes is common practice. Finally, as part of the information required for certification, the regulations should specify that the certifying manufacturer provide data on all of the values used in calculating the minimum canister capacity for each evaporative/refueling family. [EPA-HQ-OAR-2022-0829-0545, pp. 5-9]

Organization: MECA Clean Mobility

EPA should consider adopting additional requirements for SI vehicles with pressurized fuel systems for management of fuel vapors from fuel cap removal and refueling (also commonly referred to as puff losses). [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

With respect to Non-Integrated Refueling Canister Only Systems (NIRCOS), or any vehicle with a fuel tank pressure exceeding 2.5 kPa, MECA agrees with the EPA objective to continue to reduce evaporative emissions through adding a requirement designed to control for the release of fuel vapors from fuel cap removal and refueling (also commonly referred to as puff losses). We believe that the most effective way to control puff loss emissions is to set a performance-based test procedure to include the measurement of both "puff" and re-fueling emissions to ensure that the canister capacity is sufficient and that the entire system operates effectively under elevated ambient temperatures. Since puff loss emissions are normally associated with a refueling event (the fuel cap is most commonly opened prior to refueling), it would be ideal to assess the performance of a puff loss control system in a SHED as part of a refueling emissions test. A testing procedure approach has been used by EPA for all other evaporative emission standards going back to the 1970 model year. In addition, standards based on test procedures are more readily enforceable in-use over a certified vehicle's useful life. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Other major automotive regions have taken initial steps to control puff emissions, and we recommend, at a minimum, that EPA adopt the same approach as is used in the China 6 test procedures for NIRCOS, which is also currently under consideration for incorporation into Euro 7. This procedure includes the fuel cap opening as part of the refueling test in the SHED. Under this approach, any puff loss emissions not captured in the canister would be captured in the SHED and a lack of capacity in the canister could result in a higher level of refueling emissions in the SHED measurement. It ensures the canister is appropriately sized because if the puff goes to the canister and then the vehicle is refueled, the canister must be sized for both the puff loss load and refueling load; otherwise there will be emissions from the canister after it's saturated that the SHED will capture. A key limitation of this approach is that the amount of the puff loss loading is expected to be small under the conditions of the EPA refueling test (80°F soak temperature) and thus may not be representative of the higher puff loss loadings expected in-use (such as a refueling event after a long drive where the fuel system temperatures may be greater than 100°F). [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

CARB finalized in ACC II a design-based approach that uses an equation to define the minimum evaporative canister capacity for vehicles with sealed fuel tanks. While MECA supported the intent of CARB to control for puff losses, MECA reviewed the terms of the equation and provided written comments to CARB staff noting the deficiencies in this design-based approach.15 To evaluate the CARB design-based equation approach, MECA analyzed the U.S. EPA certification database16 to obtain the EPA certified canister capacities for 10 currently certified PHEV/NIRCOS models, including the most popular and top selling models for 2021 and 2022. The EPA certified canister capacities (as retrieved from the evaporative family name codes) of the PHEV/NICROS models were then compared with the predicted minimum canister capacity from the CARB equation using the manufacturer reported tank volume and the recommended default CARB inputs to the equations. Table 1 [See original comment for Table 1: EPA Certified Evaporative Canister Capacities Compared to Results Determined by the CARB Final Design-Based Equation] shows the calculated results from the equation compared to the currently certified canister capacities of PHEV models using sealed fuel tanks. Based on the data, MECA believes the design-based equation approach may lead to back sliding on canister volumes and that it does not provide a method to ensure puff losses are effectively controlled in-use. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

15 https://www.meca.org/wp-content/uploads/2022/06/MECA-ACC-II-Comments-06092022-FINAL.pdf

16 US EPA Light-Duty Vehicle Certification Database, https://www.epa.gov/compliance-and-fueleconomy- data/annual-certification-data-vehicles-engines-and-equipment

If EPA is to consider using a design-based approach such as the CARB equation, MECA recommends EPA review the terms of the CARB equation to ensure that the application of the equation would efficiently control puff losses under conditions expected in-use while also not leading to back sliding on canister volumes. [EPA-HQ-OAR-2022-0829-0564, pp. 12-24]

Organization: Mercedes-Benz AG

Non-Integrated Refueling Canister Only Systems ("NIRCOS")

EPA's NPRM states there are some potential issues that may arise when dealing with NIRCOS designed fuel vapor handling designs.10 EPA further explains that NIRCOS systems initially release any tank vapors into the canister before the cap removal, and therefore, the pressure must be released before the fuel cap is removed during refueling events. It was discovered that the Onboard Refueling Vapor Recovery ("ORVR") test procedure does not account for the extra fuel vapor loading prior to the refueling event. [EPA-HQ-OAR-2022-0829-0623, p. 14]

10 NPRM at 29275.

CARB ACCII specifically included a design requirement within the regulation to address NIRCOS. The rule specifies an updated formula to calculate minimum canister size for vehicles with a NIRCOS fuel system, as well as other vehicles that have fuel tank pressure exceeding a certain threshold. [EPA-HQ-OAR-2022-0829-0623, p. 14]

Mercedes-Benz requests EPA harmonize with CARB for NIRCOS, in particular as it pertains to In-Use Verification Program ("IUVP") and Fuel Economy Data Vehicle ("FEDV") testing procedures and the elimination of refueling the base load of a canister for both IUVP and FEDV testing. [EPA-HQ-OAR-2022-0829-0623, p. 14]

Organization: National Association of Clean Air Agencies (NACAA)

In response to EPA's request for comment on canisters, NACAA recommends that EPA add a minimum canister size requirement to control "puff" emissions from sealed fuel systems (which exist mostly on plug-in hybrid electric vehicles) during refueling. [EPA-HQ-OAR-2022-0829-0559, pp. 6-7]

EPA Summary and Response

Summary:

The Alliance for Automotive Innovation supported aligning with the CARB design-based requirement if EPA decides to act in this area, and recommended against modifying the ORVR test procedure.

Mercedes Benz requested that EPA harmonize with the CARB design-based requirement, especially as it relates to IUVP and FEDV testing.

NACAA recommended that EPA add a minimum canister size requirement to control puff losses from sealed fuel systems during refueling.

CARB recommended that EPA adopt CARB's minimum canister size requirement for vehicles with nonintegrated refueling canister-only systems to account for fuel vapors that may be released to the canister before refueling (puff losses). CARB estimated that about six percent of new vehicles, primarily PHEV, would be affected, and suggested that all those vehicles could modestly increase canister capacity to account for the design requirement to account for the added vapor load. CARB recommended adopting their design requirement instead of accounting for the added vapor load by revising the test procedure.

MECA recommended that EPA add a testing requirement designed to ensure sufficient canister capacity to control puff losses from vehicles with fuel tank pressure exceeding 2.5 kPa, even at elevated ambient temperatures. MECA believed that controlling puff losses with an improved test procedure would create a requirement that is more readily enforceable in-use over a certified vehicle's useful life. MECA recommended adopting the procedure from China 6, which involves removing the fuel cap in the SHED as part of measuring refueling emissions. MECA recognized that the test condition at a nominal ambient temperature of 80 °F may underrepresent in-use puff-loss loading to canisters, such as may occur after long drives with fuel temperatures exceeding 100 °F.

MECA recognized that CARB has adopted a design-based approach to ensure that canister capacity is sufficient to account for puff losses. MECA recommended that if EPA takes that same approach, EPA should review the terms of the CARB equation to ensure that it would efficiently control puff losses under conditions expected in-use while also not leading to backsliding on canister volumes. MECA supported this concern with an analysis of EPA certification data from ten PHEV models, which led them to conclude that CARB's equation may lead to backsliding on canister volumes and that CARB's equation does not provide a method to ensure puff losses are effectively controlled in-use.

Ingevity generally supported requiring sufficient canister capacity to control puff losses, and believed the mass values for puff losses are not insignificant. Ingevity recounted EPA's history of considering control of puff losses as follows:

- EPA identified puff losses as an issue in the mid-1980s, estimating an emission rate of 3-5 grams per refueling event based on current test procedures and estimated in-use fuel tank pressures. EPA proposed a specific test procedure in January 1990, but in the corresponding final rule in March 1993 deferred action on puff loss control. The March 1993 final rule included a requirement to vent puff losses to the evaporative canister as follows: "Fuel tank pressure during the running loss test may not exceed 10 inches of water (2.5 kPa), unless manufacturer shows that fuel vapors, other than refueling emissions, are vented to the evaporative canister when the fuel cap is removed." This requirement included no concrete provisions for compliance assessment. EPA proposed in May 1993 to adopt a test requirement to remove the fuel cap after the ORVR preconditioning drive but before refueling test to address puff losses, but did not finalize this requirement, perhaps because pressurized fuel systems were becoming less common.[12] The issue became important again in the 2010 and later timeframe as some HEVs and PHEVs began to use sealed fuel systems with higher fuel tank pressure to comply with evaporative emission standards.

12 US EPA, “Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines; Refueling Emission Regulations for Light-Duty Vehicles and Trucks and Heavy-Duty Vehicles,” Supplemental Proposal. NPRM, 58 FR 30731, May 27, 1993.

Ingevity noted the following issues: (1) The proposed rule identified puff losses as an issue for NIRCOS, which typically have tank pressure exceeding 18.6 kPa absolute, even though puff losses as a phenomenon were recognized back in 1993 as an issue for systems with tank pressure exceeding 2.5 kPa. Ingevity recommended adopting puff-loss requirements for any vehicle with tank pressure exceeding a gauge pressure of 2.5 kPa. (2) Ingevity recommended adopting provisions that require the manufacturer to demonstrate both that puff loss emissions are vented only to the canister when the fuel cap is removed and that the canister has capacity to control puff losses from a complete refueling event. (3) Ingevity shared the results of computer modeling to estimate puff loss emissions. Estimated values ranged from 3 to 25 grams per refueling event, with variability attributed mainly to altitude, tank pressure, fuel temperature, tank volume, and tank fill fraction. Ingevity also shared the observation that vehicle testing in 2019 and 2020 show puff loss values at the lower end of the modeled range, but they also observed that testing did not fully assess the impact of variations in the key parameters.

Ingevity considered it to be ideal to assess the performance of a puff loss control system in a SHED as part of a refueling emission test. Such a measurement would ensure that vapors are routed only to the canister, and that canister capacity is sufficient to account for puff losses. Ingevity recognized the complication of modifying the test procedure to remove the fuel cap from the vehicle in the SHED after testing has started, but notes that the China 6 procedure has adopted this as a testing requirement. Ingevity also recognized the complication that the current test includes at least six hours of vehicle soaking at 80 °F after the preconditioning drive, which would involve only a small mass of puff-loss emissions. Ingevity suggested that a modified refueling test could better address puff-loss emissions, but acknowledged that this approach would involve significant perturbations to otherwise stable and well-established test procedures.

If EPA adopts CARB’s approach of requiring manufacturers to make a design demonstration that canister capacity is sufficient for puff losses, Ingevity recommended that the final regulations specify that compliance with this minimum requirement be demonstrated using the tests prescribed at 40 CFR 86.132-96(h)(1)(iv)(A)–(B); specifically, the canister’s nominal working capacity measured using those tests must exceed the minimum calculated using the equation for it to be considered as compliant with the requirement. Ingevity further recommended making two changes to CARB’s formula for calculating canister capacity. First, the constant 0.88 should instead be 0.90 to represent refueling a vehicle from 10 percent to 100 percent full. Second, the vapor volume should be increased to account for the whole ullage, the volume of the fill pipe, and any vapor lines of the evaporative control system that may contain vapor when the tank is 10% full.

Ingevity included additional comments on implementing new requirements for controlling puff losses: (1) puff loss requirements should apply for all vehicle classes and fuels that are subject to evaporative and refueling emission standards; (2) tt would be reasonable to allow 3-4 years of lead time for meeting new requirements; and (3) the regulation should require manufacturers to provide data on all the values used in calculating the minimum canister capacity for each evaporative/refueling family.

Glenn Passavant stated that puff loss control has been required under part 86 since 1999, and that the chemical composition of puff loss emissions is generally representative of gasoline vapors in the tank headspace, which includes benzene and other toxic compounds with high photochemical reactivity in addition to butane and pentane isomers.

Response:

The existing refueling test procedures require vehicle stabilization with no fuel tank pressure before the vehicle enters the SHED for emission measurement. The fuel cap is removed before canister preconditioning, which means that any vapors from relieving fuel tank pressure are not represented in the refueling test. In contrast, the regulation includes a partial refueling test in which EPA may test a vehicle using a streamlined procedure. The partial refueling test requires driving followed by stabilizing the vehicle for one to six hours before the refueling test, without removing the fuel cap. The partial refueling test calls for the fuel cap removal (and tank depressurizing, as applicable) within two minutes of sealing the SHED for the refueling test. This approach includes the canister loading from puff losses, though it does not include SHED measurement to ensure that vapors from depressurizing are vented to the canister. Nevertheless, EPA testing using the existing partial refueling test can confirm with testing that refueling canisters are properly sized to control refueling emissions from vehicles with pressurized fuel tanks. This existing test accounts for puff losses, but that does not apply for manufacturers' testing for certification.

To address the disconnect between the two measurement procedures, we are adopting a requirement for manufacturers to attest in their application for certification that their vehicles with pressurized fuel tanks will meet emission standards when tested over the partial refueling emission test. We would expect manufacturers to use their engineering analysis from certifying their vehicles for CARB rules to meet this requirement. However, we are stopping short of adopting the specific requirement to follow the modeling and calculations that CARB specifies for ensuring adequate canister capacity. This approach allows us to accommodate any adjustments CARB makes to its requirements based on the several changes suggested in the comments. The result is an EPA policy conclusion that aligns with CARB regulations for all aspects of certification and testing.

The new attestation requirement related to puff losses applies for all vehicles exceeding the pressure threshold specified for the running loss test in 40 CFR 86.134. That threshold is 10 inches of water or 2.5 kPa. This aligns with the comment from Ingevity. We recognize Ingevity's observation that modifying the refueling test to account for puff losses would add significant complexity. We do not find that the incremental improvement from modifying the refueling test justifies that additional cost and complexity.

We recognize that controlling puff loss emissions is effective for controlling benzene and other toxic compounds in addition to butanes and pentanes, and expect the combination of emission standards, test procedures, and certification requirements work together to appropriately control these emissions.

7.5 – Evaporative emissions

Comments by Organizations

Organization: Alliance for Automotive Innovation

2. General Carry-Over of Tier 3 Evaporative Requirements and Unintended Impact of Redefining Light-duty Truck

Auto Innovators supports EPA's intent to continue use of Tier 3 evaporative emission requirements. However, the proposed redefinition of a light-duty truck and medium-duty passenger vehicle per § 86.1803-01 for Tier 4 tailpipe emissions, will have significant impacts to Tier 3 diurnal plus hot soak emission requirements. This definition change will cause some vehicles, currently classified as LDT2 and higher, to be considered passenger cars or medium-duty passenger vehicles with a corresponding lower standard that will require significant redesign. The light-duty truck and medium-duty passenger vehicles reclassifications for evaporative emissions compliance could result in the reduction of FWD penetrations and increased vehicle mass and ground clearances. [EPA-HQ-OAR-2022-0829-0701, pp. 187-188]

We don't believe it was EPA's intention to impact evaporative emissions standards or vehicle programs in this manner. We request that the evaporative standards, light-duty truck and medium-duty passenger vehicle definitions used under the Tier 3 evaporative emissions program apply without modification under Tier 4 for evaporative emission requirements. We would be happy to work with EPA to resolve issues of redefining light-duty truck or medium- duty passenger vehicle and their impact to evaporative emissions standards. [EPA-HQ-OAR-2022-0829-0701, pp. 187-188]

3. Test Fuel for Flex-Fueled Vehicle ORVR Testing

In the preamble for the Tier 3 rulemaking, EPA indicated that the test fuel for flex-fueled vehicle ORVR testing should be Tier 2 E0 fuel splash blended with 10% ethanol.291 In EPA's recent heavy-duty criteria pollutant rule,292 it is unclear if the splash blended test fuel or Tier 3 test fuel is required for heavy-duty incomplete vehicle ORVR testing. Clarification is requested regarding the test fuel for incomplete heavy-duty flex-fueled vehicle ORVR testing. We also recommend that Tier 3 test fuel be specified for all flex-fueled and non-flexed fueled ORVR certification testing regardless of the vehicle classification. [EPA-HQ-OAR-2022-0829-0701, p. 188]

291 81 Fed. Reg. 23509 (Apr. 28, 2014).

292 U.S. Environmental Protection Agency, Control of Air Pollution From New Motor Vehicles: Heavy Duty Engine and Vehicle Standards, Final Rule, 88 Fed. Reg. 4296 (Jan. 24, 2023).

Organization: Ford Motor Company

Evaporative Family Definition Change to Exclude High Altitude Standards from Splitting Evaporative Families [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

In discussions with EPA staff in 2019, EPA agreed that revisions to the Evaporative Family definition (located in 40 CFR 86.1821-01(b)(10)) were necessary to clarify that manufacturers do not need to split Evaporative Families based on differences in the high-altitude evaporative emissions standards (which have different vehicle category groupings than the low altitude evaporative emissions standards). [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

Ford requests EPA make this change as part of this rulemaking action, and that the EPA further modify 40 CFR 86.1821-01(b)(10) to correct the following regulatory text: [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

- Current text: “Evaporative emission standard or family emission limit (FEL).” [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

- Revised text: “Low altitude evaporative emission standard or family emission limit (FEL).” [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

EPA Proposal to revise Light Duty Truck Definition to align with the GHG LDT Definition [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

The EPA has proposed to revise the LDT definition to align with the GHG regulations. Some vehicles greater than 6000lb GVWR would be reclassified as Passenger Cars using the proposed GHG LDT definition. This would result in a decrease in whole vehicle, sea level evaporative emissions standards from 500mg to 300mg. Ford does not believe that it was EPA’s intention to change the evaporative emissions standards as part of this rulemaking; therefore, Ford requests additional discussion about this concern. If EPA proceeds with the LDT definition change, we would request that the proposed regulatory language clarify that programs greater than 6000lb GVWR LDT which would be reclassified as Passenger Cars under the GHG definitions are provided the same 4-year lead time which was referenced with the re-definition of MDPVs. [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

Ford also request the addition of an allowance for emergency vehicles to remain in the same vehicle classification as the base program upon which the emergency vehicle is based. An example would be a greater than 6000lb GVWR SUV which is classified as a LDT based on standard 3 row seating; however, the emergency vehicle based on the SUV only includes two rows of seating. [EPA-HQ-OAR-2022-0829-0605, pp. 14-15]

Organization: Ingevity Corporation

4. Additional Considerations:

Fuel cap requirement for vehicle soaks and storage:

The NPRM language at §86.132-96 (a) requires that for future testing that the fuel cap always be in place when the vehicle is in soak or otherwise awaiting testing. We have no objection to this change and suggest that it apply to all evaporative and refueling emission testing covered in the vehicle regulations. EPA needs to specify a model year of applicability. [EPA-HQ-OAR-2022-0829-0545, pp. 10-11]

Removal of drain and fill after preconditioning UDDS drive:

The current evaporative emission test procedure at 40 CFR §86 132-96 calls for a drain and 40% fill of the fuel tank after the preconditioning drive (UDDS) at §86.132-96 (c). Instead, under this proposal, after the preconditioning drive, the vehicle would be driven and parked for the 12–36-hour soak before the canister preconditioning. This proposal would apply to diesel and gaseous-fueled vehicles (CNG/LPG), fuel economy data vehicles, and IUVP vehicles (not IUCP). This does not seem to apply for certification testing for evaporative or refueling emissions. This streamlining seems acceptable provided that it is clear that the full 40 CFR §86 Subpart B test procedure remains the primary test which could be used by EPA at its discretion. Perhaps it would be better to provide this as an option. EPA needs to specify a model year of applicability. [EPA-HQ-OAR-2022-0829-0545, pp. 10-11]

Canister preconditioning for fuel economy data vehicles and IUVP:

At the proposed §86.132-96 (h) and (j), EPA is proposing to remove the canister preconditioning step at 40 CFR §86 130.96 (for 3-day and 2-day) for fuel economy and IUVP tests. Once again, this streamlining seems acceptable provided that it is clear that the full 40 CFR §86 Subpart B test procedure remains the primary test which could be used by EPA at its discretion. Perhaps it would be better to provide this as an option. EPA needs to specify a model year of applicability. [EPA-HQ-OAR-2022-0829-0545, pp. 10-11]

Organization: Kia Corporation

Kia Supports Tier 3 Evaporative Emissions Standards [EPA-HQ-OAR-2022-0829-0555, pp. 11-12]

Kia supports EPA's intent to continue use of Tier 3 evaporative emissions requirements. [EPA-HQ-OAR-2022-0829-0555, pp. 11-12]

EPA Summary and Response

Summary:

Several commenters noted that the proposed changes to definitions for "light-duty truck" and "medium-duty passenger vehicle" would cause an increase in stringency of evaporative emission standards. The Automotive Alliance requested that we include regulatory language to prevent any change in evaporative emission standards. Ford requested that we include regulatory language to allow four years of lead time for meeting any change in standards resulting from the change in definitions.

The Alliance for Automotive Innovation requested that we address an ambiguity regarding the fuel specifications for refueling tests with flexible fuel vehicles, for both medium-duty vehicles and heavy-duty vehicles above 14,000 pounds GVWR. They also suggested that we amend the regulation to specify Tier 3 E10 as the fuel for the refueling test for all vehicle types.

Ford's comment included a request to modify the regulation to acknowledge that manufacturers do not need to split evaporative families based on differences in the high-altitude evaporative emissions standards.

Ford also requested that emergency vehicles retain their vehicle classification even if they are modified for emergency purposes in a way that causes them to fall into a different vehicle classification. The specific case was for light trucks that would qualify as passenger automobiles or light-duty vehicles in the emergency-vehicle configuration.

Ingevity had no objection to the change in vehicle handling before tests as specified in 40 CFR 86.132-96(a), but suggested that we apply it to all evaporative and refueling emission testing, and that we specify a model year of applicability.

Ingevity found the proposed omission of both the second refueling event and the canister preconditioning for fuel economy and IUVP testing to be acceptable, provided that EPA could perform testing with the full procedure to evaluate compliance. Ingevity suggested that it may be better to make those omissions optional, and that we should identify when the amendments start to apply.

Kia supports EPA's intent to continue use of Tier 3 requirements for evaporative emissions.

Response:

We agree with commenters observing that the changes to vehicle category definitions were not intended to achieve an increase in stringency for evaporative emission standards. At the same time, we are aware that the less stringent standards for light-duty trucks were originally intended to reflect differences in fuel tank volumes and other vehicle characteristics related to controlling evaporative emissions. It is apparent that vehicles affected by the changing definition of "light-duty truck" are not differentiated from light-duty vehicles based on such vehicle parameters related to evaporative emission control. From that perspective, the revised definition is likely to have the effect of accomplishing the original intent of applying standards corresponding to vehicles with expected evaporative-related characteristics for light-duty vehicles.

To address the concern for the incidental change in stringency, we are adding a provision to allow manufacturers to continue to meet the evaporative emission standards for light-duty trucks or medium-duty passenger vehicles even if their vehicles are recategorized based on the changed definitions, provided that those vehicle models continue to qualify for carryover certification. With this approach, manufacturers would do new testing to meet the more stringent standard only if they already need to do new testing to certify to the evaporative emission standards. To avoid extending this provision indefinitely, we are including a requirement for manufacturers to meet the more stringent evaporative emission standards for such vehicles starting in model year 2032, even if they would otherwise qualify for carryover certification. Meeting the more stringent standards will likely involve modestly increasing canister volume and upgrading various design features and parameters in line with the technology solutions used for other light-duty vehicles. The several years of lead time will allow manufacturers to plan for making those changes.

We recognize Ford's concern for emergency vehicles and have modified the definition of "light-duty truck" for the final rule to allow emergency vehicles to qualify as light-duty trucks if they are derived from vehicles that are light-duty trucks, even if they have been modified in a way that prevents them from meeting the criteria for light trucks in 40 CFR 600.002.

We recognize that flexible fuel vehicles today will be refueled with some combination of E10 gasoline and a high-level ethanol fuel. The scenario of splash blending ethanol with an E0 fuel is no longer something that in-use vehicles will experience. We are therefore revising the refueling test fuel specification for flexible fuel vehicles to align with the test fuel specification for evaporative emission testing under 40 CFR 86.1810-17(h). The refueling test fuel will instead be based on testing with a worst-case fuel that is either the high-level ethanol test fuel in 40 CFR

1065.725 or a blend of that fuel with Tier 3 gasoline (E10 with 9 psi RVP). This same conclusion applies for refueling tests with heavy-duty vehicles subject to standards under 40 CFR 1037.103.

We agree with Ford that it is appropriate to amend the regulation to reflect the current policy allowing manufacturers to include vehicles in the same evaporative family if they are subject to the same low-altitude standards even if they are subject to different high-altitude standards.

The amendment describing how to treat vehicles before testing was intended to provide a broader good-practice description for handling vehicles before evaporative testing. This involves replacing the instruction for removing fuel caps for outdoor parking with an instruction to prevent fuel contamination and preserve fuel-system integrity. It would not be appropriate to allow lead time for following this good-practice instruction. Also, evaporative and refueling tests are typically performed together. As a result, this single instruction already applies for all evaporative and refueling emission testing.

The evaporative testing amendments for omission of the second refueling event and canister preconditioning are both optional in the final rule. As a result, there is no need to allow lead time for those amendments. EPA testing would generally not include these optional steps if manufacturers do not include those steps for their testing.

We appreciate Kia's support for continuing to apply the Tier 3 evaporative emission standards.

7.6 – Miscellaneous amendments

Comments by Organizations

Organization: Alliance for Automotive Innovation

I. Related Guidance / Regulatory Needs

1.Analytical Derivation Guidance / Regulation

EPA regulations allow a manufacturer to provide fuel economy, CO_2 emissions, and carbon-related exhaust emissions values derived from analytical expressions approved by the Administrator.249 These are generally referred to as "analytical derivations". [EPA-HQ-OAR-2022-0829-0701, pp. 139-140]

249 40 C.F.R. § 600.006.

EPA has provided guidance on analytical derivations multiple times, starting in 1983, and revising or providing new guidance in 1995, 2000, 2004, and in 2012.250 EPA also provided an analytical expression for chassis-certified medium-duty vehicles in regulation.251 [EPA-HQ-OAR-2022-0829-0701, pp. 139-140]

250 EPA Advisory Circular 83A (1984), Guidance CD-95-08 (1995), Guidance CD-00-04 (2000), Guidance CCD-04-06 (2004), and Guidance CD-12-03).

251 40 C.F.R. § 86.1819-14(g).

EPA guidance on analytical derivations has not been updated in over a decade. Auto Innovators suggests that it is timely now to update the guidance again, and/or to update the governing regulation as might be needed. There are two areas that we propose EPA should update: expanding analytical derivations to battery electric vehicles and expanding derivations to strong hybrid electric vehicles. Auto Innovators has provided supporting data and analyses to EPA to support these updates. If EPA would find it helpful, we would be happy to update our analyses again and share them with EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 139-140]

Range and energy consumption testing of battery electric vehicles can be extremely time-consuming. While recent updates to SAE test procedures provide improved procedures to reduce some of this burden, the number of battery electric models continues to grow, challenging laboratory resources. As discussed elsewhere in these comments, EPA has not yet adopted the most recent SAE test procedures for battery electric vehicles and continues to use older procedures. Providing an approved means to analytically derive BEV range and energy consumption would reduce testing burden. [EPA-HQ-OAR-2022-0829-0701, pp. 139-140]

Guidance on analytical derivations for strong hybrid electric vehicles would also be helpful. When analytical derivation guidance was last updated, there were relatively few strong hybrid models available. While strong hybrids remain a relatively small part of the fleet, there are now significantly more models available to base a statistical analysis on. We suggest that EPA update analytical derivation guidance to include strong hybrids with conventional internal combustion engine vehicles, or to provide a separate equation for them, if needed. [EPA-HQ-OAR-2022-0829-0701, pp. 139-140]

Guidance for conventional ICE vehicles could also be updated concurrent with the above changes, but this is not a high priority for auto manufacturers. [EPA-HQ-OAR-2022-0829-0701, pp. 139-140]

2.High-Fuel Economy / Low-GHG Confirmatory Test Guidance

Manufacturers are required to perform confirmatory testing under a number of circumstances, including when the fuel economy on the FTP or HFET test is higher (or the CO2 emissions are lower) "than expected," and when the fuel economy is a "potential" fuel economy leader for a class of vehicles.252 EPA has historically provided and updated guidance on cut-points that trigger the need for a confirmatory test.253

252 See 40 C.F.R. §§ 86.1835-01(b)(1)(iii), (v), and (vi); and 600.008(b)(1)(iii) and (v).

253 See EPA guidance documents CD-15-22 and CD-99-06.

Updates to this guidance are particularly important at times when fuel economy of individual vehicles is rapidly improving, such as since roughly 2010. The cut-points are absolute numbers based on statistical analysis of a historical fleet's test results. Thus, as fuel economy is improved, an increasing number of models exceed the statistical threshold for high fuel economy (or low CO2 emissions). This increases the number of confirmatory tests required, consuming laboratory resources.

Setting aside temporary guidance that provided laboratory relief in response to the COVID-19 pandemic (which have since expired),254 guidance on confirmatory testing was last updated in 2015, eight years ago. Again, an increasing number of models are exceeding the given thresholds, resulting in additional confirmatory testing of vehicles that have high, but not statistically unusual fuel economy.

254 See EPA guidance documents CD-2021-02 and CD-2020-07.

Auto Innovators believes it is timely now to again update confirmatory test guidance. We would be happy to provide an updated analysis based on a recent model year if EPA would find that helpful to moving forward with this needed update. [EPA-HQ-OAR-2022-0829-0701, pp. 140-141]

F. Compliance With Fleet Average CO_2 Standards

EPA proposes to revise 40 C.F.R. § 86.1865-12(i)(1) and (2) introductory text to specify their applicability to model years through 2026. These paragraphs pertain to requirements to calculate separate fleet average carbon-related exhaust emissions for the passenger car and light truck fleets. It is unclear what EPA intends for manufacturers to do after model year 2026, and we could not identify any description of, or reasoning for this proposed change in the preamble. [EPA-HQ-OAR-2022-0829-0701, p. 248]

G. Electronic Vehicle Documents

Under this NPRM, EPA is also proposing changes to 40 CFR 86.1844-01(e) "Part 2 Application" clarifying that the "the part 2 application must include the part numbers and descriptions of the GHG emissions related parts, components, systems, software or elements of design, and AECDs including those used to qualify for GHG credits (e.g., air conditioning credits, off cycle credits, advanced technology vehicle credits) as previously specified in EPA guidance letter CD-14-19." We also understand that EPA is proposing changes to 40 CFR 86.1844-01(e) "Part 2 Application" and 40 CFR 85.2110 to establishing that paper copies of service manuals, owner's manuals, warranty booklets, and Technical Service Bulletins (TSBs) will no longer be accepted. Instead, the aforementioned documents will all need to be digitally accessed. We request that EPA allow the use of submitting a web address to view the required documents. [EPA-HQ-OAR-2022-0829-0701, p. 248]

Organization: Cummins Inc.

VIII. Inducements

10. EPA should allow manufacturers the option to use the new Selective Catalytic Reduction inducements in 40 CFR Part 1036 for chassis-certified vehicles

EPA recently finalized new requirements for selective catalytic reduction (SCR) inducements for HD engines in 40 CFR 1036.111. Cummins requests EPA to add an option allowing manufacturers who wish to harmonize SCR inducements across their product offerings to use 40 CFR 1036.111 inducements for chassis-certified LD and MDV as well. Such an option should recognize there may need to be differences in the inducement triggering conditions between HD and LD/MDV. [EPA-HQ-OAR-2022-0829-0645, p. 11]

Cummins also encourages EPA to continue work with industry and CARB to harmonize on SCR inducement strategies that reflect the inducement principles developed by EPA for the HD 2027 NOx proposal. [EPA-HQ-OAR-2022-0829-0645, p. 11]

Organization: General Motors, LLC (GM)

The following appendices provide further detailed regulatory and technical comments. Appendix A provides recommended edits to EPA's proposed regulatory text to clarify various parts of the regulatory language to ensure a successful and aligned set of EPA regulatory requirements. The other appendices provide confidential business information to help inform various technical aspects of the criteria emission and GHG standards. In many cases, an EPA final rule aligned with CARB's LEV IV in internal combustion engine criteria emission stringency and the associated test and certification procedures will help GM achieve significant emissions reductions for internal combustion engine products as soon as MY 2027 despite limited lead time, while continuing to transition to zero-emission vehicle technologies. [EPA-HQ-OAR-2022-0829-0700, p. 6]

[See original attachment for April 7, 2023 EPA Memorandum with subject: Redline Version of EPA's Proposed Regulations to Adopt New Standards for Light-Duty and Medium-Duty Vehicle Standards"] [EPA-HQ-OAR-2022-0829-0700, p. 6]

[See original attachment containing redacted confidential comments titled, "Summary of GM Technical Comments and Recommendations in Response to Environmental Protection Agency's (EPA) Notice of Proposed Rule Making (NPRM) for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (Tier IV)" [EPA-HQ-OAR-2022-0829-0700, p. 6]

Organization: Porsche Cars North America (PCNA)

9. Porsche recommends maintaining the current definitions for Light-Duty Truck (LDT)

Porsche does not support EPA's proposal to amend the definition of Light-Duty Truck in 86.1803-01 to include the provision that for Tier-4 (i.e., starting in MY2027), light-duty truck should use the definition in Part 600.002. The definition in Part 600 reflects the definition used within the NHTSA's CAFE regulation for non-passenger automobiles under that regulation's vehicle classification terms. Vehicle classification under CAFE has a long statutory history reflecting the congressional requirement for non-passenger automobiles (otherwise referred to as "light trucks") to have unique fuel economy requirements specific to that category of automobile. This statutory history reflects energy related policies specific to CAFE. Over the past several decades, NHTSA has updated their regulatory definition and policy interpretation of non-passenger automobile to reflect changes in vehicle designs and ongoing considerations of industry usage of the classification for determining fuel economy compliance. [EPA-HQ-OAR-2022-0829-0637, pp. 15-16]

NHTSA's CAFE regulation has a long-standing history that reflects a much higher degree of differential in the fuel economy targets between passenger automobiles and non-passenger automobiles. As such, NHTSA has been careful to consider vehicle classification throughout the regulatory history of their program and in changing how the agency views the applicability of the class by industry. Even during the most recent updates to CAFE, NHTSA continues to discuss future changes to the definition and such topics as physical measurement validations, applicability to accessories and build tolerance variation. [EPA-HQ-OAR-2022-0829-0637, pp. 15-16]

NHTSA’s policy can result in manufacturers having to split individual vehicles within a model type into passenger and non-passenger versions based on issues such as having to account for dealer installed accessories. For example, under recent NHTSA rulemaking discussions, the agency clarified that a non-passenger automobile that had an optional tow- hitch installed would have to be reclassified as a passenger automobile if the hitch violated the ground clearance requirements. While this reclassification may impact end of year CAFE compliance accounting, these vehicles would otherwise need no updates that would affect certification. [EPA-HQ-OAR-2022-0829-0637, pp. 15-16]

However, EPA’s emissions certification program needs more stability in the determination of vehicle classification. For example, if EPA were to abdicate vehicle classification for Light-Duty Truck to NHTSA, the vehicle that had to change from non-passenger automobile to passenger automobile for CAFE, and thus from Light-Duty Truck (LDT) to Light-Duty Vehicle (LDV) for emissions would face certification challenges. One example would be that this unique vehicle would require a new under hood VECI label. This would mean that the installation of an optional part could trigger relabeling for the vehicle or a whole new certification application. These types of sudden changes in classification could disrupt processes and, given that the emissions programs now have minimal differences in technical standards, would have no effect on environmental outcomes. [EPA-HQ-OAR-2022-0829-0637, pp. 15-16]

EPA's definition has provided industry and the agency with a stable, consistent basis for vehicle classification for several decades. Porsche sees no value in EPA now handing over their authority for vehicle classification for systems to NHTSA, especially as the difference between light duty vehicle and light-duty truck requirements continue to converge. NHTSA has already signaled that they will seek further changes to classification, both in regulatory updates, test procedures and policy interpretation. NHTSA will pursue these with regards to their statutory fuel economy policy and would be unaware, and not responsible for, any disruptions this might create for exhaust and evaporative emissions compliance. While it may appear convenient to harmonize definitions, in this instance, given the unique statutory goals specific to fuel economy, Porsche recommends EPA stay the course with their existing LDT definition. Porsche sees no added value specific to EPA’s air quality program in changing definitions, and to avoid any complications, proposes that EPA continue to utilize their existing definition and industry practice in Part 86. [EPA-HQ-OAR-2022-0829-0637, pp. 15-16]

10. Porsche recommends streamlining the FTP test procedure to remove the initial 6-hour minimum vehicle soak. [EPA-HQ-OAR-2022-0829-0637, p. 17]

In identifying further opportunities for test streamlining, Porsche reviewed the FTP test procedure flow-chart illustrated in 1066.801(e) and analyzed the relevancy of the initial 6-hour minimum soak period that follows the initial drain-and- fill. Porsche understands that the specific role of this initial 6-hour minimum soak period may have been to account for the possibility that fuel added to the vehicle could have been stored at different temperatures than the vehicle, for example if the fuel was in an underground tank. Or if the vehicle itself was stored at a temperature outside of the lab temperature and needed time to stabilize prior to preconditioning. In situations where the vehicle and fuel are otherwise already stabilized, it is unclear if this initial soak is relevant. Porsche recommends that EPA provide flexibility to manufacturers to use good engineering judgement to determine if the initial 6-hour minimum soak period can be skipped in order to help improve test facility efficiencies. Porsche recognizes that EPA, specific to confirmatory testing, would continue to use the 6-hour minimum soak period in order to have a consistent confirmatory process. [EPA-HQ-OAR-2022-0829-0637, p. 17]

[See original comment for Figure 2 EPA FTP test procedure flow-chart from 1066.801] [EPA-HQ-OAR-2022-0829-0637, p. 17]

EPA Summary and Response

Summary:

The Auto Alliance recommended updating the guidance and/or updating the governing regulation as might be needed regarding analytical derivations for fuel economy, CO_2 emissions, and carbon-related exhaust emissions values. They specifically recommended updating the provisions to expand analytical derivations to battery electric vehicles and derivations to strong hybrid electric vehicles.

The Auto Alliance also suggested updating guidance related to confirmatory testing requirements under 40 CFR 600.008.

The Auto Alliance asked how to understand the regulatory instruction for calculating fleet average CREE values after 2026 in § 86.1865-12, based on the proposed amendment to discontinue those provisions starting in 2027.

The Auto Alliance requested that EPA allow manufacturers to meet requirements for submitting electronic records by identifying a web address with the required information.

Cummins requested that EPA allow manufacturers the option to use the new Selective Catalytic Reduction inducements in 40 CFR 1036.111 for chassis-certified vehicles under 40 CFR part 86, subpart S, perhaps allowing for differences in the inducement triggering conditions between HD and LD/MDV.

General Motors included a scattering of suggested changes to the proposed regulation language in an appendix to their comments.

Porsche recommends not finalizing the proposed change to the light-duty truck definition to align with NHTSA definitions, because NHTSA decision-making creates an unstable categorization for purposes of meeting EPA emission standards.

Porsche recommended that EPA allow manufacturers to omit the 6-hour minimum soak period at the start of vehicle testing to help improve test facility efficiencies. Porsche recognized that manufacturers would still need to use good engineering judgment, for example, to ensure that the test fuel and the test vehicles as a whole would need to be temperature-stabilized before starting the test. Porsche also recognized that EPA testing should continue to use the 6-hour minimum soak period to ensure a consistent process for confirmatory testing.

Response:

We have amended the regulation to reference the latest version of SAE J1711 for the final rule, as suggested by the Auto Innovators. We will be mindful of the need and benefit for updating the guidance on analytically derived values after finalizing the rule.

We recognize that the instructions requiring manufacturers to perform additional confirmatory tests based on fuel economy test results is no longer necessary. The final rule therefore removes 40 CFR 600.008(b)(2)(iii)–(v).

We recognize the ambiguity of the proposed change to 40 CFR 86.1865-12(i)(1) and (2) and are revising the final rule to remove the proposed amendment.

Public websites are subject to change without notice. As a result, submitting a web address is not sufficient for meeting information submission requirements. However, manufacturers can create an electronic file from a website and submit the information as posted at that time.

We recognize that Cummins's suggestion to revisit the guidance related to inducement provisions for diesel vehicles certified under 40 CFR part 86, subpart S. At the same time, there is significant complexity to consider in the regulatory provisions from 40 CFR 1036.111, and some significant differences in vehicle design and operation for the mostly personal-use medium-duty vehicles certified under 40 CFR part 86, subpart S. We expect to revisit the existing inducement guidance for medium-duty vehicles to consider whether or how to expand that guidance to allow for inducement algorithms based on what we adopted for heavy-duty engines and vehicles in 40 CFR 1036.111.

The General Motors appendix with possible amendments to the regulation included no description or rationale. Many of their suggested changes overlap with their comments, and with the comments submitted by the Auto Alliance. We are therefore not addressing the amendments in their appendix file except as those are included in the text of written comments.

With respect to the proposed change to the definition of Light-duty truck, the proposed rule described our focus on the inconsistency with NHTSA definitions causing a single vehicle to qualify under EPA programs as a light-duty vehicle for GHG emission standards and as a light-duty truck for criteria emission standards. We are also aware that EPA's historical definition of Light-duty truck included ambiguity that creates too much flexibility for manufacturers to select vehicle categories to gain an advantage in reduced stringency of emission standards. We recognize that NHTSA's ongoing decision-making can cause manufacturers to be subject to different emission standards; however, we note that this circumstance has already applied for many years relative to GHG standards and certification. We also recognize that the Tier 4 standards substantially remove differences in exhaust emission standards between light-duty vehicles and light-duty trucks. As such, this reduces the impact on manufacturers of vehicles changing to a different type of vehicle. An exception applies for evaporative emission standards, which we address in RTC Section 7.4.

As described in RTC Section 7.3 in response to a similar comment, we are not amending the final rule to allow manufacturers to eliminate the six-hour soak at the start of the test procedure.

8 - Benefit cost analysis (BCA)

Comments by Organizations

Organization: American Fuel & Petrochemical Manufacturers

2. The Proposal's costs are vastly understated

EPA estimates that the Proposed Rule will cost $26 billion dollars but will produce between $200–$220 billion in net discounted benefits.221 EPA's conclusion is built on a shaky foundation of understated and hidden costs that when properly accounted for reveal that the costs of the Proposed Rule far exceed its benefits. [EPA-HQ-OAR-2022-0829-0733, pp. 48-49]

221 Proposed Rule at 29,361-62.

EPA assumes that significant ZEV sales would occur in the absence of the Proposed Rule but fails to acknowledge that the aggressive level of OEM investments are being bade in direct response to anticipated increases in fuel economy requirements.222, EPA excludes the vehicle costs associated with these ambitious automaker commitments that are linked to EPA standards. This is improper. In conducting the cost-benefit analysis EPA estimates that the rule will result in a 67 percent ZEV penetration rate and incorporates the emissions reductions associated with each of these vehicles. EPA cannot include the benefits of these ZEVs and exclude their costs. [EPA-HQ-OAR-2022-0829-0733, pp. 48-49]

222 ALLIANCE FOR AUTOMOTIVE INNOVATION "Auto Innovators Statement on Final EPA GHG Rule" (December 20,2021 available at https://www.autosinnovate.org/posts/press-release/statement-final-epa- ghg-rule

While we have not had sufficient time to fully analyze EPA's cost analyses, we have been able to identify several significant deficiencies, each of which understates the true costs of the Proposal: (1) EPA significantly understated the costs of batteries required by the rule; (2) EPA understated the costs of ZEVs by focusing only on their purchase price and ignoring the impacts of manufacturers' emissions trading and cross-subsidization strategies; (3) EPA's analysis of operating costs and other costs of ownership is incomplete; and (4) EPA misstates the costs of EVSEs and completely ignores the costs of grid upgrades that will be necessitated under the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 48-49]

Organization: Governing for Impact and Evergreen Action (GFI)

Perhaps most importantly, the Proposed Rule's projected compliance costs fall well-within the historical norms for 202(a) GHG standards. The EPA estimates that the Proposed Rule will cost automakers approximately $15 billion on an annualized basis.81 Those costs closely track the annualized automaker costs of the 2021 GHG tailpipe rule, which fall between $13.5-14.6 billion (adjusted for inflation).82 An apples-to- apples comparison with the agency's 2010 and 2012 GHG rules is difficult because those regulatory impact analyses report cost estimates differently; still, a rough-hewn sense of the 2012 rule's compliance burden can be drawn from the agency's overall cost estimates on an annualized basis, between $7.7-12.9 billion (adjusted for inflation).83 Finally, as the following table shows, the Proposed Rule's projected industry average per vehicle cost increase actually falls below similar estimates from past GHG rules. [EPA-HQ-OAR-2022-0829-0621, pp. 10-11]

81 Proposed Rule RIA at xlvii, Table 5.

82 2021 Final Rule RIA at 6–2, Table 6–1.

83 2012 Final Rule RIA at ii, Table 1. The 2010 rule's regulatory impact analysis does not appear to report either total or vehicle technology cost estimates on an annualized basis.

Note that previous GHG rules only encompassed carbon emissions (the Proposed Rule additionally sets criteria pollutant standards) and targeted a narrower class of vehicles (light-duty, whereas the Proposed Rule also targets medium-duty vehicles). That a multi-pollutant rule like the Proposed Rule nonetheless manages to closely track previous compliance cost figures suggests the EPA — far from charting a newly ambitious course — is diligently attempting to meet its statutory obligations without straying from its historical approach. [EPA-HQ-OAR-2022-0829-0621, pp. 10-11]

[Table:

Column "CAA §202(a) passenger vehicles GHG emissions rules.84": Row "2023 Proposed Rule.87"; Column "Vehicle technology costs, equivalent annualized values (2020 dollars).85": Row "$15 billion.88"; Column "Annual industry average per vehicle cost increase (2020 dollars).86": Row "$1,164 in 2032.89" [EPA-HQ-OAR-2022-0829-0621, pp. 10-11]

Column "CAA §202(a) passenger vehicles GHG emissions rules.84": Row "2021 GHG Final Rule.90"; Column "Vehicle technology costs, equivalent annualized values (2020 dollars).85": Row " $13.5-14.6 billion.91"; Column "Annual industry average per vehicle cost increase (2020 dollars).86": Row "$1,207 in 2026.92" [EPA-HQ-OAR-2022-0829-0621, pp. 10-11]

Column "CAA §202(a) passenger vehicles GHG emissions rules.84": Row "2012 GHG Final Rule.93"; Column "Vehicle technology costs, equivalent annualized values (2020 dollars).85": Row "–94"; Column "Annual industry average per vehicle cost increase (2020 dollars).86": Row "$2,535 in 2025.95" [EPA-HQ-OAR-2022-0829-0621, pp. 10-11]

Column "CAA §202(a) passenger vehicles GHG emissions rules.84": Row "2010 GHG Final Rule.96"; Column "Vehicle technology costs, equivalent annualized values (2020 dollars).85": Row "–97"; Column "Annual industry average per vehicle cost increase (2020 dollars).86": Row "$1,401 in 2016.98"] [EPA-HQ-OAR-2022-0829-0621, pp. 10-11]

84 The table does not include deregulatory GHG rules, namely "The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks," 85 Fed. Reg. 24174 (April 2020), https://www.govinfo.gov/content/pkg/FR-2020-04-30/pdf/2020-06967.pdf, which the EPA has since rescinded. Because the SAFE Rule would have relaxed emissions standards, it would have reduced automaker compliance costs. NHTSA-EPA, "Final Regulatory Impact Analysis: The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks," 9 (March 2020), https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final_safe_fria_web_version_200701.pdf.

85 To facilitate comparison across rules, we have adjusted figures from past rules for inflation.

86 To facilitate comparison across rules, we have adjusted figures from past rules for inflation.

87 88 Fed. Reg. 29184 (April 2023).

88 Proposed Rule RIA at 10–1, Table 10–1.

89 Proposed Rule RIA at xlviii, Table 6; 13–25, Table 13–45 (cars and trucks).

90 “Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards,” 86 Fed. Reg. 74434 (Dec. 2021), https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model-year- light-duty-vehicle-greenhouse-gas-emissions-standards.

91 2021 Final Rule RIA at 6–2, Table 6–1.

92 86 Fed. Reg. at 74483 (tbl. 30).

93 “Final Rule for Model Year 2017 and Later Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards,” 77 Fed. Reg. 62623 (Oct. 2012), https://www.federalregister.gov/documents/2012/10/15/2012-21972/2017-and-later-model-year-light-duty-vehicle- greenhouse-gas-emissions-and-corporate-average-fuel.

94 See supra at fn. 83 and preceding text.

95 77 Fed. Reg. at 62865 (tbl. III-34).

96 “Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule,” 75 Fed. Reg. 25324 (May 2010), https://www.govinfo.gov/content/pkg/FR-2010-05-07/pdf/2010-8159.pdf.

97 See supra at fn. 83 and preceding text.

98 75 Fed. Reg. at 25463 (tbl. III.D.6–4).

Organization: Travis Fisher

Specifically, the EPA’s DRIA regarding the impact of the Proposed Rule on the cost and reliability of electricity in the U.S. is gravely flawed. It should be redrafted to enable the EPA Administrator to give appropriate consideration to the cost and safety factors of the Proposed Rule, as required by section 202 of the Clean Air Act.1 Further, the DRIA should address the interactions between the Proposed Rule and other EPA rules—including the recently proposed rule on greenhouse gas emissions from power plants2—as required by Executive Order 12866.3 As written, the Proposed Rule: [EPA-HQ-OAR-2022-0829-0655, p. 1]

1 42 U.S.C. § 7521, https://www.law.cornell.edu/uscode/text/42/7521.

2 New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 FR 33240; May 23, 2023. Available at: https://www.federalregister.gov/documents/2023/05/23/2023-10141/new-source- performance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed (accessed July 2, 2023).

3 Executive Order 12866, Regulatory Planning and Review, 58 FR 51735; October 4, 1993. Available at: https://www.archives.gov/files/federal-register/executive-orders/pdf/12866.pdf (accessed July 2, 2023).

1. Violates section 202 of the Clean Air Act by failing to adequately consider:

A. Impaired bulk power system reliability and

B. Increased retail electricity prices;

2. Does not comply with Executive Order 12866; and

3. Violates the Unfunded Mandates Reform Act. [EPA-HQ-OAR-2022-0829-0655, p. 1]

CONCLUSION

Thank you for the opportunity to comment on the Proposed Rule. For the foregoing reasons, the EPA should not move forward with this rule without first correcting the many dire flaws in the Proposed Rule: its violation of section 202 of the Clean Air Act and Executive Order 12866, its faulty cost-benefit analysis, and its woeful misunderstanding of the U.S. electricity sector as reflected in the DRIA. [EPA-HQ-OAR-2022-0829-0655, p. 10]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

The Cost-Benefit Analysis of the Rule is Flawed

There are numerous problems with the cost-benefit analysis in the tailpipe rule. These include misinterpretation of vehicle ownership costs; miscalculated fuel savings; miscalculated losses from refueling time; calculation of transfers and tax credits; overestimation of light duty vehicle sales; overstatement of environmental benefits; overstatement of security benefits; and low discount rate. [EPA-HQ-OAR-2022-0829-0674, pp. 11-12]

EPA Summary and Response

Summary:

The American Fuel & Petrochemical Manufacturers commented that we had understated costs, particularly for batteries, and that the costs of the proposal would far exceed its benefits. They also commented that we had excluded costs of ZEVs in the no action case while simultaneously including the benefits provided by those ZEVs. They also argued that we focused on ZEV purchase price while ignoring emissions trading and cross-subsidization strategies. They also commented that our cost of ownership analysis was incomplete and that we had failed to fully consider costs of EVSEs, in particular costs of grid upgrades.

GFI commented in support of our benefit cost analysis, arguing that it fell within historical norms for 202(a) GHG standards.

Travis Fisher commented that benefit-cost analysis was fundamentally flawed and violated section 202 of the Clean Air Act and Executive Order 12866.

The Heritage Foundation commented that our benefit cost analysis had numerous problems including miscalculated costs and fuel savings and overstatement of security benefits and use of a low discount rate.

Response:

We disagree with comments that we have underestimated costs, specifically battery costs, in the final rule. The final rule analysis makes use of updated battery costs, based on the best available data and developed along with experts at the Department of Energy and the Argonne National Laboratory. Those battery costs are somewhat higher than the costs we estimated at proposal and are in general agreement with projections of battery costs by independent third parties (see section 12.2.1 of this RTC and Chapter 2.5 of the final RIA). Even with these higher battery costs, the monetized benefits of the rule substantially exceed the costs.

The American Fuel and Petrochemical Manufacturers assert that the proposal's No Action case includes ZEV costs that are themselves the result of automaker anticipation of what at the time were yet-to-be proposed standards. While EPA agrees that manufacture announced plans may, in general, reflect future regulations, the basis for the proposal's No Action case was informed using a range of third-party projections that preceded this rulemaking process. Such projections therefore provide a reasonable basis for a No Action case, since they consider a range of factors – including for this final rulemaking the effect of IRA incentives – but not the additional requirements of these standards through MY 2032. The comment also indicates some confusion over the focus on BEV purchase price while ignoring the impacts of manufacturers' emissions trading and cross-subsidization strategies. In our OMEGA compliance modeling, we do include estimates of cross-subsidization and emission trading (see Chapters 2 and 4 of the final RIA). Summarizing briefly here, EPA's compliance modeling assumes that manufacturers may choose to apply more technology or less technology than is needed to meet the GHG targets depending on whether it is most cost effective to reach full compliance using credits to sell, purchase, or not at all. Therefore, the purchase price used when estimating consumer demand for a vehicle is influenced by the cross-subsidy, credit trading, and technology application decisions made by the manufacturer, as well as by the incentives made available by the IRA. EPA notes that we do not use purchase price when reporting manufacturer costs. As such, while the consumer might consider that purchase incentive made available by the IRA, the manufacturer's cost would not reflect that incentive since that incentive goes to the consumer, not the manufacturer. This comment also suggests that the analysis of operating costs and other costs of ownership is incomplete. One argument made suggests that EPA compares the real world fuel economy of ICE vehicles while not considering the real world energy consumption of BEVs. This claim is erroneous as the analysis does consider the real world energy consumption of both ICE vehicles and BEVs and PHEVs and does so on an equal basis. Another argument made is that EPA's analysis failed to consider excise taxes and insurance costs. The final analysis includes insurance costs since they can be significantly higher for vehicles with higher value. Regarding excise taxes, i.e., taxes or fees meant to recover foregone fuel tax revenues, EPA has not included these in our benefit-cost analysis of program social costs and social benefits (although we do show these as part of our consumer ownership experience discussion in Chapter 4.2 of the final RIA) because of the wide variety of such taxes across the nation and because many states have yet to determine the approach they will take (e.g., additional registration fees applied to BEVs or road-use fees applied to all vehicles). If those taxes and fees were included, they would increase operating costs associated with BEVs and, perhaps, HEVs and PHEVs, although we would not expect the impact to result in higher operating costs than ICE vehicles. Importantly, these taxes or fees would not factor into our benefit cost analysis as they represent transfers and not social costs of the rule. Regarding costs of EVSE and grid updates, we have updated the analysis for the final rule and respond to related comments in Sections 17 and 18 of this document.

EPA agrees with the comments from Governing for Impact and Evergreen Action (GFI), specifically that "EPA — far from charting a newly ambitious course — is diligently attempting to meet its statutory obligations without straying from its historical approach."

EPA disagrees with the comments provided by Travis Fisher. EPA notes that, consistent with CAA section 202, in evaluating potential standards we carefully weighed the statutory factors, including the emissions impacts of the standards, and the feasibility of the standards (including cost of compliance in light of available lead time). We monetize benefits of the standards and evaluate other costs in part to enable a comparison of costs and benefits pursuant to E.O. 12866, but we recognize there are benefits that we are currently unable to fully quantify. EPA's practice has been to set standards to achieve improved air quality consistent with CAA section 202, and not to rely on cost-benefit calculations, with their uncertainties and limitations, as identifying the appropriate standards. Nonetheless, our estimated benefits, which exceed the estimated costs of the final program, reinforce our view that the final standards represent an appropriate weighing of the statutory factors and other relevant considerations. More specifically, for this rule our assessment that the rule has positive net monetized benefits, regardless of the magnitude of those positive net benefits, supports our view that the final standards represent an appropriate weighing of the statutory factors and other relevant considerations. EPA also notes that the analysis includes expected impacts of other federal rules that are final rules while not considering those that are proposed. This is consistent with past EPA practice and direction from the Office of Management and Budget. However, recognizing that EPA is undertaking multiple rules at this time that may have an impact on the electricity grid, EPA has evaluated, to the extent possible, the potential cumulative impact of these rules. EPA's evaluation of the potential impact of these rules on the power system can be found in Chapter 5 of the RIA, Section 18 of this RTC, and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3. EPA judges that this rule, even considered together with the heavy-duty rule and several recent proposed rules regulating the EGU sector, as well as the IRA, will not result in significant increases in retail electricity prices (and there is no reason to expect that any increases in retail electric prices would offset all of the net total benefits for the rule). Please see Sections 21 and 23 of this document for more detailed responses on these issues. Note that our final analysis includes the results of the modeling efforts reflecting both the light- and medium-duty final rule and the heavy-duty phase 3 final rule. Further, we note that we will conduct comprehensive power sector modeling for the proposed rules regulating the EGU sector if and when they are finalized, and that the modeling of subsequent rules will account for prior rules, including this rule, in the baseline.

We disagree with the Heritage Foundation that the analysis is flawed. EPA has very carefully considered the costs and benefits associated with the final rule using the best available information at our disposal. For these reasons, we consider the analysis to be technically sound and appropriate. Moreover, EPA notes that we did not rely on the benefits and costs analysis in identifying the appropriate standards, but we find that these factors further support the reasonableness of this rule, as further discussed in Sections V and VIII of the preamble to this rule.

8.1 - General approach

Comments by Organizations

Organization: Alliance for Automotive Innovation

XI. Additional Comments on EPA's Draft Regulatory Impact Analysis

At the outset, Auto Innovators would like to commend EPA staff for the tremendous amount of work that went into preparing the Draft RIA. Auto Innovators particularly appreciates the efforts put into generating several analytic baselines and several regulatory alternatives for the proposed CO2 standards. The Alliance comments begin with the overall structure of the RIA and then proceed to specific technical concerns and suggestions that EPA should consider between now and the final rule. [EPA-HQ-OAR-2022-0829-0701, p. 279]

A. Structure of the Analysis

The preamble to the NPRM highlights the fact that the multi-pollutant rulemaking contains several distinct sets of regulatory programs and amendments: (1) new CO2 standards for model year 2027 to 2032 light-duty vehicles, (2) new CO2 standards for model year 2027 to 2032 medium-duty standards, (3) new criteria-pollutant standards for model year 2027 to 2032 vehicles, (4) new criteria pollutant standards for model year 2027 to 2032 medium-duty standards, (5) new battery durability and warranty requirements, and (6) new light-duty vehicle testing and certification improvements. [EPA-HQ-OAR-2022-0829-0701, p. 279]

B. Each Set of Regulatory Programs/Amendments Should Have its Own benefit- Cost Analysis Unless EPA Can Show that a Particular Requirement is Not a significant Change.

The DRIA presents separate benefit-cost analyses for the light- and medium-duty vehicle standards for CO2. However, Auto Innovators could not find in the DRIA separate benefit-cost analyses for each of the other regulatory programs and amendments that are embedded in the multi-pollutant rulemaking. Most of the Auto Innovators comments focus on the new CO2 standards because the agency did not prepare much analysis to support the other regulatory programs and amendments. OMB Circular A-4 specifically instructs agencies to go beyond an analysis of an entire rulemaking and prepare separate benefit-cost analyses of each program within a rulemaking. [EPA-HQ-OAR-2022-0829-0701, pp. 279-280]

C. A market-failure analysis should be provided to support each set of regulatory programs and amendments.

OMB Circular A-4, following textbook principles of benefit-cost analysis, instructs agencies to present a market failure analysis in support of each new regulatory requirement or amendment. Auto Innovators did not find any market-failure analysis in the DRIA. Without demonstrating a market failure, the agency does not have a solid justification for moving forward to a final rule. Auto Innovators believes this omission is especially glaring in the case of the battery durability and warranty requirements. It is also important in the case of the CO2 standards, since the agency is claiming that private benefits to motorists (fuel savings and maintenance/repair savings) are more than enough to pay for the private costs of the CO2 standards. If the agency's calculations are correct, why would not manufacturers, driven by consumer behavior, supply the BEV deployment and other technology improvements without EPA's proposed standards? The answer to this question requires a market-failure analysis. [EPA-HQ-OAR-2022-0829-0701, pp. 279-280]

D. Global vs. Domestic Impacts

The agency needs to decide whether the benefits and costs of the CO2 standards will include global impacts or only impacts in the United States, or whether separate analyses shall be prepared from global and U.S. perspectives. Once that decision is made, the regulatory impact analysis should adhere to that decision on a consistent basis on both the benefit and cost side of the ledger. [EPA-HQ-OAR-2022-0829-0701, p. 280]

As currently drafted, the regulatory impact analysis is inconsistent: it counts the global benefits of the CO2 standards due to reduced tailpipe emissions from U.S. vehicles but does not even consider the environmental damages that may occur around the world due to the rapid expansion of the supply chains for battery-electric vehicles to meet U.S. needs under the multi-pollutant rule. Examples of possible environmental damages include consumption of scarce water supplies in water-stressed areas of South America in the process of mining lithium, water pollution in China from the processing of mined materials for cathode makers, particulate air emissions at hard-rock mining sites in Australia, and carbon dioxide emissions throughout the global supply chain for battery-electric vehicles. [EPA-HQ-OAR-2022-0829-0701, p. 280]

We already know, from unfortunate historical experiences in the U.S. and abroad, that the expansion of the global supply chain for electric motors and lithium ion batteries will not be risk free. The agency should make a careful assessment of these environmental damages and weigh them against the global environmental benefits of CO2 control. To help get the agency started, here are some selected case studies of the environmental damages in the BEV supply chain. [EPA-HQ-OAR-2022-0829-0701, p. 280]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

Similar flaws mar the remainder of EPA's analysis. In comparing the rule's purported benefits with its costs, EPA unreasonably elides many costs by refusing to quantify them at all. And the costs and benefits that the agency does quantify rest largely on unreliable data, assumptions, or both. EPA also failed to meaningfully consider alternative approaches. It considered only slight vari- ations on the same theme, comparing new emissions standards of various levels of stringency, without exploring other solutions, such as the benefits available from renewable fuels. Only by considering its preferred proposal in a vacuum could EPA conclude that it is the optimal approach. [EPA-HQ-OAR-2022-0829-0683, p. 5]

EPA's Cost-Benefit Analysis Is Seriously Flawed In Several Respects

EPA estimates that the proposed rule will have vast net benefits of approx- imately $1.6 trillion, assuming a 3 percent discount rate. 88 Fed. Reg. at 29,362. This figure is the net of an estimated $487 billion in costs and $2.1 trillion in benefits. Id. Yet EPA's process for arriving at these amounts contains several serious flaws, detailed below, that unduly inflate the rule's purported benefits and depress its costs. Where an agency conducts a cost-benefit analysis as part of the justification for a proposed rule, as EPA has here, serious flaws like these render the rule arbitrary and capricious. See Nat'l Ass'n of Home Builders v. EPA, 682 F.3d 1032, 1040 (D.C. Cir. 2012). [EPA-HQ-OAR-2022-0829-0683, p. 61]

Fourth, when calculating the climate benefits that the proposed rule would generate, EPA relied on estimates from the Interagency Working Group on the Social Cost of Greenhouse Gases. See 88 Fed. Reg. at 29,371–79. This intro- duced two additional flaws into EPA's cost-benefit analysis. To start, it ren- dered the analysis internally inconsistent as to the discount rates used. For every other cost and benefit in the proposed rule, EPA followed OMB's guid- ance and used discount rates of 3 and 7 percent to calculate present values. See id. at 29,362. But the Interagency Working Group discounted its estimates at 2.5, 3, and 5 percent discount rates. Id. at 29,372. As a result, aside from its 3- percent scenarios, EPA was irrationally comparing costs and benefits valued using distinct discount rates. [EPA-HQ-OAR-2022-0829-0683, p. 64]

Organization: American Fuel & Petrochemical Manufacturers

The purported benefits in terms of reductions in cost, greenhouse gas emissions, and environmental impacts are based on flawed analyses and will not be realized by consumers. EPA's tailpipe-only approach is flawed, and the Agency needs to evaluate light- and medium-duty vehicles on a full lifecycle basis, regardless of whether those emissions result from electricity generation, battery production, or the combustion of liquid or gaseous fuels. Consumer benefits from the proposal are exaggerated by assuming an unrealistic baseline rate of ZEV-adoption, and inadequate assessments of ZEV purchase and ownership costs, charging costs, and road infrastructure costs. [EPA-HQ-OAR-2022-0829-0733, p. 3]

EPA's Proposed Rule here presents an analogous situation, albeit one with substantially greater costs. Mandating a rapid shift from ICEV to ZEV will reshape the American automotive market with profound collateral effects, making clear that EPA is encroaching upon an issue of "vast economic and political significance." As further discussed herein, the Proposal's direct compliance costs are enormous—even in the face of numerous errors and oversights in its analysis that materially understate these costs. EPA estimates that the cost of vehicle technology (not including the vehicle or battery tax credits) would be approximately $180 billion–$280 billion in addition to greater than $7 billion in electric vehicle supply equipment ("EVSE") costs through 2055. These figures do not include the transformation of the electric power sector and grid updates needed to meet the electricity demand created by the Proposed Rule, which is estimated to cost trillions of dollars.66 EPA acknowledges that auto manufacturers are spending over a trillion dollars by 2030, mainly for manufacturing facilities. By setting emissions standards requiring production of a different product, the Proposed Rule undoubtedly forces OEMs to meet production deadlines that would not exist but for EPA's new ZEV mandate. [EPA-HQ-OAR-2022-0829-0733, pp. 18-19]

66 Dan Shreve and Wade Schauer, Deep decarbonization requires deep pockets (June 2019), https://www.decarbonisation.think.woodmac.com/ (The U.S. needs to invest $4.5 trillion to fully transition the U.S. power grid to renewables during the next 10-20 years, annual investments exceeding the U.S. defense budget).

E. EPA's cost benefit analysis is impermissibly inadequate

Section 202(a) of the Clean Air Act does not mandate that EPA set standards to drive pollutant emissions down to zero. Rather, CAA section 202(a)(1) only requires that standards be promulgated for air pollutants which "may reasonably be anticipated to endanger public health or welfare." And in promulgating regulations, EPA must balance benefits to health and welfare against the time necessary to allow for the development and application of the requisite technology as well as costs of compliance.202 With regard to heavy duty vehicles or engines, including the MDVs subject to the Proposed Rule, EPA standards are to reflect "the greatest degree of emission reduction achievable through the application of technology which the [EPA] determines will be available" during the relevant model year.203 Rather than update ICEV standards, the Proposed Rule unlawfully forces a transition from ICEVs to ZEVs in the MY27–32 timeframe without properly evaluating all cost-effective means to address policy objectives and the time necessary for the development and application of requisite technology. EPA has not demonstrated that such a transition is feasible, let alone necessary. [EPA-HQ-OAR-2022-0829-0733, p. 44]

202 42 U.S.C. § 7521(a)(2).

203 42 U.S.C. § 7521(a)(3)(A)(i).

EPA ignores this real-world regulatory compliance pricing scheme. EPA should quantify and explain this issue of central relevance to the Proposed Rule even if it may undermine the Administration's stated goal of electrifying the transportation fleet. As noted above, E.O. 12866 requires EPA to be a neutral decisionmaker and to fairly assess the costs and benefits of this Proposal. The Agency has not met its obligations under relevant Executive Orders, the Administrative Procedure Act, or CAA section 202(a), which requires "appropriate consideration to the cost of compliance." EPA has instead understated the costs of this Proposal. [EPA-HQ-OAR-2022-0829-0733, p. 54]

vii. Costs to maintain road infrastructure

EPA fails to account for infrastructure impacts from increased operation of heavier ZEVs on the road including road and bridge deterioration and commensurate reduced funding for infrastructure from fuel tax collections. These excluded costs are known to EPA and must be included in EPA's analysis—another example of EPA's failure to address a major aspect of the proposal. [EPA-HQ-OAR-2022-0829-0733, pp. 60-61]

EPA must, therefore, conduct a full cost analysis to compare all costs that must be incurred in order to achieve the environmental benefits EPA is claiming in the Proposal. EPA cannot rationally claim an environmental benefit from its Proposal without also accounting for all the costs needed to bring about those environmental benefits. [EPA-HQ-OAR-2022-0829-0733, pp. 60-61]

Organization: American Petroleum Institute (API)

EPA fails to properly account for all of the cost increases associated with the enforcement of gasoline particulate filter (GPF) technologies. The GPF cost model is described in DRIA Chapter 3.2 and GPF cost is included in the OMEGA model. The model anticipates the direct manufacturing cost (DMC) for a bare downstream GPF, which ranges from $51 dollars for a 1.0-liter engine using a relatively low GPF 249 volume to engine displacement ratio, up to $166 dollars for a 7.0 liter engine using a relatively high GPF volume to engine displacement ratio. In the DRIA (page 3-60) GPF cost is based on the ICCT 2011 work, which is now over 10 years old. Further, the EPA assumes that the GPFs that OEMs will utilize to meet more stringent PM and GHG targets will be those new generation of MY 2022 GPFs with "high filtration efficiencies generally over 95 percent" and low backpressure. The assumed costs for MY 2022 GPF with higher efficiency appear to be unreasonably low and caused the modeling to overestimate feasibility. Furthermore, it is not clear if the associated equipment for effective operation of the GPF such as associated sensors and controllers are included in the cost assessment performed by EPA. The agency should reevaluate its assessment based on more realistic efficiency levels to avoid arbitrary and capricious action. [EPA-HQ-OAR-2022-0829-0641, p. 13]

Appendix B:

Detailed Look at the Assumptions Used in the EPA Analysis in the NPRM and the DRIA – Assessment Prepared by Martec

EPA referred to the proposed rule111 as “the most ambitious pollution standards ever for cars and trucks,” while also saving the “average consumer $12,000 over the lifetime of a light- duty vehicle.” EPA has also estimated that the benefits of the proposed standards would exceed costs by at least $1 trillion. In reaching its conclusions, the agency also expects the proposed regulations would require “67% of new light-duty sales” to be solely powered by batteries and new power generation facilities to “fuel” these new BEVs. These changes would require significant changes in the way vehicles are designed, built, and fueled. However, as these changes occur, the agency has promised large savings to the consumer and a net positive impact on the U.S. economy. The following is a detailed look at the assumptions used in the EPA analysis in the NPRM and the DRIA to determine if the claims made are valid. [EPA-HQ-OAR-2022-0829-0641, p. 42]

111 https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-multi-pollutant-emissions- standards-model.

EPA has failed to adequately explain several aspects of their analysis. In order to provide the public with meaningful ability to comment there are several aspects that need further clarification:

- The cost reduction model used in the analysis seems to be based on a model used for part cost reductions driven by improved economies of scale on fixed capital equipment. Given that raw materials make up a significant portion of battery costs, EPA should also use a raw material supply cost model that considers the increasing costs for raw materials with increased supply. [EPA-HQ-OAR-2022-0829-0641, p. 42]

- Cost and price are concepts that the agency uses interchangeably in the regulation. The true cost of the regulation is not fully calculated since the portion of the consumer- facing price is paid for by the government. The agency should fully account for the technical feasibility of any CO2-reducing technology on a cost basis as defined in the CAA regardless of governmental taxation breaks for electric vehicle technology production and sale. [EPA-HQ-OAR-2022-0829-0641, p. 42]

- The cost impact of “fueling” the significant number of electric vehicles assumed in the regulation (67% implied EV share by 2032) is not fully calculated or considered as part of the technical feasibility analysis and cost for the technology. The costs of adding additional solar, wind, and hydropower plants should be considered in the regulation as they are a necessary part of bringing electric vehicles to market. [EPA-HQ-OAR-2022-0829-0641, p. 42]

13.1.2.1 Proposed GHG Standards

Incremental Costs per vehicle for the proposed standards (compared to the No Action case) are summarized by regulatory class in Table 13-45 and by body style in Table 13-46 [EPA-HQ-OAR-2022-0829-0641, pp. 49-50]

Table 13-45: Projected Manufacturing Costs Per Vehicle, Proposed Standards

	2027	2028	2029	2030	2031	2032
Cars	$249	$102	$32	$100	$527	$844
Trucks	$891	$767	$653	$821	$1,100	$1,385

Total $633 $497 $401 $526 $866 $1,164 [EPA-HQ-OAR-2022-0829-0641, pp. 49-50]

We question the rationale for requiring 67% BEV sales for compliance by 2032 but not accounting for the cost of these BEVs over the existing regulation as part of the regulatory impact analysis. Using Argonne's battery cost values from BatPaC we would expect an average cost of ~$12,000 for the battery system to be accounted for in the analysis. Additionally, the agency also assumes a cost of ~$3,500 for electric drive units, inverters, and charging systems. [EPA-HQ-OAR-2022-0829-0641, pp. 49-50]

Removing the cost of the ICE powertrain and components from the vehicle would leave ~$7,500 to be accounted for in the regulation. With a 67% BEV market share assumption, this would be ~$5,000 compliance cost, not $1,164 as shown in the DRIA. [EPA-HQ-OAR-2022-0829-0641, pp. 49-50]

The agency needs to fully account for the costs of the regulation requiring 67% of BEVs to be sold by 2032 and not use incremental costs above the assumed volume of BEVs by the automakers themselves. [EPA-HQ-OAR-2022-0829-0641, pp. 49-50]

Required Updates

EPA must accurately assess the financial costs the proposed regulation would impart on the U.S. consumer. Accordingly, EPA should:

- Use a raw material supply cost model that considers the increasing costs for raw materials with increased supply. Automotive battery costs are largely driven by raw materials (63% of total cost) and sources for these raw materials are becoming increasingly more expensive. [EPA-HQ-OAR-2022-0829-0641, p. 51]

- Include the cost of all vehicles that are needed to meet the regulation not merely the additional volume of vehicles needed to meet the regulation over the assumed electric vehicle volumes of the automakers. [EPA-HQ-OAR-2022-0829-0641, p. 51]

- Fully account for the technical feasibility of any CO2-reducing technology on a cost basis as defined in the CAA regardless of governmental taxation breaks for electric vehicle technology production and sale. [EPA-HQ-OAR-2022-0829-0641, p. 51]

- Consider the costs of adding additional solar, wind, and hydropower plants in the regulation as they are a necessary part of bringing electric vehicles to market as described by EPA. [EPA-HQ-OAR-2022-0829-0641, p. 51]

Failure to do so would be arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0641, p. 51]

Organization: Anonymous

3. EPA incorrectly models its baseline

EPA's analysis shows that the proposed standards will reduce the compliance cost to certain manufacturers. For example, Honda could save over a $1,000 per vehicle in 2027 and 2028 if it chose the compliance pathway selected by EPA. This makes no sense from a cost-benefit analysis. The takeaway here is that manufacturers are choosing to forgo reducing costs to sell the same or less vehicles, meaning vehicle manufacturers are acting irrationally. A proper baseline should assume that manufacturers will act rationally and will produce vehicles that maximize profits (either through reduced costs or increased sales). EPA's analysis fails this very basic tenet. [EPA-HQ-OAR-2022-0829-0565, pp. 3-4]

One justification that EPA proffers for this irregularity is how it employs learning curves. EPA assumes that technologies will become cheaper over time as manufacturers learn to produce vehicles. While this is generally an accepted fact of new technologies, EPA doesn't clarify why Ford producing more battery electric vehicles in 2027 because of EPA's proposed standards will reduce the cost to Honda and Tesla. In essence, EPA takes a very generalized concept of learning over a long-period of time across industry to incorrectly reduce the costs at a firm level. For this to actually happen, some manufacturer like Ford would have to inform other manufacturers about how they improved their battery production process and for that new process to have the same effect on another manufacturer AND that other manufacturer being able to employ that new technique within the same model year. All of these assumptions are ludicrous and do not reflect how competing firms protect their trade secrets or how long it takes to design or change a vehicle line. [EPA-HQ-OAR-2022-0829-0565, pp. 3-4]

Organization: Arizona State Legislature

2. The proposed rule fails to rely on a cost-benefit analysis. EPA did not rely on a cost-benefit analysis to select the standards in the proposed rule, in contravention of statutory and case-law requirements. [EPA-HQ-OAR-2022-0829-0537, p. 2]

Organization: California Air Resources Board (CARB)

Regulatory Impact Analysis

CARB has reviewed U.S. EPA's Draft Regulatory Impact Analysis (DRIA) and finds that U.S. EPA's estimates of the costs and benefits associated with the proposed standards are appropriate and broadly consistent, where applicable, with comparable assumptions California used in its rulemaking. In general, CARB finds that U.S. EPA has taken a conservative approach to estimating net benefits. Despite this conservative approach, there are dramatic net benefits from even the most stringent alternative. CARB has identified three specific areas where U.S. EPA is likely underestimating net benefits, explained below, although these are not intended to represent an exhaustive list. While CARB does not necessarily recommend that U.S. EPA revise its analysis based on these comments, these findings suggest that directionally the net benefits of the proposed standards are even greater than what U.S. EPA has assessed. [EPA-HQ-OAR-2022-0829-0780, p. 48]

Organization: California Attorney General's Office, et al.

Our States and Cities add three observations to EPA's analysis of costs and lead time. First, EPA's projected costs likely overstate the actual costs attributable to reaching the standards in the allotted lead time, due to conservative assumptions in EPA's no-action case that omit the myriad state and local actions to promote electric vehicle adoption. See supra 18-21; CARB Comment at 16. Second, state and local agencies are implementing ambitious programs to ready power grids and charging infrastructure for the increased adoption of electric vehicles and the associated increase in electricity demand, which further supports EPA's feasibility analysis. Third, although internal-combustion-engine vehicles will make up a smaller portion of the national fleet, it is imperative that EPA's standards continue to encourage the application of feasible, cost-effective emission-reduction technologies to these vehicles, as they still represent a significant source of GHG, criteria, and toxic pollutant emissions. [EPA-HQ-OAR-2022-0829-0746, p. 33]

First, while we agree with EPA's decision to project the proposed standards' technology costs out to 2055, to promote a robust comparison with the benefits also projected for the same period, id. at 29,364-5, EPA should enhance the public's understanding of this rule's costs by providing more context for these numbers. Because the automotive industry's light- and medium-duty fleets are so large, the technology costs projected through 2055 are relatively modest when distributed over the number of vehicles they cover: more than 400 million vehicles sold over almost three decades. EPA should consider disclosing the aggregate technology costs in Table 160 as per-vehicle costs, as it has done in other parts of the Proposal. See id. Per-vehicle cost figures are particularly informative, because auto manufacturers are likely to pass at least a portion of these costs down to consumers, who will more than recoup any such price increases through reduced operating and ownership costs. Id. at 29,328. And, in the same spirit that EPA explored sensitivities to ACCII coming into effect, id. at 29,335, EPA should disclose to what extent the proposed standards' projected costs through 2055 would be reduced if ACCII were included in the no-action scenario. [EPA-HQ-OAR-2022-0829-0746, p. 36]

Second, the auto industry has already invested hundreds of billions of dollars in transitioning to electric vehicles.189 These investments cover many of the technology costs that EPA anticipates the industry will expend to comply with the proposed standards. While it may be difficult to parse to what extent this investment responds to consumer demand, business strategy, or state policies and to what extent this investment anticipates federal regulation, EPA should note that the auto industry has committed at least some of the technology costs projected in Table 160 long before these standards were proposed. [EPA-HQ-OAR-2022-0829-0746, p. 37]

189 Noah Gabriel, $210 Billion of Announced Investments in Electric Vehicle Manufacturing Headed for the U.S., Atlas EV Hub (Jan. 12, 2023), available at https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-headed-for-the-u-s/ ("Vehicle manufacturers and battery makers plan to invest $860 billion globally by 2030 in the transition to EVs. Nearly a quarter, $210 billion, is expected to be invested in the United States, more than in any other country.").

Organization: Clean Fuels Development Coalition et al.

The agency's proposal is audacious. Racing past the Biden administration's goal "to make half of all new vehicles sold in 2030 zero-emissions vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles,"1 EPA has proposed that 60 percent of new light-duty vehicles be battery electric by 2030, and 67 percent by 2032. This electrification mandate is nominally in service of reducing greenhouse-gas emissions from the transportation sector. But EPA has chosen a staggeringly cost-ineffective way to achieve this end. By the agency's own math, the pro- posed rule would reduce CO2 emissions from the baseline by 232 million metric tons at cost of $86 billion during the compliance years of 2027 to 2032: roughly $370 per ton of CO2.2 That is a very bad deal. By way of comparison, reducing emissions by investing in nearly any other energy efficiency or renewable energy technology would be at least four times cheaper. See Kenneth Gillingham, The True Cost of Reducing Greenhouse Gas Emissions, International Monetary Fund, Finance & Development (Dec. 2019), https://www.imf.org/external/chinese/pubs/ft/fandd/2019/12/pdf/the true-cost-of-reducing-greenhouse-gas-emissions-gillingham.pdf. Given this, the proposal is illogical, unless it is EPA's intent to squander limited financial resources on the most expensive emission reductions, thus effectively increasing net emissions. [EPA-HQ-OAR-2022-0829-0712, pp. 1-2]

1 FACT SHEET: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks, White House Briefing Room (Aug. 5, 2021), https://www.whitehouse.gov/brief- ing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-ameri- can-leadership-forward-on-clean-cars-and-trucks/.

2 Emissions reductions are from Table 135, 88 Fed. Reg. 29,348. Costs include EPA's calculated vehicle technology costs, Table 160, id. at 29,364–65 , Electric Vehicle Supply Equipment (EVSE) costs, Table 165, id. at 29,367, and refueling costs, Table 166, id. at 29, 367–68.

- Taxpayer subsidies: Taxpayers subsidize the sales of electric vehicles, charging infrastructure, roads, and the electricity generation, transmission, and distribution required to power these vehicles. The proposal currently ignores these costs, counting them instead as "transfers."5 88 Fed. Reg. 29,369. [EPA-HQ-OAR-2022-0829-0712, pp. 6-7]

5 As described below, the many direct subsidies (federal and state electric vehicle credits, charging credits, etc.) and regulatory subsidies (EPA multiplier credits, NHTSA multiplier credits, state ZEV credits, etc.) result in real costs to taxpayers and the consumers of the many products that cross-subsidize these "preferred" products. These costs cannot be treated as "transfers" that are cost-free, and they absolutely cannot be treated as "transfers" to circumvent the economic significance prong of the major questions doctrine.

C. The proposal manipulates timelines to inflate the benefits of the rule.

Finally, EPA's cost-benefit calculations are arbitrary because it extends its calculations to 2055. Thirty years into the future is far past the date when EPA can make reasonable projections. The agency only chose this time frame because it provides enough time for abstract and speculative benefits to "accrue," while very high initial costs of the proposal are averaged out or ameliorated by future adoption of currently nonexistent technologies, efficiencies, and improvements. This is all the more absurd when one considers that the social cost of carbon inputs rely on projections about costs and benefits 300 years in the future. This is the time horizon of science fiction and futurism, not technocratic policymaking under the Clean Air Act. In the long run, no doubt, the accounts all balance out, but only because "[i]n the long run we are all dead." J. Keynes, Tract on Monetary Reform 88 (1924) (emphasis omitted). [EPA-HQ-OAR-2022-0829-0712, pp. 22-23]

E. The sum of these miscalculations means that vehicle technology costs will be much higher than the agency projects.

Taken together, each of EPA's unreasonable projections dramatically reduced projected vehicle technology costs. Adding the additional costs missed by ignoring current cross subsidization, underestimated battery costs, and the limited availability of Clean Vehicle tax credits to the proposal's projected vehicle technology costs raises those costs from a total of $59.6 billion between 2027 and 2032 to between $339 billion and $1.09 trillion during the same span. See Figure 6. This is a cost of between $22,000 and $72,000 per electric vehicle sold. It would be impossible for automakers to sell more than a tiny share of electric vehicles if those vehicles were priced accordingly. Failing to account for the "cost of compliance" in this way violates the agency's statutory obligations and at the very least renders the rule arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0712, pp. 24-25]

SEE ORIGINAL COMMENT FOR Figure 6: Projected vehicle technology costs accounting for cross subsidies, increased battery costs, and decreased availability of the Clean Vehicle Credit. [EPA-HQ-OAR-2022-0829-0712, pp. 24-25]

IV. The Proposed Rule Fails to Adequately Consider Other Costs.

When an agency relies "on a cost-benefit analysis as part of its rulemaking, a serious flaw undermining that analysis can render the rule unreasonable." National Ass'n of Home Builders v. EPA, 682 F.3d 1032, 1040 (D.C. Cir. 2012). EPA's cost- benefit analysis suffers from "serious flaw[s]" on both sides of the ledger. First, as detailed at length above, the proposal dramatically underestimates the vehicle costs. But the proposal also engages in an unreasonable cost-benefit analysis in several other ways. The proposal underestimates the costs of charging infrastructure while inflating the benefits of the rule: ignoring emissions when convenient, relying on outrageous social costs of carbon calculations that rely on projections of benefits hundreds of years in advance to inflate the present benefit, and gerrymandering vehicle class and compliance timelines to obscure the real impacts of the rule. These flaws render the proposed rule unreasonable. [EPA-HQ-OAR-2022-0829-0712, pp. 32-33]

Organization: Environmental. and Public Health Organizations

Alternative 1 also provides greater pollution reductions and societal benefits than the Proposed Standards. Under EPA's modeling, Alternative 1 would avoid 8,100 million metric tons (MMT) of CO_2 emissions through 2055 relative to the No Action scenario, id. at 29203, tbl. 14, in contrast to the 7,300 MMT avoided under the Proposed Standards, id. at 29198, tbl. 3. Alternative 1 also provides greater reductions in criteria pollutants and air toxics. Compare id. at 29198-99, tbls. 4 and 5, to id. at 29203-05, tbls. 13-16. In addition, Alternative 1 has greater societal net benefits: ranging from $1,500-2,500 billion through 2055, id. at 29205-06, tbl. 17 (3% discount rate), depending on the values used for the GHG emission reductions, versus a range of $1,400-2,300 billion under the Proposed Standards. Id. at 29200, tbl. 6. [EPA-HQ-OAR-2022-0829-0759, p. 25]

V. Outside Analysis Demonstrates the Significant Benefits of Stronger Emission Standards, Particularly Alternative 1 with a Steeper Increase in Stringency After 2030.

Outside analysis also shows the benefits of adopting final standards stronger than EPA proposed. Environmental Resources Management, Inc (ERM), one of the largest sustainability consultancies globally, was commissioned by NRDC to provide an independent, third-party analysis of EPA's proposed standards and alternative proposals, as well as a recommended approach. ERM's methodology, assumptions, and results are described throughout this section, and the ERM report is attached to this comment letter.104 ERM's analysis shows that Alternative 1 with a steeper increase in stringency after 2030 would produce significant societal benefits. [EPA-HQ-OAR-2022-0829-0759, p. 26]

104 Dave Seamonds, et al., ERM, Impacts of EPA Light-& Medium-Duty Multi-Pollutant Standards: National Scenario Results, June 2023 [hereinafter ERM, Impacts Report] (attached to this comment letter).

ERM's analysis employed a modeling framework that leveraged EPA's tools to inform and develop inputs to ERM's Benefit-Cost Analysis (BCA) framework. It is important to note that while this analysis is based on EPA's "baseline" scenario, we believe this "baseline" is ultimately not an accurate reflection of a "No Action" scenario, as it is overly conservative. We explore this further in Section XV, but ultimately the most relevant of the analyses that EPA considered supports baseline ZEV sales greater than the baseline levels projected in the "EPA No Action" scenario. [EPA-HQ-OAR-2022-0829-0759, p. 26]

Where possible, ERM mirrored EPA's methodology to keep its analytical approach and resultant comparisons consistent with EPA's approach in the Proposal, and to allow for an apples-to-apples comparison. [EPA-HQ-OAR-2022-0829-0759, p. 26]

ERM utilized EPA's CO-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool to assess the public health benefits of the scenarios. [EPA-HQ-OAR-2022-0829-0759, p. 28]

ERM conducted five interconnected analyses as part of this BCA:

- Fuel Use and Emissions: Specifically, ERM assessed changes in fuel consumption (for diesel, gasoline, and electricity) and the tailpipe and upstream emissions associated with each fuel change for GHGs (CO2, CH4, N2O) and criteria pollutants (NOx and PM) for the various policy scenarios. Reductions in emissions are then monetized using EPA's COBRA model and EPA's Social Cost of GHGs.107 Because EPA's analysis (which this is intended to mirror) neither reflects any policies to clean up the grid nor a future grid consistent with the administration's climate goals, this likely understates disparities between scenarios with differing electric car/light-truck deployment. [EPA-HQ-OAR-2022-0829-0759, p. 28]

107 ERM utilized the interim social cost of GHG values presented by EPA in DRIA Tables 10-13, 10-14, and 10-15 (3 percent discount rate). Costs were escalated to 2021$ to be consistent with other costs in the ERM model.

- Health Impacts: This analysis assumes reductions in NOx and PM under the various policy scenarios to understand the resulting public health implications associated with reducing these emissions and calculates changes in premature deaths, hospital visits, and lost workdays. The analysis also monetizes these net health benefits. As above, these impacts are inherently understated in an effort to mirror EPA's work. [EPA-HQ-OAR-2022-0829-0759, p. 29]

- Economic Analysis: ERM assessed changes in consumer purchasing behaviors and vehicle costs, fuel costs, and maintenance practices, and how these factors could change in a more electrified fleet. This analysis also examines capital expenditures for charging infrastructure investments (i.e., purchase, installation, and maintenance). [EPA-HQ-OAR-2022-0829-0759, p. 29]

- Utility Impacts Analysis: ERM assessed impacts on utilities and their customers, including an analysis of electricity used to charge vehicles and the incremental load to the grid. The analysis also calculates utility net revenue (revenue minus costs) and potential reduction in electric bills for all utility customers that results from this net revenue. The gap analysis shows the infrastructure needs and associated costs under the different policy scenarios. [EPA-HQ-OAR-2022-0829-0759, p. 29]

Organization: Institute for Policy Integrity at New York University School of Law

C. EPA Should Better Contextualize the Proposed Rule's Economic Significance, in Both Relative and Absolute Terms

EPA could better insulate the Proposed Rule from a future major questions challenge by providing a more nuanced discussion of economic effects, both as compared to prior EPA tailpipe rules and in absolute terms.64 In terms of relative costs, the Proposed Rule already notes that the estimated average cost to manufacturers per vehicle is within the range of costs projected in prior tailpipe rules.65 EPA could strengthen this point by also providing a table that comprehensively describes annualized costs of prior tailpipe rules updated for inflation.66 This table would bolster EPA's conclusion that the costs of the Proposed Rule are not exceptional. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

64 EPA does make clear that the projected BEV penetration rate of 67% by 2032 should be compared to the projected 39% penetration under the No Action case, not today's penetration rate. Compare Proposed Rule, 88 Fed. Reg. at 29,329 tbl. 80, with id. tbl. 81.

65 Proposed Rule, 88 Fed. Reg. at 29,343.

66 Governing for Impact & Evergreen Action, Comment Regarding NPRM "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles" 10–12 (July 5, 2023).

EPA should further underscore this point by explaining that this cost similarity with prior regulations obtains even though the Proposed Rule would simultaneously establish GHG and criteria pollutant standards, instead of only one or the other. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

In terms of absolute economic significance, EPA discusses BEV adoption primarily in terms of the annual percentage of new vehicle sales,67 but an even more useful statistic would be the percentage of BEVs out of all the vehicles on the road at a given time. First and foremost, doing so would help the public better comprehend the rule's anticipated effects. It may be easier to conceptualize increased vehicle electrification in terms of the percentage of vehicles on the road, rather than the percentage of new sales. Presenting the data in this way would also help the public to better understand how the Proposed Rule would affect transportation emissions, the need for charging infrastructure, the demand for gasoline, and the demand for vehicle repair and maintenance services. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

67 Proposed Rule, 88 Fed. Reg. 29,329 tbl.80.

In terms of the major questions doctrine, reporting such data would provide compelling context regarding economic significance. For example, under the proposed program, in 2032, new vehicle sales would be 67% BEVs compared to 39% under the No Action case.68 But BEVs would comprise only 21.2% of the total fleet compared to 15% for the No Action case.69 [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

68 Id. & id. at 29,329 tbl.81.

69 This presentation would also enable a more apt comparison to the stock numbers of electricity generation that the Supreme Court noted in West Virginia's background section. West Virginia, 142 S. Ct. at 2593.

The RIA provides two figures that relate to this issue: Figure 9-1 depicts the total number of internal combustion engine (ICE) vehicles on the road every year under the proposed program, and Figure 9-2 does the same for BEVs.70 Using EPA's data underlying these two figures,71 Policy Integrity generated the table below showing percentage rates by year for the No Action case, EPA's proposed program, and Alternative 1. (For brevity, this table provides figures annually from 2027–2032, and then every five years beginning in 2035.) EPA should provide such a table or similar information in the regulation. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

70 RIA at 9-2 tbls. 9-1, 9-2.

71 Optimization Model for Reducing Emissions of Greenhouse Gases from Automobiles, EPA (Apr. 2023), https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions- greenhouse-gases (download "Light- and medium-duty effects (zip); select "20230315_091353_effects_central"; select "20230315_091353_cost_effects_annual.csv"; refer to "registered_count").

Table 1: Share of BEVs in U.S. Fleet by Year

Year	No Action BEV %	Proposed Program BEV %	Alt. 1 BEV %
2027	5.2%	5.7%	5.7%
2028	6.9%	8.1%	8.3%
2029	8.9%	11.1%	11.2%
2030	11.0%	14.3%	14.6%
2031	13.1%	17.7%	18.0%
2032	15.0%	21.2%	21.6% [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]
2035	19.2%	30.8%	31.7%
2040	24.6%	44.1%	46.0%
2045	27.4%	52.6%	55.3%
2050	28.4%	56.6%	59.8%
2055	29.2%	58.1%	61.5% [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

As Table 1 illustrates, under both the proposed program and Alternative 1, the share of BEVs out of all cars in the U.S. vehicle fleet compared to the No Action case increases gradually, reaching less than seven percentage points higher than the No Action case by 2032. This difference increases in later years. This relatively slow growth—particularly when viewed in comparison to the share of all vehicles sold per year, which EPA provides in the Proposed Rule—is not surprising given that cars remain on the road for many years, and the new cars sold in a single year reflect a small percentage of vehicles on the road at that time. [EPA-HQ-OAR-2022-0829-0601, pp. 10-12]

B. EPA Should Conduct Additional Analysis Using the Discounting Approach Laid Out in the Draft Update to Circular A-4

In economics, a discount rate translates impacts that occur at different times into a common present value—the higher the annual discount rate, the less impacts further into the future are valued relative to impacts closer to the present. In the Proposed Rule, EPA generally follows the default approach to discounting laid out in the Office of Management and Budget's Circular A-4 by applying annual discount rates of 3% and 7%.84 While it is reasonable for EPA to rely on the discount rates provided by federal guidance, it is now widely recognized that Circular A-4's discount rates are outdated and too high.85 [EPA-HQ-OAR-2022-0829-0601, pp. 14-15]

84 OFF. OF MGMT. & BUDGET, CIRCULAR A-4: REGULATORY ANALYSIS 33–34 (2003).

85 See, e.g., Peter H. Howard et al., U.S. Benefit-Cost Analysis Requires Revision, 380 SCIENCE 803 (2023); COUNCIL OF ECON. ADVISERS, DISCOUNTING FOR PUBLIC POLICY: THEORY AND RECENT EVIDENCE ON THE MERITS OF UPDATING THE DISCOUNT RATE.

In April, the Office of Management and Budget published a draft update to Circular A-4 that, among other revisions, called for extensive changes in discounting to ensure that long-term benefits and costs receive proper consideration in regulatory impact analysis ("Draft Circular A-4 Update").86 Specifically, the Draft Circular A-4 Update proposes to lower the default, risk-free consumption discount rate used in regulatory impact analysis from the current 3% to 1.7%, based on updated data and extensive economic scholarship.87 Also reflecting current economic literature, the update would eliminate the use of the opportunity cost of capital discount rate (currently estimated at 7%) and replace it with the shadow price of capital approach.88 These updates are consistent with the best available evidence and widely supported by the field's leading experts.89 [EPA-HQ-OAR-2022-0829-0601, pp. 14-15]

86 OFF. OF MGMT. & BUDGET, CIRCULAR A-4: DRAFT FOR PUBLIC REVIEW 9–11 (Apr. 6, 2023) [hereinafter DraftvCircular A-4 Update].

87 Id. at 75–76.

88 Id. at 78–80.

89 Howard et al., supra note 85.

EPA should apply the discounting approach from the Draft Circular A-4 Update in sensitivity analysis if it finalizes this regulation before OMB finalizes that update, and consider applying that approach in its primary analysis should OMB finalize the Circular A-4 Update before this rule is finalized. [EPA-HQ-OAR-2022-0829-0601, pp. 14-15]

Table 3 shows the net benefits of the Proposed Rule and Alternative 1 using the 1.7% discount rate from the Draft Circular A-4 Update (except for climate benefits), which Policy Integrity generated using OMEGA and inputting the 1.7% discount rate. A full result table with all rows from EPA's benefit-cost tables is presented below in the Appendix, as Table A-1. [EPA-HQ-OAR-2022-0829-0601, pp. 14-15]

Table 3: Net Benefits Using 1.7% Social Discount Rate (2020$ Billion)

Proposed

Program Alternative 1

3% discount rate, 3% average SC-GHG from Interagency Working Group 1600 1800

3% discount rate, 2% average SC-GHG from EPA's 2022 Draft Update 2500 2800

1.7% discount rate, 2% average SC-GHG from EPA's 2022 Draft Update 3200 3500 [EPA-HQ-OAR-2022-0829-0601, pp. 14-15]

As Table 3 illustrates, the net benefits of both the proposed program and Alternate 1 roughly double when a 1.7% social discount rate is applied (with a 2% near-term discount rate applied to climate impacts consistent with EPA's draft SC-GHG update). As these updated discount rates are used, the net benefits of Alternate 1 relative to the proposed program also increase. [EPA-HQ-OAR-2022-0829-0601, pp. 14-15]

II. Extensive Justification Supports EPA's Decisions to Omit a 7% Discount Rate and To Discount Long-Term Climate Impacts at a Lower Range of Discount Rates than the Proposed Rule's Shorter-Term Impacts

EPA applies the social cost of greenhouse gases estimates calculated at discount rates of 2.5%, 3%, and 5%,111 consistent with the Working Group's current recommendations, and justifies its decision to return to its prior conclusion that a 7% capital-based discount rate is inappropriate for climate effects. EPA's return to a reasonable range of discount rates to assess climate impacts is well supported—in fact, as recognized by both the Working Group in its 2021 update112 and EPA in the Draft SC-GHG Update,113 discount rates of 2% or lower are appropriate for valuing climate damages. [EPA-HQ-OAR-2022-0829-0743, p. 17]

111 Note that just as there is growing evidence that the discount rate should be below 2%, there is growing evidence that 5% is much too high a discount rate. The values at 5% should be considered a very conservative lower bound.

112 2021 TSD, supra note 4, at 16–22 (offering extensive evidence for the use of lower discount rates and recommending that agencies "consider discount rates below 2.5 percent" for valuing the social cost of greenhouse gases); see also id. at 4 ("Consistent with the guidance in E.O. 13990 for the IWG to ensure that the SC-GHG reflect the interests of future generations, the latest scientific and economic understanding of discount rates discussed in this TSD, and the recommendation from OMB's Circular A-4 to include sensitivity analysis with lower discount rates when a rule has important intergenerational benefits or costs, agencies may consider conducting additional sensitivity analysis using discount rates below 2.5 percent.").

113 In the Draft SC-GHG Update, EPA applies a central near-term discount rate of 2%, with additional valuations using near-term discount rates of 1.5% and 2.5%. The discount rates in the Draft SC-GHG Update also decline over time. See Draft SC-GHG Update, supra note 9, at 3 tbl.ES-1; id. at 52–61 (explaining discounting module).

The RIA cites the Working Group's arguments that, for long-term policies with intergenerational effects, uncertainty and ethical considerations make a 7% capital-based discount rate inappropriate.114 These arguments provide sufficient reason for EPA's approach to discount rates. Moreover, additional justifications support EPA's discounting choices. [EPA-HQ-OAR-2022-0829-0743, p. 17]

114 RIA at 10-11 to 10-12.

First, there is widespread consensus that the consumption rate of interest (which the 3% rate in the current Circular A-4 represents, and the Draft Circular A-4 Update pegs at 1.7%) supplies the correct framework for the analysis of climate effects—not the opportunity cost of capital. While the current Circular A-4 suggests that 7% should be a "default position" that reflects regulations that primarily displace capital investments, it also explains that "[w]hen regulation primarily and directly affects private consumption . . . a lower discount rate is appropriate."116 The 7% discount rate is based on a private sector rate of return on capital, as private market participants typically have short time horizons. By contrast, climate change concerns the public well-being broadly rather than market participants narrowly. Indeed, the Draft Circular A-4 Update acknowledges this consensus, providing an updated consumption rate of interest as the default risk-free discount rate and eliminating the use of the opportunity cost of capital approach in regulatory impact analysis.117 [EPA-HQ-OAR-2022-0829-0743, p. 18]

116 Id. at 33.

117 Draft Circular A-4 Update, supra note 10, at 75–76, 78–80.

Third, a 7% discount rate also ignores catastrophic risks and the welfare of future generations. As EPA showed in a recent cost-benefit analysis, the 7% rate truncates the long right-hand tail of social costs relative to the 3% rate's distribution.124 The long right-hand tail represents the possibility of catastrophic damages. Thus, the 7% discount rate effectively assumes that present-day Americans are barely willing to pay anything at all to prevent medium- to long-term catastrophes. Given that Congress expressed its goal for the Clean Air Act Amendments of 1977 to "[e]nsure the protection of the public health and the environment, both of this and future generations," it would not be reasonable for EPA to discount climate impacts at such a high rate as to effectively ignore the welfare of future generations.125 Moreover, as noted above, NEPA requires agencies to consider the "long-range character of environmental problems,"126 and citing this statutory requirement, the Council on Environmental Quality has advised agencies to apply climate-damage valuations that "discount future effects at rates that consider future generations."127 The 7% discount rate simply does not meet that standard. [EPA-HQ-OAR-2022-0829-0743, p. 19]

124 EPA, Benefit and Cost Analysis for Revisions to Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, at I-4 fig. I-1 (showing the 7% discount rate distribution).

125 H.R. Rep. No. 95-294, 34, 1977 U.S.C.C.A.N. 1077, 1112.

126 42 U.S.C. 4332(2)(F).

127 Council on Env't Quality, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change, 88 Fed. Reg. 1196, 1203 (Jan. 9, 2023).

Fourth, long-term time horizons counsel particularly strongly against applying a capital-based rate. For instance, recent scholarship from Dr. Qingran Li and Dr. William Pizer finds that, given their best estimate of the shadow price of capital, the appropriate social discount rate collapses to the consumption-based rate within just several decades. Consequently, the longer the time horizon of analysis, the less the capital-based rate is applicable— making the opportunity cost of capital approach entirely inappropriate for long-term effects like climate change.128 Citing this scholarship, OMB's Draft Circular A-4 Update centralizes the consumption-based discount rate, which it estimates at 1.7%, as the appropriate risk-free social discount rate for regulatory analysis.129 Particularly given the long time horizon that analysis of climate policies demands, therefore, the capital-based rate is inapplicable. [EPA-HQ-OAR-2022-0829-0743, p. 19]

128 Qingran Li & William A. Pizer, Use of the Consumption Discount Rate for Public Policy Over the Distant Future, 107 J. ENV'T ECON. & MGMT. 1 (2021); Qingran Li & William A. Pizer, Discounting for Public Benefit- Cost Analysis, RES. FOR THE FUTURE 3 (2021).

129 Draft Circular A-4 Update, supra note 10, at 76.

Sixth, a 7% discount rate is inappropriate because it is based on outdated data and diverges from the current economic consensus. Circular A-4's default assumption of a 7% discount rate was published twenty years ago and was based on data from even earlier.132 As OMB's Draft Circular A-4 Update reflects, the economic consensus now supports the use of much lower discount rates. In fact, that update drops the opportunity cost of capital approach altogether and endorses a default, risk-free discount rate of 1.7% for all regulatory impact analyses.133 In a recent article in Science, nearly 20 experts expressed strong support for OMB's proposed discounting update, explaining that the proposal is consistent with the leading scholarship in the field.134 Likewise, the Council of Economic Advisers has called for the use of lower discount rates in regulatory analysis dating back to 2017.135 [EPA-HQ-OAR-2022-0829-0743, p. 20]

132 The 7% rate was based on a 1992 report; the 3% rate was based on data from the 30 years preceding the publication of Circular A-4 in 2003. Id. at 33–34.

133 Draft Circular A-4 Update, supra note 10, at 76.

134 Peter H. Howard et al., U.S. Benefit-Cost Analysis Requires Revision, 380 SCIENCE 803 (2023). Dr. Howard and Max Sarinsky, the other corresponding author of the Science letter, are signatories on this comment.

135 CEA Issue Brief, supra note 121, at 1; see also id. at 3 ("In general the evidence supports lowering these discount rates, with a plausible best guess based on the available information being that the lower discount rate should be at most 2 percent while the upper discount rate should also likely be reduced.").

Seventh and finally, a 7% rate is inappropriate because it is now widely recognized that social discount rates reflecting the opportunity cost of capital, even when appropriate, are far below 7%. The 7% opportunity cost of capital rate reflects numerous factors that do not reflect social returns including a private risk premium, land and resource rents, private returns to social externalities, and market power.136 Recent scholarship from Newell et al. adjusts for these factors and finds an opportunity cost of capital discount rate below 3%.137 [EPA-HQ-OAR-2022-0829-0743, p. 20]

136 Peter Howard & Jason Schwartz, Valuing the Future: Legal and Economic Considerations for Updating Discount Rates, 39 YALE. J. ON REG. 595, 619–20.

137 Richard G. Newell, Brian C. Prest & William Pizer, The Shadow Price of Capital: Accounting for Capital Displacement in Benefit-Cost Analysis, RES. FOR THE FUTURE (2023)..

C. EPA Should Update the Baseline to Ensure Full Consideration of the Inflation Reduction Act

In regulatory impact analysis, the baseline refers to "the best assessment of the way the world would look absent the proposed action."90 Developing an accurate baseline is important for conducting benefit-cost analysis, but challenging when baseline conditions are in flux. That is the case here given last year's passage of the Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

90 Circular A-4, supra note 86, at 15.

To model the baseline for the Proposed Rule, EPA adopts key variables from the Annual Energy Outlook 2021 (AEO 2021), such as fleet size, new vehicle sales shares, fuel prices, electricity prices, and vehicles miles traveled.91 However, AEO 2021 was developed before the IRA's passage and thus does not include the effects of that law. While it was reasonable for EPA to rely on AEO 2021 in this proposal, it should consider adjusting the baseline in the final rule to fully incorporate the IRA's impacts. In particular, according to the 2023 version of Annual Energy Outlook (AEO 2023), the IRA will decrease both short-run and long-run electricity prices relative to the no-IRA case.92 AEO 2023 also projects that the IRA will decrease long-run gas prices, with a minimal short-run impact.93 Gasoline and electricity prices are important modeling inputs, as they affect the relative cost of ownership between ICE vehicles and BEVs and thereby influence the sales of these vehicles. These prices also affect the fuel-cost savings, the rebound effect, and related environmental impacts. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

91 See RIA at 9-1.

92 See infra p. 30 fig.2 (difference between AEO 2023 with IRA (solid-blue line) and AEO 2023's "No IRA" case (dotted-blue line)).

93 See infra p. 30 fig.1 (difference between AEO 2023 with IRA (solid-blue line) and AEO 2023's "No IRA" case (dotted-blue line)).

There are several potential options for EPA to consistently account for the IRA across modeling inputs. One option is for EPA to adopt AEO 2023 for parameters where it currently uses AEO 2021. This would presumably also entail updating future BEV penetration, which, although EPA models separately, is based in part on parameters from AEO 2021. If EPA updates its baseline to incorporate AEO 2023, it should beware that AEO 2023 models only certain aspects of the IRA but does not include the producer-side battery tax credit.94 To blunt the resulting potential underestimate of the IRA's full impact, EPA should consider using the "High uptake of the IRA" sensitivity case provided in AEO 2023. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

94 U.S. Energy Information Administration, Transportation Demand Module Assumptions 26 (Mar. 2023), https://www.eia.gov/outlooks/aeo/assumptions/pdf/TDM_Assumptions.pdf.

If updating the baseline to AEO 2023 is infeasible, a more feasible alternative may be for EPA to continue to use AEO 2021 as its baseline and then add the IRA's impact on other parameters on top of that. Data within AEO 2023 enables this type of assessment, as AEO 2023 provides sensitivity analysis in which it models the world with and without the IRA.95 This enables a direct comparison to assess the IRA's effect on key parameters, including electricity prices and gas prices.96 As noted above, EPA should consider adopting the "High uptake of the IRA" sensitivity case in AEO 2023 for comparison purposes.97 [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

95 See Projection Tables for Side Cases, Annual Energy Outlook 2023, https://www.eia.gov/outlooks/aeo/tables_side_xls.php (providing tables for "No IRA" case).

96 EPA acknowledges that it has estimates of future retail electricity prices that account for the IRA and that these estimates exhibit lower prices compared to a scenario without the IRA. But due to the absence of corresponding information on gasoline price estimates under the IRA and a desire for consistency across variables and model components, EPA opts not to use these estimates. RIA at 2-84.

97 See Projection Tables for Side Cases, supra note 95 (providing tables for “High uptake of the IRA” case).

This modeling adjustment could have meaningful effects (though it’s unclear whether this would increase or decrease net benefits overall, and it would almost certainly not change the sign or ordering of net benefits). According to projections from AEO 2023, the retail electricity price for transportation could be lower by an average of 0.45 cents per kWh from 2027 to 2032 under a high-IRA uptake scenario compared to a scenario without the IRA. This could translate to a decrease of about $50 in the “generalized cost,” 98 i.e. the purchase price net of vehicle ownership and operation costs.99 The lower cost of operating an electric vehicle would translate to greater BEV uptake than EPA projects in its baseline fleet. This suggests, among other implications, that the Proposed Rule’s compliance costs may be lower than EPA projects, since automakers may already be closer to complying with the proposed standards under the baseline than EPA recognizes. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

98 Considering the average EV efficiency at 3 miles per kWh, a reduction of 0.45 cent per kWh equates to a savings of 0.15 cents per mile. Incorporating EPA’s assumptions for consumer fuel-cost calculations in their purchase decision—with an annual mileage of 12,000 miles, a 2.5-year fuel-cost valuation period, and a fueling efficiency factor of 0.9—this saving translates to around $50 = 2.5(years) ×{0.15(¢/mile)×12,000(miles/year)÷100(¢/$)}÷0.9.

99 Both producers and consumers use this metric in their decisionmaking processes. See RIA at 4-2 to 4-4.

The Appendix below includes four figures illustrating the data presented in this section. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

In addition to EPA’s consideration of international reciprocity and cooperation in prior rulemakings, agencies have also considered transboundary spillover effects in making key decisions. As one example, when considering the “public interest” in the certification of natural gas exports under the Natural Gas Act,102 the Department of Energy routinely “consider[s] international trade policy, foreign policy, and national security interests.”103 As another example, the Food and Drug Administration also frequently considers international effects as part of its regulatory decision making, and has recognized that such costs are particularly relevant because “a portion of foreign costs could be passed on to domestic consumers.”104 [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

102 15 U.S.C. § 717b(a).

103 New Policy Guidelines and Delegation Orders from Secretary of Energy to Economic Regulatory Administration and Federal Energy Regulatory Commission Relating to the Regulation of Imported Natural Gas, 49 Fed. Reg. 6684, 6688 (Feb. 22, 1984).

104 Requirements for Additional Traceability Records for Certain Foods, 87 Fed. Reg. 70,910, 71,071 tbl.2 (Nov. 21, 2022).

Courts have confirmed that agencies may—and, in some cases, must—take into account international spillover effects. In 2020, the U.S. Court of Appeals for the Ninth Circuit rejected a Bureau of Ocean Energy Management approval of an offshore oil drilling and production facility after the agency concluded that domestic extraction would not affect international fossil-fuel supply and consumption.105 As the court explained, because domestic production causes "foreign consumers [to] buy and consume more oil"—and because that consumption "can be translated into estimates of greenhouse gas emissions" that harms the United States—the agency had an obligation to consider those increased foreign emissions resulting from domestic action.106 Two subsequent district court opinions similarly faulted Department of Interior analyses for omitting the effects of domestic production on foreign demand and consumption.107 The fact that courts have required agencies to consider the spillover impacts from foreign greenhouse gas emissions provides strong support for EPA's consideration of spillovers from domestic emissions. [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

105 Ctr. for Biological Diversity v. Bernhardt, 982 F.3d 723, 738 (9th Cir. 2020).

106 Id .

107 Sovereign Iñupiat for a Living Arctic v. Bureau of Land Mgmt., 555 F. Supp. 3d 739, 764–67 (D. Alaska 2021); citing Friends of the Earth v. Haaland, No. CV 21-2317 (RC), 2022 WL 254526, at [Star]14–15 (D.D.C. Jan. 27, 2022).

Consistent with these examples, the Draft Circular A-4 Update recognizes that relevant benefits and costs to consider in regulatory impact analysis include both effects that "result directly from a regulation's domestic applicability" and those that result "indirectly from a regulation's impact on foreign entities."108 With regard to the latter category, the Draft Circular A-4 Update explains that relevant impacts "include the effects of a regulation on U.S. strategic interests, including the potential for inducing strategic reciprocity or other policy changes from actors abroad or effects on U.S. government assets located abroad," which "are particularly likely to occur when [a] regulation bears on a global commons or a public good."109 Additionally, the Draft Circular A-4 Update states that relevant impacts include "those that occur entirely outside the United States when they affect U.S. citizens and residents."110 [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

108 Draft Circular A-4 Update, supra note 10, at 9.

109 Id.

110 Id.

As all of these examples illustrate, EPA's consideration of climate damages on a global scale is consistent with how EPA and other agencies have exercised regulatory authority in numerous contexts. [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

A. EPA Is Required to Value Climate Damages, and Doing So Provides Balance to EPA's Cost-Benefit Analysis

One objection to agency usage of the Working Group's estimates is that Congress, not the executive branch, should set policy with respect to climate change. But EPA has broad authority to assess climate impacts, and judicial precedent suggests that it must value climate- change impacts as part of its regulatory impact analysis. In fact, assessing climate damages as part of its regulatory impact analysis provides rationality and balance to EPA's approach—and does not, as critics have suggested, inappropriately skew the analysis. [EPA-HQ-OAR-2022-0829-0743, p. 22]

Organization: International Council on Clean Transportation (ICCT)

The total benefits of the proposal exceed the total cost. Per EPA's estimate, the overall technology cost of the proposal ranges from $180 billion to $280 billion for automakers (in 2020 dollars) through 2055. However, the consumers will benefit from the pre-tax fuel savings that range from $450 to $890 billion, and repair and maintenance savings from $280 to $580 billion. In addition, the social benefits include $330 billion in climate benefits and between $63 and $280 billion in criteria pollutant reduction benefits. [EPA-HQ-OAR-2022-0829-0569, p. 55]

The proposal states that the estimated average costs for automakers to meet the proposed standards would range from $200 to $1,600 (in 2020 dollars) per vehicle in MY 2032, across the range of sensitivities. Per EPA's analysis, this estimated MY 2032 average costs of $1,200 represent under three percent of the average cost of a new vehicle today (about $46,000 in 2022). This cost resonates with previous 2012 and 2021 rules which estimated that the cost to meet standards were about $1,800 (2010 dollars) and $1,000 (2018 dollars) per vehicle. Similarly, previous ICCT analysis shows that the cost for an ICE vehicle to meet the 2012 rules or Tier 2 standards would range from $405 to $690.145. [EPA-HQ-OAR-2022-0829-0569, p. 55]

145 Sanchez, F., Bandivadekar, A., and German, J. (2012). Estimated cost of emission reduction technologies for Light-Duty vehicles. International Council on Clean Transportation. https://theicct.org/wp-content/uploads/2021/06/ICCT_LDVcostsreport_2012.pdf

Organization: Jack Spencer

The proposed rule's impact on low-income Americans is vastly under analyzed in the proposed rule's publication in the Federal Register and the Draft Regulatory Impact Analysis. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

Fully Monetize the Proposed Rule's Impact on Low-Income Households [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

Though the proposed rule acknowledges "that increases in upfront purchase costs are likely to be of particular concern to low-income households," it goes on to state on page 29368 that "we look more closely into, but do not monetize, the effects of the standards on low-income households and on consumers of low priced new vehicles and used vehicles." [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

Neglecting to fully account for the monetized impact of a proposed rule on disproportionately impacted populations is an inexcusable oversight and matter of gross negligence. Academic research has long demonstrated that environmental regulations impose a higher cost on low-income Americans as compared to the population generally.2 [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

2 Graham, John D., "Saving Lives Through Administrative Law and Economics," University of Pennsylvania Law Review," P. 521, 2008-2009, (https://biotech.law.lsu.edu/blog/graham157upalrev3952008pdf.pdf)

The reality is that environmental regulations increase vehicle costs substantially. One academic study investigated the combined costs of all National Highway Traffic Safety Administration, Environmental Protection Agency, and California Air Resources Board light duty-regulations and found that they increased vehicle prices by $6,000 to $7,000. Put another way, environmental regulation increases the purchase price of most vehicles by 15-20 percent. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

Given that 12.8 percent of Americans live in poverty3 and that the mean income for the lowest two quintiles of American incomes is $13,165 and $34,7674, respectively, low-income Americans are already being financially disadvantaged by environmental regulation. According to Kelly Blue Book, the five least expensive sedans available in 2023 cost between $16,490 and $18,500.5 At current prices, a new car is already beyond the reach of most low-income Americans, which is one reason why only around 17 percent of low-income households purchase new cars.6 Given that, according to Cars.com, the top five least expensive electric vehicles (EVs) range from $27,495 to $35,4857, the proposed rule will undoubtedly make new vehicles unaffordable for nearly all low- income Americans and make purchasing even used vehicles more difficult, if not impossible. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

3 Benson, Craig, United States Census Bureau, “Poverty Rate of Children Higher Than National Rate, Lower for Older Populations,” October 4, 2022, (https://www.census.gov/library/stories/2022/10/poverty-rate-varies-by-age- groups.html).

4 Bureau of Labor and Statistics, “Table 1101. Quintiles of Income Before Taxes: Annual Expenditure Means, Shares, Standard Errors, and Coefficients of Variation, Consumer Expenditure Surveys, 2021,” (https://www.bls.gov/cex/tables/calendar-year/mean-item-share-average-standard-error/cu-income-quintiles-before- taxes-2021.pdf).

5 “Cheapest Sedans of 2023 & 2024,” Kelly Blue Book, (https://www.kbb.com/cheapest-cars/cheapest-sedans/).

6 Klein, Nicholas J., Basu, Rounaq, and Smart, Michael J., “In the Driver’s Seat: Pathway to Automobile Ownership for Lower-Income Households in the United States,” Transportation Research Interdisciplinary Perspectives 18, p. 4, ” 2023, (https://www.sciencedirect.com/science/article/pii/S2590198223000349#:~:text=The%20Survey%20of%20Househ old%20Economics,compared%20with%2013%20%25%20of%20households).

7 “Here are the 11 Cheapest Electric Vehicles You Can Buy,” Cars.com, June 23, 2023, (https://www.cars.com/articles/here-are-the-11-cheapest-electric-vehicles-you-can-buy-439849/).

This is an unacceptable outcome for any regulation as research firmly establishes that access to a car comes with a litany of positive social benefits including upward economic mobility, public safety benefits, and healthcare and education opportunities.8 Any public policy that could threaten access to autos for low-income households should be a nonstarter. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

8 Klein, N. J., “Subsidizing Car Ownership for Low-Income Individuals and Households,” Journal of Planning Education and Research, 2020, (https://doi.org/10.1177/0739456X20950428).

Conclusion

Research shows that low-income Americans too often carry the disproportionate financial burden of environmental regulation. That is bad enough but this regulation goes further by making car ownership more expensive and putting it out of reach of more people. Given that car ownership is a key component for many Americans to lift themselves out of poverty, any regulation that threatens such should be a nonstarter. Though ceasing any action on this regulation would be the best outcome, I implore you to at the very least, take the time to fully monetize and account for the financial burdens you are asking America’s low-income families to endure [EPA-HQ-OAR-2022-0829-0681, p. 3]

Organization: Kentucky Office of the Attorney General et al.

The Agency's cost-benefit assessment is wrong, too, in large part because it leans so heavily on the shaky "social cost of greenhouse gases" metric. And in EPA's rush to press forward "with haste and ambition" to tackle climate change, Timothy Puko, Biden to remake U.S. auto industry with toughest emissions limits ever, Wash. Post (April 12, 2023), https://bit.ly/3qBALKe, EPA blows past red flags about the very possibility of achieving the Proposed Rule's aims—as well as the serious consequences along the way. A more careful look at these issues shows why the Proposed Rule, if left uncorrected, would damage our economy, tax our electrical grids and the families and businesses who depend on them, and threaten our national security. For these and other reasons explained below, the undersigned Attorneys General urge EPA to reconsider the Proposed Rule. [EPA-HQ-OAR-2022-0829-0649, p. 3]

Organization: Office of Wyoming Governor Mark Gordon

The University of Wyoming, School of Energy Resources' Center for Energy Regulation and Policy Analysis published a briefing paper on the proposed rule which analyzes the estimated economic impact of the rule in its current form. There is a drastic difference in the EPA's claimed economic benefits and the reality of the available data. I ask that the EPA take a hard look at the valid disparities listed, and adjust their claims accordingly. If the EPA is pushing for mandated EV technology, the full picture should be available for public examination. [EPA-HQ-OAR-2022-0829-0675, p. 1]

Organization: Our Children's Trust (OCT)

We also ask that the EPA revise its Draft Regulatory Impacts Analysis so that it reflects the true costs of climate change, the true benefits of more swiftly electrifying the transportation sector, and utilizes no discount rate or a discount rate that does not discriminate against children and future generations. EPA must align its rulemaking with the best available science to protect children. [EPA-HQ-OAR-2022-0829-0542, p. 1]

Organization: Paul Bonifas and Tim Considine

The Environmental Protection Agency (EPA) claims that the benefits outweigh the costs for their proposed Electric Vehicle (EV) Rule and purport $1.6 trillion ($1,600 billion) in "net benefits" through 2055 (3% discount rate, with 3% SC–GHG). After reading through the 263 pages of the EPA's proposed rule1 and the accompanying 688 pages of their Draft Regulatory Impact Analysis (RIA)2, the EPA bases its $1.6 trillion "estimated benefits" on faulty premises, biased data, and narrow economic snapshots. When updating the EPA's assumptions to realistic values based on sound economics and real consumer data, their arguments hold no water and their claimed "$1.6 trillion in net benefits" is reduced by nearly $3 trillion dollars and becomes a realistic net $1,376 billion loss, as shown in Table 1 below. [EPA-HQ-OAR-2022-0829-0551, p. 2]

1 https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf

2 https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Estimated Impact of EPA's EV Rule ($ billions)

Cost Category	EPA	Realistic	Difference of EPA vs Realistic
Pre-Tax Fuel Saving:	$890	($108)	EPA underestimated $998 billion
Vehicle Technology Costs	($280)	($1,228)	EPA underestimated $948 billion
Maintenance Savings	$410	$72	EPA underestimated $338 billion
Climate Benefit (3% SC–GHG)	$330	$22	EPA underestimated $308 billion
EVSE Port Costs (charging stations) + Grid Upgrades	($120)	($330)	EPA underestimated $210 billion
Repair Savings	$170	($4)	EPA underestimated $174 billion
Energy Security Benefits	$41	$41	Did not quantify
Air Pollutant Benefits	$249	$249	Did not quantify
Increased Refueling Time & Misc. Costs	($90)	($90)	Did not quantify
Estimated Net Impact	$1,600	($1,376)	The EPA's EV rule would cost the US economy $1,376 billion, an underestimation of $2,976 billion from the EPA. [EPA-HQ-OAR-2022-0829-0551, p. 2]

Table 1 – The estimated impacts of the EPA's EV Rule for both the EPA assumptions and realistic assumptions. [EPA-HQ-OAR-2022-0829-0551, p. 2]

Vehicle Technology Costs

The EPA vastly underestimates the added cost of EVs compared to their internal combustion engine (ICE) counterparts. The EPA attempts to deceive the American people by using manufacture-EV costs instead of consumer-EV costs that owners pay when purchasing their vehicle. Correcting these EPA half-truths results in a more realistic "vehicle technology cost" of $1,228 billion, a $948 billion cost increase from the EPA's calculations. [EPA-HQ-OAR-2022-0829-0551, p. 3]

EPA Claimed Costs: $280 billion

Realistic Costs: $1,228 billion [EPA-HQ-OAR-2022-0829-0551, p. 5]

The EPA admits their proposed rule will increase the cost of building EVs. They claim the rule will increase costs by an average of $1,200 per vehicle resulting in $280 billion (present value at 3 percent discount rate). However, they are not upfront about their claim, and the true cost to the American economy is more than 4X greater. [EPA-HQ-OAR-2022-0829-0551, p. 5]

The EPA is not comparing apples to oranges with their “vehicle technology costs.” Notice the other categories in their analysis such as “repair” or “maintenance” are costs paid by the consumer, aka the owners of the EVs. However, for “vehicle technology costs” the EPA chooses to use the costs paid by the manufacturers, which is far less than the costs paid by consumers, and EPA gives no justification or acknowledgment of their inconstancy. The EPA’s rule states “These projected vehicle technology costs represent the incremental costs to manufacturers”14 [1] and the EPA’s RIA states “The costs in this section represent compliance costs to the industry and are not necessarily the same as the costs experienced by the consumer when purchasing a new vehicle”15. [EPA-HQ-OAR-2022-0829-0551, p. 5]

To find the true cost paid by consumers, one does not have to look for third-party information….the EPA themselves provide the purchase prices of new EV and ICE vehicles in their analysis on page 296 of the RIA. The EPA shows that:

- An EV sedan/wagon will cost $5,200 more than an equivalent ICE vehicle,
- An EV CUV/SUV will cost $7,100 more than an equivalent ICE vehicle, and
- An EV pickup will cost $3,500 more than an equivalent ICE vehicle.

This average is $5,266 more that an ICE owner can expect to pay for their new vehicle, 338% more than the $1,200 claimed by the EPA. Scaling the EPA’s costs up by 338% increases the estimated “vehicle technology costs” from $280 billion to $1,228 billion ($1.288 trillion). This lone category nearly wipes out the entire “net benefit” of $1.6 trillion claimed by the EPA. [EPA-HQ-OAR-2022-0829-0551, p. 5]

14 Page 182 of EPA’s Rule - https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf

15 Page 657 of EPA’s Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Organization: Steven G. Bradbury

Second, I will explain how the EPA has failed adequately to acknowledge and con- sider the true scope of the colossal costs and burdens these proposals, if finalized, would impose on American families, the U.S. economy, and our nation’s security, and how, at the same time, the Agency has wildly overestimated the benefits it claims will result from these proposed rules. Because the key analyses and assumptions on which these proposals are based are so faulty and ill-considered, if the rules were finalized in the form proposed, they would be arbitrary and capricious in violation of the APA.7 [EPA-HQ-OAR-2022-0829-0647, pp. 2-3]

7 See id. § 706(2)(A) (providing that the reviewing court shall strike down a final rule found to be “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law”).

This miracle of regulatory cost-benefit accounting cannot hold up under scrutiny. [EPA-HQ-OAR-2022-0829-0647, pp. 11-12]

EPA’s consideration of direct cost factors is inadequate and incomplete. [EPA-HQ-OAR-2022-0829-0647, pp. 11-12]

EPA estimates that the light- and medium-duty rule will impose an additional technology cost on automakers of between $180 billion and $280 billion,25 which EPA asserts will translate into an average increase of $1,200 in the purchase price of a typical vehicle, an increase EPA considers modest.26 The derivation of these cost estimates is murky and fundamentally not credible. [EPA-HQ-OAR-2022-0829-0647, pp. 11-12]

25 88 FR at 29200.

26 Id. at 29201.

EPA's estimates assume that in the "no-action world" (the future world as it would exist without the proposed rules), battery-electric vehicle sales would ramp up rapidly from today's levels and would plateau at around 40 percent of total U.S. light-duty vehicle sales by model year 2030, remaining at 39 percent through model year 2032.27 [EPA-HQ-OAR-2022-0829-0647, pp. 11-12]

27 See id. at 29296-97, Figure 20.

This assumption depends on full implementation of the Agency's own prior carbon dioxide emissions rule from 2021 (covering model years 2023 through 2026),28 which is currently facing legal challenge in the U.S. Court of Appeals for the D.C. Circuit. It also appears to depend on implementation of CARB's previously finalized ZEV mandates and carbon dioxide emissions restrictions (those that preceded CARB's Advanced Clean Car II proposals).29 Once again, these CARB rules are only in effect because EPA approved them in a special waiver for California, another EPA action under challenge in the D.C. Circuit. [EPA-HQ-OAR-2022-0829-0647, pp. 11-12]

28 See id. at 29296.

29 See id. at 29296-97.

The combined effects of all three sets of regulatory edicts—the current proposals, EPA's 2021 rule, and the CARB rules—are closely interrelated and flow from the same policy choices of the Biden administration. An accurate accounting of cost would recognize that these three regulatory actions are part of a single integrated policy implemented through EPA. They are intended to build upon each other, and in fact they do. EPA is presenting a deceptively compartmented picture of the regulatory costs of its actions by treating the effects of its own 2021 rule and the CARB rules that it authorized through its waiver decision as if they were exogenous background facts. They are not. [EPA-HQ-OAR-2022-0829-0647, pp. 11-12]

EPA's benefits analysis is flawed and arbitrary.

On the benefits side of the ledger, EPA claims sky-high monetized benefits from the asserted reductions in carbon dioxide emissions—to the tune of upwards of a trillion dollars.64 These estimates are based on predicted reductions in the amount of gasoline and diesel fuel that would be burned if the U.S. auto fleet converts to EVs at the rates projected by EPA. But they completely ignore the very large increase in carbon dioxide emissions that would necessarily occur from the projected expansion in the production of EV batteries. They also ignore the upstream emissions of carbon dioxide from the increased electricity generation that would be needed to charge the projected fleet of EVs. [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

64 See id. at 29200, 29344.

EPA's refusal to account for these huge offsetting emissions of carbon dioxide fundamentally distorts its analysis of net benefits in a manner that arbitrarily favors the Agency's preferred regulatory outcome. It is, in fact, false and misleading to label EVs "zero-emission vehicles" when the production of EV batteries and the charging of the batteries over the life of the vehicles both generate enormous amounts of carbon dioxide. [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

EPA's projections of benefits from carbon dioxide reductions are primarily based on the so-called "social cost of carbon" models. However, as summarized in analyses pub- lished by my colleague from The Heritage Foundation, Kevin Dayaratna, these models are deeply flawed and unreliable. Among other things, they depend on outdated assumptions and fail to account for the positive agricultural effects of higher carbon dioxide levels. Using more appropriate assumptions, these models would show a social cost of carbon dioxide emissions that effectively approaches zero.65 [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

65 See Kevin D. Dayaratna, "Climate Change, Part IV: Moving Toward a Sustainable Future," Testimony before Subcommittee on Environment Committee on Oversight and Reform, U.S. House of Representatives, September 24, 2020; Kevin Dayaratna and David Kreutzer, Loaded DICE: An EPA Model Not Ready for the Big Game, Backgrounder No. 2860, The Heritage Foundation, November 21, 2013, https://www.heritage.org/environment/report/loaded-dice-epa-model-not-ready-the-big-game; Kevin Dayaratna and David Kreutzer, "Unfounded FUND: Yet Another EPA Model Not Ready for the Big Game," Backgrounder No. 2897, April 29, 2014, http://thf_media.s3.amazonaws.com/2014/pdf/BG2897.pdf; Kevin Dayaratna, Ross McKitrick, and David Kreutzer, "Empirically Constrained Climate Sensitivity and the Social Cost of Carbon," Climate Change Economics, Vol. 8, No. 2 (2017), pp. 1750006-1-1750006-12, https://www.worldscientific.com/doi/abs/10.1142/S2010007817500063; and Kevin Dayaratna, Ross McKitrick, and Patrick Michaels, "Climate sensitivity, agricultural productivity and the social cost of carbon in FUND," Environmental Economics and Policy Studies, 22: 433-448 (2020), https://link.springer.com/article/10.1007/s10018-020-00263-w.

Furthermore, EPA's proposal to count the purported benefits of carbon dioxide reduc- tions on a global basis, as opposed to confining its estimates to domestic U.S. effects, is flawed and inappropriate. Even if they were accurately estimated, which they are not, these global benefit forecasts could not properly and reasonably justify the regulatory costs that the proposed rules would impose on businesses and individuals in the U.S. It is more appro- priate and consistent with the purposes of regulatory cost-benefit analyses for federal agen- cies to consider only the estimated benefits that a proposed rule is expected to have domes- tically on the U.S. economy and on persons in the United States.67 [EPA-HQ-OAR-2022-0829-0647, pp. 23-24]

67 Generally, federal agencies are authorized only to promulgate rules that apply domestically, unless the federal statute under which the agency is acting clearly and expressly authorizes the agency to issue rules to achieve benefits outside the territorial reach of the United States. Correspondingly, absent such a clear statutory mandate, the requirement of a regulatory cost-benefit analysis imposed under Executive Order 12,866 and administered by OMB's Office of Information and Regulatory Affairs (OIRA) is properly limited to considering only the benefits the rule is expected to produce for the American people in the U.S.

These estimated values are the EPA's main focus in evaluating the claimed benefits of carbon dioxide reduction. EPA pointedly avoids claiming that its proposed rules will achieve any specific reduction in global temperatures. That is not surprising. Apparently, EPA wishes to save itself the embarrassment of predicting a vanishingly small effect. Using the UN Climate Panel's model for global average temperature effects, Bjorn Lomborg has shown that if every country in the world achieved its stated EV targets by 2030, the total savings in carbon dioxide emissions would be expected to reduce global temperature by only 0.0002 degree Fahrenheit by the year 2100.68 [EPA-HQ-OAR-2022-0829-0647, pp. 23-24]

68 See Bjorn Lomborg, "If Electric Vehicles Are So Great, Why Mandate Them?," Wall Street Journal , September 10, 2022, https://www.wsj.com/articles/policies-pushing-electric-vehicles-show-why-few-people-want-one-cars-clean-energy-gasoline-emissions-co2-carbon-electricity-11662746452.

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

Transfers and tax credits should be calculated as negative costs rather than positive benefits Incorrectly, the study treats government subsidies and taxes as positive benefits rather than costs. (See Tables 167 – 169.) These transfers are costs that the federal government incurs for the purpose of altering consumer behavior. These transfer costs are not benefits to consumers but instead are costs that taxpayers incur. The study incorrectly treats them as benefit. All of the numbers in these tables, even if otherwise correctly calculated, should be negative, not positive. [EPA-HQ-OAR-2022-0829-0674, p. 13]

Low discount rate

The study uses two discount rates, 3% and 7%. The 3% discount rate is below current federal standards, and below rates used by private businesses in making business decisions, and below rates used by private households in making household decisions. More realistic rates would be 7% and 10%. [EPA-HQ-OAR-2022-0829-0674, pp. 14-15]

Organization: U.S. Chamber of Commerce

If these assumptions are indeed overly optimistic, then the ultimate costs of the rule could be underestimated by tens of billions of dollars. This could in turn negatively impact not only sales and auto sector employment, but it would also undermine the rule's potential emissions reductions, as lack of affordability drives consumers to drive older, more polluting cars for longer. In order to address this potentially major issue and better inform stakeholders and the public of the rule's potential ramifications, the Chamber urges EPA to conduct sensitivity analyses modeling sales and emissions reductions under a range of tax credit eligibility, income limitations, and technology cost assumptions. [EPA-HQ-OAR-2022-0829-0604, p. 3]

In addition, the Chamber is concerned that EPA projections regarding a number of subjective and uncertain assumptions impacting vehicle technology costs and sales may be unrealistic. For example, we have concerns with EPA's conclusion that it's standards will only increase vehicle technology costs by an average of $1,200 per vehicle. This forecast is dependent on a number of optimistic assumptions regarding technology progress, critical material input costs and availability, as well as vehicle tax credit eligibility and individual MSRP restrictions. There are similar questions related to total vehicle ownership savings stemming from charging costs, vehicle maintenance, repair, insurance, etc. [EPA-HQ-OAR-2022-0829-0604, p. 3]

- Impacts on grid reliability and resiliency. The electric grid will be called upon to handle increased demand during its own period of transition. By EPA's own estimates, deployment of EVs as envisioned by the proposed rule would increase power demand by 114 terawatt-hours (2.25 percent) nationwide by 2035. Some geographic regions and subregions will experience higher changes on a percentage basis, and as EPA notes in the proposed rule, EV charging will result in "large and abrupt electricity demand peaks" during certain periods of the day. This presents a major challenge for an electricity system that is now facing its most difficult reliability challenges in decades, and in which an already accelerated loss of existing dispatchable generating capacity could be exacerbated by EPA's concurrently proposed rule targeting these same types of electric generating facilities. The Chamber urges EPA to undertake thorough analysis of the impact of recent and forthcoming regulations and other policies on the cost and feasibility of this proposal. [EPA-HQ-OAR-2022-0829-0604, p. 3]

Organization: Valero Energy Corporation

D. EPA fails to adequately consider economic impacts of the proposed rule.

1. EPA's consideration of program costs is limited to manufacturers and purchasers.

EPA claims it is required to consider the costs only to the motor vehicle industry to come into compliance with the new emissions standards. That is incorrect, at least with regard to these rules that transform the vehicle market and are designed to address social policy. The cases EPA relies upon—Motor & Equipment Manufacturers Association Inc. v. EPA, 627 F.2d 1095, 1118 (D.C. Cir. 1979) and Coalition for Responsible Regulation v. EPA, 684 F.3d 120, 128 (D.C. Cir. 2012)—are inapposite because they were not addressing "social cost" and were not creating transformative changes to force a change from traditional combustion vehicles to ZEVs that require wholly different manufacturing and fueling sources, consumer choices, and changes to vehicle infrastructure. EPA must consider all the costs of compliance that are substantially affected by its new standards, including costs on the manufacturers of the vehicles, manufacturers of the batteries (including miners, refiners, and manufacturers of the battery source materials) and other component parts of traditional combustion engines, manufacturers and sellers of the fuels (whether electric or liquid fuels), consumers who must change their types of vehicles and fuels, and any others who will be substantially impacted by these new mandates. [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

EPA has not quantified the following program costs:

- Costs to utilities for upgrades of local electrical distribution systems to accommodate increased PEV charging;" [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

- Costs to utilities for actively managing charging behavior to mitigate potential risks to the electrical grid;156 [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

156 EPA's Multi-Pollutant LMDV Proposal at 29312 and DRIA at 5-37, 11-16.

- Costs to ratepayers, especially economically-disadvantaged communities, who lack the flexibility to charge off-hours and may incur higher electricity costs; [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

- Costs to states and communities relating to road wear by heavier vehicles, which cannot necessarily be recouped via EV registration fees; [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

- Lost state revenue due to loss of gas tax, which cannot necessarily be recouped via EV registration fees; [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

- Full impacts to drivers, including:

- o Loss of flexibility due to charging “dwell time;”
- Accounting for impacts to vehicles operating in remote areas, where higher daily VMT are needed;
- o Accounting for impacts to drivers operating in areas with higher electricity rates;
- o Loss of value in the secondary LMDV market; and
- o Costs associated with battery replacements;
- o Higher auto insurance premiums; and
- • Impacts to taxpayers footing the bill for BIL and IRA tax credits. [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

Organization: Zero Emission Transportation Association (ZETA)

We are concerned that EPA relies on MY 2019 as the base year fleet for its analysis131 The auto industry is in a period of rapid change. For example, the EV sales share grew from just 1.7 percent in MY 2019 to 4.4 percent in MY 2021132 Preliminary data show the sales share roughly doubling in MY 2022 to approximately 8 percent.133 In previous regulatory actions, the agency stated that the vintage of the base year will “not normally have a significant impact” but that certain broad shifts in the market, such as the average vehicle power-to-weight ratio, can affect the incremental cost-effectiveness of technology application in the modeling.134 The significant growth in the EV market in recent years—a trend not yet visible in the MY 2019 data—would seem to constitute a “broad market shift” with potential impacts on agency compliance modeling. For example, greater BEV volumes in the base year fleet could affect credit-trading and technology application decisions in the model. If nothing else, greater EV volumes in the base year fleet would imply greater growth potential and higher penetrations of this technology by the end of the timeframe covered by the proposed standards and could support greater stringency than the agency currently proposes. We encourage incorporation of the most recent base year data available for the final rule in accordance with typical practice.135 [EPA-HQ-OAR-2022-0829-0638, p. 27]

131 See DRIA at 9-1

132 “Explore Trends Detailed Data,” U.S. Environmental Protection Agency, accessed June 30, 2023 https://www.epa.gov/automotive-trends/explore-automotive-trends-data#DetailedData

133 See DRIA at 3-5

134 Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 151, 43,769 - 43,770 (Aug. 10, 2021)

135 EPA “will often attempt to utilize the most recent base year data,” per Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 151, 43,769 (Aug. 10, 2021)

EPA Summary and Response

Summary:

The Alliance for Automotive Innovation commented that EPA must conduct a separate benefit-cost analysis for each regulatory program and amendments that are embedded in the multi-pollutant rulemaking, stating that Circular A-4 specifically instructs agencies to do so. The Alliance also comments that a market failure analysis should be done to show why manufacturers are not providing what consumer behavior should be demanding based on the savings versus costs as presented in the NPRM. The Alliance also suggested that EPA must decide whether to consider global or domestic climate impacts. The Alliance suggests that the analysis is flawed since it considers global climate benefits but fails to consider environmental damages that may occur due to the rapid expansion of supply chains for batteries.

AmFree commented that EPA had failed to properly consider the benefits of all possible approaches to control, such as renewable fuels. AmFree also pointed out the inconsistency between discount rates used for estimating program costs and benefits and those used for estimating some of the climate benefits.

The American Fuel & Petrochemical Manufacturers argued that EPA must conduct a full life-cycle analysis. They also suggested that EPA was mandating a rapid shift from ICE to ZEV thereby reshaping the American automotive market. They argued that the EPA was mandating a transition from ICE to BEV without properly considering the availability of the technology in the given timeframe and without considering all possible means of addressing policy objectives. This commenter suggested that EPA had underestimated the costs of the rule. This commenter also expressed concern over road wear and bridge deterioration caused by BEVs that are heavier than ICE vehicles and lost tax revenues for road and bridge repair due to reduced gasoline consumption.

The American Petroleum Institute (API) had several comments about GPF costs and feasibility. API also commented that the cost reduction model used in battery cost estimation seems to be based on a model used for part cost reductions driven by improved economies of scale on fixed capital equipment. API suggests that raw material costs tend to increase with increased supply. API also argues that EPA uses the concept of cost and price interchangeably and that EPA should consider technical feasibility based on manufacturer costs regardless of governmental taxation breaks for electric vehicles. API also argues that EPA should consider the costs of additional solar, wind and hydropower plants since they are a necessary part of bringing BEVs to market. API also seems to suggest that EPA consider the total costs of the rule, not only the incremental costs of the rule over a no action future.

An anonymous commenter said that EPA's analysis suggests that manufacturers are acting irrationally since some manufacturers have negative compliance costs in some years. This commenter also suggested that EPA's learning curves imply that some manufacturers will share trade secrets with other manufacturers since learning is applied across the industry rather than at a firm level.

The Arizona State Legislature commented that the proposed rule failed to rely on a cost-benefit analysis in contravention of statutory and case-law requirements.

The California Air Resources Board (CARB) identified three specific areas where EPA is likely underestimating net benefits: 1) use of the interim SC-GHG values; 2) vehicle demand elasticity too high in absolute magnitude thereby overstating the effects of vehicle price increases; and, 3) not properly considering possible lower cost residential charging in the EVSE infrastructure cost estimates.

The California Attorney General's Office, et al., commented that EPA's analysis had overstated costs by not considering state programs to promote electric vehicle adoption. This commenter also argued for standards that would encourage the application of feasible, cost-effective emission-reduction technologies on ICE vehicles given that they will continue to represent a significant source of GHG, criteria, and toxic pollutant emissions. This commenter also suggested that EPA present aggregate costs on a per vehicle basis and that EPA acknowledge that much of the investment in electrification estimated in the NPRM has already been incurred by auto makers and much of that was done, perhaps, for market reasons and not regulatory requirements.

The Clean Fuels Development Coalition et al. commented that the proposal was racing past the Biden administration's goal of 50 percent BEV sales by 2030. The commenter also appears to consider the CO2 reductions during 2027 through 2032 and compares those to the costs in 2027 through 2032 and suggests that the cost effectiveness of that CO2 control is a "very bad deal." This commenter also suggested that taxpayers subsidize the sale of electric vehicles, charging infrastructure, etc., and the proposal ignores these costs and instead counts them as "transfers." This commenter also accuses EPA of manipulating timelines to inflate the benefits of the rule by extending calculations to 2055.

Environmental and Public Health Organizations commented in support of more stringent standards on the basis that the benefits would be even greater.

The Institute for Policy Integrity at New York University School of Law suggested that EPA provide a table that comprehensively describes annualized costs of prior tailpipe rules updated for inflation to bolster the conclusion that the costs of the Proposal Rule and not exceptional. They also commented that EPA should present not only the share of new sales that are BEV but also the share of vehicles on the road that are BEV to better inform the public about the effects of the rule. This commenter also suggested that EPA use discounting practices laid out by the Office of Management and Budget in a draft update to Circular A-4 and suggested that EPA use a discount rate of 1.7 percent and eliminate use of 7 percent. They also expressed support for valuing the global impacts of climate benefits. They also suggested an update to the baseline by moving away from use of AEO 2021 in favor of AEO 2023 to better reflect impacts of the IRA on fuel and electricity and how those impact the effects of the rule. Further, the commenter suggests that EPA use the high uptake sensitivity provided in AEO 2023 to better reflect the producer-side battery tax credit of the IRA. This commenter also suggested that EPA consider spillover impacts from domestic action on foreign oil consumption and emissions noting that the Draft Circular A-4 Update recognizes that relevant benefits and costs to consider in regulatory impact analysis include both effects that "result directly from a regulation's domestic applicability" and those that result "indirectly from a regulation's impact on foreign entities. With regard to the latter category, the Draft Circular A-4 update explains that relevant impacts "include the effects of a regulation on U.S. strategic interests, including the potential for inducing strategic reciprocity or other policy changes from actors abroad or effects on U.S.

government assets located abroad," which "are particularly likely to occur when [a] regulation bears on a global commons or a public good." Additionally, the Draft Circular A-4 Update states that relevant impacts include "those that occur entirely outside the United States when they affect U.S. citizens and residents."

Our Children's Trust commented that EPA should revise the analysis so that it utilizes either no discount rate, or a discount rate that does not discriminate against children and future generations, to reflect the true costs of climate change and benefits of electrifying the transportation sector.

Jack Spencer commented that EPA did not fully account for the monetized impact of a proposed rule on disproportionately impacted populations. and that the proposed rule will make new vehicles unaffordable for nearly all low-income Americans and make purchasing even used vehicles more difficult, if not impossible. This commenter encourages EPA to fully monetize and account for the financial burdens to America's low-income families.

The Kentucky Office of the Attorney General et al., echoed by Steven G. Bradbury, commented that the cost-benefit assessment is wrong in large part because it leans so heavily on the climate benefits and that the rule would damage our economy, tax our electrical grids and the families and businesses who depend on them while also threatening our national security. The commenter encouraged EPA to reconsider the Proposed Rule.

The Office of Wyoming Governor Mark Gordon pointed to a briefing paper submitted by Paul Bonifas and Tim Considine at the University of Wyoming that estimated the economic impact of the NPRM which showed a drastic difference in economic benefits compared to EPA's analysis. Governor Gordon also suggested that EPA is pushing for a mandated EV technology and suggested that the full picture should be available for public examination.

Paul Bonifas and Tim Considine commented that EPA's estimated benefits were based on faulty premises, biased data, and narrow economic snapshots. Paul Bonifas and Tim Considine also commented with respect to EPA's vehicle technology costs claiming that EPA had misrepresented our own costs in the presentation of our analysis.

Steven Bradbury commented that EPA had failed to adequately estimate the costs of the rule since it built on the combined effects of three sets of regulatory edicts by CARB and EPA and treated the effects of those edicts as if they were exogenous background facts which, in the commenter's opinion, they are not. This commenter also argued that EPA ignored the increase in carbon dioxide emissions that would occur from the expansion in production of EV batteries and that EPA ignored the carbon dioxide emissions from the increased electricity generation needed to charge BEVs. This commenter also commented that the social cost of carbon models failed to account for the positive agricultural effects of higher carbon dioxide levels. This commenter also commented that it is inappropriate for EPA to consider the global climate effects rather than limiting the effects to domestic impacts.

The Heritage Foundation commented that EPA had incorrectly characterized the transfers (i.e., IRA tax credits) by showing them as benefits rather than costs incurred by taxpayers. This commenter also took exception to our use of a 3 percent discount rate as being below federal standards and below rates used by private businesses and households. The commenter suggested more realistic rates of 7 percent and 10 percent.

The U.S. Chamber of Commerce suggested EPA conduct additional sensitivities to assess sales and emissions reductions under a range of tax credit eligibility, income limitations, and technology cost assumptions. This commenter also expressed concern over grid reliability.

Valero commented that EPA had failed to adequately consider all costs associated with the transformation of the fleet to BEVs. The commenter also incorrectly suggested that the rule was a mandate for BEVs. The commenter also stated that we have failed to consider costs associated with road wear from heavy BEVs, charging "dwell time," electric utility and distribution costs, loss of value in the secondary LMDV market, battery replacements, insurance and cost for taxpayers footing the bill for BIL and IRA tax credits.

The Zero Emission Transportation Associated (ZETA) expressed concern that we were using a MY 2019 base year fleet which has too few BEVs thus impacting available compliance credits in the OMEGA modeling.

Response:

Regarding comments about vehicle demand elasticity, we respond to such comments in Section 14 of this document.

Regarding comments from the Alliance, EPA disagrees that OMB Circular A-4 requires federal agencies to conduct a benefit-cost analysis for each regulatory program and amendments in the rule. OMB Circular A-4 (2003) is guidance designed to assist regulatory agencies by defining and standardizing regulatory analysis. The guidance itself acknowledges that, "You will find that you cannot conduct a good regulatory analysis according to a formula. Conducting high-quality analysis requires competent professional judgment. Different regulations may call for different emphases in the analysis, depending on the nature and complexity of the regulatory issues and the sensitivity of the benefit and cost estimates to the key assumptions." An analysis such as that suggested by the commenter would require a large number of assumptions about how to allocate costs and benefits among various program elements and would not affect our consideration of the final standards. EPA's benefit-cost analysis considers the entirety of the sets of emissions standards and provisions included in this final rule. and EPA consulted with the Office of Management and Budget during interagency review in developing the proposal and again before finalizing this rule.

Regarding the claim that a market failure analysis should be conducted, EPA disagrees with this comment since it implies that the action is being taken to provide consumers with operating cost savings through lower fuel, repair and maintenance costs. This is not the goal nor purpose of the action – we are issuing these standards under EPA's specific authority under the Clean Air Act section 202, as described in Section III of the preamble for the final rule. As described by OMB Circular A-4 (2003), "Before recommending Federal regulatory action, an agency must demonstrate that the proposed action is necessary. If the regulatory intervention results from a statutory or judicial directive, you should describe the specific authority for your action, the extent of discretion available to you, and the regulatory instruments you might use." Under EPA's authority to protect human health and welfare in the Clean Air Act section 202, the final standards will address the market failure of air pollution, which is an environmental externality borne by the public and not by the regulated entities. While the action is expected to provide savings to consumers, those effects are ancillary to the purpose of the rule in reducing harmful air pollutants. Market failures, however, do also help to explain why this rule is expected to result in savings to consumers and are discussed as they relate to vehicle sales in RIA Chapter 4.4, which accompanies this final rule.

Regarding the lack of consideration of environmental impacts associated with the battery supply chain, see Section 19.1 of this document for more detailed responses regarding life cycle analysis. It should be noted that in addition to vehicle emissions we also assessed the upstream emissions impacts of EGUs and refineries, as discussed in Sections VI and VIII of the preamble to this final rule.

Regarding the AmFree comment that EPA should have considered renewable fuels, EPA responds to such comments in Section 19 of this document. As discussed in Section X of the NPRM, section 211(c) requires a different regulatory framework and process for reducing emissions through fuels standards and this rule was adopted under section 202(a) not 211(c). Nothing in this rule precludes consumers from being free to purchase renewable fuels where available or retailers from selling such fuels, and EPA continues to require increased use of renewable fuels through the RFS program. See 88 FR 44468 (July 12, 2023). We note that our modeled compliance paths are not required nor necessarily intended to show an "optimal approach." Instead, our analysis is meant to show possible approaches that manufacturers could choose to take in meeting this rule's performance-based standards, and the costs and benefits associated with those potential approaches. In the final rule, we included analysis of several possible pathways that could lead to compliance, including one pathway that considered a possible future with no more BEVs than exist today (see Section IV.G of the preamble). Manufacturers are free to adopt any of these pathways, or entirely different pathways, in developing compliance strategies.

Regarding comments from the American Fuel & Petrochemical Manufacturers, we disagree that our analysis should be done on a life-cycle basis. Please see Section 19.1 of this document for more responses related to life-cycle analysis. Also, EPA disagrees that the rule is a mandated transition from ICE to BEV technology. Please see Section 2 of this document for more responses noting that the rule is not a mandate. Regarding road wear, we respond to this comment in our response to Valero here in Section 8.1 of this document. Regarding foregone fuel tax revenues, we present those in our discussion of transfers in Section VIII of the preamble and Chapter 9 of the RIA. We also present there the estimated impacts on state sales tax revenues.

Regarding API's comments surrounding GPF costs and feasibility, please see Sections 4 and 12.3 of this document for responses related to this issue. API incorrectly states that EPA's "cost reduction model" is used for cost reductions driven by economies of scale. It is not meant to do so and instead is meant to reflect cost reductions from learning-by-doing. Regarding the suggestion that costs for raw materials increase with increasing supply, please refer to Section 15 of this document for comments related to raw materials. Regarding cost and price being used interchangeably, we have made every effort not to do so. Importantly, EPA does fully account for the cost of technology independent of the purchase tax credit which is considered by consumers in determining the demand for BEVs and PHEVs but not by manufacturers in calculating their costs. In EPA's analysis, the battery tax credit is considered as part of the manufacturer's costs, which we believe is appropriate since that tax credit serves to reduce costs incurred by manufacturers. The Clean Air Act stipulates that EPA consider the costs to manufacturers, among other factors, in determining the appropriate standards, and we believe it is most appropriate to consider not only the costs of the technologies themselves, but the fuller picture of manufacturer costs which also encompasses the manufacturer incentives under the Inflation Reduction Act. The purpose of these IRA provisions is to incentivize particular actions by manufacturers, and we consider that disregarding these provisions would make our modeling less useful in projecting what options are available to manufacturers. Regarding the API comments that costs associated with additional wind and solar and hydropower should be included in our analysis, we note that the IPM and Retail Price Modeling that was done in support of the final rule includes consideration of all expected future power sources—renewables, coal and natural gas. How those costs would be reflected in electricity prices is included in our estimates. Regarding API's suggestion that EPA consider total costs rather than incremental costs, EPA's benefit-cost analysis follows guidance from OMB Circular A-4 regarding the establishment of a reference, or "No Action," case against which to compare the effects of the regulatory action.

Regarding comments from an anonymous commenter related to compliance costs, we respond to such comments in Section 12 of this document. Regarding comments related to our learning effects being applied industry-wide rather than by firm, we have done so because most automotive parts and the costs for those parts, i.e., those to which we refer to as "direct manufacturing costs," are purchased by automakers from suppliers. In the context of our analysis, the learning that results in reductions to, for example, battery costs occurs not at the vehicle manufacturer but rather at the relatively few battery suppliers to those vehicle manufacturers. Furthermore, we account for the need for automakers to undertake continuing R&D into batteries and other topics via our retail price equivalent (RPE) markups which account for R&D at the individual firm.

Regarding comments from the Arizona State Legislature, as also explained in Section 2 of the RTC, EPA disagrees that our standard setting must rely on cost-benefit analysis. Consistent with CAA section 202, in evaluating potential standards we carefully weighed the statutory factors, including the emissions impacts of the standards, and the feasibility of the standards (including cost of compliance in light of available lead time). We monetize benefits of the standards and evaluate other costs in part to enable a comparison of costs and benefits pursuant to E.O. 12866, but we recognize there are benefits that we are currently unable to fully quantify. EPA's practice has been to set standards to achieve improved air quality consistent with CAA section 202, and not to rely on cost-benefit calculations, with their uncertainties and limitations, as identifying the appropriate standards. Nonetheless, our conclusion that the estimated benefits exceed the estimated costs of the final program reinforces our view that the standards are appropriate under section 202(a).

Regarding comments from CARB, we note that we have updated our SC-GHG values (see Chapter 9 of the final RIA for details). Regarding the vehicle price elasticity, please see RTC Section 14. Regarding our EVSE cost estimates, we respond to such comments in Section 17 of this document.

The California Attorney General's office commented that EPA should consider state programs that encourage BEV adoption. EPA has conducted a sensitivity analysis considering the Advanced Clean Car II (ACC II) program adopted by California and Section 177 states as part of the No Action case. (See Section IV.F.1 of the preamble). We have not included the ACC II program in our central analysis for the rule because an EPA waiver for that program has not yet been issued. See Section 2 of the RTC for further discussion. We note that while costs of the EPA program would be reduced by inclusion of the ACC II program in the No Action case, so too would the benefits of the EPA program (see Section IV.F.1 of the preamble). This commenter also suggested that EPA's program should encourage more emission control of ICE vehicles. The final program is expected to provide significant reductions in GHG and criteria pollutant emissions from the light- and medium-duty fleet via a set of performance standards that allow for several different pathways toward compliance. This is the traditional method taken by EPA for mobile source emissions and allows for auto makers to choose which set of technologies is best suited for their fleets to meet the standards, which could include a focus on reducing emissions from ICE technologies.

Regarding comments that EPA present aggregate costs on a per vehicle basis, we do this through 2032, the final year of new standards, which is consistent with our past practice. This commenter also suggested that EPA acknowledge that much of the investment needed for the transition to electrified powertrains has already been made or that EPA otherwise attempt to parse the auto industry investment into electrification for market purposes from that done for regulatory purposes. We note that the cost estimation approach we have taken—estimating indirect costs including R&D and other such investment—via a retail price equivalent markup requires that all products sold into the market carry its share of that indirect cost burden. As such, arguing that some or much of the investment has been made, thereby reducing the need for investment going forward, would be inconsistent with the approach of the analysis. The analysis essentially assumes that product sales are funding ongoing operations and that future sales must do the same.

Regarding the cost-effectiveness calculation done by the Clean Fuels Development Coalition et al., we note that it is highly inappropriate to consider the costs of vehicles sold during the years 2027 through 2032 and compare those costs to the emissions reductions of those vehicles during those same years when, in fact, most of those vehicles will continue to operate and provide emission reductions relative to their No Action emissions for another 25 or more years. The commenters' approach includes the full cost of the technology but only a small fraction of the benefits. Furthermore, we note that if the cost-effectiveness calculation included cost-savings in the numerator, the cost-effectiveness measure would actually be a measure of the net savings to consumers per ton of CO_2 reduced, which provides an unusually favorable calculation. Regarding taxpayers paying for portions of the rule via tax credits, we disagree that we have ignored these costs. We present them in full transparency in Table 210, Section VIII.G of the preamble. However, since these tax credits do not represent new taxes but rather new uses of taxpayer dollars, they do in fact represent transfers and should not be included as social costs of the rule. Regarding assertions that EPA manipulated timelines, we disagree. EPA has followed long-standing practice for mobile source rules of conducting our analysis far enough into the future such that the majority of the on-road fleet can be reasonably expected to be "turned over" to vehicles meeting the revised emissions standards. In this case, we selected an analysis year of 2055, which is 23 years in advance of the final year of phase-in of the revised standards, 2032. Because new vehicles tend to continue operating in the fleet for over 23 years, it is likely that the light-duty fleet will not be fully "turned over" by 2055, meaning that EPA's analysis is somewhat conservative and not capturing the fullest representation of emissions reductions under the final standards. This practice is also consistent with OMB Circular A-4 guidance that states

"…the time frame for your analysis should cover a period long enough to encompass all the important benefits and costs likely to result from the rule."

EPA agrees with Environmental and Public Health Organizations that more stringent standards would provide greater benefits. However, EPA must balance factors under the Clean Air Act, and while we did consider the greater emission reductions of more stringent standards, we also considered factors such as costs and lead time for the manufacturers, as required considerations under the Clean Air Act. EPA's consideration of this balancing of factors to arrive at the final standards is discussed in detail in Section V of the preamble. We note that, while our analysis does not reflect EPA policies that are not yet set forth via final regulation, the analysis does reflect projections that the Inflation Reduction Act incentives will result in a cleaner electric grid.

Regarding comments from the Institute for Policy Integrity at New York University School of Law, we note that we have added some context regarding the final rule and how it compares to past rules in the preamble (e.g., Section V of the preamble) and elsewhere in this RTC. We note also that we have added a presentation of BEV and PHEV vehicles as part of the stock of vehicles in the fleet, in addition to sales, to better inform the public of the rate of transition to electrification within the fleet (see Chapter 8 of the final RIA). EPA agrees that the global valuation of climate benefits is appropriate, and we respond to issues surrounding the SC-GHG values in Section 8.4 of this document. Regarding suggestions to update the baseline by moving toward AEO 2023, EPA agrees and AEO 2023 is in fact being used in the final analysis. Regarding foreign spillover effects resulting from this domestic action, we respond to related comments in Section 8.4 of this document.

In response to commenters who suggested that EPA use a discount rate lower than 3 and 7 percent, or no discount rate whatsoever, we note that we have applied a 2 percent discount rate in the benefit cost analysis to accompany discount rates of 3 and 7 percent. While we were conducting the analysis for the final rule, OMB finalized an update to Circular A-4, in which it recommended the general application of a 2 percent discount rate to costs and benefits. The effective date of the updated Circular A-4 guidance does not apply to the final rule; however, we updated the analysis to reflect the updated discount rate guidance and to be consistent with discount rate assumptions used to estimate the updated SC-GHGs (see Section 8.4 of this RTC document). The application of a lower discount rate did not affect our consideration of the final standards, nor did it change our conclusion that the total benefits of both the proposal and the final rule far outweigh the total costs and therefore result in positive net benefits. Current guidance does not recommend that federal agencies utilize a discount rate of zero in their benefit-cost analyses.

Regarding comments from Jack Spencer and the rule's impacts on low-income Americans, we respond to such comments in Section 13 of this document.

Regarding comments from the Kentucky Office of the Attorney General et al., that the analysis is wrong because it leans so heavily on the SC-GHG metric, we note that the rule is net beneficial even before considering the climate benefits. The climate benefits only make it more so. As discussed in Section V of the preamble, EPA is, consistent with its consistent past practice, setting standards to achieve improved air quality consistent with CAA section 202 and is not relying on cost-benefit calculations, with their uncertainties and limitations, in identifying the appropriate standards. Nonetheless, our estimated benefits, which exceed the estimated costs of the final program, reinforce our view that the final standards represent an appropriate weighing of the statutory factors and other relevant considerations. More specifically, for this rule our assessment that the rule has positive net monetized benefits, regardless of the magnitude of those positive net benefits, supports our view that the final standards represent an appropriate weighing of the statutory factors and other relevant considerations. Thus, EPA disagrees that it is leaning heavily on the SC-GHG metric, because regardless of the method used in quantifying the monetized benefits of GHG reductions for purposes of this rulemaking, EPA would still find the emissions reductions, in light of the cost of compliance, available lead time and other factors, would justify adoption of these standards.

EPA disagrees that the rule would damage our economy. On the contrary, this rule will be beneficial for U.S. competitiveness; automakers compete in a global economy and the rest of the world also is transitioning toward cleaner transportation technologies. EPA also disagrees that the rule will adversely affect our electrical grid and the families and businesses who depend on them (see Section 18 of this document for our responses to grid reliability issues). Lastly, we disagree that the rule will threaten our national security. In fact, as our reliance on foreign sources of energy is reduced, we see benefits associated with energy security (see Section 21 of this document for comment responses related to energy security).

Regarding comments from the Governor of Wyoming, we note first that we respond to the Paul Bonifas and Tim Considine comments directly below. EPA also notes that the final rule is not a BEV mandate but rather a set of performance standards under which manufacturers choose the technologies they believe are best suited for their fleets, and that can be met via several different pathways. We make this clear in Section IV of the preamble where we show compliance with the standards via several technology pathways including one pathway that involves no more BEVs than exist in the fleet today.

Regarding comments from Paul Bonifas and Tim Considine, EPA disagrees with the assertion that our analysis is based on faulty premises, biased data, and narrow economic snapshots. EPA has relied on the best available information in the public record, including consideration of updated data submitted by commenters, in the final rule analysis, including the benefit-cost analysis. The commenters provided more detailed comments regarding the line items in the table included in the comment excerpt above and we respond to those comments elsewhere in this document. For example, we respond to comments regarding vehicle technology costs in Section 12 of this document, fuel savings in RTC Section 8.3, maintenance and repair in RTC Section 8.2, climate in RTC Section 8.4, and air pollutant benefits in RTC Section 8.5.

Regarding vehicle technology cost comments from Paul Bonifas and Tim Considine, the commenter asserts that EPA has underestimated new vehicle purchase prices. The commenter points to EPA's own numbers of $5,200, $7,100 and $3,500 for a new sedan/wagon, CUV/SUV and pickup, respectively. The commenter then does a straight average of these three values (i.e., not a sales-weighted average) to arrive at a result of $5,266 as the average price increase per vehicle. The commenter notes that this amount is in sharp contrast to the $1,200 increase cited by EPA. The commenter then incorrectly argues that EPA has reduced the price paid by consumers to arrive at the $1,200 value by assuming the full $7,500 purchase tax credit available via the Inflation Reduction Act. First, EPA did not in the proposal and still does not in this final rule assume the full $7,500 purchase tax credit would be realized on all BEV sales. The NPRM analysis applied an average level of purchase tax credit to all BEV sales meaning that, while some BEVs might receive the full credit others might receive less. The result in the NPRM analysis being an average credit of $3,750 in 2023 ramping up to $6,000 in 2032 with a value of $7,500 never reached, on average.

Importantly, Bonifas and Considine are mixing and matching numbers in the EPA analysis. First, the $1,200 value reported by EPA was the average incremental cost for a new vehicle under the proposed standards relative to the cost of a new vehicle under the No Action scenario. In contrast, the $5200/$7100/$3500 values noted by the commenter and reported by EPA in Table 4-7 of the draft RIA, were estimated prices of ICE vehicles versus BEVs under the proposed standards. Comparing these numbers, the $1,200 to the $5200/$7100/$3500 is not consistent since the $5200/$7100/$3500 values are not relative to a No Action scenario but are instead comparisons of one powertrain to another within a scenario. This makes moot the scaling of EPA's technology costs upward by 338% as suggested by the commenter. The commenter also argues that the purchase tax incentive is paid by taxpayers and, therefore, does not increase nor decrease the "net benefit" to the US economy. EPA agrees and that is why we do not include the purchase tax credit as part of our net benefits calculation. EPA regrets that the commenter may have misunderstood the point of the analysis presented in Table 4-7 of the draft RIA. It was not meant to reflect the incremental costs of the proposal, nor was it meant to reflect the Benefit Cost Analysis or net benefits of the proposal. Instead, it was meant to inform the public of the out-of-pocket expenses that might occur for future buyers considering a BEV versus an ICE purchase under the proposed standards.

Regarding comments from Steven Bradbury that we had failed to account for three CARB and EPA edicts that were built into our analysis reference case, we note that those past programs are final rules and final EPA actions which should not be considered in the cost or benefit accounting of this action but rather, as we have done, as the reference case (No Action case) from which this action should be measured. We disagree with the commenter that we are in error on this issue. We also disagree that we have ignored power sector emissions that are expected to charge the electrified vehicles we project under this rule. EPA has in fact considered these power section emissions; please see Chapter 8 of the final RIA for an accounting of those emissions. We acknowledge that we have not considered the emissions that would occur from the manufacture of batteries while also noting that we do not consider the emissions that occur, or any reduction that might occur, from manufacturing ICE vehicles and engines. See Section 19.1 of this RTC for additional discussion of life cycle emissions. As for the global vs. domestic accounting of climate benefits, we respond to such comments in Section 8.4 of this document. The commenter is correct that we have not estimated temperature impacts for many reasons, as discussed in RTC Section 8.4.

Regarding the Heritage Foundation comments regarding transfers being shown as benefits, we disagree with the assertion. The sign used in the table, positive rather than negative as suggested by the commenter, was not meant to reflect benefit or cost. Instead, the mentioned tables simply present the magnitude of the transfers. In the final rule, we have included state sales taxes so now we present some transfers with positive and some with negative signs and make clear the nature of the signs used. Further, while taxpayers do in fact provide the government with the money necessary to pay those transfers, those payments by taxpayers do not reflect new costs. Instead, this is money already paid by taxpayers and being used as appropriated by Congress. We consider them neither a cost nor a benefit and, instead, a transfer. Regarding discount rates, we follow the guidance set forth in OMB Circular A-4.

Regarding the U.S. Chamber of Commerce, EPA has conducted additional sensitivities in the final analysis although not necessarily those suggested. For example, we believe our sensitivities regarding faster and slower BEV adoption and higher and lower battery costs generally address the commenters' concerns about assessing a range of technology cost assumptions and a range of eligibility for tax credits. We believe that we have conducted a sufficient set of multiple sensitivity analyses to show that the final rule is reasonable and achievable. As for grid reliability, we respond to such comments in Section 18 of this document.

Regarding comments from Valero, we disagree that section 202(a) should be interpreted differently for this rulemaking than for prior rulemakings under section 202(a). EPA is engaged in the exact same exercise, pursuant to the same grant of authority from Congress, as in prior rulemakings. EPA is tasked with assessing what standards are appropriate in order to reduce harmful air pollution, taking into consideration the "cost of compliance" with the available lead time. It is well-established in case law, as the commenter notes, that "cost of compliance" here refers to costs to the automakers. EPA disagrees that these rules are transforming the vehicle market—as discussed in the preamble EPA is reflecting a significant shift in the vehicle market but that shift is largely occurring due a broader set of factors, including Congressional action, international markets, and automaker investments and business strategies. However, even if these rules are contributing to that shift, there is no basis for altering the meaning of section 202(a). Moreover, EPA notes that we have, consistent with our prior practice, considered a full range of social costs, for purposes of the benefit-cost analysis, that go well beyond the costs to automakers and encompass many of the topics identified by the commenter.

Thus, we have fully considered the costs associated with the BEV and PHEV technologies relative to ICE technologies. We note that we are not requiring any consumers to change their types of vehicles and fuels. In fact, we expect that under the final rule there will be a diversity of vehicles for consumers to choose from, according to their preferences and needs. We fully expect that ICE vehicles and hybrids will continue to be sold and that some consumers will choose PHEV technologies. We respond to comments regarding EVSE charging and the grid in Sections 17 and 18 of this document. We acknowledge that we have not quantified road wear costs from BEVs. We disagree with the commenter that there is evidence that the increased weight of BEVs attributable to this rule will result in a significant impact on road or bridge degradation.[370] At this time, we have not seen data to indicate that EVs will increase degradation of roads or bridges, and we are not aware of any attempts to quantify the associated potential costs. (See Section 11.1 of this RTC for more discussion of road wear and vehicle weight.) We have indeed considered the costs of driver "dwell time" during charging. Please see Chapter 4.3.5 of the final RIA. We have not considered loss of value in the secondary market because at this time we have not seen data to indicate this is a valid concern. We have not considered costs of battery replacements because we do not believe that is a concern for the light/medium-duty vehicle market (see Chapter 1 of the final RIA and Section 12.2.5 of this RTC). For the final rule, we

[370] We note that, as shown in Table 8-5 of the RIA, the projected increase in weight within vehicle classes is small and is dwarfed by the increase in weight due from the shift from cars to light trucks and SUVs, which is unrelated to the increased sale of BEVs.

have included insurance costs for all vehicles in our benefit cost analysis. Regarding taxpayers and tax credits, see our response above to the Heritage Foundation.

Regarding comments from ZETA, we agree that the base year fleet should be updated, if possible, to reflect the most recent data available. As such, we have updated the base year fleet for the final analysis and are now using a MY 2022 vehicle base year fleet.

8.2 - Non-emission costs and benefits

Comments by Organizations

Organization: Alliance for Consumers (AFC)

Most notably, while "EPA projects lower maintenance and repair costs for several advanced technologies (e.g., battery electric vehicles)," EPA has failed to properly consider the likelihood, frequency, or expense of repairing or replacing a light-duty or medium-duty vehicle's battery due to wear, accident, or malfunction; a repair or replacement of a battery for an electric vehicle could potentially undo any cost savings projected by EPA in terms of "lower maintenance and repair costs" for "battery electric vehicles." Indeed, as some sources have pointed out: "[t]here will be scenarios in which a new EV battery will cost more than the vehicle's value." Ronald Montoya, Electric Car Battery Replacement Costs, Edmunds.com, May 2, 2023; see also id. ("On one hand, [battery replacement] costs might be cheaper than buying a new EV, but spending $15,000 on a new pack for a car that might be worth $10,000 is a tough sell.").2 EPA has failed to properly consider this aspect of the problem. [EPA-HQ-OAR-2022-0829-0534, p. 4]

2 Available at https://www.edmunds.com/electric-car/articles/electric-car-battery- replacement-costs.html.

Failure To Adequately Consider All Aspects Of The Problem

An agency rule is arbitrary and capricious if "the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). [EPA-HQ-OAR-2022-0829-0534, p. 4]

Here, EPA has failed to adequately consider all aspects of the problem and adequately address crucial consideration that go to the validity of the proposal. This includes failure to properly consider the rising price of electric vehicles in the wake of the Inflation Reduction Act, the limits on credits and subsidies that have resulted from this surge in electric vehicle pricing, and the true cost of repairing electric vehicles over a relevant time horizon. [EPA-HQ-OAR-2022-0829-0534, p. 4]

Organization: American Fuel & Petrochemical Manufacturers

Shockingly, EPA provides no analysis of the impact of this rule on the U.S. biofuels or agricultural industries. The U.S. is the world's largest biofuels producer, yet a search of the DRIA reveals that the only mention of biofuels comes in a footnote describing the contents of an

EIA Annual Energy Outlook table. Considering the implications for the biofuels industry, as well as the significant impact it will have on the agricultural producers that supply the industry, this glaring omission underscores the arbitrary nature of this rulemaking. [EPA-HQ-OAR-2022-0829-0733, pp. 10-11]

The DRIA also relies on out-of-date cases from EIA's AEO 2021. In EIA's AEO 2023 released earlier this year, U.S. crude production is higher, as are U.S. net exports of petroleum products, petroleum consumption is lower and U.S. refining capacity is lower. These changes call into question the validity of EPA's estimate of the reduction in U.S. imports of crude oil that result from the proposed rule. [EPA-HQ-OAR-2022-0829-0733, pp. 10-11]

Finally, EPA used a Low Economic Growth case from AEO 2021 to estimate the impact of the proposed rule on oil imports, rather than carrying out an analysis specific to the changes in demand that EPA projects to result from the proposed rule. Although demand in the Low Economic Growth Case is lower than in the Reference Case, the oil demand decreases in the Low Economic Growth case differ from the oil demand decreases EPA projects in Table 9-42 and there is no consideration of how those differences affect the oil security analysis. [EPA-HQ-OAR-2022-0829-0733, pp. 10-11]

Second, EPA concludes that the costs of the proposed rule would be offset by a $580 billion reduction—which EPA counts as a "benefit"—in "mainte-nance and repair costs" that it expects consumers to realize by shifting to elec-tric vehicles. 88 Fed. Reg. at 29,372, 29,385. As support for this enormous sum, EPA points to a single study suggesting that lifetime repair-and-maintenance costs for electric vehicles will be less than for combustion-engine vehicles. See Draft RIA at 4-32. In so doing, the agency unreasonably ignores countervailing sources suggesting the opposite. For instance, Consumer Reports has found that consumers report more problems with electric vehicles than combustion-engine vehicles—including issues with battery packs, charging, electric drive motors, and heating and cooling systems unique to electric vehicles. Jake Fisher, Tesla and Nissan Make the Most Reliable Electric Vehicles, Consumer Reps. (Dec. 14, 2022), https://tinyurl.com/mryx9z6c. It also takes longer, and costs more, for problems with electric vehicles to get resolved. Charette, Convincing Consumers. And there are fewer qualified technicians to resolve them: out of 229,000 auto-repair technicians in the United States, only 3,100 are certified for electric vehicles. Id. Moreover, if a manufacturer goes out of business (much more common in the nascent electric-vehicle industry), purchasers of that com-pany's vehicles will be on their own in seeking to repair the vehicles, without standard manufacturer-servicing support. Beia Spiller et al., Medium-and Heavy-Duty Vehicle Electrification: Challenges, Policy Solutions, and Open Research Questions, Res. for the Future, at 13 (May 2023). Any final rule must explain why EPA's fuel-savings figures are realistic in the face of this contrary evidence. [EPA-HQ-OAR-2022-0829-0683, pp. 62-63]

Organization: Anonymous

As explained below, EPA has placed its thumb on the scale to make it appear that BEVs are perfect vehicles with no drawbacks, and that their proposal will increase the prevalence of these magic vehicles at no costs to the American public. While BEVs are necessary to help address climate change, EPA's analysis goes from neutral observer to biased participant. EPA should revise its analysis to more holistic to the costs and benefits of BEVs and give the public an opportunity to comment on these changes before finalizing any standards given that EPA has 4 years before the first year of their proposed standards are set to take effect. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

1. Repair and Maintenance

EPA uses a non-rigorous, unscientific DOE study to selectively calculate maintenance and repair benefits that favor their proposed action, which leads to inflating the projected net benefits by half a trillion. EPA should not be estimating such a large and important factor using an unscientific methodology, and if they are attempting to measure maintenance and repair costs, they need to do so more comprehensively rather than just estimating the costs of maintaining and repairing ICE engines. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

For maintenance, EPA uses DOE's service schedule to estimate the differences in routine maintenance between powertrains. In constructing the schedule, DOE admitted "[t]here was a lack of publicly available real-world data" to directly estimate maintenance costs; instead, DOE created schedules by looking at manufacturer recommended service intervals of 15 vehicles (Comprehensive Total Ownership Report, Burnham, Gohlke, et al. 2021, 81). However, instead of just sticking to what manufacturers' advised best practices, the authors augmented the schedules by including more maintenance items based on "guidance from several experts". DOE does not explain which services and mileages were derived from manuals and which were derived from 'experts', but just generally cites to three sources. (The first source is from another DOE report from 2012 (Vyas 2012); the Comprehensive Total Ownership Report notes that maintenance costs decrease overtime on a per mile basis (72), which begs the question whether a report, which isn't even based on data, from over a decade ago is still a valid 'estimate'). DOE also excluded or misrepresented some obvious items. For example, manufacturers generally recommend BEVs have a battery maintenance check every 6months to 2 years (see https://www.quirkchevy.com/electric-vehicle-service-maintenance-best-practices/#:~:text=Like%20every%20other%20car%2C%20truck,how%20your%20battery%20is%20performing and https://lucidmotors.com/media/document/Owner's+Manual+-+Lucid+Air-enUS_2022_30_1.pdf). [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

Another issue with DOE's report is the assumption that maintenance schedules are based exclusively on how much a vehicle is driven rather than time. EPA's maintenance estimate fails to consider that maintenance is also a function of an environment, rather than just use. For example, EPA assumes that brake calipers will last 50% longer on BEVs than Ice vehicles because of regenerative braking. But this assumption ignores that calipers can rust and erode in the presence of salt, which would indicate that the lifetime is a measurement of time and exposure to the elements. (see https://www.wagnerbrake.com/technical/parts-matter/automotive-repair-and-maintenance/why-rust-on-my-brakes.html#:~:text=For%20those%20that%20live%20in,that%20can%20corrode%20brake%20components.) [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

In general, the DOE and EPA approach is tilted towards BEVs from a methodological approach. EPA assumes that the owner of an ICE or hybrid vehicle will maintain their vehicle in perfect condition through the first 15 years of its life, while owners of electrified vehicles will not maintain their vehicle's battery or other BEV specific parts, nor experience any corresponding decrease in utility due to diminished capacity, such as battery range reducing over time. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

The repair estimates contained in the DOE report that EPA relies upon are even more egregious. The single DOE study that EPA relies upon, extrapolates repair estimates based on 3 BEV models: BMW i3, Fiat 500e, and the Soul Electric. The DOE study also assumes that these three vehicles are comparable to the BMW 3 series, Fiat 500, and the Kia Soul, respectively. Besides the extremely limited amount of observations which cannot produce statistically significant results and prone to large errors, DOE's assumption that those vehicles are comparable is misguided. For example, the BMW i3 was not built on the same chassis as the 3 series (https://www.klipnik.com/best-used-cars/bmw-i3-model-history-and-buyers-guide/), is a different body type (the i3 is a hatchback while the 3 series is a sedan), and assumes that the performance and style of the two vehicles are comparable despite the i3 being less stylish with less interior room and slower acceleration (compare, for example, the 2021 i3 https://www.caranddriver.com/bmw/i3 with the 2021 3 series https://www.caranddriver.com/bmw/3-series-2021). Perhaps the largest difference is how a consumer would use an i3 compared to a 3 series. The i3 consistently had less than a 100 mile range. It is absurd to expect that the i3 had the same consumer base and usage patterns that would make it a strong data point to compare the maintenance and repair cost differential between ICE and BEVs, and leads to a clear underestimation of how much an electric 3-series would actually cost to repair (and maintain). DOE used those 3 similar-dissimilar BEV-ICE vehicles to determine that BEVs have a 33% lower repair cost. This was not derived from any statistically significant review of repair costs, and it's unclear how much VMT was driven in the BEVs over the same time period as their ICE counterparts. Lower VMT could obscure the fact that on a per mile basis, BEVs are costlier to repair. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

The 'statistical methodology' portion of DOE's analysis is just as wanting. DOE uses MSRP as a proxy instead of directly estimating repair costs and discounts based on the differences observed in the three BEV/Ice vehicle pairings noted in the previous paragraph. This methodology implicitly assumes that the most expensive ICE vehicles have comparable BEV vehicles which are also included in the analysis, which in 2019 and earlier, is baseless. Hence DOE implicitly compares the costs to repair and maintain a small, affordable BEV like the leaf to something like a GM Hummer. A similar absurd analysis would be to look at the Toyota Prius compared to the eHummer and assume that ICE vehicles on par use less energy to operate, are cheaper to buy, and cheaper to maintain and replace than BEVs. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

Perhaps the largest omission in EPA's analysis is considering what happens if BEV needs a battery replaced. Battery replacements can cost well into the tens of thousands (https://www.jdpower.com/cars/shopping-guides/how-often-do-tesla-batteries-need-to-be-replaced), and there's some evidence that some BEVs are 'totaled' even with minor damage because it doesn't make sense to repair and replace the battery pack (for example, https://www.caranddriver.com/news/a42709679/tesla-insurance-fixes-expense/). however, this consideration is not included in EPA's analysis of repair and maintenance nor elsewhere in the rule. This unaccounted for cost obscures the true cost of ownership, and if included, could flip the estimated cost per mile of repair and maintenance costs from BEVs being net positive compared to ICE vehicles to net negative. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

The DOE study that EPA relies upon also declines to estimate the maintenance costs of other GHG reducing technologies, such as mass reduction, as they assume the cost would be equivalent across powertrains; that assumption, however, can't be applied to the delta between EPA's baseline and alternatives as those technologies will be applied in response to their proposed standards. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

An ancillary maintenance and repair item excluded from EPA's analysis is the impacts of BEVs on road maintenance. https://www.energylivenews.com/2023/06/27/evs-cause-twice-the-road-damage-of-petrol-vehicles-study-reveals/. BEVs are generally heavier than their ICE counterparts, which causes more wear and tear on roads. If EPA is using a per VMT maintenance cost, they can also easily include the increase in road maintenance costs. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

If EPA wants to include an estimate of maintenance and repair costs that shows 500 billion in savings, it needs to be based on a scientific, rigorous and transparent process, and should be derived from data that is statistically significant, otherwise, EPA is inflating the net benefits based of imprecise estimates that have less than a 40 cents difference on a per mile basis. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

Organization: Arizona State Legislature

6. The proposed rule relies on speculative and erroneous estimates for repair and maintenance. EPA's assumption that electric vehicles will have lower maintenance and repair costs than fossil fuel-powered vehicles is contradicted by data for service and repair visits and insurance claims. [EPA-HQ-OAR-2022-0829-0537, p. 2]

VI. The proposed rule is arbitrary and capricious because it relies on speculative and erroneous estimates for repair and maintenance.

EPA believes "lower maintenance and repair costs for several advanced technologies (e.g., battery electric vehicles)" from the proposed rule "would result in significant savings for consumers." 88 Fed. Reg. 29,199, 29,201. EPA relies on a single government-funded study, which includes significant assumptions and data limitations. Id. at 29,384 n.794. Based on this sole study, EPA calculates the proposed rule will save a staggering $75 billion in combined repair and maintenance costs. Id. at 29,362. [EPA-HQ-OAR-2022-0829-0537, pp. 23-24]

EPA's conclusions are contradicted by widely available data. An analysis of the service and repair visits for about 19 million vehicles between the 2016 and 2021 model years found that electric vehicles cost more to repair than gas-powered vehicles.24 The study found that electric vehicles were 2.3 times more expensive than gas-powered vehicles to service in the first three months of ownership, and 1.6 times more expensive at the twelve-month mark.25 The study blamed the increased time that technicians spent as well as the fewer number of technicians that could work on electric vehicles charging a higher hourly rate.26 [EPA-HQ-OAR-2022-0829-0537, pp. 23-24]

24 Sean Tucker, Study: EVs Cost More to Repair, Less to Maintain, KELLEY BLUE BOOK, Aug. 17, 2021, available at https://www.kbb.com/car-news/study-evs-cost-more-to-repair-less-to-maintain/.

25 Id.

26 Id.

Insurance claims data includes similar findings. A study found repairing mid-size and luxury-brand SUVs cost 53% more for electric vehicles than comparable gas-powered vehicles, and 27% more for small, non-luxury electric vehicles.27 The study found that electric vehicles had more expensive driver assistance system sensors that were more likely to be damaged in a collision, heavier battery packs that resulted in collisions with greater momentum as well as more expensive materials to offset battery weight, and battery pack removal and reinstallation in order to spray paint. [EPA-HQ-OAR-2022-0829-0537, pp. 23-24]

27 Jim Henry, Repairing an Electric Vehicle Could Cost More Than Gasoline Cars: A New Kind of Sticker Shock, FORBES, July 25, 2022, available at https://www.forbes.com/sites/jimhenry/2022/07/25/repairing-an-electric-vehicle- could-cost-more-than-gasoline-cars-a-new-kind-of-sticker-shock/?sh=17c649ff5eee.

28 Id.

EPA also does not calculate the frequency or likelihood that a light-duty or medium-duty vehicle will need to replace its battery due to wear or accident. Nor does EPA calculate the cost of battery replacement. Battery replacement for a passenger vehicle can cost between $5,000 and $15,000.29 One battery replacement could obviate any cost savings estimated by EPA for that vehicle. [EPA-HQ-OAR-2022-0829-0537, p. 24]

29 Devin Pratt, What Happens to the Old Batteries in Electric Cars, CONSUMER REPORTS, Feb. 23, 2022, available at https://www.consumerreports.org/cars/hybrids-evs/what-happens-to-the-old-batteries-in-electric-cars-a1091429417/.

EPA's failure to adequately consider repair and maintenance costs is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0537, p. 24]

Organization: Betsy Cooper

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24 Sean Tucker, Study: EVs Cost More to Repair, Less to Maintain, KELLEY BLUE BOOK, Aug. 17, 2021, available at https://www.kbb.com/car-news/study-evs-cost-more-to-repair-less-to-maintain/.

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27 Jim Henry, Repairing an Electric Vehicle Could Cost More Than Gasoline Cars: A New Kind of Sticker Shock, FORBES, July 25, 2022, available at https://www.forbes.com/sites/jimhenry/2022/07/25/repairing-an-electric-vehicle-could-cost-more-than-gasoline-cars-a-new-kind-of-sticker-shock/?sh=17c649ff5eee.

28 Id.

Organization: Charles Forsberg

We conducted a series of workshops and wrote multiple papers on replacing all crude oil-domestically and internationally. By definition, this includes everything covered in the proposed EPA rule and all other uses of oil-based products. Based on those studies, the likely consequences of the proposed EPA rulemaking are much higher costs for light vehicles, failure to meet greenhouse gas reduction goals by decades, significant reductions in life expectancy and major reductions in incomes of the bottom 60% of the U.S. population. A summary of the basis for those conclusions and recommendations for EPA is provided herein. The recently published open-access paper (below) provides more detail and includes references to support these conclusions. [EPA-HQ-OAR-2022-0829-0738, p. 1]

C. W. Forsberg, "What is the Long-Term Demand for Liquid Hydrocarbon Fuels and Feedstocks?" Applied Energy, 341, 121104 (2023) https://doi.org/10.1016/j.apenergy.2023.121104 [EPA-HQ-OAR-2022-0829-0738, p. 1]

Organization: Chevron

4. Feasibility and implementation.

Chevron is concerned that the rapid increases in forecasted BEV sales rate are optimistic and may overstate the benefits of the proposals. The proposals may limit choices and increase costs for consumers, including those in economically disadvantaged groups and smaller businesses. [EPA-HQ-OAR-2022-0829-0553, p. 6]

BEV sales forecasts may rely on optimistic expectations for increased electricity generation and charging infrastructure. EPA should conduct an assessment to account for the costs and timing associated with upgrades to the nation's grid infrastructure, including new and upgraded generation, transmission, and distribution, and the costs associated with the installation of public and private electric vehicle chargers. If it is not feasible to complete expansion and improvements for the current grid, it may not be possible to meet the additional demand created by the proposed regulation. [EPA-HQ-OAR-2022-0829-0553, p. 6]

Organization: Clean Fuels Development Coalition et al.

These aggregate costs include:

- Vehicle maintenance and repair costs. EPA underestimates maintenance costs in several ways, not the least of which is by ignoring the massive expense of replacing an electric vehicles battery. For example, a Tesla battery typically costs between $12,000 and $20,000 to replace and is out of warranty after only 8 years. [EPA-HQ-OAR-2022-0829-0712, pp. 5-6]

- Insurance costs. Electric vehicles are more costly to insure than conventional vehicles both because they have a higher upfront sticker cost and "because of higher repair and replacement costs for damaged parts." Mark Rosanes, Do Electric Vehicles Cost More to Insure Than Gasoline Powered Cars?, Insurance Business (Oct. 28, 2022), https://www.insurancebusiness-mag.com/us/news/auto-motor/do-electric-vehicles-cost-more-to-insure- than-gasolinepowered-cars-425631.aspx; see also Benjamin Preston, Electric Vehicles May Cost More to Insure Than Gasoline-Powered Cars, Consumer Reports (Apr. 27, 2023), https://www.consumerre-ports.org/money/car-insurance/electric-vehicles-cost-more-to-insure-than- gasoline-powered-a6372607024. [EPA-HQ-OAR-2022-0829-0712, p. 6]

Organization: Consumer Energy Alliance (CEA)

Struggling with access to affordable transportation, however, is just one of the equity impacts that has not been addressed by the U.S. EPA How will U.S. EPA address the systemic inequity and energy injustice issues embedded in this rule beyond the financial burden that will be caused? [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

For example, the practical use of EVs benefit wealthier users as well. Charging infrastructure Is a critical component for EV usage, with access to chargers (and specifically fast chargers) a major consideration in purchasing an EV. Wealthier users are far more likely to live In single family homes where installation of a fast charger costing thousands of dollars is simply a matter of fact. Lower income families who are more likely to reside in apartments or rented properties do not have the option of installing their own personal dedicated fast chargers. [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

Even the location of charging infrastructure tends to benefit the wealthier, whiter, male demographic that makes up 75% of the individuals who purchase EVs. A recent MIT study on EVs and equity noted7:

"According to Hsu and Fingerman (43], Black and Hispanic neighborhoods only had 0.7 times the access to public chargers as the no-majority reference group in California. They also determined that even when income, proximity to the nearest highway, and multi-family housing were controlled for, White-majority census block groups were 1.5 times more likely to have access to public charging stations compared to Black- and Latino-majority census block groups." [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

7 sciencepolicvreview.org/2021/08/equity-transition-electric-vehicles/

They also noted that public charging, when available to lower income communities, typically costs more than home charging stating:

"This higher cost would disproportionately affect low-income households who already pay a higher proportion of their income towards transportation." [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

By creating disparities in access to the "fuel" through charging network realities this further exacerbates the differences in transportation equity between rich and poor. Combine that with what is sure to be higher electricity prices from the requisite generation, distribution and transmission infrastructure buildout required to meet growing electricity demand as is often the case the poor will just keep getting poorer. [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

Organization: Consumer Reports (CR)

3. The Proposed Standards Will Save Consumers Money

Over the past two decades, clean car standards such as EPA's GHG Standards for Model Years 2023-2026, harmonized with the Department of Transportation (DOT) National Highway Traffic Safety Administration's (NHTSA) Corporate Average Fuel Economy (CAFE) standards, have delivered $7,000 in lifetime fuel savings and a 30% reduction in greenhouse gas emissions from the average new vehicle over the last two decades.11 At the same time, vehicles have become safer, larger, and more powerful; but, most impressively, all of those improvements were delivered with no (inflation-adjusted) increase in vehicle prices. [EPA-HQ-OAR-2022-0829-0728, pp. 8-10]

11 Vehicle Price Trends: Fuel Economy and Safety Improvements Come Standard, Consumer Reports, February 21, 2023, https://advocacy.consumerreports.org/wp-content/uploads/2023/02/CR-Vehicle-Price-Trends-Feb-21-202 3.pdf.

EPA estimates that its latest proposed standards for MY27+ will save consumers over $1 trillion through 2055 while reducing GHG emissions by over 7 gigatons. This result is consistent with CR's analysis from 2021 which found that reducing emissions from new vehicles by 60% by 2030 would save consumers $1.6 trillion through 2050.12 This proposal, when combined with EPA's previous rule for model years 2023 to 2026, is consistent with that trajectory of 60% reduction in emissions by 2030. [EPA-HQ-OAR-2022-0829-0728, pp. 8-10]

12 Meeting Emissions Goals Will Save Consumers A Lot of Money, Consumer Reports, March 2021, https://advocacy.consumerreports.org/wp-content/uploads/2021/03/Consumer-Reports-Vehicle-Emissions-Standards-Fact-Sheet-3.22.21-FINAL.pdf.

CR analysis shows that at an average gas price of $3.50/gallon, close to the national average gas price in June 2023, an electric SUV would deliver an average of $1,700 in fuel and maintenance savings every year.13 A 2020 analysis by CR found that the most popular EVs were already cheaper to own than the most popular and highest-rated gasoline vehicles in their class, even factoring in the higher purchase prices of EVs.14 That analysis has been updated for 2023 in Section 5 of this comment letter. The findings are consistent with the previous analysis; however now all 6 EVs analyzed show consumer savings in the very first year of ownership when financed. This means that the average American buying a new, mainstream vehicle doesn't have to wait for some point in the future to start saving money with an EV. [EPA-HQ-OAR-2022-0829-0728, pp. 8-10]

13 New Consumer Reports analysis shows rising gas prices ramp up savings for EV owners, Consumer Reports, March 10, 2022, https://advocacy.consumerreports.org/press_release/new-consumer-reports-analysis-shows-rising-gas-pri ces-ramp-up-savings-for-ev-owners/.

14 New analysis from CR finds that the most popular electric vehicles cost less to own than the best-selling gas-powered vehicles in their class, Consumer Reports, October 8, 2020, https://advocacy.consumerreports.org/press_release/new-analysis-from-cr-finds-that-the-most-popular-ele ctric-vehicles-cost-less-to-own-than-the-best-selling-gas-powered-vehicles-in-their-class/.

Overall, EVs save an average of 60% on fuel and 50% on repairs and maintenance compared to comparable gasoline vehicles.15 Importantly, the 2020 study found that while EVs were usually cheaper to own for a first owner who drove the vehicle for the first seven years, the largest chunk of the savings flowed to a second owner who purchased the vehicle used. This is because used vehicle buyers will pay less of a premium to purchase an EV, but will encounter similar fuel savings, and even greater maintenance cost savings due to increasing maintenance requirements for older ICE vehicles. [EPA-HQ-OAR-2022-0829-0728, pp. 8-10]

15 Id.

Additionally, recent federal investments give consumers even more options to save on the initial purchase or lease of an EV. The Inflation Reduction Act (IRA) offers tax credits of up to $7,500 for the purchase of new EVs that meet certain manufacturing, vehicle pricing, buyer income, and critical minerals requirements. A 2023 study from the International Council on Clean Transportation estimated that these tax credits would make the average new qualifying EV cheaper to purchase than the average new conventional vehicle by 2025, resulting in a large boost in EV demand.16 The IRA also includes tax credits of up to $4,000 for the purchase of used EVs subject to certain income and vehicle price limits, helping to make EV's more accessible to consumers who buy used vehicles. [EPA-HQ-OAR-2022-0829-0728, pp. 8-10]

16 Analyzing the Impact of the Inflation Reduction Act on Electric Vehicles Uptake in the United States, The International Council on Clean Transportation, January 2023, https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23-2.pdf.

6.6. Inclusion of Maintenance and Repair Savings in Cost Benefit Analysis

CR supports EPA including maintenance and repair savings in their cost benefit analysis. CR's research has found that in real world operations BEVs and PHEVs can both deliver around 50% savings compared to conventional gasoline powered vehicles.47 CR is in the process of updating this analysis with more recent data and will share the results with EPA once it is complete. [EPA-HQ-OAR-2022-0829-0728, p. 23]

47 New analysis from CR finds that the most popular electric vehicles cost less to own than the best-selling gas-powered vehicles in their class, Consumer Reports, October 8, 2020, https://advocacy.consumerreports.org/press_release/new-analysis-from-cr-finds-that-the-most-popular-ele ctric-vehicles-cost-less-to-own-than-the-best-selling-gas-powered-vehicles-in-their-class/.

Organization: Daniel Hellebuyck

Weight: An EV can weigh up to 1 ½ times a comparable internal combustion engine (ICE) vehicle. This creates more safety issues in a collision and more weight that our crumbling infrastructure has to absorb. Furthermore, insurance companies may be charging higher premiums to all customers to pay for the increased risk of injury and the larger costs involved in repairing EVs versus and ICE vehicle. [EPA-HQ-OAR-2022-0829-0526, p. 1]

Organization: Delek US Holdings, Inc.

V. The Proposed Rule Severely Underestimates the Costs of BEVs

EPA claims that the Proposed Rule will somehow result in $200 to $220 billion in net benefits for calendar year 2055, which represents less than the cost of vehicle technology and associated electric vehicle supply equipment ("ESVE") required to meet the associated standards.30 As industry experts have asserted, "the derivation of these cost estimates is murky and fundamentally not credible," especially as EPA's estimate of the no-action alternative from which all other proposals are compared to deceptively ignores the regulatory costs of the Administration's current efforts to rapidly escalate electrification and automatically assumes that "American car buyers will suddenly drop their resistance to EVs."31 [EPA-HQ-OAR-2022-0829-0527, p. 7]

30 Proposed Rule at 29,200 (based on present value (PV) of net benefits for calendar years 2027 through 2055, with discounting to 2027 using a 3 percent discount rate).

31 Steven G. Bradbury, THE HERITAGE FOUNDATION, Prepared Statement for the hearing entitled "Driving Bad Policy: Examining EPA's Tailpipe Emissions Rules and the Realities of a Rapid Electric Vehicle Transition," before the Subcommittee on Economic Grown, Energy Policy, and Regulatory Affairs of the U.S. House of Representatives Committee on Oversight and Accountability, at 10 (May 17, 2023) available at https://oversight.house.gov/wp-content/uploads/2023/05/Bradbury-Prepared-Statement-for- 17-May-2023-Oversight-Hearing.pdf.

Despite the substantial price differences between ZEV and ICE vehicles, EPA's cost analysis concludes—with little to no concrete support—that "the proposal would result in significant savings for consumers from fuel savings and reduced vehicle repair and maintenance" and that "[t]hese lower operating costs would offset the upfront vehicle costs."32 Instead of fully accounting for these obvious costs, EPA relies heavily on incentives under the IRA, which apply to a limited number and type of vehicles and taxpayers, and ignores the fact that incentives from the IRA are still a "cost" to tax-paying consumers.33,34 EPA oddly accounts for potential purchase incentives from the IRA for net consumer prices in its analysis, once again despite the fact that this cushion is limited.35 Beyond the direct costs to the consumer, EPA fails to account for costs associated with infrastructure impacts from increased operation of increased driving it anticipates, including road and bridge deterioration and commensurate reduced funding for infrastructure from fuel tax collections. Finally, EPA's failure to quantitatively analyze these costs——is fatal to its analysis. [EPA-HQ-OAR-2022-0829-0527, p. 7]

32 DRIA at xlviii.

33 See, e.g., DRIA at 2-86–87; Proposed Rule at 29,328.

34 See, e.g., IRS, "Credits for New Clean Vehicles Purchased in 2023 or After" (Apr. 17, 2023), available at https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after (citing IRA, § 30D).

35 Proposed Rule at 29,371.

b. BEV charging consumes significantly more time than refueling ICE-powered vehicles.

The Proposed Rule fails to consider the impact that increased charging times will have on consumer adoption rates and whether end users will be willing to such disruptions to daily travel in addition to the increased prices and upfront costs. According to DOT, Level 1 EVSE, which provides charging through a 120-volt AC outlet, can take 40–50+ hours to fully charge (80%) a BEV from empty; Level 2 EVSE, which offers a higher-rate AC charging and is typically used for home, workplace and public charging, can take 4–10 hours to fully charge a BEV from empty; and direct current fast charging EVSE, which provides rapid charging along heavy-traffic corridors where already installed, can take up to an hour to fully charge a BEV from empty.42 Regardless of fast charging, most PHEVs currently on the market do not work with the DCFC equipment.43 But under any scenario, these ZEVs will incur additional downtime for more frequent, and longer, charging times as compared to the equivalent ICE. And faster charging infrastructure is larger and more expensive, making it difficult for the average consumer to comfortably travel unless there is sufficient access to fast and convenient charging. Yet the Proposed Rule fails to consider whether, in light of these impacts, consumers will purchase ZEVs at the rate necessary to meet EPA's targets regardless of whether a manufacturer can produce them. [EPA-HQ-OAR-2022-0829-0527, p. 9]

42 DEP'T OF TRANSPORTATION, "Charger Types and Speeds" (May 4, 2023), available at https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds#:~:text=EVs%20can%20be%20charged%20using,6%20hours%20for%20a%20PHEV.

43 Id.

Organization: Environmental Defense Fund (EDF) (1of 2)

A. Feasibility, cost, and lead time support final Class 2b and 3 standards at least as protective as the proposal.

i. Costs for Class 2b and 3 ZEVs are rapidly declining.

Like light-duty passenger vehicles, the costs of zero-emitting medium-duty passenger vehicles (Class 2b and Class 3) are rapidly declining. A recent study by Roush analyzed the upfront cost and TCO of MY 2027 and MY 2030 Class 2b and 3 BEVs compared to their ICEV counterparts.115 The study also looked at the effect of IRA credits on BEV and charger purchase price and TCO in the 2023 and 2027 timeframes. Roush assumed three different scenarios that reflect increasing levels of cost: 1) the cost of electrification when migrating from a high-cost ICEV to a low-cost BEV (lowest incremental cost); 2) the cost of electrification when migrating from a medium-cost ICEV to a medium-cost BEV; and 3) the cost of electrification when migrating from a low-cost ICEV to a high-cost BEV (highest incremental cost). Gasoline price projections from the EIA's high oil price sensitivity case are used in Scenario 1, reference case gasoline prices are used in Scenario 2, and gasoline prices from the low oil price case are used in Scenario 3. [EPA-HQ-OAR-2022-0829-0786, pp. 45-46]

115 H. Saxena, V. Nair, and S. Pillai, “Electrification Cost Evaluation of Class 2b and Class 3 Vehicles in 2027–2030,” May 2023. Roush. (Attachment T)

Figure 13 illustrates the incremental cost of electrifying Class 2b–3 vehicles under Scenarios 1, 2, and 3, without considering the impacts of the IRA. In Scenario 1 (the lowest incremental cost of electrification), the powertrain cost of all BEVs analyzed is less than the equivalent ICEV in the 2027–2030 timeframe, except in the case of the Class 3 pickup BEV300 (only MY 2027) and BEV400. And in all scenarios (except for Class 3 pickup and delivery (P&D) trucks and Class 3 vans in Scenario 3 in 2027), the powertrain cost of a BEV150 is less than the equivalent ICEV. However, in Scenarios 2 and 3, BEVs with a 250-mile or greater range in all Class 2b–3 vehicle types have more expensive powertrains than a comparable ICEV in MY 2027 and MY 2030. In the case of the Class 3 pickup truck, introducing a longer-range BEV (300 and 400 miles) necessitates a heavier, costlier battery pack, motor and power electronics, resulting in a more expensive electric vehicle. However, these costs are based on NMC811 battery technology, and several technologies that are currently being developed to support higher efficiency and lower production costs are expected to be available in the future. [EPA-HQ-OAR-2022-0829-0786, pp. 45-46]

[See original attachment for Figure 13: Projected incremental cost of BEV over ICE powertrain in 2027 and 2030 for Class 2b and 3] [EPA-HQ-OAR-2022-0829-0786, pp. 45-46]

Source: Roush, Electrification Cost Evaluation of Class 2b and Class 3 Vehicles in 2027-2030 [EPA-HQ-OAR-2022-0829-0786, pp. 45-46]

While the upfront cost of some medium-duty BEVs is higher than the ICEV counterpart, this study concludes that over the life of ownership of all Class 2b–3 vehicles, BEVs are almost universally less expensive to own and operate than comparable ICEVs, as shown in Figure 14. Across the vehicle types and three cost scenarios considered by Roush, the TCO of BEVs averages $0.334 per mile (ranging from $0.291 per mile to $0.39 per mile) while the TCO of ICEVs averages $0.428 per mile (ranging from $0.336 per mile to $0.574 per mile). [EPA-HQ-OAR-2022-0829-0786, pp. 46-48]

[See original attachment for Figure 14: Projected range of total TCO per mile for Class 2b and 3 BEVs and ICEVs in 2027 and 2030]

Source: Roush, Electrification Cost Evaluation of Class 2b and Class 3 Vehicles in 2027-2030 [EPA-HQ-OAR-2022-0829-0786, pp. 46-48]

As shown in Figure 15 below, BEVs produce significant cumulative net savings compared to ICEVs over their assumed lifetime of 12 years. Scenario 1 has the highest savings and Scenario 3 has the lowest savings. With the exception of certain vehicle types in Scenario 3 in 2027, all BEVs across the three scenarios produce considerable savings compared to ICEV ownership. On average, this study shows that consumers and fleets who switch to BEVs can save about $20,000 for a MY 2027 purchase and $25,000 for a MY 2030 purchase over the lifetime of the vehicle. [EPA-HQ-OAR-2022-0829-0786, pp. 46-48]

[See original attachment for Figure 15: Projected cumulative net savings of BEVs over ICEVs over their lifetime] [EPA-HQ-OAR-2022-0829-0786, pp. 46-48]

Source: Roush, Electrification Cost Evaluation of Class 2b and Class 3 Vehicles in 2027-2030 [EPA-HQ-OAR-2022-0829-0786, pp. 46-48]

Roush's study also evaluated the time it would take for BEVs purchased in MY 2027 and MY 2030 to achieve TCO parity with equivalent ICEVs. Table 13 below shows that under Scenario 1, all vehicles purchased in 2027 and 2030 achieve TCO parity within the first year of ownership, except the BEV400 pickup, which achieves parity after the first year. Under Scenarios 2 and 3, longer range BEVs take additional time to reach TCO parity. [EPA-HQ-OAR-2022-0829-0786, pp. 48-50]

[See original attachment for Table 13: Time (in years) for BEVs to achieve TCO parity with comparable ICEVs purchased in 2027 and 2030] [EPA-HQ-OAR-2022-0829-0786, pp. 48-50]

Source: Roush, Electrification Cost Evaluation of Class 2b and Class 3 Vehicles in 2027-2030 [EPA-HQ-OAR-2022-0829-0786, pp. 48-50]

To estimate the sensitivity of the TCO of ICEVs to recent high fuel prices, a sensitivity analysis was performed using summer 2022 fuel prices. With ongoing geopolitical crises and volatility in the oil and gas sector, per the EIA, the price of retail gasoline reached an all-time high in 2022. Such high fuel prices have a direct impact on ICEV's operating expenses and TCO. Using 2022 peak fuel prices, even the class 3 BEV400 pickup achieved TCO parity within 1-2 years of ownership. These results make a compelling case, especially from a consumer and fleet savings standpoint, to electrify the class 2b–3 segment. [EPA-HQ-OAR-2022-0829-0786, pp. 48-50]

Roush's study also examined the potential impacts of the IRA on Class 2b–3 BEV costs in the near term (MY 2023) and the long term (MY 2027). They assumed economies of scale and sufficient raw material supply to meet demands in the production of MY 2023 BEVs. The study found that the incentives made available by the IRA will have a profound positive impact on the cost of MYs 2023 and 2027 Class 2b–3 BEVs, helping to offset higher purchase prices of BEVs. The results of this IRA impact analysis show acceleration of purchase price and TCO parity across all vehicle types purchased in 2023 and 2027 under Scenario 1. In 2027, purchase parity and TCO parity accelerate across all vehicle types and all scenarios. All BEVs achieve parity within the first year of ownership upon purchase, except for the Class 3 pickup truck BEV400, which achieves parity within 2 years of purchase. With clean vehicle credits (§30D) and charger credits, BEVs' cumulative net TCO savings in MYs 2023 and 2027 average about $5,000 and $27,000, respectively. And with qualified commercial clean vehicles (§45W) and charger credits, BEVs' cumulative net TCO savings in MYs 2023 and 2027 average about $6,000 and $23,000, respectively. Roush concludes that the purchase credit (§30D) and advanced manufacturing production credit (§45X) can provide OEMs with a financial buffer against potential market disruptions while also enabling them to produce BEVs at a competitive cost. On average, battery pack costs could reach as high as $218/kWh, almost 187% more than the estimated pack cost of $76/kWh, and still allow for purchase price parity within the first year of BEV ownership in MY 2027. Expected advancements in battery technology will further reduce battery costs and drive down the TCO of BEVs even below the estimates developed in the analysis. [EPA-HQ-OAR-2022-0829-0786, pp. 48-50]

Roush conducted a second study for EDF which expanded this analysis to PHEVs.116 As described in Figure 16 (Figure 6 from the Roush report), Roush projects that PHEV50s in the Class 2b-3 segment will be very cost competitive with BEVs. Therefore, we encourage EPA to include PHEV technology pathways in its analysis of GHG emission control from Class 2b-3 vehicles in the final rule. [EPA-HQ-OAR-2022-0829-0786, pp. 48-50]

116 H. Saxena, V. Nair, and S. Pillai, "Technical Review of: Alternative Powertrain Pathways for Light-Duty and Class 3 Vehicles to Meet Future CO2 Emission Targets," 13 March 2023. Roush for EDF.

See original attachment for Figure 16: Impact of the Clean Vehicle Credits on Class 3 vehicles in MYs 2024 and 2027] [EPA-HQ-OAR-2022-0829-0786, pp. 48-50]

Organization: Institute for Policy Integrity at NYU School of Law et al.

E. EPA Should Consider a Range of Rebound Effect Assumptions for BEVs While Upholding Its Current Assumption for ICE Vehicles EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

The "rebound effect" refers to "the additional energy consumption that may arise from the introduction of a more efficient, lower cost energy service."118 In the Proposed Rule, EPA reasonably, and consistently with prior rules, assumes 10% rebound for ICE vehicles119—meaning that for every 1% improvement in fuel efficiency, there is a 0.9% drop in total fuel use and a corresponding increase in vehicle miles traveled. EPA's adoption of a 10% rebound rate for ICE vehicles is consistent with the literature.120 EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

118 RIA at 4-13.

119 Id. at 4-16.

120 See generally Inst. for Pol'y Integrity, Comments on Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards (Sep. 27, 2021),

While a wealth of economic literature supports a small rebound effect for ICE vehicles, there is comparatively little economic research on the rebound effect for BEVs. Based on the research available, EPA assumes a rebound effect of 0% for BEVs.121 This rebound assumption has two implications. First, it assumes that drivers do not switch their driving behavior when they switch from an ICE vehicle to a BEV,122 despite cost differences.123 Second, it assumes that any change in per-mile cost for BEVs, including from the introduction of more efficient BEVs or fluctuations in electricity prices, does not affect driving behavior. In effect, EPA's projection of no rebound for BEVs over the long term presumes that there is something fundamentally different about consumer perceptions of BEVs compared to ICE vehicles, and not simply an issue of familiarity or technological constraints that will be overcome in the future. EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

121 RIA at 4-16.

122 Id. at 4-17 (stating that "BEVs are not driven more than ICE vehicles").

123 According to predictions from OMEGA, under the Proposed Rule, the average per-mile fuel cost of BEVs is projected to be approximately 62% lower than that of ICE vehicles between 2022 and 2055. This data is sourced from the '20230315_091353_MY_period_costs.csv' file in the '20230315_091353_effects_central' folder, downloadable from the 'Light-and medium-duty effects' section on EPA's website: https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions-greenhouse-gases

EPA's assumption of no rebound effect for BEVs relies on the empirical evidence available, namely Chakraborty et al. (2022) and Nehiba (2022).124 Although insightful, these studies leave reason for uncertainty. For instance, both studies employ cross-sectional data and do not fully address the endogeneity between vehicle choices and usage, which is discussed further below. This correlation between consumer vehicle choices and usage could significantly vary between early adopters of BEVs and average ICE vehicle owners, thereby impacting the study conclusions. While these studies contribute to the emerging body of research in this field, their findings should thus be interpreted with some caution. Beyond Chakraborty et al. (2022) and Nehiba (2022), we are aware of several other studies that purport to use better data and identifying assumptions and also find zero rebound for electric vehicles (but do not yet have working papers available).125 EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

124 RIA at 4-14.

125 Wendan Zhang et al., Brookings Institution Electric Vehicle Adoption and Combustion Mile Displacement Across Demographics: Short Run Evidence and Implications For Policy, 2023 AERE Presentation (finding a negative rebound effect for electric vehicles.); Beia Spiller, Kenneth Gillingham & Marta Talevi. The Electric Vehicle Rebound Effect, 2023 AEA Conference.

While the available research provides some support for a 0% rebound rate for BEVs based on historical evidence, there is reason to believe that effect may not hold in the future. One potential explanation for the current BEV rebound findings is that "[c]onsumers are quite price inelastic, because they are inattentive."126 With the costs of BEV charging often consolidated into electricity bills, this alteration in cost perception could augment price inelasticity, rendering BEV owners less sensitive to per-mile cost variations.127 But this effect may become less pronounced as BEVs become more common. In particular, as infrastructure grows, electricity price salience may increase as gas stations convert to charging stations and prominently display electricity prices. Relatedly, the current literature could be shaped by the demographic profile of past and current BEV owners—predominantly early adopters—who may not reflect the population that purchases BEVs in the future.128 As BEV penetration accelerates, the associated rebound effect could potentially deviate from current estimates: Outside the vehicle context, economic literature documents a small rebound effect as electrical appliances become more efficient,129 which could hint at similar patterns in the future for BEVs. EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

126 Xavier Gabaix, Behavioral Inattention at 311, in 2 Handbook of Behavioral Economics: Applications and Foundations (2019).

127 See generally Ben Gilbert & Joshua Graff Zivin, Dynamic Salience with Intermittent Billing: Evidence from Smart Electricity Meters, 107 J. ECON. BEHAVIOR & ORG. 176 (2014) (finding that households tend to decrease their consumption in response to billing information—an effect that wanes as the bill's salience fades); Steven Sexton, Automatic Bill Payment and Salience Effects: Evidence from Electricity Consumption, 97 REV. ECON. & STAT. 229 (2015) (finding that automatic bill payments decreases price responsiveness).

128 RIA at 4-14 (acknowledging that the available data is "not likely representative of the current and future general population of car buyers and their driving behavior").

129 Kenneth Gillingham et al., The Rebound Effect is Overplayed, 493 NATURE 475, 476 (2013) (finding a 10% rebound effect). Later, Gillingham et al. (2016) also highlight that the rebound effect for both gasoline and electricity generally falls within a range of 5% to 40%, with the majority of studies suggesting a rebound effect between 5% and 25%. Kenneth Gillingham et al., The Rebound Effect and Energy Efficiency Policy, 10 REV. ENV'T ECON. & POL'Y 68, 75 (2016).

In light of these complexities and uncertainties, EPA should consider exploring a range of possible rebound estimates for BEVs, including the same 10% assumption used for ICE vehicles. EPA should conduct sensitivity analysis to assess the implications of a range of rebound effects between 0% and 10%. EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

Notably, such an analysis would have a very limited impact on EPA's assessment of net benefit. Policy Integrity reran OMEGA using a 10% rebound rate for BEVs and found that this change decreased total net benefits by just 0.43–0.71%, leaving the rule highly net beneficial overall. In fact, when total net benefits were rounded to two significant figures, as EPA does in the Proposed Rule and RIA, they appeared unchanged. (See Table A-1 in the appendix below for full results.) This is likely because additional BEVs resulting from the Proposed Rule make up a small share of the total fleet, particularly in the earlier years in the analysis that are weighted more as a result of discounting. In future standards, the BEV rebound effect could become more significant as BEVs make up a larger share of the vehicle fleet. [EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

Organization: John Graham

The DRIA does include an assessment of maintenance and repair costs for different propulsion systems. The underlying study relied upon by EPA finds that the HEV has lower maintenance and repair costs than ICEs. The BEV assessment is based on three low-volume BEVs that are not representative of the BEV market. The assessment is tilted to favor BEVs by omitting two significant impacts on maintenance and repair costs for BEVs; BEV weight and long-term battery durability. [EPA-HQ-OAR-2022-0829-0585, p. 19]

The higher weight of BEVs will cause tires and brakes to wear out faster and the instant torque response of BEVs may also increase tire wear, increasing BEV maintenance costs compared with hybrids. However, the proposed rule states, "Specific to tires and tire replacement, an issue often cited with respect to BEVs versus ICE vehicles, the authors noted that their analysis assumed that tire life and replacement costs are the same for all powertrains." (DRIA page 4-33). In reaching this conclusion the authors discussed irrelevant factors such as tire rolling resistance, instead of acknowledging the impact of the higher BEV weight and instant torque response – factors that clearly underpin the Goodyear claim "that traditional tires wear 30 percent faster when installed on BEVs" (Burnham, Gohlke, et al. 2021, 83). [EPA-HQ-OAR-2022-0829-0585, p. 19]

The DRIA page 4-33 also states, "the authors assumed that brake pad, rotor, and caliper replacement intervals could be extended by 33% for HEVs and by 50% for PHEVs and BEVs, relative to ICE vehicles". When considering only regenerative brake effects this is likely accurate, but it does not account for the impact of the higher weight of the BEV on brake life. When weight is also considered, the brake replacement intervals are likely to be similar for BEVs and HEVs. [EPA-HQ-OAR-2022-0829-0585, p. 20]

Of course, the impact of increased BEV weight on tire and brake replacement intervals can be addressed by installing larger tires and brakes, but this would both increase new vehicle cost and would make replacement tires and brake parts more expensive. In either case, the impact of higher BEV weight on tire and brake costs must be included in the Final Rule. [EPA-HQ-OAR-2022-0829-0585, p. 20]

The Repair Costs Section 4.3.6.2 (DRIA pages 4-35 to 4-37) does not specify how – or even if - battery replacements were included in BEV repair costs. Given the 30+-year vehicle lifetime in OMEGA used for assessing repair costs (Figure 4-9), it is indefensible to assume zero battery replacement costs for BEVs, especially for BEVs more than 10 years old. Given the extreme cost of BEV battery repair/replacement, the repair cost curves in Figure 4-9 are likely to significantly understate the repair cost for older batteries in BEVs. [EPA-HQ-OAR-2022-0829-0585, p. 20]

The BEV model with the longest run of real-world experience, the Nissan Leaf, has experienced troublesome rates of battery degradation within the first half of the Leaf's expected life (Graham, 2021). It is instructive that most battery warranties for BEVs do not extend beyond 8 years or 100,000 miles of vehicle life.26 The NPRM refers to a claim that BEV batteries will last longer than the life of the vehicle but, as noted by NAS in 2021, that claim is based on laboratory tests. Real-world driving conditions are much more diverse (e.g., extreme temperature conditions, extreme uses of batteries and so forth) and may contribute to battery degradation in ways that lab tests do not cover.27 One specific concern with laboratory tests is that they can only simulate cycle life, not battery life, and real-world experience with battery life beyond about 10 years is completely lacking. Since battery replacement costs are so large, they must be addressed in the Final Rule. [EPA-HQ-OAR-2022-0829-0585, p. 20]

26 For data on the Leaf's rate of battery degradation and battery warranty policies, see John D. Graham. The Global Rise of the Modern Plug-In Electric Vehicle: Public Policy, Innovation, and Strategy. Elgar House Publishing, UK, 2021, 44-46.

27 National Academy of Sciences. Improving Light-Duty Vehicle Fuel Economy: 2025 to 2035. National Academies Press. Washington, DC., 2021, 115.

It is worth noting here that the smaller batteries in HEVs do tend to last at least as long as the life of the vehicle. However, that is due to the HEV's battery management system, which restricts the range of the battery charge level, usually between 30% and 70% of a full charge. BEVs require deeper charging cycles to accomplish the driving ranges that customers demand. It is well known that deeper charging cycles contribute to the rate of battery degradation. Unlike HEVs,28 BEVs also need to be designed to recharge as fast as possible, which also increases the rate of battery degradation. [EPA-HQ-OAR-2022-0829-0585, p. 20]

28 John D. Graham. 2021, 154 (see footnote 26 above for full reference).

Another factor that has previously been ignored is vehicle insurance costs. "For many electric vehicles, there is no way to repair or assess even slightly damaged battery packs after accidents, forcing insurance companies to write off cars with few miles - leading to higher premiums and undercutting gains from going electric."29 "According to online brokerage Policygenius, the average U.S. monthly EV insurance payment in 2023 is $206, 27% more than for a combustion-engine model."30 [EPA-HQ-OAR-2022-0829-0585, p. 21]

29 Scratched EV battery? Your insurer may have to junk the whole car, Reuters March 20, 2023; https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk-whole-car- 2023-03-20/?utm_source=CAR+General+Mailing+List&utm_campaign=afebc6e55f-EMAIL_CAMPAIGN_2023_02_08_09_40_COPY_01&utm_medium=email&utm_term=0_-59328f5e21-%5BLIST_EMAIL_ID%5D.

30 ibid.

Compounding the problem, part of the forecasted future reduction in battery cost is integration of the battery pack into the vehicle structure to reduce manufacturing cost. However, this will just make the insurance problem worse:

"Sandy Munro, head of Michigan-based Munro & Associates, which tears down vehicles and advises automakers on how to improve them, said the Model Y battery pack has "zero repairability." "A Tesla structural battery pack is going straight to the grinder," Munro said."31 [EPA-HQ-OAR-2022-0829-0585, p. 21]

31 ibid.

The repairability problem can be improved, although not eliminated, by making batteries in smaller sections, or modules, that are easier to fix, but this will increase battery pack costs. [EPA-HQ-OAR-2022-0829-0585, p. 21]

Given the high amount of embedded GHG emissions during battery manufacturing, the repairability problem will also significantly reduce the GHG benefit of BEVs. [EPA-HQ-OAR-2022-0829-0585, p. 21]

The intertwined issues of repairability, insurance cost, battery cost, and impacts on GHG benefits should be incorporated into the final rule. [EPA-HQ-OAR-2022-0829-0585, p. 21]

Organization: Missouri Farm Bureau (MOFB)

Similar to EPA's proposed HD rule, this proposal picks winners and losers by doubling-down on electric vehicle (EV) technology, while increasing in adoption in the light-duty sector, only represents 8.4 percent of light-duty production in MY 2022.2 While the proposed rule cites a reduced total cost of ownership, EPA estimates it will raise "average upfront per-vehicle costs to meet the proposed standards to be approximately $1,200 in MY 2032, as estimated using 2020 dollars."3 The proposed rule estimates that in order for automakers to comply with the emissions standards, Battery Electric Vehicles (BEVs) will comprise up to 67 percent of new passenger vehicle sales by 2032 and up to 46 percent of medium-duty vehicle sales.4 In addition to increased purchase costs for EVs, MOFB is concerned about the lack of available public charging stations to accommodate the vast number of EVs mandated by this rule, especially in rural Missouri where most of our members live and work. [EPA-HQ-OAR-2022-0829-0590, pp. 1-2]

2 U.S. EPA Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Vol. 88, Fed. Reg. 29184, p. 29189 (May 5, 2023) (to be codified at 40 CFR pts. 85, 86, 600, 1036, 1037 & 1066).

3 Ibid., 29201.

4 Ibid., 29189, 29331.

Organization: National Automobile Dealers Association (NADA)

EPA forecasts that the average marginal per-vehicle cost for regulated manufacturers (OEMs) to comply with its proposed light-duty mandates will rise from $633 in MY 2027 to $944 in MY 2031, and projects that the marginal per vehicle cost of compliance will jump to approximately $1,200 in MY 2032.12 For medium-duty vehicles, EPA's estimated average marginal per vehicle OEM cost of compliance ranges from $364 in MY 2027 to approximately $1,800 in MY 2032.13 [EPA-HQ-OAR-2022-0829-0656, p. 3]

12 88 Fed. Reg. at 29201, 29328, 29343; See also EPA's Draft Regulatory Impact Analysis (DRIA) at l (able 11), 4-17, 13-25 (Table 13-45).

13 88 Fed. Reg. at 29328; DRIA at 13-52 (Table 13-127).

Importantly, these costs are in addition to those imposed by EPA in prior rules, which are necessarily built into the cost of MY 2027 and later vehicles. EPA asserts, however, that higher light- and medium-duty costs will be offset by purchase incentives arising from the Inflation Reduction Act (IRA), and by lower EV operating costs.14 [EPA-HQ-OAR-2022-0829-0656, p. 3]

14 88 Fed. Reg. at 29201, 29328-29, 29344, 29364.

Organization: Nebraska Farm Bureau Federation (NEFB)

NEFB is Nebraska's largest farm and ranch organization representing all sectors of Nebraska agriculture. Without a doubt, renewable fuels and the renewable fuels industry have been a tremendous success story for the country and the rural economy. Nebraska's ethanol industry alone contributes over $4.5 billion per year to Nebraska's economy according to a study conducted by the University of Nebraska-Lincoln. [EPA-HQ-OAR-2022-0829-0660, p. 1]

Organization: Paul Bonifas and Tim Considine

Maintenance savings: The EPA relies on unrealistic maintenance schedules pushed by car salesmen and manufacturers instead of real data. This is an example of government bureaucrats ignoring the simple real-world consumer data to sell a narrative to citizens. The myth that EVs don't require maintenance is false, and because most mechanics have neither the training nor the technology to work on EVs, EV maintenance commands a price premium. When switching to realistic and reliable consumer maintenance cost information from Kelley Blue Book, the maintenance savings decrease from the EPA's claimed $410 billion to a realistic $72 billion, a $338 billion savings decrease from the EPA's calculations. [EPA-HQ-OAR-2022-0829-0551, p. 3]

Repair Savings: Like their maintenance calculations, instead of using real-world consumer data, the EPA relied on elaborate multi-variable mathematical equations that include a "multiplier" that inherently makes ICE vehicles ~50% more expensive to repair than EVs. Though EVs are supposedly in the shop less frequently, they're more expensive to repair when they do go in5. This is in part due to the battery costs, which can be up to 50% of the entire EV's cost. The battery health of an EV's contributes significantly to its depreciation and replacement costs. Scaling the EPA's repair estimates using realistic and reliable consumer repair cost information from Kelley Blue Book, the repair "savings" decrease from the EPA's claimed $170 billion to a realistic NEGATIVE $4 billion, a $174 billion savings decrease from the EPA's calculations. [EPA-HQ-OAR-2022-0829-0551, p. 3]

5 https://www.gobankingrates.com/saving-money/car/experts-factors-to-consider-before-switching-to-ev-electric- car/

Maintenance Savings

EPA Claimed Savings: $410 billion

Realistic Savings: $72 billion [EPA-HQ-OAR-2022-0829-0551, p. 6]

The EPA overestimates the maintenance cost savings in their proposed rule. They support their maintenance cost estimates for the 15-year life of a vehicle (15,000 miles driven, per year) from Argonne National Laboratory's study from 2021 17. The EPA claims a lifetime maintenance cost for an Internal Combustion Engine (ICE) vehicle of $20,050 compared to

$12,675 for a Battery Electric Vehicle (EV)18. This corresponds to a maintenance cost for the first-five-years of ownership of $3,710 for an ICE vehicle and $2,555 for an EV, a supposed 45% cost increase for ICE vehicles… [EPA-HQ-OAR-2022-0829-0551, p. 6]

17 https://www.osti.gov/biblio/1780970

18 Page 310 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

However, the EPA and Argonne base their calculations on "factory-recommended actions at periodic mileage or calendar intervals." These maintenance schedules are unilaterally set by automobile manufacturers and dealerships who are incentivized to boost their bottom line with after-purchase services and don't necessarily have the best interest of the consumer in mind. NADA, the National Automobile Dealers Association, reports that 49.6% of dealerships' profits come from the service and parts departments compared to only 26% profit from the sale of new vehicles19. The question is: how many people follow the exact schedule of recommended maintenance for their vehicle? The EPA admits this oversight by writing "in practice, not everyone follows the recommended service intervals", yet they choose to ignore it in their maintenance cost estimates and follow the biased, inaccurate schedule of car salesmen. [EPA-HQ-OAR-2022-0829-0551, pp. 6-7]

19 https://www.edmunds.com/car-buying/where-does-the-car-dealer-make-money.html

In contrast, the widely trusted Kelley Blue Book (KBB) company provides a "5-year cost to own" figure20 based on continuously updated real-world consumer data instead of "factory-recommended actions." KBB reports that ICE owners spend $4,583 and EV owners spend $4,246 on maintenance during the first five years, only an 8% difference21. Compare that to EPA's claimed 45% increase from EV to ICE and it is clear the EPA severely overestimated the maintenance savings associated with their proposed rule. Scaling the EPA's maintenance cost saving down from 45% to 8% dramatically reduces the estimated maintenance benefit from $410 billion to $72 billion. [EPA-HQ-OAR-2022-0829-0551, pp. 6-7]

20 https://www.kbb.com/new-cars/total-cost-of-ownership/

21 https://www.nada.org/nada/nada-headlines/beyond-sticker-price-cost-ownership-evs-v-ice-vehicles

The EPA has many holes in its maintenance analysis, the largest bein g that they are not using real-world consumer data. Furthermore, they are purposefully ignoring differences in EVs that they are aware of, namely the EV tire problem. EV tires are more expensive and more advanced because of the heavy battery weight of EVs and their faster initial acceleration, and their need for noise reduction22. The EPA states "Specific to tires and tire replacement…, the authors noted that their analysis assumed that tire life and replacement costs are the same for all powertrains… Some BEVs are equipped with tires that differ from those on typical ICE vehicles to address tread wear and the instant torque of BEVs making the issue raised by the authors a valid issue for consideration… The authors did reiterate a Goodyear claim that traditional tires wear 30 percent faster when installed on BEVs"23. Therefore, though the EPA is aware of the increased maintenance cost for tires on EVs, they do NOT include that in their analysis. [EPA-HQ-OAR-2022-0829-0551, p. 7]

22 https://www.businessinsider.com/tesla-differences-between-gas-and-electric-vehicles-maintenance-2020-4

23 Page 309 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Though there are relatively fewer moving parts in an EV than in an ICE vehicle, EVs still require maintenance. Most mechanics do not have the training or the technology to work on EVs, causing a supply constraint on EV mechanics for maintenance. Because of the lack of options, mechanics that provide EV maintenance tend to charge a price premium, have long wait-times, and are not located within proximity of all EV owners24. [EPA-HQ-OAR-2022-0829-0551, p. 7]

24 https://www.gobankingrates.com/money/financial-planning/hidden-costs-of-electric-vehicles/

For these reasons and more, overall EV owner customer service satisfaction is 42 points lower than ICE owner satisfaction. Automotive News reports that recall rates are double among EVs and a lack of service advisor knowledge contributes to the lower satisfaction rating25. [EPA-HQ-OAR-2022-0829-0551, p. 7]

25 https://www.autonews.com/service-and-parts/lexus-bright-spot-disappointing-jd-power-service-survey

The National Automobile Dealers Association (NADA) also agrees, stating that contrary to popular belief, EV owners pay more for repairs than their ICE counterparts. Though EVs are in the shop less frequently, they're more expensive to repair when they do go in39. [EPA-HQ-OAR-2022-0829-0551, p. 10]

39 https://www.gobankingrates.com/saving-money/car/experts-factors-to-consider-before-switching-to-ev-electric- car/

Generally, mechanics do not have the training or the technology to work on EVs, causing a supply constraint on EV mechanics for repairs. Because of the lack of options, mechanics that do repair EVs have long wait-times and high prices, as the consumers have no alternative choices. It may also lead to needing to travel for hours to reach a mechanic capable of repairing an EV [EPA-HQ-OAR-2022-0829-0551, p. 10]

Though the number of miles on an ICE engine is a good indicator of the health of the vehicle, the same cannot be said for EVs. Instead, the conditions an EV battery was subjected to have a significant impact on its future life. Things that degrade a battery include an EV being exposed to cold weather, or being exposed to hot weather, or if it was fast-charged, or if it was left on low-battery, or charged above 90%43. Because up to 50% of an EV's value is the health of its battery, there is significant depreciation and replacement costs associated with battery status. [EPA-HQ-OAR-2022-0829-0551, p. 11]

43 https://www.businessinsider.com/electric-car-vehicle-resale-value-mystery-tesla-2023-1

Also, because the average price-tag of EVs is 23% more than their ICE counterpart, repair costs in case of collisions are also more expensive44. [EPA-HQ-OAR-2022-0829-0551, p. 11]

44 https://www.gobankingrates.com/money/financial-planning/hidden-costs-of-electric-vehicles/

Likewise, among the many things the EPA doesn't consider in its analysis is how EV suspensions are likely to wear out sooner due to EVs higher weights thanks to their hefty batteries45. [EPA-HQ-OAR-2022-0829-0551, p. 11]

45 https://www.businessinsider.com/tesla-differences-between-gas-and-electric-vehicles-maintenance-2020-4

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

EPA's cost estimate does not include battery replacement.37 With the proposed standards taking effect in 2027, and some of the cost and savings estimates being extrapolated out through 2055, even if Tesla can be the first EV manufacturer to achieve a battery that lasts 20 years, a replacement will be a requirement. Based on the EPA's chosen 100 kWh capacity and the Department of Energy's 2022 estimated cost of manufacturing of $153/kWh, a new battery without labor, disposal fees, and other associated expenses would cost the consumer $15,300. [EPA-HQ-OAR-2022-0829-0674, p. 10]

37 "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." EPA, Apr. 2023, www.epa.gov/system/files/documents/2022-12/420d22003.pdf (accessed 5 July 2023).

Table 4-5, which outlines the studies used to justify the proposal, shows that all but one study either came from California or New York. The claimed national study only contained 862 vehicles and therefore poses insignificant statistical relevance. It also shows that the entirety of the country is not represented. While the Census Bureau splits the United States at 80% urban and 20% rural living, New York and California cannot be considered as viable representations of the county's entire population. Due to differences in infrastructure, state-imposed regulations and laws, population density, and other factors, it is likely that differences could be found even between major cities throughout the country. [EPA-HQ-OAR-2022-0829-0674, p. 10]

On page 4-34, when referring to maintenance costs over the 225,000-mile life of a vehicle, EPA does not mention the need for battery replacement. [EPA-HQ-OAR-2022-0829-0674, p. 10]

Misinterpretation of vehicle ownership costs

"Vehicle Technology Costs"—the costs of purchasing and maintaining a vehicle excluding fuel costs—are assumed to be lower (a benefit) under the proposed rule than absent the rule. (See Table 160.) This result makes no sense, and the value should be negative, a cost to American households. Empirically, we observe that the vast majority of vehicles sold in America—even with substantial tax credit incentives—are not electric vehicles. American consumers are rational, not irrational. If purchasing an electric vehicle led to lower ownership costs of purchase, maintenance, and repair, then most purchases today would be for electric vehicles, particularly given the substantial tax benefits. Americans make a different choice with their hard-earned dollars. Consequently, the vehicle technology costs presented in Table 160 should all be negative, not positive. [EPA-HQ-OAR-2022-0829-0674, p. 12]

Organization: Toyota Motor North America, Inc.

2.5. Conclusion

A deeper analysis of global and IRA-compliant critical mineral supply and demand is needed to support the Final Rule. The proposal's cursory assessment results in erroneous conclusions that "critical battery mineral supply is likely to be adequate to meet anticipated demand, in some cases by a significant margin."9 The proposal lacks the evidence to support this finding. Demand for critical minerals are higher today than in the years referenced in the proposal due to new government policies and automaker targets. Future demand growth for PEVs is unclear given the uncertain geo-political considerations and supply chain operations beyond the control of manufacturers and EPA. It is highly plausible the tight supply-demand for lithium and graphite will lead to volatile prices. The proposal fails to consider how this could suppress demand and annual PEV market share. The Final Rule must include a significantly more robust and clear-eyed analysis based on a boarder array of sources. It must also reconsider how the global supply chain for mineral mining, refining, cell production, and battery production are most likely to evolve in order to better understand the extent to which IRA or other financial incentive can be considered in the cost analysis supporting the rule. [EPA-HQ-OAR-2022-0829-0620, p. 14]

9 DRIA at 3-23.

Organization: Valero Energy Corporation

b) EPA does not adequately quantify vehicle maintenance and repair costs.

In its analysis of maintenance and repair costs, EPA relies on data gathered and summarized by Argonne National Laboratory (ANL) in their evaluation of TCO for vehicles of various sizes and powertrains.176 However, the BEV models relied upon in ANL's and EPA's analyses – the BWM i3, Fiat 500e and Kia Soul Electric177 – are limited in breadth and not representative of new light-duty and medium-duty BEV sales in the U.S.: [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

176 EPA's Proposed Rule at 29384 (Burnham et al., Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains, Argonne National Laboratory. ANL/ESD-21/4. April 2021).

177 EPA DRIA at 4-32 and Burnham et al at 69.

- In 2022, the BMW i3 held a 0.0 percent market share in the U.S. with 9 total sales178 and has since been discontinued;179

- The Fiat 500e is not currently available for sale in the U.S.;180 and

- The Kia Soul EV will be discontinued after the 2023 model year.181 [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

178 Kelley Blue Book, "Electric Vehicle Sales Report – Q4 2022", January 16, 2023, https://www.coxautoinc.com/wp- content/uploads/2023/01/Kelley-Blue-Book-EV-Sales-and-Data-Report-for-Q4-2022.pdf.

179 See https://www.bloomberg.com/news/features/2022-12-12/bmw-s-discontinued-i3-is-already-an-ev-cult-classic#:~:text=By%202021%20the%20company%20was,like%20the%20brand%27s%20other%20models.

180 See https://insideevs.com/news/621727/fiat-500e-confirmed-us-debut-2024/.

181 See https://www.guideautoweb.com/en/articles/70428/r-i.p-kia-soul-ev-another-small-electric-car-bows- out/#:~:text=Another%20small%20electric%20car%20is,of%20the%202023%20model%20year.

Furthermore, all three BEV models are subcompact cars and SUVs, not at all representative of EPA's projections for model year 2027 to 2032 sales.182 [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

182 DRIA at 1-4 and 1-5.

In addition to the questionable nature of the input data for EPA's application in this rulemaking, EPA diverges from ANL's approach (and from any of the other above-referenced peer-review sources) in its establishment of maintenance costs curves on a per-mile basis.183 Not only is EPA's approach to establishing maintenance cost curves lacking in independent peer review – it is also illogical. [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

183 DRIA at 4-34 and 4-35.

EPA cites the following example outcome of its maintenance costs curves:

"For example, an ICE vehicle having an odometer reading of 120,000 miles would have a maintenance cost per mile of $0.10 []. If that vehicle travels 10,000 miles in the given year, then its estimated maintenance costs would be $1,000 in that year. If that vehicle were to instead travel 15,000 miles in that year, its estimated maintenance costs would be $1,500."184 [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

184 DRIA at 4-35.

This simply does not comport with logical projections using the input data that EPA adopts from ANL.185 As demonstrated below in Tables 4 and 5, if the ICE vehicle referenced by EPA having an odometer reading of 120,000 miles travels 10,000 miles in the given year, its projected maintenance costs would be $315. And if that vehicle travels 15,000 miles in the given year, its projected maintenance costs would be $505. EPA's approach to establishing constant-slope maintenance cost per mile curves produces flawed results that contradict the conclusions of the literature sources upon which EPA relies and to which it cites. [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

185 DRIA at 4-34 and Burnham et al at 85.

Table 4 – Projected ICEV maintenance costs between 120,000 and 130,000 miles [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

Service	Miles per Event ICE186	Cost per Event (2019 dollars)187	Number of events incurred by ICEV at 120,000 miles188	Number of events incurred by ICEV at 130,000 miles189	Maintenance costs incurred between 120,000 and 130,000 miles190
Engine Oil	7,500	$65	16	17	$6
Oil Filter	7,500	$20	16	17	$20
Tire Rotation	7,500	$50	16	17	$50
Wiper Blades	15,000	$45	8	8	$0
Cabin Air Filter	20,000	$50	6	6	$0
Multi-Point Inspection	20,000	$110	6	6	$0

Engine Air Filter	30,000	$40	4	4	$0
Brake Fluid	37,500	$150	3	3	$0
Tires Replaced	50,000	$525	2	2	$0 [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]
Brake Pads	50,000	$350	2	2	$0
Starter Battery	50,000	$175	2	2	$0
Spark Plugs	60,000	$225	2	2	$0
Oxygen Sensor	80,000	$350	1	1	$0
Headlight Bulbs	80,000	$90	1	1	$0
Transmission Service	90,000	$200	1	1	$0
Timing Belt	90,000	$750	1	1	$0
Accessory Drive Belt	90,000	$165	1	1	$0
HVAC Service	100,000	$50	1	1	$0
Brake Rotors	100,000	$500	1	1	$0
Shocks and Struts	100,000	$1,000	1	1	$0
Engine Coolant	125,000	$190	0	1	$190
EV Battery Coolant	n/a	$210	-	-	-
Fuel Filter	150,000	$110	0	0	$0
Brake Calipers	150,000	$1,000	0	0	$0

Total cost of maintenance between 120,000 and 130,000 miles $325 [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

186 DRIA at 4-34.

187 DRIA at 4-34.

188 Calculated as 120,000 miles divided by the service interval specified by EPA (e.g., 7,500 miles), rounded down to the nearest integer.

189 Calculated as 130,000 miles divided by the service interval specified by EPA (e.g., 7,500 miles), rounded down to the nearest integer.

190 Calculated as the difference in the number of maintenance events incurred at 130,000 miles versus 120,000 miles (e.g., 17 - 16 = 1 engine oil service event), multiplied by the cost per event specified by EPA.

Table 5 – Projected ICEV maintenance costs between 120,000 and 135,000 miles [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

Service

Miles per Event ICE[191]

Cost per Event (2019 dollars)[192]

Number of events incurred by ICEV at 120,000 miles[193]

Number of events incurred by ICEV at 135,000 miles[194]

Maintenance costs incurred between 120,000 and 135,000 miles[195] [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

Engine Oil	7,500	$65	16	18	$130
Oil Filter	7,500	$20	16	18	$40
Tire Rotation	7,500	$50	16	18	$100
Wiper Blades	15,000	$45	8	9	$45
Cabin Air Filter	20,000	$50	6	6	$0
Multi-Point Inspection	20,000	$110	6	6	$0
Engine Air Filter	30,000	$40	4	4	$0
Brake Fluid	37,500	$150	3	3	$0
Tires Replaced	50,000	$525	2	2	$0
Brake Pads	50,000	$350	2	2	$0
Starter Battery	50,000	$175	2	2	$0
Spark Plugs	60,000	$225	2	2	$0
Oxygen Sensor	80,000	$350	1	1	$0
Headlight Bulbs	80,000	$90	1	1	$0
Transmission Service	90,000	$200	1	1	$0
Timing Belt	90,000	$750	1	1	$0
Accessory Drive Belt	90,000	$165	1	1	$0
HVAC Service	100,000	$50	1	1	$0
Brake Rotors	100,000	$500	1	1	$0
Shocks and Struts	100,000	$1,000	1	1	$0
Engine Coolant	125,000	$190	0	1	$190
EV Battery Coolant	n/a	$210	-	-	-
Fuel Filter	150,000	$110	0	0	$0
Brake Calipers	150,000	$1,000	0	0	$0

Total cost of maintenance between 120,000 and 135,000 miles $505 [EPA-HQ-OAR-2022-0829-0707, pp. 35-38]

191 DRIA at 4-34.

192 DRIA at 4-34.

193 Calculated as 120,000 miles divided by the service interval specified by EPA (e.g., 7,500 miles), rounded down to the nearest integer.

194 Calculated as 135,000 miles divided by the service interval specified by EPA (e.g., 7,500 miles), rounded down to the nearest integer.

195 Calculated as the difference in the number of maintenance events incurred at 135,000 miles versus 120,000 miles (e.g., 18 - 16 = 2 engine oil service events), multiplied by the cost per event specified by EPA.

e) EPA omits the costs of unrepairable battery packs.

In the evolution of EV design, battery packs that were once organized into modules are being replaced by a single large battery packs that are integrated into the structure of the vehicle.219, 220 With a modular design, if a single battery cell is damaged, the specific module can be replaced without incurring the cost of replacing the entire battery pack.221 If an integrated battery pack is damaged, there is no way to access and repair the damaged pack – as a result, the Tesla Model Y has been characterized as having "zero repairability", and reports also indicate repairability problems with EVs from Nissan, Hyundai, Stellantis and BMW.222 [EPA-HQ-OAR-2022-0829-0707, p. 41]

219 Kyle Field, Elon Musk Shares History Of Tesla Battery Modules & Why They Are Going Away, CLEANTECHNICA, Feb. 2, 2020, https://cleantechnica.com/2020/02/02/elon-musk-shares-history-of-tesla-battery-modules-why-they- are-going-away/

220 Nick Carey et al., Insight: Scratched EV battery? Your insurer may have to junk the whole car, REUTERS, Mar. 20, 2023, https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk- whole-car-2023-03-20/

221 Id.

222 Id.

The integrated design has created unexpected problems for motorists and insurers. Following an accident in which some of the battery cells in a pack are damaged, insurers are forced to write off the EV or pay the cost of a complete battery replacement, potentially at costs exceeding $20,000.223 Yet EPA's analysis of repair costs assumes that EVs have lower repair cost per mile than ICEVs, at a ratio of 0.91 for HEVs, 0.86 for PHEVs, and 0.67 for BEVs and FCEVs.224 [EPA-HQ-OAR-2022-0829-0707, p. 41]

223 Brengt Halvorson, EVs still cost much more than gas cars to insure—even hybrids, GREEN CAR REPORTS, Apr. 27, 2023, https://www.greencarreports.com/news/1139493_evs-still-cost-much-more-than-gas-cars-to-insure-even- hybrids

224 DRIA at 4-36.

Unsurprisingly, insurance premiums for EVs have increased to reflect their inability to be repaired; the online brokerage Policygenius estimates that the average monthly insurance payment for a U.S. EV is $206, 27% more than for an average ICEV.225 EPA relies on outdated data in its analysis, finding that insurance costs are roughly the same for BEVs and ICEVs and making no adjustments for insurance premium differences.226 [EPA-HQ-OAR-2022-0829-0707, p. 41]

225 Nick Carey et al., Insight: Scratched EV battery? Your insurer may have to junk the whole car, REUTERS, Mar. 20, 2023, https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk- whole-car-2023-03-20/

226 DRIA at 4-22.

I. EPA fails to adequately consider the environmental justice impacts of the proposed rule.

Disadvantaged communities already face significant access barriers to electric vehicles, such as: higher upfront costs to electric vehicle ownership; a lack of existing charging infrastructure available to them in low-income, minority populated, and rural areas; and costlier and time-intensive charging due to a greater reliance on public charging infrastructure, particularly for individuals living in multi-family housing. [EPA-HQ-OAR-2022-0829-0707, p. 55]

EPA's EJ analysis must be thorough and inclusive of factors that may impact the price of transported goods, such as ZEV affordability, the availability of public charging, reasonable charging practices, and a lifecycle analysis of electric vehicles and power generation emissions. Without doing so, EPA runs the risk of intensifying price disparities and access to transport relative to the baseline for EJ communities. EPA's EJ analysis must be thorough and inclusive of electric vehicle affordability, the availability of public charging, reasonable charging practices, and a lifecycle analysis of electric vehicles and power generation emissions. Without doing so, EPA runs the risk of intensifying price disparities and access to transport relative to the baseline for EJ communities. These impacts can be both quantitively and qualitatively characterized.300 EPA's silence on these disparities is especially worrisome given EPA's prior binding commitments to EJ analysis for the benefit of disadvantaged and low-income communities. [EPA-HQ-OAR-2022-0829-0707, p. 55]

300 See, i.e., supra.

To date, the target electric vehicle customer base for OEMs consists of "mostly male, high-income, highly educated, homeowners, who have multiple vehicles in their household and have access to charging at home."301 Additionally, according to the U.S. Department of Transportation (DOT), "the rate of EV adoption in rural areas is roughly 40% lower than it is in urban areas, and EV charging infrastructure expansion has mostly been concentrated in cities and along major highways".302As a result, electric vehicle ownership remains primarily concentrated in affluent, large metropolitan and urban areas.303 By contrast, the supporting electricity generation necessary to support EPA's proposal is predominantly located in more remote, rural regions that are geographically isolated from urban centers. [EPA-HQ-OAR-2022-0829-0707, pp. 55-56]

301 Scott Hardman*, Kelly L. Fleming, Eesha Khare, and Mahmoud M. Ramadan, A perspective on equity in the transition to electric vehicles, MIT SCIENCE POLICY REVIEW (Aug. 30, 2021) available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/.

302 U.S. Department of Transportation, Community Benefits of Rural Vehicle Electrification (last updated February 2, 2022), available at https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/community- benefits.

303 See, i.e., Shuocheng Guo, Eleftheria Kontou, Disparities and equity issues in electric vehicles rebate allocation, Energy Policy, Volume 154, 2021, 112291, ISSN 0301-4215, available at https://doi.org/10.1016/j.enpol.2021.112291.

EPA's proposal directly impacts EJ communities by contributing to additional, local emissions to meet electric vehicle charging demand. Consequently, in theory, EJ communities incur an incremental burden in exchange for the subsidization of electric vehicles for more affluent consumers. And this subsidy occurs at expense of our most vulnerable communities burdened by emissions as a direct result of the proposal, with no corresponding benefit, since electric vehicles are likely to remain concentrated in affluent areas. Further, these communities remain unable to afford EPA's chosen mode of transport and are particularly vulnerable to rising electricity costs. [EPA-HQ-OAR-2022-0829-0707, pp. 55-56]

Notwithstanding EPA's hope that its proposal may serve to incentivize the purchases of electric vehicles, these vehicles are significantly more expensive on average than their ICE vehicle counterparts and unaffordable for many households. These are costs are also likely understated as each electric vehicle already enjoys thousands of dollars' worth of Federal and state subsidies, which are ultimately funded by taxpayers. Additionally, an automakers' ability to sell electric vehicles to consumers depends on substantial price subsidies in the form of credit support. EPA ignores the reality that many EJ stakeholders are currently unable to afford the upfront costs of purchasing an electric vehicle in the first place. With the cost of transition minerals expected to escalate exponentially in the coming years as a function of limited supply and increasing demand, the costs to manufacture and purchase electric vehicles will likely rise. [EPA-HQ-OAR-2022-0829-0707, p. 56]

EPA should also consider the effects of the proposal on electricity prices, as low-income populations often spend a larger percentage of their earnings on essential utilities compared to the rest of the United States. Reliance on electric vehicles has been shown to spur increases in load and demand during peak periods, which impact electricity prices. Because EPA lacks expertise in the area of electrical grid management and economics, EPA should consult with other agencies and credible experts in these areas in order to adequately evaluate these impacts.304 EPA should ensure that the proposal meets reliability and affordability criteria and helps EJ communities make informed decisions about their own energy needs. Additionally, EPA's EJ assessment fails to acknowledge the likelihood that many owners will lack access to residential charging, which will substantially increase their operating expenses. Consistent reliance on fast charging also shortens electric vehicle battery life, resulting in a need to replace the battery and/or the vehicle more frequently. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

304 See, West Virginia, 142 S.Ct. at 2612-13 (stating that EPA admitted that opining on trends in electricity transmission, distribution, and storage requires technical and policy expertise not traditionally needed in EPA regulatory development and finding that there is little reason to think Congress assigned such decisions to the EPA).

If EJ is truly a commitment for EPA, it should carefully consider criticisms like those leveled by The Two Hundred, which point out the disproportionate impacts to working and minority communities as a result of California's climate approach regarding electrified transport; those impacts and concerns remain true, and indeed are magnified under the proposed standards.305 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

305 See Plaintiffs' Complaint, The Two Hundred for Homeownership, et al. v. California Air Resources Board, et al., No. 1:22-CV-01474.

It is critical from the outset to design standards to minimize the potential for price shocks and supply disruptions. As written, the proposal ultimately benefits electric vehicle manufacturers at the expense of disadvantaged communities by subsidizing unaffordable transportation that is not fit for the purposes of commuting to and from EJ communities. At minimum, EPA should perform a thorough EJ assessment specific to its LDV proposal that is comprehensive of both transport challenges and impacts faced by EJ stakeholders and the government-wide Justice40 Initiative. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

The average purchase price of EV cars in 2022 was approximately $65,000, which is more than what 46 percent of American households earn in income in a year.306 While the average "used" EV sold for $42,895 in March of 2023.307 While EPA's DRIA anecdotally indicates that "emerging consensus suggests that purchase price parity is likely to occur by the mid-2020's for some vehicle segments and models"308, Ford CEO Jim Farley told attendees at its 2023 Capital Markets Days that EV cost parity may not come until after 2030.309 Moreover US auto makers are focusing their efforts on producing higher priced electric SUVs and trucks, including Fords $100,000 F150 Lightening Platinum310 and GM's announcement that its luxury brands, Cadillac and Buick, will be its first all-electric product lineups.311 While smaller EV's like the Chevy Bolt, touted by the Biden Administration as being affordable alternatives, are being discontinued.312 The reality is that most middle- and lower-income families simply cannot afford to purchase a new or used EV, even when taking into account available tax incentives and rebates. In fact, middle – and lower -income families are more likely to purchase older used vehicle, due to their lower upfront costs, and to hold onto those vehicles for longer periods.313 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

306 Kelly Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1% and all United States Household Income Percentiles, DQYJD

307 What to know about buying a used electric vehicle as more hit the auto sale market, CNBC, May 21, 2023

308 EPA DRIA, 3.1.3.1, 4-15

309 Ford CEO says EV cost parity may not come until after 2030, Reuters, May 31, 2023

310 https://www.ford.com/trucks/f150/f150-lightning/models/

311 Cadillac and Buick will be GM's first all-EV brands, Automotive News, July 1, 2022

312 GM Killed the Chevy Bolt- and the dream of a small, affordable EV, The Verge, April 26, 2023

313 Supporting Lower-Income Households' Purchase of Clean Vehicles: Implications From California-wide Survey Results, UCLA Luskin Center for Innovation, 2020

EPA Summary and Response

Summary:

Regarding maintenance and repair costs:

Commenters expressed dissatisfaction with EPA's use of the Argonne National Lab Total Cost of Ownership study as the basis for the maintenance cost analysis (American Fuel & Petrochemical Manufacturers, Betsy Cooper, Paul Bonifas and Tim Considine). Commenters also argued that EPA had failed to consider routine battery maintenance checks that auto makers recommend every 6 months to 2 years and that the analysis is tilted in favor of BEVs by ignoring factors such as environmental impacts on BEV brakes and diminished BEV battery capacity (Anonymous), and by omitting impacts of BEV weight and battery durability (John Graham). Other commenters, in support of EPA's inclusion of repair and maintenance costs and savings in the benefit cost analysis, stated their finding that BEVs and PHEVs can deliver around 50 percent savings compared to conventional gasoline vehicles (Consumer Reports).

Commenters asserted that the higher weight of BEVs will cause tires and brakes to wear out faster and the instant torque response may increase tire wear (John Graham).

Commenters expressed concerns regarding the use of the ANL study to support the EPA repair cost estimates (Anonymous, Arizona State Legislature). Commenters pointed out the different types of vehicles considered by ANL and noted that the BEVs were not comparable to the ICE vehicles and that EPA's repair and maintenance costs failed to consider road maintenance costs associated with heavier BEV vehicles (Anonymous, Valero).

Some commenters provided considerable detail regarding repair and maintenance costs suggested that EPA had overestimated repair and maintenance savings (Paul Bonifas and Tim Considine). They argued that the maintenance savings should be $72 billion rather than EPA's calculated $410 billion and that repair savings should be negative $4 billion (i.e., a cost, not a savings) compared to EPA's estimated $170 billion.

Other comments took exception to EPA's approach of generating a cost curve for maintenance costs rather than using a constant cost per mile value (Valero).

Commenters expressed concern over the cost of battery repairs (Alliance for Consumers) and higher insurance costs due to those repairs and possible battery replacements (Clean Fuels Development Coalition et al., John Graham). Other commenters asserted that is was indefensible not to include battery replacement costs in the analysis (John Graham).

Regarding biofuels and agriculture:

Commenters expressed concern that EPA had not considered the impact of the rule on the U.S. biofuels or agriculture industries (American Fuel & Petrochemical Manufacturers, Charles Forsberg).

Regarding crude oil import impacts:

Commenters noted EPA's use of AEO 2021 in the rule's analysis thus calling into question the validity of EPA's estimates of reductions in crude oil imports resulting from the rule (American Fuel & Petrochemical Manufacturers).

Commenters expressed dissatisfaction with EPA's use of the Low Economic Growth case from AEO 2021 to estimate the impact of the proposed rule on oil imports (American Fuel & Petrochemical Manufacturers).

Regarding the electric grid and infrastructure:

Commenters encouraged EPA to conduct an assessment to account for the costs associated with upgrades to the nation's grid infrastructure including upgraded generation, transmission, and distribution, and installation of public and private chargers (Chevron). Other commenters expressed concern over charging availability (Missouri Farm Bureau). Other comments argued that EPA had failed to consider annual operating and maintenance costs for EVSE (Valero).

Regarding consumer savings:

Commenters noted that past EPA rules have delivered savings while, at the same time, vehicles have become safer, larger, and more powerful with no (inflation-adjusted) increase in vehicle prices (Consumer Reports).

Regarding IRA incentives and consumer costs:

Commenters argued that EPA was not fully accounting for costs by relying on incentives under the IRA and that EPA oddly accounts for potential purchase incentives for net consumer prices (Delek US Holdings, Inc.).

Regarding medium-duty vehicles:

Commenters provided detailed analysis of medium-duty electrification costs, ownership costs along with supporting information regarding PHEVs to support the stringency of the medium-duty standards (Environmental Defense Fund).

Regarding time spent refueling BEVs:

Commenters argued that BEVs take more time to refuel than ICE vehicles, noting that recharging with a level 1 charger can take 40 to 50 hours to fully charge while level 2 charging can take 4 to 10 hours (Delek US Holding, Inc.). Commenters also noted that most PHEVs do not work with DC fast chargers (Delek US Holding, Inc.).

Regarding vehicle weight and insurance costs:

Commenters argued BEVs, being heavier than comparable ICE vehicles, create more safety issues in a collision and more weight that our crumbling infrastructure has to absorb. Furthermore, insurance companies may be charging higher premiums to all customers to pay for the increased risk of injury and the larger costs involved in repairing EVs versus and ICE vehicle (Daniel Hellebuyck).

<u>Response:</u>

Regarding certain comments presented in this Section 8.2, we respond to specific comments regarding environmental justice and equity in Section 9 and 13 of this document, consumer impacts in Section 13 of this document, critical minerals in Section 15 of this document, battery replacement and battery replacement costs in Section 16 of this document, and grid reliability in Section 18 of this document.

The Arizona State Legislature pointed to a story by Sean Tucker of Kelly Blue Book showing BEV repair costs exceeding ICE repair costs in the first 12 months of ownership. The Sean Tucker story was actually quoting a study done by a predictive analytics organization called "We Predict." Not surprisingly, the Sean Tucker story pointed to labor as the source of the higher repair costs. The story states, "EV repair is a specialized service at the moment. But it won't remain a rare specialty forever." The story also states, "The newness of EVs also means there are few older EVs to study. But We Predict believes that EVs may prove less expensive in the long run. 'The cost of keeping the vehicle in service for the EV, even as the EV gets older, becomes smaller and smaller and actually less than keeping an ICE [internal combustion engine] vehicle on the road,' We Predict CEO James Davies told reporters. 'That's not just maintenance costs, but all service costs.'" The story referenced by the Arizona State Legislature appears to be more supportive of the ANL study and EPA's use of the ANL study than of the position taken by the commenter. The Arizona State Legislature also pointed to a Forbes story that showed higher repair costs for BEVs than for ICE vehicles. The Forbes story notes that, "However, those results come with a string of asterisks. The short version is, sample sizes may be too small, and the growth in EV share may be too new, to draw lasting conclusions from the data that's available so far, said Susanna Gotsch, director and Industry Analyst at CCC." The Forbes story also notes that, "EV repairs can take longer, until technicians get accustomed to the new routines."

Regarding the maintenance and repair savings estimated in the final analysis, EPA continues to make use of the ANL study as a reasonable source of repair and maintenance data despite the issues noted by the commenter that some of the vehicles had low market shares, and we are not aware of other sources of repair data that are any more complete or reliable. EPA notes that, while the maintenance and repair savings are significant, the final rule is net beneficial even without consideration of the maintenance and repair savings we have estimated. Regarding the repair and maintenance cost/savings analysis conducted by Paul Bonifas and Tim Considine, the commenters used a different source for their estimates (a story from NADA[371] which the commenters suggested used Kelley Blue Book data but this is not clear in the NADA story) which showed maintenance costs for ICE vehicles of $4,583 and for BEVs $4,246 which represents a lower savings for BEVs than estimated by the ANL study and EPA. As noted, it is not clear where the NADA estimates came from and, although we recognize that not everyone follows the exact schedule of recommended maintenance, EPA believes most people do follow automaker recommendations for proper maintenance and it is reasonable to base maintenance costs on manufacturer-recommended maintenance actions as ANL and EPA have done. Importantly, the commenters' analysis still suggested a $68 billion net savings to consumers. We also note that, while we have not estimated battery replacement costs (because we do not believe it is necessary or appropriate to do so as further discussed in Section 12.2.5 of this RTC), we have similarly not estimated the savings associated with the reduced number of transmission replacements and overhauls, catalyst replacements, etc.

EPA appreciates the comments from Consumers Reports and agrees that BEVs and PHEVs can provide repair and maintenance savings relative to traditional ICE vehicles, as we have included in our analysis (see Section VIII.B.3 of the preamble).

Regarding the detailed maintenance costs submitted by Valero, it appears that the commenter understands the approach used by EPA but takes exception to the example provided in the NPRM which stated that, "If that vehicle has a maintenance cost of $0.10 per mile and travels 10,000 miles in the given year, then its estimated maintenance costs would be $1,000 in that year. If that vehicle were to instead travel 15,000 miles in that year, its estimated maintenance costs would be $1,500." This was simply meant to be an example of the way maintenance costs are dependent on maintenance costs per mile and the number of miles driven, not an actual calculation within OMEGA. OMEGA works exactly as the commenter laid out in its tables and the example has been removed from the final RIA to avoid confusion. We believe the source

[371] https://www.nada.org/nada/nada-headlines/beyond-sticker-price-cost-ownership-evs-v-ice-vehicles, accessed February 5, 2024.

study is consistent with the literature on which we base our estimates and is the most appropriate approach for our analysis.

Regarding brake and tire wear, we respond to such comments in Section 11.1 of this document.

Regarding IRA incentives and the impact on net consumer prices, we note an apparent misunderstanding of our analysis by commenters. While we do consider the IRA incentives in the consumer choice elements of the compliance modeling—that is, when consumers consider purchase prices and out-of-pocket expenses along with potential operating savings and how that might impact product offerings by auto makers—we do not include the IRA purchase incentives when calculating the social costs and benefits of the rule. So, while the consumer choice decision might reflect a vehicle purchase of $40,000 less an IRA incentive such that the purchase is something less than $40,000, the cost would include the full $40,000 value. As such, the analysis does not fail to account for the costs to society of that vehicle purchase. Note that we present transfers, including the purchase incentives, in Section VIII.G of the preamble.

Regarding medium-duty vehicle standards and costs, we appreciate the work of commenters and have considered these comments in updating our final rule analysis. We have updated our medium-duty technology costs along with most of our technology costs.

Regarding BEV weight and safety and impacts on insurance costs, as noted in our earlier responses in this section, we have included insurance costs for all vehicles with that cost incumbent on the value of the vehicle (price less depreciation). Given that BEVs are higher value vehicles, at least in their early years, we have included the higher insurance costs for them (see Section VIII.B.2 of the preamble).

Regarding time spent refueling (or recharging) BEVs, the analysis is meant to reflect only mid-trip refueling events, those that occur as a necessity to continue with a given trip. Such trips happen routinely with ICE vehicles, HEVs and PHEVs. However, for BEVs, they tend to occur only on occasion since most BEV charging is expected to occur over night or during work hours or while shopping, etc. As such, mid-trip BEV recharging is not expected to occur at level 1 chargers or even many level 2 chargers in the future and will instead occur at DC fast chargers that recharge at rates up to and exceeding 400 miles per hour of charging. This may take longer than a typical ICE vehicle refueling event, but is expected to occur at a lower frequency than a typical ICE vehicle refueling event. As for PHEVs not being able to recharge at a DC fast charger, we would not expect that to be an issue since the PHEV can refuel with liquid-fuel. We recognize that while BEVs ability to charge at home is an advantage over ICE vehicles, the additional time to charge on longer road trip is a disadvantage. We have considered whether insufficient charging infrastructure will adversely affect consumer acceptance of BEVs and for the reasons discussed elsewhere we have concluded that charging infrastructure will be sufficient and will not adversely affect BEV adoption. However, we also note that our central analysis is only one of many possible ways in which manufacturers could comply with the standards, and as illustrated by our sensitivity analyses, the standards are feasible even with significantly lower rates of BEV adoption.

8.3 - Fueling impacts

<u>Comments by Organizations</u>

Organization: American Enterprise Institute

I. Fuel Savings Are Not an Appropriate Economic Benefit of the Proposed Rule

The conceptual purpose of any proposed regulation is the correction of some set of purported inefficiencies inherent in market allocational outcomes, usually assumed to result from some social resource or other cost not reflected in market prices. This is the standard definition of an externality.2 The value of fuel savings measured as a function of market prices represents no such divergence between market prices and resource costs apart from the climate effects (discussed below); other such assumed impacts not reflected in market prices already are regulated under different provisions of the Clean Air Act. [EPA-HQ-OAR-2022-0829-0571, pp. 3-4]

2 I shunt aside here the issue of whether government can be predicted to adopt policies yielding systematic allocational improvement. See section IV at https://www.aei.org/wp-content/uploads/2023/06/Zycher-comment- OMB-Proposed-Circular-A-4-Regulatory-Analysis-June-2023.docx.pdf.

Accordingly, fuel savings per se are not relevant analytically. The inclusion of fuel savings is illegitimate as a component of the "benefits" of the proposed rule because the economic benefits of fuel savings are captured fully by consumers of fuels. There is no "externality" attendant upon fuel consumption per se, and if "fuel savings" are to be considered relevant for purposes of benefit/cost analysis, then the adverse effects or costs of a (forced) reduction in fuel consumption in terms of the quality of transportation services must be included in the analysis. The EPA claims that the fuel savings attendant upon implementation of the proposed rule would yield benefits in present value terms of $380-$770 billion (net of EVSE port costs), depending on the choice of discount rate.3 Those figures are much greater than any other of the asserted benefits from the proposed rule, except for the purported climate benefits, which, as discussed in section II, are wholly artificial constructs. [EPA-HQ-OAR-2022-0829-0571, pp. 3-4]

3 See the proposed rule at Table 6.

That the proposed rule would force consumers of fuels to change their consumption patterns in ways that would not be observed without the proposed rule demonstrates that the "fuel savings," even if we accept the underlying calculations, must be accompanied by some explicit or implicit costs in terms of forgone quality dimensions of transportation services, which in turn must be greater than the value of the purported fuel savings. That obviously is why we do not observe the allocational outcomes envisioned in the proposed rule as a result of market forces. Why does market behavior not yield fuel consumption for the vehicle fleet envisioned in the proposed rule? Or does EPA believe that consumers of motorized transportation services powered with conventional fuel simply are stupid? [EPA-HQ-OAR-2022-0829-0571, pp. 3-4]

In order to see this clearly, suppose that the proposed rule were simply to outlaw entirely the use of motor fuels by cars and light trucks, forcing consumers massively to use bicycles, horse-drawn carts, and similar substitutes technologically backward. It is no answer to say that electric vehicles and the like would be substituted without loss of value in terms of the quality of transportation services; the fact that such technologies have not been adopted by markets in the aggregate, even given the subsidies embedded in current policies, demonstrates that these technologies must impose some set of disadvantages in terms of costs and/or performance. The data reported by the Energy Information Administration show that in 2021 expenditures on motor gasoline alone in the transportation sector were about $386.9 billion.4 Under the EPA methodology, that “fuel saving” in total would be an annual benefit of such a hypothetical rule outlawing the use of motor fuels, and the disadvantages of bicycles, horse-drawn carts, and the like — the marginal benefits of using motor vehicles — would be irrelevant. Under the methodology underlying the proposed rule, the more stringent the constraint imposed upon fuel use, the greater the purported benefit from “fuel savings.” In other words, the market spends scarce resources on the consumption of transportation fuels without any offsetting benefits at all! Amazingly, this implicitly is the analytic framework underlying this part of the estimated benefits asserted in the proposed rule. It is not to be taken seriously. [EPA-HQ-OAR-2022-0829-0571, pp. 3-4]

4 See https://www.eia.gov/state/seds/sep_sum/html/pdf/sum_ex_tra.pdf.

Organization: American Fuel & Petrochemical Manufacturers

EPA incorrectly assumes that ZEV owners will pay the national average residential electricity price to charge their vehicles. EPA fails to consider that the majority of ZEVs in the U.S. are located in utility service territories with some of the highest electricity rates in the country and that the average EV owner currently pays a much higher price to charge their ZEV at home than the national average residential electricity rate. Given that EV penetration has varied widely across the U.S., it would be arbitrary to assume that EVs will, unlike in the past, penetrate uniformly across the U.S. and thus that the average electricity price would be representative of the actual cost electricity. For example, California, which has roughly 40 percent of all registered ZEVs in the U.S., has a residential electricity rate that is roughly double the national average. Considering that EPA is modeling its rule after a California-like approach to mandate ZEVs, it would be more appropriate for EPA to assume similar real-world costs (at a minimum, given California’s temperate climate). Moreover, EPA fails to consider that mandating such a high ZEV sales rate will necessarily require exponential increases in commercial ZEV charging at rates that are currently three, four or five times higher than the current national average residential electricity rate, depending on location and charging speed. Those customers who are not homeowners and not able to install their own charging stations and take advantage of charging at low-cost times will be adversely impacted. Instead, EPA uses a residential rate for electricity and does not consider peak power or time of use charges. California electric prices rose 42 percent - 78 percent between 2010 and 2020 and are projected to rise an additional 50 percent by 2030 as shown in Figure 9. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

SEE ORIGINAL COMMENT FOR Historic and Forecasted Residential Average Rates Based on Most Recent 5-year Average Rate Increase. Figure 9:

Source: Michael Shellenberger, Twitter (citing California Public Advocate’s Office data), April 27, 2021). [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Heaping additional demand for EV charging into this market could exacerbate already high electricity prices. This will be especially impactful to lower-income homeowners who may not be able to install dedicated charging units, forcing them to pay more out of pocket for charging during peak demand periods.265 [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

265 Hardman, Scott, et al., “A Perspective on Equity in the Transition to Electric Vehicles.” MIT Science Policy Review, (Aug. 20 2021), available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/ (accessed June 29, 2023).

EPA must revise its analysis to account for realistic electricity prices. The proposed ZEV mandate will require an enormous investment in power generation and distribution, resulting in nationwide increases in electricity bills that EPA has not considered. Of course, considering the additional trillions of dollars in costs would paint a clear picture that the costs of forced electrification far exceed even the inflated benefits EPA presented in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Third, EPA asserts that consumers will receive $890 billion in fuel savings— in other words, that operating electric vehicles will be cheaper than operating combustion-engine vehicles because consumers will no longer need to purchase fuel directly. See 88 Fed. Reg. at 29,362. But this figure depends on consumers’ choosing to switch from their familiar combustion-engine vehicles to electric vehicles in overwhelming numbers. Even if all of the obstacles to manufacturing and charging electric vehicles discussed above could be overcome, the fuel savings EPA posits still would not materialize unless individuals decide to pur-chase those vehicles. For the reasons already noted, there is ample reason to doubt that consumers would do so, including based on concerns about electric vehicles’ higher up-front costs and perceptions that charging and maintenance facilities are inadequate. [EPA-HQ-OAR-2022-0829-0683, pp. 63-64]

To the extent EPA believes that the prospect of fuel and other operational savings itself would motivate consumers to adopt electric vehicles in sufficient numbers, experience thus far indicates otherwise. As EPA acknowledges, if abandoning combustion-engine vehicles in favor of electric vehicles actually resulted in net operating savings, rational users of combustion-engine vehicles would likely already be switching to electric vehicles in much greater numbers than they are today. See 88 Fed. Reg. at 29,397; Draft RIA at 4-38–39 (noting that “[c]onventional economic principles” would lead “people [to] buy [electric vehicles]”). The fact that consumers are not doing so—but instead currently “tend to favor [combustion-engine] vehicles over” the electric vehicles that are available now even “when two vehicles are comparable in cost and capability,” 88 Fed. Reg. at 29,342—is a strong indication that EPA’s asserted savings do not in reality outweigh the costs of switching to electric vehicles. [EPA-HQ-OAR-2022-0829-0683, pp. 63-64]

EPA attempts to sidestep this problem by invoking a supposed “energy efficiency gap,” positing a market failure that is responsible for skewing consumers’ decisions away from purchasing electric vehicles. 88 Fed. Reg. at 29,397. But EPA provides no evidence demonstrating that low adoption of electric vehicles is actually the result of any such market failure, as opposed to well-founded concerns about the drawbacks of the technology. EPA offers only a hope that nothing “immutable within consumers or inherent to” electric vehicles will “irremediably obstruct[] acceptance.” Id. at 29,312. But in light of the gap between the data and consumer behavior on the one hand, and EPA’s rosy savings estimates on the other, any final rule must explain why EPA’s fuel-savings figure is realistic and why it is an appropriate offset for the rule’s costs. See Am. Pub. Gas Ass’n v. DOE, 22 F.4th 1018, 1027–28 (D.C. Cir. 2022). EPA cannot justify an economy-altering rule by invoking an ill-defined, unsubstantiated market failure of its own imagining. [EPA-HQ-OAR-2022-0829-0683, pp. 63-64]

Organization: American Highway Users Alliance

The proposed rule would also place downward pressure on sorely needed highway investment by triggering a reduction in revenue into the Federal Highway Trust Fund (HTF) as, unlike internal combustion engine (ICE) vehicles, EVs do not generate payment of fuel taxes into the HTF. [EPA-HQ-OAR-2022-0829-0696, p. 2]

Further, the two lengthy NPRMs and the lengthy draft Regulatory Impact Analysis (RIA) for each of them do not appear to include any consideration of the adverse impacts of the proposal on revenues flowing to the Highway Trust Fund (HTF) and resulting Federal highway infrastructure investment. The proposed rules in the two dockets seek to accelerate a shift from the public's use of ICE vehicles to EVs. A substantial erosion of revenue into the HTF would result,3 placing major downward pressure on needed highway and bridge investment, which already faces an investment backlog of $786 billion per USDOT's latest "Conditions and Performance Report." Moreover, that $786 billion estimate was developed before recent significant inflation. [EPA-HQ-OAR-2022-0829-0696, pp. 3-4]

3 The draft RIA for the heavy-duty vehicle NPRM includes a brief reference (page 429) that, under the proposed rule, fuel consumption would be "reduced." Fuel sales, which are subject to a Federal excise tax, generate the largest share of HTF revenue.

Failure to Consider Adverse Impact on Highway Investment

As noted earlier, the lengthy NPRM and its draft Regulatory Impact Analysis in this docket and in the heavy-duty vehicle Phase 3 docket do not evidence any consideration of the adverse impacts of the proposals on revenues flowing to the Highway Trust Fund (HTF) and resulting Federal highway infrastructure investment. For decades, the largest source of Federal transportation infrastructure funding has been the HTF, which is largely dedicated to highway funding distributed to states. The proposed rules in this docket, and in the heavy-duty vehicle Phase 3 NPRM, seek to massively accelerate a shift from the public's use of ICE vehicles to EVs. A substantial erosion of revenue into the HTF would result, placing major downward pressure on needed highway investment, which already faces an investment backlog of $786 billion per USDOT's latest "Conditions and Performance Report." [EPA-HQ-OAR-2022-0829-0696, pp. 5-6]

Moreover, that backlog estimate was developed before recent inflation of 50% or more just from Q1 2021 to Q3 2022 in the Federal Highway Administration's national highway construction cost index. That index also shows significant inflation from 2017 through the third quarter of 2022 –approximately 72%.6 EPA must reconsider what it proposes after seriously weighing, among other issues noted, the impact of the proposal on the HTF and highway investment, particularly given all of the benefits from those investments for highway safety and the economy. [EPA-HQ-OAR-2022-0829-0696, pp. 5-6]

6 For the NHCCI see – https://explore.dot.gov/views/NHIInflationDashboard/NHCCI?%3Aiid=1&%3Aembed=y&%3AisGuestRedirectFromVizp ortal=y&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link The last entry for 2022 is an index reading of 2.786 (with 2003 as 1.000), while the index was at 1.62 at the start of 2017 (thus, an increase of 72% since the start of 2017).

Organization: Chevron

EPA should also consider the impacts associated with the loss of revenue for the highway trust fund resulting from increased sales of BEVs. Reductions in excise taxes and local sales taxes on gasoline will impair the ability of state and local governments to maintain and improve roadways, resulting in more traffic congestion, longer travel times, and added depreciation and repair costs. [EPA-HQ-OAR-2022-0829-0553, p. 6]

Organization: Departments of Transportation of Idaho, Montana, North Dakota, South Dakota and Wyoming

The proposed rule would, among other actions, set standards that would exponentially reduce the permissible level of tailpipe emissions of various substances, including but not limited to CO2 and other greenhouse gases (GHGs), from newly manufactured light-duty and medium-duty vehicles. The reductions would be phased in over model years (MYs) 2027-32. [EPA-HQ-OAR-2022-0829-0525, p. 1]

A major erosion of revenue into the Highway Trust Fund (HTF) would result from such drastic changes, as the new EVs encouraged by the proposed rule would generate wear and tear on the highways without paying fuel taxes into the HTF. This would place significant downward pressure on highway and bridge investment, which already faces an investment backlog of $786 billion per U.S. Department of Transportation's latest "Conditions and Performance Report" for highways, bridges and transit. Moreover, that backlog estimate was developed before recent inflation of approximately 50% from Q1 2021 to Q3 2022 in the Federal Highway Administration's (FHWA's) highway construction cost index. [EPA-HQ-OAR-2022-0829-0525, p. 1]

> 1 For the NHCCI see – https://explore.dot.gov/views/NHIInflationDashboard/NHCCI?%3Aiid=1&%3Aembed=y&%3AisGuestRedirectFromVizpor tal=y&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link

Further, the HTF is the main funding source for investment to maintain and improve our states' highways and bridges. A transportation network in good condition is essential for people and business. It enables safe and reliable access to markets, schools, health services and other important destinations. Proposed policies that would seriously weaken the flow of revenue into the HTF place downward pressure on our ability to maintain and improve the transportation network. That, in turn has adverse impacts on access to markets and the ability of people and business to access essential services, including schools, work, food and other basic shopping, health services and more. [EPA-HQ-OAR-2022-0829-0525, p. 1]

Summary and Conclusion

While there are many issues raised by the NPRM, we emphasize here that EPA must reconsider what it has proposed after seriously considering the impact of the proposal on the HTF and highway investment, particularly given the many benefits from those investments for highway safety, the economy, and personal mobility. After reconsidering, EPA should pivot to a much more gradual approach to reducing tailpipe emissions that is not singularly focused on favoring EVs. A more gradual approach would provide policymakers more time to consider and find ways to make up for HTF revenue loss caused by EPA tailpipe emission rules so as to better fund needed highway investments that provide so much public benefit. [EPA-HQ-OAR-2022-0829-0525, p. 2]

Significantly, at the same time that EPA has issued this NPRM, it has also issued a separate proposed rule calling for reduced tailpipe emissions of CO2, other GHGs, and other substances from heavy-duty vehicles. See 88 Fed. Reg. 25926 (April 27, 2023). That proposal would accelerate growth in EVs as a percentage of new heavy-duty vehicles and erode revenue into the HTF. [EPA-HQ-OAR-2022-0829-0525, p. 2]

However, even though these proposed tailpipe emission rules are high profile initiatives, and the HTF and the programs it supports are high profile programs, the lengthy NPRM in this docket and its lengthy draft Regulatory Impact Analysis (RIA) do not appear to include any consideration of the adverse impacts of the proposal on revenues flowing to the Highway Trust Fund (HTF) and on highway investment – again, as the new EVs encouraged by the proposed rule would generate wear and tear on the highways without paying fuel taxes into the HTF. As the HTF has been, for decades, the Federal Government's largest source of funds for highway investment, proposed policies that would greatly erode revenue into the HTF raise important concerns that must be seriously considered by regulatory agencies. [EPA-HQ-OAR-2022-0829-0525, p. 2]

Organization: Donn Viviani

2) Errors/omissions in the proposal and the RIA.

Not addressed in the RIA is the effect the IRA incentivizing carbon capture and sequestration (CCS) used for enhanced oil recovery (EOR) will have on fuel prices . Setting aside the unsettled question of how much net car- bon is sequestrated after the oil produced in turn emits additional CO2, as not germane to the EV rule.15 What is germane is that the oil will be produced at marginally lower cost. While the rebound effect is taken into con- sideration in the RIA based on increased vehicle milage efficiency, the de- creased cost of fuel from EOR is not. Cheaper fuel will also have a re- bound effect, encouraging more driving, and reducing the pressure to transition to a BEV.16 This effect needs to be reflected in the RIA, otherwise the RIA is incomplete and presents a distorted projection. [EPA-HQ-OAR-2022-0829-0697, p. 5]

15 It's estimated a ton of injected CO2 will produce about 2 barrels of oil which when combust- ed, will emit about a ton of CO2

16 Small, K., and Hymel Kent. "The rebound effect from fuel effciency standards: measurement and projection to 2035." Prepared for US EPA, Washington, DC (2011)

Organization: Environmental. and Public Health Organizations

B. Even the 10% rebound effect is too high, and EPA should consider using a rebound effect of a lesser magnitude.

The two most reliable rebound estimates based on U.S. national data from EPA's preferred studies are 10% (Greene (2012)) and around 4% (Hymel and Small (2015)).621 Hymel and Small (2015) noted that their data indicated that fuel economy rebound could be lower than fuel price rebound, meaning that even the 4.0% and 4.2% values could be too high.622 Moreover, another paper in the list of EPA's seven preferred studies, Gillingham et al. (2015), estimates the rebound effect at 10%. But the study also found that "a high percentage of vehicles are almost entirely inelastic in response to gasoline price changes" and that "the lowest fuel economy vehicles in the fleet drive the responsiveness, with higher fuel economy vehicles highly inelastic with respect to gasoline price changes."623 While Gillingham et al. (2015) does not offer an alternative best rebound estimate for higher fuel economy vehicles, it is fair to assume that the 10% estimate is at the high end of reasonable estimates for the vehicles impacted by this rulemaking. [EPA-HQ-OAR-2022-0829-0759, p. 191]

621 See Kenneth A. Small, Comment Letter on Proposed MY 2021-2026 Standards, NHTSA-2018-0067-7789, at 1 (Sept. 14, 2018) ("A better characterization of the most recent study would be that it finds a long-run rebound effect of 4.0 percent or 4.2 percent under two more realistic models that are supported by the data.").

622 Hymel K. & K. Small, The Rebound Effect for Automobile Travel: Asymmetric Response to Price Changes and Novel Features of the 2000s, 49 Energy Econ. 93, 97 (2015); see also Greene, D., Rebound 2007: Analysis of U.S. Light-Duty Vehicle Travel Statistics, 41 Energy Pol'y 14 (2012) (although fuel prices "had a statistically significant impact on VMT, . . . fuel efficiency did not.").

623 Kenneth Gillingham et al., Heterogeneity in the Response to Gasoline Prices: Evidence from Pennsylvania and Implications for the Rebound Effect, 52 Energy Economics S41–S52 (2015).

Other factors would also suggest that even the best and most relevant existing studies could lead to a rebound estimate that is too large. For example, the rebound effect's magnitude diminishes over time, largely due to increasing income and decreasing driving costs, a fact that EPA has historically understood.624 As incomes rise over time, any fuel efficiency improvement will have less of an effect on the total vehicle miles traveled, and thus the rebound effect will decline. In both 2010 and 2012, EPA chose to use a 10% rebound effect as "a reasonable compromise between historical estimates and projected future estimates."625 The 2012 Final Rule noted, however, that several high-quality studies indicated that the rebound effect's magnitude is significantly diminishing over time as incomes rise.626 This income effect on rebound makes clear that the projected future estimates are in fact much more accurate than historical estimates. Moreover, more than 15 years will have passed since the 2010 Final Rule found a 10% rebound effect to be a good compromise and the implementation of the Proposed Standards, and income has continued to grow since that time, supporting a substantially diminished rebound effect. [EPA-HQ-OAR-2022-0829-0759, p. 192]

624 See, e.g., 2016 Draft TAR at 10-14 and 10-20; 77 Fed. Reg. at 62924, 62995; accord Small K. & K. Van Dender, Fuel Efficiency and Motor Vehicle Travel: The Declining Rebound Effect, 28 Energy J. 25 (2007); Hymel, K. et al., Induced Demand and Rebound Effects in Road Transport, 44 Transp. Rsch. Part B 1220 (2010).

625 77 Fed. Reg. at 62924.

626 NHTSA, Corporate Average Fuel Economy for MY 2017-MY 2025 Passenger Cars and Light Trucks: Final Regulatory Impact Analysis, at 851-52 (2012) (citing Small & Van Dender (2007) (finding average rebound to be 22% for 1966-2001, but declining to 11% when looking at only 1997-2001); Hymel et al. (2010) (finding that average rebound for 1966 through 2004 was 24%, but rebound by 2004 was only 13%); Greene, D., Rebound 2007: Analysis of Light-Duty Vehicle Travel Statistics (Mar. 2010) (internal EPA research) (estimating the rebound effect would be 10% in 2010 and 8% in 2030, using 1966-2007 data); see also Greene (2012) (same)).

EPA should give more weight to the fact that the rebound effect varies with income over time. In the 2021 rule, the agency cited Gillingham (2014) to assert that the evidence of how the rebound effect varies with income is "mixed," but then also correctly excluded that study from its list of preferred studies. Gillingham (2014) specifically considers the response to the 2008 gasoline price shock in California. EPA is correct to conclude that this was "an unusual period when gasoline prices were particularly salient to consumers." 2021 RIA at 3-6 to 3-7. As EPA noted, Gillingham explained in a follow-up paper in 2020 that the Gillingham (2014) results should not be used for developing an estimate of the VMT rebound effect for fuel economy or GHG standards. 2021 RIA at 3-7. The Gillingham (2014) paper is equally irrelevant to the question of the income effect on rebound. Various papers have confirmed that the rebound effect is declining over time and one study certainly should not be used as the basis for giving this factor "less weight," especially a study whose own author acknowledges its irrelevance to this rulemaking context and to which EPA gives little to no weight otherwise. Because of this, EPA should more fully consider the impacts of the income effect on rebound, and in doing so, could support a rebound effect of a magnitude lower than 10%. [EPA-HQ-OAR-2022-0829-0759, p. 192]

In fact, the income effect on rebound is particularly important in the context of setting LDV GHG emissions regulations for two reasons. First, even the most recent relevant studies on which rebound estimates are based consider data only from 2013 and earlier. The historical growth rate of per capita personal income was 1.4% between 2001 and 2019,627 and thus income growth since 2013 would indicate a declining rebound effect even in the time since the most recent data utilized were collected. Second, EPA's final standards will affect the fuel efficiency—and therefore the rebound effect—for vehicles for the next 30 years or more. Private forecasts have estimated approximately 1.6% growth in real personal income per year over the next 30 years, see 85 Fed. Reg. at 24675 n.1763, meaning that when most vehicles subject to the regulations are retired, incomes will be at least 61% higher than they are today (which are already higher than during the time periods in which the available rebound studies were conducted).628 More recent projections in AEO 2023 anticipate incomes rising even more than prior estimates—an average of 2.4% per year through 2050.629 This income growth would be expected to cause a large reduction in the magnitude of the rebound effect, supporting a rebound effect for the vehicles subject to EPA's final standards of a magnitude well below 10%. [EPA-HQ-OAR-2022-0829-0759, pp. 192-193]

627 See Amicus Brief of Economists at 16 for calculation of 1.4% growth rate.

628 Amicus Brief of Economists at 16.

629 U.S. Energy Information Administration, Annual Energy Outlook 2023, Table 20: Macroeconomic Indicators, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2023&cases=ref2023&sourcekey=0.

Organization: National Automobile Dealers Association (NADA)

2. EPA's Fuel Savings Analysis Is Unclear and Incomplete.

Despite acknowledging that its proposed mandates will result in increased electricity consumption and expenditures, EPA claims that consumers will nevertheless experience fuel savings that will help offset higher upfront EV purchasing costs.40 EPA appears to have premised its conclusion on the modeling of liquid fuel and electricity consumption levels. EPA does not explain how it converted modeled consumption levels into monetary values to show actual consumer savings, and it makes no comparison of fueling costs and electricity rates based on modeled consumption levels. Nor is information provided on individual consumer savings. Thus, the basis for EPA's consumer fuel savings conclusion is unclear, at best. [EPA-HQ-OAR-2022-0829-0656, pp. 8-9]

40 88 Fed. Reg. at 29365-66.

EPA's savings assertion seems questionable. Conceivably, liquid fuel costs could decrease more than electricity costs increase if the proposal is adopted, but even then, EPA's analysis seems to overstate the fuel savings from switching to EVs. According to the Energy Information Agency (EIA), the average American household uses 886 kilowatt hours of electricity per month,41 and EPA reports that the average EV consumes 36 kilowatt hours of electricity per 100 miles driven.42 If the average household drives an EV 15,000 miles per year, or 1,250 miles per month, and the EV is charged at home to the tune of 450 kilowatt hours of electricity per month, the household's electricity bill will increase by around 50 percent. [EPA-HQ-OAR-2022-0829-0656, pp. 8-9]

41 See Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA).

42 See Comparison: Your Car vs. an Electric Vehicle | US EPA.

Moreover, as EV sales increase, electricity rates are likely to rise due to increased power demands. Higher electricity prices will also reflect the cost of increased transmission and generation infrastructure, which some estimates indicate will need to increase 60 percent by 2030, and even more over the following two decades.43 EPA must account for these higher electricity costs when determining accurately whether, and to what extent, commercial and noncommercial purchasers/lessees operating EVs will benefit from any fuel savings. [EPA-HQ-OAR-2022-0829-0656, pp. 8-9]

43 See Queued Up… But in Need of Transmission | Department of Energy.

Organization: Office of Wyoming Governor Mark Gordon

There is also concern among the Department of Transportations in western and rural states about this rule's impact on the Highway Trust Fund (HTF). States look to lose hundreds of billions of dollars that maintain our nation's infrastructure by removing the HTF's main source of funding. There is no consideration in the proposed rule on the effects of mandating the removal of gasoline powered vehicles to the current structure of highway funding. [EPA-HQ-OAR-2022-0829-0675, pp. 1-2]

My office, along with Wyoming's state agencies, look forward to working with the EPA in a meaningful collaborative and cooperative manner. In addition to these comments, attached are comment letters from the University of Wyoming, School of Energy Resources' Center for Energy Regulation and Policy Analysis and Wyoming Department of Transportation's joint comments along with Idaho, Montana, North Dakota, and South Dakota. [EPA-HQ-OAR-2022-0829-0675, pp. 1-2]

Organization: Paul Bonifas and Tim Considine

Fuel cost "savings": The EPA claims gasoline prices will increase when demand for gasoline decreases, even though that directly contradicts basic economic theory and real-world examples; when government restrictions forced less drivers on the road during the COVID pandemic, demand for gasoline dropped, plummeting the prices of oil and retail gasoline. [EPA-HQ-OAR-2022-0829-0551, p. 2]

Pre-Tax Fuel Savings

EPA Claimed Savings: $890 billion

Realistic Savings: NEGATIVE $108 billion [EPA-HQ-OAR-2022-0829-0551, p. 4]

The EPA vastly overestimates the savings in fuel costs from their proposed rule. They define fuel cost savings as the difference between higher electricity costs associated with charging EVs less the avoided costs of liquid fuel consumption. They underestimate electricity costs and overestimate savings in liquid fuel costs. [EPA-HQ-OAR-2022-0829-0551, p. 4]

Under their rule, EPA estimates that eventually annual liquid fuel consumption would be 49 billion gallons lower, or 3.2 million barrels lower per day7. This significant reduction in liquid fuel demand would lower equilibrium prices for liquid fuels by about 50%, assuming an oil supply elasticity of 0.6 8, thereby reducing their liquid fuel cost savings from $1.3 trillion to $620 billion. During the COVID pandemic, liquid fuel demand also dropped significantly and, as a result, so did oil prices. [EPA-HQ-OAR-2022-0829-0551, p. 4]

7 Page 182 of EPA's Rule - https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf

8 Considine, T.J. (2006) "Is the strategic petroleum reserve our ace in the hole?" The Energy Journal, 27, 3, 91-112.

EPA also assumed unrealistically low electricity rates. Not all households have access to home charging ports. The average rate for charging at a Tesla super-charger is 25 cents per kilowatt hour (Kwh)9. In contrast, EPA assumes electricity rates for EV charging are 10.3 cents per kwh in 2027 and fall to 9.3 cents per kwh by 205510. 63 percent of households in the US have garages or car ports, which provides an upper bound for home charging11. Accordingly, 47 percent of households would be paying much higher commercial rates for EV charging. If we assume Tesla's price, this implies that EPA underestimated electricity rates paid for EV charging by 55%. [EPA-HQ-OAR-2022-0829-0551, p. 4]

9 https://www.leafscore.com/tesla/how-much-does-it-cost-to-charge-a-tesla

10 Page 168 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

11 https://www.energy.gov/eere/vehicles/fact-958-january-2-2017-sixty-three-percent-all-housing-units-have- garage-or-carport

Moreover, the EPA did not factor in the impact on electricity rates from their recent power plant rule that would essentially force all remaining coal and natural gas power plants to cut emissions by 90%12. [EPA-HQ-OAR-2022-0829-0551, p. 4]

12 https://www.nbcnews.com/science/environment/biden-administrations-power-plant-rules-underscore-reality- epa-limits-rcna84201

This rule is like the Clean Power Plan proposed by the Biden Administration. The US Energy Information Administration conducted a study of the Clean Power Plan and found that average retail electricity rates would increase upwards of 3-7%.13 Taking the mid-range of this price increase, or 5%, the proposed rule would raise the previous electric rate increase of 55% to 58% and increase electricity costs for EV charging from EPA's estimate of $460 billion to $728 billion. [EPA-HQ-OAR-2022-0829-0551, p. 5]

13 https://www.eia.gov/analysis/requests/powerplants/cleanplan/

This $728 billion in higher electricity expenditures more than offsets the savings in reduced liquid fuel spending of $620. On balance, the fuel cost savings are a NEGATIVE $108 billion in contrast to EPA's estimated pre-tax fuel savings of $890 billion. This is a nearly $1 trillion difference. So, under rather conservative but realistic assumptions and elementary economic analysis, the proposed EV rule will not save consumers money but instead will lead to higher electricity costs, especially for poor and lower to middle class households living in rental units. [EPA-HQ-OAR-2022-0829-0551, p. 5]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

The last detrimental aspect of this arbitrary benchmark is that part of the cost analysis done by EPA included refueling time. With larger batteries come longer recharge times, which again add to the cost. While EPA might argue that the high-speed chargers will make up for that, EPA does not want to address the fact that rapid charge or discharge of a battery accelerates its lifecycle. Every time a consumer inputs or draws large amounts of power from a battery, it damages it more than a slower input or draw, thereby decreasing the timeline for the battery's replacement and moving that expense up sooner in the timeline of EV ownership. [EPA-HQ-OAR-2022-0829-0674, p. 9]

Miscalculated fuel savings [EPA-HQ-OAR-2022-0829-0674, pp. 12-13]

The study finds substantial fuel savings costs from the rule. (See Tables 163 and 164.) Curiously, these values increase nearly 100-fold from 2027 to 2055. The retail fuel savings are approximately $1 billion in 2027, or approximately $7.50 for each of the 130 million households in the United States in 2022. There will doubtlessly be more households in 2027, and consequently the per-household benefit will be less. [EPA-HQ-OAR-2022-0829-0674, pp. 12-13]

By 2055, the total benefit is predicted to be closer to $100 billion, or approximately $750 per household, a consequential amount. The Net Present Value (NPV) in either the 3% case or the 7% from fuel savings account for over half of the total net benefits recorded in the summary in Table 156 ($1.1 trillion out of $1.4 trillion in the 3% discount rate case and $550 billion out of $610 billion in the 7% discount rate case.) [EPA-HQ-OAR-2022-0829-0674, pp. 12-13]

But the numbers on fuel savings are almost certainly wrong. They appear to presume a substantial increase in gasoline prices and a constant electricity price. These assumptions ignore two market realities. First, gasoline prices are set in a global petroleum market, not by federal policy. Global petroleum markets have had fairly predictable prices in a range of $40-$100 barrel for the past two decades or more. Federal policy can raise those prices artificially, but those policies are unlikely to remain steadily increasing over the next 30 years, as the study assumes. If their analysis is correct, then EVs will significantly crowd out ICE autos, which will result in a drastic reduction in demand, which should also result in lower gasoline prices. [EPA-HQ-OAR-2022-0829-0674, pp. 12-13]

Second, electricity prices are very much affected by domestic policies. Current Administration policy is to substantially reduce electricity generation capacity with new capacity limited to high-cost renewable sources. While future Administrations may reverse these policies, new generation capacity takes many years to bring online, and rational electric utilities will be reluctant to invest in efficient electricity generation that may be outlawed every few years. The net result is that electricity prices, unlike gasoline prices, will predictably increase over the next few decades under most plausible policy scenarios. [EPA-HQ-OAR-2022-0829-0674, pp. 12-13]

Consequently, the assumptions in the study that fuel costs under the proposed rule will decrease substantially are almost certainly incorrect in magnitude, and quite likely in direction as well. [EPA-HQ-OAR-2022-0829-0674, pp. 12-13]

Miscalculated costs of increased refueling times

The study correctly finds increased refueling times with electricity vehicles. (See Table 166.) But the magnitude of the costs of such increased refueling times are trivially small. In 2027, increased refueling times are estimated to cost -$0.1 billion, or $0.75 per household. Those refueling time costs are predicted to increase to $8.2 billion in 2055, or approximately $63 per household, assuming the number of households does not increase. If average wages are around $30/hour, this means that a median household is expected to lose approximately an additional 2 hours waiting to refuel in the entire year 2055 under the proposed rule relative to the non-rule case. If a vehicle is refueled even once every two weeks, this means that each refueling is predicted to take no more than additional five minutes or so. (120 minutes/26 refueling). This seems implausible. [EPA-HQ-OAR-2022-0829-0674, p. 13]

Organization: U.S. Chamber of Commerce

Finally, it is incumbent upon EPA and its federal partners to analyze and address the spillover impacts of this rulemaking on the quality of America's roadways. Since 1956, federal highway projects have been funded by the Highway Trust Fund, designed to be a self-sustaining source of funding that is refilled regularly by revenues from a series of dedicated taxes, primarily the gas and diesel fuel tax. While this revenue source has successfully funded projects for decades, the balance of the trust fund has declined in recent years, becoming insolvent for the first time in 2008. As a result of declining revenues, for eight of the last ten years Congress has had to transfer funds from the general fund to the Trust Fund to ensure continued funding of highway projects. The most significant reason for the reduction in contributions is decreased fuel tax revenue as fuel economy standards change and more customers purchase electric vehicles that do not contribute to the Trust Fund, despite benefiting from the infrastructure Trust Fund revenue provides. [EPA-HQ-OAR-2022-0829-0604, pp. 3-4]

According to the proposed rule, fuel sales would be reduced by 21 billion gallons in 2035, rising to 34 and 48 billion gallons in 2040 and 2050, respectively. This equates to lost Trust Fund revenues of $3.9B in 2035, $6.3B in 2040, and $165B through 2055. Absent a plan to replace these revenues, the adverse impacts of a rapid EV transition proposed in the rule stand to exacerbate this depletion as the number of vehicles contributing to the Trust Fund decreases with no alterative revenue stream to take the place of ICE vehicle contributions. A high-quality transportation network is vital for American businesses and consumers, and a sharp reduction in contributions over the next several years as a result of this rule would result in significant degradation of our nation's roads and bridges. Record high inflation is already reducing buying power under recently passed laws such as the Infrastructure Investment and Job Act, further degradation to reduced Trust Fund contributions would adversely impact access to medical facilities, schools, employers, grocery stores, and other basic needs necessary for the American public. [EPA-HQ-OAR-2022-0829-0604, pp. 3-4]

Organization: Valero Energy Corporation

9. EPA fails to account for the rising cost of electricity over the regulatory period. [EPA-HQ-OAR-2022-0829-0707, p. 10]

EPA estimates future pre-tax and retail gasoline, diesel, and electricity prices based on the "reference case" projections in the Energy Information Administration's (EIA's) Annual Energy Outlook 2021 (AEO2021).46 However, the AEO2021 Reference case assumes:

46 DRIA at 2-85.

• Current laws and regulations as of September 2020 remain unchanged,47 and

• Gasoline and flex fuel vehicles will account for 79% of new-LDV sales by 2050.48 [EPA-HQ-OAR-2022-0829-0707, p. 10]

47 U.S. EIA "AEO2021 Press Presentation" at 5, https://www.eia.gov/pressroom/presentations/AEO2021_Release_Presentation.pdf.

48 U.S. EIA "AEO2021" at page 24, https://www.eia.gov/outlooks/archive/aeo21/pdf/AEO_Narrative_2021.pdf.

In its projection of future electricity prices, EPA fails to account for the impacts of mass electrification (increased electricity demand), the transmission infrastructure upgrades and battery storage that will be needed to support a transition to renewable generation sources, and the potential impacts to electrical grid costs and reliability from EPA's recently proposed New Source Performance Standards for GHG emissions from power plants.49 [EPA-HQ-OAR-2022-0829-0707, p. 10]

49 88 Fed. Reg. 33240 (May 23, 2023).

EPA also fails to account for the fact that most EV ownership and charging occurs in parts of the country where electricity prices are well above U.S. average. [EPA-HQ-OAR-2022-0829-0707, p. 10]

EPA projects home charging to account for ~77% of total charging demand in 2028, declining to ~61% of total charging demand in 2055.50 Most of the non-residential charging is projected by EPA to occur at level 2 and DCFC public chargers;51 however, EPA does not account for the increased electricity fuel costs associated with public charging, which are around $0.30/kWh for Level 2 and $0.40/kWh for DC fast charging.52 [EPA-HQ-OAR-2022-0829-0707, p. 10]

50 DRIA at 5-29.

51 DRIA at 5-29.

52 https://driveclean.ca.gov/electric-car-charging.

Organization: Western Energy Alliance

Refueling Time: EPA makes the unfounded claim that the benefits of the rule will include, "…the value of reduced refueling time needed to refuel vehicles" (p. 29199) Assuming "…time spent refueling vehicles would be reduced due to the lower fuel consumption of new vehicles…" (p. 29200) is simply absurd. EPA seems to be willfully twisting the well-know disadvantage of long EV charging times. Whereas an ICEV takes a matter of minutes to refuel, charging times can be over an hour. Even fast charging stations, if available without a long wait due to their scarcity, require 30 minutes for 125 miles and an hour for 250 miles, well in excess of ICEV refueling times but with vastly less range.9 [EPA-HQ-OAR-2022-0829-0679, pp. 5-6]

9 "How Long Does It Take to Charge an Electric Car?", J.D. Power, March 26, 2020.

Limited charging infrastructure could drag refueling times to hours beyond what is needed by the driver. Further, were EPA's projection that 67% of new sales of light-duty and 46% of medium-duty vehicles will be EVs by 2032 attained, the strain on the grid would mean governments and utilities would likely enforce refueling times after hours, well past when a driver would need. Californians, just days after learning of the state's ban on ICEVs by 2035, were asked not to charge their EVs during the peak hours of 4 – 9pm because of the strain on the grid.10 Rather than being a benefit, EPA should consider how this rule would limit Americans mobility, as limited electricity capacity would cause drivers to run out of fuel when they need it for vital activities such as driving to work and school while making long roadtrips impractical. Even though EPA finds a net cost regarding refueling times, the value for that cost is likely much lower, given the assumptions EPA makes in the analysis. [EPA-HQ-OAR-2022-0829-0679, pp. 5-6]

10 "California asks residents not to charge electric vehicles, days after announcing gas car ban," John Clark, August 31, 2022.

EPA Summary and Response

Summary:

Commenters argued that fuel savings were not an appropriate economic benefit of the rule (American Enterprise Institute, American Fuel & Petrochemical Manufacturers). The commenter argued that the inclusion of fuel savings is illegitimate as a component of the "benefits" of the proposed rule because the economic benefits of fuel savings are captured fully by consumers of fuels. There is no "externality" attendant upon fuel consumption per se, and if "fuel savings" are to be considered relevant for purposes of benefit/cost analysis, the commenter believes then the adverse effects or costs of a (forced) reduction in fuel consumption in terms of the quality of transportation services must be included in the analysis (American Enterprise Institute). Similarly, commenters asked, "Why does market behavior not yield fuel consumption for the vehicle fleet envisioned in the proposed rule (American Enterprise Institute)

Commenters suggested that EPA should revise its analysis concerning charging time and continue with promulgating a final rule for future emissions standards that accounts for the reality of today's automotive market and not the public pronouncements of the automotive industry, a single state or group of states, or other unsupported estimates of future market growth (American Fuel & Petrochemical Manufacturers).

Commenters expressed concern over lost fuel tax revenues and the impact that would have on the Highway Trust Fund and Federal highway infrastructure investment (American Highway Users Alliance, Chevron, Departments of Transportation of Idaho, Montana, North Dakota, South Dakota and Wyoming, Office of Wyoming Governor Mark Gordon, U.S. Chamber of Commerce).

Commenters suggested that EPA reflect the effect on fuel prices of the IRA on incentivizing carbon capture and sequestration used for enhanced oil recovery (Donn Viviani). The commenter suggests that such incentives would reduce fuel prices which in turn could slow the transition to BEVs.

Commenters suggested that EPA's use of a 10 percent rebound effect was too high and a value well below that would be more appropriate (Environmental. And Public Health Organizations).

Commenters argued that EPA's fuel savings analysis was unclear and incomplete (NADA). This commenter also argues that EPA appears to have premised its conclusion on the modeling of liquid fuel and electricity consumption levels. This commenter believes that EPA does not explain how it converted modeled fuel consumption levels into monetary values to show actual consumer savings, and that we did not compare fueling costs and electricity rates based on modeled consumption levels. The commenter also believes EPA did not provide information on individual consumer savings. Thus, NADA believes the basis for EPA's consumer fuel savings conclusion is unclear. This commenter also states that, if the average household drives an EV 15,000 miles per year, or 1,250 miles per month, and the EV is charged at home to the tune of 450 kilowatt hours of electricity per month, the household's electricity bill will increase by around 50 percent and electricity prices are likely to rise with increasing demand.

Commenters argued that EPA's fuel savings were incorrect because they did not consider the impact of lower gasoline demand on lower gasoline prices and simultaneously ignoring the impact on electricity prices associated with increased demand (Paul Bonifas and Tim Considine, The Heritage Foundation, Valero). Commenters argued that the BEV refueling times and associated costs are underestimated suggesting that they equate to an additional five minutes of refueling time for recharging once every two weeks (The Heritage Foundation).

<u>Response:</u>

We respond to comments related to the rebound effect in Section 13 of this document, to EVSE charging infrastructure in Section 17 of this document, the grid and infrastructure upgrades in Section 18 of this document.

Regarding fuel savings being included as a benefit of the rule, this is a mischaracterization of EPA's consideration of fuel savings. EPA considers the fuel savings to be a cost of the rule, a cost which happens to be negative and therefore a savings to vehicle drivers. Fuel savings factor into net benefits since net benefits are monetized benefits less costs. The commenter suggests that, if EPA continues to calculate fuel savings and include them in net benefits, that the "costs of a (forced) reduction in fuel consumption in terms of the quality of transportation services must be included in the analysis." EPA disagrees that there are costs associated with a reduction in fuel consumption because there is no reason to believe that there will be an impact on the quality of transportation services. Presumably the commenter believes, without having provided supporting data, that drivers of BEVs will experience less quality in their transportation. This is an unfounded belief given that the literature indicates that BEV drivers to date appear to be happy with their decision to purchase a BEV.[372] Further, studies show that the more consumers are exposed to BEVs the more interested in BEVs they become.[373]

Regarding assertions that the market will provide all the fuel savings customers desire, the issue here is one referred to as the "energy paradox" and EPA has addressed this issue in past rules (see 75 FR 25510 and 77 FR 62914) and again in this rule (Section VIII.K.1 of the preamble).

Regarding comments from Paul Bonifas and Tim Considine concerning fuel prices and those from the American Fuel & Petrochemical Manufacturers regarding electricity prices, our liquid fuel price projections in the final analysis are not EPA's projections, but instead are based on AEO 2023, the best available projections developed by the recognized experts in the Energy Information Administration. Regarding electricity prices, we have updated the electricity prices used for EV charging estimates and the EVSE port costs used in our benefit cost analysis and respond to related comments in Section 17 of this document.

Regarding the impact of lower liquid fuel demand on liquid fuel prices, Paul Bonifas and Tim Considine assert that the significant reduction in liquid fuel demand would lower equilibrium prices for liquid fuels by about 50 percent, assuming an oil supply elasticity of 0.6, thereby reducing EPA's estimated liquid fuel savings from $1.3 trillion to $620 billion. The commenter's source for the suggested oil supply elasticity of 0.6 is the one of the authors of this comment in a study looking at the impacts of increasing supply to the Strategic Petroleum Reserve as opposed to releasing that supply to lower liquid fuel prices.

The impact of lower gasoline demand on gasoline prices is likely two-fold: 1) reduction of crude oil demand, which lowers crude oil prices and then lowers the cost of producing gasoline and other refined products and 2) lower demand for gasoline in refineries would impact the cost of producing gasoline as gasoline production at refineries decreases.

With respect to #1, one would expect that reducing crude oil demand would reduce crude oil prices, however, swing producers such as Saudi Arabia could then turn around and lower crude oil production to send crude oil prices back up again.[374] At the same time, crude oil production is changing with many crude oil wells in decline while new oil fields are being developed. Those which are in decline producing crude oil at, for example, $30/bbl could add tertiary crude oil recovery (carbon dioxide flood) and then their marginal production cost could rise to $70/bbl.

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[372] Youngs, Jeff, "First-Time EV Owners Satisfied with their Choice," J.D. Power, January 31, 2022, https://www.jdpower.com/cars/shopping-guides/study-first-time-ev-owners-satisfied-with-their-choice, accessed January 30, 2024.

[373] Lundin, Ben, "More BEV Exposure Leads to Higher BEV Purchase Intent," Escalent, December 20, 2022, https://escalent.co/blog/more-bev-exposure-leads-to-higher-bev-purchase-intent/#:~:text=Almost%2070%25%20of%20Heavy%20EV,a%20gas%20or%20diesel%20vehicle., accessed January 30, 2024.

[374] What drives crude oil prices: Supply OPEC; Energy and Financial Markets; Energy Information Administration; last updated 1/9/2024.

Predicting the economics of producing crude oil over the next 30 years is extremely challenging at best.

With respect to #2, reducing gasoline production at refineries would likely lower refining costs. However, as gasoline demand decreases, refineries close and the system returns to the same point of the cost curve for producing gasoline. The refining costs for gasoline would, though, likely change if gasoline demand is decreasing faster than other refined products which is possible.

Because there are so many confounding factors at play when and if liquid fuel demand decreases and how that may or may not impact liquid fuel prices, EPA has chosen not to attempt to reflect such relationships in its analysis using a single elasticity parameter applied to demand as suggested by the commenter. Any attempt at reflecting such relationships are best handled by large scale economic models such as the National Energy Modeling System (NEMS) which considers all such factors simultaneously.

Regarding the comment that EPA used the residential electricity price ($/kWh) in estimating electricity expenditures to charge BEVs, this was true in the proposed rule. For the proposal, EPA used the value reported in the Annual Energy Outlook and used that value to be consistent with the AEO liquid fuel prices used in the EPA analysis. We acknowledge the use of this electricity price as a shortcoming of the NPRM's analysis. In the final rulemaking analysis, we are using estimated electricity prices from the Integrated Planning Model runs done in support of the electric generating unit emission inventory and charge demand estimates. Further, we have added additional factors to reflect the share of BEV charging done at public versus private sources and the different prices projected to be paid at those sources. We respond to comments regarding our electricity charging prices in Section 17 of this document.

Regarding refueling time, we have updated our estimates of refueling time by including a charge rate of 400 miles per hour of charging compared to the 100 miles per hour of charging that was used in the NPRM (see Chapter 4 of the final RIA). We note that the refueling time associated with BEVs is meant to reflect mid-trip charging only, not routine charging done overnight at home, while purchasing groceries or other goods, or while working. We would not expect mid-trip charging to take place once every two weeks. In fact, our OMEGA analysis estimates a mid-trip charging event every 3,600 to 5,200 miles, depending on the vehicle body style (car, van/suv, pickup). This would suggest just 2 to 5 events per year for 10,000 to 15,000 miles of driving in the year.

Regarding comments that the fuel savings analysis was unclear and incomplete, based on the level of detailed observations relayed in this comment, it appears that EPA's analysis was quite clear to the commenter. The commenter also provides an estimate of a 50 percent increase in home electricity consumption associated with in-home BEV charging. Without assessing the accuracy of that estimate, 450 kWh/month of charging at a $0.20/kWh would cost $90/month. A gasoline vehicle driving 1,250 miles/month at 30 miles/gallon and fueled with $3.00/gallon gasoline would be $125/month. Therefore, in this rough back-of-the-envelope calculation that might be typical of a consumer considering a new vehicle purchase, the BEV provides a $35 savings every month or $420/year. If that consumer purchasers a level 2 home charger for $1,280 (see Table 5-12 of the final RIA, single-family home (SFH) L2), that charger would be paid for after 3 years and the $420/year savings would be available for other needs. And this ignores other expected operating savings. Thus, contrary to the implication in this comment, EPA's analysis indicates that ownership costs for BEVs are lower than those for ICE vehicles, on average over time.

8.4 - Social cost of GHGs

Comments by Organizations

Organization: Alliance for Automotive Innovation

Once the agency fixes the modeling of CO2 emissions with and without the new 2027-2032 standards, it should revisit its decision about how to monetize the CO2 emissions benefits. A good case can be made that one set of benefit calculations should make use of a global measure of the social cost of carbon, as use of a global measure may encourage other countries to control CO2 emissions through deployment of BEVs and cleaner electricity systems. EPA has taken this position in the DRIA. However, once again, the agency's analysis should not engage in wishful thinking, as it is well known that most countries are not meeting their pledged commitments under the 2015 Paris accords. It also makes sense to disclose to Congress and the public the climate benefits of the rule, measured with a domestic cost of carbon. This measure would account for the fact that most of the climate benefits of the 2027-2032 rule will occur outside the United States, as greenhouse gases are globally mixing pollutants. Presentation of both global and domestic estimates of climate benefits will ensure that the RIA is seen as an objective analysis. [EPA-HQ-OAR-2022-0829-0701, pp. 291-292]

Overall, Auto Innovators believes that a more modest, measured claim of climate-control benefits in the final rule would make the rule more defensible. As the DRIA stands now, the climate-benefits analysis could be vulnerable to technical criticism. [EPA-HQ-OAR-2022-0829-0701, pp. 291-292]

Organization: American Enterprise Institute

II. The Purported Climate Benefits of the Proposed Rule Are Illusory and the Social Cost of Carbon Parameters Are Fundamentally Flawed

EPA asserts in the proposed rule that it would yield cumulative reductions in greenhouse gas (GHG) emissions of between 7.3 billion and 8.0 billion metric tons through 2055.5 Using the higher figure, that is an annual average reduction of about 276 million metric tons. U.S. emissions of GHG in 2021 were about 6.3 billion metric tons on a CO2-equivalent basis.6 The Biden administration policy goal is net-zero emissions by 2050.7 If we use the EPA climate model in order to estimate the prospective temperature effect of the entire Biden administration policy, under a set of assumptions that exaggerate the temperature effects of reduced emissions, that policy would yield a global temperature reduction of 0.062°C by 2050, and 0.173°C by 2100.8 [EPA-HQ-OAR-2022-0829-0571, pp. 4-5]

5 See the proposed rule at Table 3.

6 See https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks#:~:text=In%202021%2C%20U.S.%20greenhouse%20gas,sequestration%20from%20the%20land%20sector. U.S. GHG emissions in 2005 on a CO2-equivalent basis were about 7.5 billion metric tons; see

Table ES-2 at https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Chapter-Executive-Summary.pdf.

7 See https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/20/fact-sheet-president-biden-to- catalyze-global-climate-action-through-the-major-economies-forum-on-energy-and-climate/#:~:text=President%20Biden%20has%20set%20an,by%20no%20later%20than%202050.

8 Author computations using Model for the Assessment of Greenhouse Gas Induced Climate Change (MAGICC), version 7.0, at https://magicc.org/. Assumes equilibrium sensitivity of the climate system at 4.5°, with global baseline emissions path A1B from the IPCC 4th Assessment Report.

The cumulative reduction in U.S. emissions under the net-zero policy, from 6.3 billion metric tons in 2021 to net zero by 2050, would total about 88.2 billion metric tons. For the 2027- 2050 time period relevant in the proposed rule, the cumulative reduction would be about 60 billion tons. Accordingly, the cumulative emissions reduction of 8.0 billion metric tons asserted in the proposed rule would be about 13.3 percent of the total envisioned in the Biden net-zero policy, which as just noted, would yield a reduction in global temperatures of 0.173°C by 2100. A linearity assumption is not strictly correct, but it is wholly appropriate for purposes of close approximation. The “climate benefit” of the proposed rule, under the explicit EPA assumptions and estimates, would be about 0.023°C by 2100. Because the standard deviation of the surface temperature record is 0.11°C, that effect would not be detectable.9 Accordingly, the monetized climate benefits of the proposed rule asserted by EPA are an illusion. [EPA-HQ-OAR-2022-0829-0571, pp. 4-5]

9 See https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/1999JD900835.

EPA attempts to circumvent this obvious problem by substituting in place of any such analysis an application of the “social cost of carbon” (SC-GHG) to the asserted reductions in GHG emissions attendant upon implementation of the proposed rule, as estimated on an interim basis by the Biden Administration Interagency Working Group.10 [EPA-HQ-OAR-2022-0829-0571, pp. 4-5]

10 The interim estimates are at https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

EPA estimated the climate benefits for the final standards using measures of the social cost of three GHGs: Carbon, methane, and nitrous oxide. The social cost of each gas (i.e., the social cost of carbon (SC–CO2), methane (SC– CH4), and nitrous oxide (SC–N2O)) is the monetary value of the net harm to society associated with a marginal increase in emissions in a given year, or the benefit of avoiding that increase. Collectively, these values are referenced as the ‘‘social cost of greenhouse gases’’ (SC–GHG).11 [EPA-HQ-OAR-2022-0829-0571, pp. 4-5]

11 See the proposed rule at 29371.

The interim IWG estimates are deeply flawed, in that they (1) distort the actual economic growth predictions produced by the integrated assessment models, (2) base predictions of future climate phenomena on climate models that cannot predict the past or the present, (3) incorporate “co-benefits” in the form of a reduction in the emissions of other criteria and hazardous air pollutants already regulated under different provisions of the Clean Air Act, (4) incorporate the asserted benefits of GHG reductions on a global basis, and (5) employ discount rates that are inconsistent and inappropriate.12 [EPA-HQ-OAR-2022-0829-0571, pp. 5-8]

12 See Benjamin Zycher at https://scholarship.law.tamu.edu/cgi/viewcontent.cgi?article=1154&context=lawreview. The issue of discount rates is addressed in section III.

The available analysis suggests that the prospective economic growth risks of anthropogenic climate change, at least in the aggregate, are much smaller than many assert. Consider the predictions from the integrated assessment models, a central one of which is the Dynamic Integrated Climate and Economy Model, for which William D. Nordhaus won the Nobel Prize in Economics in 2018.13 Under DICE, global gross domestic product (GDP) in 2100 varies by about 3 percent across policy scenarios, including no climate policies at all, a figure that is both very small and almost certainly not statistically significant given the vagaries of economic forecasting and the number of years remaining before the end of this century. (I exclude here Nordhaus' "Stern discounting" policy scenario, as it assumes a discount rate effectively equal to zero, a fundamental analytic error.14) Per capita consumption varies only by about 1.3 percent across policy scenarios, also a very small number and almost certain not to be statistically significant. [EPA-HQ-OAR-2022-0829-0571, pp. 5-8]

13 See William Nordhaus and Paul Sztorc, "DICE 2013R: Introduction and User's Manual," Yale University, Department of Economics, October 2013, Figure 4 and Table 1, http://www.econ.yale.edu/~nordhaus/homepage/homepage/documents/DICE_Manual_100413r1.pdf. See also Benjamin Zycher, "The Climate Left Attacks Nobel Laureate Willian D. Nordhaus," monograph, American Enterprise Institute, July 2020, at https://www.aei.org/wp-content/uploads/2020/07/The-Climate-Left-Attacks- Nobel-Laureate-William-D.-Nordhaus.pdf.

14 See Nicholas Stern, The Economics of Climate Change: The Stern Review (Cambridge, UK: Cambridge University Press, January 2007), https://www.cambridge.org/us/academic/subjects/earth-and-environmental- science/climatology-and-climate-change/economics-climate-change-stern-review?format=PB. On the contrast between the climate predictions made by the Stern model and the actual record, see https://rogerpielkejr.substack.com/p/off-target-an-evaluation-of-the-stern?utm_source=substack&publication_id=119454&post_id=104480671&utm_medium=email&utm_content=sha re&triggerShare=true&isFreemail=true. See also David Kreutzer, "Discounting Climate Costs," Heritage Foundation, June 16, 2016, at https://www.heritage.org/environment/report/discounting-climate-costs.

The IPCC — even in its most alarmist analyses — arrives at a conclusion very close to that reported in the DICE analysis. In its "1.5 Degree C" report, it finds that the damage from anthropogenic climate change unmitigated by policy initiatives will reduce global GDP by 2.6 percent by 2100.15 By that year, IPCC projects that individual incomes on average will be at least 400 percent greater than is the case today.16 [EPA-HQ-OAR-2022-0829-0571, pp. 5-8]

15 See Marco Bindi, et. al., "Impacts of 1.5°C of Global Warming on Natural and Human Systems," at https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Chapter3_Low_Res.pdf, Chapter 3 of Valerie Masson-Delmotte, et. al., eds., IPCC Special Report, Global Warming of 1.5°C, at https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf.

16 This implies average annual growth in per capita GDP of less than 1.5 percent for the rest of this century.

The interim estimates of the SCC are driven by damage functions predicted by the various climate models — the EPA model in particular — the track records of which are poor.17 McKitrick and Christy summarize the contrast between their predictions and the actual satellite record as follows: [EPA-HQ-OAR-2022-0829-0571, pp. 5-8]

17 The specifics of the CMIP5 and CMIP6 models, respectively, can be found at https://pcmdi.llnl.gov/mips/cmip5/ and https://pcmdi.llnl.gov/CMIP6/.

The tendency of climate models to overstate warming in the tropical troposphere has long been noted. Here we examine individual runs from 38 newly released Coupled Model Intercomparison Project Version 6 (CMIP6) models and show that the warm bias is now observable globally as well. We compare CMIP6 runs against observational series drawn from satellites, weather balloons, and reanalysis products. We focus on the 1979–2014 interval, the maximum span for which all observational products are available and for which models were run using historically observed forcings. For lower-troposphere and midtroposphere layers both globally and in the tropics, all 38 models overpredict warming in every target observational analog, in most cases significantly so, and the average differences between models and observations are statistically significant. We present evidence that consistency with observed warming would require lower model Equilibrium Climate Sensitivity (ECS) values.18 [EPA-HQ-OAR-2022-0829-0571, pp. 5-8]

18 See https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020EA001281.

OMB Circular A-4 directs federal agencies conducting benefit/cost analysis of regulatory measures as follows: “Your analysis should focus on benefits and costs that accrue to citizens and residents of the United States. Where you choose to evaluate a regulation that is likely to have effects beyond the borders of the United States, these effects should be reported separately.”23 The IWG analysis incorporates explicitly in its benefit/cost calculation the purported global climate benefits from reductions in U.S. GHG emissions, presumably on the grounds that the assumed GHG externality is global in nature. [EPA-HQ-OAR-2022-0829-0571, p. 8]

23 See OMB Circular A-4, “Regulatory Analysis,” September 17, 2003, at https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/.

This argument is fundamentally flawed, in substantial part because the global climate effect of all U.S. GHG emissions is very close to zero, as discussed above. Accordingly, the global “benefits” of U.S. GHG emissions reductions would be effectively zero. Neither the IWG nor EPA can dispute this because it is the EPA climate model used directly or indirectly through the IAMs applied to the analysis of the SCC. More generally, it is the EPA climate model that is used throughout the federal government for analysis of climate and energy policies.24 [EPA-HQ-OAR-2022-0829-0571, p. 8]

24 See, e.g., Environmental Protection Agency and Department of Transportation, National Highway Traffic Safety Administration proposed rule, “Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy- Duty Engines and Vehicles — Phase 2,” July 12, 2015, at https://www.regulations.gov/document/EPA-HQ-OAR- 2014-0827-0002.

Furthermore, the inclusion of purported global benefits in the benefit/cost analysis of U.S. GHG policies would create a very large distortion in terms of an efficient international adoption of climate policies. An efficient promulgation of climate policies internationally would attempt to achieve both an equation of the global marginal benefits and costs of GHG emission reductions, and an allocation of emissions reductions that equates the marginal cost of such reductions across economies. If the U.S. is to promulgate domestic policies that equate domestic marginal costs with global marginal benefits, then other countries would have powerful incentives to obtain free rides on U.S. efforts. Given that the marginal cost function for reductions in GHG emissions almost certainly is upward sloping — the marginal cost of GHG reductions rises as such reductions increase — the outcome would be a global effort to reduce GHG emissions more costly than an international effort equating marginal costs across economies.25 That is the central implication of the imperative incorporated in the IWG analysis of the SCC: Under any assumption about the global benefits of reduced GHG emissions, that cannot be an efficient outcome unless the U.S. is the low-cost source of all reductions in GHG emissions, an assumption that simply is not plausible. [EPA-HQ-OAR-2022-0829-0571, p. 8]

25 This is true whether the marginal cost functions across economies are identical or differ, although the latter is far more plausible.

With respect to the issue of the choice among discount rates, “climate policy” by definition is the allocation of resources away from current consumption and from productive activities that yield consumption goods during the current time period, in favor of a reduction in GHG emissions/concentrations that purportedly would increase the production of consumption goods during some series of future time periods. That is why EPA asserts that the proposed rule would yield positive net benefits in present value terms, that is, increase the present value of the consumption stream. Accordingly, that use of resources during the current time period — again, by definition — is an investment, and it must be evaluated in comparison with the social return to alternative investments. [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

Therefore, it is the opportunity of cost of capital that is the appropriate discount rate to be applied to the evaluation of the proposed rule, because the allocation — the investment — of resources to such endeavors imposes an opportunity cost in the form of other forgone investments. Because the use of scarce resources for reductions in GHG emissions is an investment, whether promising returns low or high, the appropriate discount rate is the opportunity cost of capital for the economy as a whole. For the period 1928-2020, the average annual before-tax return to investment in the Standard and Poor 500, in real (inflation-adjusted) terms was 8.5 percent.26 For the period 1960-2020, the figure was 7.61 percent. Such long-run historical figures are consistent with the directive in OMB Circular A-4 that a discount rate of 7 percent be the baseline parameter applied to regulatory analysis by the federal government. [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

26 The data on annual returns for several investment alternatives are reported by the Stern School of Management, New York University, at http://www.stern.nyu.edu/~adamodar/pc/datasets/histretSP.xls.

EPA in previous analyses has justified a “consumption rate of interest” defined alternatively at 2.5 percent, 3 percent, or 5 percent, as follows.27 [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

27 See the regulatory impact analysis for https://www.govinfo.gov/content/pkg/FR-2021-08-10/pdf/2021-16582.pdf.

Second, the IWG found that the use of the social rate of return on capital (7 percent under current OMB Circular A-4 guidance) to discount the future benefits of reducing GHG emissions inappropriately underestimates the impacts of climate change for the purposes of estimating the SC-GHG. Consistent with the findings of the National Academies and the economic literature, the IWG continued to conclude that the consumption rate of interest is the theoretically appropriate discount rate in an intergenerational context… and recommended that discount rate uncertainty and relevant aspects of intergenerational ethical considerations be accounted for in selecting future discount rates. As a member of the IWG involved in the development of the

February 2021 TSD, EPA agrees with this assessment and will continue to follow developments in the literature pertaining to this issue. [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

That analytic argument is fundamentally flawed. First: The "consumption rate of interest" is not the correct conceptual discount rate for analysis of the proposed rule because the use of resources for purposes of reductions in GHG emissions is obviously an investment, the opportunity cost of which is the marginal social return to investment. Even if we assume that the "consumption rate of interest" conceptually is the correct parameter for discounting purposes, the relevant metric is the real market rate of interest on intertemporal consumption shifts, one crude measure of which is the market rate of interest on unsecured consumer loans. Even given the recent years of low interest rates maintained by the Federal Reserve, that market rate appears to be over 7 percent in real terms.28 For secured loans (new autos), the real interest rate appears to be at least 3 percent,29 but that is not the correct parameter because there is no collateral insuring against the possibility that government policies mandating reductions in GHG emissions will prove uneconomic. The EPA discount rate argument is fundamentally flawed analytically, and is inconsistent with the data for the U.S. credit market. [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

28 See the data reported by the Federal Reserve Bank of St. Louis at https://fred.stlouisfed.org/series/TERMCBPER24NS.

29 See https://fred.stlouisfed.org/series/RIFLPBCIANM60NM.

Note also that the use of a (low) "consumption rate of interest" for the evaluation of climate policy only would introduce an important bias in the allocation of resources among government policies and between government and private-sector resource use. EPA does not argue that the "consumption rate of interest" should be applied to the benefit/cost analysis of all government investment and regulatory activity; only climate policies are to be so treated, on the grounds of "intergenerational equity," discussed below. Nor would the private sector choose to use an artificially-low discount rate for the evaluation of alternative resource uses. If it is only the climate dimension of investment and consumption choice dynamics that is to be shaped by the use of a low "consumption rate of interest," it is obvious that important distortions would be the central outcome, with a smaller capital stock resulting. [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

Second: The implicit premise in the EPA discussion of intergenerational analysis and the discount rate is straightforward: Future generations prefer to avoid the damages that they ostensibly will bear because of the climate effects of resource allocation decisions made by the current generation, and because future generations cannot vote during the current time period, it is equitable to force the current generation to bear the costs of anthropogenic climate change that otherwise would be inflicted upon future generations. [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

However seemingly straightforward, that argument is not correct. Future generations prefer to receive a bequest of an aggregate capital stock more- rather than less valuable, an objective very different from a maximization of the value of one dimension — climate phenomena — of that aggregate capital stock. This requires efficient resource allocation by the current generation, and therefore the application of the correct discount rate. Consider a homo sapiens baby borne in a cave some 50,000 years ago. Despite the fact that at birth that child would have enjoyed environmental quality effectively unaffected by mankind, and a fortiori climate phenomena determined by natural processes only, the baby at birth would have had a life expectancy of only about ten years.30 [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

30 This life expectancy observation was provided by Professor Gail Kennedy, Department of Anthropology, University of California, Los Angeles, during a telephone interview conducted February 16, 2011.

Accordingly, it is obvious that given the opportunity to choose, that child would opt for less environmental quality and greater climate risk in exchange for a longer life expectancy engendered by a more valuable aggregate capital stock yielding improved shelter, expanded food supplies, a cleaner water supply, better medical care, ad infinitum. Greater wealth is the central objective of any generation, a reality shunted aside by the focus in the RIA upon only the climate dimension of the aggregate capital stock to be bequeathed to future generations. [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

In short: EPA uses the SCC as a substitute for estimation of the actual prospective climate impacts of its proposed rule because the latter cannot be asserted to be greater than zero operationally or as a matter of statistical significance. But the SCC is fundamentally flawed for the reasons summarized above, and is inconsistent with the evidence on climate phenomena and with the prospective effectives of climate policies in the EPA climate model.31 [EPA-HQ-OAR-2022-0829-0571, pp. 8-10]

31 See https://www.budget.senate.gov/imo/media/doc/Dr.%20Benjamin%20Zycher%20-%20Testimony%20-%20Senate%20Budget%20Committee.pdf.

Organization: Arizona State Legislature

4. The proposed rule relies on unlawful and faulty calculations for the Social Cost of Greenhouse Gases. The Social Cost of Greenhouse Gases calculations relied upon by EPA in its post-hoc cost-benefit analysis violate the separation of powers and suffer from glaring methodological deficiencies. [EPA-HQ-OAR-2022-0829-0537, p. 2]

IV. EPA’s Calculation of the “Social Cost of Greenhouse Gases” Is Unlawful, Unconstitutional, Arbitrary and Capricious. [EPA-HQ-OAR-2022-0829-0537, pp. 9-10]

As noted above, EPA claims that it need not engage in any cost-benefit analysis to justify the proposed rule. Yet, in Section VIII, to comply with Executive Order 12866, EPA gives a clear indication of what such a cost-benefit analysis would look like if EPA admitted that it were required to conduct one. That cost-benefit analysis rests heavily on the so-called “Social-Cost of Greenhouse Gases.” If adopted by EPA as justification for the proposed rule, it is equally unlawful, unconstitutional, arbitrary, and capricious. [EPA-HQ-OAR-2022-0829-0537, pp. 9-10]

EPA’s calculation of the so-called “Social Cost of Greenhouse Gases” (“SC-GHG”) plays a pivotal role in the analysis conducted in Section VIII. See 88 Fed. Reg. 29,371-379. Avoiding the supposed “social costs” of greenhouse gases is the first and principal benefit of the new emissions standards proposed by EPA. See id. Indeed, it is clear that reducing greenhouse gas emissions is the driving force behind the proposal. See id. But EPA’s approach is baseless. EPA’s continued reliance on the “social cost of greenhouse gases” metric, as calculated by the “Interagency Working Group” convened by Executive Order 13990, to predict future climate damages is unlawful, unconstitutional, arbitrary and capricious. It violates the separation of powers and thPAe Major Questions Doctrine, and suffers from glaring methodological deficiencies. [EPA-HQ-OAR-2022-0829-0537, pp. 9-10]

A. EPA uncritically adopts the Interagency Working Group's values for the SC- GHG, as it was instructed to do by Section 5(b) of E.O. 13990.

In its Section VIII discussion, EPA uncritically adopts the values for the SC-GHG provided by the Interagency Working Group convened by Executive Order 13990. EPA states: "We estimate the global social benefits of CO2, CH4, and N2O emission reductions expected from the proposed rule using the SC-GHG estimates presented in the February 2021 Technical Support Document (TSD): Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under E.O. 13990 (IWG 2021)." 88 Fed. Reg. 29,372 (emphasis added). EPA claims that "[w]e have evaluated the SC-GHG estimates in the TSD and have determined that these estimates are appropriate for use in estimating the global social benefits of CO2, CH4, and N2O emission reductions expected from this proposed rule." Id. However, EPA's substantive discussion of the Interagency Working Group's values includes only statements recognizing their "limitations." See id. For example, EPA states that "these interim SC-GHG estimates have a number of limitations, including that the models used to produce them do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate-change literature and that several modeling input assumptions are outdated." Id. Further, EPA admits that "more robust methodologies for estimating damages from [greenhouse gas] emissions" are available, and that there is room to "further improve SC-GHG estimation going forward." Id. Nevertheless, with scant analysis, EPA uncritically adopts the Interagency Working Group's values for the "Social Costs" of carbon dioxide, methane, and nitrous oxide: [EPA-HQ-OAR-2022-0829-0537, p. 10]

Table 172 through Table 175 show the benefits of reduced CO2, CH4, N2O and GHG emissions, respectively, and consequently the annual quantified benefits (i.e., total GHG benefits), for each of the four interim social cost of GHG (SC–GHG) values estimated by the interagency working group. [EPA-HQ-OAR-2022-0829-0537, pp. 10-11]

Id. (emphasis added).

Why so? Why does EPA adopt SC-GHG values that it admits are subject to numerous "limitations," are based on "outdated" modeling assumptions, and compare poorly with "more robust methodologies"? Id. Moreover, why does it appear that every other federal agency to quantify the "social costs" of carbon dioxide, methane, and/or nitrous oxide since February 2021 used the Interagency Working Group's "interim estimates"?16 What explains the astonishing, persistent persuasive power of these admittedly flawed numbers? [EPA-HQ-OAR-2022-0829-0537, pp. 10-11]

16 At least twelve agency actions have expressly used the Working Group's "interim estimates" from the 2021 TSD since it was published in February 2021. See, e.g., Doc. 98, Louisiana v. Biden, Case No. 2:21-cv-01074, at 16-18 (W.D. La. Feb. 11, 2022) (citing nine such agency actions, including action by EPA, DOE, BLM, FAR, CEQ, NHTSA, and DOI, addressing issues such as light-duty vehicle emissions standards, general service lamps, oil and gas new and modified sources, fossil fuel leasing, and manufactured housing, among others); see also, e.g., Office of Energy Efficiency and Renewable Energy, Department of Energy, Energy Conservation Program: Energy Conservation Standards for General Service Lamps, Final Rule, 87 Fed. Reg. 27,439 (May 9, 2022), at 27,456/1 ("DOE used the estimates for the SC–GHG from the most recent update of the IWG in its February 2021 TSD."); Office of Energy Efficiency and Renewable Energy, Department of Energy, Energy Conservation Program: Energy Conservation

Standards for Manufactured Housing, Final Rule, 87 Fed. Reg. 32,728 (May 31, 2022), at 32,733/1-2 ("DOE used interim SC-GHG values developed by an Interagency Working Group on the Social Cost of Greenhouse Gases (IWG)."); National Highway Traffic Safety Administration, Department of Transportation, Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks, Final Rule, 87 Fed. Reg. 25,710 (May 2, 2022), id. at 25,724/1 ("In this final rule, NHTSA employed the SC–GHG values from the Interim Revised Estimates developed by the Interagency Working Group on the Social Cost of Greenhouse Gases (IWG), and discounted it at values recommended by the IWG for its main analysis."). By contrast, commenters are not aware of any agencies that are not independent of the President that have declined to adopt the Interagency Working Group's 2021 recommendations on this point.

The answer to this question is obvious: EPA and the other federal agencies use the Interagency Working Group's "Interim Estimates" because they have been ordered to do so by the President. Section 5 of Executive Order 13990 directs that the "Working Group shall …publish an interim SCC, SCN, and SCM within 30 days of the date of this order, which agencies shall use when monetizing the value of changes in greenhouse gas emissions resulting from regulations and other relevant agency actions until final values are published." E.O. 13990, § 5(b)(ii)(A), 86 Fed. Reg. 7040 (emphasis added). The Executive Order is not ambiguous: It provides that "agencies shall use" the Interagency Working Group's values "until final values are published," id. (emphasis added)—which, as EPA concedes, has never happened and is now long overdue. [EPA-HQ-OAR-2022-0829-0537, pp. 10-11]

The meaning of the word "shall" in this context is perfectly plain—it is an auxiliary verb "used to express a command or exhortation." Shall, Merriam-Webster Online, at https://www.merriam-webster.com/dictionary/shall (defining "shall" as "used to express a command or exhortation"); see also, e.g., Kingdomware Technologies, Inc. v. United States, 579 U.S. 162, 171 (2016) ("Unlike the word 'may,' which implies discretion, the word 'shall' usually connotes a requirement."); Lexecon Inc. v. Milberg Weiss Bershad Hynes & Lerach, 523 U.S. 26, 35 (1998) (recognizing that "shall" is "mandatory" and "normally creates an obligation impervious to judicial discretion"). The President "used the word 'shall' in" E.O. 13990, and that functions "as a command." Kingdomware, 579 U.S. at 172. [EPA-HQ-OAR-2022-0829-0537, pp. 11-12]

Thus, in Executive Order 13990, the President gave a command to the agencies—a binding directive that they "shall" use the Interagency Working Group's interim values (and, later, its final values, if they are ever published) in any "regulations and other relevant agency actions" that involve the calculation of SC-GHG. See E.O. 13990, § 5(b)(ii)(A), 86 Fed. Reg. 7040. And every federal agency since then has interpreted it as a command—acting in lockstep with each other in adopting the Interagency Working Group's interim estimates whenever they quantify the benefits of reducing emissions of CO2, CH4, and N2O. [EPA-HQ-OAR-2022-0829-0537, pp. 11-12]

This situation is unlawful, for at least three reasons. First, it involves an unconstitutional arrogation of legislative power to the Working Group, in violation of the separation of powers. Second, it violates the Major Questions Doctrine. Third, the Interagency Working Group's methodology is profoundly flawed, such that any reliance on its numbers is inherently arbitrary and capricious—as EPA all but concedes by recognizing that its numbers are "outdated" and fraught with "limitations." 88 Fed. Reg. 29,372. [EPA-HQ-OAR-2022-0829-0537, pp. 11-12]

B. The Interagency Working Group's promulgation of binding values for the SC- GHG violates the separation of powers and Major Questions Doctrine.

In litigation about the status of the Interagency Working Group, the U.S. Department of Justice admitted: "No statute establishes it, nor delegates it any legislative authority." Doc. 28, Missouri v. Biden, No. 4:21-cv-00287-AGF (E.D. Mo.), at 54. This is undeniably true. There is no statute that either creates or delegates power to an "Interagency Working Group on Social Cost of Greenhouse Gases"—it is purely a creature of E.O. 13990. Yet, pursuant to the plain terms of E.O. 13990, the Working Group purports to exercise legislative authority—the authority to dictate to all federal agencies the specific values that they must use when they monetize the costs of future greenhouse-gas emissions. This is quintessentially legislative power, exercised without any delegation from Congress. [EPA-HQ-OAR-2022-0829-0537, p. 12]

Article I, Section 1 of the Constitution provides: "All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives." U.S. Const. art. I, § 1. The Interagency Working Group's interim estimates in the 2021 Technical Support Document constitute specific, mandatory numerical values on a policy question of great import, which federal agencies are bound to use in "regulations and other relevant agency actions" under the plain terms of E.O. 13990. E.O. 13990, § 5(b)(ii)(A), 86 Fed. Reg. 7040; see also Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990 (Feb. 2021), at https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf ("2021 TSD"). [EPA-HQ-OAR-2022-0829-0537, p. 12]

This is legislation, plain and simple. "[W]hen an agency wants to state a principle 'in numerical terms,' terms that cannot be derived from a particular record, the agency is legislating and should act through rulemaking." Catholic Health Initiatives v. Sebelius, 617 F.3d 490, 495 (D.C. Cir. 2010) (quoting Henry J. Friendly, Watchman, What of the Night?, BENCHMARKS 144– 45 (1967)). As Judge Posner wrote, adopting "[a] rule that turns on a number" is a "legislative function." Hoctor v. USDA, 82 F.3d 165, 170 (7th Cir. 1996). "Legislators have the democratic legitimacy to make choices among value judgments, choices based on hunch or guesswork or even the toss of a coin, and other arbitrary choices. When agencies base rules on arbitrary choices they are legislating, and so these rules are legislative…." Id. When it adopts specific numbers for the so-called "social costs" of gases, the Interagency Working Group is "legislating." Id. The Working Group adopts specific numbers, set forth in tables, for SC-GHG at four specific discount rates. 2021 TSD, at 4-6. It is unquestionable that the Working Group's adoption of these specific numbers as binding estimates is "legislative." Id. The calculations do not involve the application of simple arithmetic; rather, they involve (as the Working Group admits) "issues of uncertainty and ethics," and "highly contested and exceedingly difficult questions of science, economics, ethics, and law." 2021 TSD, at 17, 21. "[T]he range of discount rates reflects both uncertainty and, at least in part, different policy or value judgments." Id. at 27 (emphasis added). And, as EPA admits here, they involve "outdated" assumptions, inputs with significant "limitations," and the use of a less "robust methodology" than even EPA admits is available. [EPA-HQ-OAR-2022-0829-0537, pp. 12-13]

Thus, the adoption of specific values against a wide range of possibilities, based on assumptions that involve widely disputed scientific methodologies and value judgments at the intersection of "politics" and "ethics," is a legislative action. But no Executive agency may exercise legislative authority without a delegation from Congress. "It is axiomatic that an administrative agency's power to promulgate legislative regulations is limited to the authority delegated by Congress." Bowen v. Georgetown Univ. Hosp., 488 U.S. 204, 208 (1988). So when "there is no statute conferring authority, a federal agency has none." Michigan v. EPA, 268 F.3d 1075, 1081 (D.C. Cir. 2001). Here, the Working Group is purely a creature of Executive authority—it was created solely by Executive Order, not by Congress, and it exercises no delegated authority. The President lacks any independent legislative authority to bestow on the Working Group. See U.S. Const. art. I, § 2 ("The executive Power shall be vested in a President of the United States of America."). Therefore, it has none, and its exercise of legislative power encroaches on the exclusive authority of Congress. [EPA-HQ-OAR-2022-0829-0537, pp. 12-13]

This violates the separation of powers, the most fundamental structural guarantee of liberty. As the Supreme Court has held for decades, "[t]he President's power, if any, to issue [an] order must stem either from an act of Congress or from the Constitution itself." Youngstown Sheet & Tube Co. v. Sawyer, 343 U.S. 579, 585 (1952). Where "[t]here is no statute that expressly authorizes the President to take" an action, "[n]or is there any act of Congress … from which such a power can fairly be implied," the action is not authorized by an act of Congress. Id. In the absence of such an express or implied authorization by act of Congress, "if the President had authority to issue the order he did, it must be found in some provision of the Constitution." Id. at 587. But the vesting Clauses of Article I and Article II reflect a careful separation of the Legislative and Executive Branches into their respective spheres. There is no provision of the Constitution that confers purely legislative authority—of the sort exercised by the Interagency Working Group—on the President. For the Executive Branch to exercise such authority, it must be delegated by Congress. Congress has not done so here. [EPA-HQ-OAR-2022-0829-0537, pp. 12-13]

The separation of powers is the most fundamental and profound feature of our unique structure of government. The vesting clauses of Article I and Article II reflect the Founders' insights that "the legislative, executive, and judiciary departments ought to be separate and distinct," and that this separation is an "essential precaution in favor of liberty." The Federalist No. 47 (Madison) (C. Rossiter ed. 1961), p. 301. As James Madison stated, "[n]o political truth is certainly of greater intrinsic value, or is stamped with the authority of more enlightened patrons of liberty." Id. "The accumulation of all powers, legislative, executive, and judiciary, in the same hands, whether of one, a few, or many, and whether hereditary, selfappointed, or elective, may justly be pronounced the very definition of tyranny." Id. [EPA-HQ-OAR-2022-0829-0537, pp. 13-14]

This principle of separation of powers is the most crucial safeguard of liberty. "It is the proud boast of our democracy that we have 'a government of laws, and not of men.'" Morrison v. Olson, 487 U.S. 654, 697 (1988) (Scalia, J., dissenting). "The Framers of the Federal Constitution . . . viewed the principle of separation of powers as the absolutely central guarantee of a just Government." Id. "Without a secure structure of separated powers, our Bill of Rights would be worthless, as are the bills of rights of many nations of the world that have adopted, or even improved upon, the mere words of ours." Id. "The purpose of the separation and equilibration of powers in general . . . was not merely to assure effective government but to preserve individual freedom." Id. at 727. "While the separation of powers may prevent us from righting every wrong, it does so in order to ensure that we do not lose liberty." Id. at 710. [EPA-HQ-OAR-2022-0829-0537, pp. 13-14]

The Working Group created by EO 13990, therefore, reflects the Executive Branch's naked arrogation of legislative power to itself. "Frequently," a threat to the separation of powers "will come … clad, so to speak, in sheep's clothing…. But this wolf comes as a wolf." Id. at 699. [EPA-HQ-OAR-2022-0829-0537, pp. 13-14]

Furthermore, for similar reasons, the Working Group's promulgation of binding values for the so-called "Social Cost of Greenhouse Gases" violates the Major Questions Doctrine. As noted above, the Major Questions Doctrine requires "clear congressional authorization" for federal agencies to make decisions on questions of major political, social, and economic significance. West Virginia, 142 S. Ct. at 2609. Here, dictating binding values for the "social costs" of gases that apply to all federal agencies making all "regulations and other relevant agency actions," E.O. 13990, § 5(b)(ii)(A), 86 Fed. Reg. 7040, decides a matter of enormous economic and political significance, all at one stroke. Cass Sunstein, one of the architects of the "social cost of carbon" analysis in the Obama Administration, describes the SC-GHG as "the most important number you've never heard of." Cass R. Sunstein, The Arithmetic of Climate Change (Aug. 18, 2021), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3906854. This description is apt because "within the executive branch, the stringency of regulation of greenhouse gases emissions often depends on that number." Id. [EPA-HQ-OAR-2022-0829-0537, p. 14]

In fact, the "social cost of carbon" was cited in regulatory decisions at least eighty-three times during the Obama Administration alone. Howard & Schwartz, Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon, 42:S COLUM. J. ENVT'L LAW 203, 219–20 & appx. A (2017). This included a wide array of agencies—including, but not limited to, EPA, DOE, DOT, DOI, and USDA, see id.—that applied the predecessor Working Group's analysis to formulate federal regulations, policies, and regulatory actions related to vending machines, light trucks, dishwashers, dehumidifiers, microwave ovens, kitchen stoves, clothes washers, small electric motors, residential water heaters, ozone standards, residential refrigerators and freezers, sewage guidelines, medium and heavy-duty vehicles, mercury emissions, industrial boilers, solid waste incineration units, fluorescent lamps, residential clothes dryers, room air conditioners, residential furnaces, residential central air conditioners, battery chargers, dishwashers, petroleum refineries, halide lamps, walk-in coolers and freezers, commercial refrigeration units, commercial clothes washers, commercial ice makers, and heat pumps. See id. [EPA-HQ-OAR-2022-0829-0537, p. 14]

The ability to decide this set of numbers for all federal agencies engaged in all such regulatory actions is a matter of enormous political and economic significance, which requires clear authorization from Congress. West Virginia, 142 S. Ct. at 2609. But here, not only is there no "clear" delegation from Congress, there is no delegation at all—as the U.S. Department of Justice admits, when it comes to the Interagency Working Group, "[n]o statute establishes it, nor delegates it any legislative authority." Doc. 28, Missouri v. Biden, No. 4:21-cv-00287-AGF (E.D. Mo.), at 54. [EPA-HQ-OAR-2022-0829-0537, pp. 14-15]

C. The Interagency Working Group's promulgation of so-called "interim" estimates for SC-GHG violated the APA.

For similar reasons, the Working Group's promulgation of the so-called "interim" estimates—which have served as the definitive values for all federal agencies for two and a half years, with no end in sight—violated the Administrative Procedure Act because it was arbitrary, capricious, contrary to law, unconstitutional, and adopted without agency procedures required by law. See 5 U.S.C. § 706(2)(A)-(D). [EPA-HQ-OAR-2022-0829-0537, p. 15]

First, just as the Interim Estimates constitute a de facto exercise of binding legislative authority, they constitute "legislative rules" under the APA, which can only be promulgated through observance of notice-and-comment procedures. As Judge Posner wrote in Hoctor, "[p]rovided that a rule promulgated pursuant to such a delegation is intended to bind, … the rule would be the clearest possible example of a legislative rule, as to which the notice and comment procedure not followed here is mandatory…." Hoctor, 82 F.3d at 169. "When agencies base rules on arbitrary choices they are legislating, and so these rules are legislative or substantive and require notice and comment rulemaking, a procedure that is analogous to the procedure employed by legislatures in making statutes." Id. at 170-71. [EPA-HQ-OAR-2022-0829-0537, p. 15]

"Notice of a proposed rule must include sufficient detail on its content and basis in law and evidence to allow for meaningful and informed comment." Am. Med. Ass'n v. Reno, 57 F.3d 1129, 1132 (D.C. Cir. 1995). "The purpose of the comment period is to allow interested members of the public to communicate information, concerns, and criticisms to the agency during the rule-making process." Connecticut Light & Power Co. v. Nuclear Regul. Comm'n, 673 F.2d 525, 530 (D.C. Cir. 1982). The Interagency Working Group, however, did not seek any public comment before issuing the 2021 SC-GHG estimates. Instead, it provided notice and comment for not-yet-promulgated SC-GHG estimates for future use—preventing the public from commenting on the 2021 SC-GHG estimates that federal agencies currently use. Thus, the Interim Estimates were adopted "without observance of procedure required by law," 5 U.S.C. § 706(2)(D), and they violate the APA. [EPA-HQ-OAR-2022-0829-0537, p. 15]

Likewise, the Working Group's Interim Estimates are "not in accordance with law," "contrary to constitutional right, power, privilege, or immunity," and "in excess of statutory jurisdiction, authority, or limitations." 5 U.S.C. § 706(2)(A), (B), (C). They are unconstitutional and unlawful because they violate the separation of powers and constitute legislative rules that were adopted without notice and comment. And they are in excess of statutory authority because the Working Group has no statutory authority whatsoever—least of all, authority to promulgate binding legislative rules that apply to all federal agencies on a hotly disputed policy question that has enormous practical consequences. [EPA-HQ-OAR-2022-0829-0537, p. 15]

D. The Interim Estimates are substantively arbitrary and capricious.

The Interagency Working Group's Interim Estimates in the 2021 TSD are also substantively arbitrary and capricious because they ignore important aspects of the problem, they decline to consider relevant data, they violate longstanding principles of statutory interpretation, they suffer from glaring methodological flaws, they lack scientific rigor, and they are irredeemably speculative. See State Farm, 463 U.S. at 43. Moreover, all these errors work in the same direction—to inflate estimated future climate damages. [EPA-HQ-OAR-2022-0829-0537, pp. 15-16]

As an initial matter, the Integrated Assessment Models ("IAMs") employed by the Working Group claim a predictive power that is staggering in scope. They purport to predict the global impact of human migrations, wars, natural disasters, agricultural capacities, technological developments, worldwide mitigation efforts, and other unknowable future developments for the next 300 years—i.e., "the value of all climate change impacts, including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services," until the year 2300. 2021 TSD, at 2. According to the 2021 TSD, "[e]xamples of affected interests include: direct effects on U.S. citizens and assets located abroad, international trade, tourism, and spillover pathways such as economic and political destabilization and global migration." Id. at 3. The Working Group admits that proper calculations would require predicting "mitigation activities by other countries," and "international mitigation actions." Id. In short, the Working Group's calculations purport to predict the arc of human and ecological history for the next three centuries. [EPA-HQ-OAR-2022-0829-0537, pp. 15-16]

The Interagency Working Group convened by E.O. 13990 lacks adequate tools to make such impossible predictions with anything like scientific rigor. On the contrary, its attempts are hampered by hopelessly outdated assumptions and glaring methodological flaws, as discussed further below. EPA candidly acknowledges that the IAMs suffer from such methodological shortcomings and outdated assumptions. As noted above, EPA admits that the three "Integrated Assessment Models" ("IAMs") on which the 2021 values are based suffer from grievous methodological flaws, including "outdated" assumptions and what EPA euphemistically calls "limitations." 88 Fed. Reg. 29,372. EPA does not bother to elucidate these flaws and limitations, but an analysis of the IAMs and their application reveals that they are inherently speculative, fundamentally non-scientific, lacking in methodological rigor, based on false assumptions, and subject to virtually limitless user manipulation. Five examples illustrate these shortcomings: (1) the selection of the discount rate, (2) the selection of the time horizon over which damages are calculated, (3) the estimate of the Equilibrium Climate Sensitivity factor, (4) the treatment of anticipated benefits of moderate warming, and (5) the geographic scope of anticipated damages. [EPA-HQ-OAR-2022-0829-0537, p. 16]

Dr. Kevin Dayaratna aptly summarizes these shortcomings: "[L]ike its predecessors, the 2021 TSD is predicated on faulty models that are prone to user-selected manipulation. Each model is highly sensitive, or produces a vastly disparate range of results, based on the user assumptions. Essentially the assumptions, and not quantifiable data, drive the results—garbage in, garbage out." Statement of Kevin D. Dayartna 15 ("Ex. A") (attached as Exhibit A). [EPA-HQ-OAR-2022-0829-0537, p. 16]

Selection of the discount rate. First, the selection of the discount rate plays an outsized role in the IAMs' damage calculations. The Interagency Working Group describes the "discount rate" as follows: "[I]n calculating the SC-GHG, the stream of future damages to agriculture, human health, and other market and non-market sectors from an additional unit of emissions are estimated in terms of reduced consumption (or consumption equivalents). Then that stream of future damages is discounted to its present value in the year when the additional unit of emissions was released." 2021 TSD, at 17. Dr. Dayaratna describes this process as follows: "Discounting future benefits of averting climate damage compares the rate of return from CO2 reduction to the rate of return that could be expected from other investments. In principle, discounting runs the compound rate of return exercise backwards, calculating how much would need to be invested at a reasonably expected interest rate today to result in the value of the averted future climate damage." Ex. A, [EPA-HQ-OAR-2022-0829-0537, pp. 16-17]

18. A lower discount rate entails a higher calculation of anticipated damages from climate change, and thus a higher "social cost" for each greenhouse gas. "The present value of a future benefit or cost is the amount you would have to invest today that would grow in value to match that benefit or cost at the specified time in the future. The discount rate represents the rate of return of this investment and should reflect the real rates of return to capital." Id. 19. [EPA-HQ-OAR-2022-0829-0537, pp. 16-17]

As the Working Group admits, the selection of a discount rate "has a large influence on the present value of future damages." 2021 TSD, at 17. As the analysis of Dr. Dayaratna demonstrates, this is an understatement—the selection of discount rate has an enormous influence on outcomes. But, as the Working Group also admits, the selection of the discount rate is an exercise in value judgment, not scientific calculation: "the choice of a discount rate … raises highly contested and exceedingly difficult questions of science, economics, ethics, and law." 2021 TSD, at 17. As the Working Group admits, the selection of a discount rate ultimately rests on "different policy or value judgments." Id. at 27 [EPA-HQ-OAR-2022-0829-0537, p. 17]

Before the 2021 TSD, the discount rate was calculated using OMB's peer-reviewed Circular A-4, which provided for a 7 percent discount rate based on the long-term return on investment capital to be used in cost-benefit analyses. Dayaratna Statement 20. The 2021 TSD abandons the longstanding, peer-reviewed approach to the discount rate in favor of a range of much lower discount rates, which yield much higher "social cost" calculations: 2.5 percent, 3 percent, 5 percent, and the 95th percentile probability distribution at the 3 percent discount rate. 2021 TSD, at 5-8. [EPA-HQ-OAR-2022-0829-0537, p. 17]

The Working Group admits that there are "disagreements in the literature on the appropriate discount rate to use in this context, and uncertainty about how rates may change over time." Id. at 17. Rather than grappling with this uncertainty and disagreement, the Working Group simply selects a range of low values that (it states) "span a plausible range of certainty-equivalent constant consumption discount rates." Id. The Working Group rejects OMB Circular A-4's peer-reviewed approach, concluding that "the social rate of return to capital, estimated to be 7 percent in OMB's Circular A-4, is not appropriate for use in calculating the SC-GHG," and opts for a range of much lower discount rates based on consumption equivalents instead of investment equivalents instead—yielding much higher "social costs" for each gas. Id. Thus, "the IWG is returning to the approach of calculating the SC-GHG based on the consumption rate of interest," which is much lower than the expected rate of return on investment. Id. at 18. [EPA-HQ-OAR-2022-0829-0537, pp. 17-18]

As Dr. Dayaratna discussed, this decision—which purports to resolve "exceedingly difficult questions of science, economics, ethics, and law," id. at 17—results in a dramatic inflation of the "social cost" values on all three of the IAMs—DICE, FUND, and PAGE. Ex. A, 21-27. [EPA-HQ-OAR-2022-0829-0537, pp. 17-18]

For example, using the FUND model, "the choice in the discount rate can cause the social cost of carbon to drop by as much as 80 percent or more." Id. 24. The other models yield similar results. "These figures show that the discount rate an agency picks have a drastic effect on the cost estimates, and the lower the discount rate, the greater the damages." Id. 27. [EPA-HQ-OAR-2022-0829-0537, pp. 17-18]

Time horizon selected. The time horizon selected for expected damages is another arbitrary choice that has a strong influence on the IAMs' results. "Closely related to the choice of discount rate, the time horizon that the agencies choose to use to calculate damages has an outsized impact on the social cost of greenhouse gases." Ex. A, 28. [EPA-HQ-OAR-2022-0829-0537, p. 18]

Quite obviously, purporting to predict climate damages centuries into the future is an irreducibly speculative task. "It is essentially impossible to forecast technological changes decades, let alone centuries, into the future. In particular, many commonplace technological innovations such as internet, smartphones and GPS technology were mere science fiction 300 years ago." Id. 29. "Yet, in every TSD to date, including the 2021 TSD, the IAMs have calculated damages based on projections ending in 2300—nearly 300 years into the future." Id. Asking the models to predict technological changes and other developments for 300 years is speculative to the point of absurdity. [EPA-HQ-OAR-2022-0829-0537, p. 18]

Suggesting that the IAMs can make reliable predictions across a 300-year time frame for all of global economic and technological history is pure speculation. It is akin to asking the soldiers of the First Crusade to predict Columbus's discovery of America, Queen Anne of England to predict the election of Donald Trump, the signers of the Peace of Westphalia to predict the invention of nuclear weapons, and the court of King Louis XIV to predict the invention of smartphones and the internet—all rolled into one, and compounded thousands of times over. This is not science. It is naked speculation. [EPA-HQ-OAR-2022-0829-0537, p. 18]

Yet this naked speculation is an important driver of the Working Group's calculations— and it drives uniformly them in one direction: upward. "Extending the time horizon in such a manner increases the SCC estimates, thus enabling the IWG to claim larger economic damages associated with CO2 emissions." Ex. A, 29. As Dr. Dayaratna recounts, the IAMs leverage the wild uncertainty inherent in 300-year projections of global history by concealing key assumptions. "[T]he IWG's estimates of the SCC are based on climate scenarios 'that are not just badly out of date, but reflecting a set of fictional worlds.'" Ex. A, 31 (quoting Roger Pielke Jr., The Biden Administration Just Failed its First Science Integrity Test (Feb. 28, 2021), at https://rogerpielkejr.substack.com/p/the-biden-administration-just-failed). "The IWG originally estimated the SCC in 2010 based on eight different scenarios of the future of the climate, developed over a decade ago. Four of these scenarios were to represent different trajectories of the future, sans climate policies and thus referred to as 'business as usual'…." Id. (emphasis added). "Four others were combined into a single scenario to reflect a future with climate policy. These five scenarios initially projected out to 2100, and the IWG extended the scenarios to 2300 using a range of assumptions." Id. [EPA-HQ-OAR-2022-0829-0537, p. 18]

"[T]hese BAU scenarios are over a decade old and thus badly outdated and unrealistic." Id. 33. "In fact, they fail to take into account recent transitions toward less CO2 intensive forms of energy such as natural gas—assuming instead [that] … the 'world would have to make it a policy goal to burn as much coal as possible over the coming centuries.'" Id. (quoting Pielke, supra). "If fossil fuels are not burned at the levels described in the scenarios above, then the IWG's estimates of the SCC that they constitute the basis for are therefore wrong, unfounded, and nonsensical." Id. Thus, the IAMs take an implausible worst-case scenario—in fact, one that is not just implausible, but has already been falsified by recent events—and project that worst-case scenario 300 years into the future. Needless to say, this approach "continues to unrealistically increase damages" calculated using the "social cost" rubric. Id. 37. [EPA-HQ-OAR-2022-0829-0537, pp. 18-19]

Equilibrium Climate Sensitivity assumptions. Each IAM includes assumptions about "Equilibrium Climate Sensitivity" ("ECS") in its calculation of future climate damages. See 2021 TSD, at 2 ("The three IAMs were run suing a common set of input assumptions in each model for… equilibrium climate sensitivity (ECS) – a measure of globally averaged temperature response to increased atmospheric CO2 concentrations."). "The ECS is a distribution that probabilistically quantifies the earth's temperature response to a doubling of carbon dioxide concentrations. Simply put, it is one of the most fundamental measures within an IAM of CO2 impacts on climate. Other effects, such as sea-level rise, all depend on a reliable ECS." Ex. A, 39. [EPA-HQ-OAR-2022-0829-0537, pp. 18-19]

The IAMs used by the Working Group employ outdated ECS assumptions that date to 2007 and have been rendered obsolete by subsequent research. "All the TSDs … since … 2013," including the 2021 TSD, "have relied on the Roe & Baker article 'Why is Climate Sensitivity So Unpredictable' published in Science in October 2007." Id. 40. "[T]his [2007] distribution vastly overstates the probability of high-end global warming compared to more recent distributions." Id. [EPA-HQ-OAR-2022-0829-0537, pp. 18-19]

The Working Group, like EPA itself, admits that its assumptions are outdated on this point. It admits that "the versions of the three models used in the 2013 and 2016 TSDs," which the 2021 TSD nevertheless adopts, "do not reflect the tremendous increase in the scientific and economic understanding of climate-related damages that has occurred in the past decade." 2021 TSD, at 22. In fact, "[t]here are several newer and more up-to-date distributions suggested in the peer-reviewed literature, and many of those suggest lower probabilities of extreme global warming in response to CO2 concentrations." Ex. A, 41. In fact, using ECS assumptions current based on peer- reviewed research in 2015—which is "preferable to Roe Baker (2007) because its estimation controlled for observed ocean heat uptake efficiency, thus yielding an empirically constrained sensitivity distribution, id. 42—yields "a reduction of over 45% with respect to the IWG's estimates" for the DICE model, id. 44. Updating the ECS factor likewise yields "a reduction of over 80% with respect to the IWG's estimates" for the FUND model. Id. 45. [EPA-HQ-OAR-2022-0829-0537, pp. 18-19]

Agricultural benefits of warming. "Another policy assumption that is made by the IWG in its modeling choices is that it does not fairly account for agricultural benefits by increased CO2 concentration." Id. 47. "For example, it is a well-established fact that increases in CO2 concentration enhance plant growth by increasing their internal water use efficiency as well as raising the rate of net photosynthesis." Id. Thus, increasing temperature results in an increase in net agricultural productivity—a benefit of warming. Id. [EPA-HQ-OAR-2022-0829-0537, pp. 19-20]

Some models used by the Working Group, such as the DICE model, simply ignore the potential benefits of warming and do not include them in their calculations. "[T]he DICE model as utilized by the IWG explicitly presumes that only damages will result from more CO2 in the atmosphere." Id. 52. By contrast, "[t]he FUND model attempts to quantify these benefits, and when the benefits of CO2 emissions outweigh costs, the SCC is negative." Id. 48. For example, if one corrects the admittedly "outdated" ECS assumption with more current 2015 figures under the FUND model, accounting for the benefits of warming results in negative mean estimates for social costs in 2020, 2030, 2040, and 2050: "Using the empirically estimated Lewis and Curry distribution (2015), the mean estimate of the SCC is negative $1.10 in 2020, negative $1.01 in 2030, negative $0.82 in 2040, and negative $0.53 in 2050 in 2007 dollars." Id. So also, under the other models, "under reasonable updates to the agricultural productivity component, the mean SCC estimate may be zero or negative and that there are substantial probabilities of negative SCC under very reasonable assumptions." Id. 53. [EPA-HQ-OAR-2022-0829-0537, pp. 19-20]

A negative "social cost" means that emitting a metric ton of carbon dioxide is beneficial to society, and thus should be encouraged. See id. 54 ("One policy implication of a negative SCC is that the emission of an additional ton of a greenhouse gas should be encouraged, rather than avoided."). This result effectively discredits the IAMs as tools of rational policymaking: "The fact that, under very reasonable assumptions, the model can elicit SCC estimates of either sign [positive or negative] suggests that it is highly prone to user manipulation, and thus … the model is unreliable and should not be used by lawmakers and regulators." Id. 55. [EPA-HQ-OAR-2022-0829-0537, p. 20]

Global damages. The 2021 Working Group departed from recent practice by considering not just domestic harms, but global anticipated climate damages in its analysis. 2021 TSD, at 3. The decision to consider not just damages to the United States of America, but all other countries potentially impacted by climate change, is not a scientific decision—it is a political decision. In fact, the Working Group did not make this decision—in E.O. 13990, the President commanded it to consider global damages. See E.O. 13990, 86 Fed. Reg. 7040; 2021 TSD, at 3 (acknowledging that "[t]he IWG was tasked with" publishing estimates that "tak[e] global damages into account"). The Working Group concedes that this is a policy decision, involving considerations of "climate risk, environmental justice, and intergenerational equity." 2021 TSD, at 3. [EPA-HQ-OAR-2022-0829-0537, p. 20]

In doing so, the Working Group departed from black-letter Supreme Court law, without lawful justification. Unlike the Working Group—which claims to be constrained by no statute—the federal agencies that must rely on the Working Group's calculations in "regulations and other relevant agency actions," E.O. 13990, § 5(b)(ii)(A), 86 Fed. Reg. 7040, are exercising delegated authority from Congress, pursuant to statutory delegations of authority. There is a black-letter presumption applicable to each of those statutes, that they do not authorize the federal agency to consider global effects when calculating "social costs." When interpreting federal statutes, the Supreme Court has long recognized "the presumption against extraterritorial application," which provides that "when a statute gives no clear indication of an extraterritorial application, it has none." Kiobel v. Royal Dutch Petroleum Co., 569 U.S. 108, 115 (2013) (quoting Morrison v. National Australia Bank Ltd., 130 S.Ct. 2869, 2878 (2010)). This presumption reflects the "presumption that United States law governs domestically but does not rule the world." Id. (quoting Microsoft Corp. v. AT & T Corp., 550 U.S. 437, 454 (2007)). [EPA-HQ-OAR-2022-0829-0537, pp. 20-21]

The Working Group justified its decision to consider global damages, instead of domestic impacts, by arguing that "climate impacts occurring outside U.S. borders can directly and indirectly affect the welfare of U.S. citizens" through "spillover pathways." 2021 TSD, at 3. But that argument, if true, merely calls for the calculation of additional harms to domestic citizens and the domestic economy—it does not argue that “social costs” include harms to foreign citizens and nations. Arguing that domestic actors are harmed through foreign pathways is not the same as arguing that domestic cost-benefit analysis should consider harms to foreign actors. Absent a “clear indication” from Congress in the statute—and none is identified here—there is no statutory authorization to consider such effects. Kiobel, 569 U.S. at 115. [EPA-HQ-OAR-2022-0829-0537, pp. 20-21]

The 2021 TSD does not “likely underestimate” climate damages. Parroting the Interagency Working Group, see 2021 TSD, at 4, 31, 35, EPA suggests with scant analysis that the 2021 TSD’s “limitations suggest that these SCGHG estimates likely underestimate the damages from GHG emissions.” 88 Fed. Reg. 29,372. This ipse dixit is unsupportable. As discussed above, virtually every error in the Working Group’s analysis points in the same direction—toward overstating likely damages, not “underestimating” them. The selection of discount rates well below 7 percent massively inflates damage calculations. The adoption of a 300-year time horizon massively inflates damage calculations. The continued use of the obsolete 2007 ECS values massively inflates damage calculations. The complete disregard of countervailing benefits massively inflates damage calculations. The unlawful expansion of damages to include foreign as well as domestic anticipated harms massively inflates damage calculations. These errors are not randomly distributed. They all point in the same direction: jacking the calculation of costs upward. [EPA-HQ-OAR-2022-0829-0537, p. 21]

For all these reasons, the IAMs and their “social cost” calculations are inherently arbitrary, capricious, and unreliable. For very similar reasons, a federal agency has previously declined “to use ‘social cost of carbon’ analysis or a similar analytical tool to analyze the environmental impacts of greenhouse gas emissions from the construction and operation of the converted [natural gas] facilities.” EarthReports, Inc. v. Fed. Energy Regul. Comm’n, 828 F.3d 949, 956 (D.C. Cir. 2016). In that instance, the Federal Energy Regulatory Commission (FERC) rejected “social cost” calculations because of three factors: (1) “the lack of consensus on the appropriate discount rate leads to significant variation in output,” (2) the SCC “tool does not measure the actual incremental impacts of a project on the environment,” and (3) “there are no established criteria identifying the monetized values that are to be considered significant for NEPA purposes.” Id. (internal quotation marks omitted). FERC noted that “there is no standard methodology to determine how a project’s incremental contribution to [greenhouse gas emissions] would result in physical effects on the environment, either locally or globally.” Id. All these concerns remain true today. [EPA-HQ-OAR-2022-0829-0537, pp. 21-22]

Robert Pindyck, the MIT economist, writes that “an IAM-based analysis suggests a level of knowledge and precision that is nonexistent, and allows the modeler to obtain almost any desired result because key inputs can be chosen arbitrarily.” Robert S. Pindyck, Climate Change Policy: What do the Models Tell Us?, National Bureau of Economic Research Working Paper 19244, at 16 (2013), at https://www.nber.org/system/files/working_papers/w19244/w19244.pdf (emphasis added). The IAMs “have crucial flaws that make them close to useless as tools for policy analysis: certain inputs (e.g. the discount rate) are arbitrary, but have huge effects on the SCC estimates the models produce; the models’ descriptions of the impact of climate change are completely ad hoc, with no theoretical or empirical foundation; and the models can tell us nothing about the most important driver of the SCC, the possibility of a catastrophic climate outcome.” Id. at ii. “IAM-based analyses of climate policy create a perception of knowledge and precision, but that perception is illusory and misleading." Id. [EPA-HQ-OAR-2022-0829-0537, pp. 21-22]

The EPA should jettison its serial reliance on the so-called "interim estimates" for the "Social Cost of Greenhouse Gases" adopted by the unconstitutional Interagency Working Group in the 2021 TSD, as unlawful, unconstitutional, arbitrary, and capricious. [EPA-HQ-OAR-2022-0829-0537, pp. 21-22]

VIII. The proposed rule is arbitrary and capricious because it relies on non-final reports.

On at least two occasions, EPA identifies reports that are not yet final because they are undergoing peer review. [EPA-HQ-OAR-2022-0829-0537, p. 26]

First, EPA reports that it "commissioned a new full-vehicle teardown study" to compare manufacturing cost and assembly requirements between gas-powered and electric-powered vehicles. 88 Fed. Reg. 29,303. "The report was delivered to EPA in February 2023 and will undergo a contractor-managed peer review process to be completed by mid-2023." Id. EPA even plans to rely on the report for the final rule: "The results of this study will be used to inform the analysis for the final rulemaking where appropriate." Id. EPA later admits, "We hope to use this information in additional analytical discussions in the final rule." Id. at 29,391. [EPA-HQ-OAR-2022-0829-0537, p. 26]

Second, as discussed in Section IV, significant issues exist with EPA's current social cost of greenhouse gas methodology. However, EPA apparently is working on an update: "Most recently, EPA has developed a draft updated SC-GHG methodology within a sensitivity analysis in the regulatory impact analysis of EPA's November 2022 supplemental proposal for oil and gas standards that is currently undergoing external peer review and a public comment process." After it published the proposed rule, on May 11, 2023, EPA announced that it had received the peer review and was "taking the peer reviewers' recommendations under advisement."38 [EPA-HQ-OAR-2022-0829-0537, p. 26]

38 U.S. EPA, Peer Review of EPA's Draft 'Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances' Concludes, May 11, 2023, available at https://www.epa.gov/environmental- economics/scghg-tsd-peer-review.

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Social Cost of Carbon

As noted in the DRIA, there has been considerable progress in the state of science in valuation of the Social Cost of Carbon (SCC) since the Interim SCC values were developed based on the Interagency Working Group report in 2007. To better reflect this progress in its analysis, CARB recommends that U.S. EPA include a sensitivity analysis with the draft updated SC-GHG methodology that follows what was provided in U.S. EPA's November 2022 supplemental proposal for oil and gas standards. 78 The estimates from the draft updated SC-GHG methodology of the climate benefits of reducing emissions predict that the benefit per metric ton of CO2 (MTCO2) reduced is over 50 percent greater by 2030 ($51/MTCO2) and over 70 percent greater by 2050 ($84/MTCO2) than the interim values. 79 This shows the estimated net benefits of the proposal may be substantially more than the DRIA estimates. [EPA-HQ-OAR-2022-0829-0780, pp. 48-49]

78 U.S. EPA. Supplementary Material for the Regulatory Impact Analysis for the Supplemental Proposed Rulemaking. Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing sources: Oil and Natural Gas Sector Climate Review. September 2022. https://www.epa.gov/system/files/documents/2022-11/epa_scghg_report_draft_0.pdf

79 At a 2.5 percent discount rate.

Organization: California Attorney General's Office, et al.

Third, although the projected benefits through 2055 already outweigh the costs by an impressive degree, even these benefits are understated. As EPA recognizes, the social cost of greenhouse gases ("SC-GHG") metric does not fully capture the harms from climate change. 88 Fed. Reg. at 29,372. In recent comments on EPA's proposed GHG standards for heavy-duty vehicles, a group of states and cities (many of whom are signatories to this comment) set out several ways in which the SC-GHG metric significantly underestimates the climate benefits of reducing GHG emissions, particularly in terms of unquantified climate damages (such as wildfires and loss of cultural and historical resources) and its utilization of overly high discount rates. We attach those comments here for reference.190 Moreover, as EPA states, monetized benefits for reduced criteria and air toxics pollution are only a fraction of the total benefits, representing only the value attributable to reducing PM2.5. 88 Fed. Reg. at 29,372, 29,379-83. Although the Administrator did not rely on the exact size of the proposed standards' projected benefits or the amount by which they exceed projected costs, id. at 29,198, the public's understanding of the Proposal will benefit from EPA underscoring the degree to which projected benefits are underestimated, and projected costs overestimated. See CARB Comment at 69-74. [EPA-HQ-OAR-2022-0829-0746, p. 37]

190 Comments Of States and Cities Supporting EPA's Proposed Greenhouse Gas Emissions Standards For Heavy-Duty Vehicles—Phase 3 (Jun. 16, 2023), at 39-44, EPA-HQ-OAR-2022-0985-1423.

Organization: Clean Fuels Development Coalition et al.

D. The calculations of the social cost of carbon are incorrect.

The calculations of the social cost of carbon are incorrect or highly variable. See DRIA 10-14, 15, 16 ("The distribution of the SC-CO2 estimate reflects uncertainty in key model parameters such as the equilibrium climate sensitivity, as well as uncertainty in other parameters."). Social cost of carbon estimates are nothing new, but those used here are illegal. Relying on such estimates in the proposal exceeds EPA's statutory authority. [EPA-HQ-OAR-2022-0829-0712, p. 36]

Executive Order 13990 directs that agencies "shall use" the SC-GHG Esti mates "when monetizing the value of changes in greenhouse gas emissions resulting from regulations and other relevant agency actions." 86 Fed. Reg. 7,037, 7,040 (Jan. 25, 2021). Consistent with this order, the Biden Administration has been applying the SC-GHG estimates throughout its rulemakings, often to large effect. But the proposal—or indeed any other action undertaken by the Biden Administration—provides no statutory authority for its estimates. Further, these estimates, which are made binding through the dozens of rulemakings and adjudications they are incorporated in, have never undergone notice and comment rulemaking procedure. Because such estimates were made without statutory authority and in violation of the Administrative Procedure

Act, their incorporation into the proposal would be unlawful. [EPA-HQ-OAR-2022-0829-0712, p. 36]

Organization: Delek US Holdings, Inc.

IV. The Proposed Rule Overstates the Benefits of Transitioning to BEVs

The economic benefits of EPA's proposal are based on the flawed, inflated interim social cost of three greenhouse gas estimates (carbon, methane, and nitrous oxide) or "SC- GHGs," including estimates of the "social cost of carbon" or "SCC."24 EPA should refrain from relying on the Interagency Working Group's ("IWG") SC-GHGs Interim Estimates, which suffer from major procedural defects.25 The interim estimates are not the product of a full and legally adequate administrative process, including a robust and independent peer review. While the administration provided an opportunity for public comment on the SC-GHGs in 2021, the interim estimates EPA relies upon in the Proposed Rule were released without any prior notice or public comment period.26 [EPA-HQ-OAR-2022-0829-0527, p. 6]

24 Proposed Rule at 29,371–72 (citing the February 2021 Technical Support Document (TSD): Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under E.O. 13990 (Interagency Working Group on the Social Cost of Greenhouse Gases ("IWG"))).

25 Id.

26 Off. of Mgmt. & Budget, Notice of Availability and Request for Comment on the "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990," 86 Fed. Reg. 24,669 (May 7, 2021).

Further, the interim estimates failed to account for the recommendations of the National Academies of Sciences, Engineering, and Medicine ("NAS"), which called for a new IWG framework and changes to the methodologies used to calculate the underlying SCC estimates.27 Consideration of the recommendations of the NAS is critical for any robust social cost analysis—and is in fact mandated by President Biden's Executive Order 13990 that directed the IWG to develop interim SC-GHG estimates.28 [EPA-HQ-OAR-2022-0829-0527, p. 6]

27 National Academies of Sciences, Engineering, and Medicine. 2017. Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide. Washington, DC: The National Academies Press.

28 Exec. Order 13990 of Jan. 20, 2021, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, 86 Fed. Reg. 7,037, 7,041 (Jan. 25, 2021) (Sec. 5 (iii) Methodology states: "In carrying out its activities, the Working Group shall consider the recommendations of the National Academies of Science, Engineering, and Medicine as reported in Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide (2017)."

The interim estimates also conflict with longstanding White House Office of Management and Budget ("OMB") guidance on information quality, which requires rigorous independent peer review and heightened transparency for such "influential scientific information" as the SC-GHG estimates.29 For these and other reasons, EPA should not rely upon the interim SC-GHG estimates in this rulemaking. [EPA-HQ-OAR-2022-0829-0527, p. 6]

29 Off. of Mgmt. & Budget, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies, 67 Fed. Reg. 8,452 (Feb. 22, 2002); Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Pub. L. No. 106-554.

Here, EPA's reliance on these SC-GHG estimates result in overstated benefits in terms of potential GHG emissions reductions achieved domestically while ignoring the increased GHG emissions elsewhere and how those global GHG emissions are distributed amongst a domestic ZEV fleet. [EPA-HQ-OAR-2022-0829-0527, pp. 6-7]

Organization: Energy Innovation

I. The U.S. must transition LDVs and MDVs to zero-emission technologies [i] quickly to reduce their emissions, which contribute to climate change and air pollution—both of which endanger public health and welfare. Adoption of the most stringent tailpipe standards for new vehicles is the most effective tool to achieve this goal. [EPA-HQ-OAR-2022-0829-0561, pp. 1-2]

i This includes technologies that eliminate tailpipe GHG emissions and other pollutants, namely battery electric vehicles for LDVs and MDVs.

Organization: Institute for Policy Integrity at NYU School of Law et al.

The Proposed Rule appropriately applies the climate-damage estimates from the Interagency Working Group on the Social Cost of Greenhouse Gases (Working Group) and rejects the faulty numbers that EPA applied from 2017 until early 2021. The Working Group developed its climate-damage estimates through a rigorous and transparent process incorporating the best available science available at the time. Those values—though widely agreed to underestimate the full social costs of greenhouse gas emissions4—are appropriate to use for now as conservative underestimates. They have been applied in dozens of previous rulemakings5 and upheld in federal court.6 In contrast, the estimates that EPA applied during the Trump administration disregarded the best available science and their use was deemed arbitrary and capricious by a federal court.7 [EPA-HQ-OAR-2022-0829-0743, p. 1]

4 Interagency Working Group on the Social Cost of Greenhouse Gases, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide – Interim Estimates Under Executive Order 13,990 at 4 (2021) [hereinafter "2021 TSD"] (acknowledging that current social cost valuations "likely underestimate societal damages from [greenhouse gas] emissions"). Richard L. Revesz et al., Global Warming: Improve Economic Models of Climate Change, 508 NATURE 173 (2014) (explaining that the Working Group's values, though methodically rigorous and highly useful, are very likely underestimates) (co-authored with Nobel Prize-winning economist Kenneth Arrow).

5 Peter Howard & Jason A. Schwartz, Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon, 42 COLUM. J. ENV'T L. 203, 270–84 (2017) (listing all uses through mid-2016).

6 Zero Zone v. Dept. of Energy, 832 F.3d 654, 679 (7th Cir. 2016).

7 California v. Bernhardt, 472 F. Supp. 3d 573, 613 (N.D. Cal. 2020).

EPA provides compelling justifications for readopting the Working Group's climate-damage estimates,8 and in fact many additional justifications support this choice. In particular, further justifications support EPA's decision to adopt a global damages valuation and the range of discount rates it applies to climate effects. As detailed herein, there are many additional legal, economic, and policy justifications for such methodological decisions that further bolster EPA's support for these choices. [EPA-HQ-OAR-2022-0829-0743, pp. 1-2]

8 Proposed Rule, 88 Fed. Reg. at 29,371–72; RIA at 10-8 to 10-13.

While the Working Group's climate-damage valuations represent a marked improvement over the arbitrary values that EPA adopted during the Trump administration, they remain underestimates. In November 2022, EPA released a draft update to the social cost of greenhouse gases that faithfully implements the roadmap laid out in 2017 by the National Academies of Sciences and applies recent advances in the science and economics on the costs of climate change (Draft SC-GHG Update).9 These updated valuations more robustly capture the incremental benefits of reducing greenhouse gas emissions and further confirm that the Working Group's climate-damage values represent conservative underestimates. [EPA-HQ-OAR-2022-0829-0743, pp. 1-2]

9 EPA External Review Draft of Report on the Social Cost of Greenhouse Gases (Sept. 2022) (Docket No. EPA- HQ-OAR-2021-0317) ("Draft SC-GHG Update").

These comments are organized into four sections. Section I offers additional justification for adopting a global framework for valuing climate impacts. These include legal justifications based on the Clean Air Act, the National Environmental Policy Act's broad government-wide policy mandates, the Administrative Procedure Act's requirement to consider all important factors, and executive orders and international agreements. This section also provides extensive regulatory precedent outside the climate context supporting EPA's global approach, including the Office of Management and Budget's (OMB) draft update to Circular A-4 (Draft Circular A-4 Update).10 [EPA-HQ-OAR-2022-0829-0743, p. 2]

10 OFF. OF MGMT. & BUDGET, CIRCULAR A-4: DRAFT FOR PUBLIC REVIEW 9–11 (Apr. 6, 2023) ("Draft Circular A-4 Update").

Section II offers additional justification for adopting the range of discount rates endorsed by the Working Group and for declining to apply a 7% capital-based discount rate for climate impacts. In particular, this section provides additional justification for combining climate effects discounted at an appropriate consumption-based rate with other costs and benefits discounted at a capital-based rate. Besides climate effects presenting special legal, economic, and policy considerations for the discount rate, it is appropriate generally for EPA to focus its analysis of this rule on consumption-based rates given that most costs and benefits are projected to fall to consumption rather than to capital investments. This is also confirmed by the Draft Circular A-4 Update.11 [EPA-HQ-OAR-2022-0829-0743, p. 2]

11 Id. at 78–80.

Section III offers extensive justification for relying on the Working Group's other methodological choices, including the fact that the Working Group applied a transparent and rigorous process that relied upon the best-available and most widely-cited models for monetizing climate damages that existed at the time of their development. This section also provides detailed rebuttals to criticisms of the Working Group's methodology from opponents of climate regulation. [EPA-HQ-OAR-2022-0829-0743, pp. 2-3]

Finally, Section IV recommends that EPA apply the revised climate-damage valuations from the Draft SC-GHG Update—either in sensitivity analysis or as part of the main analysis if this regulation is finalized after the Draft SC-GHG Update is finalized. This section also suggests that EPA conduct additional analysis using the updated approach to discounting in the Draft Circular A-4 Update. The section provides modeling results showing a substantial increase under this approach in net benefits for the proposed program and its alternatives. [EPA-HQ-OAR-2022-0829-0743, pp. 2-3]

I. Extensive Justification Supports EPA's Reliance on Global Climate Damage Valuations

In the Proposed Rule, EPA appropriately focuses on a global estimate of climate benefits, continuing its historical approach and once again rejecting its temporary and arbitrary practice during the Trump administration of disregarding all climate effects that occur outside the physical borders of the United States. While EPA offers persuasive justifications for this decision, many additional justifications—some of which EPA itself provides in the Draft SC-GHG Update12—further support this approach.13 In particular, EPA could emphasize the concern for the impacts of U.S. pollution on foreign welfare in the Clean Air Act and other sources of law, further highlight the significance of U.S. strategic interests and reciprocity, further emphasize the importance of extraterritorial impacts and spillovers, and highlight the inconsistency that would occur if the agency considered only domestic benefits while focusing on global costs. [EPA-HQ-OAR-2022-0829-0743, p. 3]

12 Draft SC-GHG Update, supra note 9, at 10–15.

13 See generally Jason A. Schwartz, Inst. for Pol'y Integrity, Strategically Estimating Climate Pollution Costs in a Global Environment (2021), https://policyintegrity.org/files/publications/Strategically_Estimating_Climate_Pollution_Costs_in_a_Global_Envir onment.pdf.

A. Relevant Statutes and Executive Orders Compel, and Certainly Permit, a Global Perspective on Climate Damages

The Clean Air Act, National Environmental Policy Act, Administrative Procedure Act, and other key sources of law not only permit, but in fact require, EPA to consider international effects. EPA should highlight these legal requirements as justification for its focus on global climate impacts. [EPA-HQ-OAR-2022-0829-0743, pp. 3-4]

Section 202 of the Clean Air Act, under which EPA issues the Proposed Rule, charges EPA with regulating "air pollutant[s] which may be reasonably anticipated to endanger public health or welfare,"14 where "welfare" is defined to include "effects on . . . weather . . . and climate."15 When interpreting Section 202, the Supreme Court found "there is nothing counterintuitive to the notion that EPA can curtail the emission of substances that are putting the global climate out of kilter."16 And when industry challenged another EPA climate program under Title I of the Clean Air Act by arguing that the statute "was concerned about local, not global effects," the U.S. Court of Appeals for the D.C. Circuit had "little trouble disposing of Industry Petitioners' argument that the [Clean Air Act's prevention of significant deterioration] program is specifically focused solely on localized air pollution," finding instead that the statute was "meant to address a much broader range of harms," including "precisely the types of harms caused by greenhouse gases."17 [EPA-HQ-OAR-2022-0829-0743, pp. 3-4]

14 42 U.S.C. § 7521(a)(1).

15 42 U.S.C. § 7602(h); Massachusetts v. EPA, 127 S. Ct. 1438, 1447 (2007).

16 Massachusetts, 127 S. Ct. at 1461 (emphasis added). This case concerned Section 202 of the Clean Air Act, which similarly permits EPA to regulate "any air pollutant . . . which may reasonably be anticipated to endanger public health or welfare." Id. at 1454 (quoting 42 U.S.C. § 7521(a)(1)).

17 Coalition for Responsible Regulation v. EPA, 684 F.3d 102, 137-38 (D.C. Cir. 2012), aff'd in part, rev'd in part sub nom. Util. Air Regulatory Grp. v. EPA, 134 S. Ct. 2427 (2014).

And under the Administrative Procedure Act, it is arbitrary and capricious for agencies to "entirely fail[] to consider an important aspect of the problem"30—an obligation that a federal court held requires federal agencies to consider transboundary climate impacts. Specifically, a recent ruling from the U.S. Court for the Northern District of California struck down as arbitrary the Bureau of Land Management's (BLM) rescission of the Waste Prevention Rule in part because the agency had abandoned the Working Group's peer-reviewed, global estimates of the social cost of greenhouse gases in favor of flawed estimates (the same estimates that EPA applied under the Trump administration) that looked narrowly at effects within the U.S. borders.31 The court found that the global values developed by the Working Group reflected "the best available science about monetizing the impacts of greenhouse gas emissions,"32 whereas "focusing solely on domestic effects has been soundly rejected by economists as improper and unsupported by science."33 The court reminded BLM that relevant executive orders, including Executive Order 12,866, require consideration of "all" costs and benefits, based on the "best reasonably obtainable scientific, technical, economic, and other information," and concluded that "no[] . . . regulatory rules or orders require exclusion of global impacts."34 [EPA-HQ-OAR-2022-0829-0743, pp. 5-6]

30 Motor Vehicle Manufacturers Ass'n v. State Farm Mutual Auto. Ins. Co., 463 U.S. 29, 41–43 (1983).

31 Bernhardt, 472 F. Supp. 3d at 613.

32 Id. at 611.

33 Id. at 613.

34 Id. at 611–12 (internal quotation marks omitted).

More recently, Executive Order 13,990 instructs agencies to "tak[e] global damages into account," because "[d]oing so facilitates sound decision-making, recognizes the breadth of climate impacts, and support the international leadership of the United States on climate issues."35 This language again reinforces the instructions from NEPA that, whenever not precluded by statute from doing so, agencies should account for the environmental impacts of their actions on foreign nations and global commons. [EPA-HQ-OAR-2022-0829-0743, p. 6]

35 Exec. Order No. 13,990 § 5(a), 86 Fed. Reg. 7037, 7040 (Jan. 20, 2021).

EPA should draw upon these legal authorities in justifying its reliance on global climate-damage valuations. [EPA-HQ-OAR-2022-0829-0743, p. 6]

The Biden Administration has made such a strategic choice, to adopt a global valuation of climate damages as part of its diplomatic strategy. Executive Order 13,990 unequivocally states that "[i]t is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account . . . [to] support the international leadership of the United States on climate issues."41 The Order later elaborates: "Our domestic efforts must go hand in hand with U.S. diplomatic engagement. Because most greenhouse gas emissions originate beyond our borders, such engagement is more necessary and urgent than ever. The United States must be in a position to exercise vigorous climate leadership to achieve a significant increase in global climate action and put the world on a sustainable climate pathway."42 [EPA-HQ-OAR-2022-0829-0743, p. 7]

41 Exec. Order No 13,990 § 5(a).

42 Id. § 6(d). Though this subsection takes action on the Keystone XL Pipeline permit, its statement of diplomatic goals has much broader relevance.

The current Circular A-4 requires agencies to count all significant costs and benefits, including "use" values as well as "non-use" values like bequest and existence values.74 Circular A-4 cautions that "ignoring these values" may cause analyses to "significantly understate the benefits and/or costs" involved.75 Similarly, Circular A-4 recognizes that U.S. citizens may have "altruism for the health and welfare of others," and instructs agencies that when "there is evidence of selective altruism, it needs to be considered specifically in both benefits and costs."76 U.S. citizens will experience costs because of their use values, non-use values, and altruistic values attached to climate effects occurring outside the U.S. borders. [EPA-HQ-OAR-2022-0829-0743, p. 12]

74 A bequest value captures willingness to pay to preserve a resource for a future generation. Existence value captures willingness to pay to preserve a resource even with no intention to ever use or bequeath the resource. Off. of Mgmt. & Budget, Circular A-4: Regulatory Analysis 22 (2003).

75 Id.

76 Id.

Such non-use and altruistic values take many forms. For one, the United States and its citizens have a willingness to pay—as well as a legal obligation—to protect the global commons of the oceans and Antarctica from climate damage. Furthermore, a quarter of the U.S. population consists of either foreign-born immigrants or second-generation residents,77 and subsequent generations of Americans retain significant familial, cultural, economic, and religious ties to their ancestors' home nations across the world.78 U.S. citizens and residents have a significant willingness to pay to protect their relatives, ancestral homes, and cultural and religious sites located abroad.79 Similarly, U.S. citizens value natural resources and plant and animal lives abroad—even if they never see or use those resources—and care about the health and welfare of unrelated foreign citizens80 and cultural and world heritage sites threatened by climate change.81 This altruism is "selective altruism," consistent with Circular A-4, because the United States is directly responsible for a huge amount of the historic emissions contributing to climate change.82 [EPA-HQ-OAR-2022-0829-0743, pp. 12-13]

77 U.S. Census Bureau, Characteristics of the U.S. Population by Generational Status: 2013 at 3 (2016), https://perma.cc/AS3H-BCWK; see also Pew Res. Ctr., First- and second-generation share of the population, 1900- 2017, June 3, 2019, https://perma.cc/Y9WT-75R4 (showing a growing percentage in recent years); see also Pew Res. Ctr., Key Findings About U.S. Immigration, Aug. 20, 2020, https://perma.cc/8JEK-Y88S (showing that 77% of the U.S. foreign-born population are naturalized U.S. citizens or permanent/temporary U.S. residents).

78 Over $100 billion is sent from the United States to other countries in remittances every year. See Pew Res. Ctr., Remittance Flows Worldwide in 2017, Apr. 3, 2019, https://perma.cc/D684-7ZA8.

79 Many cultural sites are located near water because of how civilization developed, Yu Fang & James W. Jawitz, The evolution of human population distance to water in the USA from 1790 to 2010, 10 NATURE COMMUNICATIONS 1 (2019), and so such sites may be especially vulnerable to climate change, see Lee

Bosher et al., Dealing with multiple hazards and threats on cultural heritage sites: an assessment of 80 case studies, 29 DISASTER PREVENTION AND MANAGEMENT: AN INTERNATIONAL JOURNAL 109 (2019). More broadly, there are clear cultural costs of climate change, W. Neil Adger et al., Cultural dimensions of climate change impacts and adaptation, 3 NATURE CLIMATE CHANGE 112 (2013), and a willingness to pay to protect culture, Ali Ardeshiri et al., Conservation or Deterioration in Heritage Sites? Estimating Willingness To Pay for Preservation (Working Paper, 2019).

80 See Arden Rowell, Foreign Impacts and Climate Change, 39 HARV. ENV'T L. REV. 371 (2015); Dana, supra note 71 (discussing U.S. charitable giving abroad and foreign aid, and how those metrics likely severely underestimate true U.S. willingness to pay to protect foreign welfare).

81 See UNESCO, Climate Change Now Top Threat to Natural World Heritage, Dec. 2, 2020, https://perma.cc/K9SW-XQDM.

82 Datablog, A History of CO2 Emissions, THE GUARDIAN (Sept. 2, 2009) (from 1900-2004, the United States emitted 314,772.1 million metric tons of carbon dioxide; Russia and China follow, with only around 89,000 million metric tons each).

Indeed, OMB's Draft Circular A-4 Update is even more explicit than the current guidance on the need to consider direct and indirect transboundary impacts on U.S. citizens. As the Draft Circular A-4 Update explains, effects that occur entirely outside the United States are relevant to consider in a regulatory impact analysis "when they affect U.S. citizens and residents, such as effects experienced by citizens residing abroad"; when "assessing effects on noncitizens residing abroad provides a useful proxy for effects on U.S. citizens and residents that are difficult to otherwise estimate"; and when "assessing effects on noncitizens residing abroad provides a useful proxy for effects on U.S. national interests that are not otherwise fully captured by effects experienced by particular U.S. citizens and residents."83 [EPA-HQ-OAR-2022-0829-0743, p. 13]

83 Draft Circular A-4 Update, supra note 10, at 9–10.

C. Focusing on Global Climate Damages Is Consistent With EPA's Consideration of Global Costs

EPA can further justify its focus on global climate benefits as necessary for consistency with the rest of its analysis. To begin, EPA treated monopsony impacts as an international transfer payment, rather than as potential benefits to U.S. consumers at the expense of foreign oil producers.84 As Circular A-4 suggests, an analysis adopts a global rather than U.S.-centered perspective when it treats such international flows as transfers rather than as costs or benefits.85 EPA's global perspective on monopsony effects is consistent with it adopting a global perspective on climate effects. [EPA-HQ-OAR-2022-0829-0743, pp. 13-14]

84 RIA at 11-27; 86 Fed. Reg. at 43,792.

85 Circular A-4 at 38 (stating that if "the analysis is conducted from the United States perspective," then "transfers from the United States to other nations should be included as costs, and transfers from other nations to the United States as benefits").

More broadly, EPA's analysis implicitly takes a global perspective on compliance costs, and so—as OMB's Draft Circular A-4 Update emphasizes86—it would be arbitrary not to similarly take a global perspective on climate effects. All industry compliance costs ultimately fall on the owners, employees, or customers of regulated and affected firms. Whether the Proposed Rule's compliance costs are passed to consumers or investors, or some combination thereof, a significant portion of the Proposed Rule's alleged compliance costs will ultimately accrue to foreign customers or foreign investors. Regulated manufacturers include major corporations that are headquartered abroad: In fact, many of the country's largest automakers— Toyota, BMW, Nissan, Mercedes, Stellantis (Fiat Chrysler), Volkswagen, and others—are headquartered abroad. The rule's compliance costs will therefore fall partly on foreign actors, but EPA did not break out these "global" costs separately from "domestic" costs. [EPA-HQ-OAR-2022-0829-0743, pp. 13-14]

86 Id. at 10 ("You should be consistent in your treatment of noncitizens residing abroad in your benefit and cost estimates. If you include some effects experienced by such noncitizens in your primary analysis, consistency generally requires also including countervailing effects on similar noncitizens in your primary analysis. For example, if benefits that are experienced by noncitizens residing abroad are included in your analysis, compliance costs borne by noncitizens residing abroad should generally be included in your analysis as well, and vice versa.").

Furthermore, even the domestically-based automakers regulated under this rule are publicly traded with investors across the globe. In general, about 29% of U.S. corporate debt and 14% of equities are foreign-owned,87 and adding foreign direct investment to portfolio stock ownership suggests that foreigners own about 40% of U.S. corporate equity.88 Thus, a significant share of the Proposed Rule's compliance costs are likely to fall on foreign entities, but EPA never distinguishes between those costs that would accrue to foreign entities as opposed to U.S. citizens or U.S. entities. Thus, the agency's calculations of cost implicitly include all global effects. Considering global climate benefits is consistent with that approach. [EPA-HQ-OAR-2022-0829-0743, p. 14]

87 Dept. of Treasury et al., Foreign Portfolio Holdings of U.S. Securities at B-3 (2020), https://perma.cc/6VP6- PPG6.

88 Steve Rosenthal & Theo Burke, Who's Left to Tax? U.S. Taxation of Corporations and Their Shareholders at 2 (Urban-Brookings Tax Policy Center Working Paper, 2020), https://perma.cc/YMR2-XREM.

In a few recent analyses, agencies including EPA have admitted that some portion of the costs or cost savings calculated for publicly-traded corporations will "accru[e] to entities outside U.S. borders" through foreign ownership, employment, or consumption.89 Yet much like in the Proposed Rule, these analyses do not attempt to separate such effects to foreign interests, nor attempt to exclude such effects from consideration altogether. Indeed, splitting corporate effects into subparts based on ultimate ownership—much like separating climate benefits geographically—could be extremely complicated.90 Thus, as a practical matter, agencies typically count all costs or benefits to corporations, no matter how those effects may be passed through to foreign owners, foreign employees, or foreign customers. As the Draft Circular A-4 Update explains, this practice requires consistent treatment for benefits.91 [EPA-HQ-OAR-2022-0829-0743, p. 14]

89 See, e.g., EPA, Regulatory Impact Analysis for the Proposed Reconsideration of the Oil and Natural Gas Sector Emission Standards for New, Reconstructed, and Modified Sources at 3-13 (2018); EPA, Regulatory Impact Analysis for the Proposed Revised Cross-State Air Pollution Rule (CSAPR) Update for the 2008 Ozone NAAQS at 5-5 (2020).

90 See, e.g., EPA, Draft Guidelines for Preparing Economic Analyses: Review Copy prepare for EPA's Science Advisory Board at 5-2 (2020), https://perma.cc/3K86-M7AH ("Limiting standing to citizens and residents of the United States can be complicated to operationalize in practical terms (e.g., how should multi-national firms with plants in the United States but shareholders elsewhere be treated?).").

91 Draft Circular A-4 Update, supra note 10, at 10.

Since EPA analyzes the Proposed Rule's costs globally—without distinguishing between U.S. and foreign effects—it would be inconsistent and arbitrary for the agency to attempt to separate and disregard climate benefits that occur abroad, as doing so would "put a thumb on the scale" by treating costs globally but benefits domestically.92 EPA can therefore highlight its consistent treatment of costs and benefits as further justification for assessing climate damages from a global perspective. [EPA-HQ-OAR-2022-0829-0743, pp. 14-15]

92 Ctr. for Biological Diversity, 538 F.3d at 1198.

D. Considering Extraterritorial Climate Effects Is Consistent With Administrative Precedent Outside the Climate Context

While EPA offers extensive justification for its focus on global damage estimates, it can provide additional regulatory precedent supporting that approach. Agencies often consider the extraterritorial effects of their actions—including effects on international reciprocity, international cooperation, and transboundary spillovers—when administering their statutory authority. And on numerous occasions, courts have endorsed this practice. Indeed, as the Supreme Court has acknowledged, agency decisions "are routinely informed by . . . foreign relations and national security concerns."93 [EPA-HQ-OAR-2022-0829-0743, p. 15]

93 Dep't of Com. v. New York, 139 S. Ct. 2551, 2573 (2019).

For one, as noted above, the National Environmental Policy Act (NEPA) requires agencies to administer and interpret the nation's law to "recognize the worldwide and long-range character of environmental problems" and to "lend appropriate support" to help "maximize international cooperation."94 Numerous court decisions—including one from the U.S. Court of Appeals for the D.C. Circuit—have held that reasonably foreseeable transboundary effects must appear in NEPA analyses.95 And consistent with those decisions, agencies have assessed transboundary impacts under NEPA for over 40 years under Executive Order 12,114, which instructs agencies to "take into consideration in making decisions" effects of their actions on the "environment of a foreign nation" and "the global commons."96 EPA's consideration of extraterritorial environmental impacts is thus consistent with decades of agency practice. [EPA-HQ-OAR-2022-0829-0743, p. 15]

94 42 U.S.C. § 4332(2)(I) (cited at Draft SC-GHG Update, supra note 9, at 15 n.37, as § 4332(2)(F)).

95 E.g. Env't Def. Fund, Inc. v. Massey, 986 F.2d 528 (D.C. Cir. 1993); Gov't of Man. v. Salazar, 691 F. Supp. 2d 37, 51 (D.D.C. 2010).

96 See Exec. Order No. 12,114 § 2–3, 44 Fed. Reg. 1957 (Jan. 4, 1979).

Executive Order 13,990 instructs agencies to ensure that the social cost of greenhouse gas values adequately account for "intergenerational equity."138 A 7% rate ignores much of future generations' welfare and so would be inconsistent with that mandate. Notably, even when using high discount rates for climate damages in 2020, EPA explained that the 7% capital rate did not adequately account for "tradeoffs between improving the welfare of current and future generations."139 Accordingly, EPA's decision not to apply that discount rate for assessing climate damages is entirely justified. [EPA-HQ-OAR-2022-0829-0743, p. 20]

138 Exec. Order § 13,990 5(b)(ii)(E).

139 85 Fed. Reg. at 24,735 (explaining that the central analysis focused on a 3% rate, and the 7% rate was used only for sensitivity analysis).

B. Focusing on Global Climate Damages Furthers U.S. Strategic Interests by Facilitating Reciprocity, Mitigating International Spillover Effects, and Protecting U.S. Extraterritorial Interests

EPA explains in both the regulatory impact analysis36 and the Draft SC-GHG Update37 that it is appropriate to value climate damages on a global scale because climate impacts occurring outside U.S. borders can directly and indirectly affect U.S. welfare through spillovers and foreign reciprocity. Indeed, the theory and evidence for reciprocity on their own justify a focus on the full global values, and additional strategic and practical justifications provide further support for EPA's approach. [EPA-HQ-OAR-2022-0829-0743, p. 6]

36 RIA at 10-11.

37 Draft SC-GHG Update, supra note 9, at 10–15.

1. Use of the Global Values Facilitates International Reciprocity

Because the world's climate is a single interconnected system, the United States benefits greatly when foreign countries consider the global externalities of their greenhouse gas pollution and cut emissions accordingly. It therefore promotes the strategic interests of the United States to encourage all other countries to think globally in setting their climate policies. The United States can advance this objective by itself adopting the full global social cost of greenhouse gases—as numerous leading climate economists and experts have explained.38 Indeed, basic economic principles demonstrate that the United States stands to benefit greatly if all countries apply global social cost of greenhouse gas values in their regulatory decisions and project reviews39—likely trillions of dollars in direct benefits from foreign action to combat climate change.40 [EPA-HQ-OAR-2022-0829-0743, pp. 6-7]

38 Most generally, it is individually rational for a country to fully internalize the global social cost of greenhouse gases "if a country expects a decrease in its own emissions to decrease that of all others in proportion to the ratio of its external cost of emissions to its internal costs." Matthew J. Kotchen, Which Social Cost of Carbon? A Theoretical Perspective, 5 J. ASSOC. ENV'T & RES. ECON. 673, 683 (2017). Other economists have justified use of the global social cost estimates on more intuitive grounds. See, e.g., Tamma Carleton & Michael Greenstone, Updating the United States Government's Social Cost of Carbon at 26-27 (Becker Friedman Institute Working Paper 2021-04, Jan. 2021), https://perma.cc/H9EU-XWBX ("The global SCC . . . is an ingredient in efforts to procure the necessary international action. . . . Even if policymakers decide that the effects of regulations on U.S. citizens are what matter (in terms of both law and policy), it would make sense to use the global measure, as it would protect U.S. citizens against a range of adverse effects from unmitigated climate change."); William Pizer et al., Using and Improving the Social Cost of Carbon, 346 SCIENCE 1189, 1190 (2014) (explaining that the "potential to leverage foreign mitigation," combined with moral, ethical, and security issues, provide "compelling reasons to focus on a global SCC but, more important, to make a strategic choice."); Robert S. Pindyck, Comments on Proposed Rule and Regulatory Impact Analysis on the Delay and Suspension of Certain Requirements for Waste Prevention and Resource Conservation, Nov. 6, 2017, https://perma.cc/HG8Q-MT6H ("[W]hat treatment of international damages is in the United States' self-interest? . . . The simplest answer is to find the value of the [social cost of carbon] that maximizes global welfare. I continue to think that the global value is the appropriate provisional value for use as research on this topic continues.").

39 See Kotchen, supra note 38, at 678 (providing formulas for the "efficiency argument in support of all countries internalizing the GSCC [global social cost of carbon] for domestic policy").

40 Inst. for Pol'y Integrity, Foreign Action, Domestic Windfall: The U.S. Economy Stands to Gain Trillions from Foreign Climate Action (2015), https://perma.cc/T3WN-H42U.

The Biden Administration has made such a strategic choice, to adopt a global valuation of climate damages as part of its diplomatic strategy. Executive Order 13,990 unequivocally states that "[i]t is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account . . . [to] support the international leadership of the United States on climate issues."41 The Order later elaborates: "Our domestic efforts must go hand in hand with U.S. diplomatic engagement. Because most greenhouse gas emissions originate beyond our borders, such engagement is more necessary and urgent than ever. The United States must be in a position to exercise vigorous climate leadership to achieve a significant increase in global climate action and put the world on a sustainable climate pathway."42 [EPA-HQ-OAR-2022-0829-0743, p. 7]

41 Exec. Order No 13,990 § 5(a).

42 Id. § 6(d). Though this subsection takes action on the Keystone XL Pipeline permit, its statement of diplomatic goals has much broader relevance.

There is already evidence that the U.S. strategy of combining its domestic efforts— including the global valuation of climate damages—with its diplomatic engagement is spurring foreign reciprocity. As EPA explained in the Draft SC-GHG Update, "[m]any countries and international institutions have either already explicitly adapted the IWG's estimates of global damages in their domestic analyses . . . [or] developed their own estimates of global damages" following the U.S. approach.43 Earlier this year, in fact, Canada adopted the climate-damage valuations from EPA's Draft SC-GHG Update as its official estimates.44 [EPA-HQ-OAR-2022-0829-0743, p. 7]

43 Draft SC-GHG Update, supra note 9, at 14.

44 Social Cost of Greenhouse Gas Emissions, Government of Canada (last modified Apr. 20, 2023), https://www.canada.ca/en/environment-climate-change/services/climate-change/science-research-data/social-cost- ghg.html.

In January 2021, Trevor Houser and Kate Larsen published a conservative estimate of the number of tons of greenhouse gases that the rest of the world had committed to reduce for each ton that the United States has pledged to reduce: a figure they call the "Climate Reciprocity Ratio."49 Using only the quantifiable, unconditional pledges that 51 countries had made since 2014 to cut emissions through 2030, Houser and Larsen conservatively estimate that for every ton the United States pledged to reduce, these other countries had collectively pledged to reduce 6.1–6.8 tons in return.50 While implementation of all these foreign policies is not guaranteed, and while these estimates reflect pledges that may now be outdated, Houser and Larsen cite evidence that several large emitters are on track to meet their goals, and that the ratio should grow over time as the U.S. share of global emissions falls.51 [EPA-HQ-OAR-2022-0829-0743, pp. 8-9]

49 Trevor Houser & Kate Larsen, Rhodium Grp., Calculating the Climate Reciprocity Ratio for the U.S. (2021), https://perma.cc/7MJ8-DN23 (calling their estimate "deliberately conservative").

50 The estimate is conservative because it omits any conditional pledges, any pledges that are not readily quantified into specific reductions, any actions from countries that have not formally submitted Nationally Determined Contributions to the United Nations, any reductions occurring after 2030, and any foreign actions already achieved before 2014 that may have motivated U.S. pledges in the first place. Id.

51 Id.

In short, both empirical evidence and economic theory strongly support a strategic choice for U.S. agencies to adopt the full global estimates of the social cost of greenhouse gases, as this facilitates international reductions in greenhouse gas pollution that directly benefits the United States. Notably, OMB's Draft Circular A-4 Update specifically recognizes that "the potential for inducing strategic reciprocity or other policy changes from actors abroad" offers a basis for considering regulatory impacts on a global basis.52 Accordingly, EPA should provide evidence of foreign reciprocity to further support its focus on the full global valuations of the social cost of greenhouse gases. [EPA-HQ-OAR-2022-0829-0743, pp. 8-9]

52 Draft Circular A-4 Update, supra note 10, at 9.

Experts on the social cost of greenhouse gases have therefore concluded that, because the integrated assessment models that underlie the Working Group's social cost valuations currently do not capture many of these key inter-regional costs, the use of the global values can be further justified as a proxy for capturing all spillover effects.67 Though not all climate damages will spill back to affect the United States, many will, and together with other justifications, the likelihood of significant spillovers makes a global valuation the better, more transparent accounting of the full range of costs and benefits that matter to U.S. policymakers and the public. EPA can therefore highlight spillover impacts as further justification for relying on global social cost valuations. In addition to the spillover effects that EPA already mentions,68 EPA should further argue that transboundary spillovers, feedback loops, information spillovers, and other effects justify a focus on the full global values, either independently or in combination with other strategic and ethical considerations.69 [EPA-HQ-OAR-2022-0829-0743, pp. 10-11]

67 Robert E. Kopp & Bryan K. Mignone, Circumspection, Reciprocity, and Optimal Carbon Prices, 120 CLIMATE CHANGE 831, 833 (2013) (2013) (explaining that the principle of "circumspection" can account for spillover effects and can then be used to justify a global SC-GHG value).

Globalization and the many avenues by which the fortunes of countries are linked mean that a high CSCC in one place may result in costs as the global climate changes even in places where the CSCC is nominally negative. For many countries, the effects of climate change may be felt more greatly through transboundary effects, such as trade disruptions, large-scale migration, or liability exposure than through local climate damage…These considerations suggest that country-level interests may be more closely aligned to global interests than indicated by contemporary country-level contributions to the SCC…[A] host of other strategic and ethical considerations factor into the international relations of climate change mitigation…We make no claim here regarding the utility of the CSCC in setting climate policies. CO2 emissions are a global externality. [EPA-HQ-OAR-2022-0829-0743, p. 11]

Id. at 899 (emphases added). [EPA-HQ-OAR-2022-0829-0743, p. 11]

68 RIA at 10-11 (citing trade, tourism, economic spillovers, political destabilization, and global migration).

69 See Schwartz, supra note 13, at 26; id. at 12 (on information spillovers).

3. Use of the Global Values Preserves Extraterritorial Interests

The RIA highlights direct and indirect impacts on U.S. citizens and assets located abroad as a justification for a global valuation,70 but U.S. extraterritorial interests are even more extensive and significant. A domestic-only estimate of the social cost of greenhouse gases based on some rigid conception of geographic borders or U.S. share of world GDP will fail to capture all the climate-related costs and benefits that matter to U.S. citizens, including impacts to significant U.S. ownership interests in foreign businesses, properties, and other assets, as well as U.S. consumption abroad including tourism,71 and even effects to the millions of Americans living abroad.72 The United States also has military personnel and assets located in almost every nation across the globe, and many if not all installations abroad—including those with high replacement costs or irreplaceable strategic value—face imminent climate risks.73 Because no methodology for estimating a "domestic-only" value would capture these impacts to extra- territorial interests, focusing on the global values can be further justified in part as a proxy for these important considerations. [EPA-HQ-OAR-2022-0829-0743, p. 11]

70 RIA at 10-11.

71 "U.S. residents spend millions each year on foreign travel, including travel to places that are at substantial risk from climate change, such as European cities like Venice and tropical destinations like the Caribbean islands." David A. Dana, Valuing Foreign Lives and Civilizations in Cost-Benefit Analysis: The Case of the United States and Climate Change Policy 10 (Northwestern Faculty Working Paper 196, 2009), https://perma.cc/EW3B-NKYC.

72 2021 TSD, supra note 4, at 15 (citing a 2016 figure from Bureau of Consular Affairs, Dept. of State); see also Dept. of State, Consular Affairs by the Numbers (2020), https://perma.cc/F3M8-EFSJ.

73 Ctr. for Climate & Sec., Military Expert Panel Report: Sea Level Rise and the U.S. Military's Mission 7 (2d ed. 2018), https://perma.cc/ZM4R-ED89.

Both strategic considerations and the need to account for spillovers already provide independent justifications for focusing on the full global social cost of greenhouse gas estimates. But the global values can also be at least partly justified as a proxy for these extra-territorial interests that otherwise would be overlooked using a domestic-only damage estimate. EPA can therefore further highlight U.S. extraterritorial interests as additional justification for relying on global social cost valuations, and can specifically call attention to climate-vulnerable U.S. military installations abroad with high replacement costs or irreplaceable strategic value, U.S. willingness to pay to protect relatives, ancestral homes, cultural and religious sites, and natural resources located abroad, and U.S. altruism toward the people, animals, and natural habitats across the globe. [EPA-HQ-OAR-2022-0829-0743, p. 13]

Beyond NEPA, and outside the climate context, agencies have considered key effects on international reciprocity in their regulatory cost-benefit analyses and decision making. Perhaps the best antecedent on this front is EPA's 1988 regulations to protect stratospheric ozone—another problem that, like greenhouse gases, requires international cooperation to effectively mitigate. In issuing those regulations, EPA recognized that it could "consider other countries' willingness to take regulatory action" in "deciding whether and how to regulate."97 EPA also took "[c]onsideration of the international ramifications of United States action" into account when "analyzing the cost and feasibility of controls."98 And in its regulatory impact analysis, EPA modeled alternative regulatory stringency levels based on potential international participation rates and the influence that EPA regulation would have on reciprocal international actions.99 By adopting a global approach to the social cost of greenhouse gases, EPA therefore draws upon the approach that it took for stratospheric ozone under the Reagan administration. [EPA-HQ-OAR-2022-0829-0743, p. 15]

97 Protection of Stratospheric Ozone, 53 Fed. Reg. 30,566, 30,569 (Aug. 12, 1988).

98 Id. ("Certainly other nations' ozone-depleting emissions or control of emissions affect the cost of United States' controls, and the need for other nations to limit their emissions may make appropriate United States action that encourages, or does not discourage, other nations to agree to such limits.").

99 Env't Prot. Agency, Regulatory Impact Analysis for the Protection of Stratospheric Ozone (1988).

In addition to EPA's consideration of international reciprocity and cooperation in prior rulemakings, agencies have also considered transboundary spillover effects in making key decisions. As one example, when considering the "public interest" in the certification of natural gas exports under the Natural Gas Act,102 the Department of Energy routinely "consider[s] international trade policy, foreign policy, and national security interests."103 As another example, the Food and Drug Administration also frequently considers international effects as part of its regulatory decision making, and has recognized that such costs are particularly relevant because "a portion of foreign costs could be passed on to domestic consumers."104 [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

102 15 U.S.C. § 717b(a).

103 New Policy Guidelines and Delegation Orders from Secretary of Energy to Economic Regulatory Administration and Federal Energy Regulatory Commission Relating to the Regulation of Imported Natural Gas, 49 Fed. Reg. 6684, 6688 (Feb. 22, 1984).

104 Requirements for Additional Traceability Records for Certain Foods, 87 Fed. Reg. 70,910, 71,071 tbl.2 (Nov. 21, 2022).

Courts have confirmed that agencies may—and, in some cases, must—take into account international spillover effects. In 2020, the U.S. Court of Appeals for the Ninth Circuit rejected a Bureau of Ocean Energy Management approval of an offshore oil drilling and production facility after the agency concluded that domestic extraction would not affect international fossil-fuel supply and consumption.105 As the court explained, because domestic production causes "foreign consumers [to] buy and consume more oil"—and because that consumption "can be translated into estimates of greenhouse gas emissions" that harms the United States—the agency had an obligation to consider those increased foreign emissions resulting from domestic action.106 Two subsequent district court opinions similarly faulted Department of Interior analyses for omitting the effects of domestic production on foreign demand and consumption.107 The fact that courts have required agencies to consider the spillover impacts from foreign greenhouse gas emissions provides strong support for EPA's consideration of spillovers from domestic emissions. [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

105 Ctr. for Biological Diversity v. Bernhardt, 982 F.3d 723, 738 (9th Cir. 2020).

106 Id .

107 Sovereign Iñupiat for a Living Arctic v. Bureau of Land Mgmt., 555 F. Supp. 3d 739, 764–67 (D. Alaska 2021); citing Friends of the Earth v. Haaland, No. CV 21-2317 (RC), 2022 WL 254526, at [Star]14–15 (D.D.C. Jan. 27, 2022).

Consistent with these examples, the Draft Circular A-4 Update recognizes that relevant benefits and costs to consider in regulatory impact analysis include both effects that "result directly from a regulation's domestic applicability" and those that result "indirectly from a regulation's impact on foreign entities."108 With regard to the latter category, the Draft Circular A-4 Update explains that relevant impacts "include the effects of a regulation on U.S. strategic interests, including the potential for inducing strategic reciprocity or other policy changes from actors abroad or effects on U.S. government assets located abroad," which "are particularly likely to occur when [a] regulation bears on a global commons or a public good."109 Additionally, the Draft Circular A-4 Update states that relevant impacts include "those that occur entirely outside the United States when they affect U.S. citizens and residents."110 [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

108 Draft Circular A-4 Update, supra note 10, at 9.

109 Id.

110 Id.

As all of these examples illustrate, EPA's consideration of climate damages on a global scale is consistent with how EPA and other agencies have exercised regulatory authority in numerous contexts. [EPA-HQ-OAR-2022-0829-0743, pp. 16-17]

II. Extensive Justification Supports EPA's Decisions to Omit a 7% Discount Rate and To Discount Long-Term Climate Impacts at a Lower Range of Discount Rates than the Proposed Rule's Shorter-Term Impacts

EPA applies the social cost of greenhouse gases estimates calculated at discount rates of 2.5%, 3%, and 5%,111 consistent with the Working Group's current recommendations, and justifies its decision to return to its prior conclusion that a 7% capital-based discount rate is inappropriate for climate effects. EPA's return to a reasonable range of discount rates to assess climate impacts is well supported—in fact, as recognized by both the Working Group in its 2021 update112 and EPA in the Draft SC-GHG Update,113 discount rates of 2% or lower are appropriate for valuing climate damages. [EPA-HQ-OAR-2022-0829-0743, p. 17]

111 Note that just as there is growing evidence that the discount rate should be below 2%, there is growing evidence that 5% is much too high a discount rate. The values at 5% should be considered a very conservative lower bound.

112 2021 TSD, supra note 4, at 16–22 (offering extensive evidence for the use of lower discount rates and recommending that agencies "consider discount rates below 2.5 percent" for valuing the social cost of greenhouse gases); see also id. at 4 ("Consistent with the guidance in E.O. 13990 for the IWG to ensure that the SC-GHG reflect the interests of future generations, the latest scientific and economic understanding of discount rates discussed in this TSD, and the recommendation from OMB's Circular A-4 to include sensitivity analysis with lower discount rates when a rule has important intergenerational benefits or costs, agencies may consider conducting additional sensitivity analysis using discount rates below 2.5 percent.").

113 In the Draft SC-GHG Update, EPA applies a central near-term discount rate of 2%, with additional valuations using near-term discount rates of 1.5% and 2.5%. The discount rates in the Draft SC-GHG Update also decline over time. See Draft SC-GHG Update, supra note 9, at 3 tbl.ES-1; id. at 52–61 (explaining discounting module).

The RIA cites the Working Group's arguments that, for long-term policies with intergenerational effects, uncertainty and ethical considerations make a 7% capital-based discount rate inappropriate.114 These arguments provide sufficient reason for EPA's approach to discount rates. Moreover, additional justifications support EPA's discounting choices. [EPA-HQ-OAR-2022-0829-0743, p. 17]

114 RIA at 10-11 to 10-12.

A. For Numerous Reasons, the 7% Discount Rate Is Inappropriate for Climate Effects

There is no support in the economics literature for applying a 7% discount rate to long- term impacts such as climate damage. The suggestion that EPA must apply a 7% discount rate to climate impacts—which is based exclusively on a narrow reading of two pages of the current Circular A-4 that OMB has proposed to substantially revise—is utterly inconsistent with economic practice and theory.115 There are in fact numerous reasons why applying a 7% discount rate to climate effects that occur over a 300-year time horizon would be unjustifiable—and that discount rates of 2% or lower are appropriate. [EPA-HQ-OAR-2022-0829-0743, pp. 17-18]

115 Although the current Circular A-4 provides discount rates of 3% and 7% as a default assumption, it also requires agency analysts to do more than rigidly apply default assumptions. Circular A-4, supra note 74, at 3 ("You cannot conduct a good regulatory analysis according to a formula. Conducting high-quality analysis requires competent professional judgment."). As such, analysis must be "based on the best reasonably obtainable scientific, technical, and economic information available," id. at 17, and agencies must "[u]se sound and defensible values or procedures to monetize benefits and costs, and ensure that key analytical assumptions are defensible," id. at 27.

Fifth, several standard justifications for capital-based discount rates break down given the particular threats of climate change. For example, one argument for capital-based discount rates is that spending capital on climate-abatement policies has opportunity costs and so, in policy analysis, future costs and benefits should be discounted at the rate of return to capital. However, the irreversible, uncertain, and catastrophic risks of climate change may disrupt this "opportunity cost" rationale: while it may seem, for instance, that future, wealthier generations might have better opportunities to address climate change for themselves, irreversible or catastrophic damages could arise that make future mitigation efforts more expensive or impossible.130 Similarly, if climate damages are "non-marginal," such that climate change significantly affects the very natural resources needed to drive economic growth, then growth could plummet or even turn negative.131 [EPA-HQ-OAR-2022-0829-0743, pp. 19-20]

130 Richard L. Revesz & Matthew R. Shahabian, Climate Change and Future Generations, 84 S. CAL. L. REV. 1097, 1149-52 (2011).

131 Id. at 1153 & n.246 (citing Heal's observation that estimates of productivity growth based on historical records omit depletion of natural resources, and thus bias discount rates upwards).

Executive Order 13,990 instructs agencies to ensure that the social cost of greenhouse gas values adequately account for "intergenerational equity."138 A 7% rate ignores much of future generations' welfare and so would be inconsistent with that mandate. Notably, even when using high discount rates for climate damages in 2020, EPA explained that the 7% capital rate did not adequately account for "tradeoffs between improving the welfare of current and future generations."139 Accordingly, EPA's decision not to apply that discount rate for assessing climate damages is entirely justified. [EPA-HQ-OAR-2022-0829-0743, p. 20]

138 Exec. Order § 13,990 5(b)(ii)(E).

139 85 Fed. Reg. at 24,735 (explaining that the central analysis focused on a 3% rate, and the 7% rate was used only for sensitivity analysis).

B. Extensive Justification Supports EPA's Distinct Approach to Discounting Climate Effects Relative to Other Costs and Benefits

As explained above, EPA's choice to use the social cost of greenhouse gases values calculated with consumption-based discount rates is fully justified. But this choice also means EPA is calculating the present value of reduced greenhouse gas emissions differently than the present value of other costs and benefits (which, per Circular A-4's default recommendations, it calculates using 3%and 7% discount rates). Extensive justification supports this distinct treatment of climate impacts relative to other costs and benefits. [EPA-HQ-OAR-2022-0829-0743, p. 21]

For one, given the nature of the Proposed Rule's costs and benefits and in light of the Draft Circular A-4 Update, it is more appropriate to discount all effects using consumption-based rates, and so the present value calculations that include some costs and benefits discounted at a 7% rate can be viewed as lower-bound sensitivity analyses. The capital-based discount rate theoretically assesses whether the net benefits from government action will exceed the returns that society could earn by instead investing the same resources in the private sector. But this framework for discounting and comparing benefits and costs makes sense only under the "extreme" assumption that all the costs of government action would "fully displace" (i.e., crowd out) private investment.140 In this way, the capital-based rate "at best creat[es] a lower bound on the estimate of net benefits," by applying a maximum discount rate that reflects an extreme case not likely to apply to many government actions.141 As Li and Pizer explain, a capital-based approach does not provide "a suitable discount rate" for regulatory cost-benefit analysis, in large part because the benefits of regulation—and not just the costs—may fall on capital as well.142 [EPA-HQ-OAR-2022-0829-0743, p. 21]

140 2021 TSD, supra note 4, at 18-19.

141 Id.

142 Qingran Li & William A. Pizer, Discounting for Public Benefit-Cost Analysis, RES. FOR THE FUTURE 3 (July 2021), https://www.rff.org/publications/issue-briefs/discounting-for-public-benefit-cost-analysis/.

Moreover, apart from the widespread support for consumption- over capital-based rates,143 special legal, economic, and policy considerations justify a distinct approach to discounting climate effects. While effects like compliance costs will play out over the next several decades, the climate effects of this rule are much longer term, affecting the welfare of future generations over centuries. Therefore, the arguments in favor of lower consumption-based discount rates—based on long-term uncertainty, ethics, declining economic growth, inapplicable market data, and other considerations—apply much more strongly to climate effects than to other costs and benefits. And because a high capital-based rate, like 7%, will effectively ignore the welfare of future generations (e.g., over the course of just 80 years, a 7% rate discounts away 99.5% of a future effect's value144) legal requirements to consider the welfare of future generations caution much more strongly against the application of a 7% rate to long-term climate effects than to other costs and benefits. [EPA-HQ-OAR-2022-0829-0743, p. 21]

143 See Howard et al., supra note 134 ("Recent economic literature strongly supports the use of a consumption discount rate over a capital rate of return over longer time horizons").

144 The discount factor is 1/(1+r)t; 1/(1+0.07)80 = 0.0045 = 0.45%.

Consequently, as the National Academies of Sciences has recognized, differences in the application of discount rates may be warranted "when only some categories [of costs and benefits] have an intergenerational component."145 The National Academies has offered recommendations for how agencies can best apply different annualized discount rates to climate impacts versus other costs and benefits,146 and EPA can rely on the National Academies' guidance to support its approach to discounting here. Likewise, as noted above, both the current Circular A-4147 and Draft Circular A-4 Update also recognize that intergenerational effects merit lower discount rates than intragenerational costs and benefits.148 [EPA-HQ-OAR-2022-0829-0743, p. 21]

145 NAS 2017 Report, supra note 122, at 182.

146 Id.

147 Circular A-4, supra note 74, at 35–36.

148 Draft Circular A-4 Update, supra note 10, at 80–82.

Case law on the social cost of greenhouse gases also offers support for EPA's discounting approach. Specifically, in Zero Zone v. Department of Energy, the plaintiffs argued that the Department of Energy had arbitrarily considered hundreds of years of climate benefits while limiting its assessment of employment impacts and other effects to just a thirty-year time horizon. The court upheld the regulatory analysis, concluding that the difference in time horizons was justified because the rule "would have long-term effects on the environment but . . . would not have long-term effects on employment."149 The choice of time horizons is related to the choice of discount rate: any cost or benefit occurring beyond the end of the analytical time horizon is effectively discounted at a 100 percent rate.150 Analogizing from this precedent, a court may similarly defer to an agency's finding that the long time horizon of climate change justifies a lower discount rate than the rate applied to shorter-term costs and benefits. [EPA-HQ-OAR-2022-0829-0743, p. 22]

149 Zero Zone, 832 F.3d at 679.

150 See Arden Rowell, Time in Cost-Benefit Analysis, 4 U.C. IRVINE L. REV. 1215, 1237-38 (2014) (noting time inconsistencies in different regulatory analyses and advising agencies to identify a temporal break-even point by which a proposed policy will pay for itself).

III. Common Criticisms of the Working Group's Methodology from Opponents of Climate Regulation Lack Merit

While the Working Group developed its social cost valuations through a rigorous process that incorporated the best scientific and economic modeling available at the time, its assumptions have sometimes been criticized by opponents of climate regulation. Such objections lack merit and do not supply bases for EPA to reject the Working Group's expert valuations. This section offers responses to criticisms from opponents of sensible climate policy. [EPA-HQ-OAR-2022-0829-0743, p. 22]

1. EPA Must Monetize Climate Impacts as Part of Its Analysis

It is widely established that federal agencies may—and often must—consider effects on climate change when those effects flow from the agency's actions. With EPA, this is especially well-established. In Massachusetts v. EPA, the Supreme Court held that greenhouse gas emissions qualify as an "air pollutant" for regulation under the Clean Air Act.151 Because one of the Proposed Rule's aims is to regulate greenhouse gas pollution as an "air pollutant" under Section 202 of the Clean Air Act—following the Massachusetts precedent—EPA should obviously consider impacts on climate when deciding upon the stringency of its regulation. [EPA-HQ-OAR-2022-0829-0743, pp. 22-23]

151 Massachusetts v. EPA, 127 S. Ct. 1438 (2007).

Monetizing climate impacts is a natural and rational option to account for those impacts. [EPA-HQ-OAR-2022-0829-0743, pp. 22-23]

Indeed, it is well accepted in regulatory practice and precedent that agencies should monetize regulatory impacts to the extent feasible, to compare costs and benefits along a common metric.152 EPA has long monetized climate damages in vehicles regulations promulgated under the Obama, Trump, and Biden administrations. [EPA-HQ-OAR-2022-0829-0743, pp. 22-23]

152 Circular A-4, supra note 74, at 2 ("Benefit-cost analysis is a primary tool used for regulatory analysis.2 Where all benefits and costs can be quantified and expressed in monetary units, benefit-cost analysis provides decision makers with a clear indication of the most efficient alternative, that is, the alternative that generates the largest net benefits to society (ignoring distributional effects).").

Monetizing climate impacts may also be legally required. In 2007, the U.S. Court of Appeals for the Ninth Circuit held that the federal government must monetize climate impacts when it conducts a cost-benefit analysis. In Center for Biological Diversity v. National Highway Traffic Safety Administration, the Ninth Circuit remanded a fuel economy rule to the Department of Transportation (DOT) for failing to monetize the benefits of carbon dioxide reductions in its regulatory analysis.153 The Court recognized the presence of uncertainty in the valuation of climate damages, but explained that "the value of carbon emissions reduction is certainly not zero."154 By failing to value the benefit of greenhouse gas emission reductions in its analysis, the Court continued, DOT effectively ignored the adverse impacts of greenhouse gas emissions and thus "put a thumb on the scale by undervaluing the benefits . . . of more stringent standards."155 [EPA-HQ-OAR-2022-0829-0743, p. 23]

153 Ctr. for Biological Diversity, 538 F.3d at 1198–1203 (9th Cir. 2008).

154 Id. at 1200.

155 Id. at 1198.

2. Monetizing Climate Benefits Does Not Skew the Analysis, but Rather Provides Balance Since EPA Also Monetizes Costs

Another objection to the use of the social cost of greenhouse gases from critics of climate action is that these valuations account only for the damages from climate change, but do not take account of the alleged economic benefits from fossil-fuel production and usage. But this argument is unpersuasive for two key reasons. [EPA-HQ-OAR-2022-0829-0743, pp. 23-24]

First, the economic benefits of fossil-fuel extraction are far more limited than its proponents suggest, since the broader benefits that society derives from power and electricity are attributable to energy production in general and are not unique to fossil fuels.156 Accordingly, controls on fossil fuels will have limited net economic impacts.157 Second, while there are of course some economic impacts from reductions in fossil-fuel production and usage, those impacts should not be included in any calculation of climate damages, but rather considered separately by regulators on the costs side of the ledger in individual determinations. [EPA-HQ-OAR-2022-0829-0743, pp. 23-24]

156 Renewable energy, like fossil fuels, generates revenue, supports jobs, and vitalizes local economies. See, e.g., Katie Siegner et al., Rocky Mtn. Inst., Seeds of Opportunity: How Rural America Is Reaping Economic Development Benefits from the Growth of Renewables 6–16 (2021), https://perma.cc/DWH9-D4L7.

157 Environmental regulation typically has limited impacts on total employment or other macroeconomic indicators, but rather shifts production from one sector to another. See Inst. for Pol'y Integrity, Does Environmental Regulation Kill or Create Jobs (2017), https://policyintegrity.org/files/media/Jobs_and_Regulation_Factsheet.pdf. Meanwhile, the sharp decline in the cost renewable energy is already expected to crowd out the demand for gas-fuel electricity in the coming years and decades. See, e.g. Energy Info. Admin., Annual Energy Outlook 2021 Narrative 18 tbl. 11 (projecting doubling of renewables as a share of domestic energy consumption—from 21% to 42%—by 2050 under reference case, while share of coal and natural gas declines); Charles Teplin et al., ROCKY MTN. INST., The Growing Market for Clean Energy Portfolios 8 fig. ES-2 (2019), https://perma.cc/P5YJ-WARJ (showing precipitous decline in cost of clean energy to being cheaper than fossil fuels).

In the Proposed Rule, EPA monetizes not only the expected benefits of the proposal but also the expected compliance costs from industry. EPA then compares quantified cost and benefit estimates in determining whether and how to regulate, as instructed by federal guidance and executive order.158 Capturing climate benefits is thus essential to ensuring a balanced analysis. As the Ninth Circuit has recognized, "failure to monetize the most significant benefit of more stringent standards: reduction in carbon emissions"—while continuing to value estimated compliance costs—would "put a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards."159 [EPA-HQ-OAR-2022-0829-0743, p. 24]

158 Exec. Order No. 12,866 § 1(a), 58 Fed. Reg. 51,735 (Oct. 4, 1993) (directing that "in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits").

159 Ctr. for Biological Diversity, 538 F.3d at 1198–99.

B. Other Common Criticisms of the Working Group's Methodology from Opponents of Climate Policy Lack Merit

EPA should also provide responses to any objections to the Working Group's methodology and valuations raised during this comment period. The Working Group, of course, has already responded to criticisms of its methodology that were offered during the public comment period that it held in 2013,160 and EPA should draw from that document where relevant in responding to objections offered through this notice-and-comment process. But some objections are now being raised that were not offered during the 2013 comment period, while some of the responses that the Working Group provided can be supplemented with more recent information. Below, we provide brief responses to common objections that are now being presented by opponents of climate reforms. [EPA-HQ-OAR-2022-0829-0743, p. 24]

160 Response to Comments, supra note 118.

1. The Social Cost Valuations Are Not Too Uncertain to Apply

While critics sometimes argue that there is too much uncertainty to rely on the Working Group's social cost valuations, this argument is incorrect on multiple levels. As a legal matter, the presence of some uncertainty in the social cost valuations should not preclude agencies from using available valuations. And as a factual matter, the Working Group rigorously considered uncertainty and accounted for it in numerous ways. Moreover, the presence of continued uncertainty suggests that the social cost valuations should be higher than presently valued—not that climate damages should be ignored. This is confirmed by EPA's Draft SC-GHG Update, which incorporates the latest available research and produces substantially higher climate-damage valuations than those the Working Group previously developed. [EPA-HQ-OAR-2022-0829-0743, pp. 24-25]

Federal courts have repeatedly recognized that agency analysis necessitates making predictive judgments under uncertain conditions, explaining that "[r]egulators by nature work under conditions of serious uncertainty" 161 and "are often called upon to confront difficult administrative problems armed with imperfect data."162 As the Ninth Circuit has explained, "the proper response" to the problem of uncertain information is not for the agency to ignore the issue but rather "for the [agency] to do the best it can with the data it has."163 Courts generally grant broad deference to agencies' analytical methodologies and predictive judgments so long as they are reasonable and do not require agencies to act with complete certainty.164 [EPA-HQ-OAR-2022-0829-0743, pp. 24-25]

161 Pub. Citizen v. Fed. Motor Carrier Safety Admin., 374 F.3d 1209, 1221 (D.C. Cir. 2004).

162 Mont. Wilderness Ass'n v. McAllister, 666 F.3d 549, 559 (9th Cir. 2011).

163 Id.

164 See Wis. Pub. Power, Inc. v. FERC, 493 F.3d 239, 260 (D.C.Cir.2007) ("It is well established that an agency's predictive judgments about areas that are within the agency's field of discretion and expertise are entitled to particularly deferential review, so long as they are reasonable.").

The Working Group rigorously considered various sources of long-term uncertainty "through a combination of a multi-model ensemble, probabilistic analysis, and scenario analysis."165 As the Working Group explained, the three reduced-form integrated assessment models (IAMs) account for uncertainty themselves by spanning a range of economic and ecological outcomes.166 Additionally, the use of three separate models—all developed by different experts spanning a range of views—accounts for uncertainty by integrating a diversity of viewpoints and structural and analytical considerations.167 [EPA-HQ-OAR-2022-0829-0743, p. 25]

165 2021 TSD, supra note 4, at 26.

166 See id.

167 See id.

In addition to the use of three distinct damage models with different inputs and assumptions, the Working Group integrated various sources of uncertainty into its damage valuations. For instance, the Working Group applied an equilibrium climate sensitivity—that is, an estimate of how much an increase in atmospheric greenhouse gas concentrations affects global temperatures—that reflects a broad distribution of possible outcomes.168 The Working Group also applied five different socioeconomic and emissions trajectories from the published literature reflecting a range of possible outcomes for future population growth, global gross domestic product, and greenhouse gas emission baselines—all important inputs that affect long- term climate damage estimates.169 The Working Group ran each integrated assessment model 10,000 times per scenario (and per greenhouse gas) for a total of 150,000 draws per greenhouse gas and then averaged across those results to develop its recommended estimates.170 In addition to reporting the average valuations, the Working Group published the results of each model run under each scenario.171 [EPA-HQ-OAR-2022-0829-0743, p. 25]

168 Id. at 13 tbl.1 (showing 5th-95th probability range of distributions in the chosen Roe & Baker model from 1.72°C from a doubling of atmospheric reenhouse gas concentrations to 7.14°C(.

169 Id. at 15–17 & tbl.2.

170 Id. at 28; see also 2021 TSD, supra note 4, at 26–27 (providing additional detail).

171 Interagency Working Group, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis 26 tbl.3 (2010) ["2010 TSD"].

Moreover, experts broadly agree—and EPA's Draft SC-GHG Update confirms—that the presence of uncertainty in the social cost valuations counsels for more stringent climate regulation, not less.172 This is due to various factors including risk aversion, the informational value of delaying climate change impacts, and the possibility of irreversible climate tipping points that cause catastrophic damage.173 In fact, as discussed above and emphasized in EPA's Draft SC-GHG Update, uncertainty is a factor justifying lowering the discount rate, particularly in intergenerational settings.174 Furthermore, the current omission of key effects of climate change—such as catastrophic damages, wildfires and certain cross-regional spillover effects—also suggests that the true social cost values are likely higher than the Working Group's current estimates.175 [EPA-HQ-OAR-2022-0829-0743, pp. 25-26]

172 See, e.g., Alexander Golub et al., Uncertainty in Integrated Assessment Models of Climate Change: Alternative Analytical Approaches, 19 ENV'T MODELING & ASSESSMENT 99 (2014) ("The most important general policy implication from the literature is that despite a wide variety of analytical approaches addressing different types of climate change uncertainty, none of those studies supports the argument that no action against climate change should be taken until uncertainty is resolved. On the contrary, uncertainty despite its resolution in the future is often found to favor a stricter policy.").

173 The undersigned organizations have filed comments in numerous regulatory proceedings highlighting the various forms of uncertainty that increase the social cost of greenhouse gases, and providing numerous references. See, e.g., Environmental Defense Fund et al., Improper Valuation of Climate Effects in the Proposed Revised Cross- State Air Pollution Rule Update for the 2008 Ozone NAAQS, Technical App'x: Uncertainty (Dec. 14, 2020), https://policyintegrity.org/documents/Joint_SCC_comments_EPA_revised_CSAPR_Ozone_NAAQS_2020.12.14.p df.

174 Peter Howard & Jason A. Schwartz, Inst. for Pol'y Integrity, About Time: Recalibrating the Discount Rate for the Social Cost of Greenhouse Gases 13– 25 (2021).

175 Interagency Working Group, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis 21 (2016) ["2016 TSD"] (recognizing that "these limitations suggest that the [social cost of greenhouse gases] estimates are likely conservative").

2. The Working Group Did Not Bias Its Estimates by Ignoring Positive Impacts of Climate Change

Critics sometimes claim that the Working Group's social cost values ignore important positive impacts of a warming climate. Examples that have been offered to support this argument include alleged agricultural benefits from higher temperatures and decreased wintertime mortality. But these arguments are legally and factually dubious, and miss the forest for the trees. [EPA-HQ-OAR-2022-0829-0743, pp. 26-27]

Mere omission of some impacts does not counsel for abandoning the social cost estimates, particularly since independent experts—and EPA's Draft SC-GHG Update—widely agree that those estimates likely undervalue true climate damages because they omit far more negative effects than positive ones. For instance, the Working Group has explained that several of the underlying economic models omit certain major damage categories such as catastrophic damages and certain cross-regional spillover effects.176 These effects can be massive: One paper, for instance, finds that the inclusion of tipping points doubles the social cost estimates,177 with another paper concluding that the effect is even greater and thus the Working Group's existing values "may be significantly underestimating the needs for controlling climate change."178 The current consensus of experts puts damages for a 3°C increase at roughly 5% to 10% of gross domestic product,179 which is substantially higher than the damages estimated by the IAMs.180 And as the Ninth Circuit has explained, the presence of some omitted damages does not provide a legal basis to ignore established methodologies to monetize climate damages, since while "there is a range of [plausible] values, the value of carbon emissions reduction is certainly not zero."181 [EPA-HQ-OAR-2022-0829-0743, pp. 26-27]

176 2010 TSD, supra note 171, at 26, 32.

177 Derek Lemoine & Christian P. Traeger, Economics of Tipping the Climate Dominoes. 6 NATURE CLIMATE CHANGE 514 (2016).

178 Yongyang Cai et al., Environmental Tipping Points Significantly Affect the Cost-Benefit Assessment of Climate Policies, 112 PROCS. NAT'L ACADS. SCIS. 4606 (2015).

179 See, e.g., Peter Howard & Derek Sylvan, Inst. for Pol'y Integrity, Gauging Economic Consensus on Climate Change 25 (2021) (reporting mean estimate of 8.5% GPD loss and median estimate of 5% loss, based on elicitation of over 700 climate-policy experts).

180 2010 TSD, supra note 171, at 9 fig.1A (showing range of GDP loss below 5% for 3°C temperature increase).

181 Ctr. for Biological Diversity, 38 F.3d at 1200.

In addition to its legal shortcomings, arguments about the impact of positive externalities are also factually suspect. For instance, while agricultural benefits have become a flashpoint in this debate, the IAMs in fact do account for the potential agricultural benefits of carbon dioxide fertilization from a warming planet.182 And evidence suggests that, if anything, these models likely overvalue agricultural benefits from a warming planet—and thus undervalue the social cost of greenhouse gases.183 One paper, for instance, concludes that estimates of net agricultural impacts produced an undervaluation of the social cost values by more than 50%, explaining that "new damage functions reveal far more adverse agricultural impacts than currently represented" in the IAMs used by the Working Group.184 And a comprehensive investigation of the impacts of climate change on agriculture has rejected the hypothesis "that agricultural damages over the next century will be minimal and indeed that a few degrees Celsius of global warming would be beneficial for world agriculture," concluding that climate change "will have at least a modest negative impact on global agriculture in the aggregate."185 This conclusion is confirmed by the Draft SC-GHG Update, which finds that climate change on net will harm, not benefit, the agricultural sector.186 [EPA-HQ-OAR-2022-0829-0743, p. 27]

182 See Peter Howard, Omitted Damages: What's Missing from the Social Cost of Carbon 6 (2014), https://policyintegrity.org/files/publications/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon. pdf. See also Inst. for Pol'y Integrity, A Lower Bound: Why the Social Cost of Carbon Does Not Capture Critical Climate Damages and What That Means for Policymakers 5 (2019), https://policyintegrity.org/files/publications/Lower_Bound_Issue_Brief.pdf; Climate Impacts Reflected in the SCC Estimates, Cost of Carbon Project, https://costofcarbon.org/scc-climate-impacts.

183 See, e.g., Frances C. Moore et al., Economic Impacts of Climate Change on Agriculture: A Comparison of Process-Based and Statistical Yield Models, 12 ENV'T RES. LTRS., 65008 ("[W]e find little evidence for differences in the yield response to warming. The magnitude of CO2 fertilization is instead a much larger source of uncertainty. Based on this set of impact results, we find a very limited potential for on-farm adaptation to reduce yield impacts.").

184 Frances C. Moore et al., New Science of Climate Change Impacts on Agriculture Implies Higher Social Cost of Carbon, 8 NATURE COMMUNS. 1607 (2017).

185 WILLIAM R. CLINE, GLOBAL WARMING AND AGRICULTURE: IMPACT ESTIMATES BY COUNTRY 1–2 (2007).

186 Draft SC-GHG Update, supra note 9, at 70 tbl.3.1.4 (breaking down damage estimates by sector/category).

Other arguments focusing on omitted positive impacts are equally misguided. For example, while some critics of the Working Group's methodology misleadingly point out that one of the models, DICE, focuses on increased heat-related mortality and does not account for reductions in wintertime mortality, consideration of the many damages omitted from the IAMs (such as particulate matter from wildfires, deaths from flooding, Lyme and other tick-based diseases), including certain mortality effects, consistently point toward a higher social cost value.187 One recent study concludes that the IAMs, on net, undervalue mortality from climate change.188 Focusing on the omission of reductions in wintertime mortality thus misses the forest for the trees, and does not supply a basis to disregard the Working Group's valuations. [EPA-HQ-OAR-2022-0829-0743, p. 27]

187 See, e.g., Howard, supra note 182; see also 2016 TSD, supra note 175, at 21.

188 See Tamma A. Carleton et al., Valuing the Global Mortality Consequences of Climate Change Accounting for Adaptation Costs and Benefits (U. Chicago, Becker Friedman Inst. for Econ. Working Paper No. 2018-51) (Jul. 31, 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3224365 (finding that new empirical estimates suggest that the increase in morality risk from climate change is valued at approximately 3.2% of global GDP in 2100).

3. The Working Group Did Not Overstate the Pace of Climate Change

Critics sometimes allege that the chosen Equilibrium Climate Sensitivity (ECS) distribution—that is, the amount of warming that is expected to result from a doubling of the atmospheric carbon dioxide concentration—is outdated and fails to account for recent evidence showing that sensitivity to be lower than previously believed. But these arguments rely on cherry-picked data and ignore the scientific consensus. [EPA-HQ-OAR-2022-0829-0743, p. 28]

In 2016, the National Academies of Sciences dedicated an entire report to whether the Working Group should update the social cost metrics to reflect more recent science on the ECS. The National Academies decided that such an update was unnecessary, "recommend[ing] against a near-term change in the distributional form of the ECS" and explaining that any reasonable revisions on this front would "have a minimal impact on estimates of the [social cost of greenhouse gases]."189 [EPA-HQ-OAR-2022-0829-0743, p. 28]

189 Nat'l Acad. Scis., Eng'g & Med., Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update 34, 46 (2016), https://perma.cc/TJM6-XE65 [hereinafter "NAS 2016 Report"].

On top of the National Academies' rejection of this argument, there is little support for the claim that the Working Group overstated the pace of climate change. The most recent estimate from the Intergovernmental Panel on Climate Change (IPCC)—which reflects consensus estimates from the worldwide scientific community—projects an ECS range from 2.5°C to 4°C, with 3°C as a "best estimate."190 This is consistent with the range applied by the Working Group—based off of Roe & Baker—which uses 3°C as its median and 3.5 °C as its mean ECS value.191 In evaluating the ECS, the Working Group assessed estimates from a wide range of experts and selected consensus values. In fact, as the Working Group acknowledged, some ECS estimate ranges go as high as 10º C, making its selected ECS distribution substantially lower than these high-end estimates and a reasonable middle range.192 The Draft SC-GHG Update confirms this approach by applying a similar ECS value using the FaIR model.193 [EPA-HQ-OAR-2022-0829-0743, p. 28]

190 IPCC, AR6 Synthesis Report SPM-14 (2021).

191 2010 TSD, supra note 171, at 13 tbl.1.

192 Id. at 14 fig.2.

193 Draft SC-GHG Update, supra note 9, at 28–29 & 29 tbl.2.2.1.

In previous dockets, opponents of the Working Group's estimates have cited Lewis & Curry (2015)—which estimates a median ECS of 1.64 ºC with an uncertainty range (5–95%) of 1.05–4.05 ºC—to suggest that the Working Group applied an inappropriately high ECS range.194 But in light of the consensus estimates discussed above, that paper is a severe outlier. Since its publication, Lewis & Curry (2015) has been criticized by other climate scientists for methodological deficiencies that may cause it to underestimate the ECS.195 And as noted above, the National Academies did not think that Lewis & Curry (2015) merited an update to the Working Group's valuations to revise the ECS estimates.196 [EPA-HQ-OAR-2022-0829-0743, pp. 28-29]

194 Nicholas Lewis & Judith A. Curry, The Implications for Climate Sensitivity of AR5 Forcing and Heat Uptake Estimates, 45 Climate Dynamics 1009 (2015).

195 See, e.g., Kate Marvel et al., Internal Variability and Disequilibrium Confound Estimates of Climate Sensitivity from Observations, 45 GEOPHYS. RES. LTRS. 1595 (2018) ("[A] range of recent work … suggests that [Lewis & Curry (2015)] may underestimate equilibrium warming."); Timothy Andrews et al., Accounting for Temperature Patterns Increases Historical Estimates of Climate Sensitivity, 45 GEOPHYS. RES. LTRS. 8490 (2018) (explaining that Lewis and Curry disregard "the impact from non?CO2 forcings and unforced climate variability that could have had a significant impact on the pattern of historical temperature change").

196 NAS 2016 Report, supra note 189.

Critics further argue that the ECS distribution applied by the Working Group inappropriately skews rightward, meaning that its mean ECS value exceeds the median value of 3º C that the IPCC has indicated. But that decision is a feature, not a bug. As the National Academies explained, the IPCC has found that there is a "positively skewed distributional form for [the ECS] parameter" similar to the ECS distribution applied by the Working Group.197 (This too is confirmed in EPA's Draft SC-GHG Update.198) In other words, the mean ECS value should be higher than the median ECS value, and the Working Group applied an appropriate distribution. Criticisms to the contrary are meritless. [EPA-HQ-OAR-2022-0829-0743, pp. 28-29]

197 Id. at 25.

198 Draft SC-GHG Update, supra note 9, at 29 tbl.2.2.1 (reporting mean ECS of 3.18 °C and median of 2.95 °C).

4. The Working Group Applied a Reasonable Range of Emission Baselines

Critics sometimes argue that the Working Group's valuations are an overestimate because they apply outdated emission scenarios that exaggerate the baseline level of atmospheric greenhouse gas levels. Using a higher baseline level of emissions raises the social cost estimates because the harm from an additional unit of emissions increases with the baseline atmospheric emissions level. However, the Working Group used a reasonable emissions baseline that reflects different possible mitigation scenarios. [EPA-HQ-OAR-2022-0829-0743, p. 29]

While the Working Group assumed a baseline emissions range of 13–118 gigatons of carbon dioxide emitted per year by 2100,199 recent projections from the Climate Action Tracker indicate that baseline emissions will reach between 14–175 gigatons of carbon dioxide by 2100 under a range of scenarios reflecting different levels of mitigation.200 Thus, the baselines used by the Working Group potentially understate baseline emissions rather than overvalue them as opponents argue. Several of the Working Group's supposedly "business-as-usual" scenarios are actually more consistent with baseline estimates reflecting policy projections.201 Accordingly, the criticism that the Working Group overestimated future greenhouse gas concentrations in the atmosphere falls flat. [EPA-HQ-OAR-2022-0829-0743, p. 29]

199 2010 TSD, supra note 171, at 16 tbl.2.

200 Climate Action Tracker, Global Emissions Time Series (Dec. 1, 2020), https://perma.cc/B4X2- RAWA.

201 Compare id. (projecting 35-48 gigatons of emissions in 2100 under "current policy projections" scenarios and 83-175 gigatons under business-as-usual scenario) with 2010 TSD, supra note 171, at 16 tbl.2 (incorporating supposedly business-as-usual scenarios of 42.7 and 60.1 gigatons in 2100).

Moreover, this choice does not particularly affect the social cost valuations. In comparison to the Working Group's central social cost of carbon estimate in 2020 of $51 per ton, the average social cost of carbon under the Working Group's supposed business-as-usual emissions scenarios is $53 per ton and $41 per ton under the emissions scenario that is consistent with sustained and widespread mitigatory action.202 While relying less on the Working Group's supposed business-as-usual scenarios would therefore modestly decrease the interim social cost valuations in a vacuum, more holistic updates to the metrics as recommended by the National Academies of Sciences would very likely increase the social cost valuations overall—as confirmed by EPA's Draft SC-GHG Update—due to the omitted damages discussed above and recent evidence regarding intergenerational discount rates.203 At best, therefore, this argument makes a mountain out of a molehill. [EPA-HQ-OAR-2022-0829-0743, pp. 29-30]

202 See Peter Howard et al., Option Value and the Social Cost of Carbon: What Are We Waiting For? (Inst. for Pol'y Integrity Working Paper No. 2020/1) at 16 tbl.1 (2020), https://policyintegrity.org/files/publications/Working_paper_06.22.20.pdf.

203 See 2021 TSD, supra note 4, at 4 (Working Group acknowledging that its current social cost valuations "likely underestimate societal damages from [greenhouse gas] emissions").

5. The Working Group Applied Scientifically-Based Damage Models

Critics sometimes claim that the IAMs—the damage functions for translating climate impacts into economic losses—are flawed and arbitrary. While newer data has enabled the development of updated damage models that EPA applies in the Draft SC-GHG Update, the Working Group's damage functions nonetheless are based on reasonable assumptions made by a range of experts.204 They have also withstood scientific scrutiny, and while opponents of climate reform frequently highlight criticism of the damage functions by a notable economist, they take this criticism out of context. [EPA-HQ-OAR-2022-0829-0743, p. 30]

204 Response to Comments, supra note 118, at 8 ("While the development of the DICE, FUND and PAGE models necessarily involved assumptions and judgments on the part of the modelers, the damage functions are not simply arbitrary representations of the modelers' opinions about climate damages.").

The Working Group selected three models of climate damages that, when the Working Group selected them in 2010, were the most widely used and cited models in the economics literature linking physical climate impacts to economic damages205: the DICE, FUND, and PAGE models.206 These models were developed by outside experts, published in peer-reviewed economic literature,207 and the product of extensive scholarship and expertise. One of the models, DICE, was developed by William Nordhaus, an economics professor and former provost of Yale University who won a Nobel Memorial Prize in Economic Sciences for developing the model. And PAGE's developer, Chris Hope, was a lead author and review editor for the Third and Fourth Assessment Reports of the IPCC, which shared the Nobel Peace Prize in 2007 with former U.S. Vice President Al Gore.208 [EPA-HQ-OAR-2022-0829-0743, p. 30]

205 Response to Comments, supra note 118, at 4 (stating the models "remain the most widely cited"), 8 (quoting the National Academies of Sciences for recognizing that the chosen models represent "the most widely used impact assessment models" available).

206 2010 TSD, supra note 171, at 5.

207 Response to Comments, supra note supra note 118, at 4.

208 See Chris Hope faculty bio page, University of Cambridge Judge Business School, https://www.jbs.cam.ac.uk/faculty-research/research-teaching-staff/chris-hope/.

The three models reflect a wide diversity of methodological assumptions about a range of key parameters and inputs.209 This reflects, in part, different judgments about the experts who developed the models. For instance, Richard Tol, who developed the FUND model, has stated that "[t]he impact of climate change is relatively small," and dismissed much of the research behind climate change as "scaremongering" rather than "sound science."210 Unsurprisingly, his model produces the lowest damage estimates of the three models incorporated by the Working Group.211 William Nordhaus, who developed the DICE model, is widely credited with popularizing the goal that global temperatures increase no more than 2° Celsius (or 3.6° Fahrenheit) above pre-industrial levels212—a goal now considered conservative by the global community.213 His model produces higher damage estimates that are close to the Working Group's average damage valuations.214 [EPA-HQ-OAR-2022-0829-0743, pp. 30-31]

209 See 2010 TSD, supra note 171, at 6 (discussing how "[t]he parameters and assumptions embedded in the three models vary widely").

210 Richard S.J. Tol, Why Worry About Climate Change?, ESRI Research Bulletin 2009/1/1, at 3, 5 (2009).

211 See 2010 TSD, supra note 171, at 50 tbl.A5 (reporting that FUND model has the lowest mean estimate of the three models at all discount rates, including a negative social cost of carbon estimate at a 5% discount rate).

212 The 2° C Limit on Global Warming, The Economist (Dec. 6, 2015), https://www.economist.com/the-economist-explains/2015/12/06/the-2degc-limit-on-global-warming.

213 For instance, the Paris Agreement calls for governments to "hold[] the increase in the global average temperature to well below 2°C above pre-industrial levels and pursu[e] efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." Paris Agreement to the United Nations Framework Convention on Climate Change, Art. 2(1)(a), Dec. 12, 2015, T.I.A.S. No. 16-1104.

214 Compare 2010 TSD, supra note 171, at 50 tbl.A5 with id. at 1.

Opponents of climate mitigation policy sometimes point to criticisms from Robert S. Pindyck, a noted climate economist who has been critical of the Working Group's choice of damage functions. But as Professor Pindyck has himself stated, his "writings continue to be taken out of context by some to unfairly attack the Interagency Working Group's methodology and its interim estimates."215 While Professor Pindyck has questioned the shape of the models' damage functions,216 he has acknowledged that the damage functions reflect "common beliefs" about the effects of two or three degrees of warming. [EPA-HQ-OAR-2022-0829-0743, p. 31]

215 Robert S. Pindyck, Comments on "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990" at 1 (June 15, 2021), https://www.regulations.gov/comment/OMB-2021-0006-0012.

216 Robert S. Pindyck, Climate Change Policy: What do the Models Tell Us? (Nat'l Bureau of Econ. Research, Working Paper No. 19244) 16 (2013), https://perma.cc/G25M-MA7W.

And Pindyck states that uncertainty about the social cost estimates, including the damage functions, "does not imply that [their] value should be set to zero until the uncertainty is resolved."217 In fact, he actually advocates for an even higher social cost value than that produced by the Working Group218 and declared in 2017 (prior to the release of the Draft SC-GHG Update) that "the federal government should continue to use the [Working Group's] interim estimates . . . as lower bound estimates."219 [EPA-HQ-OAR-2022-0829-0743, p. 31]

217 Robert S. Pindyck, Comments to Ms. Catherine Cook, Bureau of Land Management, on Proposed Rule and Regulatory Impact Analysis on Delay and Suspension of Certain Requirements for Waste Prevention and Resource Conservation 3 (Nov. 6, 2017), https://perma.cc/8MY5-58P5; see also Pindyck, supra note 216, at 16 (My criticism of IAMs should not be taken to imply that because we know so little, nothing should be done about climate change right now, and instead we should wait until we learn more. Quite the contrary.").

218 Pindyck, supra note 215, at 1 ("My work instead strongly suggests that the estimates of the social cost of greenhouse gases should be higher than the February 2021 interim estimates[.]") In 2019, Pindyck's own estimate of the average social cost of carbon dioxide was between $80 to $100, with plausible values going up to $200. Robert S. Pindyck, The Social Cost of Carbon Revisited, 94 J. ENV'T ECON. & MGMT. 140, 140, 154–55 (2019). This is far higher than the Working Group's current central estimate of $51.

219 Pindyck, supra note 215, at 1.

In other words, the best critic of the Working Group's methodology that opponents could find supports the continued use of the Working Group's estimates and considers them to be conservative underestimates of the true cost to society of greenhouse gas emissions. His conclusion is supported by EPA's Draft SC-GHG Update, which provides conclusive evidence that the Working Group's climate-damage valuations are underestimates. Accordingly, criticisms of the Working Group's valuations from opponents of sensible climate policy are groundless. [EPA-HQ-OAR-2022-0829-0743, p. 31]

IV. EPA Should Conduct Additional Analysis Using the Climate-Damage Estimates from the Draft SC-GHG Update and the Discounting Approach from the Draft Circular A-4 Update

While EPA's application of the Working Group's climate-damage valuations as conservative underestimates is legally justified, the agency should conduct additional analysis using the draft climate-damage valuations that EPA recently published.220 EPA's draft valuations faithfully implement the roadmap laid out in 2017 by the National Academies of Sciences for updating the social cost of greenhouse gases221 and apply recent advances in the science and economics on the costs of climate change. EPA's methodology and valuations are consistent with those applied by a range of expert independent researchers. And while EPA's draft valuations remain underestimates,222 they more fully account for the costs of climate change by incorporating the latest available research on climate science, damages, and discount rates. While EPA should apply the Draft SC-GHG Update in sensitivity analysis if it finalizes this regulation prior to its finalization of that update, it should consider applying those valuations in its primary analysis (with the Working Group's estimates in sensitivity analysis) should it finalize the SC- GHG Update before this rule. [EPA-HQ-OAR-2022-0829-0743, p. 32]

220 Draft SC-GHG Update, supra note 9.

221 Nat'l Acads. Sci., Engineering & Med., Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide (2017).

222 Draft SC-GHG Update, supra note 9, at 4 ("[B]ecause of data and modeling limitations . . . estimates of the SC- GHG are a partial accounting of climate change impacts and, as such, lead to underestimates of the marginal benefits of abatement."); id. at 72.

Likewise, EPA should also conduct additional analysis using the discounting approach from the Draft Circular A-4 Update. The Draft Circular A-4 Update would ensure that long-term benefits and costs receive proper consideration in regulatory impact analysis. Specifically, the Draft Circular A-4 Update proposes to lower the default, risk-free consumption discount rate used in regulatory impact analysis from the current 3% to 1.7%, based on updated data and extensive economic scholarship.223 Also reflecting current economic literature, the update would eliminate the use of the opportunity cost of capital discount rate (i.e., the 7% rate in the current Circular A-4) and replace it with the shadow price of capital approach.224 These updates are consistent with the best available evidence and widely supported by the leading experts in the field.225 Once again, EPA should apply the discounting approach from the Draft Circular A-4 Update in sensitivity analysis if it finalizes this regulation prior to OMB's finalization of that update, and consider applying that approach in its primary analysis should OMB finalize the Circular A-4 Update before this rule is finalized. [EPA-HQ-OAR-2022-0829-0743, p. 32]

223 Draft Circular A-4 Update, supra note 10, at 75–76.

224 Id. at 78–80.

225 Howard et al., supra note 134.

Table 1 shows the climate benefits of the Proposed Rule and Alternative 1 (the proposal's more stringent alternative) using EPA's "central" certainty-equivalent near-term discount rate of

2%.226 For comparison, the table presents those estimates alongside the four estimates from the Working Group that EPA provides in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0743, p. 32]

226 Id. at 9 (describing 2% as the "central" rate).

Table 1: Climate Benefits Using Draft SC-GHG Update (2020$ Billion)

Working Group 5% Average: Proposed Program: 82; Alternative 1: 91

Working Group 3% Average: Proposed Program: 330; Alternative 1: 360

Working Group 2.5% Average: Proposed Program: 500; Alternative 1: 560

Working Group 3% 95th percentile: Proposed Program: 1000; Alternative 1: 1100

Draft Update (2% discount)227: Proposed Program: 1200; Alternative 1: 1300 [EPA-HQ-OAR-2022-0829-0743, p. 32]

227 Emissions in future years are discounted back to present value using a 3% discount rate. This is consistent with EPA's approach to the climate-damage valuations using non-standard discount rates of 2.5% and 5%.

Table 2 shows the net benefits of the Proposed Rule and Alternative 1 using the 1.7% discount rate from the Draft Circular A-4 Update (except for climate benefits, which are discounted starting at a near-term rate of 2% per the Draft SC-GHG Update).

Table 2: Net Benefits Using 1.7% Social Discount Rate (2020$ Billion)

3% discount rate, 3% average SC-GHG from Interagency Working Group: Proposed Program: 1600; Alternative 1: 1800

3% discount rate, 2% average SC-GHG from EPA's 2022 Draft Update: Proposed Program: 2500; Alternative 1: 2800

1.7% discount rate, 2% average SC-GHG from EPA's 2022 Draft Update: Proposed Program: 3200; Alternative 1: 3500 [EPA-HQ-OAR-2022-0829-0743, p. 33]

As Table 2 illustrates, the net benefits of both of the proposed program and Alternative 1 increase when a 1.7% social discount rate is applied (with a 2% near-term discount rate applied to climate impacts consistent with the Draft SC-GHG update). As these updated discount rates are used, the net benefits of Alternative 1 relative to the proposed program also increase. [EPA-HQ-OAR-2022-0829-0743, p. 33]

By applying the latest available science and evidence on both discounting and valuing climate damages, EPA will ensure a more complete presentation and analysis of the benefits and costs of the Proposed Rule and any alternatives that it considers. [EPA-HQ-OAR-2022-0829-0743, p. 33]

Conclusion

For the foregoing reasons, it is appropriate for EPA to continue to apply the Working Group's valuations of the social cost of greenhouse gases in the Proposed Rule as conservatives underestimates. Nonetheless, to bolster its assessment of the costs and benefits of the Proposed Rule and potential alternatives, EPA should conduct additional analysis using the climate-damage estimates from the Draft SC-GHG Update and the discounting approach from the Draft Circular A-4 Update. [EPA-HQ-OAR-2022-0829-0743, p. 33]

Organization: Kentucky Office of the Attorney General et al.

B. The cost-benefit analysis supporting the Proposed Rule is flawed.

The Agency relies on the flawed social cost of carbon metric to measure the alleged benefits of the Proposed Rule. U.S. Environmental Protection Agency, Draft Regulatory Impact Analysis: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (April, 2022) at 560 ("DRIA") (EPA "estimate[s] the social benefits of GHG reductions expected to occur as a result of the proposed and alternative standards using estimates of the social cost of greenhouse gases (SC-GHG)."). The SC-GHG allegedly represents "the monetary value of the net harm to society associated with a marginal increase in emissions . . . in a given year." Id. EPA asserts that "the SC-GHG includes the value of all climate change impacts (both negative and positive), including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk and natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services." Id. [EPA-HQ-OAR-2022-0829-0649, pp. 9-10]

This cost-benefit analysis suffers from serious flaws. And when an agency relies "on a cost benefit analysis as part of its rule-making, a serious flaw undermining that analysis can render the rule unreasonable." National Ass'n of Home Builders v. EPA, 682 F.3d 1032, 1040 (D.C. Cir. 2012). Specifically, EPA's SC-GHG analysis dramatically and unjustifiably inflates the alleged benefits of the Proposed Rule in relation to its costs. [EPA-HQ-OAR-2022-0829-0649, pp. 9-10]

For example, the Proposed Rule uses a discount rate much lower than the normal 7%. A lower discount rate ensures that the putative benefits of regulation always outweigh the costs. Longstanding guidance from the Office of Management and Budget's Circular A-4 stipulates a 7% discount rate for rules that primarily affect capital investment. Here, EPA specifically rejects that guidance. "EPA concludes that a 7 percent discount rate is not appropriate to apply to value the social cost of greenhouse gases . . . ." DRIA at 564. Instead, the Proposed Rule utilizes a 3% discount rate—a decrease of 57%. The Proposed Rule settles on the 3% discount rate "for simplicity in presentation" and because 3% "is the rate used in past GHG rules[.]" 88 Fed. Reg. 29,199. But mere convenience has never been recognized as a reason to short-circuit adequate cost-benefit analysis. [EPA-HQ-OAR-2022-0829-0649, pp. 9-10]

The Agency argues that "to discount the future benefits of reducing GHG emissions inappropriately underestimates the impacts of climate change for the purposes of estimating the SC-GHG." DRIA at 563. EPA is wrong, and its conclusory, normative statement appears to misunderstand the basic economic function of a discount rate. Its lower discount rate is simply a ruse to help the Agency arrive at its preferred, but not accurate, cost-benefit analysis. Though the Office of Management and Budget ("OMB") is in the process of amending Circular A-4—a proposal that has its own flaws—OMB specifically indicated that the version requiring utilization of a 7% discount rate "remains in effect." Draft OMB Circular A-4 (April 6, 2023), https://www.whitehouse.gov/wp-content/uploads/2023/04/DraftCircularA-4.pdf. [EPA-HQ-OAR-2022-0829-0649, pp. 9-10]

Additionally, the Proposed Rule considers global climate impacts instead of focusing on domestic impacts. DRIA at 563. According to EPA, "[t]he only way to achieve an efficient allocation of resources for emissions reductions on a global basis … is for all countries to base their policies on global estimates of damages." Id. But Congress did not authorize the Agency to address international pollution through tailpipe emissions regulation. And under the presumption against extra-territoriality, courts generally limit the application of statutes to domestic applications. RJR Nabisco, Inc. v. Eur. Cmty, 579 U.S. 325, 335, 136 S. Ct. 2090, 2100 (2016) ("When a statute gives no clear indication of an extraterritorial application, it has none." (citation omitted)). [EPA-HQ-OAR-2022-0829-0649, pp. 9-10]

The effect of these errors is significant. EPA estimates the value of the Proposed Rule's benefit at between "$83 billion and $1.0 trillion across a range of discount rates and values for the social cost of carbon." 88 Fed. Reg. at 29,344. The range of these supposed benefits illustrates their arbitrary and capricious nature. When EPA irrationally and arbitrarily stacks the benefit side of the cost-benefit deck, it negates the usefulness of that analysis. [EPA-HQ-OAR-2022-0829-0649, pp. 9-10]

Organization: Landmark Legal Foundation

When performing the legally required analysis to calculate the costs and benefits of the Proposed Rule, the Environmental Protection Agency ("EPA") uses a metric calculated by an entity with no statutory or constitutional authority. Costs and benefits in the Proposed Rule are calculated based on values called the "social cost" of carbon, methane, and nitrous oxide emissions, collectively known as Social Cost of Greenhouse Gases ("SC-GHGs"). These metrics measure the predicted cost of each ton of greenhouse gas released into the atmosphere. An SC-GHG valuation "in principle includes the value of all climate change impacts." 88 Fed. Reg. 29199n130 (May 5, 2023). The valuations generally are used to estimate the benefit of imposing policy that regulates sources of greenhouse gas production, or the climate cost of permitting projects that increase greenhouse gas emissions. Since 2008, the federal government has used Social Cost of Carbon valuations when considering regulatory actions. Jane A. Leggett, Federal Citations to the Social Cost of Greenhouse Gases, Congressional Research Service, March 21, 2017, available at https://sgp.fas.org/crs/misc/R44657.pdf (Accessed June 20, 2023). By 2017, there were at least 160 regulatory actions that cited SC-GHG valuations in their calculations. Id. [EPA-HQ-OAR-2022-0829-0547, pp. 2-3]

SC-GHG valuations, however, may be used to manipulate regulatory cost-benefit analyses to support otherwise unjustifiable proposed rules. For example, this Proposed Rule purports that its benefits come from the greenhouse gases it will prevent from being emitted. According to the proposed rule and its SC-GHG estimates, the benefits of the new standards would equate to "$83 billion to $1.0 trillion across a range of discount rates and values for the social cost of carbon..." 88 Fed Reg 29344 (May 5, 2023). [EPA-HQ-OAR-2022-0829-0547, pp. 2-3]

As rosy as these outcomes appear, the Proposed Rule is illegitimate because its cost benefit analysis is based on improperly established SC-GHG valuation standards. Shortly after entering office, President Biden issued Executive Order 13990 ("EO 13990" or "the Order"), creating the IWG. The IWG was formed with the express purpose of issuing a monetary valuation to be used by every government agency in calculating the costs of emitting certain greenhouse gases. The SC-GHGs that underlie the justification for the proposed rule are based upon valuations promulgated by this group. The IWG, however, is not vested with any constitutional or statutory authority to institute such a policy. Thus, the creation of the IWG and the use of its published SC-GHG valuations violate the federal rulemaking process and the Constitution's separation of powers. For this reason, the proposed rule is unlawful. [EPA-HQ-OAR-2022-0829-0547, p. 3]

The IWG is not vested with any statutory authority to act as an agency. Lacking a clear statement of congressional intent, the President did not have the authority to implement the IWG in the first place. [EPA-HQ-OAR-2022-0829-0547, pp. 3-4]

No statute vests the IWG with any authority and President Biden's Order establishing it does not cite any statutes. He claims that "the authority vested in [him] as President by the Constitution and the laws of the United States of America" allows him to issue the Order. Exec. Order 13990 (January 20, 2021). But this purported authority resides neither in the law nor in the Constitution. [EPA-HQ-OAR-2022-0829-0547, pp. 3-4]

The IWG provisions of EO 13990 differ significantly from other Executive Orders issued around the same time. For example, contrast the vague assertion of statutory authority in EO 13990 with the operative language in EO 14054. In EO 14054, President Biden states that his authority to terminate a declaration of an emergency comes from "the International Emergency Economic Powers Act....the National Emergencies Act. section 212 (f) of the Immigration and Nationality Act of 1952. , and section 301 of title 3, United States Code." Exec. Order No. 14054 (Nov. 18, 2021). Similarly, Section 3 of EO 13990 specifically cites "the Antiquities Act, 54 U.S.C. 320301, et seq." to establish the statutory authority to direct the Secretary of the Interior to review monument boundaries and conditions. 86 Fed. Reg. 7039 (Jan. 25, 2021). [EPA-HQ-OAR-2022-0829-0547, pp. 3-4]

The Presidential power that underpins executive orders "must stem either from an act of Congress or from the Constitution itself." Youngstown Sheet & Tube Co. v. Sawyer, 343 U.S. 579 (1952). This requirement for clear statutory authorizations is essential to maintain the separation of powers and to prevent overreach of executive power. In this case, EO 13990 creates a body with quasi-legislative authority without a Congressional grant to do so. This EO therefore violates the Constitution. [EPA-HQ-OAR-2022-0829-0547, pp. 3-4]

For the IWG to legally behave like an agency, as it has by creating the SC-GHG rules, Congress must enact a statute granting that power. The President does not have, nor has he even claimed to have, specific statutory or constitutional authority to create such an agency. Only the legislature retains such privileges. And because the legislature has not exercised that power here, the President may not vest the IWG with the authority to issue regulatory actions carrying the full force of law. [EPA-HQ-OAR-2022-0829-0547, pp. 3-4]

Organization: Landmark Legal Foundation

The Proposed Rule uses a metric established by an entity with no constitutional or statutory authority. The Interagency-Working Group ("IWG") is not vested with any statutory authority to act as an executive agency. Therefore, the President did not have the authority to implement the IWG in the first place. [EPA-HQ-OAR-2022-0829-0547, pp. 1-2]

2. The IWG nonetheless acts as an agency and is therefore subject to the Administrative Procedures Act ("APA"). [EPA-HQ-OAR-2022-0829-0547, pp. 1-2]

3. The APA requires agencies to follow a proscribed rulemaking process that provides opportunities for the public to comment on agency actions. The IWG bypassed this process when it established new metrics for the Social Costs of Greenhouse Gas ("SC- GHG"). [EPA-HQ-OAR-2022-0829-0547, pp. 1-2]

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The IWG acts as an agency and is therefore subject to the APA. [EPA-HQ-OAR-2022-0829-0547, pp. 5-6]

The President is within his power to create advisory boards to advise him on policy recommendations. Congress, however, "under its legislative power is given the establishment of offices [read: agencies], the determination of their functions and jurisdiction..." Myers v. United States, 272 U.S. 52 (1926). [EPA-HQ-OAR-2022-0829-0547, pp. 5-6]

The IWG's role as a promulgator of binding SC-GHG valuations goes beyond a legal advisory role, and instead makes it an agency. In EO 13990 § 5(b)(ii), which describes the "Mission and Work" of the IWG, the Order charges the IWG with the duties of an agency. The Order states that the Working Group will publish their binding valuations of SC-GHGs "as appropriate and consistent with applicable law." 86 Fed. Reg. 7040 (Jan. 25, 2021). The Order also tasks the IWG to "publish an interim SCC, SCN, and SCM." 86 Fed. Reg. 7040 (Jan. 25, 2021). Moreover, the Order tasks the IWG with publishing a final valuation of SC-GHGs "by no later than January 2022." Id. Those numbers are what "agencies shall use when monetizing the value of changes in greenhouse gas emissions..." (emphasis added). Id. In other words, the valuations published by the IWG are binding to other government agencies and are not simply figures produced to advise the President on relevant climate issues. The SC-GHG valuations the working group produces therefore constitute technical guidelines that are implemented in further governmental policy and action. [EPA-HQ-OAR-2022-0829-0547, pp. 5-6]

Given these substantial agency activities, the IWG is subject to the requirements of the APA. [EPA-HQ-OAR-2022-0829-0547, pp. 5-6]

The APA dictates a stringent rulemaking process, which is essential for public input. Nonetheless, the IWG bypassed this process completely. [EPA-HQ-OAR-2022-0829-0547, pp. 6-7]

The APA defines a regulation as "the whole or part of an agency statement of general or particular applicability and future effect designed to implement, interpret, or prescribe law or policy." 5 U.S.C. § 551. According to this statue, the binding prescriptive and implementary nature of the valuations used in the Proposed Rule makes them regulations. Regulations encompassed by the APA, but which have not been implemented according to the APA rulemaking process, are built upon unauthorized and improper legal grounds. The Proposed Rule, derived from such unlawful regulations in EO 13990 and the subsequent IWG valuation, is also unauthorized and improper under the APA. [EPA-HQ-OAR-2022-0829-0547, pp. 6-7]

The APA requires that, for an agency to create a new rule, an agency must follow the steps of the rulemaking process, which consists of posting a proposed rule, receiving and responding to public comments, and then posting the final rule. This all takes place on the public Federal Register website, ensuring that the American public, and all other interested parties, can provide meaningful input before a rule takes on the full force and effect of law. EO 13990 circumvents this process by skipping notice and comment altogether and implementing the SC- GHG valuations directly. This end-run of the rulemaking process violates the APA. [EPA-HQ-OAR-2022-0829-0547, pp. 6-7]

The very purpose of the APA is to allow notice-and-comment, public discourse, open criticism, and abridgements to be part of the regulatory process. It is especially critical when certain regulations will have prominent effects on individual Americans or vast swaths of the American economy. The APA was not passed by Congress simply as a procedural formality, but rather as a direct response to the actions of President Roosevelt, who massively increased the size and centralization of the executive branch. Hall, D: Administrative Law Bureaucracy in a Democracy 4th Ed., page 2. Pearson, 2009. [EPA-HQ-OAR-2022-0829-0547, pp. 6-7]

The APA is meant to protect the separation of powers in our government. It is unacceptable for the Biden administration to circumvent this check on power through the fiat of Executive Order. This intrusion must be rectified. [EPA-HQ-OAR-2022-0829-0547, pp. 6-7]

The federal rulemaking process is supposed to create regulations that allow federal agencies to effectively enforce congressional statutes. Without adherence to Notice and Comment, the administrative state could legislate on its own, without oversight from the public. Circumvention of Notice and Comment is antithetical to Article I, Section I of the US Constitution, which vests the legislative power solely in the people's immediate representatives. [EPA-HQ-OAR-2022-0829-0547, p. 8]

With this EPA tailpipe regulation, based on the inclusion of unlawful SC-GHG metrics produced by the IWG, the public has not been afforded the proper Notice and Comment period. Since this method was created without going through the formal rulemaking process, the valuations are invalid, and the Proposed Rule itself is unlawful. [EPA-HQ-OAR-2022-0829-0547, p. 8]

Organization: Our Children's Trust (OCT)

As an example, transitioning Montana to 100% wind-water-solar for all energy purposes reduces Montana's 2050 annual energy costs by 69.6% or $6.3 billion per year, saves another $1.7 billion per year in health costs and an additional $21.1 billion per year in avoided global climate damages. Electric transportation uses less energy than ICE engine transportation, with the Ford F150 EV 3.9 times more efficient than the gas/E85 F150. The efficiencies in EVs and cost savings are true across all states. See Expert Report of Dr. Jacobson and Trial Testimony and Demonstratives in Held v. Montana. [EPA-HQ-OAR-2022-0829-0542, p. 2]

Organization: Paul Bonifas and Tim Considine

Climate Benefit: The EPA bases their climate benefit on an $80 per ton price of carbon, which reflects the global cost of carbon instead of the domestic cost. When correcting for that error, the domestic social cost of carbon for the United States is between $3 and $8 dollars per ton according to the Institute for Energy Research4. This results in a more realistic climate benefit of $22 billion, a $308 billion benefit decrease from the EPA's calculations. [EPA-HQ-OAR-2022-0829-0551, p. 3]

4 Institute for Energy Analysis (2017) "Explaining IERs position on the social cost of carbon," https://instituteforenergyresearch.org/analysis/clarifying-iers-position-social-cost-carbon/

Climate Benefit

EPA Claimed Benefit: $330 billion

Realistic Benefit: $22 billion [EPA-HQ-OAR-2022-0829-0551, pp. 7-8]

EPA estimates $330 billion in climate benefits. Most of these benefits, however, accrue to the global community. The social cost of carbon used in the EPA Regulatory Impact Analysis reflects this global focus but not the domestic social cost of carbon, which is far lower, in contrast to the $80 per ton estimate used by EPA. [EPA-HQ-OAR-2022-0829-0551, pp. 7-8]

For a 3% discount rate, the domestic social cost of carbon for the United States is between $3 and $8 dollars per ton according to the Institute for Energy Research26. The Office of Management and Budget provides guidelines for project evaluation and states: “Your analysis should focus on benefits and costs that accrue to citizens and residents of the United States,”27. Hence, US domestic consumers would realize only $22 billion in net climate benefits with the remaining benefits accruing to consumers outside the US. [EPA-HQ-OAR-2022-0829-0551, pp. 7-8]

26 Institute for Energy Analysis (2017) “Explaining IERs position on the social cost of carbon,” https://instituteforenergyresearch.org/analysis/clarifying-iers-position-social-cost-carbon/

27 Office of Management and Budget (2003) “Circular A4,” https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf

The social cost of carbon is estimated from integrated assessment models (IAM). These models project future emissions and atmospheric concentrations of CO2, average global temperatures, the economic impacts from these temperature changes, the costs of abating greenhouse gas emissions, and the trade- offs from cutting pollution today to avoid environmental damages in the future. Each IAM is different depending on assumptions made about abatement costs, damage costs, and many other parameters. As a result, various IAM studies have strikingly different estimates for the social cost of carbon so that Pindyck28 notes: [EPA-HQ-OAR-2022-0829-0551, p. 8]

28 Pindyck, Robert S. (2013) “Climate change policy: What do the models tell us?” Journal of Economic Literature, 51, 3, 860– 872. (Robert Pindyck is the Bank of Tokyo-Mitsubishi Professor of Economics and Finance at Sloan School of Management at Massachusetts Institute of Technology)

“And here we see a major problem with IAM-based climate policy analysis: the modeler has a great deal of freedom in choosing functional forms, parameter values, and other inputs, and different choices can give wildly different estimates of the SCC and the optimal amount of abatement. You might think that some input choices are more reasonable or defensible than others, but no, “reasonable” is very much in the eye of the modeler. Thus, these models can be used to obtain almost any result one desires.” [EPA-HQ-OAR-2022-0829-0551, p. 8]

Organization: Reginald Modlin and B. Reid Detchon

1. Valuing the social cost of those avoided emissions at $25 per ton would imply a benefit of more than $3 billion per year. Using the “interim” rate of $51 per ton put forward by the Biden administration in 2021, the benefits would come to more than $6 billion per year. At the rate of $76 per ton used in the administration’s proposed Corporate Average Fuel Economy Standards, the benefits exceed $9 billion per year. [EPA-HQ-OAR-2022-0829-0570, pp. 39-40]

212 Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, “Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990” (2021): Figure ES-1: Frequency Distribution of SC-CO2 Estimates for 2020, p. 5: https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf (accessed Mar. 1, 2021)

213 National Highway Traffic Safety Administration, op. cit., supra note 176.

Organization: Senator Shelley Moore Capito et al.

Lastly, both rules rely on a questionable cost metric, known as the Social Cost of Greenhouse Gases (SC-GHG), to inflate the rules' projected benefits and skew its overall cost-benefit analysis. The EPA's use of SC-GHG in its cost estimate relies upon an economic modeling sleight of hand in the form of "discount rates" to exaggerate potential costs associated with the status quo and the benefits of transitioning to BEV s. The estimate also emphasizes theoretical future costs in foreign countries to justify imposing the rules' real costs and job losses on American families today. [EPA-HQ-OAR-2022-0829-5083, p. 5]

Organization: Steven G. Bradbury

Regrettably, the EPA is not likely to adjust its “social cost of carbon” benefits esti- mates downward at all. In fact, the Agency may be planning to dial them way up—perhaps to as high as $3 trillion to $5 trillion—when it finalizes these rules. The proposals rely on the usual discount rates of 3 and 7 percent traditionally used by the Office of Management and Budget (OMB) when estimating the present value of benefits expected to accrue in the distant future. But the Biden OMB has recently proposed to amend its Circular A-4 (gov- erning such calculations) to encourage agencies to use lower discount rates (such as the 1.7 percent rate generally applicable to interest on long-term Treasury bonds) in assessing the value of long-term or so-called “intergenerational” benefits.66 The use of the lower rate will increase the monetized present value of claimed benefits considerably. In these pro- posed rules, EPA has labeled its benefits calculations “interim,” signaling that it may choose to recalculate the benefits using a lower discount rate, should OMB finalize the proposed amendments to A-4. Doing so would only exacerbate the arbitrary nature of the Agency’s inflated benefit estimates for the proposed rules. [EPA-HQ-OAR-2022-0829-0647, p. 23]

66 See https://www.whitehouse.gov/wp-content/uploads/2023/04/DraftCircularA-4.pdf.

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

Rule is Predicated on Flawed Modeling of the Social Cost of Carbon

The proposed rule claims purported climate benefits in terms of carbon dioxide emissions. Specifically, p. 29344 of the proposed rule states: "The present value of climate benefits attributable to the proposed standards are estimated at $83 billion to $1.0 trillion across a range of discount rates and values for the social cost of carbon (present values in 2027 for GHG reductions through 2055)" In engaging in this type of cost/benefit analysis one must assess the robustness of the social cost of carbon. [EPA-HQ-OAR-2022-0829-0674, p. 15]

The tremendous uncertainty associated with the SCC is relevant for this question.40 The SCC is an estimate in dollars of the cumulative long-term damage caused by one CO2 emitted in a specific year. That number also represents an estimate of the benefit of avoiding or reducing one ton of CO2 emissions. The SCC is estimated by Integrated Assessment Models (IAMs), which have been used in the past by the federal government as a basis for regulatory policy. For example, the Obama administration's Interagency Working Group (IWG) had drawn upon three models – abbreviated as DICE, FUND, and PAGE—to estimate the SCC.41,42 The Biden administration appears to be using other models as well.43 [EPA-HQ-OAR-2022-0829-0674, p. 15]

40 Some of the remarks in this comment was also utilized in a separate regulatory comment. See Patrick Michaels, Kevin Dayaratna, Marlo Lewis. Federal Energy Regulatory Commission, Notice Inviting Technical Conference Comments, 86 FR 66293." https://cei.org/wp-content/uploads/2022/04/CEI-Comments-Michaels-Dayaratna-Lewis- Docket-No-PL21-3-000-January-7-2022.pdf

41 IWG, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, August 2016, p. 4, https://www.epa.gov/sites/default/files/2016- 12/documents/sc_co2_tsd_august_2016.pdf (hereafter IWG, TSD 2016).

42 For the DICE (Dynamic Integrated Climate and Economy) model, see William D. Nordhaus, "DICE/RICE Models," https://williamnordhaus.com/dicerice-models. For the FUND (Framework for Uncertainty, Negotiation, and Distribution) model, see "FUND Model, http://fund-model.org (accessed September 15, 2021). For the PAGE (Policy Analysis for the Greenhouse Effect) model, see Climate CoLab, "PAGE," https://www.climatecolab.org/wiki/PAGE

43 Interagency Working Group, "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990" https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf (hereafter IWG, TSD 2021) and United States Environmental Protection Agency, "EPA External Review Draft of "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances," November 11, 2022, https://www.epa.gov/environmental-economics/scghg

As any model is as good as the assumptions from which it is composed, we took these IAMs in house at The Heritage Foundation and tested their sensitivity to a variety of important and reasonable assumptions. We have found that under very reasonable assumptions they can offer a plethora of different estimates of the SCC, ranging from extreme damages to overall benefits. Therefore, the vast potential estimates of the SCC suggest that the economic impact of climate change is highly questionable, and therefore understanding of climate-related risks is quite uncertain. [EPA-HQ-OAR-2022-0829-0674, pp. 15-16]

Among others, SCC estimates are highly sensitive to:

- Discount rates chosen to calculate the present value of future emissions and reductions. [EPA-HQ-OAR-2022-0829-0674, pp. 15-16]

- Estimated climate sensitivities chosen to estimate the warming impact of projected increases in atmospheric GHG concentration. [EPA-HQ-OAR-2022-0829-0674, pp. 15-16]

- Timespan chosen to estimate cumulative damages from rising GHG concentration. [EPA-HQ-OAR-2022-0829-0674, pp. 15-16]

- Assumptions regarding agricultural benefits [EPA-HQ-OAR-2022-0829-0674, pp. 15-16]

We find the economic impact of climate change (even if it exists) is quite uncertain depending on assumptions made and that the EPA should take note accordingly. [EPA-HQ-OAR-2022-0829-0674, pp. 15-16]

How Discount Rates Affect the SCC44 [EPA-HQ-OAR-2022-0829-0674, pp. 16-17]

44 Sections 3-6 draw upon Kevin Dayaratna's testimony on "Climate Change, Part IV: Moving Toward a Sustainable Future," before the House Oversight and Reform Subcommittee on the Environment, September 24,
2020, https://oversight.house.gov/sites/democrats.oversight.house.gov/files/Dayaratna%20Testimony%2C%20updated%2 0for%20Sept%2024%20hearing.pdf.

Models used to estimate the SCC rely on the specification of a discount rate. Discounting is essential in benefit-cost analysis because compliance costs are best viewed as investments intended to yield benefits in the future. Applying discount rates enables agencies to compare the projected rate of return from CO2-reduction expenditures to the rates of return from other potential investments in the economy. [EPA-HQ-OAR-2022-0829-0674, pp. 16-17]

Office of Management and Budget (OMB) guidance in Circular A-4 specifically stipulates that agencies discount the future costs and benefits of regulations using both 3.0% and 7.0% discount rates.45 The Obama and Biden administrations have suggested that a 7% discount rate is an affront to intergenerational equity, apparently on the theory that discount rates higher than 1% to 2% imply that people living today are more valuable than people living decades or centuries from now.46 [EPA-HQ-OAR-2022-0829-0674, pp. 16-17]

45 Office of Management and Budget, "Circular A-4," Obama White House, February 22, 2017, https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/ (accessed September 27, 2021).

46 IWG, TSD 2021, pp. 17-19.

We respectfully disagree. The point of discounting is not to rank the worth of different generations but to have a consistent basis for comparing alternate investments. Only then can policymakers determine which investments are most likely to transmit the most valuable capital stock to future generations. In other words, discounting clarifies the opportunity cost of investing in climate mitigation, for example, rather than medical research, national defense, or trade liberalization. [EPA-HQ-OAR-2022-0829-0674, pp. 16-17]

Not only is it reasonable to include a 7% discount rate in SCC estimation, it is arguably the best option because 7% is the rate of return of the New York Stock Exchange over the last hundred and twenty-five years and thus particularly pertinent to the financial institutions impacted by this rule.47 Only by using a 7% discount rate can policymakers assess the wealth foregone when government spends funds on GHG reduction rather than other policy objectives or simply allows companies and households to invest more of their dollars as they see fit. [EPA-HQ-OAR-2022-0829-0674, p. 17]

47 D. W. Kreutzer, "Discounting Climate Costs," Heritage Foundation Issue Brief No. 4575, June 16, 2016, https://www.heritage.org/environment/report/discounting-climate-costs; Kevin Dayaratna, Rachel Greszler and Patrick Tyrrell, "Is Social Security Worth Its Cost?" Heritage Foundation Backgrounder No. 3324, July 10, 2018, https://www.heritage.org/budget-and-spending/report/social-security-worth-its-cost.

It is hard to shake the suspicion that the IWG declines to use a 7% discount rate, even as a sensitivity case analysis, because doing so would spotlight the comparatively low rates of return of GHG-reduction policies. [EPA-HQ-OAR-2022-0829-0674, p. 17]

If any government agency is going to use SCC analysis, it should include SCC discounted at 7% as part of its benefit-cost analysis, because only on that basis can the public compare climate policy “investments” to other capital expenditures. And only through such comparisons can policymakers reasonably assess which investments will best position future generations to inherit the most productive capital stock. Furthermore, as the above analysis illustrates, under a 7% discount rate, the SCC is essentially zero and might even be negative at times, suggesting overall net benefits to climate change [EPA-HQ-OAR-2022-0829-0674, p. 18]

Substitution of gas-fired combustion for coal firing reduces net greenhouse gas emissions by nearly 60%. Supercritical natural-gas fired turbine technology can actually reduce net emissions to zero in an experimental plant,51 though a much-anticipated commercial-grade upscaling has yet to be achieved. These developments only serve to emphasize how foolhardy it is to use, as the IWG does, a 300-year period (2000-2300). Dayaratna and his former Heritage Foundation colleague David Kreutzer ran the DICE model with a significantly shorter, albeit still unrealistic, time horizon of 150 years into the future.52 [EPA-HQ-OAR-2022-0829-0674, pp. 19-20]

51 See for example Sonia Patel, "Breakthrough: NET Power’s Allam Cycle Test Facility Delivers First Power to ERCOT Grid," Power, November 18, 2021, https://www.powermag.com/breakthrough-net-powers-allam-cycle-test- facility-delivers-first-power-to-ercot-grid/

52 Dayaratna and Kreutzer, Loaded DICE: An EPA Model Not Ready for the Big Game, Backgrounder No. 2860, The Heritage Foundation, November 21, 2013, https://www.heritage.org/environment/report/loaded-dice-epa-model-not- ready-the-big-game.

Here are the DICE-estimated SCC values with a baseline ending in 2300:

SEE ORIGINAL COMMENT FOR Average SCC Baseline, End Year 2300 [EPA-HQ-OAR-2022-0829-0674, pp. 19-20]

Here are the results with a baseline ending in 2150:

SEE ORIGINAL CMMENT FOR TABLE Average SCC, End Year 2150 [EPA-HQ-OAR-2022-0829-0674, pp. 19-20]

The SCC estimates drop substantially—in some cases by more than 25%—as a result of ending the SCC estimation period in 2150. [EPA-HQ-OAR-2022-0829-0674, pp. 19-20]

How the Equilibrium Climate Sensitivity (ECS) Distribution Affects the SCC

The key climate specification used in estimating the SCC is the equilibrium climate sensitivity (ECS) distribution. Such distributions probabilistically quantify the earth’s temperature response to a doubling of CO2 concentrations. [EPA-HQ-OAR-2022-0829-0674, pp. 20-21]

ECS distributions are derived from general circulation models (GCMs) or more comprehensive earth system models (ESMs), which attempt to represent physical processes in the atmosphere, ocean, cryosphere and land surface. The IWG used the ECS distribution from a study by Gerard Roe and Marcia Baker published 15 years ago in the journal Science.53 This non-empirical distribution, calibrated by the IWG based on assumptions it selected in conjunction with past Intergovernmental Panel on Climate Changes (IPCC) recommendations,54 is no longer scientifically defensible.55 In particular, since 2011, a variety of newer and empirically-constrained distributions have been published in the peer-reviewed literature. Many of those distributions suggest lower probabilities of extreme global warming in response to CO2 concentrations. Figure 1 are three such distributions:56 [EPA-HQ-OAR-2022-0829-0674, pp. 20-21]

53 Gerard H. Roe and Marcia B. Baker. 2007. Why Is Climate Sensitivity So Unpredictable? Science, Vol. 318, No. 5850, pp. 629–632, https://science.sciencemag.org/content/318/5850/629.

54 IWG, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, February 2010, pp. 13-14, https://www.epa.gov/sites/default/files/2016-12/documents/scc_tsd_2010.pdf (hereafter IWG, TSD 2010).

55 Patrick J. Michaels, "An Analysis of the Obama Administration's Social Cost of Carbon," testimony before the Committee on Natural Resources, U.S. House of Representatives, July 22, 2015, https://www.cato.org/publications/testimony/analysis-obama-administrations-social-cost-carbon.

56 Nicholas Lewis, "An Objective Bayesian Improved Approach for Applying Optimal Fingerprint Techniques to Estimate Climate Sensitivity," Journal of Climate, Vol. 26, No. 19 (October 2013), pp. 7414–7429, https://journals.ametsoc.org/view/journals/clim/26/19/jcli-d-12-00473.1.xml; Alexander Otto et al., "Energy Budget Constraints on Climate Response," Nature Geoscience, Vol. 6, No. 6 (June 2013), pp. 415–416, https://www.nature.com/articles/ngeo1836; Nicholas Lewis and Judith A. Curry, "The Implications for Climate Sensitivity of AR5 Forcing and Heat Uptake Estimates," Climate Dynamics, Vol. 45, No. 3, pp. 1009–1923, http://link.springer.com/article/10.1007/s00382-014-2342-y.

SEE ORIGINAL COMMENT FOR Outdated Roe Baker (2007) and More Recent ECS Distributions. Figure 1: A variety of equilibrium climate sensitivity (ECS) distributions

The areas under the curves between two temperature points represent the probability that the earth's temperature will increase between those amounts in response to a doubling of CO2 concentration. For example, the area under the curve from 4°C onwards (known as right-hand "tail probability") represents the probability that the earth's temperature will warm by more than 4°C in response to a doubling of CO2 concentrations. Note that the more up-to-date ECS distributions (Otto et al., 2013; Lewis, 2013; Lewis and Curry, 2015) have significantly lower tail probabilities than the outdated Roe-Baker (2007) distribution used by the IWG.

Here, again, is the IWG's 2016 SCC estimates for 2020-2050:

SEE ORIGINAL COMMENT FOR Table ES—1: Social Cost of CO2, 2010-2050(in 2007 dollars per metric ton of CO2) [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

In Climate Change Economics, Dayaratna and colleagues re-estimated the DICE and FUND models' SCC values using the more up-to-date ECS distributions and obtained the following results:57 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

57 Dayaratna, McKitrick, and Kreutzer, "Empirically Constrained Climate Sensitivity and the Social Cost of Carbon."

DICE Model Average SCC – ECS Distribution Updated in Accordance with Lewis and Curry (2015), End Year 2300

Year: 2020

Discount Rate - 2.5%:$28.92

Discount Rate – 3.0%:$19.66

Discount Rate – 5.0%:$6.86

Discount Rate – 7.0%:$3.57 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Year:2030

Discount Rate - 2.5%:$33.95

Discount Rate – 3.0%:$23.56

Discount Rate – 5.0%:$8.67

Discount Rate – 7.0%:$4.65 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Year: 2040

Discount Rate - 2.5%:$39.47

Discount Rate – 3.0%:$27.88

Discount Rate – 5.0%:$10.74

Discount Rate – 7.0%:$5.91 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Year:2050

Discount Rate - 2.5%:$45.34

Discount Rate – 3.0%:$32.51

Discount Rate – 5.0%:$13.03

Discount Rate – 7.0%:$7.32 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

FUND Model Average SCC – ECS Distribution Updated in Accordance with Lewis and Curry (2015), End Year 2300 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Year: 2020

Discount Rate - 2.5%:$5.86

Discount Rate – 3.0%:$3.33

Discount Rate – 5.0%:–$0.47

Discount Rate – 7.0%:–$1.10 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Year: 2030

Discount Rate - 2.5%:$6.45

Discount Rate – 3.0%:$3.90

Discount Rate – 5.0%:–$0.19

Discount Rate – 7.0%:–$1.01 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Year: 2040

Discount Rate - 2.5%:$7.02

Discount Rate – 3.0%:$4.49

Discount Rate – 5.0%:–$0.18

Discount Rate – 7.0%:–$0.82 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Year: 2050

Discount Rate - 2.5%:$7.53

Discount Rate – 3.0%:$5.09

Discount Rate – 5.0%:$0.64

Discount Rate – 7.0%:–$0.53 [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

Using the more up-to-date ECS distributions dramatically lowers SCC estimates. The IWG's outdated assumptions overstate the probabilities of extreme global warming, which artificially inflates their SCC estimates. In its Fifth Assessment Report (AR5), the IPCC used the Coupled Model Intercomparison Project Phase 5 (CMIP5) models to project future warming and the associated climate impacts.58 Figure 2 compares predicted and observed average tropospheric temperature over the tropics.59 The observations come from satellites, weather balloons, and reanalyses.60 A careful look analysis reveals that only one of the 102 model runs correctly simulates what has been observed. This is the Russian climate model INM-CM4, which also has the least prospective warming of all of them, with an ECS of 2.05°C, compared to the CMIP5 average of 3.2°C. [EPA-HQ-OAR-2022-0829-0674, pp. 21-22]

58 Program for Climate Model Diagnosis and Intercomparison, CMIP5 – Coupled Model Intercomparison Project Phase 5 – Overview, https://pcmdi.llnl.gov/mips/cmip5/.

59 The CMIP5 predictions are available at https://climexp.knmi.nl/start.cgi.

60 Climate reanalyses produces synthetic histories of recent climate and weather using all available observations, a consistent data assimilation system, and mathematical modeling to fill in data gaps. See National Center for Atmospheric Research, Atmospheric Reanalysis: Overview & Comparison, https://climatedataguide.ucar.edu/climate-data/atmospheric-reanalysis-overview-comparison-tables and ECMWF, Climate Reanalysis, https://www.ecmwf.int/en/research/climate-reanalysis

Altogether, faulty assumptions regarding climate sensitivity have been manifested in the SCC and associated regulatory policy, and more realistic assumptions inject significant uncertainty into the potential long-term impact of climate change. [EPA-HQ-OAR-2022-0829-0674, p. 25]

-Negative SCC Values

Policymakers and the media often assume carbon dioxide emissions have only harmful impacts on society. However, CO2 emissions have enormous direct agricultural67 and ecological benefits,68 global warming lengthens growing seasons,69 and warming potentially also alleviates cold-related mortality, which may exceed heat-related mortality by 20 to 1.70 [EPA-HQ-OAR-2022-0829-0674, p. 25]

67 Literally hundreds of peer-reviewed studies document significant%age increases in food crop photosynthesis, dry- weight biomass, and water-use efficiency due to elevated CO2 concentrations. See the Center for the Study of Carbon Dioxide and Global Change's Plant-Growth Database: http://co2science.org/data/plant_growth/plantgrowth.php

68 See, for example, Randall J. Donahue et al. 2013. Impact of CO2 fertilization on maximum foliage cover across the globe's warm, arid environments. Geophysical Research Letters Vol. 40, 1–5, https://friendsofscience.org/assets/documents/CO2_Fertilization_grl_Donohue.pdf; Zaichun Zhu et al. The Greening of the Earth and Its Drivers. 2016. Nature Climate Change 6, 791-795, https://www.nature.com/articles/nclimate3004; and J.E. Campbell et al. 2017. Large historical growth in global gross primary production. Nature 544, 84-87, https://www.nature.com/articles/nature22030.

69 EPA, Climate Change Indicators: Length of Growing Season, https://www.epa.gov/climate-indicators/climate- change-indicators-length-growing-season.

70 Antonio Gasparrini et al. 2015. Mortality risk attributable to high and low ambient temperature: a multicountry observational study, The Lancet, Volume 386, Issue 9991, https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(14)62114-0/fulltext.

Of the three IAMs used by the IWG, only the FUND model estimates CO2 fertilization benefits. Dayaratna and colleagues investigated whether a model with CO2 fertilization benefits could produce negative SCC estimates. A negative SCC means that each incremental ton of CO2 emissions produces a net benefit. [EPA-HQ-OAR-2022-0829-0674, p. 25]

The researchers calculated the probability of a negative SCC under a variety of assumptions. Below are some of the results published both at the Heritage Foundation as well as in the peer-reviewed journal Climate Change Economics:71 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

71 Dayaratna and Kreutzer, "Unfounded FUND: Yet Another EPA Model Not Ready for the Big Game," Backgrounder No. 2897, April 29, 2014, http://thf_media.s3.amazonaws.com/2014/pdf/BG2897.pdf; and Dayaratna et al. (2017).

FUND Model Probability of Negative SCC – ECS Distribution Based on Outdated Roe–Baker (2007) Distribution, End Year 2300

Year: 2020

Discount Rate - 2.5%:0.084

Discount Rate – 3.0%:0.115

Discount Rate – 5.0%:0.344

Discount Rate – 7.0%:0.601 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2030

Discount Rate - 2.5%:0.080

Discount Rate – 3.0%:0.108

Discount Rate – 5.0%:0.312

Discount Rate – 7.0%:0.555 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2040

Discount Rate - 2.5%:0.075

Discount Rate – 3.0%:0.101

Discount Rate – 5.0%:0.282

Discount Rate – 7.0%:0.507 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2050

Discount Rate - 2.5%:0.071

Discount Rate – 3.0%:0.093

Discount Rate – 5.0%:0.251

Discount Rate – 7.0%:0.455 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

FUND Model Probability of Negative SCC – ECS Distribution Updated in Accordance with Otto et al. (2013), End Year 2300 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2020

Discount Rate - 2.5%:0.268

Discount Rate – 3.0%:0.306

Discount Rate – 5.0%:0.496

Discount Rate – 7.0%:0.661 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2030

Discount Rate - 2.5%:0.255

Discount Rate – 3.0%:0.291

Discount Rate – 5.0%:0.461

Discount Rate – 7.0%:0.619 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2040

Discount Rate - 2.5%:0.244

Discount Rate – 3.0%:0.274

Discount Rate – 5.0%:0.425

Discount Rate – 7.0%:0.571 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2050

Discount Rate - 2.5%:0.228

Discount Rate – 3.0%:0.256

Discount Rate – 5.0%:0.386

Discount Rate – 7.0%:0.517 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

FUND Model Probability of Negative SCC – ECS Distribution Updated in Accordance with Lewis (2013), End Year 2300 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2020

Discount Rate - 2.5%:0.375

Discount Rate – 3.0%:0.411

Discount Rate – 5.0%:0.565

Discount Rate – 7.0%:0.685 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2030

Discount Rate - 2.5%:0.361

Discount Rate – 3.0%:0.392

Discount Rate – 5.0%:0.530

Discount Rate – 7.0%:0.645 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2040

Discount Rate - 2.5%:0.344

Discount Rate – 3.0%:0.371

Discount Rate – 5.0%:0.491

Discount Rate – 7.0%:0.598 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2050

Discount Rate - 2.5%:0.326

Discount Rate – 3.0%:0.349

Discount Rate – 5.0%:0.449

Discount Rate – 7.0%:0.545 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

FUND Model Probability of Negative SCC – ECS Distribution Updated in Accordance with Lewis and Curry (2015), End Year 2300 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2020

Discount Rate - 2.5%:0.402

Discount Rate – 3.0%:0.432

Discount Rate – 5.0%:0.570

Discount Rate – 7.0%:0.690 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2030

Discount Rate - 2.5%:0.388

Discount Rate – 3.0%:0.414

Discount Rate – 5.0%:0.536

Discount Rate – 7.0%:0.646 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2040

Discount Rate - 2.5%:0.371

Discount Rate – 3.0%:0.394

Discount Rate – 5.0%:0.496

Discount Rate – 7.0%:0.597 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Year: 2050

Discount Rate - 2.5%:0.354

Discount Rate – 3.0%: 0.372

Discount Rate – 5.0%:0.456

Discount Rate – 7.0%: 0.542 [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

As the above statistics illustrate, under a variety of reasonable assumptions, the SCC has a substantial probability of being negative. In fact, in some cases, the SCC is more likely to be negative than positive, which implies—if one adopts the perspective of a central planner—that the EPA should, in fact, subsidize (not limit) CO2 emissions. We, of course, oppose such interventionism. Our purpose here is to illustrate the extreme sensitivity of these models to reasonable changes in assumptions as well as to point out that the probabilities of negative SCC value are non-trivial and potentially quite substantial. [EPA-HQ-OAR-2022-0829-0674, pp. 25-27]

Updated Agricultural Benefits and Benefit-Cost Analysis

It is a well-established fact that increases in CO2 concentration enhance plant growth by increasing their internal water use efficiency as well as raising the rate of net photosynthesis.72 As discussed in the previous section, the FUND model attempts to incorporate those benefits; however, this aspect of the model is grounded on research that is one-to-two decades old. Even so, as discussed in the preceding section, Dayaratna et al. (2017) found substantial probabilities of negative SCC using the outdated assumptions in FUND. Dayaratna et al. (2020) summarized more recent CO2 fertilization research in a peer-reviewed study published in Environmental Economics and Policy Studies and re-estimated the FUND model's SCC values upon updating those assumptions.73 To facilitate the EPA's review of that research, we excerpt several paragraphs from Dayaratna et al. (2020): [EPA-HQ-OAR-2022-0829-0674, pp. 27-28]

72 K.E. Idso and S.B. Idso. 1994. Plant responses to atmospheric CO2 enrichment in the face of environmental constraints: A review of the past 10 years' research. Agricultural and Forest Meteorology, 69, 153-203, https://www.sciencedirect.com/science/article/abs/pii/0168192394900256; Jennifer Cuniff et al. 2008. Response of wild C4 crop progenitors to subambient CO2 highlights a possible role in the origin of agriculture. Global Change Biology 14: 576-587, https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2486.2007.01515.x.

73 Kevin Dayaratna, Ross McKitrick, and Patrick Michaels. 2020. Climate sensitivity, agricultural productivity and the social cost of carbon in FUND. Environmental Economics and Policy Studies 22: 433-448, https://link.springer.com/article/10.1007/s10018-020-00263-w.

Three forms of evidence gained since then indicates that the CO2 fertilization effects in FUND may be too low. First, rice yields have been shown to exhibit strong positive responses to enhanced ambient CO2 levels. Kimball (2016) surveyed results from Free-Air CO2 Enrichment (FACE) experiments, and drew particular attention to the large yield responses (about 34%) of hybrid rice in CO2 doubling experiments, describing these as “the most exciting and important advances” in the field. FACE experiments in both Japan and China showed that available cultivars respond very favorably to elevated ambient CO2. Furthermore, Challinor et al. (2014), Zhu et al. (2015) and Wu et al. (2018) all report evidence that hybrid rice varietals exist that are more heat-tolerant and therefore able to take advantage of CO2 enrichment even under warming conditions. Collectively, this research thus indicates that the rice parameterization in FUND is overly pessimistic. [EPA-HQ-OAR-2022-0829-0674, pp. 27-28]

Second, satellite-based studies have yielded compelling evidence of stronger general growth effects than were anticipated in the 1990s. Zhu et al. (2016) published a comprehensive study on greening and human activity from 1982 to 2009. The ratio of land areas that became greener, as opposed to browner, was approximately 9 to 1. The increase in atmospheric CO2 was just under 15% over the interval but was found to be responsible for approximately 70% of the observed greening, followed by the deposition of airborne nitrogen compounds (9%) from the combustion of coal and deflation of nitrate-containing agricultural fertilizers, lengthening growing seasons (8%) and land cover changes (4%), mainly reforestation of regions such as southeastern North America. [EPA-HQ-OAR-2022-0829-0674, pp. 27-28]

Munier et al. (2018) likewise found a remarkable increase in the yield of grasslands. In a 17-year (1999-2015) analysis of satellite-sensed LAI, during which time the atmospheric CO2 level rose by about 10%, there was an average LAI increase of 85%. A full 31% of earth’s continental land outside of Antarctica is covered by grassland, the largest of the three agricultural land types they classified. Also, for summer crops, such as maize (corn) and soybeans, greening increased an average of 52%, while for winter crops, whose area is relatively small compared to those for summer, the increase was 31%. If 70% of the yield gain is attributable to increased CO2, the results from Zhu et al (2016) imply gains of 60%, 36%, and 22% over the 17-year period for, respectively, grasslands, summer crops and winter crops, associated with only a 10% increase in CO2, compared to parameterized yield gains in the range of 20% to 30% for CO2 doubling in FUND. [EPA-HQ-OAR-2022-0829-0674, pp. 27-28]

Third, there has been an extensive amount of research since Tsingas et al. (1997) on adaptive agricultural practices under simultaneous warming and CO2 enrichment. Challinor et al. (2014) surveyed a large number of studies that examined responses to combinations of increased temperature, CO2 and precipitation, with and without adaptation. In their metanalysis, average yield gains increased 0.06% per ppm increase in CO2 and 0.5% per percentage point increase in precipitation, and adaptation added a further 7.2% yield gain, but warming decreased it by 4.9% per degree C. In FUND, 3°C warming negates the yield gains due to CO2 enrichment. However, based on Challinor et al.’s (2014) regression analysis, doubling CO2 from 400 to 800 pm, while allowing temperatures to rise by 3°C and precipitation to increase by 2%, would imply an average% yield increase ranging from 2.1 to 12.1% increase, indicating the productivity increase in FUND is likely too small. [EPA-HQ-OAR-2022-0829-0674, pp. 27-28]

<u>EPA Summary and Response</u>

<u>Summary:</u>

We have grouped the comments related to the SC-GHG into four distinct themes, the use of discount rates, global versus domestic calculations, fundamental modeling of the SC-GHG, and process level comments related to the SC-GHG. Below is a summary of each theme and EPA's response.

A few commenters expressed concern with how discount rates are applied within the proposed regulation's analyses. For example, the *Kentucky Office of the Attorney General* expressed concern that the proposed rule uses a discount rate much lower than what they characterize as the normal 7%, which they assert ensures that the putative benefits always outweigh the costs. *The Heritage Foundation* also expressed concern over the discount rates used within this rule, "It is hard to shake the suspicion that the IWG declines to use a 7% discount rate, even as a sensitivity case analysis, because doing so would spotlight the comparatively low rates of return of GHG-reduction policies." However, the *Institute for Policy Integrity* wrote at length supporting EPA's choice of discount rate, including support for omitting the 7% discount rate and EPA's choice to use the SC-GHG values calculated with consumption-based discount rates.

American Enterprise Institute, Arizona State Legislature, Kentucky Office of the Attorney General, Paul Bonifas and Tim Considine, and *Senator Shelley Moore Capito* all express concerns with the use of global SC-GHG values, arguing that future damages in foreign countries should not justify domestic costs to Americans today and citing OMB guidance regarding focusing on domestic benefits and costs. However, the *Institute for Policy Integrity* supports EPA's use of global values within the proposed rule, arguing that this global approach is justified because the impacts of GHGs are global, because there are spillover effects from global impacts to the U.S., because of extraterritorial interests of the U.S., because of administrative precedent, because relevant statutes and Executive Orders compel or at least permit it, and in order to facilitate international reciprocity, among other arguments. The *Alliance for Automotive Innovation* supports the presentation of both global and domestic estimates of climate benefits will ensure that the RIA is seen as an objective analysis.

American Enterprise Institute, *Arizona State Legislature, Kentucky Office of the Attorney General*, *Paul Bonifas and Tim Considine and The Heritage Foundation* all criticized the EPA's approach to calculating the SC-GHG. The main comments were related to criticizing the Integrated Assessment Models (IAMs) used for estimating climate damages as incapable of projecting conditions 300 years into the future, the use of purported unrealistic Business as Usual (BAU) scenarios, the use of purported outdated estimates of climate sensitivity, and not including sufficient benefits to agriculture resulting from higher CO2 concentrations. The *Clean Fuels Development Coalition* stated that the calculations of the social cost of carbon are incorrect, and that relying on such estimates in the proposal exceeds EPA's statutory authority.

In contrast, the *Institute for Policy Integrity* defended EPA's process and results against many common criticisms, such as too much uncertainty, ignoring positive climate impacts, too high climate sensitivities, too high emission baselines, or flawed IAMs. *The Institute for Policy Integrity* urged EPA to update the SC-GHG approach to include advances consistent with the draft SC-GHG update from the Oil and Gas rule (2023). They argued that the interim SC-GHG underestimates climate damages by omitting key damage sectors.

Lastly, a few commenters (The Arizona State Legislature, the Clean Fuels Development Coalition, Delek US Holdings, Kentucky Office of the Attorney General and *Landmark Legal Foundation)* criticized the use of the interim SC-GHG for what they claim are violations of administrative process requirements. *Arizona* claims that the adoption of the IWG estimate for the SC-GHG was based solely on the instruction from EO 13990, that it violates the major questions doctrine and the separation of powers, that it never was subject to public comment, and that it is therefore unlawful, unconstitutional, arbitrary, and capricious. Moreover, they claim that it suffers from glaring methodological deficiencies. *The Clean Fuels Development Coalition (et al.)* similarly argues that the SC-GHG estimates have never undergone notice and comment rulemaking procedure, that there is no statutory authority for the IWG interim estimates, and that they are in violation of the APA. Finally, *Delek US Holdings, Inc*. also highlight a claimed lack of public comment, and also criticize the SC-GHG for not incorporating the recommendations of the NAS to update the SC-GHG.

In contrast, *California Air Resources Board* and *Institute for Policy Integrity at NYU School of Law* support the use of the "draft updated SC-GHG methodology that follows what was provided in U.S. EPA's November 2022 supplemental proposal for oil and gas standards".

Response:

Regarding the discount rate used within the SC-GHG, consistent with the recent scientific literature, the recommendations of the National Academies, and the recent update of OMB Circular A-4, the SC-GHG now relies on the use of a dynamic discount rate. This discount rate is calibrated to observed market interest rates in the near term and uses a Ramsey approach to dynamically update the discount rate over the long-term. See the preamble of this rule and the 2023 Final Oil and Gas NSPS RIA for more details. Within the RIA for this final rule, EPA uses updated SC-GHG estimates that EPA believes represents the latest available science and follows the recommendations of the National Academies of Science, Engineering, and Medicine. Please refer to the supplementary material to the Final RIA for the Oil and Gas NSPS, "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances," and the Response to Comments document for the Oil and Gas NSPS for detailed responses pertaining to the rigor of the updated methodology, including the discounting approach.

Note that the EPA presented these updated discount rate estimates in a sensitivity analysis in the December 2022 Supplemental RIA for the Oil and Gas Rulemaking that address recommendations of the National Academies of Sciences, Engineering, and Medicine (2017), and invited public comment on the sensitivity analysis and on the technical report, titled "External Review Draft: Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances," explaining the methodological updates that was included as Supplementary Material to the Oil and Gas Supplemental Proposal RIA. The EPA published and used these estimates in the main analysis of the RIA for the December 2023 Final Oil and Gas NSPS/EG Rulemaking, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review" and responded to public comments received on the new estimates in the Response to Comments document for the Final Oil and Gas Rulemaking.

As also discussed in preamble Section VIII, we monetize benefits of the final CO_2 standards and evaluate other costs in part to better enable a comparison of costs and benefits pursuant to E.O. 12866, but we recognize that there are benefits we are unable to fully quantify. EPA's consistent practice has been to set standards to achieve improved air quality consistent with CAA section 202 and not to rely on cost-benefit calculations, with their uncertainties and limitations, in identifying the appropriate standards. Regarding commenters' assertions that EPA has improperly inflated the climate benefits of the rule, and one commenter's (Steven Bradbury) assertion that the SC-GHG "effectively approaches zero," EPA disagrees with these commenters' contentions. As we explain in preamble Section VIII.E and RIA Chapter 6.2, the SC-GHG is based on a voluminous record, significant public process, and an external expert peer review. EPA's use of SC-GHG for purposes of assessing the monetized climate benefits of this rulemaking is clearly reasonable. While we strongly disagree with commenter Steven Bradbury about monetized climate benefits, solely for purposes of this argument we note that even without the monetized benefits from the SC-GHG the rule would be net beneficial. As further explained in Section VIII.E of the preamble, to the extent that EPA considers the positive monetized net benefits as supportive of the final standards (regardless of magnitude of the net benefits), this illustrative hypothetical shows that the positive monetized net benefits do not depend on either the final rule's SC-GHG estimates or the IWG SC-GHG estimates (see RIA Appendix to Chapter 9 for the latter in the final rule); EPA would still find the emissions reductions, in light of the cost of compliance, available lead time and other factors, justify adoption of these standards. In sum, while the positive net benefits figure supports EPA's final standards, we do not consider it necessary to the justification. EPA finds that this approach, of placing weight on judging the appropriate level of emissions reductions, in light of the costs of compliance and lead time, while still evaluating and considering total social costs and benefits, is consistent with both the Supreme Court's decision in Michigan v EPA, 576 US 743 (2015) and with section 202 of the CAA.

EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4 and EPA's Guidelines for Preparing Economic Analyses. We therefore consider our analysis methodologically rigorous, and a best estimate of the projected benefits and costs associated with the final rule.

With respect to the social cost of greenhouse gases (SC-GHG), as more fully discussed in preamble Section VIII.E and RIA Chapter 6.2, EPA has updated its approach in the final rule and the final approach uses updated estimates of the SC-GHG that reflect recent advances in the scientific literature on climate change and its economic impacts and incorporate recommendations made by the National Academies of Science, Engineering, and Medicine[375]. The EPA published and used these estimates in the RIA for the December 2023 Final Oil and Gas NSPS/EG Rulemaking, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review." As we explain in preamble Section VIII.E and RIA Chapter 6.2, EPA's updated SC-GHG estimates are based on a voluminous record, significant public process, and expert peer review. EPA's use of SC-GHG for purposes of assessing the climate benefits of this rulemaking is clearly reasonable.

[375] National Academies of Sciences, Engineering, and Medicine (National Academies). 2017. Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide. National Academies Press.

An updated discussion of the reasons for focusing on the global impacts of GHGs when calculating the SC-GHG can be found in the preamble for this final rule, as well as the RIA and RTC for the December 2023 Final Oil and Gas NSPS/EG Rulemaking, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review." We incorporate and rely on those reasons for this rulemaking as well. Within the RIA for this final rule, EPA used updated SC-GHG estimates that EPA believes represents the latest available science and follows the recommendations of the National Academies of Science, Engineering, and Medicine. Please refer to the supplement to the 2023 Final Oil and Gas RIA, "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances" for detailed responses pertaining to the rigor of the updated methodology and responses pertaining to the global focus of the SC-GHG estimates. EPA notes that when the Agency is directed to consider costs under the CAA, it does not consider costs on a nationality basis but rather, typically, cost is considered at the facility or firm level without respect to which entity owns or operates the facility(s) or firm(s). Further, EPA's cost estimates in RIAs, including the cost estimates contained in the Final RIA for this rule, regularly do not differentiate between compliance costs expected to accrue to U.S. firms versus foreign interests.[376]

Note that the EPA presented these updated estimates in a sensitivity analysis in the December 2022 Oil and Gas Supplemental RIA that address recommendations of the National Academies of Sciences, Engineering, and Medicine (2017), and invited public comment on the sensitivity analysis and on the technical report, titled External Review Draft: Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances, explaining the methodological updates that was included as Supplementary Material to the Oil and Gas Supplemental Proposal RIA. The EPA published and used these estimates in the main analysis of the RIA for the December 2023 Final Oil and Gas NSPS/EG Rulemaking, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review" and responded to public comments received on the new estimates in the Response to Comments document for the Final Oil and Gas Rulemaking.

As discussed in preamble Section VIII.E and RIA Chapter 6.2, EPA has updated its approach and now uses estimates of the SC-GHG that reflect recent advances in the scientific literature on climate change and its economic impacts and incorporate recommendations made by the National Academies of Science, Engineering, and Medicine[377]. The EPA presented these updated estimates in a sensitivity analysis in the December 2022 Oil and Gas Supplemental RIA that address recommendations of the National Academies of Sciences, Engineering, and Medicine (2017), and invited public comment on the sensitivity analysis and on the technical report, titled

[376] For example, in the RIA for the 2018 Proposed Reconsideration of the Oil and Natural Gas Sector Emission Standards for New, Reconstructed, and Modified Sources, the EPA acknowledged that some portion of regulatory costs will likely "accru[e] to entities outside U.S. borders" through foreign ownership, employment, or consumption (https://www.epa.gov/sites/default/files/2018-09/documents/oil_and_natural_gas_nsps_reconsideration_proposal_ria.pdf, p. 3-13, accessed 03/05/2024). Similarly, some portion of the regulatory costs of this rule will fall on foreign vehicle manufacturers and on companies who import components or entire vehicles made in other countries for sale in the U.S. In general, a significant share of U.S. corporate debt and equities are foreign-owned.

[377] National Academies of Sciences, Engineering, and Medicine (National Academies). 2017. Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide. National Academies Press.

External Review Draft: Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances, explaining the methodological updates that was included as Supplementary Material to the Oil and Gas Supplemental Proposal RIA. The EPA published and used these estimates in the main analysis of the RIA for the December 2023 Final Oil and Gas NSPS/EG Rulemaking, “Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review” and responded to public comments received on the new estimates in the Response to Comments document for the Final Oil and Gas Rulemaking. These estimates have taken on the latest and most up to date science, including updates to the climate model, the socioeconomic, and the damage estimation components. With respect to climate sensitivity, EPA’s updated modeling approach includes representation of climate sensitivity uncertainty consistent with the most recent IPCC assessment, addressing that concern from *Arizona*. Regarding the comments about emissions projections and time horizon of analysis, EPA’s updated modeling is now relying on socioeconomic and emissions projections developed under the Resources for the Future (RFF) Social Cost of Carbon Initiative (referred to as the RFF-SPs). As described in the “Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances” (included as a supplement to the 2023 Final Oil and Gas rule) the RFF-SPs are a set of probabilistic projections of population, GDP, and GHG emissions (CO_2, CH_4, and N_2O) to 2300. Consistent with the National Academies’ recommendation, the RFF-SPs were developed using a mix of statistical and expert elicitation techniques to capture uncertainty in a single probabilistic approach, taking into account the likelihood of future emissions mitigation policies and technological developments, and unlike other sources of projections, they provide inputs for estimation out to 2300 without further extrapolation assumptions. This is a suitable time horizon consistent with the National Academies’ recommendation[378] and OMB Circular A-4 (2003) guidance[379], since in the modeling conducted for this report 2300 is far enough in the future to capture the majority of discounted climate damages. See Section 2.1 and 3 of the “Report on the Social Cost of Greenhouse Gases” from the Final Oil and Gas rule for more discussion. The approach to estimating damages has also advanced – see the “Report on the Social Cost of Greenhouse Gases” for more discussion on the damage modules and the approach to accounting for carbon fertilization.

As we explain in preamble Section VIII.E and RIA Chapter 6.2, the SC-GHG estimates are based on a voluminous record, significant public process, an external expert peer review, as well as being responsive to the recommendation from the National Academy of Sciences, Engineering, and Medicine (NAS, 2017). EPA’s use of SC-GHG for purposes of assessing the climate benefits of this rulemaking is clearly reasonable.

We disagree with commenters, such as *Arizona*, *Clean Fuels Development Coalition, and Delek US Holdings* that the Interagency Working Group (IWG) was required to undertake notice and comment rulemaking in order to recommend values for SC-GHG to EPA. The IWG is not

[378] The National Academies (2017) recommended that socioeconomic scenarios used to estimate the SC-GHG should: “extend far enough in the future to provide inputs for estimation of the vast majority of discounted climate damages”.

[379] Regarding the analytic time horizon for regulatory benefit-cost analysis, OMB Circular A-4 (2003) advises “The ending point should be far enough in the future to encompass all the significant benefits and costs likely to result from the rule” (OMB 2003). OMB Circular A-4 (2023) similarly advises “The ending point for your analysis should be far enough in the future to encompass, to the extent feasible, all the important benefits and costs likely to result from all regulatory alternatives being assessed” (OMB 2023).

an “agency” for purposes of the APA, and it does not violate the separation of powers for the President to provide guidance to agencies on how to perform benefit-cost analyses when appropriate and consistent with applicable law. Commenters are free, as demonstrated by the docket for this rulemaking, to comment on EPA’s approach to estimating SC-GHG and the role those estimates should play in EPA’s decisionmaking about the final standards adopted in this rule. However, EPA notes that it did not primarily use the IWG estimates in this final rule (though they are included as an appendix to RIA Chapter 9), because EPA concluded it would be more appropriate to use estimates of the SC-GHG that reflect recent advances in the scientific literature on climate change and its economic impacts and incorporate recommendations made by the National Academies of Science, Engineering, and Medicine. EPA also notes, as explained above, that the benefit-cost analysis for this rule played a very limited role in decision-making for the standards. EPA did not rely on benefit-cost analysis to *identify* the appropriate standards. That is, EPA did not seek to select standards that would maximize net benefits as calculated by the benefit-cost analysis. Based on the RIA and the range of scenarios we evaluated, we anticipate such an approach would have required significantly more stringent standards, which would, in EPA’s judgment, be inconsistent with the statutory requirement to give appropriate consideration to costs of compliance and lead time. As described in section V of the preamble, and explained above in responding to Stephen Bradbury’s comment, the selection of the final standards was made based on judgments about the feasibility of further emissions reductions, in light of the cost of compliance, available lead time and other factors, and not specifically on estimates of the SC-GHG [380]

EPA considers its use of estimates of the SC-GHG entirely consistent with its authority under the CAA 202(a) to establish standards, and has fully complied with applicable requirements, including Section 307(d) of the Clean Air Act in this rulemaking. Unless a statute requires a different approach, it is entirely permissible for agencies to consider costs and benefits when deciding whether or how to regulate. See, e.g., *Entergy Corp. v. Riverkeeper*, 556 U.S. 208, 226 (2009). The costs and benefits of these final standards plainly include the effects of the standards on emissions of GHG. Any attempt to consider monetized net benefits of this rulemaking must at least attempt to monetize the effect of GHG emissions such as through estimates of SC-GHG. Indeed, courts have held that it may be arbitrary and capricious for agencies not to use SC-GHG in their benefit-cost analyses (see the 2023 Final Oil and Gas NSPS RIA for a more complete history of government use of the SC-GHG).

As discussed in preamble Section VIII.E and RIA Chapter 6.2, EPA has updated its approach and now uses estimates of the SC-GHG that reflect recent advances in the scientific literature on climate change and its economic impacts and incorporate recommendations made by the National Academies of Science, Engineering, and Medicine[381]. The EPA published and used these estimates in the RIA for the December 2023 Final Oil and Gas NSPS/EG Rulemaking, “Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review.” This directly addressed the comment by *Delek US Holdings* suggesting that the EPA follow the NAS

[380] For example, EPA would have adopted the same standards had it considered the IWG estimates to be more appropriate. EPA presents IWG estimates of the SC-GHG for the final standards in an appendix to the RIA. Indeed, as explained above, the rule would be net beneficial even if no monetized climate benefits were included.
[381] National Academies of Sciences, Engineering, and Medicine (National Academies). 2017. Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide. National Academies Press.

recommendations and makes a number of the comments by *Arizona and the Clean Fuels Development Coalition* moot, as there was an opportunity to provide comment on these new values during the Oil and Gas NSPS/EG Rulemaking process. The EPA gave notice in the proposal for this rule that these updated SC-GHG values were under consideration.

8.5 - Criteria air pollutant benefits

Comments by Organizations

Organization: Alliance for Automotive Innovation

E. Comments on Estimated Social benefits of the CO2 Standards

In this section, Auto Innovators comments on the major categories of estimated social benefits for the CO2 performance standards for model years 2027-2032. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

1. Local/Regional Air Quality benefits from Control of Criteria Air Pollutants

The DRIA estimates that the present value of the quantified health benefits from criteria air pollution control range from $64 billion to $290 billion, depending on the discount rate and the dose-response study used for PM2.5 and mortality. This range is so large that it overlaps the lower agency estimate of the Proposed Rule's climate benefits ($83 billion to $1 trillion). Auto Innovators believes that the agency's estimates are not consistent with the findings in the peer-reviewed scientific literature and are exaggerated. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

In any event, any net reductions in PM2.5 emissions (primary or PM2.5 precursors) accomplished by the revised CO2 standards will not provide public health benefits that are additive to the emissions reductions accomplished by EPA's other mobile-source and stationary-source programs for criteria air pollutants. The public health benefits are not additive, as we explain below, because of the way Congress designed the Clean Air Act, structured state implementation plans, and the way EPA defined emissions limits and nonattainment on a community-by-community basis. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Specifically, reductions in vehicle emissions do not provide additive benefits to public health because the structure of the Clean Air Act allows the states to include national changes in mobile source emissions in their state emissions inventories and implementation plans for attainment of the National Ambient Air Quality Standards. In nonattainment areas and areas close to nonattainment, states and localities are disinclined to impose any more limits on stationary source emissions than is necessary to meet EPA's air-quality standards. If state and local limits are unduly strict, new factories may be built in other states and localities where the state implementation plans are not as strict on new stationary sources. (In attainment areas, where PM2.5 health benefits might also be considered, there is the complication of the Prevention of significant Deterioration (PSD) doctrine that needs to be evaluated). Thus, the practical impact of diminished mobile source emissions, at the margin, is somewhat less pressure on stationary sources to meet the requirements described in state implementation plans. Thus, there are benefits from further reductions in mobile source emissions under the Proposed Rule, but they are likely to be realized in reduced compliance costs for stationary sources rather than as public health benefits from reduced overall exposures to PM2.5. The magnitude of the compliance cost savings is likely to be a small fraction of the estimated public health benefits that the agency has claimed, given EPA estimates that the benefits of PM control vastly exceed costs in the stationary source arena. At a minimum, Auto Innovators suggests presentation of two alternative approaches for calculating the benefits of PM2.5 control: one where the benefits are expressed as compliance-cost savings for stationary sources and one – as developed in the DRIA – where the benefits of PM2.5 control are expressed as public health gains. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Auto Innovators made a similar public comment on the DRIA supporting the 2023-2026 rules. In the final rule, Auto Innovators' comment was ignored in the agency's "Response to Comment" document. (This was unusual, as many of the other Auto Innovators comments were handled very carefully in the Response to Comment document). [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

In this rulemaking alone, new criteria pollutant controls are expected to reduce direct PM2.5 emissions from gasoline vehicles by roughly 90%, so those same PM2.5 control benefits should not also be counted as benefits of the CO2 standards and BEVs. Auto Innovators suggests the EPA focus on the potential benefits of a successful transformation to electric vehicles rather than incremental benefits of adding additional PM control beyond the California ACC II requirements. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

The final regulatory impact analysis should acknowledge that the peer-reviewed scientific literature does not generally support the agency's claim that a shift from ICEs to BEVs in the light-duty sector will reduce criteria air pollution across the country. In 2021, Burnham et al. of Argonne National Laboratory (DOE) presented a regional U.S. lifecycle analysis of the impact of BEVs through 2050, accounting for upstream emissions of criteria air pollutants at the powerplant. The abstract of their paper concludes as follows: [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

We generated state-level emission factors using a projection from 2020 to 2050 for three light-duty vehicle types. We found that BEVs currently provide GHG benefits in nearly every state, with the median state's benefit being between approximately 50% to 60% lower than gasoline counterparts. However, gasoline vehicles currently have lower total NOx, urban NOx, total PM2.5, and urban PM2.5 in 33%; 15%; 70%; and 10% of states, respectively. BEV emissions will decrease in 2050 due to a cleaner grid, but the relative benefits when compared to gasoline vehicles do not change significantly, as gasoline vehicles are also improving over this time. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

The results of this study concerning total PM2.5 are especially concerning because the agency's quantified criteria-pollutant benefits in this rulemaking are dominated by an alleged advantage of BEVs with respect to PM2.5 control. Moreover, the lifecycle analysis by Burnham et al. (2021) is published in the peer-reviewed literature, while the agency's lifecycle inputs and analysis have not been peer reviewed by qualified experts. For the final rule, Auto Innovators believes it is unwise for the agency to rely on its lifecycle analysis of criteria air pollutant control as a primary rationale for the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Insofar as criteria air pollution control is considered a primary rationale for a rule that regulates CO2 emissions, we recommend that the agency go beyond an analysis of average ICE emissions and consider "best-in-class" vehicle emissions in the baseline. For example, in a peer-reviewed contribution, Winker et al. (2018) compared HEVs and BEVs in terms of criteria air pollution emissions. When the upstream emissions from BEVs are included, they find that BEV emissions are 0.06 grams per mile (NOx) while average HEV emissions are 0.004 grams per mile (NOx and HC). The results of Winkler et al. are consistent with an earlier paper by Michalek et al. (2011), which found that HEVs and PHEVs, with small battery packs, are environmentally and economically superior to BEVs. Thus, HEVs may be a superior technological option for criteria air pollution control than BEVs, at least in some regions of the country and until the upstream and manufacturing emissions of BEVs are controlled. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

1. Andrew Burnham, Zifeng Lu, Michael Wang, Amgad Elgowainy. Regional Emissions Analysis of Light-Duty Battery-Electric Vehicles. Atmosphere. 12(11). 2021, 1482.

2. S.L. Winkler, J.E. Anderson, L. Garza, W.C. Ruona, R. Vogt, T.J. Wellington. Vehicle Criteria Pollutant (PM, NOx, CO and HCx) Emissions: How Low Should We Go? Climate and Atmospheric Science. 1. 2018, 26.

3. Jeremy J. Michalek, Mikhail Chester, Paulina Jaramillo, Lester B. Lave. Valuation of Plug-In Vehicle Life-Cycle Air Emissions and Oil Displacement Benefits. Proceedings of the National Academy of Sciences. 108(40). 2011, 16554-16558. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Organization: American Enterprise Institute

Because no policy to reduce GHG emissions can satisfy any plausible benefit/cost test — their attendant future climate effects for the most part would approach zero — federal agencies often have included purported "co-benefits," that is, the benefits of reductions in other pollutants, as factors to be considered in the evaluation of proposed regulations and projects. This is particularly the case for the asserted health benefits of reductions in the emissions of fine particulates (PM2.5).19 Like many of the other pollutants included in the co-benefits methodology, fine particulates are a "criteria" pollutant,20 as distinct from "hazardous air pollutants (HAP)." EPA already limits ambient levels of PM2.5 in a separate regulation, and is required under the CAA to determine every five years whether that standard "accurately reflects the latest scientific knowledge" on the health effects of exposure to particulates.21 [EPA-HQ-OAR-2022-0829-0571, pp. 5-8]

19 The EPA discussion of particulate matter regulatory actions is at https://www.epa.gov/pm-pollution/particulate- matter-pm-implementation-regulatory-actions. For sharp critiques of the EPA analysis of the mortality and morbidity effects of fine particulate matter, see https://www.regulations.gov/document/EPA-HQ-OAR-2015-0072- 0260 and https://www.sciencedirect.com/science/article/abs/pii/S0273230017301538. See also https://junkscience.com/2023/06/milloy-sets-off-greens-responds-to-politifact-inquiry-on-wildfire-smoke/#more- 108474.

20 See the EPA summary discussion at https://www.epa.gov/criteria-air-pollutants.

21 See the EPA requirements for fine particulates at https://www.epa.gov/pm-pollution/implementation-national- ambient-air-quality-standards-naaqs-fine-particulate-matter. The CAA sections are at https://www.epa.gov/clean-air- act-overview/clean-air-act-title-i-air-pollution-prevention-and-control-parts-through-d#ia.

The Clean Air Act explicitly requires the EPA, upon finding that a given criteria pollutant endangers the public health, to promulgate a "national ambient air quality standard" (NAAQS) that "protects the public health" with "an adequate margin of safety."22 The CAA also empowers the EPA to regulate emissions of HAP. The law mandates that costs not be considered in the establishment of the NAAQS; this means that those standards are likely to be too stringent in a benefit/cost sense. Lowering the emissions of those pollutants even more through insertion of a co-benefits calculation in a new regulation aimed at an entirely different type of emission means that the excess net costs of the regulation are likely to be driven up even more. [EPA-HQ-OAR-2022-0829-0571, pp. 5-8]

22 See §7409 (b)(1), "National primary and secondary ambient air quality standards" at https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partA- sec7409.htm.

Organization: American Fuel & Petrochemical Manufacturers

In another example of EPA's biased analysis, EPA estimated the value of health benefits from reductions in PM2.5 emissions by multiplying PM2.5-related benefit- per-ton ("BPT") values by the annual reduction in tons of directly emitted PM2.5 and PM2.5 precursor emissions (NOx and SO2) from displaced ICEVs.206 However, EPA ignored the fleet turnover benefit that would result from replacing older ICEVs with new, more efficient, ICEVs.

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Health Impact Analysis

Morbidity Health Endpoints and Ozone Impacts

U.S. EPA's health analysis of the proposed rule focused solely on evaluating mortality, excluding other morbidity health effects associated with fine particulate matter (PM2.5) emission reductions. Reporting morbidity endpoints such as asthma would highlight the importance of this proposed rule, particularly on children and other vulnerable populations. For instance, CARB suggests including additional studies, such as those that show the increased susceptibility of the development of asthma in children due to air pollution. 87, 88 Also, the analysis of the proposed rule only provides the total valuation and does not report the number of health outcomes themselves (e.g., mortality cases). While the economic assessment is important, providing the quantification of the health effects would be valuable in informing the public about the wide range of health implications. Additionally, adding a quantification of ozone impacts would strengthen this analysis and provide a more comprehensive quantitative assessment of the effects of criteria pollutants on health. CARB recommends that U.S. EPA report the number of health cases and quantify the morbidity health effects, providing a more comprehensive understanding of the potential benefits of reducing PM2.5 exposure. Also, we recommend that U.S. EPA similarly include the quantified health impacts of ozone. [EPA-HQ-OAR-2022-0829-0780, p. 52]

87 McConnell R, Berhane K, Yao L, Jerrett M, Lurmann F, Gilliland F, Künzli N, Gauderman J, Avol E, Thomas D, Peters J. Traffic, susceptibility, and childhood asthma. Environ Health Perspect. 2006 May;114(5):766-72.

88 McConnell R, Islam T, Shankardass K, Jerrett M, Lurmann F, Gilliland F, Gauderman J, Avol E, Künzli N, Yao L, Peters J, Berhane K. Childhood incident asthma and traffic-related air pollution at home and school. Environ Health Perspect. 2010 Jul;118(7):1021-6.

Health Impacts at Low Levels of PM2.5 and Ozone

CARB recommends that U.S. EPA also include a discussion of the research showing health impacts at low levels of air pollution, particularly PM2.5 and ozone. Strong associations have been found between PM2.5 levels below the current NAAQS (12 µg/m3) 89 and premature mortality in key multi-city epidemiological studies in the U.S. and Canada. For instance, as included in U.S. EPA's 2022 Supplement to the 2019 Integrated Science Assessment (ISA) for PM, 90 a study by Bennett et al. (2019) found that long-term exposure in excess of very low PM2.5 levels (3 µg/m3) may still lead to lower life expectancy for both men and women. 91 This study is representative of the research studies that show that mortality and morbidity impacts still occur at PM2.5 levels below the current standard. [EPA-HQ-OAR-2022-0829-0780, pp. 52-53]

89 As finalized in the Federal Register 78 No. 10. January 15, 2013. https://www.govinfo.gov/content/pkg/FR- 2013-01-15/pdf/2012-30946.pdf

90 U.S. EPA. Supplement to the 2019 Integrated Science Assessment for Particulate Matter (Final Report, 2022). U.S. Environmental Protection Agency, Washington, DC, EPA/635/R–22/028, 2022.

91 Bennett JE, Tamura-Wicks H, Parks RM, Burnett RT, Pope CA 3rd, Bechle MJ, Marshall JD, Danaei G, Ezzati M. Particulate matter air pollution and national and county life expectancy loss in the USA: A spatiotemporal analysis. PLoS Med. 2019 Jul 23;16(7):e1002856. doi: 10.1371/journal.pmed.1002856. PMID: 31335874; PMCID: PMC6650052.

Similarly, research has demonstrated significant adverse health impacts at ozone levels below the current NAAQS (70 ppb). 92 As described in U.S. EPA's 2020 Ozone ISA, 93 multiple epidemiological studies showed that both short- and long-term exposures to ozone with median or average levels near or below the current 8-hour NAAQS were associated with adverse health outcomes, including lung function decline, increases in childhood asthma onset, preterm births, increased emergency room visits, and premature mortality. CARB therefore recommends that U.S. EPA include and discuss the evidence showing that health impacts still occur at low air pollution levels, as described in U.S. EPA's 2019 PM ISA, 94 2020 Ozone ISAs, and the 2022 Supplement to the PM ISA. [EPA-HQ-OAR-2022-0829-0780, pp. 52-53]

92 As finalized in the Federal Register 80 No. 206 January 15, 2015 https://www.govinfo.gov/content/pkg/FR-2015-10-26/pdf/2015-26594.pdf and retained in the Federal Register 85 No. 251 December 31 2020 https://www.govinfo.gov/content/pkg/FR-2020-12-31/pdf/2020-28871.pdf .

93 U.S. EPA. Integrated Science Assessment (ISA) for Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R–20/012, 2020.

94 U.S. EPA. Integrated Science Assessment (ISA) for Particulate Matter (Final Report, 2019). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R–19/188, 2019.

Organization: Environmental. and Public Health Organizations

F. Comparison of Criteria Emissions and Possible Health Benefits

For this part of the analysis, ERM utilized EPA's COBRA model to estimate the public health benefits associated with all the policy scenarios. ERM's analysis shows that stricter standards and increased deployment of clean L/MD vehicles results in greater gains in terms of consumer savings and avoided public health impacts (such as premature death, hospital admissions and emergency room visits, respiratory symptoms, and reduced activity and lost workdays). The policy scenario reflective of our Alternative 1+ recommended approach achieves the most reductions: nearly an 80% reduction in NOx and a 60% reduction in PM in 2040 compared to 2026 levels. An Alternative 1+ approach is also projected to achieve almost $42 billion in monetized value of reductions: nearly $8.5 billion more in monetized value than would occur under EPA's Main Proposal and preferred approach (as shown in Figure V.F-1). [EPA-HQ-OAR-2022-0829-0759, pp. 31-32]

SEE ORIGINAL COMMENT FOR Table V.F-1: Comparison of Possible Health Benefits114 [EPA-HQ-OAR-2022-0829-0759, p. 31]

SEE ORIGINAL COMMENT FOR Figure V.F-1: Comparison of Possible Health Benefits112 [EPA-HQ-OAR-2022-0829-0759, p. 32]

112 Id. at 12

ERM's analysis incorporates: EPA's assumed changes in tailpipe emission reductions, EPA's upstream assumptions that rely upon the Integrated Planning Model (IPM) for electricity generated units, and ERM assumptions on changes from reduced demand on refining of finished products for diesel (and gasoline) based on the use of Argonne National Laboratory's Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model. [EPA-HQ-OAR-2022-0829-0759, p. 32]

The benefits associated with the Alternative 1+ approach are further depicted in Table V.F-1, which shows the various scenario criteria emissions (NOx and PM) aggregated from 2026-2040 for each of the policy scenarios, as well as possible reduced health incidents, and the monetized value of these reductions (if realized) compared to EPA's No Action scenario.113 [EPA-HQ-OAR-2022-0829-0759, p. 32]

113 ERM's analysis results in slightly lower cumulative reductions of NOx and PM compared with EPA's net air pollutant impacts for the EPA Main Proposal, Alternative 1, and Alternative 3 policy scenarios (Tables 9-37, 9-38 and 9-40 of the DRIA). However, despite the difference, Alternative 1+ would correspond with approximately a 25% increase in benefits relative to the EPA Main Proposal and a similar increase would be expected under EPA's methodology.

114 ERM, Impacts Report at 12.

1. Comparison of Overall Societal Benefits

The results from ERM's analysis (depicted in Figure V.I-1) show that on a net societal basis––inclusive of the costs to fleets as well as air quality benefits, climate benefits, and reduced utility bills—the greatest benefits are seen with Alternative 1+ at about $125.7 billion through the 2040 timeframe. [EPA-HQ-OAR-2022-0829-0759, p. 35]

SEE ORIGINAL COMMENT FOR Figure V.I-1: Comparison of Possible Annual Net Societal Benefits119 [EPA-HQ-OAR-2022-0829-0759, p. 36]

119 Id. at 15.

This figure depicts net annual societal benefits (which incorporates net incremental fleet cost savings, climate benefits, air quality benefits, and reduced utility bills). [EPA-HQ-OAR-2022-0829-0759, p. 36]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

EPA's technical analysis finds that 15,000 tons of PM2.5 would be reduced in 2055 as a result of the proposed LDV and MDV standards. EPA estimates the cumulative monetized benefits of the standards through 2055 to be between $63 and $280 billion (2020 $US) depending on the selected discount rate.27 Other analyses have also demonstrated the substantial health and air quality benefits that can be expected from stringent particulate emission standards. For example, the Manufactures of Emission Controls Association (MECA) conducted a study to model the benefits of a national 0.5 mg/mi PM standard. The study found that implementation of a national 0.5 mg/mi PM standard would result in health cost savings ranging from $18 to $163 billion (2020 $US) depending on the pace of electrification and selected discount rate.28 NESCAUM and the OTC urge EPA to finalize the standards as proposed for all three test cycles. [EPA-HQ-OAR-2022-0829-0584, pp. 10-11]

27 See EPA, DRIA, EPA-420-D-23-003 (Apr. 14, 2023), https://www.regulations.gov/document/EPA-HQ-OAR- 2022-0829-0360. As EPA notes in the DRIA, these monetized benefits do not reflect benefits associated with reducing ambient concentrations of ozone, direct exposure to nitrogen dioxide, or exposure to mobile source air toxics, nor do they account for improved ecosystem effects or visibility. The estimated benefits of the proposal would be larger if these unquantified benefits were monetized.

28 MECA, Impacts Analysis of a Revised Federal Light-Duty On-Road Particulate Matter Standard (June 2023), LDV_PM_Standard_Final_Report_06272023.pdf (meca.org).

Organization: Paul Bonifas and Tim Considine

The air pollutant benefit calculations have serious limitations, including lacking direct measures of individual lifetime pollution exposures and facing the potential for the confounding of effects from the omission of unknown, unmeasured, or inadequately-controlled-for mortality risk factors. With improved pollution controls on internal combustion engines, exposure rates are much lower than in the past and continue to decline as new vehicles replace older models. This suggests that EPAs estimated benefits from reduced criteria air pollutants also may be over-estimated. [EPA-HQ-OAR-2022-0829-0551, p. 4]

The EPA's "benefits" for both Energy Security & Air Pollutant are unchanged in this realistic analysis because it would require a thorough quantitative investigation. However, even with these likely overstated benefits staying consistent, the overall cost of the EPA's rule is still overwhelmingly negative. [EPA-HQ-OAR-2022-0829-0551, p. 4]

Air Pollutant Benefits

The EPA also estimates that their proposed rule could generate between $140 and $280 billion in benefits from reduced criteria air pollutants citing two studies.52 Like the modeling-based social cost of carbon, which is not observable, these studies also have serious limitations, lacking direct measures of individual lifetime pollution exposures and facing the potential for the confounding of effects from the omission of unknown, unmeasured, or inadequately-controlled-for mortality risk factors. With improved pollution controls on internal combustion engines, exposure rates are much lower than in the past and continue to decline as new vehicles replace older models. This suggests that EPAs estimated benefits from reduced criteria air pollutants also may be over-estimated. Even if keeping the EPA's estimate of air pollution benefits untouched, the overall economic impact of this rule is still overwhelmingly negative. [EPA-HQ-OAR-2022-0829-0551, p. 12]

> 52 Wu et al., X, Braun, D, Schwartz, J, Kioumourtzoglou, M and Dominici, F. 2020. "Evaluating the impact of long-term exposure to fine particulate matter on mortality among the elderly." Science Advances 6 (29): eaba5692. Pope III et al., CA, Lefler, JS, Ezzati, M, Higbee, JD, Marshall, JD, Kim, S-Y, Bechle, M, Gilliat, KS, Vernon, SE and Robinson, AL. 2019. "Mortality risk and fine particulate air pollution in a large, representative cohort of US adults." Environmental Health Perspectives 127 (7): 077007.

EPA Summary and Response

Summary:

One commenter stated that the benefits of controlling emissions from light- and medium-duty vehicles far outweigh the costs. Another commenter provided a benefits analysis of different and more stringent standards.

Another commenter claimed that the criteria pollutant benefits analysis was flawed, suggesting that the criteria pollutant benefits of the proposal: (1) are exaggerated; (2) are not additive to the benefits attributable to emissions reductions accomplished by EPA's other mobile-source and stationary-source programs for criteria air pollutants ("because of the way Congress designed the Clean Air Act, structured state implementation plans, and the way EPA defined emissions limits and nonattainment on a community-by-community basis"); and, (3) should be estimated using alternative approaches for calculating the benefits of $PM_{2.5}$ control. The same commenter suggested that direct $PM_{2.5}$ emission reductions from new criteria pollutant controls should not be counted as benefits of the CO_2 standards and BEVs. We also received comment that EPA overestimated $PM_{2.5}$-related benefits due to "the inherent unsupported assumption that the derived C-R relationships continue to hold fully, well below the ranges of exposure observations on which those C-R relationships were based." This commenter suggested benefits from reduced air pollution may be overestimated because exposure rates will be lower in the future and asserted that the benefit calculations have limitations because they lack direct measures of individual lifetime exposures and face potential confounding of effects from the omission of various mortality risk factors.

EPA also received comment that, "The interim IWG estimates are deeply flawed, in that they … incorporate 'co-benefits' in the form of a reduction in the emissions of other criteria and hazardous air pollutants already regulated under different provisions of the Clean Air Act."

One commenter claimed that, when applying the BPT approach to monetizing PM-related health benefits, EPA ignored the fleet turnover benefit that would result from replacing older ICEVs with new, more efficient, ICEVs.

EPA also received comment suggesting we did not monetize non-fatal illnesses in the proposal and that EPA should include a discussion of the research showing health impacts at low levels of air pollution, particularly $PM_{2.5}$ and ozone.

Response:

In this RTC section's response, EPA is focusing on addressing comments related to the health benefits associated with the criteria pollutant impacts of the rule. To the extent that these commenters raise other issues, those issues are addressed elsewhere in this RTC or in the final rule's preamble for this action.

EPA notes that, consistent with CAA section 202, in evaluating potential standards we carefully weighed the statutory factors, including the emissions impacts of the standards, and the feasibility of the standards (including cost of compliance in light of available lead time). We monetize benefits of the standards and evaluate other costs in part to enable a comparison of costs and benefits pursuant to E.O. 12866, but we recognize there are benefits that we are currently unable to fully quantify. EPA's practice has been to set standards to achieve improved air quality consistent with CAA section 202, and not to rely on cost-benefit calculations, with their uncertainties and limitations, as identifying the appropriate standards. Nonetheless, our conclusion that the estimated benefits exceed the estimated costs of the final program reinforces our view that the standards are appropriate under section 202(a). More specifically, for this rule our benefits assessment indicates that the rule has positive net monetized benefits under any of the alternative discount rates. To the extent that EPA considers the positive monetized net benefits as supportive of the final standards (regardless of the magnitude of those positive benefits), net benefits are positive regardless of which stream of $PM_{2.5}$ health benefits are used; EPA would still find the emissions reductions, in light of the cost of compliance, available lead time and other factors, justify adoption of these standards.

After consideration of comments, for the final rule we did not fundamentally alter our approach to estimating criteria air pollutant benefits from that used in the proposal. However, we did conduct air quality modeling of the regulatory program's impacts in 2055 and used the ambient $PM_{2.5}$ and ozone concentration data as inputs to a full analysis of the health benefits (including avoided deaths and avoided non-fatal illnesses) attributable to the rule in 2055. This additional analysis is responsive to comments suggesting EPA include in its analysis ozone-related benefits and quantified estimates of specific health endpoint incidence. We also estimated the present and annualized value of costs and benefits using a 2 percent discount rate, in addition to a 3 and 7 percent discount rate, and we used updated Social Cost of Greenhouse Gas (SC-GHG) values to monetize climate benefits. Both of these updates are responsive to comments requesting the EPA to use a lower range of discount rates than those used in the proposal. Responses to comments related to the SC-GHGs and benefits related to reductions of GHG emissions can be found in Section 8.4 of the RTC. We expand our response to comments about the discount rate later in this section.

EPA agrees with the commenter who stated that the benefits of controlling emissions from light- and medium-duty vehicles far outweigh the costs. Another commenter provided a benefits analysis of different and more stringent standards. To the extent that the information introduced by this commenter was intended to advocate for more stringent standards, we refer the reader to Sections 3.2 and 4 of this RTC document, and Section V of the preamble.

We generally respond to commenters who claimed that the criteria pollutant benefits analysis was flawed by noting that the benefits analyses of the proposed and final rulemakings follow all appropriate best practices, and our methods are described and supported, in detail, in the preamble and RIA that accompany the final rule. EPA's analysis is consistent with applicable guidance and best practices for conducting benefit-cost analyses, including OMB Circular A-4 and EPA's Guidelines for Preparing Economic Analyses. We consider our analysis consistent with the guidance, methodologically rigorous, and a best estimate of the projected societal benefits and costs associated with the final program.

The Agency disagrees with the commenter who claimed that the criteria pollutant benefits of the rule: (1) are exaggerated; (2) are not additive to the benefits attributable to emissions reductions accomplished by EPA's other mobile-source and stationary-source programs for criteria air pollutants ("because of the way Congress designed the Clean Air Act, structured state implementation plans, and the way EPA defined emissions limits and nonattainment on a community-by-community basis"); and, (3) should be estimated using alternative approaches for calculating the benefits of $PM_{2.5}$ control. As noted above, we consider our criteria pollutant benefits a best and credible estimate of those associated with the rule. The improvements in air quality related to the rule are incremental to all other rulemakings that are currently "on the books," and we account for the full suite of already-promulgated rulemakings (for both mobile and stationary sources) in our baseline ("business as usual") scenario to which we compare the changes in air quality once the light- and medium-duty standards are in place. These benefits are also additive to benefits achieved by other regulations, since they will achieve unique emissions reductions attributed specifically to this rulemaking. Furthermore, the regulatory authority under which we promulgate mobile source regulations is distinct from, and independent of, the NAAQS standard-setting process. Regardless of an area's attainment/nonattainment determination status, the light- and medium-duty vehicle standards will apply nationally, and the health benefits associated with the standards will accrue to those who experience reductions in pollution exposure. Any consideration of how these standards might affect decisions related to the NAAQS attainment/nonattainment process is beyond the scope of this rulemaking, and we therefore also reject the suggestion that PM benefits be expressed as compliance-cost savings associated with theoretical (and unsupported) relaxation of stationary source regulations in the future. We further note that state agencies have expressed the view in comments that the emissions reductions of this rule are essential to enabling states to attain and maintain the NAAQS, particularly in light of the CAA's constraints on state regulation of mobile sources. See, e.g., EPA-HQ-OAR-2022-0829-0559, pp. 2-3. Thus, we disagree that these reductions should be treated as displacing other reductions.

The same commenter suggested that direct $PM_{2.5}$ emission reductions from new criteria pollutant controls should not be counted as benefits of the CO_2 standards and BEVs. We respond that we do not double count $PM_{2.5}$ reductions associated with the standards. As discussed above, we are not taking credit for the same $PM_{2.5}$ reductions from the criteria pollutant controls and the GHG standards; the PM reductions from both programs are incremental to each other and additive. We therefore consider it appropriate to assess the benefits of the entire program.

In response to the comment mentioning EPA's monetization of "co-benefits" (benefits related to pollutants other than GHGs such as criteria pollutant benefits), we note that benefits from criteria pollutant reductions are directly related to the criteria pollutant standards being finalized and are a co-controlled pollutant related to the GHG standards. As noted above, the emissions benefits attributable to the GHG and criteria pollutant standards are additive and are not double counted, and their inclusion in the benefit-cost analysis is consistent with OMB Circular A-4 guidance, which states that Agencies should attempt to monetize all of the benefits attributable to a rulemaking in its regulatory impact analyses. Furthermore, we reject the commenter's assertion that somehow the IWG SC-GHG estimates are flawed because they "incorporate 'co-benefits' in the form of a reduction in the emissions of other criteria and hazardous air pollutants already regulated under different provisions of the Clean Air Act." If we interpret this comment to mean that pollution reduction benefits associated with the standards are inflated because they include criteria pollutant benefits that might already be controlled by other regulations, such as the PM NAAQS ($PM_{2.5}$ is the only monetized criteria pollutant benefit in the benefit-cost analysis of the standards; we did not monetize HAP pollutant benefits), this is incorrect. The NAAQS and their associated RIAs illustrate, but do not predict, the benefits and costs of possible emissions control strategies to attain a revised NAAQS; these costs and benefits are illustrative and cannot be added to, nor are they a substitute for, the costs and benefits of policies that prescribe specific emission control measures, such as those associated with the specific mobile source emissions control measures reflected in the benefit-cost analysis of the proposed and final standards.

We respond to comments about fleet turnover in Section 12.1.3 of this RTC document and to the issue of ICE vehicle "backsliding" in Section 12.3 of this document. We respond to the comment regarding criteria pollutants attributable to the shift from ICEs to BEVs in the light-duty sector in Section 19.2 of this RTC document.

In response to the commenter who suggested we did not monetize non-fatal illnesses in the proposal, this is incorrect. For the analysis of both the proposed and final standards, we use a reduced-form "benefit-per-ton" (BPT) approach to estimate the monetized $PM_{2.5}$-related health benefits of the final standards. As described in RIA Chapter 6.5, the BPT approach monetizes avoided premature deaths and illnesses that are expected to occur as a result of reductions in directly-emitted $PM_{2.5}$ and $PM_{2.5}$ precursors attributable to the standards. The commenter was correct in noting that the BPT approach does not monetize ozone (and other air pollutant) benefits, nor does the BPT approach allow us to report on individual health endpoint incidence. The estimated benefits of the standards would be larger if the BPT approach were able to estimate those omitted health benefits. However, as mentioned earlier in this response, EPA conducted full-scale photochemical air quality modeling of the final rule's impacts in 2055. Using the ambient $PM_{2.5}$ and ozone concentration data, we conducted a full benefits analysis that quantifies and monetizes the $PM_{2.5}$- and ozone-related benefits attributable to the rule in 2055. This analysis complements the BPT approach, which we use to monetize $PM_{2.5}$-related benefits in the benefit-cost analysis. See RIA Chapter 7 for more information about the air quality modeling and health benefits analyses.

The same commenter also suggested that EPA include a discussion of the research showing health impacts at low levels of air pollution, particularly $PM_{2.5}$ and ozone, and cited EPA's PM and ozone ISAs as evidence. Drawing from the same robust body of literature, we agree that there are health impacts at low levels of air pollution and that there is no evidence of a threshold below which exposure to $PM_{2.5}$ and ozone yields no health response. In our discussion of criteria pollutant benefits in both the preamble and RIA for this rulemaking, we refer to the health benefits Technical Support Document (Benefits TSD) that accompanied the 2023 PM NAAQS

Proposal, which details the approach used to estimate $PM_{2.5}$- and ozone-related benefits.[382] In that TSD, we summarize some of this research and how it applies to the benefits analysis.

Regarding the comment that EPA has overestimated $PM_{2.5}$-related benefits due to "the inherent unsupported assumption that the derived C-R relationships continue to hold fully, well below the ranges of exposure observations on which those C-R relationships were based," we reject this premise. As detailed in the 2019 PM ISA and previous assessments in support of the PM NAAQS, EPA's review of the science has consistently found no evidence of a threshold below which exposure to $PM_{2.5}$ yields no health response. Specifically, the 2019 PM ISA found that "extensive analyses across health effects continues to support a linear, no-threshold concentration-response (C-R) relationship." This conclusion in the 2019 PM ISA is supported by the more recent evaluation of the health effects evidence detailed in the recently released Supplement to the PM ISA which found "continued evidence of a linear, no-threshold concentration-response (C-R) relationship."

As noted above, based on the evidence and lack of nonlinear relationships between long-term $PM_{2.5}$ exposure and health impacts, we assume a linear, no-threshold relationship and find that health impacts are associated with exposures from low levels of air pollution. The commenter who suggests benefits from reduced air pollution may be overestimated because exposure rates will be lower in the future provides no evidence to support this assertion, which is contrary to the weight of evidence in the literature that supports such impacts. The commenter also asserted that the benefit calculations have limitations because they lack direct measures of individual lifetime exposures and face potential confounding of effects from the omission of various mortality risk factors. EPA agrees that there are uncertainties associated with the estimation and assignment of exposure in epidemiological studies, and that confounding is also a potential source of uncertainty, both of which are discussed in the Benefits TSD cited above. However, we disagree that the potential uncertainty is a limitation. We follow a systematic approach to identifying the studies and risk estimates most appropriate to inform a $PM_{2.5}$ and ozone health benefits analysis for an RIA, and we take into consideration a number of minimum and preferred study attributes that include whether specified models from individual studies are single- or multi-pollutant, among many other factors.[383] Clearly specifying criteria for identifying such studies helps ensure EPA transparently specifies its scientific judgement. These criteria are similar to those applied in previous EPA RIAs with the primary goal of identifying risk estimates that best characterize risk from $PM_{2.5}$ and ozone exposure among the total population located throughout the U.S.

9 - Environmental justice

[382] U.S. Environmental Protection Agency (U.S. EPA). 2023. Estimating $PM_{2.5}$- and Ozone-Attributable Health Benefits. Technical Support Document (TSD) for the PM NAAQS Reconsideration Proposal RIA. EPA-HQ-OAR-2019-0587.

[383] Such attributes include estimated risks of population exposure to one or more pollutants across a variety of geographic locations, age groups, population attributes, methods for estimating exposure, $PM_{2.5}$ concentrations, time periods, study sizes, follow-up durations, as well as other attributes. See the following for full details regarding EPA's study selection criteria and benefits analysis methods: U.S. Environmental Protection Agency (U.S. EPA). 2023. Estimating $PM_{2.5}$- and Ozone-Attributable Health Benefits. Technical Support Document (TSD) for the PM NAAQS Reconsideration Proposal RIA. EPA-HQ-OAR-2019-0587.

Comments by Organizations

Organization: Alliance for Automotive Innovation

7. Environmental Justice Considerations

We agree with EPA that a reduction in heavy aromatics in gasoline will produce beneficial reductions in PM emissions that will further national environmental justice goals. EPA notes in the NPRM that people living and working near roadways will benefit from fuel improvements that reduce PM formation, that those individuals are more likely to be people of color and/or have a low socioeconomic status (SES), and that lower-SES neighborhoods are likely to have more vehicles with higher emissions than higher-SES neighborhoods.442 A fuel-based regulation to reduce PM emissions would do so for all vehicles in the on-road fleet. Importantly, the greatest absolute emissions reductions will occur in and benefit lower-SES communities, as those communities are more likely to have the highest-emitting vehicles, i.e., a higher proportion of older vehicles with the highest emissions levels (due to their vehicle's age). [EPA-HQ-OAR-2022-0829-0701, pp. 270-271]

442 NPRM at 29393

EPA also uses this same rationale (proximity of low-SES communities to roadways) in support of a proposed lower tailpipe PM emissions limit, but the distribution of ages of vehicles on roadways is not discussed. The emissions reductions from the proposed tailpipe emissions rule will only reduce emissions for the newest vehicles, which in the near-term benefits higher-SES communities more than lower-SES communities. Moreover, these new vehicles will tend to replace vehicles of more recent vintage that already adhere to the newest, most stringent PM emissions limits. A fuel-based regulation targets all vehicles and is the only approach that immediately reduces emissions from older, higher-emitting vehicles more often found in low-SES communities. [EPA-HQ-OAR-2022-0829-0701, pp. 270-271]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

The U.S. needs the strongest vehicle standards

The United States will need to greatly reduce light-duty vehicle (LDV) greenhouse gas emissions if it is to have any chance of meeting the Biden Administration's economy-wide emissions reduction goal of 50% by 2030 and stave off the worst impacts of climate change. Transportation is now the largest source of greenhouse gas emissions in the United States and the light-duty sector makes up 58% of those emissions.1 Reducing carbon emissions is critical to tackling climate change but increasing LDV efficiency will also have significant benefits to air quality and will reduce driver fueling costs. Vehicles are a significant contributor to local air pollution and the associated health impacts, leading to increased rates of asthma, increased risk of heart attacks, strokes, and lung cancer.2 These impacts are particularly bad in low-income communities and communities of color, which bear a disproportionate air pollution burden.3 Greater efficiency can also provide significant cost savings for drivers when they refuel their vehicles. Low-income households are especially burdened by fueling costs, paying three times more than their higher-income counterparts on gasoline, as a percent of their total income.4 [EPA-HQ-OAR-2022-0829-0642, pp. 1-2]

1 https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

2 https://www.consumerreports.org/emissions/how-your-car-can-make-the-air-cleaner/

3 https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities

4 https://www.aceee.org/white-paper/2021/05/understanding-transportation-energy-burdens

Organization: American Lung Association (ALA) et al.

The American Lung Association's most recent "State of the Air" report noted that approximately 120 million Americans live in communities impacted by unhealthy levels of ozone and/or particle pollution.1 Exposure to air pollution can contribute to asthma attacks, heart attacks and stroke, lung cancer, low birthweight and premature birth, premature death and other health risks. Traffic pollution specifically is associated with premature death due to cardiovascular disease, lung cancer death, asthma onset in children and adults and other negative outcomes.2 The burdens of air pollution are not equally shared: people of color make up the majority of those living in the communities with unhealthy air and a person of color in the United States is 3.7 times more likely to live in a community with the worst air pollution in the nation than a white person. [EPA-HQ-OAR-2022-0829-0745, p. 1]

1 American Lung Association. State of the Air 2023. April 2023. www.lung.org/sota

2 Health Effects Institute. "Systematic Review and Meta-analysis of Selected Health Effects of Long-Term Exposure to Traffic-Related Air Pollution." Special Report 23: 2022.

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Introduction

Reducing emissions from motor vehicles is urgently needed to combat climate change and reduce exposure to harmful air pollution, especially in the nation's most vulnerable communities. The California Air Resources Board (CARB) commends the U.S. Environmental Protection Agency (U.S. EPA) for proposing to adopt multi-pollutant emissions standards for the 2027 and later model years (MY) for light- and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0780, p. 7]

The science could not be clearer. We must act now to reduce pollution to stabilize the climate and avoid the most serious consequences of climate change. In California and many other states, the changing climate is already increasing the frequency and severity of drought, wildfires, and extreme weather events like heat waves, jeopardizing public health and economic stability. We likewise must continue to urgently pursue efforts to improve air quality and reduce toxic emissions and reduce the disparate impacts that have persisted for decades. In California and across the U.S., many low-income communities and communities of color are exposed to disproportionate levels of pollution from on-road vehicle emissions, which contributes to respiratory illness, cardiovascular disease, cancer, and premature death. These impacts are often compounded by the congregation of nearby industrial sources, including upstream, midstream, and downstream fuel production sources. Furthermore, many of these same communities are especially vulnerable to the effects of climate change, as the most severe harms from climate change fall disproportionately on these underserved communities who are least able to prepare for and recover from associated impacts. U.S. EPA's proposed standards are urgently needed to help address these issues. [EPA-HQ-OAR-2022-0829-0780, p. 7]

Despite significant progress reducing air pollution, California experiences some of the nation's poorest air quality, with more than 21 million Californians living in areas that exceed federal ozone standards. 3 Within these areas, there are many low-income and disadvantaged communities that are exposed to not only ozone, but also to particulate and toxic pollutant levels that are significantly higher than applicable federal standards and which have immediate and detrimental health effects. With new research demonstrating adverse health impacts even below NAAQS levels, it remains critically important to continue to reduce emissions wherever feasible. [EPA-HQ-OAR-2022-0829-0780, p. 8]

3 California Air Resources Board (CARB). 2022 State Strategy for the State Implementation Plan. October 2021. https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf

4 CARB. 2022 Scoping Plan for Achieving Carbon Neutrality. December 2022. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

The above impacts especially apply to tribal communities. Due to land dispossession and forced migration, tribal communities are more exposed to extreme heat and more likely to rely on local water sources that are less resilient to drought and more contaminated.69 Beyond those impacts, tribal communities also suffer cultural harms from the decimation or harm to local ecosystems and species of particular meaning to cultural practices.70 These cultural resources have intrinsic value, and they are also critical to tribal community identity and group cohesion, which translates into direct health benefits.71 Moreover, degradation of these cultural resources threatens traditional ecological knowledge, such as particularized understanding of local ecosystems, agriculture, and sustainable practices, that can help limit the impacts of climate change.72 Tribal communities with sovereign land holdings are also more vulnerable to climate impacts because they are unable to relocate.73 [EPA-HQ-OAR-2022-0829-0746, pp. 10-11]

69 Justin Farnell, et al., Effects of land dispossession and forced migration on Indigenous peoples in North America, Science (2021), at 374; USGCRP Study, supra n. 61, at 254.

70 Ron Goode et al., California Energy Commission, California's Fourth Climate Change Assessment: Summary Report from Tribal and Indigenous Communities within California (2018), at 19, available at https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-010_TribalCommunitySummary_ADA.pdf.

71 Id.

72 Id. at 13-16;

73 Farnell et al., supra n. 69.

Furthermore, environmental justice communities, including tribal communities, are environmentally overburdened due to greater existing pollution exposure.74 This disadvantage manifests in higher rates of chronic disease, premature death, and other adverse public health outcomes.75 Compounding these disparities, residents of environmental justice communities also have less access to health care—they are less likely to have health insurance and less likely to be able to afford necessary tests and procedures, and health care facilities are poorly staffed and equipped.76 Consequently, residents of environmental justice communities are less able to withstand climate impacts that further damage their health, such as increased local smog conditions.77 [EPA-HQ-OAR-2022-0829-0746, pp. 10-11]

74 California Climate Justice Report, supra n.61, at 40-41.

75 Id.; USGCRP Study, supra n. 61, at 253.

76 Samantha Artiga et al., Kaiser Family Foundation, Health Coverage by Race and Ethnicity, 2010-2021 (2022), available at https://www.kff.org/racial-equity-and-health-policy/issue-brief/health-coverage-by-race-and-ethnicity/; Benjamin Sommers, et al., Beyond Health Insurance: Remaining Disparities in US Health Care in the Post-ACA Era, 95 THE MILBANK QUARTERLY 1 (2017).

77 California Climate Justice Report, supra n.61, at 40-43.

In addition to being more vulnerable to the impacts of climate change, environmental justice communities endure structural disadvantages that blunt their ability to adapt to a changing climate. Environmental justice communities have less access to financial resources, such as income and wealth, that are critical to climate resilience.78 More financial resources equate to more mobility, more ability to spend (on utilities, health care, home adaptation, etc.) to reduce climate harms, and more safeguards (such as insurance) in the event of extreme climate events.79 Environmental justice communities have higher rates of limited English proficiency, which can reduce access to climate resilience programs and increase vulnerability in extreme climate events due to an inability to understand public health information.80 Social capital in the political process is critical to ensure environmental justice communities receive resources to increase climate resilience and to prevent further entrenching existing inequities. [EPA-HQ-OAR-2022-0829-0746, pp. 10-11]

78 Id. at 39.

79 Id.

80 Id. at 43; USGCRP Study, supra n.61, at 106.

Environmental Health Equity and Environmental Justice

Scientific Evidence on Environmental Health Equity

CARB commends U.S. EPA for its thorough review of the environmental justice literature on the effects of GHG and criteria pollutants and air toxics across different populations. The documentation for the proposed rule highlights the disproportionate climate impacts and exposure to traffic-related air pollution (TRAP) among vulnerable groups, such as people of color, low-income populations, children, and outdoor workers. However, this analysis could be strengthened by additional discussions on cumulative impacts and climate change, health co-benefits of climate actions, and additional research on disproportionate exposure to TRAP. Inclusion of these topics would enhance the description of the evidence base for persistent health disparities affecting marginalized populations, which further illustrates why the proposed standards are so urgently needed to advance and attain health equity. [EPA-HQ-OAR-2022-0829-0780, p. 54]

Disproportionate impact of exposure to Traffic-Related Air Pollution (TRAP)

While U.S. EPA conducted an extensive literature review on disparities in exposure to TRAP across U.S. populations, CARB has identified several national studies and a series of California studies that enrich the existing literature already documented by U.S. EPA for the proposed standards. [EPA-HQ-OAR-2022-0829-0780, pp. 56-57]

A recent nationwide study reported that people of color experience disproportionate exposures to PM2.5. 103 The study found that the systemic PM2.5 exposure disparity experienced by people of color is related to emission sources from almost all major emission categories. The largest sources of the disparities are industry, light-duty gasoline vehicles, construction, and heavy-duty diesel vehicles. Moreover, the disproportionate exposures have been seen in individual U.S. states, in individual urban and rural areas, across incomes, and across exposure levels. Another national study showed that zip codes with more White and Native American populations have lower average PM2.5 levels than ZIP codes with more Black, Asian, and Hispanic or Latino populations. 104 The disparities in PM2.5 exposure is also shown in zip codes with low-income populations compared to zip codes with high-income populations. Moreover, people of color in the U.S. not only face longer-term PM2.5 exposure but also short-term PM2.5 exposure (e.g., more days with PM2.5 concentrations above the thresholds) than non-Hispanic Whites. 105 [EPA-HQ-OAR-2022-0829-0780, pp. 56-57]

103 Tessum CW, Paolella DA, Chambliss SE, Apte JS, Hill JD, Marshall JD. PM2.5 polluters disproportionately and systemically affect people of color in the United States. Sci Adv. 2021 Apr 28;7(18):eabf4491.

104 Jbaily A, Zhou X, Liu J, Lee TH, Kamareddine L, Verguet S, Dominici F. Air pollution exposure disparities across US population and income groups. Nature. 2022 Jan;601(7892):228-233.

105 Collins TW, Grineski SE. Racial/Ethnic Disparities in Short-Term PM2.5 Air Pollution Exposures in the United States. Environ Health Perspect. 2022 Aug;130(8):87701.

Environmental pollutants affect children more than adults, and children in low-income and urban areas near industrial, rail, and traffic sources face particularly high health risks. Results from CARB's groundbreaking, long-term children's health study in Southern California demonstrated that particle pollution may significantly reduce lung function growth in children 106, 107, 108 and indicates these effects are likely permanent. 109 Additionally, increased exposure to vehicular traffic pollution was associated with adverse childhood health impacts, including slower lung development, 110 increased symptoms and medication use in asthmatic children, 111, 112 and increases in the development of asthma in children. 113 Compared with non-Hispanic White children, the cohort's Hispanic White children, especially those with more Native American ancestry, tended to live closer to a freeway or a major nonfreeway road. Furthermore, a higher percentage of asthma was observed among the Hispanic White children with more than 50 percent Native American ancestry who lived near a major nonfreeway road compared to those who lived farther away. 114 CARB is submitting these studies to U.S. EPA to further demonstrate the increased impacts on vulnerable populations from TRAP, pointing to the urgent need to adopt more stringent emission standards to protect these groups. [EPA-HQ-OAR-2022-0829-0780, pp. 56-57]

106 Peters JM, Avol E, Gauderman WJ, Linn WS, Navidi W, London SJ, Margolis H, Rappaport E, Vora H, Gong H Jr, Thomas DC. A study of twelve Southern California communities with differing levels and types of air pollution. II. Effects on pulmonary function. Am J Respir Crit Care Med. 1999 Mar;159(3):768-75.

107 Avol EL, Gauderman WJ, Tan SM, London SJ, Peters JM. Respiratory effects of relocating to areas of differing air pollution levels. Am J Respir Crit Care Med. 2001 Dec 1;164(11):2067-72.

108 Gauderman WJ, Gilliland GF, Vora H, Avol E, Stram D, McConnell R, Thomas D, Lurmann F, Margolis HG, Rappaport EB, Berhane K, Peters JM. Association between air pollution and lung function

growth in southern California children: results from a second cohort. Am J Respir Crit Care Med. 2002 Jul 1;166(1):76-84.

109 Gauderman WJ, Avol E, Gilliland F, Vora H, Thomas D, Berhane K, McConnell R, Kuenzli N, Lurmann F, Rappaport E, Margolis H, Bates D, Peters J. The effect of air pollution on lung development from 10 to 18 years of age. N Engl J Med. 2004 Sep 9;351(11):1057-67.

110 Gauderman WJ, Vora H, McConnell R, Berhane K, Gilliland F, Thomas D, Lurmann F, Avol E, Kunzli N, Jerrett M, Peters J. Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study. Lancet. 2007 Feb 17;369(9561):571-7.

111 Gauderman WJ, Avol E, Lurmann F, Kuenzli N, Gilliland F, Peters J, McConnell R. Childhood asthma and exposure to traffic and nitrogen dioxide. Epidemiology. 2005 Nov;16(6):737-43.

112 See McConnell et al. 2006

113 See McConnell et al. 2010

114 Weaver GM, Gauderman WJ. Traffic-Related Pollutants: Exposure and Health Effects Among Hispanic Children. Am J Epidemiol. 2018 Jan 1;187(1):45-52.

Disproportionate Exposure to Air Pollution at the Community Scale

In addition to research studies documenting disparate health impacts from exposure to air pollution, CARB illustrates these disproportionate impacts for one California community. This example points to the urgent need to address these emission sources for communities that face similar exposures. [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

The benefits of U.S. EPA's proposal for on-road vehicles are especially critical from a community perspective in disadvantaged communities along heavily traveled roads. In these communities, the pollution and public health impacts from on-road vehicle emissions are especially significant and greater than in other communities. In California, East Los Angles, Boyle Heights, and West Commerce is one such community. Selected under CARB's Community Air Protection Program to develop a community air monitoring plan and a community emissions reduction program, this community has more than 30 miles of freeways within its approximately 26 square mile emissions study boundary area (Figure 4). 115 Emissions from on-road vehicles are a significant contributor to the community's air pollution exposure, and its population shows a greater degree of health impacts from air pollution. [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

The community has a high cumulative air pollution exposure burden, a significant number of sensitive receptors, and includes census tracts that have been designated as disadvantaged communities by California law. 116 [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

115 For more information on this community and CARB's Community Air Protection Program, see: https://ww2.arb.ca.gov/our-work/programs/community-air-protection-program/communities/east-los-angeles- boyle-heights-west.

116 Disadvantaged community designations per Senate Bill 535 (De León, Chapter 830, Statutes of 2012).

[See original for graphic titled "Figure 4. East LA/Boyle Heights/West Commerce Community Boundary"] [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

Based on the 2019 American Community Survey (ACS) data from the Census Bureau, 117 more than 227,000 people live within the East LA/Boyle Heights/West Commerce community.

Major freeways bisecting the community include Highways 101 and 60, and Interstates 5, 10, and 710, resulting in four freeway junctions and increased pollution exposures for the populations living and working in this community as compared to Los Angeles County as a whole. [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

117 U.S. Census Bureau, 2015-2019 American Community Survey 5-year Estimates. https://data.census.gov/cedsci/

Approximately 95 percent of the population in this community is Latino, nearly 14 percent are children under the age of 10 years, and 11 percent of the population is elderly (over the age of 65 years). These population characteristics are important indicators of disparities in existing pollution burden, exposure to air pollution, and health vulnerabilities—especially for children and the elderly. 118 [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

118 The metrics presented here are the same as the data presented in the 2019 Community Emissions Reduction Plan for East Los Angeles, Boyle Heights, West Commerce, but have been updated to include the latest Census ACS 5-year estimates (2015-2019) for the community boundary. South Coast Air Quality Management District, Assembly Bill (AB) 617 Community Air Initiatives, Community Emissions Reduction Plan for East Los Angeles, Boyle Heights, West Commerce, September 2019, http://www.aqmd.gov/docs/default-source/ab-617-ab- 134/steering-committees/east-la/cerp/carb-submittal/final-cerp.pdf?sfvrsn=8

Certain groups of the general population are more vulnerable to air pollution by virtue of their age and health, including children, elderly, pregnant women, and health compromised individuals. Places where these sensitive populations gather, called sensitive receptor locations, can include schools, day-care providers, hospitals, nursing homes, and senior care facilities. There are numerous sensitive receptor locations in the East LA/Boyle Heights/West Commerce community, including 80 schools, 79 day-care providers, and 36 health care facilities including hospitals, nursing homes and dialysis clinics (Figure 5). [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

[See original for graphic titled “Figure 5. Sensitive Receptors in East LA/Boyle Heights/West Commerce Community”] 119 [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

119 The metrics presented here are the same as the data presented in the 2019 Community Emissions Reduction Plan for East Los Angeles, Boyle Heights, West Commerce, but have been updated to include the latest Census ACS 5-year estimates (2015-2019) for the community boundary. South Coast Air Quality Management District, Assembly Bill (AB) 617 Community Air Initiatives, Community Emissions Reduction Plan for East Los Angeles, Boyle Heights, West Commerce, September 2019, http://www.aqmd.gov/docs/default-source/ab-617-ab- 134/steering-committees/east-la/cerp/carb-submittal/final-cerp.pdf?sfvrsn=8

CalEnviroScreen 4.0 is a screening tool developed by the California Office of Environmental Health Hazard Assessment to help identify California communities that are disproportionately burdened by multiple sources of pollution and socioeconomic indicators. Approximately 95 percent of the census tracts in this community are in the top 25 percent (75-100th percentile) of the CalEnviroScreen 4.0 120 (CES) scores within the State. The maximum overall CES score for any census tract in the community is the 99th percentile, which means that people living in that census tract are in the top 1 percent of the most impacted census tracts in the State. Most of the census tracts in this community are considered disadvantaged under California law. 121 [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

120 The Office of Environmental Health Hazard Assessment (OEHHA) released the California Communities Environmental Health Screening Tool: CalEnviroScreen 4.0 in October 2021. https://oehha.ca.gov/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf

121 Disadvantaged community designations per Senate Bill (SB) 535 (De León, Chapter 830, Statutes of 2012).

Table 4 and Table 5 present the number of census tracts in the community that are in the top 25 percent (75-100th percentile) of impacted tracts in the State, as well as the maximum percentile for exposure (e.g., ozone, PM2.5, diesel PM, traffic impacts), health status (asthma, cardiovascular disease, low birth weight), and socio-economic (education, linguistic isolation, poverty, unemployment, and housing burden) indicators for the census tracts in this community. [EPA-HQ-OAR-2022-0829-0780, pp. 57-59]

Table 4. CalEnviroScreen (CES) 4.0 Overall Score in the East LA/Boyle Heights/West Commerce Community [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

CES 4.0 Overall Score: CES Score

Number of Census Tracts with Highest CES Scores (Top 25%, 75-100th Percentile): 51

Percent of Census Tracts with Highest CES Scores (Top 25%, 75-100th Percentile) 122: 91%

Maximum Percentile in Community: 99.9 [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

122 The percentages for the overall CES 4.0 score represent the number of census tracts in this community that are considered "disadvantaged" per SB 535 (75th percentile or top 25% of all census tracts in the State)

[See original for table titled "Table 5. CalEnviroScreen (CES) 4.0 Scores for Key Exposure, Health, and Socio-Economic Indicators in the East LA/Boyle Heights/West Commerce Community"]123 [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

123 The percentages for the individual CES 4.0 metrics present the number of census tracts in the community that are in the top 25 percent of census tracts for a given indicator.

Figure 6 compares the average scores for exposure (e.g., ozone, PM2.5 concentrations, diesel PM emissions, traffic impacts), health status (asthma, cardiovascular disease, low birth weight), and socio-economic (education, linguistic isolation, poverty, unemployment, and housing burden) indicators in the community against statewide averages—the community scores for these key indicators are generally higher compared to the statewide averages. [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

[See original for graph titled "Figure 6. CalEnviroScreen 4.0 Scores for Key Indicators in the East LA/Boyle Heights/West Commerce Community Relative to Statewide Averages"] [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

The indicators discussed above also explain the disparate effects of air pollution faced by other communities in California, which extends to numerous other communities across the nation. Figure 7 presents the average scores for PM2.5 concentrations and diesel PM emissions relative to statewide averages for a few communities across the State; vehicle emissions contribute predominantly to the particulate matter and diesel PM impacts in these communities. The chart includes asthma-related emergency room visits and linguistic isolation (i.e., limited

English speaking) as proxies for demographic and socio-economic disadvantages faced by these communities. [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

[See original for graph titled “Figure 7. CalEnviroScreen 4.0 Scores for PM2.5 Concentration, Diesel PM Emissions, and Socio-economic Indicators in California Communities”] [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

Many California communities experience significantly higher levels of both regional and near-source air pollution, and the demographic and socio-economic characteristics of these communities exacerbate their susceptibility and vulnerability to the adverse effects of air pollution. A 2019 CARB research study revealed on-road vehicles and industrial activity to be the top two sources of exposure in California, each contributing to 24 percent of the total PM2.5 exposure, and disproportionately impacting non-white and low-income populations. 124 Existing scientific literature conclusively links air pollution to adverse health outcomes, including pre-mature mortality, and the disproportionate pollution and health burden on poor and socially disadvantaged communities. OEHHA’s CES 4.0 report provides an exhaustive review of existing literature connecting each of the indicators used in the CES method to pollution burden and population sensitivities. 125 [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

124 Apte J. et al (2019). A Method to Prioritize Sources for Reducing High PM2.5 Exposures in Environmental Justice Communities in California. CARB Research Contract Number 17RD006. https://ww2.arb.ca.gov/sites/default/files/classic//research/apr/past/17rd006.pdf

125 OEHHA CES 4.0 Report. October 2021. pp. 29-197. https://oehha.ca.gov/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf

The East LA, Boyle Heights, West Commerce community is just one example of many such communities across the nation that bear the consequences of near-roadway emissions, in addition to impacts from other sources of air pollution in their neighborhoods. For these communities, reducing emissions from on-road vehicles is a priority. [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

Organization: California Attorney General's Office, et al.

Strong emissions standards are necessary now to stave off the worst impacts of human-induced climate change and to confront inequitably distributed threats to public health and the environment from climate change as well as other forms of pollution. From extreme heat to wildfires to drought, our States and Cities are already experiencing the devastating impacts of climate change, which will continue to mount and compound with rising concentrations of GHGs in the atmosphere. Moreover, vehicle emissions of oxides of nitrogen (NOx), particulate matter (PM), and other criteria pollutants continue to endanger the health and welfare of our residents. [EPA-HQ-OAR-2022-0829-0746, p. 1]

4. Environmental Justice Communities Disproportionately Bear the Burden of Climate Change Impacts

Climate change’s impacts will continue to disproportionately fall on environmental justice communities.55 Environmental justice communities experience more severe climate impacts and are more vulnerable as the climate crisis worsens. [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

55 “Environmental justice” is defined by EPA as the “fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to development, implementation, and enforcement of environmental laws, regulations and policies.” EPA, EJ 2020 Action Agenda: The U.S. EPA’s Environmental Justice Strategic Plan for 2016-2020, EPA-300-B-1-6004, at 1 (Oct. 2016). For the purpose of this comment, the term “environmental justice community” refers to a community of color or community experiencing high rates of poverty that, due to past and/or current unfair and inequitable treatment, is overburdened by environmental pollution, and the accompanying harms and risks from exposure to that pollution because of past or current unfair treatment.

Severe climate harms are already a reality for many environmental justice communities. Globally, the last nine years have been the nine hottest on record, and that trend is expected to continue.56 Members of environmental justice communities tend to work in occupations with increased exposure to extreme heat, such as the agricultural, construction, and delivery industries.57 Farmworkers die of heat-related causes at 20 times the rate of the rest of the U.S. civilian workforce.58 Since 2005, the first year California began tracking the number of heat-related fatalities, 36% of California’s heat-related worker deaths have been of farmworkers.59 Similarly, although construction workers comprise only 6% of the national workforce, they account for 36% of heat-related deaths.60 [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

56 NASA, NASA Says 2022 Fifth Warmest Year on Record, Warming Trend Continues, supra n. 3; Masson-Delmotte et al., supra n. 6, at 10.

57 See, e.g., Juley Fulcher, Boiling Point: OSHA Must Act Immediately to Protect Workers From Deadly Temperatures, Public Citizen (Jun. 28, 2022), available at https://www.citizen.org/article/boiling-point/; Union of Concerned Scientists, Too Hot to Work: Assessing the Threats Climate Change Poses to Outdoor Workers (2021), at 3, available at https://www.ucsusa.org/sites/default/files/2021-09/Too-Hot-to-Work_9-7.pdf; Ariel Wittenberg, OSHA Targets Heat Threats Heightened by Climate Change, E&E News (Oct. 26, 2021), available at https://www.eenews.net/articles/osha-targets-heaththreats-heightened-by-climate-change/.

58 See Union of Concerned Scientists, Farmworkers at Risk: The Growing Dangers of Pesticides and Heat (2019) at 4, available at https://www.ucsusa.org/sites/default/files/2019-12/farmworkers-at-risk-report-2019-web.pdf (citing Centers for Disease Control and Prevention, Heat-Related Deaths Among Crop Workers—United States, 1992–2006, available at https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5724a1.htm (last updated June 19, 2008)).

59 Teniope Adewumi-Gunn & Juanita Constible, Natural Resources Defense Council, Feeling the Heat: How California’s Workplace Heat Standards Can Inform Stronger Protections Nationwide (2022), available at https://www.nrdc.org/sites/default/files/feeling-heat-ca-workplace-heat-standards-report.pdf.

60 Xiuwen Sue Dong et al., Heat-Related Deaths Among Construction Workers in the United States, 62 AM. J. INDUS. MED. (2019), at 1047-57.

At home, environmental justice communities suffer disproportionate impacts from extreme heat because they are more likely to lack air conditioning, tree canopy, and greenspace. Environmental justice communities have less access to air conditioning to cool down, and are less able to pay the utility bills required to run air conditioning units or fans.61 In urbanized environments, pavement, cement, and other non-vegetated areas contribute to the heat island effect, in which built environments retain heat, causing daytime temperatures to be from 1 °F to 6 °F hotter than suburban and rural areas and nighttime temperatures to be as much as 22 °F hotter.62 The heat island effect is inequitably distributed—it is most extreme in lower-income communities and communities of color.63 Contributing to this effect is the lack of tree canopy and greenspace in environmental justice communities, often due to lower historical and ongoing investment. Indeed, tree canopy and greenspace is highly correlated with historical redlining practices, in which federal housing policy directed investment away from lower-income communities, and especially communities of color, characterized as “risky” for loan servicing.64 Moreover, an EPA report found that individuals with lower incomes and individuals of color are respectively 11% to 16% and 8% to 14% more likely to live in areas with the highest projected increases in premature mortality from extreme heat.65 [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

61 Michelle Roos et al., California Energy Commission, California’s Fourth Climate Change Assessment: Climate Justice Report, (2018), at 39-40, 45, available at https://resourceslegacyfund.org/wp-content/uploads/2018/09/Climate-Justice-Report-4CCCA-v.4-00455673xA1C15.pdf (“California Climate Justice Report”); Allison Crimmins, et al., The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment, U.S. Global Change Research Program (2016), at 252, available at https://health2016.globalchange.gov/low/ClimateHealth2016_FullReport_small.pdf (“USGCRP Study”).

62 See EPA, Heat Island Effect, available at https://www.epa.gov/heatislands (last updated May 1, 2023); California Environmental Protection Agency, Understanding the Urban Heat Island Index, available at https://calepa.ca.gov/climate/urban-heat-island-index-for-california/understanding-the-urban-heat-island-index/ (last visited May 24, 2023).

63 EPA, Heat Islands and Equity, available at https://www.epa.gov/heatislands/heat-islands-and-equity (last updated Dec. 12, 2022); USGCRP Study, supra n. 61, at 252.

64 Dexter Locke et al., Residential Housing Segregation and Urban Tree Canopy in 37 US Cities, 1 NPJ URBAN SUSTAINABILITY 15 (2020), at 3-4; Ian Leahy & Yaryna Serkez, Since When Have Trees Existed Only for Rich Americans?, The New York Times (Jul. 4, 2021), available at https://www.nytimes.com/interactive/2021/06/30/opinion/environmental-inequity-trees-critical-infrastructure.html.

65 EPA, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts (2021), at 36, available at https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.

In addition, flooding and drought from extreme weather events disproportionately affect environmental justice communities, and the inequity will grow as climate impacts worsen. Due to disinvestment, environmental justice communities often lack sufficient infrastructure to control flooding or ensure steady water supplies.66 They also suffer from more severe impacts, such as contaminated water from pollutant flows during floods and increased concentration of contaminants during droughts.67 EPA has also determined that individuals with lower incomes are more likely to live in areas with the highest projected land losses from sea level rise inundation and are more likely to face substantial traffic delays due to climate-driven changes in high-tide flooding.68 [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

66 Lily Katz, A Racist Past, a Flooded Future: Formerly Redlined Areas Have $107 Billion Worth of Homes Facing High Flood Risk—25% More Than Non-Redlined Areas, Redfin (2021), available at https://www.redfin.com/news/redlining-flood-risk/; California Climate Justice Report, supra n. 61, at 41-42; USGCRP Study, supra n. 61, at 253-54.

67 USGCRP Study, supra n. 61, at 158-74.

68 EPA, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts, supra n. 65, at 49, 59.

3. Criteria Pollutant and Air Toxics Emissions from Light- and Medium-Duty Vehicles Disproportionately Impact Environmental Justice Communities

Criteria pollutant emissions from light- and medium-duty vehicles disproportionately endanger residents of environmental justice communities by exposing them to harmful air pollution that causes significant health impacts. Light- and medium-duty vehicles' emissions are concentrated along transportation corridors. 88 Fed. Reg. at 29,396. Aggravating historical injustices, decision-makers disproportionately site highways and other transportation infrastructure in lower-income communities and communities of color. The burden of vehicle emissions therefore falls inequitably on environmental justice communities, which also face industrial pollution cumulatively with vehicle emissions.91 [EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

91 See, e.g., EPA, Estimation of Population Size and Demographic Characteristics among People Living Near Truck Routes in the Coterminous United States (Feb. 16, 2022), EPA-HQ-OAR-2019-0055-0982, at 11-12, Fig. 3, 17-19, Fig. 9 (finding that individuals living near major truck routes are more likely to be people of color and lower-income); see also Michelle Meyer and Tim Dallmann, The Real Urban Emissions Initiative, Air quality and health impacts of diesel truck emissions in New York City and policy implications (2022), at 7 Fig. 5 (concluding that Black and Latino individuals in New York City are disproportionately exposed to PM2.5 along freight corridors); Gaige Hunter Kerr, et al., COVID-19 Pandemic Reveals Persistent Disparities in Nitrogen Dioxide Pollution, 118 PROC. NAT'L ACAD. SCIENCES 30 (2021); Mary Angelique G. Demetillo, et al. Space-Based Observational Constraints on NO2 Air Pollution Inequality from Diesel Traffic in Major US Cities, GEOPHYSICAL RESEARCH LETTERS 48 (2021); Paul Allen, et al., Newark Community Impacts of Mobile Source Emissions: A Community- Based Participatory Research Analysis (2020); Maria Cecilia Pinto de Moura, et al., Union of Concerned Scientists, Inequitable Exposure to Air Pollution from Vehicles in Massachusetts (2019); Iyad Kheirbek, et al., The Contribution of Motor Vehicle Emissions to Ambient Fine Particulate Matter Public Health Impacts in New York City: a Health Burden Assessment, 15 ENV'T HEALTH 89 (2016).

For example, EPA modeling has shown that race and income are significantly associated with living near major roadways nationally, even when controlling for other factors.92 EPA research has also indicated that people of color are more likely to live within 300 feet of major transportation facilities and go to school within 200 meters of the largest roadways.93 Environmental justice communities bear the effects of these land use patterns. In the Northeast and Mid-Atlantic Region, average concentrations of exposures to PM2.5 are 75%, 73%, and 61% higher for Latinx residents, Asian-American residents, and African American residents, respectively, than they are for white residents.94 PM2.5 and NO2 concentrations are also highest for Black and Latinx communities in Massachusetts, in part because of their proximity to industrial facilities and highways, and these concentrations have increased over time even though overall exposure to those pollutants has decreased in the Commonwealth.95 [EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

92 EPA, Estimation of Population Size and Demographic Characteristics among People Living Near Truck Routes in the Coterminous United States, supra n. 91, at 20-24.

93 Chad Bailey, EPA, Demographic and Social Patterns in Housing Units Near Large Highways and other Transportation Sources (2011), EPA-HQ-OAR-2019-0055-0126, at 3.

94 Union of Concerned Scientists, Inequitable Exposure to Air Pollution from Vehicles in the Northeast and Mid-Atlantic (2019), available at https://www.ucsusa.org/sites/default/files/attach/2019/06/Inequitable-Exposure-to-Vehicle-Pollution- Northeast-Mid-Atlantic-Region.pdf.

95 Office of Massachusetts Attorney General Maura Healey, COVID-19's Unequal Effects in Massachusetts (2020), at 5, available at https://www.mass.gov/doc/covid-19s-unequal-effects-in-massachusetts/download.

More granular data from California fully illustrate this phenomenon. The census tracts in California with the highest levels of exposure to ozone, PM2.5, and air toxics like diesel particulate matter are communities of color bordering major transportation corridors—Highway 99 in the San Joaquin Valley and Highways 10 and 60 in the Inland Empire: [EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

Census Tracts in California with Highest Levels of Ozone, PM2.5, and Diesel PM Exposure96

Census Tract	Location	People of Color	Ozone	PM2.5	Diesel PM
6065041408	Riverside	78.1%	91st	92nd	97th
6071002109	Ontario	73.2%	91st	96th	93rd
6071003301	Fontana	91.6%	97th	93rd	94th
6065040303	Jurupa Valley	79.3%	95th	94th	97th
6029003113	Bakersfield	80.4%	94th	100th	96th
6029001801	Bakersfield	57.3%	94th	100th	95th
6029002812	Bakersfield	72.5%	94th	100th	96th
6029002813	Bakersfield	76.6%	94th	100th	95th

[EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

96 Data from CalEnviroScreen 4.0, California Office of Environmental Health Hazard Assessment, available at https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40. Metrics for ozone, PM2.5, and diesel particulate matter exposure are the census tract's percentile ranking as compared to all census tracts in California, demonstrating that these census tracts are among those with the greatest pollution exposure statewide. The raw data for these percentile rankings are available on the CalEnviroScreen 4.0 website. The eight census tracts shown here are examples of the 29 census tracts in California that rank above the 90th percentile statewide for exposure to ozone, fine particulate matter, and diesel particulate matter, all of which are communities in Bakersfield or the Inland Empire near major transportation thoroughfares.

Refineries, drilling sites, and other upstream sources of emissions are also disproportionately located in or near environmental justice communities.97 These facilities routinely emit dozens of toxic air contaminants, such as formaldehyde and benzene, and can cause accidental releases of air toxics that require emergency response. 98 Many of these upstream emissions sources also release other pollution, such as water contaminants.99 Residents of communities near these sites tend to have higher rates of health problems, such as cancers, chronic disease, and adverse birth outcomes, even after accounting for other demographic factors.100 As with transportation corridors, census tract-level data from California demonstrate these concerns. For example, the census tracts near the California refinery with the largest output (the Marathon Refinery in Carson)101 are overwhelmingly communities of color with high cumulative pollution burdens and adverse health outcomes: [EPA-HQ-OAR-2022-0829-0746, pp. 15-16]

97 James Boyce & Manuel Pastor, Clearing the air: incorporating air quality and environmental justice into climate policy, 120 CLIMATIC CHANGE 801 (2013).

98 Karen Riveles & Alyssa Nagai, Analysis of Refinery Chemical Emissions and Health Effects, California Office of Environmental Health Hazard Assessment (2019), available at https://oehha.ca.gov/media/downloads/faqs/refinerychemicalsreport032019.pdf.

99 Louisa Markow, et al., Oil's Unchecked Outfalls: Water Pollution from Refineries and EPA's Failure to Enforce the Clean Water Act, Environmental Integrity Project (2023), available at https://environmentalintegrity.org/wp-content/uploads/2023/01/Oils-Unchecked-Outfalls-03.06.2023.pdf.

100 Jill Johnston & Lara Cushing, Chemical exposures, health and environmental justice in communities living on the fenceline of industry, 7 CURRENT ENVIRONMENTAL HEALTH REPORTS 48 (2020); Stephen Williams, et al., Proximity to Oil Refineries and Risk of Cancer: A Population-Based Analysis, 4 JNCI CANCER SPECTRUM 6 (2020).

101 California Energy Commission, California's Oil Refineries, available at https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/californias-oil-refineries (data as of Feb. 7, 2023).

Census Tracts near the Marathon Refinery in Carson, California 102

Census Tract	People of Color	Pollution	Toxic Releases	Asthma	Heart Disease
6037294120	98.0%	93rd	99th	83rd	93rd
6037543306	92.4%	96th	99th	57th	52nd
6037543905	97.2%	84th	99th	72nd	77th
6037294110	90.5%	88th	99th	75th	83rd

[EPA-HQ-OAR-2022-0829-0746, pp. 15-16]

102 Data from CalEnviroScreen 4.0, supra n.96. Metrics for overall pollution burden, toxic releases, asthma, and heart disease are the census tract's percentile ranking as compared to all census tracts in California, demonstrating that these census tracts are among those with the greatest pollution exposure and detrimental health impacts statewide.

Accordingly, achieving emissions reductions from light- and medium-duty vehicles is a critical step to begin dismantling historical patterns of environmental injustice burdening communities near transportation infrastructure and upstream emissions sources. See CARB's Comment at 84- 96. [EPA-HQ-OAR-2022-0829-0746, pp. 15-16]

b. More stringent standards will reduce the air pollution dangers faced by communities near refineries and roadways

Our States and Cities agree with EPA that reducing air toxics—including known carcinogens like formaldehyde and benzene—and criteria pollutants from vehicle exhaust and refining will significantly benefit our residents, especially those in communities proximate to major roadways and refineries. 88 Fed. Reg. at 29,395-97. [EPA-HQ-OAR-2022-0829-0746, pp. 31-32]

PM2.5 and air toxics pollution from refineries significantly impact neighboring communities due to localized concentrations of these pollutants. Nearly 700,000 people live within three miles of the 17 refineries that reported actual annual benzene fenceline concentrations in 2020 above the level set by EPA that requires the refinery to take action to clean up emissions. Of these 700,000 people, 62% are African-American, Hispanic, Asian/Pacific Islander, or American

Indian residents, and nearly 45% have incomes below the poverty level.182 [EPA-HQ-OAR-2022-0829-0746, pp. 31-32]

182 Environmental Integrity Project, Environmental Justice and Refinery Pollution: Benzene Monitoring Around Oil Refineries Showed More Communities at Risk in 2020 (Apr. 28, 2021), at 7, n. 6, available at https://environmentalintegrity.org/wp-content/uploads/2021/04/Benzene-report-4.28.21.pdf.

Communities near major roadways will also benefit greatly from any improvements in air quality. EPA has long acknowledged that people living, working, and attending school near major roadways face greater air pollution exposure. 88 Fed. Reg. at 29,221; 77 Fed. Reg. 62,624, 62,907 (Oct. 15, 2012); 75 Fed. Reg. 25,324, 25,504 (May 7, 2010). The pollution and public health impacts from on-road vehicle emissions are especially significant and greater in disadvantaged communities.183 For example, the community of Wilmington, Carson, and West Long Beach in Los Angeles, California is affected by six major freeway junctions, as well as freight, port, and rail operations, oil and gas production, and five petroleum refineries. A majority of this community is considered disadvantaged under California law, scoring higher than the state average on key indicators of vulnerability, including criteria pollutant exposure, health status, and socio-economic criteria. See CARB Comment at 88-90. Measures that reduce pollution in these communities are urgently needed, and addressing that need (and others described above) is mandatory under Section 202(a). Our States and Cities strongly agree with EPA's assessment that the proposed standards will significantly benefit public health and welfare, especially in areas next to major roadways. 88 Fed. Reg. at 29,395-97. [EPA-HQ-OAR-2022-0829-0746, pp. 31-32]

183 CARB, Benefits of California's Zero-Emission Vehicle Standards on Community-Scale Emission Impacts (Jul. 6, 2021), App. B to Comments of States and Cities in Support of EPA Reversing Its SAFE 1 Actions.

While the proposed standards are expected to moderately increase criteria pollutant and air toxics emissions from power plants due to some increase in electricity demand from more electric vehicles, id. at 29,353, 29,397, EPA's other regulatory actions to control power plant emissions, and emissions from related infrastructure, and our States and Cities' efforts to promote renewable generation should reduce these impacts to the communities adjacent to these plants. Nevertheless, EPA should further develop its understanding of the distributive impacts for communities proximate to power plants and refineries. [EPA-HQ-OAR-2022-0829-0746, pp. 31-32]

Organization: Center for American Progress (CAP)

Automobile emissions and their effects on health are not distributed equally. People of color are exposed to 24 percent more automobile emissions.5 and the ALA finds that people of color are 3.7 times as likely as White Americans to live in a county with 3 failing grades for air pollution.6 Strong standards must be finalized quickly in order to protect all Americans, especially those disproportionately affected, from the harmful effects of automotive air pollution.7 [EPA-HQ-OAR-2022-0829-0658, pp. 1-2]

5 Tessum et al. "PM2.5 polluters disproportionately and systematically affect people of color in the United States," Science Advances, April 28, 2021, available online: https://www.science.org/doi/pdf/10.1126/sciadv.abf4491; Ciaran L Gallagher and Tracey Holloway, "U.S. decarbonization impacts on air quality and environmental justice," Environmental Research Letters, October 25, 2022, available online: https://iopscience.iop.org/article/10.1088/1748-9326/ac99ef/pdf

6 American Lung Association, “State of the Air Report,” April 2023, available online: https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf

7 Kevin DeGood and Michela Zonta. “Colorado’s Greenhouse Gas Emissions Rule for Surface Transportation Offers a Model for Other States and the Nation,” Center for American Progress, March 29, 2022, available online: https://www.americanprogress.org/article/colorados-greenhouse-gas-emissions-rule-for-surface-transportation-offers -a-model-for-other-states-and-the-nation/; Alexander-Kearns et al. “The Impact of Automation on Carbon Emissions,” Center for American Progress, November 18, 2016, available online: https://www.americanprogress.org/article/the-impact-of-vehicle-automation-on-carbon-emissions-where-uncertainty -lies/

Organization: Center for Biological Diversity et al.

More than one-third of Americans live in areas with failing grades for ozone or particulate pollution, and people of color are 3.7 times more likely than white people to live in a county with failing air quality.1 Already at a disadvantage, these communities have the most to lose from emissions standards that do little to attack pollution from gas-powered cars and trucks. EPA should act in accordance with President Biden’s recent recommitment to environmental justice and treat pollution from gas-powered vehicles as an urgent environmental justice issue. [EPA-HQ-OAR-2022-0829-0671, p. 1]

1 American Lung Association, 2023 State of the Air Report, https://www.lung.org/research/sota.

Organization: Ceres BICEP (Business for Innovative Climate and Energy Policy) Network

Finally, on-road vehicles are largely responsible for the harmful pollutant emissions that disproportionally impact historically low-income and BIPOC16 communities located near fleet depots, major transportation corridors, distribution centers, and ports. 36% of Americans live in communities with unhealthy air pollution, and a person of color is 64% more likely than a white person to live in such a community.17 Further, the American Lung Association predicts that the U.S. could see $978 billion in public health benefits from cleaner air by 2050 as the nation shifts to 100% zero-emission new passenger vehicle sales and clean electricity generation.18 EPA’s decision to reduce multipollutant vehicle emissions is positive, and we urge EPA to finalize LMDV emission standards at least as strong as those proposed as soon as possible to protect the health of those in these vulnerable communities and realize these significant economic benefits. [EPA-HQ-OAR-2022-0829-0600, pp. 2-3]

16 BIPOC: Black, Indigenous, People of Color.

17 https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf.

18 https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf.

Organization: Ceres Corporate Electric Vehicle Alliance (CEVA)

While medium- and heavy-duty trucks represent only 5% of vehicles on the road, their GHG emissions represent 23% of the transportation sector’s carbon footprint, which grew 75% over the last three decades.9 They are also largely responsible for the harmful pollutant emissions that disproportionally impact historically low-income and BIPOC communities located near fleet depots, major transportation corridors, distribution centers, and ports.10
In fact, the American Lung Association found that one in three Americans live in places with

unhealthy air pollution, largely due to transportation sector emissions. As such, vehicle emissions standards serve as a crucial mechanism to protect public health and advance environmental justice.11 Further, with many major companies aiming to deploy 50-100% zero-emission trucks by 2030, EPA's proposed standards fail to stimulate the rate of commercial electric truck production that commercial fleet operators seek.12 By strengthening the proposed Phase 3 standards to ensure at least 50% ZEV sales across all market segments by 2032, EPA will accelerate the industry's necessary investments in heavy-duty ZEV manufacturing and the accompanying investments in charging infrastructure. [EPA-HQ-OAR-2022-0829-0511, pp. 2-3]

9 https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf (p.2-35, 3-25)

10 BIPOC: Black, Indigenous, People of Color

11 https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf

12 https://theicct.org/wp-content/uploads/2023/04/hdv-phase3-ghg-standards-benefits-apr23.pdf (p.i-19).

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

Environmental impacts from the transportation sector—and the resulting health and economic consequences—are a major concern. Vehicles are the top source of greenhouse gas (GHG) emissions in Colorado, and are also a top source of particulate matter, NOx, and other criteria air pollutants that have disproportionate impacts on communities living near highways and freight routes. Transportation is one of the two largest sources of ozone precursors in Colorado along with oil and gas production, largely due to NOx emissions from vehicles, and reducing transportation emissions is a critical strategy to meet federal health-based air quality standards. [EPA-HQ-OAR-2022-0829-0694, p. 1]

Organization: District of Columbia Department of Energy and Environment (DOEE)

Environmental Justice Implications

DOEE acknowledges that the District's metropolitan and natural environments are constructed and managed in ways that have not benefitted the District's communities equally. District residents who continue to suffer the effects of environmental hazards—and their compounding impacts—are disproportionately people of color and people experiencing poverty. These hazards manifest as air pollution, inequities in access to clean water and nutritious food, lack of proximate green space, proximity to industrial toxins, racial disparities in life expectancy, and increased vulnerability to extreme weather events and climate change. Most germane to this rulemaking, many of these residents have had highways and major arterials constructed through their communities, increasing the burdens from air pollution emitted by motor vehicles. By addressing racial inequity in the systems we manage and influence, we create opportunities for more communities to benefit from, and participate in, the process of identifying and implementing environmental solutions. [EPA-HQ-OAR-2022-0829-0550, pp. 3-4]

People of color and people with lower incomes are more likely to live near high-volume or high-traffic density roads than their white, wealthier counterparts. About 19% of the US population lives near highly trafficked roads, whereas 27% of people of color live near high-volume roads (Census of the US near- roadway population, Rowangould). According to the Union of Concerned Scientists, “Nearly one half of everyone living in the United States—an estimated 150 million—live in areas that don’t meet federal air quality standards. Passenger vehicles and heavy-duty trucks are a major source of this pollution, which includes ozone, particulate matter, and other smog-forming emissions.” [EPA-HQ-OAR-2022-0829-0550, pp. 3-4]

The Union of Concerned Scientists further confirms the hazards of vehicle emissions and living near roads through modeling of vehicle air pollution in California as well as the Northeast and Mid-Atlantic region. The study indicated similar results as the Census of the US near-roadway population by Rowangould, finding that people near roads are burdened by the prevalent and harmful PM2.5. UCS modeling shows that Asian Americans are, on average, exposed to 34 percent higher levels of PM2.5 from vehicles than the average for the total US population. Other groups also have higher than average exposure: African Americans are burdened with 24 percent higher than average exposure, and Latinos have 23 percent higher exposure. On the other hand, exposure of whites to PM2.5 from vehicles is, on average, 14 percent lower than the average exposure for everyone.10 [EPA-HQ-OAR-2022-0829-0550, pp. 4]

10 David Reichmuth. Air Pollution from Cars, Trucks, and Buses in the US: Everyone is Exposed, But the Burdens are not Equally Shared. October 2019. https://blog.ucsusa.org/dave-reichmuth/air-pollution-from-cars-trucks-and-buses-in-the-u-s- everyone-is-exposed-but-the-burdens-are-not-equally-shared/

In addition, data from the Centers for Disease Control and Prevention shows that, nationally, Black and Indigenous people statistically have significantly higher asthma rates than their counterparts in other races.11 In the District, children who live in predominately Black communities have 20 to 25 times more asthma-related emergency room visits than their counterparts in majority White communities.12 [EPA-HQ-OAR-2022-0829-0550, pp. 4-5]

11 Center for Disease Control. Most Recent National Asthma Data. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm.

12 Children’s National Medical Hospital. 2017. “Asthma Surveillance in DC Emergency Departments and Hospitals.” https://childrensnational.org/-/media/cnhs-site/files/departments/impactdc/impact-dc-surveillance.pdf?la=en&hash=4235C55A9C1DE9DE9725D8D5D99D30831FCA18CF

Studies also illustrate links between increased school absenteeism and ozone exposure.13 This is a District-wide concern as disparities already exist in the education system between students of color and White students. In particular, the literacy disparities have grown since the Covid-19 pandemic: 28% of Black and 30% of Hispanic students were proficient on a fall 2021 test, while 70% of White students were proficient. In the fall of 2019, 44% of Black students and 42% of Hispanic students hit these benchmarks, compared with 73% of White students.14 [EPA-HQ-OAR-2022-0829-0550, pp. 4-5]

13 Daniel L Mendoza et al 2020 Environ. Res. Lett. in press https://doi.org/10.1088/1748-9326/abbf7a

14 Perry Stein. 2022 The Washington Post. “Literacy scores show widening achievement gap in D.C. during pandemic.” https://www.washingtonpost.com/education/2022/03/17/dc-schools-achievement-gap-pandemic-reading/

According to DC Kids Count, White students achieve third-grade literacy at a rate 2-3 times more than Black and Latinx students. This gap continues into high school, where 19% of Black students and 41% of Latinx students who enroll in an Advanced Placement (AP) class pass at least one of the AP or International Baccalaureate (IB) exams. Meanwhile, 83% of White students pass at least one of the exams.15 Often, students experiencing greater education inequality are also living in areas of the District that are exposed to higher levels of air pollution and noxious emissions, which ultimately leads to more health issues and a higher likelihood of more missed school days and further education loss.16 [EPA-HQ-OAR-2022-0829-0550, p. 5]

15 DC Kids Count Powered by DC Action. 2021. “DC Students’ Educational Outcomes Gaps are Massive.” https://dckidscount.org/education/

16 DC Kids Count Powered By DC Action. 2021. “How Many DC Kids Live in Poverty in Ward 5? Are Homeless?” https://dckidscount.org/ward-snapshots/ward5/

On-road vehicle emissions constitute one of the most significant individual contributors to local air pollution-related health burdens, making up 23% of all pollution-related premature deaths in the District. On-road vehicle emissions are estimated to contribute to 51% of NO2-attributable new asthma cases and 13% of pollution-attributable premature deaths in the District. Regional emissions from all sectors, which originate outside of the District’s jurisdiction, contribute disproportionately to the District's air pollution- related new asthma cases and premature deaths (89% and 57%, respectively). [EPA-HQ-OAR-2022-0829-0550, p. 5]

These studies illustrate that air quality is an issue connected to all aspects of people’s lives. The pollution from vehicle emissions affects District residents, creating poor air quality and living conditions and with it, a myriad of health, wellness, and educational discrepancies. The District strives to reduce pollution as much as possible; however, pollution from light-duty and medium-duty vehicles must be solved at a larger scale as light-duty and medium-duty vehicles from states across the United States travel into the District. Therefore, the District cannot solve all its pollution problems without action from EPA. EPA needs to set stronger light-duty and medium-duty vehicle emission standards to relieve overburdened and bystander communities experiencing the adverse impacts of vehicle emissions. [EPA-HQ-OAR-2022-0829-0550, p. 5]

Organization: Donna Jackson

[*From Hearing Testimony, May 10, 2023*] This new proposed rule has the distinction of harming black people on two continents, in the African nation of Congo as well as here in the United States. In the Congo where 75 percent of the world's cobalt needed for rechargeable EV batteries is located, black slave and child labor is readily being used to mine these minerals. It is well documented that their conditions are deplorable. The need for cobalt and thus the extent of the suffering will increase exponentially as a result of the EPA's proposed rule and if that wasn't bad enough, this new proposed rule will create an economic hardship and serious decline in the standard of living for all Americans but especially black Americans. Blacks have more single parent households, lower medium household income and higher poverty rates than the overall population. According to the 2021 U.S. Census Bureau, the median household income for black Americans was $45,000 compared to $71,000 for white Americans and $101,000 for Asian Americans. As such, they can't afford more expensive EV vehicles nor the higher prices for limited supply of gasoline powered vehicles and as it is, many Blacks have already been priced out of the new vehicles markets and can only afford used ones. Overall the consequences of this rule will remove private car ownership from many if not most black Americans. Even if the EVs weren't so expensive, they still don't fit the lives of many Blacks Americans, for example, more

Blacks are renters, so fewer have the chance to charge their vehicles at home. Many black Americans live in apartments where street and parking lots is the norm with no ability to charge. In addition, many black households can only afford one vehicle but the reality is EVs are practical only for multi car households and the list goes on. Suffice to say it is that no EV supporter ever bothered to ask the black community if this is what they want or fits the needs of their family. And for those Blacks who want EV vehicle, they are free to choose one with or without an EPA mandate. The proposed rule here only serves to force more expensive vehicles on everyone whether they like it or not. The truth is that black people like most Americans want to make these choices for themselves. For this reason, I urge the EPA to withdraw the proposed rule and instead start thinking of ways to make personal transportation more accessible. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 2]

Organization: Elders Climate Action

Action requested:

Elders Climate Action requests that EPA revise the standards for HDVs to set a zero emission standard for nitrogen oxides (NOx), PM2.5 and CO2 for the classes of L/MDVs or types of L/MDVs that operate in duty cycles for which zero emission power trains are currently in use or which EPA expects will be available by 2027 [EPA-HQ-OAR-2022-0829-0737, pp. 1-2].

ECA requests that EPA use its authority to set emission standards to –

1) respond meaningfully to the urgency of the climate crisis that threatens to destroy the future for our children and grandchildren by destroying or disrupting the natural systems upon which all life, including human civilization, relies to thrive and survive, to avoid turning the planet into an unsustainable Hell on Earth;

2) optimize the emission reductions needed from L/MD on-road vehicles to ensure attainment of the ozone and PM2.5 NAAQS within the deadlines established by the CAA rather than delaying attainment until 2045 for some areas, and not attaining at all in the New York/Connecticut?New Jersey, Houston, South Coast and San Joaquin Valley nonattainment areas; and

3) to end the inequitable and unlawful disparate impact on BIPOC and low income frontline communities who are most exposed to emissions from L/MDVs in violation of Title VI of the Civil Rights Act and thereby suffer "disproportionately high and adverse human health or environmental effects on minority populations and low-income populations" in violation of EO 12,898. [EPA-HQ-OAR-2022-0829-0737, pp. 1-2]

3. Public Health Urgency.

Diesel trucks and buses are also major sources of other deadly air pollutants. Medium and heavy-duty diesel engines emit more than 60% percent of the deadly particle pollution from vehicles. Particle pollution cuts short tens of thousands of US lives per year and contributes to the heavy burden of asthma on our nation's children. Diesels are the primary source of particles in communities near heavily-trafficked highways where 65 million Americans are exposed to harmful concentrations. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

Vehicle pollution inequitably harms Black and Latinex communities that are much more likely compared to whites to reside near heavy truck traffic on highways, and at truck terminals, ports and distribution centers. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

NOx from diesels combines with heat and sunlight in the atmosphere to form ground level ozone, or smog, a lung irritant and asthma trigger. Heavy duty vehicle emissions are a major contributor to urban smog in the 230 urban counties where pollution concentrations violate national air quality standards. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

The need for national zero emission standards is greatest in the urban areas that EPA has designated “extreme” (South Coast AQMD) and “severe” (San Joaquin Valley AQMD), or recently bumped-up to “serious” for ozone. NOx emissions from L/MDVs are a primary contributor to their numerous elevated violations of the ozone NAAQS. These areas are not able to achieve sufficient emissions reductions to attain the NAAQS without significant NOx reductions from L/MDVs. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

2. Impacts of Climate Warming on Public Health are Significant and Widespread.

Fire smoke and unprecedented hot temperatures are having a significant impact on human health as an example of the regional impact of heat waves, drought and wildfires. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

The heat dome that raised temperatures above 110 F for three days in the Pacific NW in June 2021 caused over 200 heat-related deaths in Oregon and Washington. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

Recent research demonstrates that emissions from wildfire are the largest source of fine particle pollution in large regions of the U.S., and contributed to thousands of pre-mature deaths. Wildfire in the western U.S. now accounts for half of all fine particle pollution in some areas of the West, doubling the exposure to PM2.5 [18] from non-fire sources including motor vehicles, power plants and industrial operations.19 [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

18 PM2.5 are particles smaller than 2.5 micrometers in diameter.

19 Burke, M. et al., The changing risk and burden of wildfire in the United States | PNAS (Jan 11, 2021).

A warming climate is responsible for roughly half of the increase in burned area in the United States (4), and future climate change could lead to up to an additional doubling of wildfire-related particulate emissions in fireprone areas (36) or a many-fold increase in burned area (37, 38). Costs from these increases include both the downstream economic and health costs of smoke exposure, as well as the cost of suppression activities, direct loss of life and property, and other adaptive measure (e.g., power shutoffs) that have widespread economic consequences.20 [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

20 Id.

Using satellite measurements of smoke plumes integrated with ground level monitored PM2.5 (fine particle) concentration data, Burke et al. estimate that between 7,000 and 14,500 deaths per year (depending on the dose/response curve used to estimate mortality from observed exposures) are attributable to fire smoke in the contiguous U.S. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

Mortality and other health impacts such as asthma attacks and exacerbating COPD will be experienced most severely by communities already burdened by the adverse health effects of daily exposure to fine particle pollution emitted from tailpipes, power plants and industrial sources. Exposure to fire smoke in the American West during the 2020 fire season was universal. No communities were spared. But fire smoke at least doubled the annual exposure routinely suffered by BIPOC and low income communities living near major highways and industrial sources. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

In Oregon, mortality attributed to fire includes many hundreds more deaths than the lives lost directly to fires. Statewide smoke pollution during the 2020 fires threatened lives and well- being with extreme hazard concentrations of particles known to cause pre-mature death and cancer, exacerbate asthma, COPD and other respiratory conditions, and cardio-vascular diseases. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

The Oregon Health Authority (OHA) reports that "[t]he most severe recent air quality events in Oregon are due to wildfire smoke…"21 OHA cited a study finding that fire smoke in 2012 "caused hundreds of premature deaths, nearly 2,000 emergency room visits and more than $2 billion in health costs."22 OHA points to the longer fire season as increasing the harm from exposure to smoke. "Fire seasons in Oregon are roughly 100 days longer than they were in the 1970s. Longer seasons mean more smoke in Oregon communities."23 The greater density of smoke and longer duration of smoke exposure in 2020 likely at least doubled the mortality caused by smoke exposure compared to 2012. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

21 Oregon Climate and Health Report, 40 (Oregon Health Authority, 2020).

22 Id., 33.

23 Id.,

In addition, low income families without air conditioning are much less able to escape smoke pollution by closing doors and windows during the summer heat to keep themselves safe. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

Workers cannot avoid exposure to smoke pollution if required to work outdoors. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

Beyond the economic and environmental damage, social disruption, and harm to health that will result from a longer fire season and expanded fire zones, more deadly air quality will likely make parts of the American West uninhabitable during the fire season for the most vulnerable populations such as the elderly, children and those with existing respiratory and cardiovascular conditions. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

These recent data and other sources published since 2009, including the data discussed at length in the Administrator's 2009 Endangerment Finding, 74 Fed. Reg. 66,496 (December 15, 2009), confirm the finding that EPA made 12 years ago: "The Administrator finds that the elevated atmospheric concentrations of the well-mixed greenhouse gases may reasonably be anticipated to endanger the public health and welfare of current and future generations." Id., at 66,523. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

Organization: Energy Innovation

In addition to improvements to public health and welfare that the EPA's proposed tailpipe GHG standards would achieve, the proposed multi-pollutant standards will help reduce criteria pollutants and air toxics from remaining internal combustion engine (ICE) vehicles. As LDVs and MDVs transition away from combustion and tailpipes that cause harmful air pollution, these multi-pollutant standards are critical to saving the lives and improving the health of the people and children harmed by transportation pollution.15 Although we do not provide detailed comments on this aspect of the proposed rule, we encourage the EPA to adopt the most stringent standards feasible to mitigate the harmful effects of these pollutants. The EPA aptly points out that "reducing human exposure to these pollutants results in significant and measurable health benefits,"16 especially to frontline communities, communities of color, and low-income communities and individuals that bear the burden of bad air quality from tailpipe emissions.17 Adopting more stringent multi-pollutant standards will also help states meet National Ambient Air Quality Standards18 and improve air quality in all communities. [EPA-HQ-OAR-2022-0829-0561, p. 7]

15 American Lung Association, "Health Impact of Air Pollution," American Lung Association State of the Air, n.d.,

https://www.lung.org/research/sota/health-risks.

16 U.S. EPA, 29379.

17 "Disparities in the Impact of Air Pollution," American Lung Association, April 20, 2020, https://www.lung.org/clean-air/outdoors/who-isat-risk/disparities.

18 U.S. EPA, "Reviewing National Ambient Air Quality Standards (NAAQS): Scientific and Technical Information," U.S. EPA, n.d., https://www.epa.gov/naaqs and "Current Nonattainment Counties for All Criteria Pollutants," U.S. EPA, May 31, 2023, https://www3.epa.gov/airquality/greenbook/ancl.html.

Organization: Environmental and Public Health Organizations

EPA should set strong emissions standards to meet its obligations under presidential directives on environmental justice. Under Executive Order 12,898, EPA "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." 59 Fed. Reg. 7629 (Feb. 11, 1994). And Executive Order 14,008 directs EPA to develop "programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.'' 86 Fed. Reg. 7619, 7629 (Jan. 27, 2021). It also establishes the Administration's policy ''to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution.'' Id. [EPA-HQ-OAR-2022-0829-0759, p. 18]

C. More stringent standards would bring greater benefits to environmental justice communities.

This rulemaking will provide benefits to environmental justice communities by reducing harm from climate change and pollution exposure. And Alternative 1, with a faster ramp rate after

2030, would bring even greater benefits to vulnerable populations that suffer the brunt of pollution and climate change harms. EPA appropriately recognizes that environmental justice communities are disproportionately affected by climate change and pollution impacts related to light- and medium-duty vehicles and upstream emissions. Addressing these harms by providing these communities relief more quickly—a priority for this Administration—is a compelling reason why EPA should adopt Alternative 1 with a faster ramp rate after 2030. [EPA-HQ-OAR-2022-0829-0759, p. 18]

Given the vast history of disproportionate environmental and public health burdens placed on communities of color and low-income communities, EPA appropriately included consideration of environmental justice, energy justice, and equity in its Proposal.74 Communities that are overburdened with pollution from sources such as major roadways, industrial sites, and agriculture are predominantly low-income, and a large percentage of residents of these communities are people of color and non-English speakers.75 With the improvements described in this comment letter, this rulemaking could bring about significant air quality and health improvements in communities that are disproportionately burdened with air pollution from motor vehicles and overburdened from pollution more broadly.76 [EPA-HQ-OAR-2022-0829-0759, p. 18]

74 For more information on the history and definition of the environmental justice movement, see Initiative for Energy Justice, Section 1—Defining Energy Justice: Connections to Environmental Justice, Climate Justice, and the Just Transition (Dec. 23, 2019), https://iejusa.org/section-1-defining-energy-justice/.

75 See Gina M. Solomon et al., Cumulative Environmental Impacts: Science and Policy to Protect Communities, 83 Annual Review of Public Health (Jan. 6, 2016), https://pubmed.ncbi.nlm.nih.gov/26735429/.

76 See EPA, ISA for Particulate Matter at Ch. 12: Populations and Lifestages Potentially at Increased Risk of a Particulate Matter-Related Health Effect; Section 5: Sociodemographic Factors, https://www.epa.gov/isa/integrated-science-assessment-isa-particulate-matter.

1. Reductions in greenhouse gas emissions will bring climate change benefits to environmental justice communities.

Reducing GHG emissions from light- and medium-duty vehicles will help reduce the significant harm that climate change inflicts on environmental justice communities. By 2055, the Proposed Standards would avoid 7,300 million metric tons (MMT) of CO2 emissions, 88 Fed. Reg. at 29198, tbl. 3, and EPA's calculations show the Proposal would produce climate benefits of between $82 and $1,000 billion in 2020 dollars by 2055, depending on the values used for GHG emission reductions. Id. at 29200, tbl. 6 (using a 3% discount rate). As compared to the Proposed Standards, by 2055 Alternative 1 would achieve an additional 800 MMT of CO2 savings, 88 Fed. Reg. at 29203, tbl. 14, and increase climate benefits by between $9 and $100 billion. Id. at 29205, tbl. 17. And adopting Alternative 1 with a faster ramp rate after 2030 would bring even more climate benefits to environmental justice communities. See infra Section V (detailing the societal benefits of more stringent standards). [EPA-HQ-OAR-2022-0829-0759, p. 19]

Reducing climate harm will benefit environmental justice communities because, as EPA has aptly described, climate change disproportionately affects these communities. 88 Fed. Reg. at 29393-95. EPA recognized in the 2009 Endangerment Finding that vulnerable populations, including economically and socially disadvantaged communities and Indigenous or minority populations, are especially vulnerable to climate change. Id. at 29393. Reports from the U.S. and international climate bodies over the last decade add evidence to the conclusion that climate change disproportionately impacts environmental justice communities, including by "altering exposures to heat waves, floods, droughts, and other extreme events; vector-, food- and waterborne infectious diseases; changes in the quality and safety of air, food, and water; and stresses to mental health and well-being.'' Id. at 29394. Notably, the 2016 scientific assessment on the Impacts of Climate Change on Human Health predicts that people of color will suffer a disproportionate impact of climate exacerbations of air pollution. Id. at 29395. It also describes unique vulnerabilities of Native American communities because of expected impacts to their cultural resources, customs, and traditional subsistence lifestyles, including expected declines in food security for Alaskan Indigenous Peoples. Id. [EPA-HQ-OAR-2022-0829-0759, p. 20]

Though EPA has included a significant number of publications in its literature review, it should also include its 2021 analysis of the disproportionate climate impacts on vulnerable populations. The study quantifies the increased risks of climate change on socially vulnerable populations in six categories: Air Quality and Health; Extreme Temperature and Health; Extreme Temperature and Labor; Coastal Flooding and Traffic; Coastal Flooding and Property; and Inland Flooding and Property, using data on where people live as an indicator of exposure.79 The report concludes that Black and African American individuals will likely face higher impacts of climate change for all six impacts analyzed compared to all other demographic groups. Black and African Americans are 40% more likely to live in communities with the highest increase in premature mortality from extreme temperatures, and 34% are more likely to live in areas with the highest increases in PM2.5 childhood asthma diagnoses with 2°C (3.6°F) of global warming.80 Hispanic and Latinos are also significantly more likely to live in areas where impacts are projected to be highest.81 Low-income individuals and those without a high school diploma have 25-26% greater risk of living in areas with the highest extreme temperature labor hours lost.82 [EPA-HQ-OAR-2022-0829-0759, p. 20]

79 EPA, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts, EPA 430-R-21-003 (2021) at 9 (Six Impacts), https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.

80 Id. at 79.

81 Id. at 76.

82 Id. at 77.

And as we witness time and again with each unfolding disaster, vulnerable populations suffer the most from climate change-fueled extreme events. Taking recent events in this country as illustrative examples, economically disadvantaged individuals, low-wage outdoor workers, and homeless and elderly people died from heat stroke in the Northwest heat wave in 2021,83 an event that researchers found would have been "virtually impossible without human-caused climate change."84 In New Orleans, the people who could not evacuate before disastrous Hurricanes Katrina and Ida struck land are those who did not have the means or ability to do so.85 In New York City, many people who could only afford to live in illegal basement apartments died as a result of flooding during Ida.86 During western wildfire season, those without homes or means do not have the luxury of filtered air to protect their lungs.87 To help address the urgency of the climate crisis and its impacts on vulnerable populations, EPA must adopt the more stringent Alternative 1 with a faster ramp rate after 2030. [EPA-HQ-OAR-2022-0829-0759, pp. 20-21]

83 E.g., Irfan, U., Extreme heat is killing American workers, Vox (Jul. 21, 2021), https://www.vox.com/22560815/heat-wave-worker-extreme-climate-change-osha-workplace-farm-restaurant.; Geranios, N.K., Pacific Northwest strengthens heat protections for workers (Jul. 9, 2021), https://apnews.com/article/business-science-health-environment-and-nature-washington-c463fc55ab6b601cf70b2fd7 3644f973; Peterson, D., New data shows scope of heatwave-related homeless deaths, (Jul. 23, 2021), https://www.koin.com/news/special-reports/new-data-shows-scope-of-heatwave-related-homeless-deaths/; Bella, T., Historic heat wave in Pacific Northwest has killed hundreds in U.S. and Canada over the past week (Jul. 1, 2021), https://www.washingtonpost.com/nation/2021/07/01/heat-wave-deaths-pacific-northwest/

84 World Weather Attribution, Western North American extreme heat virtually impossible without human-caused climate change (Jul. 7, 2021), https://www.worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human -caused-climate-change/.

85 E.g., Willingham, L., "We can't afford to leave": No cash or gas to flee from Ida, (Aug. 29, 2021), https://www.denverpost.com/2021/08/29/hurricane-ida-no-money-evacuate/see also Wade, L., Who Didn't Evacuate for Hurricane Katrina?, Pacific Standard (Aug, 31, 2015), at https://psmag.com/environment/who-didnt-evacuate-for-hurricane-katrina.

86 Haag M. & J.E. Bromwich, Most of the apartments where New Yorkers drowned were illegal residences, New York Times (Sept. 3, 2021), https://www.nytimes.com/live/2021/09/03/nyregion/nyc-flooding-ida#nyc-illegal-basement-apartment-ida.

87 E.g., Kardas-Nelson, M., Racial and Economic Divides Extend to Wildfire Smoke, Too, (Sept. 21, 2020), at https://www.invw.org/2020/09/21/racial-and-economic-divides-extend-to-wildfire-smoke-too/.

2. Reductions in criteria pollution emissions will bring health benefits to environmental justice communities.

This rulemaking presents a critical opportunity to mitigate the adverse health impacts plaguing communities that are overburdened by air pollution from motor vehicles and other sources. According to the American Lung Association's (ALA) 2023 State of the Air report, which grades counties on daily and long-term measures of particle pollution and daily measures of ozone, more than 119 million Americans live in places that received failing grades for unhealthy levels of ozone or PM in their air.88 The report notes:

88 Am. Lung Ass'n, State of the Air 2023 Report (2023) at 12, https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf.

Although people of color are 41% of the overall population of the U.S., they are 54% of the nearly 120 million people living in counties with at least one failing grade. And in the counties with the worst air quality that get failing grades for all three pollution measures, 72% of the 18 million residents affected are people of color, compared to the 28% who are white.89

89 Id.

In addition to the disproportionate impact on people of color noted above, ALA outlines other "high-risk" groups that are impacted by the pollution in these regions. For example, low-income communities are particularly vulnerable and at risk of health impacts from pollution. More than 14.6 million people whose incomes meet the federal definition for living in poverty reside in counties that received a failing grade on at least one of the ALA's pollutant indicators, while nearly 2.6 million people living in poverty reside in counties that received failing grades on all three pollutant measures.90 In addition, around 27 million children (under age 18) and 18 million older adults (age 65 or older) live in counties that received a failing grade on at least one pollutant.91 [EPA-HQ-OAR-2022-0829-0759, pp. 21-22]

90 Id. at 20.

91 Id.

In fact, it is well established that communities of color and economically disadvantaged communities are disproportionately exposed to environmental burdens from a variety of sources. The White House Council on Environmental Quality (CEQ) released (and recently updated) a Climate and Economic Justice Screening Tool, which identifies communities around the country that are "marginalized, underserved, and overburdened by pollution"92 and would therefore qualify for Justice4093 investments (President Biden's key environmental justice initiative). The Screening Tool identifies census tracts as "disadvantaged" if they are above the threshold for one or more environmental or climate indicators (e.g., exposure to diesel PM or PM2.5, traffic proximity and volume, or proximity to hazardous waste sites) and above the threshold for socioeconomic indicators related to income and education.94 A recent analysis found that 64% of the population in census tracts the Screening Tool identifies as disadvantaged are Hispanic/Latino, Black or African American, or American Indian or Alaskan Native.95 Overall, 50% of Hispanic/Latino, Black or African American, and American Indian or Alaskan Native individuals in the country reside in disadvantaged communities, compared to just 17% of White, Non-Hispanic/Latino individuals.96 [EPA-HQ-OAR-2022-0829-0759, p. 22]

92 The White House, Biden-Harris Administration Launches Version 1.0 of Climate and Economic Justice Screening Tool, Key Step in Implementing President Biden's Justice40 Initiative (Nov. 22, 2022) https://www.whitehouse.gov/ceq/news-updates/2022/11/22/biden-harris-administration-launches-version-1-0-of-cli mate-and-economic-justice-screening-tool-key-step-in-implementing-president-bidens-justice40-initiative/. See CEQ, Preliminary Climate and Economic Justice Screening Tool, https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5.

93 The White House, The Path to Achieving Justice40 (July 20, 2021), https://www.whitehouse.gov/omb/briefing-room/2021/07/20/the-path-to-achieving-justice40/.

94 CEQ, Climate and Economic Justice Screening Tool: Technical Support Document, (Nov. 2022) at 4–8, https://static-data-screeningtool.geoplatform.gov/data-versions/1.0/data/score/downloadable/1.0-cejst-technical-supp ort-document.pdf.

95 Emma Rutkowski et al., Justice40 Initiative: Mapping Race and Ethnicity, Rhodium Group (Feb. 24, 2022), https://rhg.com/research/justice40-initiative-mapping-race-and-ethnicity/.

96 Id.

3. Significant decreases in vehicle and upstream non-GHG emissions over time will provide benefits to environmental justice communities.

In addition to securing GHG reductions, the Proposal will reduce non-GHG tailpipe emissions over time as well as upstream emissions from refineries, both of which will benefit environmental justice communities. 88 Fed. Reg. at 29393. Compared to the Proposal, Alternative 1 provides greater reductions in criteria pollutants and air toxics. Compare id. at 29198–99, tbls. 4 and 5, with id. at 29204–05, tbls. 15-16. EPA should adopt Alternative 1 with a faster ramp rate after 2030 to bring more relief more quickly to environmental justice communities. [EPA-HQ-OAR-2022-0829-0759, p. 23]

Notably, the immediate benefits more stringent standards would provide from reductions over time in tailpipe and upstream refining emissions vastly outweigh any potentially small non-GHG emissions increases from upstream electric generation. By one measure, reducing refinery emissions may be more beneficial to environmental justice communities as a whole than reducing emissions from electric generation. EPA has concluded that refineries have far higher health benefits per ton of emission reductions than do electric generating units, due in part to greater proximity to populations.97 [EPA-HQ-OAR-2022-0829-0759, p. 23]

97 EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, Technical Support Document, Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 17 Sectors, at 6, 16 (Feb. 2018), available at https://www.epa.gov/sites/production/files/2018-02/documents/sourceapportionmentbpttsd_2018.pdf (valuing electricity-generation-unit emissions of particulate matter in 2020 at $150,000–350,000 per ton and corresponding refinery emissions at $360,000–830,000 per ton).

EPA correctly concludes that environmental justice communities are disproportionately harmed by the non-GHG criteria and air toxics emissions associated with vehicles and upstream sources, and therefore these communities will especially benefit from reduced tailpipe emissions. 88 Fed. Reg. at 29395–97. After conducting a literature review and its own analysis, EPA recognizes that higher percentages of communities of color and low-income communities live or attend school near major roadways, suffering the largest share of their emissions and associated adverse health impacts. Id. EPA also recognizes that higher percentages of communities of color and low-income communities live near electric generating units and refineries. Id. at 29397. EPA should, however, strengthen its statement that "[a]nalysis of populations near refineries also indicates there may be potential disparities in pollution-related health risk from that source." Id. (emphasis added). The study of socioeconomic factors near refineries cited by EPA itself concludes that "[m]inority and African American percentages are approximately twice as high as national percentages" for cancer risk as a result of petroleum refinery emissions.98 That study alone is enough evidence to warrant a conclusion that such populations do experience disparities in health risk. For further evidence, please see NGO coalition comments on the Proposed SAFE Vehicles Rule for Model Years 2021-2026.99 Additionally, EPA should recognize here, as it did in its Proposed Rule for MY 2023-2026 Passenger Cars and Light Trucks, that "most anthropogenic sources of PM2.5, including industrial sources, and light- and heavy-duty vehicle sources, disproportionately affect people of color."100 Finalizing strong standards will help mitigate these harms. [EPA-HQ-OAR-2022-0829-0759, pp. 23-24]

98 EPA, Risk and Technology Review—Analysis of Socio-Economic Factors for Populations Living Near Petroleum Refineries. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina at 6 (Jan. 2014).

99 See NGO comment, Dkts. NHTSA-2018-0067, EPA-HQ-OAR-2018-0283, at 232-34, available at https://downloads.regulations.gov/EPA-HQ-OAR-2018-0283-5070/attachment_2.pdf. See also EIP, Monitoring for Benzene at Refinery Fencelines, 10 Oil Refineries Across U.S. Emitted Cancer-Causing Benzene Above EPA Action Level (Feb. 6, 2020), https://www.environmentalintegrity.org/wp-content/uploads/2020/02/Benzene-Report-2.6.20.pdf.

100 86 Fed. Reg. 43726, 43802 n. 213 (citing C.W. Tessum, D.A. Paolella, S.E. Chambliss, J.S. Apte, J.D. Hill, J.D. Marshall, PM2.5 polluters disproportionately and systemically affect people of color in the United States. Sci. Adv. 7, eabf4491 (2021)).

Organization: Environmental Defense Fund (EDF) (1of 2)

i. Additional reductions in PM pollution are urgently needed, especially in communities that have long faced elevated pollution burdens. [EPA-HQ-OAR-2022-0829-0786, p. 63]

Continuing to drive criteria pollutant reductions is particularly important for low-income communities and communities of color, which have historically faced significant and elevated harms from health-harming transportation pollution. As a result of housing discrimination and other unjust policies, communities of color and low-income communities constitute a higher percentage of the population near our roads and highways and therefore suffer disproportionately from associated harmful pollution.174 According to the American Lung Association's 2023 State of the Air report, people of color are almost four times more likely to breathe the most polluted air when compared to white people.175 A report by Moving Forward Network also found that, on average, Asian and Black Americans are exposed to PM2.5 pollution that is 56 and 44 percent higher, respectively, than white Americans.176 And an EDF analysis of the Bay Area in California found that neighborhoods with higher percentages of residents of color experienced double the rate of asthma from nitrogen dioxide (NO2) –a pollutant often used as a marker for transportation-related pollution.177 Moreover, as described above, recent studies have found light- duty vehicles, including light-duty trucks are responsible for a significant share of pm- attributable premature mortalities. [EPA-HQ-OAR-2022-0829-0786, p. 63]

174 Gregory M. Rowangould, A Census of the US Near-Roadway Population: Public Health and Environmental Justice Considerations, Transportation Research Part D 25, 59-67 (2013), https://www.sciencedirect.com/science/article/abs/pii/S1361920913001107.

175 American Lung Association, State of the Air Report 2023 (2023), https://www.lung.org/getmedia/338b0c3c- 6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf. (Attachment C)

176 Jimmy O'dea, Zero-Emissions Technology for Freight: Heavy-Duty Trucks, Tools to Advocate for Zero- Emissions Technology, Moving Forward Network (2020), http://www.movingforwardnetwork.com/wp- content/uploads/2020/10/MFN_ZeroEmissionToolkit-1.pdf. (Attachment X)

177 EDF, Air Pollution's Unequal Impacts in the Bay Area (2021), https://www.edf.org/airqualitymaps/oakland/health-disparities.

Accordingly, finalizing the criteria standards EPA has proposed, including setting the PM standard at a level that will encourage the use of GPFs, is critical to protecting health and combatting environmental injustice. [EPA-HQ-OAR-2022-0829-0786, p. 63]

Organization: Governing for Impact and Evergreen Action (GFI)

In addition to contributing to the climate crisis, light and medium duty passenger vehicles are responsible for emitting harmful pollutants including carbon monoxide, particulate matter, and nitrogen oxides, which can cause or contribute to significant negative public health outcomes such as lung and heart diseases.15 These harmful health outcomes disproportionately affect low income populations and communities of color, who are exposed to greater amounts of vehicle pollution.16 Unfortunately, these same communities are at the greatest risk of harm from the impacts of climate change, and often lack sufficient resources or support to protect themselves from these harmful impacts.17 Strong transportation emissions standards — for both GHGs and criteria pollutants — will limit the present and imminent public health threats that vulnerable populations face due to vehicle pollution. [EPA-HQ-OAR-2022-0829-0621, pp. 2-3]

15 See U.S. Dep't of Transp., "Cleaner Air," https://www.transportation.gov/mission/health/cleaner-air#:~:text=Vehicle%20emissions%20contribute%20to%20the,illnesses%2C%20including%20pneumonia%20and%20b ronchitis (last visited June 15, 2023).

16 See, e.g., Maria Cecilia Pinto de Moura and David Reichmuth, "Inequitable Exposure to Air Pollution from Vehicles in the Northeast and Mid-Atlantic," Union of Concerned Scientists (Jun 21, 2019), https://www.ucsusa.org/about/news/communities-color-breathe-66-more-air-pollution-vehicles.

17 See generally, EPA "Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts," 430-R-21- 003 (2021), available at: https://www.epa.gov/cira/social-vulnerability-report.

Organization: GreenLatinos et al.

On behalf of the undersigned environmental justice groups, locality-based organizations, and other advocacy groups, we urge the U.S. EPA to create the strongest possible standards to mitigate detrimental impacts of heavy duty vehicle (HDV) and light- and medium-duty vehicle (L/MDV) pollution on our communities. The current tailpipe emissions rulemaking can help enable us to achieve a more sustainable, emissions-free future for all communities. [EPA-HQ-OAR-2022-0829-0789, p. 1]

Evidence makes clear how instrumental the swift adoption of stringent HDV and L/MDV standards are for the future of Latino/e communities. The 2023 American Lung Association State of the Air Report (https://www.lung.org/research/sota) finds that more than one-third (36%) of people in the U.S. live in areas with failing grades for ozone or particulate pollution. This is concerning, especially considering the same report found that people of color are 3.7 times more likely than white people to live in a county with failing national air quality standards, putting our communities at even greater risk to severe health impacts and premature death. [EPA-HQ-OAR-2022-0829-0789, p. 1]

Pollution from vehicles makes us sick and kills us. The data shows this over and over again. We need long-term protective regulation now. [EPA-HQ-OAR-2022-0829-0789, p. 2]

For example, Latino/e children are three times more likely (https://www.jpedhc.org/article/S0891-5245(06)00737-1/fulltext) than white children to live in counties with low air quality. About 10% of Latino/e children (https://www.edf.org/blog/2014/04/22/why-latinos-are-disproportionately-affected-asthma-and-what-we-can-do#:~:text=Today%20in%20the%20United%20States,from%20this%20chronic%20respiratory%20illness.) suffer from asthma, and Latino/e children are 40% more likely to die from asthma than non-Latino white children. These disparities have only increased over time relative to the air quality standards set by the U.S. EPA. [EPA-HQ-OAR-2022-0829-0789, p. 2]

Transportation is the largest source of pollution that fuels the climate crisis in the US. Latino/e communities disproportionately suffer harm from tailpipe emissions. While Latino/es are less likely to have access to a car (https://salud-america.org/research-latinos-face-big-public-transportation-challenges/) and Latino/e workers commute by public transit nearly three times (https://www.demos.org/research/move-thrive-public-transit-and-economic-opportunity-people-color) the rate of white commuters, our community can face up to 75% higher rates of exposure (https://www.ucsusa.org/about/news/communities-color-breathe-66-more-air-pollution-vehicles) to harmful pollutants. [EPA-HQ-OAR-2022-0829-0789, p. 2]

Today, we are at a critical nexus for clean transportation policy: We must drastically and permanently reduce air pollution from vehicles and transform our transportation landscape. [EPA-HQ-OAR-2022-0829-0789, p. 2]

It is critical that the Biden administration pass regulations to reduce vehicle pollution and accelerate the shift to EVs. This action is crucial to achieving environmental justice. By implementing stringent HDV and L/MDV standards, the U.S. EPA will act on the Biden Administration's stated commitment to environmental justice, (https://www.whitehouse.gov/omb/briefing-room/2022/05/23/delivering-historic-and-long-overdue-investments-in-disadvantaged-communities/) which the White House reaffirmed in April 2023 with a new Executive Order, Revitalizing Our Nation's Commitment to Environmental Justice for All. (https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/21/fact-sheet-president-biden-signs-executive-order-to-revitalize-our-nations-commitment-to-environmental-justice-for-all/) [EPA-HQ-OAR-2022-0829-0789, p. 2]

The strongest possible HDV and L/MDV standards will help reach the urgent goal to cut greenhouse gas emissions by 60% by 2030 and will put American cars and trucks on a clear path towards achieving 100% zero emission electric vehicle (EV) sales by 2035 or earlier. [EPA-HQ-OAR-2022-0829-0789, p. 2]

The Biden administration's leadership in setting strong HDV and L/MDV standards is instrumental to mitigate the inequitable tailpipe pollution experienced by Latino/e and other frontline communities, which triggers asthma and other sometimes fatal respiratory illnesses. [EPA-HQ-OAR-2022-0829-0789, p. 2]

We need the cleanest possible vehicles now. Our lives literally depend on it. [EPA-HQ-OAR-2022-0829-0789, p. 2]

Organization: Interfaith Power & Light

It is critical to remember that the climate crisis is a challenge of racial, economic, and generational justice, and these rules target air pollution that disproportionately harms marginalized communities of color and low-wealth communities that reside in counties closest to major freeways. Implementing the strongest light-duty vehicle standards is a matter of environmental justice, and these standards would deliver massive emission reductions and life-saving relief to frontline communities. [EPA-HQ-OAR-2022-0829-0530, p. 1]

Organization: International Council on Clean Transportation (ICCT)

Health benefits and environmental justice modeling recommendations

In evaluating the health benefits of the proposed rule, it is critical to consider the evidence of increases in PM from recent model year vehicles. The health benefits assessment included in EPA's proposal uses emission factors from Motor Vehicle Emission Simulator (MOVES), which likely underestimates PM emissions from recent model year vehicles. Figure 15 shows a comparison between EPA MOVES emission factors and remote sensing UV smoke averages by model year, shown as a percent change from each sources respective model year 2005 averages.140 From model years 2006–2015, year-to-year changes, shown in the slopes of the lines, are relatively consistent between EPA MOVES and remote sensing data. However, from model year 2015 on, the trends diverge. For light-duty passenger trucks, the EPA MOVES PM emission factors sharply decline while the remote sensing data show an increase in UV smoke averages.141 Though less significant, a similar trend is observed for passenger cars, with the EPA MOVES PM emission factor continuing to decline after 2015 and remote sensing UV smoke averages showing a slight increase. These findings suggest that the modeled air quality and health benefits of the proposed rule may be underestimated when considering the large benefits of replacing 2015–2020 model year vehicles with future vehicles meeting the proposed PM emission limits. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

140 EPA MOVES emission factors are converted from fuel-specific to distance-specific emission factors for this comparison. This is done using real-world fuel economy data from EPA Automotive Trends report, the same source used to convert the remote sensing emissions from fuel-specific to distance-specific.

141 Light-duty passenger truck emission trends from EPA MOVES are compared to light-duty truck (LDT) emission trends from remote sensing data. Similarly, passenger car emission trends from EPA MOVES are compared to light-duty vehicle (LDV) emission trends from remote sensing data.

SEE ORIGINAL COMMENT FOR Figure 15. Percent change in distance-specific PM emission factor from EPA MOVES and remote sensing (RS) UV smoke measurements from Colorado (CO) and Virginia (VA) sources by model year, compared to model year 2005. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

Additionally, a full assessment of relative air quality and health benefits across demographics, as done for the heavy-duty multi-pollutant rule, is recommended for this light-duty and medium-duty multi-pollutant rule. It is widely understood that heavy-duty vehicles contribute to racial disparities in exposure to air pollution, and EPA reported the projected air quality impacts across demographics in their finalized heavy-duty multi-pollutant rule. Inequities in air pollution exposure exist for light-duty vehicle emissions as well. One study finds that on a national level, people of color are exposed to 46% more ambient PM2.5 from light-duty gasoline vehicles than White people.142 This is a greater disparity than that of HDVs; the same study finds that people of color exposed to 35% higher ambient PM2.5 levels from heavy-duty diesel vehicles compared to White people. Additionally, the health benefits from the heavy-duty multipollutant rule, as projected by the EPA, are on similar scales to that of the proposed light-duty and medium-duty vehicle rule.143 Thus, as the environmental justice and health implications of the light-duty and medium-duty vehicle rule are significant, a full assessment of the projected distribution of changes in PM2.5 and ozone concentrations by geography, race/ethnicity, and income is recommended for the finalized rule. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

142 Tessum, C et al. (2021). PM2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States," Science Advances 7, no. 18: eabf4491, https://doi.org/10.1126/sciadv.abf4491.

143 EPA's proposed light-duty and medium-duty rule is estimated to result in $63 billion and $280 billion (for 7% and 3% discount rates, respectively) in total monetized health benefits from 2027 to 2055. EPA's finalized heavy-duty multipollutant rule is projected to result in $53–150 billion and $91–260 billion (for 7% and 3% discount rates, respectively) in total monetized health benefits from 2027 to 2045.

Benefits and cost-effectiveness of the proposal

The LDV and MDV proposal is projected to reduce 15,000 tons of PM2.5, 66,000 tons of NOx, and 220,000 tons of hydrocarbons from 2027 to 2055.144 These benefits are compared to

2055 levels without the proposal. Based on the previous section on Particulate Matter emission standards, health benefits associated with PM reductions could be greater than EPA's projections. The proposed standards would reduce air pollution near-road where affected populations are often low-income or communities of color. Reducing these emissions will provide cleaner air and are critical to improving public health. [EPA-HQ-OAR-2022-0829-0569, p. 55]

144 US EPA. (2023). Multi-Pollutant emission standards for Model years 2027 and later Light-duty and Medium-duty vehicles Program Announcement. https://www.epa.gov/system/files/documents/2023-04/420f23009.pdf

Organization: Mass Comment Campaign sponsored by Arizona Interfaith Power & Light. (web) (216 signatures)

As a person of faith and conscience, I recognize that we have a moral obligation to cut carbon emissions that harm our Shared Home. People of faith and conscience are ready for bold, new transportation solutions, and cleaner cars and light trucks are an integral step towards addressing climate change for our communities, future generations, and our Sacred Earth. [EPA-HQ-OAR-2022-0829-0692]

I am asking EPA to move quickly and finalize the strongest possible light-duty vehicle (LDV) standards. This proposal is a first step and the EPA needs to finish the job by finalizing the strongest possible standards this year. [EPA-HQ-OAR-2022-0829-0692]

In order for the U.S. to meet our Paris Climate Agreement goals we need the strongest possible long-term standards—beyond model year 2026— that will put the country on a path to a 100% zero-emission new vehicle sales target by 2035. Not implementing the strongest possible light-duty vehicle standards would create major negative implications for our country's climate goals. [EPA-HQ-OAR-2022-0829-0692]

We must also keep in mind that these rules target air pollution that disproportionately harms marginalized communities of color and low-wealth communities. For example, "Black and Hispanic Americans are exposed to 56 and 63 percent more particulate matter pollution, respectively, than they produce." This is especially concerning for people of faith, as all religions call on us to treat our neighbors with respect, dignity, and compassion. Implementing the strongest LDV standards is a matter of environmental justice, and these standards would deliver massive emission reductions and life-saving relief to frontline communities. [EPA-HQ-OAR-2022-0829-0692]

In addition, electrifying passenger vehicles will be key to improving air quality and saving lives across the nation. More than 119 million American residents currently live in areas with unhealthy levels of air pollution. In 2020, the national passenger vehicle fleet represented approximately 94% of the nation's on-road vehicles and generated over 33,400 tons of fine particles annually, which are so small that they easily enter our bloodstream and harm our health. It is also critical that standards require tighter limits on internal combustion engine vehicles in order to continually make these cars cleaner as manufacturers transition to zero- emission vehicles. [EPA-HQ-OAR-2022-0829-0692]

So again, on behalf of millions of people of faith and conscience around the country, I urge the EPA to move quickly and finalize the strongest possible light-duty vehicle standards in order to reap the benefits of light-duty vehicle electrification and accelerate the transition to zero-emission vehicles. [EPA-HQ-OAR-2022-0829-0692]

Organization: Mass Comment Campaign sponsoring organization unknown (44,335 signatures)

I am a supporter of the League of Conservation Voters, and I am writing to ask that the EPA set the strongest rules possible to cut dangerous pollution from trucks and passenger vehicles. I urge you to ensure that light-, medium-, and heavy-duty vehicle standards accelerate greater zero-emission vehicle adoption, pushing beyond what is expected from federal clean energy investments. [EPA-HQ-OAR-2022-0829-1704]

Emissions from cars and trucks both contribute to climate change and impact my health and the health of communities across the country. Low-wealth communities and communities of color are often hit hardest, as are any neighborhoods near highways, freight hubs and anywhere with lots of traffic. These communities deserve a chance to live in a society where access to clean air is a fundamental right. [EPA-HQ-OAR-2022-0829-1704]

We encourage you to finalize the strongest standards possible that will open the door to a brighter future for all. Please adopt strong vehicle emissions standards that bring us to 100% clean vehicles sold by 2035. Or else help us all to buy an electric vehicle, because those things are expensive! [EPA-HQ-OAR-2022-0829-1704]

Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

Critical pollution reductions

In 2020, the transportation sector contributed 27 percent of total GHG emissions in the United States—more than any other single sector. Transport also contributes over 55 percent of our nation’s total nitrogen oxide (NOx) emissions. NOx and particulate matter pollution pose serious health risks, leading to devastating human health impacts including asthma, other respiratory issues, and even premature death. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Fast-tracking robust car and truck standards is critical for the United States to meet its GHG targets over the coming decade, meet Clean Air Act requirements and provide long-overdue protections for environmental justice communities. We believe that such standards would be consistent with the U.S. nationally determined contribution to the Paris Agreement, under which the United States committed to cut economy-wide GHG emissions by 50 to 52 percent in 2030, compared to 2005 levels. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Stakeholder involvement

EPA must incorporate a robust and responsive stakeholder engagement process— particularly for frontline communities. Transportation is a leading source of air pollution and disproportionately harms people on lower incomes and people of color. EPA must work with environmental justice communities to ensure they are included in decision-making processes. [EPA-HQ-OAR-2022-0829-0732, p. 2]

Organization: Minnesota Pollution Control Agency (MPCA)

The proposed standards would advance environmental justice by decreasing vehicle emissions of non- greenhouse gas pollutants that contribute to ambient concentrations of ozone, particulate matter, nitrogen dioxide, carbon monoxide, and air toxics. Reducing emissions of these from vehicles through stringent emissions standards is important for protecting the health of communities near busy roadways. MPCA research demonstrates that communities of concern for environmental justice are disproportionately exposed to air pollution from transportation.3 National studies have identified significant disparities in exposure to nitrogen oxides (NOX) based on race: researchers at the University of Minnesota estimate that people of color in America experience 38% more NOX pollution where they live than white Americans.4 People in these communities are also often more vulnerable to air pollution health impacts due to underlying structural inequities, such as limited access to health care, housing insecurity, and systemic racism. [EPA-HQ-OAR-2022-0829-0557, p. 3]

3 Pratt et al. (2015) Traffic, Air Pollution, Minority and Socio-Economic Status: Addressing Inequities in Exposure and Risk. Int. J. Res. Public Health, 12(5): 5355-5372. https://doi.org/10.3390/ijerph120505355

4 Clark LP, Millet DB, Marshall JD (2014) National Patterns in Environmental Injustice and Inequality: Outdoor NO2 Air Pollution in the United States. PLoS ONE 9(4): e94431. doi:10.1371/journal.pone.0094431

Organization: National Association of Mutual Insurance Companies (NAMIC)

Representing two thirds of the providers of America’s homeowners’ insurance, NAMIC is respectfully concerned with and reaching out about statements made by the Environmental Protection Agency regarding potential differential treatment of insurance policyholders or applicants. Specifically, the EPA, in submissions to the Federal Register, appears to assert that individuals within referenced Environmental Justice populations (defined as people of color and low-income populations in at least some EPA Federal Register notices) have less or limited access to homeowner insurance. Examples of such EPA publications follow: [EPA-HQ-OAR-2022-0829-5092, pp. 1-2]

- Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles on 05/05/2023,

- Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles-Phase 3 on 04/27/2023,

- Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards on 12/30/2021,

- Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards on 08/10/2021, and,

- Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review on 11/15/2021. [EPA-HQ-OAR-2022-0829-5092, pp. 1-2]

In its posted online EJ 2020 Glossary, the EPA defines [https://www.epa.gov/environmentaljustice/ej-2020-glossary] “Environmental Justice” (EJ) as follows: “The fair treatment and meaningful involvement of all people regardless of race, color, culture, national origin, income, and educational levels with respect to the development, implementation, and enforcement of protective environmental laws, regulations, and policies." [EPA-HQ-OAR-2022-0829-5092, pp. 1-2]

By presenting statements about homeowners' insurance in the above referenced publications which feature discussions of Environmental Justice, the EPA seems to imply that potential insurance availability or affordability issues may be linked to EJ. Yet, the EPA does not offer specific references or "scientific assessments" on insurance coverage in such areas to support the implication that homeowner insurance is not being made available in some way based on race, color, culture, national origin. [EPA-HQ-OAR-2022-0829-5092, pp. 1-2]

Respectfully, NAMIC asks the EPA to refrain from such charges regarding homeowners' insurance in its publications moving forward. NAMIC is greatly concerned that an agency of the federal government with minimal expertise in homeowners' insurance would infer such morally repugnant allegations. The Administration's requirement of a "whole of government" focus on climate and equity does not empower federal agencies to broadly impute blame, particularly in the absence of legal authority in an industry that is highly regulated at the state level. [EPA-HQ-OAR-2022-0829-5092, pp. 1-2]

The Information Quality Act passed through Section 515 of the Consolidated Appropriations Act [PLAW-106publ554.pdf (govinfo.gov)], 2001 requires that each federal agency disseminating information ensure and maximize the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency, and to allow affected persons to seek and obtain correction of information disseminated by the agency. [EPA-HQ-OAR-2022-0829-5092, pp. 1-2]

If the EPA has rigorous scientific assessments to support these statements, NAMIC would greatly appreciate the EPA sharing that information with us. However, if the EPA does not have such scientific assessments , we would respectfully request that the EPA discontinue the inclusion of such statements is support of proposed rules of a federal regulatory agency. [EPA-HQ-OAR-2022-0829-5092, p. 2]

Organization: National Corn Growers Association (NCGA)

Bringing high octane fuel to market in the form of midlevel ethanol blends will be significantly less capital-intensive than attempting to increase blend stock octane with hydrocarbon components at refineries. It will also be incredibly cleaner. The avoided production cost and offset emissions lower end-costs to consumers, reducing both economic costs and social costs related to health and environment, key considerations in advancing environmental justice and avoiding adverse impacts from oil refineries on communities that have historically borne them. [EPA-HQ-OAR-2022-0829-0643, p. 7]

Organization: National Parks Conservation Association (NPCA)

Lastly, to the degree through which this proposal could increase the development and permitting of domestic critical mineral mining projects to support LDV and MDV battery production, NPCA asks that EPA and the administration as a whole take necessary steps to mitigate or entirely avoid negative impacts on overburdened populations and sensitive ecosystems. This includes promoting practices such as critical mineral recycling, as well as overseeing the responsible citing of mining projects to limit harms to environmental justice communities, indigenous communities, and ecosystems within our beloved national parks. [EPA-HQ-OAR-2022-0829-0607, pp. 4-5]

Organization: National Tribal Air Association (NTAA)

Climate Change and Greenhouse Gas Mitigation

The acute and continuous impacts of climate change on Native Americans and Alaska Native Villagers are well documented. Unfortunately, new consequences of this global crisis continue to be revealed. For multiple reasons including vulnerability and geographic constraints, Tribal communities are disproportionately suffering from these changes. The U.S. Fourth National Climate Assessment (NCA4)1 noted, in part, that “Climate change increasingly threatens indigenous communities’ livelihoods, economies, health, and cultural identities by disrupting interconnected social, physical, and ecological systems.” A more focused examination of Tribal needs to address the impacts of climate change is presented in 2021 publication The Status of Tribes and Climate Change (STACC)2. [EPA-HQ-OAR-2022-0829-0504, pp. 1-2]

1 USGCRP, 2018: Impacts, Risks, and Adaptation in the United States

2 The Status of Tribes and Climate Change (STACC), Institute for Tribal Environmental Professionals, 2021

The NTAA has a long history of information sharing with EPA and advocacy for reducing emissions of greenhouse gases. Multiple reports, policy statements, and comment letters are compiled and accessible on our organization’s website3. NTAA’s Status of Tribal Air Reports (STAR) including STAR 20224 document climate change impacts on Tribal lands and people. [EPA-HQ-OAR-2022-0829-0504, pp. 1-2]

3 National Tribal Air Association, www.ntaatribalair.org

4 Status of Tribal Air Report, National Tribal Air Association 2022

Criteria Pollutant Emissions Standards

Many residents in Indian country continue to be exposed to concentrations of ozone and particulate matter that exceed current National Ambient Air Quality Standards. With a few exceptions, the sources of this pollution are outside the jurisdiction and control of Tribal governments. It is imperative that the EPA and applicable state and local authorities take all necessary measures to return Tribal communities to healthy air quality. [EPA-HQ-OAR-2022-0829-0504, p. 2]

The proposed emissions standards for new light-duty and medium-duty vehicles for non-methane organic gases plus nitrogen oxides (NMOG+NOx) constitute one key step in reducing the impacts from the largest source of these ozone-precursor pollutants. Concurrently, reduced emissions of NMOG+NOx will reduce ambient air concentrations of particulate matter, and PM2.5 more specifically. The NTAA supports the proposed standards for these pollutants across the applicable vehicle categories and looks forward to healthier air quality in our many impacted communities. [EPA-HQ-OAR-2022-0829-0504, p. 2]

Organization: Our Children's Trust (OCT)

4. Strengthening the GHG emission standards for passenger cars and light trucks is needed in order to protect the fundamental constitutional rights of children and future generations, particularly children within environmental justice communities, including communities of color, low-income communities, and indigenous communities. Executive Order 13990's policy directive clearly states "to listen to the science; to improve public health and protect our environment; to ensure access to clean air and water; . . . to reduce greenhouse gas emissions[.]" The science is clear. The world must stop fossil fuel emissions as soon as possible, every ton matters and causes more danger, 5 and the transportation sector must be an early target for decarbonization. A key tool for EPA to facilitate emission reductions is through strong GHG emission standards for passenger cars and light trucks. [EPA-HQ-OAR-2022-0829-0542, pp. 2-3]

5 IPCC, Summary for Policymakers, in Climate Change 2021: The Physical Science Basis, SPM-37 (2021) ("Every tonne of CO? emissions adds to global warming.").

The Earth's Energy Is Imbalanced and thus the EPA's Must Cease Infringing the Constitutional Rights of Youth. EPA has Public Trust and Constitutional Obligations to use its Authority to Protect the Atmosphere. [EPA-HQ-OAR-2022-0829-0542, p. 3]

Our Children's Trust represents twenty-one youth plaintiffs, including eleven Black, Brown, and Indigenous youth, in the constitutional climate lawsuit, Juliana v. United States, in which the Administrator, in his official capacity, and EPA are defendants. This case asserts, and courts have found, that, through the government's past and ongoing affirmative actions that cause climate change, it has violated the youngest generation's constitutional rights to life, liberty, property, and equal protection of the law, as well as failed to protect essential public trust resources. In this litigation, federal courts have affirmed "that the federal government has long promoted fossil fuel use despite knowing that it can cause catastrophic climate change" 16 and "has long understood the risks of fossil fuel use and increasing carbon dioxide emissions". 17 The Ninth Circuit Court of Appeals found that there was evidence showing that the federal government was a substantial factor in causing the youth's constitutional injuries because "[a] significant portion of [GHG] emissions occur in this country; the United States accounted for over 25% of worldwide emissions from 1850 to 2012, and currently accounts for about 15%." 18 Without immediate effective action, our children and future generations will continue to suffer injury with long-lasting and potentially irreversible consequences. 19 These judicially-recognized facts should guide EPA's policies and practices so they can identify, and alter, those policies that exacerbate American youth's existing climate change injuries. [EPA-HQ-OAR-2022-0829-0542, p. 5]

16 Juliana v. United States, 947 F.3d 1159, 1164 (9th Cir. 2020).

17 Juliana v. United States, 947 F.3d 1159, 1166 (9th Cir. 2020).

18 Juliana v. United States, 947 F.3d 1159, 1169 (9th Cir. 2020).

19 See Assessing "Dangerous Climate Change"; James Hansen et al., Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming Could be Dangerous, 16 Atmos. Chem. & Phys. 3761 (2016); U.S. Global Change Research Program, Fourth National Climate Assessment, Vol. II (2018); David I. Armstrong McKay et al., Exceeding 1.5°C Global Warming Could Trigger Multiple Climate Tipping Points, 377 Science eabn7950

(2022); Nico Wunderling et al., Global Warming Overshoots Increase Risks of Climate Tipping Cascades in a Network Model, 13 Nature Climate Change 75 (2023). Note that many researchers use the temperature targets set during the Paris Accord as a point of reference, not as a sanctioning of those levels of average planetary heating.

Under the 5th Amendment to the U.S. Constitution, the government is restrained from engaging in conduct that infringes upon fundamental rights to life, liberty, and property, and equal protection of the law, all of which includes a climate system that sustains human life and liberty. Under the Public Trust Doctrine, embedded in our Constitution and other founding documents, and in the very sovereignty of our Nation, U.S. residents (both present and future, i.e., Posterity) have a right to access and use crucial natural resources, like air and water. The U.S. government, and its executive agencies, have fiduciary duties as trustees to manage, protect, and prevent substantial impairment to our country's vital natural resources which the government holds in trust for present and future generations. 20 [EPA-HQ-OAR-2022-0829-0542, p. 5]

20 Juliana v. United States, 217 F. Supp. 3d 1224, 1254 (D. Or. 2016).

Our children and future generations are already suffering injury with long-lasting and potentially irreversible consequences at present levels of heating. Moreover, all young people seeking environmental and climate justice, especially youth from frontline and environmental justice communities that have contributed the least to emissions and have long suffered from systemic environmental racism and social and economic injustices, must not only have their voices heard, but have their rights protected. [EPA-HQ-OAR-2022-0829-0542, pp. 5-6]

To learn more about how young people are being harmed, please watch the award-winning, independent feature-length documentary film now streaming on Netflix, YOUTH v GOV. These stories constitute just a small sample of what American children are experiencing due to the climate crisis the federal government continues to exacerbate by and through its national energy system. We request that the EPA incorporates the protection of children's fundamental rights to a safe climate system, defined by the best available science, into future rulemaking, policies, and initiatives. Human laws must respect the laws of nature; our government ignores the natural laws of energy imbalance and climate destabilization at the peril of our children. [EPA-HQ-OAR-2022-0829-0542, p. 6]

Organization: South Coast Air Quality Management District

4. Consider special provisions to increase ZEV adoption in environmental justice communities. Environmental justice (EJ) communities are disproportionately impacted by air pollution due to proximity to goods movement corridors such as ports and railyards as well as freeways. Further, many residents in EJ communities are classified in low- or moderate-income groups, and struggle to afford ZEVs which are still more expensive than conventional engine vehicles. We believe special provisions and incentives should be considered for easier access to ZEVs by these communities. For example, ACC II includes a provision for manufacturers to receive an additional 0.5 credit for each ZEV sold at a discount to qualifying communities. Also, manufacturers can earn an additional 0.1 credit per each sale of lower-priced vehicles that low-income community residents can afford. These incentive provisions in the ACC II regulation not only provide easier access for EJ community members but also lead to accelerated deployment of ZEVs and PHEVs in communities with the highest pollution burden and public health need. [EPA-HQ-OAR-2022-0829-0659, p. 3]

Organization: Southern Environmental Law Center (SELC)

There are also major economic costs to climate change, and studies have found that the future costs will be unequally distributed across the United States.28 Relative to the rest of the nation, the South will face the largest economic losses from climate change, with low-income and minority communities particularly affected.29 Lower income counties in the South may lose between 5 and 20 percent of gross domestic product per year—compared to an average yearly loss of 1.2 percent nationally—for every additional degree of warming by the 2080s.30 [EPA-HQ-OAR-2022-0829-0591, p. 4]

28 See, e.g., Hsiang, et al., supra note 9, at 1363.

29 Id.

30 Id. See also Brad Plumer & Najda Popovich, As Climate Changes, Southern States Will Suffer More Than Others,

N.Y. TIMES (June 29, 2017), https://www.nytimes.com/interactive/2017/06/29/climate/southern-states-worse- climate-effects.html. [EPA-HQ-OAR-2022-0829-0591, p. 4]

Exposure to this type of pollution is not equally distributed across all populations in the United States, and this inequity raises serious environmental justice concerns. Compared to national averages, a higher percentage of low-income and minority communities live along routes that experience high volumes of light- and medium-duty vehicle traffic,48 increasing these communities' exposure to tailpipe pollution and its harmful effects. One study estimated that, even among populations living within 100 meters of major roadways, minorities are exposed to up to 15 percent more PM2.5 pollution and up to 35 percent more nitrogen dioxide (NO2) pollution than their White counterparts.49 This disproportionate burden stems in part from our nation's long history of discriminatory zoning and land use policies and practices, including those implemented in the South, that resulted in redlining and the intentional siting of infrastructure projects through poor, minority neighborhoods.50 [EPA-HQ-OAR-2022-0829-0591, p. 6]

48 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicle, 88 Fed. Reg. 29184, 29199 (May 5, 2023).

49 Alejandro Valencia, Mark Cerre & Saravanan Arunachalam, A hyperlocal hybrid data fusion near-road PM2.5 and NO2 annual risk and environmental justice assessment across the United States, 18 PLOS ONE 1 (2023).

50 See, e.g., Gabi Velasco, How Transportation Planners Can Advance Racial Equity and Environmental Justice, URBAN INST. (Aug. 18, 2020), https://www.urban.org/urban-wire/how-transportation-planners-can-advance-racial- equity-and-environmental-justice.

Organization: Tesla, Inc.

These negative effects of air pollution disproportionately harm the most vulnerable populations, including children, the elderly, and residents in low-income and disadvantaged communities.70 Indeed, two-thirds of Americans who live near high-volume roads are people of color and the median household income in these places is roughly 20% below the national average.71 Repeatedly, peer reviewed, government and inter- governmental studies point to electrification as key to addressing criteria air pollutants, improving air quality, and lower the risk of respiratory illness.72 [EPA-HQ-OAR-2022-0829-0792, p. 10]

70 U.N. Environmental Programme, Young and old, air pollution affects the most vulnerable (Oct. 16, 2018). available at h ttps://www.unep.org/news-and-stories/blogpost/young-and-old-air-pollution-affects-most-v ulnerable#:~:text=Since%20children%20are%20still%20growing,of%20conditions%20such%20as%20asthma.

71 Union of Concerned Scientists, Delivering Opportunity: How Electric Buses and Trucks Can Create Jobs and Improve Public Health in California," (Oct. 11,2016), at 10. available at h ttps://www.ucsusa.org/resources/delivering-opportunity.

72 See e.g., International Panel on Climate Change (IPCC), AR 6 Climate Change 2022: Impacts, Adaptation and Vulnerability (Feb. 28, 2022) at 7-120 available at h ttps://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_FinalDraft_FullReport.pdf; USGCRP, National Climate Assessment 4, Volume II, Chapter 29 at Box 29.2 available at h ttps://nca2018.globalchange.gov/chapter/29/https://nca2018.globalchange.gov/chapter/29/ (In transportation, for example, switching away from petroleum to potentially lower GHG fuels, such as electricity and hydrogen, is projected to reduce local air pollution. In California, drastic GHG emissions reductions have been estimated to improve air quality and reduce local particulate matter emissions associated with freight transport that disproportionately impact disadvantaged communities").

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

NHTSA estimates that the decline in new vehicle sales would result in up to 812 additional deaths on the road each year, 16,206 more injuries, and almost 50,000 more crashes involving property damage.24 This is because fewer people would be able to afford new and later-model used cars, which are safer than old cars. EPA's proposed regulations would make the situation worse. EPA does not account for this in the rule. [EPA-HQ-OAR-2022-0829-0674, pp. 5-6]

This increase in prices caused by successive reductions in emissions contradicts NHTSA's core values,25 namely leading "the Nation by setting the motor vehicle and highway safety agenda," and serving "as the catalyst for addressing critical safety issues that affect the motor vehicle and highway safety communities." Deaths and injuries from the new rules would be concentrated among low-income Americans, disproportionately minorities, who would pay the price of the new rule: due to the price increases, they would buy fewer new cars and fewer later-model used cars. [EPA-HQ-OAR-2022-0829-0674, pp. 5-6]

24 Ibid., pp. 25894-5.

25 U.S. Department of Transportation, National Highway Traffic Safety Administration, "NHTSA's Core Values," https://www.nhtsa.gov/about-nhtsa/nhtsas-core-values (accessed May 1, 2023).

Organization: Valero Energy Corporation

I. EPA fails to adequately consider the environmental justice impacts of the proposed rule.

Disadvantaged communities already face significant access barriers to electric vehicles, such as: higher upfront costs to electric vehicle ownership; a lack of existing charging infrastructure available to them in low-income, minority populated, and rural areas; and costlier and time-intensive charging due to a greater reliance on public charging infrastructure, particularly for individuals living in multi-family housing. [EPA-HQ-OAR-2022-0829-0707, p. 55]

EPA's EJ analysis must be thorough and inclusive of factors that may impact the price of transported goods, such as ZEV affordability, the availability of public charging, reasonable charging practices, and a lifecycle analysis of electric vehicles and power generation emissions. Without doing so, EPA runs the risk of intensifying price disparities and access to transport relative to the baseline for EJ communities. EPA's EJ analysis must be thorough and inclusive of electric vehicle affordability, the availability of public charging, reasonable charging practices, and a lifecycle analysis of electric vehicles and power generation emissions. Without doing so, EPA runs the risk of intensifying price disparities and access to transport relative to the baseline for EJ communities. These impacts can be both quantitively and qualitatively characterized.300 EPA's silence on these disparities is especially worrisome given EPA's prior binding commitments to EJ analysis for the benefit of disadvantaged and low-income communities. [EPA-HQ-OAR-2022-0829-0707, p. 55]

300 See, i.e., supra.

To date, the target electric vehicle customer base for OEMs consists of "mostly male, high-income, highly educated, homeowners, who have multiple vehicles in their household and have access to charging at home."301 Additionally, according to the U.S. Department of Transportation (DOT), "the rate of EV adoption in rural areas is roughly 40% lower than it is in urban areas, and EV charging infrastructure expansion has mostly been concentrated in cities and along major highways".302As a result, electric vehicle ownership remains primarily concentrated in affluent, large metropolitan and urban areas.303 By contrast, the supporting electricity generation necessary to support EPA's proposal is predominantly located in more remote, rural regions that are geographically isolated from urban centers. [EPA-HQ-OAR-2022-0829-0707, pp. 55-56]

301 Scott Hardman*, Kelly L. Fleming, Eesha Khare, and Mahmoud M. Ramadan, A perspective on equity in the transition to electric vehicles, MIT SCIENCE POLICY REVIEW (Aug. 30, 2021) available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/.

302 U.S. Department of Transportation, Community Benefits of Rural Vehicle Electrification (last updated February 2, 2022), available at https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/community- benefits.

303 See, i.e., Shuocheng Guo, Eleftheria Kontou, Disparities and equity issues in electric vehicles rebate allocation, Energy Policy, Volume 154, 2021, 112291, ISSN 0301-4215, available at https://doi.org/10.1016/j.enpol.2021.112291.

EPA's proposal directly impacts EJ communities by contributing to additional, local emissions to meet electric vehicle charging demand. Consequently, in theory, EJ communities incur an incremental burden in exchange for the subsidization of electric vehicles for more affluent consumers. And this subsidy occurs at expense of our most vulnerable communities burdened by emissions as a direct result of the proposal, with no corresponding benefit, since electric vehicles are likely to remain concentrated in affluent areas. Further, these communities remain unable to afford EPA's chosen mode of transport and are particularly vulnerable to rising electricity costs. [EPA-HQ-OAR-2022-0829-0707, pp. 55-56]

Notwithstanding EPA's hope that its proposal may serve to incentivize the purchases of electric vehicles, these vehicles are significantly more expensive on average than their ICE vehicle counterparts and unaffordable for many households. These are costs are also likely understated as each electric vehicle already enjoys thousands of dollars' worth of Federal and state subsidies, which are ultimately funded by taxpayers. Additionally, an automakers' ability to sell electric vehicles to consumers depends on substantial price subsidies in the form of credit support. EPA ignores the reality that many EJ stakeholders are currently unable to afford the upfront costs of purchasing an electric vehicle in the first place. With the cost of transition minerals expected to escalate exponentially in the coming years as a function of limited supply and increasing demand, the costs to manufacture and purchase electric vehicles will likely rise. [EPA-HQ-OAR-2022-0829-0707, p. 56]

EPA should also consider the effects of the proposal on electricity prices, as low-income populations often spend a larger percentage of their earnings on essential utilities compared to the rest of the United States. Reliance on electric vehicles has been shown to spur increases in load and demand during peak periods, which impact electricity prices. Because EPA lacks expertise in the area of electrical grid management and economics, EPA should consult with other agencies and credible experts in these areas in order to adequately evaluate these impacts.304 EPA should ensure that the proposal meets reliability and affordability criteria and helps EJ communities make informed decisions about their own energy needs. Additionally, EPA's EJ assessment fails to acknowledge the likelihood that many owners will lack access to residential charging, which will substantially increase their operating expenses. Consistent reliance on fast charging also shortens electric vehicle battery life, resulting in a need to replace the battery and/or the vehicle more frequently. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

304 See, West Virginia, 142 S.Ct. at 2612-13 (stating that EPA admitted that opining on trends in electricity transmission, distribution, and storage requires technical and policy expertise not traditionally needed in EPA regulatory development and finding that there is little reason to think Congress assigned such decisions to the EPA).

If EJ is truly a commitment for EPA, it should carefully consider criticisms like those leveled by The Two Hundred, which point out the disproportionate impacts to working and minority communities as a result of California's climate approach regarding electrified transport; those impacts and concerns remain true, and indeed are magnified under the proposed standards.305 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

305 See Plaintiffs' Complaint, The Two Hundred for Homeownership, et al. v. California Air Resources Board, et al., No. 1:22-CV-01474.

It is critical from the outset to design standards to minimize the potential for price shocks and supply disruptions. As written, the proposal ultimately benefits electric vehicle manufacturers at the expense of disadvantaged communities by subsidizing unaffordable transportation that is not fit for the purposes of commuting to and from EJ communities. At minimum, EPA should perform a thorough EJ assessment specific to its LDV proposal that is comprehensive of both transport challenges and impacts faced by EJ stakeholders and the government-wide Justice40 Initiative. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

The average purchase price of EV cars in 2022 was approximately $65,000, which is more than what 46 percent of American households earn in income in a year.306 While the average "used" EV sold for $42,895 in March of 2023.307 While EPA's DRIA anecdotally indicates that "emerging consensus suggests that purchase price parity is likely to occur by the mid-2020's for some vehicle segments and models"308, Ford CEO Jim Farley told attendees at its 2023 Capital Markets Days that EV cost parity may not come until after 2030.309 Moreover US auto makers are focusing their efforts on producing higher priced electric SUVs and trucks, including Fords $100,000 F150 Lightening Platinum310 and GM's announcement that its luxury brands, Cadillac and Buick, will be its first all-electric product lineups.311 While smaller EV's like the Chevy Bolt, touted by the Biden Administration as being affordable alternatives, are being discontinued.312 The reality is that most middle- and lower-income families simply cannot afford to purchase a new or used EV, even when taking into account available tax incentives and rebates. In fact, middle – and lower -income families are more likely to purchase older used vehicle, due to their lower upfront costs, and to hold onto those vehicles for longer periods.313 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

306 Kelly Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1% and all United States Household Income Percentiles, DQYJD

307 What to know about buying a used electric vehicle as more hit the auto sale market, CNBC, May 21, 2023

308 EPA DRIA, 3.1.3.1, 4-15

309 Ford CEO says EV cost parity may not come until after 2030, Reuters, May 31, 2023

310 https://www.ford.com/trucks/f150/f150-lightning/models/

311 Cadillac and Buick will be GM's first all-EV brands, Automotive News, July 1, 2022

312 GM Killed the Chevy Bolt- and the dream of a small, affordable EV, The Verge, April 26, 2023

313 Supporting Lower-Income Households' Purchase of Clean Vehicles: Implications From California-wide Survey Results, UCLA Luskin Center for Innovation, 2020

Organization: Western Energy Alliance

Affordability/Environmental Justice: EPA is assuming that although the retail price of EVs is typically higher than for comparable ICEVs at this time, the price difference will narrow or disappear as the cost of batteries and other components fall in the coming years. EPA is taking a huge leap of faith in the ability of EV manufacturers to innovate in time for the arbitrary deadlines imposed by the president and EPA through this rule. Market projections six months from now are difficult, much less nine years into the future. [EPA-HQ-OAR-2022-0829-0679, p. 7]

But recent evidence suggests that EPA's assumption is well off the mark. EV battery costs soared in 2022 due to rising raw material and battery component costs. As countries around the world attempt to reach similar arbitrary targets for EVs and renewable energy, the competition for limited supplies of raw materials will likewise grow.13 Prices for rare earth minerals have increased between 60% and 400% while prices for lithium have increased by over 300% since 2020.14 Further, a U.K. study has found that EVs depreciate at a rate of 51% compared to 37% for gasoline cars, losing £15,220 ($18,786) versus £9,901 ($12,400).15 Clearly EPA's estimate that "…the average upfront per-vehicle cost to meet the proposed standards to be approximately $1,200 in MY 2032, as shown in Table 7.131…" is greatly underestimated. EPA mentions but then dismisses the impact on low-income households by just assuming that manufacturers, "will continue to offer a variety of models at different price points…" and that they will save on fuel costs. [EPA-HQ-OAR-2022-0829-0679, p. 7]

13
"EV battery costs have soared in 2022, hampering EV affordability," Stephen Edelstein, Green Car Reports, December 8, 2022.

14 Current Strategic Metals Prices, Strategic Metals Invest and D aily Metals Prices, both accessed July 5, 2023.

15 "Electric cars losing value twice as fast as petrol vehicles - drivers may lose £25,000," Felix Reeves, Express, May 3, 2023.

Organization: Wisconsin Department of Natural Resources

In this proposal, EPA concludes that people who live or attend school near major roadways are more likely to be non-White, Hispanic, or have a low socioeconomic status. As such, these populations are expected to directly benefit from reduced tailpipe emissions of criteria pollutants and mobile source air toxics that would result from these standards. EPA also notes that poorer or predominantly non-White communities can be especially vulnerable to climate change impacts, which these proposed GHG standards would help address. Reducing greenhouse gases, ozone, and particulate matter pollution from on-road vehicles will improve health outcomes throughout Wisconsin. Most importantly, it will take a critical step toward improving air quality in areas overburdened by pollution. [EPA-HQ-OAR-2022-0829-0507, p. 2]

Organization: Zero Emission Transportation Association (ZETA)

It's also critical to highlight that tailpipe emissions from LMD ICEVs do not affect all communities equally. The intersections of negative health outcomes, their link to transportation-related pollution, and the ties to race are well-documented. In 2017, a national study found that in 2010, people of color experienced 37% more NOX exposure than white populations and had 2.5 times higher concentrations of NOX within their communities.64 Furthermore, had these communities of color been exposed to the same level of NOX as white populations, 5,000 deaths from heart disease could have been prevented. Likewise, the American Lung Association estimates that people of color are 3.2 times more likely to live in a county with at least one pollution-related "failing grade."65 [EPA-HQ-OAR-2022-0829-0638, pp. 15-16]

64 "Changes in Transportation Related Air Pollution Exposures by Race, Ethnicity, and Socioeconomic Status: Outdoor Nitrous Oxide in the US in 2000 and 2010", Lara P. Clark, et. al., (September 14, 2017) https://ehp.niehs.nih.gov/doi/10.1289/EHP959

65 Id. at footnote 62

A study conducted in New York State found that road emissions have a disproportionate impact on both lower-income communities and communities of color.66,67 For example, 74% of New York's African American and Latino populations and 80% of its Asian American population experience higher NOX emissions than the state-wide average. Another study found that the New York City metro area experiences 1,400 premature deaths annually, specifically as a result of road emissions. Within the city, PM2.5 vehicle air pollution causes approximately 320 premature deaths from heart disease and other illnesses each year. The West Bronx in particular—whose population is 70% Latino and 29% African American—is home to the Cross

Bronx Expressway and has the worst air quality in the state. [EPA-HQ-OAR-2022-0829-0638, pp. 15-16]

66 “Inequitable Exposure to Air Pollution from Vehicles in New York State,” (June, 2019) https://www.ucsusa.org/sites/default/files/attach/2019/06/Inequitable-Exposure-to-Vehicle-Pollution-NY.pdf

67 “Asthma alley - why minorities bear burden of pollution inequity caused by white people,” The Guardian, (April 2019) https://www.theguardian.com/us-news/2019/apr/04/new-york-south-bronx-minorities-pollution-inequity

EPA Summary and Response

Summary:

Many commenters shared concerns and evidence about environmental justice. Commenters shared evidence and examples of how traffic-related air pollution affects the people who are likely to be low-income and also likely to be people of color (ACEEE, ALA, BGA, CARB; CAP; Ceres BICEP, EDF; GFI; Arizona Interfaith Power & Light and League of Conservation Voters; MPCA; SELC, Tesla; WI DNR; ZETA). The commenters also discussed heath disparities associated with race and ethnicity (GreenLatinos et al., CARB, others). Elders Climate Action mentions lack of air conditioning in low-income families and outdoor workers being unable to avoid exposure to smoke from fires. Several commenters also highlighted evidence that populations living near refineries and other industrial facilities are more likely to be people of color or low income, as well as likely to face higher risks from the associated emissions (Environmental and Public Health Organizations, NCGA, CARB, California Attorney General et al.). California Attorney General et al. suggested that EPA further develop EJ research on communities near power plants and refineries. GreenLatinos et al. also shared evidence that Latino/es are less likely to have access to a car and more likely to commute by public transport.

Environmental and Public Health Organizations provide evidence that reducing emissions from refineries has higher benefits per ton than do EGU emission reductions, citing an EPA report. The commenter urges EPA to strengthen statements about evidence of adverse disparities for populations near refineries (in particular, they prefer a more definitive statement than “may be potential disparities”).

In contrast, numerous commenters express concerns about the potential economic impacts of the rule on low-income and/or communities of color (Donna Jackson, Valero Energy Corporation). Also, other commenters pointed to evidence that low-income households face higher expenditures for fueling their vehicles with gasoline (e.g., ACEEE). The Heritage Foundation (Davaratna and Furchtgott-Roth) claim new rules will create death and injuries concentrated among low-income Americans, “disproportionately minorities,” who would purchase fewer new and recent model year used cars. The Hyundai Motor America and SCAQMD suggest EPA should provide incentives to make it easier for EJ or low-moderate income communities to purchase ZEV and/or PHEVs. These comments are summarized and responded to in RTC Section 13.2. By contrast, the Alliance for Automotive Innovation claimed that vehicle standards without fuel-based regulations will disproportionately benefit higher-SES communities, as those locations purchase newer vehicles more rapidly than lower-SES communities.

Valero Energy Corporation comments that EPA's EJ analysis must be thorough and include factors affecting the price of transported goods, including ZEV affordability, the availability of public charging, reasonable charging practices, and lifecycle emissions analysis. The comments claim that charging will cause higher emissions from electrical generation in more remote rural regions that are geographically isolated from urban centers. It claims that these standards will incur burdens on EJ communities that subsidize electric vehicles for more affluent consumers, who remain concentrated in affluent areas. It claims that electric vehicles are unaffordable to these communities, despite higher electricity costs being imposed on them.

Commenters shared how the problems of environmental justice were caused by a long history of discriminatory policies, such as zoning, land use, and infrastructure siting, particularly in poor and/or communities of color (SELC; California Attorney General et al.). NTAA highlighted the problems and disparities faced by Tribes and residents of Indian Country that emission reductions could help address (NTAA).

Several comments suggest that EPA should set new fuel standards to reduce emissions from gasoline-powered motor vehicles (e.g., Alliance for Automotive Innovation, National Corn Growers Association). The Alliance for Automotive Innovation stated that reducing heavy aromatics will reduce PM from all gasoline vehicles on the road and further EJ. The Alliance also suggested that such fuel-based standards would benefit low-SES communities more quickly than tailpipe standards, as higher-SES communities purchase new vehicles more quickly than lower-SES communities.

Two commenters make claims that EPA is bound by legal requirements to reduce emissions in a manner that either removes inequitable exposure to air pollution (Elders Climate Action, citing Title VI of the Civil Rights Act of 1964) or preserves future generations' access to a healthy climate and environment under the Public Trust Doctrine (Our Children's Trust).

Numerous commenters urged EPA to conduct additional analyses of environmental justice. ICCT urged EPA to include a full-scale photochemical modeling analysis of the rule and how it will differentially affect different demographic groups. In the context of how benefits of the rule would be greater with changes to the MOVES model, ICCT also made comments suggesting that EPA's MOVES model understates PM emissions from motor vehicles. Environmental and Public Health Organizations urged EPA to include its 2021 analysis of the adverse and disproportionate impacts of climate change on vulnerable populations.

Reflecting the "meaningful involvement" part of environmental justice, Mayor Becky Daggett of Flagstaff, AZ urged EPA to incorporate strong stakeholder engagement process, particularly involving frontline communities.

NAMIC requested that EPA refrain from stating that people of color or low-income populations have less or limited access to homeowner insurance.

NPCA requested that, to the extent this rule increases the development and permitting of domestic critical mineral projects in support of battery production for vehicles, EPA and the Administration as a whole move to avoid adverse impacts on overburdened populations and sensitive ecosystems. It lists as examples critical mineral recycling as well as responsible siting of mining projects to limit harms to EJ communities, indigenous communities, and natural park ecosystems.

NTAA and CARB provided comments about how Tribal communities face unique and adverse effects of climate change and air pollution. NTAA described how Tribal communities are unique in their vulnerability and limited ability to independently address climate change. NTAA mentions adverse and disproportionate impacts on Tribal communities resulting from climate change, with note of the NCA4's statement that climate change threatens indigenous communities' sociopolitical and ecological systems. NTAA also notes that, despite much air pollution being outside the jurisdiction of Tribal governments, many residents of Indian country live in areas with ozone and PM concentrations that exceed current NAAQS. NTAA urges EPA, in combination with state and local governments, to take all necessary measures to ensure healthful air quality to Tribal communities.

Response:

EPA acknowledges the comments that provided evidence and examples of how communities of color and lower-income or lower-SES communities face higher levels of ambient air pollution, including vehicle-generated air pollution, and higher rates of death and disease than other communities. EPA recognizes comments about how low-income and low-SES families face barriers to managing exposures to temperature changes, such as due to limited access to air conditioning and increased incidence of outdoor work, as well as comments that people of color are more often reliant on public transit. EPA also acknowledges all those comments that refer to historical public policies at federal, state, and local levels that had discriminatory intent and impact, such as discriminatory "redlining" in underwriting criteria for mortgages created by the Home Owners' Loan Corporation (HOLC) and intentional siting of highways and other locally-unwanted infrastructure in poor neighborhoods of color. EPA acknowledges the unique concerns of Tribal and indigenous communities, as expressed by NTAA.

Regarding comments that EPA should strengthen its statement about evidence of adverse and disparate impacts of refinery emissions on nearby populations, EPA has included new references to represent the state of research more fully on this issue.

As regards the comment from Elders Climate Action that LMDV emissions create harmful and disparate exposures that violate Title VI of the Civil Rights Act of 1964, the EPA did not propose, nor is finalizing, any federal financial assistance for any program or activity in this rulemaking, so comments related to Title VI of the Civil Rights Act of 1964 are out of the scope of this rulemaking. EPA is committed to taking decisive action to advance environmental justice and civil rights as part of its FY 2022-2026 Strategic Plan. This rulemaking advances that strategic goal by setting stronger national emission standards for light- and medium-duty vehicles. In general, our discussion of environmental justice and the impacts of this final rule on communities overburdened by pollution is included in preamble Section VIII.J, with additional information in this Section 9 of this RTC document.

Valero Energy Corporation's comments about the impacts of electricity prices are summarized and addressed in Sections 17 and 18 of this RTC. However, here, we disagree with the comments on the environmental justice implications of these rules.

First, the assumption that these standards require electrification of the fleet is not aligned with the final form of the standards. The performance-based standards are technology-neutral. EPA presents multiple example pathways for compliance with these standards, and manufacturers are free to use any combination of vehicle technologies to meet the standards.

Second, Valero Energy Corporation provides no data to support its hypothetical assertions that low-income communities in remote, rural areas will be disproportionately harmed by these standards. Preamble Section VII.B and RIA Chapter 7.4 presents results from EPA's air quality modeling of impacts of this rule in 2055. Preamble Section VII.D and RIA Chapter 7.6 examines the how these air quality changes are expected to affect different demographic groups. Notably, $PM_{2.5}$ and ozone reductions are estimated for the total CONUS, for both metropolitan and non-metropolitan areas, for all racial groups, for all educational levels, and for all levels of life expectancy. The few areas that experience increased PM2.5 concentrations of 0.025 ug/m3 or greater constitute 0.1% of the CONUS population. Areas experiencing ozone increases of 0.1 ppb or greater also constitute 0.1% of the CONUS population.

Finally, Valero Energy Corporation fails to account for changes in power sector emissions. In particular, we note that the agency has broad authority to regulate emissions from the power sector (e.g., the mercury and air toxics standards, and new source performance standards), as do the States and EPA through cooperative federalism programs (e.g., in response to PM NAAQS implementation requirements, interstate transport, emission guidelines, and regional haze),[384] and that EPA reasonably may address air pollution incrementally across multiple rulemakings, particularly across multiple industry sectors. For example, EPA has separately proposed new source performance standards and emission guidelines for greenhouse gas emissions from fossil fuel-fired power plants, which would also reduce emissions of criteria air pollutants such as $PM_{2.5}$ and SO_2 (88 FR 33240, May 23, 2023). Furthermore, while some emission increases are expected associated with higher electrical generation, those impacts decline over time. Furthermore, the net emissions of all criteria pollutants – including onroad emissions, EGUs, and refineries – are also decreasing, as described in Section VII.A of the preamble and Chapter 7.1 of the RIA.

The Alliance for Automotive Innovation's comments in support of reductions of heavy aromatics in gasoline are summarized and addressed in part in Section 11.1 of this RTC. However, its comment that tailpipe emission rules only reduce emissions for the newest vehicles, with near-term benefits accruing more to higher-SES communities than lower-SES communities, is not supported by available evidence. In particular, the Alliance mistakes the location of individual vehicle ownership for the location where emissions of aggregate vehicle traffic occur. In fact, numerous studies cited in Section II of the preamble illustrate that concentrations of traffic-related air pollutants are found to be highest in locations near major roads and other locations of high vehicle activity. Furthermore, simulation studies examining the impact of emission reductions focused on turning over the vehicle fleet starting with making the newest vehicles cleanest have shown similar results. In particular, a recent study by Yu et al. (2023) examining adoption of light-duty ZEV in California demonstrated that, despite simulating higher-SES census tracts adopting ZEVs at higher rates than lower-SES tracts, more rapid reductions in exposures were estimated to occur in low-SES locations.[385]

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[384] See also CAA 116.

[385] Yu et al. (2023) California's zero-emission adoption brings air quality benefits yet equity gaps persist. Nature Communications 14: 7778. (Online at https://doi.org/10.1038/s41467-023-43309-9)

The ICCT recommended that EPA conduct a full assessment of the air quality and health impacts of this rule on different demographic groups, akin to “the heavy-duty multi-pollutant rule.” As described in RIA Chapter 7.6, EPA did conduct full-scale photochemical modeling and examination of which groups were affected by the rule in a manner consistent with ICCT’s recommendation. ICCT’s comments about MOVES PM emission rate are addressed in RTC Section 12.5.1.

NAMIC’s comment and request that we remove mention of limited access to homeowners’ insurance overlooks considerable evidence. The text in the preamble is intended to indicate that individuals who may be classified as being particularly vulnerable or sensitive to climate impacts, and who frequently comprise communities facing environmental justice concerns, often live in locations that face the greatest risks from climate change effects and have fewer resources available to adapt. As is well documented, areas that experience greater threats of natural hazards, such as wildfires, hurricanes, or coastal inundation, face higher rates for homeowners’ and flood insurances, which may price out individuals from accessing more comprehensive coverage, leave them uninsurable, or may prevent them from being able to rebuild in areas where home values and construction costs have exceeded historic amounts (Gotham 2014; Keenan et al., 2018; Fleming et al., 2018; Wilson et al. 2021; Brown, 2022).[386,387,388,389,390] Low-income and Black, Indigenous, and People of Color (BIPOC) individuals often are more likely to inhabit areas facing greater vulnerability to climate change hazards that can affect home displacement or loss, such as wildfires, sea level rise, or extreme weather events (Gamble et al., 2016; EPA, 2021).[391,392]

There are clear examples of how this is translating into real-time effects. The costs of the National Flood Insurance Program have gone up considerably in recent years, and rates are expected to continue to increase, thus pricing out low-income homeowners (Fleming et al., 2018).[393] We have seen that homeowners’ insurance providers are cancelling coverage or failing

[386] Gotham, K.F., 2014: Reinforcing inequalities: The impact of the CDBG Program on post-Katrina rebuilding. *Housing Policy Debate*, 24 (1), 192-212. http://dx.doi.org/10.1080/10511482.2013.840666
[387] Brown, A.R. (2022), “Driving Down a Road and Not Knowing Where You're At”: Navigating the Loss of Physical and Social Infrastructure After the Camp Fire. *Rural Sociology*, 87: 3-25. https://doi.org/10.1111/ruso.12411
[388] Keenan, J.M., T. Hill, and A. Gumber, 2018: Climate gentrification: From theory to empiricism in Miami-Dade County, Florida. Environmental Research Letters, 13, 054001. DOI 10.1088/1748-9326/aabb32
[389] Wilson, B., E. Tate, and C.T. Emrich, 2021: Flood Recovery Outcomes and Disaster Assistance Barriers for Vulnerable Populations. Frontiers in Water, 3, 752307. http://dx.doi.org/10.3389/frwa.2021.752307
[390] Brown, A.R. (2022), “Driving Down a Road and Not Knowing Where You're At”: Navigating the Loss of Physical and Social Infrastructure After the Camp Fire. Rural Sociology, 87: 3-25. https://doi.org/10.1111/ruso.12411
[391] EPA. 2021. Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency, EPA 430-R-21-003.
[392] Gamble, J.L., J. Balbus, M. Berger, K. Bouye, V. Campbell, K. Chief, K. Conlon, A. Crimmins, B. Flanagan, C. Gonzalez-Maddux, E. Hallisey, S. Hutchins, L. Jantarasami, S. Khoury, M. Kiefer, J. Kolling, K. Lynn, A. Manangan, M. McDonald, R. Morello-Frosch, M.H. Redsteer, P. Sheffield, K. Thigpen Tart, J. Watson, K.P. Whyte, and A.F. Wolkin, 2016: Ch. 9: Populations of Concern. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 247–286. http://dx.doi.org/10.7930/J0Q81B0T
[393] Fleming, E., J. Payne, W. Sweet, M. Craghan, J. Haines, J.F. Hart, H. Stiller, and A. Sutton-Grier, 2018: Coastal Effects. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II

to insure homes at greater risk of wildfire damage, the greatest burdens of which are being, and will be, borne by low-income individuals (Auer & Hexamer, 2022).[394] This all is irrespective of concerns regarding rising housing costs across the United States (Brooks, 2022), let alone the influence of gentrification and general disparities in socioeconomic and racial demographics between renters versus homeownership (Kuebler & Rugh, 2013; Tedesco et al., 2022).[395,396,397] Homeownership in desirable areas that are less at risk of climate hazards increasingly is becoming less available to, or less populated by, low-income or BIPOC households (Keenan et al., 2018; Ruhks-Ahidiana, 2021; Tedesco et al., 2022). [15,398,399]

Comments from NPCA about taking steps to avoid adverse impacts resulting from impacts of future domestic mining of critical minerals are recognized. While EPA acknowledges that mining impacts are a concern, many of these topics, such as siting for mines, are out of scope for this rulemaking which does not regulate the mining sector. Particular issues associated with critical minerals are addressed in RTC Section 15 (recycling and environmental issues from mining; critical minerals and supply chain).

The comments by Our Children's Trust about the Public Trust Doctrine are addressed in RTC Section 2.

Comments about the rule's potential vehicle safety and disparate and adverse impacts on low-income populations are addressed in RTC Section 22.

Comments about the rule's potential disparate and adverse economic impacts on low-income and low-SES communities are addressed in RTC Section 13.

In response to commenters who identify potential environmental justice concerns from the effects of criteria and GHG pollutants from light-duty and medium-duty vehicles, or additional scientific information, views, or analyses that were not specifically addressed in the proposed or final action, the EPA notes that the evidence regarding the environmental justice impacts of the proposed and final rulemakings is adequately described in Section VIII.J of the preamble.

The EPA does not interpret supportive comments related to the environmental justice impacts associated with the proposal as indicating disagreement with the evidence on environmental justice information that was presented in the proposal, but rather understands these comments to suggest that the additional information they provide adds support for finalizing the rulemaking.

[Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 322–352. doi: 10.7930/NCA4.2018.CH8

[394] Auer MR, Hexamer BE. Income and Insurability as Factors in Wildfire Risk. Forests. 2022; 13(7):1130. https://doi.org/10.3390/f13071130

[395] Brooks, M.M., 2022: The changing landscape of affordable housing in the rural and urban United States, 1990-2016. *Rural Sociology*, 87, 2, 511-546. https://doi.org/10.1111/ruso.12427

[396] Kuebler, M., and J.S. Rugh, 2013: New evidence on racial and ethnic disparities in homeownership in the United States from 2001 to 2010. Social Science Research, 42, 5, 1357-1374. https://doi.org/10.1016/j.ssresearch.2013.06.004

[397] Tedesco, M., J.M. Keenan, and C. Hultquist, 2022: Measuring, mapping, and anticipating climate gentrification in Florida: Miami and Tampa case studies. Cities, 131, 103991. https://doi.org/10.1016/j.cities.2022.103991

[398] Keenan, J.M., T. Hill, and A. Gumber, 2018: Climate gentrification: From theory to empiricism in Miami-Dade County, Florida. Environmental Research Letters, 13, 054001. DOI 10.1088/1748-9326/aabb32

[399] Rucks-Ahidiana, Z, 2021; Racial composition and trajectories of gentrification in the United States. Urban Studies, 58, 13, 2721–2741. https://doi.org/10.1177/0042098020963853

To the extent that the information introduced by commenters was intended to advocate for more stringent standards, we refer the reader to Section 3 and 4 of this RTC document. See Sections 8 and 12 of this RTC document for responses relating to our updated cost and technology assessments for the final rule. For responses related to GHGs and the social cost of GHGs, see Sections 8.4 and 10 of the RTC. Comments regarding new fuel standards are responded to in Section 19 of the RTC.

10 - Climate science and GHG emissions

Comments by Organizations

Organization: Advanced Energy United

A large percentage of emissions reductions from the transportation sector will be accomplished by replacing gas- and diesel-powered buses, trucks and vans with EV models. EVs are not only much more energy efficient than gas-powered cars but are also less expensive to fuel and maintain over their lifetimes. Thus, the EPA's proposed rule presents an opportunity to decarbonize the largest source of emissions in the American economy while scaling up an emerging domestic market. Electrified transportation reduces our reliance on fossil fuels, strengthens America's energy independence, and produces economic benefits across the value chain of the automotive industry. [EPA-HQ-OAR-2022-0829-0695, p. 2]

Organization: Alliance for Automotive Innovation

Once the agency fixes the modeling of CO2 emissions with and without the new 2027-2032 standards, it should revisit its decision about how to monetize the CO2 emissions benefits. A good case can be made that one set of benefit calculations should make use of a global measure of the social cost of carbon, as use of a global measure may encourage other countries to control CO2 emissions through deployment of BEVs and cleaner electricity systems. EPA has taken this position in the DRIA. However, once again, the agency's analysis should not engage in wishful thinking, as it is well known that most countries are not meeting their pledged commitments under the 2015 Paris accords. It also makes sense to disclose to Congress and the public the climate benefits of the rule, measured with a domestic cost of carbon. This measure would account for the fact that most of the climate benefits of the 2027-2032 rule will occur outside the United States, as greenhouse gases are globally mixing pollutants. Presentation of both global and domestic estimates of climate benefits will ensure that the RIA is seen as an objective analysis. [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

Overall, Auto Innovators believes that a more modest, measured claim of climate-control benefits in the final rule would make the rule more defensible. As the DRIA stands now, the climate-benefits analysis could be vulnerable to technical criticism. [EPA-HQ-OAR-2022-0829-0701, pp. 291-292]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

The U.S. needs the strongest vehicle standards

The United States will need to greatly reduce light-duty vehicle (LDV) greenhouse gas emissions if it is to have any chance of meeting the Biden Administration's economy-wide emissions reduction goal of 50% by 2030 and stave off the worst impacts of climate change. Transportation is now the largest source of greenhouse gas emissions in the United States and the light-duty sector makes up 58% of those emissions.1 Reducing carbon emissions is critical to tackling climate change but increasing LDV efficiency will also have significant benefits to air quality and will reduce driver fueling costs. Vehicles are a significant contributor to local air pollution and the associated health impacts, leading to increased rates of asthma, increased risk of heart attacks, strokes, and lung cancer.2 These impacts are particularly bad in low-income communities and communities of color, which bear a disproportionate air pollution burden.3 Greater efficiency can also provide significant cost savings for drivers when they refuel their vehicles. Low-income households are especially burdened by fueling costs, paying three times more than their higher-income counterparts on gasoline, as a percent of their total income.4 [EPA-HQ-OAR-2022-0829-0642, pp. 1-2]

1 https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

2 https://www.consumerreports.org/emissions/how-your-car-can-make-the-air-cleaner/

3 https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities

4 https://www.aceee.org/white-paper/2021/05/understanding-transportation-energy-burdens

The Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) have set aside historic amounts of funding for electric vehicles and will greatly reduce greenhouse gas (GHG) emissions from the transportation sector if that money is invested with climate impacts in mind. EPA's standards must build off of these investments. While we commend EPA for proposing strong standards that help the U.S. achieve President Biden's 2030 goal of 50% zero emission new vehicle sales, these historic investments mean we can go even further.5 Since the IRA was signed into law, $50 billion in investments in EV and battery manufacturing, and supply chain projects have been announced.6 These investments could get the U.S. to over 60% new light-duty EV sales by the early 2030s.7 But more will be needed to adequately address the climate emergency. EPA's MY 2027-2032 standards should fully account for the recent federal activity and build off them to achieve further emissions reductions. [EPA-HQ-OAR-2022-0829-0642, pp. 1-2]

5 https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/

6 https://www.charged-the-book.com/na-ev-supply-chain-map

7 https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23.pdf; https://rmi.org/insight/how-inflation-reduction-act-will-affect-ev-adoption-in-the-united-states/

Organization: American Enterprise Institute

IV. Assertions of a Serious Anthropogenic Climate Threat Are Inconsistent with the Evidence

EPA asserts that "there is consensus that the effects of climate change represent a rapidly growing threat to human health and the environment, and are caused by GHG emissions from human activity, including motor vehicle transportation." This is not correct, even apart from the dubious premise that some sort of undefined “consensus” is a proper basis for policy formulation, and even apart from the failure of EPA even to attempt to separate anthropogenic and natural influences on climate phenomena. [EPA-HQ-OAR-2022-0829-0571, p. 12]

There is no evidence in support of the “rapidly growing threat” asserted by EPA. Anthropogenic climate change is “real” — increasing GHG concentrations are having detectable effects — and incontrovertible, but that does not tell us the magnitude of the observable impacts, which must be measured empirically. [EPA-HQ-OAR-2022-0829-0571, p. 12]

Temperatures are rising, but as the Little Ice Age ended no later than 1850, it is not easy to separate natural from anthropogenic effects on temperatures and other climate phenomena, as discussed below in section VII.36 The latest research in the peer-reviewed literature suggests that mankind is responsible for about half of the approximate temperature increase of 1.1 degrees C since 1880.37 [EPA-HQ-OAR-2022-0829-0571, p. 12]

36 On the Little Ice Age, see Michael E. Mann, “Little Ice Age,” in Encyclopedia of Global Environmental Change, Volume 1: The Earth System: Physical and Chemical Dimensions of Global Environmental Change, ed. Michael C. MacCracken, John S. Perry and Ted Munn (Chichester, England: John Wiley & Sons, 2002), http://www.meteo.psu.edu/holocene/public_html/shared/articles/littleiceage.pdf.

37 See, e.g., Nicholas Lewis, “Objectively Combining Climate Sensitivity Evidence,” Climate Dynamics, September 19, 2022, at https://link.springer.com/article/10.1007/s00382-022-06468-x; Ross McKitrick and John Christy, “A Test of the Tropical 200- to 300 hPa Warming Rate in Climate Models”; Nicholas Lewis and Judith Curry, “The Impact of Recent Forcing and Ocean Heat Uptake Data on Estimates of Climate Sensitivity,” Journal of Climate 31 (August 2018): 6051–71, https://journals.ametsoc.org/doi/pdf/10.1175/JCLI-D-17-0667.1; and John R. Christy and Richard McNider, “Satellite Bulk Tropospheric Temperatures as a Metric for Climate Sensitivity,” Asia-Pacific Journal of Atmospheric Sciences 53 (2017): 511–18, https://link.springer.com/article/10.1007/s13143-017-0070-z. For a chart summarizing the recent empirical estimates of equilibrium climate sensitivity as reported in the peer- reviewed literature, see Patrick J. Michaels and Paul C. Knappenberger, “The Collection of Evidence for a Low Climate Sensitivity Continues to Grow,” Cato Institute, September 25, 2014, https://www.cato.org/blog/collection- evidence-low-climate-sensitivity-continues-grow.

There is little trend in the number of “hot” days for 1895–2017; eleven of the 12 years with the highest number of such days occurred before 1960, as shown in the following chart.38 [EPA-HQ-OAR-2022-0829-0571, pp. 12-15]

38 For the reconstruction of the NASA data, see John R. Christy, “Average per Station (1114 USHCN Stations) 1895–2017: Number of Days Daily Maximum Temperature Above 100?F and 105?F,” drroyspencer.com, http://www.drroyspencer.com/wp-content/uploads/US-extreme-high-temperatures-1895-2017.jpg.

SEE ORIGINAL COMMENT FOR Graph of Average per station (1114 USHCN Stations) 1895-2017. Number days of daily Maximum temperature above 100 F degrees and 105 F degrees [EPA-HQ-OAR-2022-0829-0571, pp. 12-15]

NOAA has maintained since 2005 the U.S. Climate Reference Network, comprising 114 meticulously maintained temperature stations spaced more or less uniformly across the lower 48 states, 21 stations in Alaska, and two stations in Hawaii.39 They are placed to avoid heat island effects and other such distortions as much as possible; the reported data show no trend over the available 2005–2023 reporting period, as shown in the following chart.40 [EPA-HQ-OAR-2022-0829-0571, pp. 12-15]

39 For the Climate Reference Network program description, see National Centers for Environmental Information, “U.S. Climate Reference Network,” https://www.ncdc.noaa.gov/crn/.

40 For a visualization of a prototypical station, see Willis Eschenbach, “NOAA’s USCRN Revisited—No Significant Warming in the USA in 12 Years,” Watts Up with That?, November 8, 2017, https://wattsupwiththat.com/2017/11/08/the-uscrn-revisited/. For the monthly data and charts reported by the National Oceanic and Atmospheric Administration (NOAA), see National Oceanic and Atmospheric Administration, “National Temperature Index,” https://www.ncdc.noaa.gov/temp-and-precip/national-temperature- index/time-series?datasets%5B%5D=uscrn¶meter=anom-tavg&time_scale=p12&begyear=2005&endyear=2020&month=8, and the monthly data at https://www.ncei.noaa.gov/access/monitoring/national-temperature-index/time-series/anom-tavg/1/0.

SEE ORIGINAL COMMENT FOR Graph of Average Temperature Anomaly Jan 2005-Feb 2023 [EPA-HQ-OAR-2022-0829-0571, pp. 12-15]

Koonin notes for the U.S. as follows for 1900 through 2019:

… the average coldest temperature of the year has clearly increased since 1900, while the average warmest temperature has hardly changed over the last sixty years and is about the same today as it was in 1900.41 [EPA-HQ-OAR-2022-0829-0571, pp. 12-15]

41 See Steven E. Koonin, Unsettled: What Climate Science Tells Us, What It Doesn’t, and Why It Matters, Dallas: BenBella Books, 2021, at p. 102.

A NOAA reconstruction of global temperatures over the past one million years, using data from ice sheet formations, shows that there is nothing unusual about the current warm period.42 [EPA-HQ-OAR-2022-0829-0571, pp. 12-15]

42 See https://www.instituteforenergyresearch.org/wp-content/uploads/2020/03/temperature-flucturations.png, from R. Bintanja and R. S. W. van de Wal, “North American Ice-Sheet Dynamics and the Onset of 100,000-Year Glacial Cycles,” Nature 454, no. 7206 (August 14, 2008): 869–72, https://www.researchgate.net/publication/23171740_Bintanja_R_van_de_Wal_R_S_W_North_American_ice- sheet_dynamics_and_the_onset_of_100000-year_glacial_cycles_Nature_454_869-872. NOAA published the underlying data at R. Bintanja and R. S. W. van de Wal, “Global 3Ma Temperature, Sea Level, and Ice Volume Reconstructions,” National Oceanic and Atmospheric Administration, August 14, 2008, https://www.ncdc.noaa.gov/paleo-search/study/11933.

SEE ORIGINAL COMMENT FOR Graph of Temperature Fluctuations Over the Past Million Years [EPA-HQ-OAR-2022-0829-0571, pp. 12-15]

Global mean sea level has been increasing at about 3.3 mm per year since satellite measurements began in 1993, as shown in the following chart from NASA.43 That ongoing sea level rise would be about 13 inches over the course of a century, an outcome very unlikely to prove a “crisis,” in particular given the time available for adaptation. [EPA-HQ-OAR-2022-0829-0571, pp. 15-17]

43 NASA reports 96.7 millimeters of sea level rise for the period 1993-2022. See the NASA data at https://climate.nasa.gov/vital-signs/sea-level/.

SEE ORIGINAL COMMENT FOR Graph of Sea Height Variation (mm) 1995-2020

The tidal-gauge data before the altimeter era show annual increases of about 1.8 mm per year, as shown in the following chart.44 [EPA-HQ-OAR-2022-0829-0571, pp. 15-17]

44 Ibid.

SEE ORIGINAL COMMENT FOR Graph of Sea Level Change (mm)

The two datasets are not directly comparable in that the tidal gauges do not measure sea levels per se; they measure the difference between sea levels and "fixed" points on land that in reality might not be fixed due to seismic activity, tectonic shifts, land settlement, precipitation, and other parameters. Accordingly, the data are unclear as to whether there is occurring an acceleration in sea level rise. It is reasonable to hypothesize that there has been such an acceleration simply because temperatures are rising due to both natural and anthropogenic influences, and such increases should result in more melting ice and the thermal expansion of seawater. But because rising temperatures are the result of both natural and anthropogenic causes, as discussed in section VII, we do not know the relative contributions of those causes to any such acceleration.45 [EPA-HQ-OAR-2022-0829-0571, pp. 15-17]

45 See Frederikse et. al. at https://www.nature.com/articles/s41586-020-2591-3. As a crude approximation, the data suggest that about two-thirds of such sea level increases are due to ice melt, and one-third to thermal expansion of seawater. See Judith Curry, "Sea Level and Climate Change," Climate Forecast Applications Network, November 25, 2018, https://curryja.files.wordpress.com/2018/11/special-report-sea-level-rise3.pdf. Curry cites research from Xianyao Chen and colleagues, the central finding of which is that "global mean sea level rise increased from 2.2 ± 0.3 mm/year in 1993 to 3.3 ± 0.3 mm/year in 2014." See Xianyao Chen et al., "The Increasing Rate of Global Mean Sea-Level Rise During 1993–2014," Nature Climate Change 7 (June 26, 2017): 492–95, https://www.nature.com/articles/nclimate3325. Whether the trend from a 21-year period can yield important inferences is a premise problematic at a minimum. For a different empirical conclusion from the tidal gauge record, see J. R. Houston and R. G. Green, "Sea-Level Acceleration Based on U.S. Tide Gauges and Extensions of Previous Global-Gauge Analyses," Journal of Coastal Research 27, no. 3 (May 2011): 409–17, https://meridian.allenpress.com/jcr/article-abstract/27/3/409/28456/Sea-Level-Acceleration-Based-on-U-S-Tide- Gauges?redirectedFrom=fulltext. For an example of temporary rapid sea-level rise in the 18th century, see W. R. Gehrels et al., "A Preindustrial Sea-Level Rise Hotspot Along the Atlantic Coast of North America," Geophysical Research Letters 47 (2020), https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2019GL085814. For further reported evidence of an acceleration, see Hans-Otto Pörtner et al., Special Report on the Ocean and Cryosphere in a Changing Climate, Intergovernmental Panel on Climate Change, 2019, https://www.ipcc.ch/srocc/.

The inconsistency of the northern and southern hemisphere sea ice changes add to the analytic complexity of anthropogenic climate change. The arctic sea ice has been declining, as shown in the following two charts.46 For the second chart, however, note that the small number of years shown prevents a reliable derivation of inferences. [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

46 See, respectively, https://www.epa.gov/climate-indicators/climate-change-indicators-arctic-sea-ice and https://nsidc.org/arcticseaicenews/.

SEE ORIGINAL COMMENT FOR GRAPH of Sea Ice Extent (million square miles) 1975-2025 [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

SEE ORIGINAL COMMENT FOR Progression Graph of Artic Sea Ice Extent (Area of Ocean with at least 15% sea ice) [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

There is no long-term trend in the Antarctic sea ice extent, as shown in the following chart from the EPA.47 [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

47 See https://www.epa.gov/climate-indicators/climate-change-indicators-antarctic-sea-ice#ref5.

SEE ORIGINAL COMMENT FOR GRAPH of Sea Ice Extent (million square miles) [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

Even for the more recent years, the Antarctic sea ice appears to be stable as a matter of statistical significance, but, as noted above, it is inappropriate to derive inferences from a small number of year-to-year variations.48 [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

48 See https://nsidc.org/arcticseaicenews/2023/02/antarctic-sea-ice-minimum-settles-on-record-low-extent-again/. https://www.thegwpf.org/content/uploads/2021/12/Bates-Sea-Ice-Trends.pdf?mc_cid=dac7df538b&mc_eid=ad653edd6d; and https://www.thegwpf.org/content/uploads/2022/04/Humlum-State-of-Climate-2021-.pdf?mc_cid=dac7df538b&mc_eid=ad653edd6d. See also Patrick J. Michaels, “Spinning Global Sea Ice,” Cato Institute, February 12, 2015, https://www.cato.org/blog/spinning-global-sea-ice.

SEE ORIGINAL COMMENT FOR Graph of Antarctic Sea Ice Extent (Area of ocean with at least 15% sea ice) [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

The data show that the Antarctic eastern ice sheet — about two-thirds of the continent — is growing, while the western ice sheet (and the peninsula) is shrinking, as shown in the following chart from the National Snow & Ice Data Center.49 No agreed explanation for this phenomenon is reported in the literature. [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

49 See https://nsidc.org/arcticseaicenews/2023/02/antarctic-sea-ice-minimum-settles-on-record-low-extent-again/. On the eastern ice sheet, see https://www.nature.com/articles/s41561-022-00938-x. On the western ice sheet, see http://nsidc.org/greenland-today/. See also https://nsidc.org/arcticseaicenews/2023/02/antarctic-sea-ice-minimum- settles-on-record-low-extent-again/.

SEE ORIGINAL COMMENT FOR Map View of Sea Ice Extent, 21 Feb 2023 [EPA-HQ-OAR-2022-0829-0571, pp. 17-22]

U.S. tornado activity for all EF (“Enhanced Fujita” scale) classes shows an upward trend since 1950, but, again, the issue of anthropogenic versus natural origins is unresolved.50 The data for the period 1954 through 2014 for EF-3+ tornadoes show no trend or a downward trend. These trends are shown in the following two charts.51 [EPA-HQ-OAR-2022-0829-0571, pp. 22-25]

50 See https://www.climate.gov/maps-data/dataset/monthly-and-annual-numbers-tornadoes-graphs-and-maps.

51 See NOAA, “Historical Records and Trends,” at https://www.ncdc.noaa.gov/climate-information/extreme- events/us-tornado-climatology/trends; and https://climateataglance.com/climate-at-a-glance-tornadoes/. Note that the latter chart shows a heading of “1954-2020,” but the bar chart begins in 1970. This discrepancy is unlikely to change the overall inference.

SEE ORIGINAL COMMENT FOR BAR GRAPH of 1991-2020 U.S. Tornados [EPA-HQ-OAR-2022-0829-0571, pp. 22-25]

SEE ORIGINAL COMMENT FOR BAR GRAPH of U.S. Annual Count of Strong to Violent Tornados (F3+) 1954-2020 [EPA-HQ-OAR-2022-0829-0571, pp. 22-25]

Tropical cyclones and accumulated cyclone energy show little trend since satellite measurements began in the early 1970s.52 [EPA-HQ-OAR-2022-0829-0571, pp. 22-25]

52 For data on global tropical cyclone activity, see Ryan N. Maue, “Global Tropical Cyclone Activity, updated December 31, 2022, at http://climatlas.com/tropical/.

SEE ORIGINAL COMMENT FOR Trend Graph of Global Tropical Cyclone Frequency [EPA-HQ-OAR-2022-0829-0571, pp. 22-25]

SEE ORIGINAL Global Major Hurricane Frequency – 12 month running sums [EPA-HQ-OAR-2022-0829-0571, pp. 22-25]

SEE ORIGINAL COMMENT FOR Trend Graph of Global Tropical Accumulated Cyclone Energy (ACE) [EPA-HQ-OAR-2022-0829-0571, pp. 22-25]

The number of U.S. wildfires shows no trend since 1985.53 Global acreage burned declined sharply for 1998-2015, and by about 18 percent for the period 2003-2015 as reported by NASA, shown in the following figure.54 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

53 For the reported U.S. wildfire data, see the EPA at https://www.epa.gov/climate-indicators/climate-change- indicators-wildfires and the National Interagency Fire Center, "Total Wildland Fires and Acres (1926–2019)," https://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html. Note that the recent U.S. wildfire phenomenon has been observed in government forests to a degree vastly disproportionate relative to private forests. See http://nwmapsco.com/ZybachB/Articles/Magazines/Oregon_Fish_&_Wildlife_Journal/20220401_Global_Warming/ Zybach_20220401.pdf.

54 On the decline in global area burned over past decades, see NASA at https://earthobservatory.nasa.gov/images/90493/researchers-detect-a-global-drop-in-fires; and Stefan H. Doerr and Cristina Santin, "Global Trends in Wildfire and Its Impacts: Perceptions Versus Realities in a Changing World," Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences 371, no. 1696 (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4874420/pdf/rstb20150345.pdf.

SEE ORIGINAL COMMENT FOR MAP GRAPH of the Burned Area Trend(% per year) [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

The Palmer Drought Severity index shows no trend since 1895, as shown in the following chart.55 Vicente-Serrano, et. al. report that "Meteorological droughts do not show any substantial changes at the global scale in at least the last 120 years."56 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

55 See US Environmental Protection Agency, "Climate Change Indicators: Drought," https://www.epa.gov/climate- indicators/climate-change-indicators-drought; and US Department of Commerce, National Climatic Data Center, "Divisional Data Select," https://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp.

56 See Sergio M. Vicente-Serrano, et. al., "Global Drought Trends and Future Projections," Philosophical Transactions of the Royal Society, October 2022, at https://www.researchgate.net/publication/364672519_Global_drought_trends_and_future_projections.

SEE ORIGINAL COMMENT FOR The Palmer Drought Severity index trend from 1890-2020 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

U.S. flooding over the past century is uncorrelated with increasing GHG concentrations.57 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

57 See R. M. Hirsch and K. R. Ryberg, "Has the Magnitude of Floods Across the USA Changed with Global CO2 Levels?," Hydrological Sciences Journal 57, no. 1 (2012): 1–9, https://www.tandfonline.com/doi/full/10.1080/02626667.2011.621895?scroll=top&needAccess=true&.

SEE ORIGINAL COMMENT FOR GRAPH OF Estimation of B1 to the Region and the Percent Change per 10 ppm Increase in CO2 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

The IPCC in the AR6 reports that “The SREX (Seneviratne et al., 2012) assessed low confidence for observed changes in the magnitude or frequency of floods at the global scale. This assessment was confirmed by AR5 (Hartmann et al., 2013).”58 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

58 See https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter11.pdf at p. 1568.

The available data do not support the ubiquitous assertions about the dire impacts of declining pH levels in the oceans.59 Goklany reports as follows.60 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

59 For a summary discussion, see https://www.mattridley.co.uk/blog/thousands-of-results-on-ocean-acidification/. A comprehensive database is at CO2 Science, “Ocean Acidification Database,” http://www.co2science.org/data/acidification/results.php. See also Alan Longhurst, Doubt and Certainty in Climate Science, pp. 214–25, https://curryja.files.wordpress.com/2015/09/longhurst-print.pdf.

60 See https://www.thegwpf.org/content/uploads/2015/10/benefits1.pdf at p. 16.

There is no likelihood of the ocean’s average pH getting anywhere near as low as 7 (neutral) because of elevated carbon dioxide concentrations during the next three centuries. Ocean pH currently averages about 8 and is forecast to fall by 0.2 pH units or so during the present century. This change is considerably smaller than the difference in pH between different parts of the ocean, different days in the same part of the ocean, and even different times of day in coral reef lagoons. An examination of upper-ocean pH for a wide variety of ecosystems ranging from polar to tropical, open-ocean to coastal, kelp forest to coral reefs, indicates that variations in month-long pH spanned a range of 0.024 –1.430 pH units, and found that many organisms ‘are already experiencing pH regimes that are not predicted until 2100. [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

The IPCC in the Fifth Assessment Report was deeply dubious about the various severe effects often asserted to be looming as impacts of anthropogenic warming; an example is a collapse of the Antarctic western and Greenland ice sheets. The IPCC analysis in the Sixth Assessment Report is almost identical.61 [EPA-HQ-OAR-2022-0829-0571, pp. 25-28]

61 For the AR5, see Julie M. Arblaster et al., “Long-Term Climate Change: Projections, Commitments and Irreversibility—Final Draft Underlying Scientific-Technical Assessment,” in Working Group I Contribution to the IPCC Fifth Assessment Report (AR5), Climate Change 2013: The Physical Science Basis, September 23–26, 2013, p. 12–78, at http://www.climatechange2013.org/images/uploads/WGIAR5_WGI- 12Doc2b_FinalDraft_Chapter12.pdf. See the analogous analysis in the AR6 at p. 12-115 at https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf.

Organization: American Lung Association (ALA) et al.

In addition to being a leading contributor to air pollution challenges, transportation is the leading source of climate pollution in the nation. The life-saving progress made to clean the air under the Clean Air Act is increasingly challenged by climate change impacts. Extreme heat, drought and catastrophic wildfire conditions and enhanced conditions for ozone formation increase pollution burdens and inequities. Climate impacts on health are far reaching beyond degraded air quality, including water quality, vector-borne diseases, mental health impacts, health issues from displacement and other risks.3 EPA must act to set the strongest possible multi-pollutant standards for new passenger vehicles that ensure cleaner combustion engines while spurring the rapid and widespread transition to zero-emission technologies needed to ensure cleaner air and a healthy climate. [EPA-HQ-OAR-2022-0829-0745, pp. 1-2]

3 USGCRP. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. 2018.

Organization: Anonymous

Losses from additional energy conversions

Conversion of energy from one form to another is not 100% conservative. With each energy conversion from one form to another, you lose some energy. [EPA-HQ-OAR-2022-0829-0562, p. 1]

In a typical vehicle you have energy conversions of fuel => pistons => forward motion. With an electrical vehicle you have

Power generation => electricity => battery => electricity => electrical motor => forward motion. [EPA-HQ-OAR-2022-0829-0562, p. 1]

An electrical vehicle has at least 5 conversions with associated losses. Requiring vehicles to be battery powered will result in increased energy use with increased energy losses. This comes with a limited benefit, if any. [EPA-HQ-OAR-2022-0829-0562, p. 1]

Any benefit which can be conceived is tied to power plant generation. According to https://afdc.energy.gov/vehicles/electric_emissions.html [EPA-HQ-OAR-2022-0829-0562, p. 1]

In geographic areas that use relatively low-polluting energy sources for electricity generation, all-electric vehicles and PHEVs typically have an especially large life cycle emissions advantage over similar conventional vehicles running on gasoline or diesel. In areas with higher-emissions electricity, all-electric vehicles and PHEVs may not demonstrate as strong a life cycle emissions benefit. [EPA-HQ-OAR-2022-0829-0562, p. 1]

And the amount of any benefit may not be all that great. https://www.fueleconomy.gov/feg/climate.shtml [EPA-HQ-OAR-2022-0829-0562, p. 1]

Highway vehicles release about 1.4 billion tons of greenhouse gases (GHGs) into the atmosphere each year—mostly in the form of carbon dioxide (CO_2) [EPA-HQ-OAR-2022-0829-0562, p. 1]

https://ourworldindata.org/greenhouse-gas-emissions

Today, we collectively emit around 50 billion tonnes of CO_2e each year.

So the maximum we could hope to save would be 1.4 / 50, or 2.8% of that released. And this needs to be put in light of the total CO_2 in the atmosphere. [EPA-HQ-OAR-2022-0829-0562, pp. 1-2]

https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon- dioxide

Published May 12, 2023

Based on the annual report from NOAA’s Global Monitoring Lab, global average atmospheric carbon dioxide was 417.06 parts per million (“ppm” for short) in 2022, setting a new record high. [EPA-HQ-OAR-2022-0829-0562, pp. 1-2]

Using 1 ppm = 7.8 Gigatonnes of Carbon Dioxide in the atmosphere. This calculates to

417.06 x 7.8 Gigatonnes / 1 ppm = 3,253 Gigatonnes

1.4 billion tonnes (Gigatonnes) / 3,253 Gigatonnes = 0.000307402120091

The most we could hope to save would be 0.0003 of the total atmosphere carbon dioxide. But that's only if none was produced from vehicles. However, any savings will be less than 0.0003 with the power generation plants which produce carbon dioxide. And there will be additional waste of energy in the energy conversions to the different forms needed for electric vehicles. [EPA-HQ-OAR-2022-0829-0562, pp. 1-2]

Energy conversion from battery to forward movement [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

According to archive.org, https://www.fueleconomy.gov/feg/evtech.shtml In December, 2019, it stated:

EVs convert about 59%–62% of the electrical energy from the grid to power at the wheels. Conventional gasoline vehicles only convert about 17%–21% of the energy stored in gasoline to power at the wheels.

Then in February, 2020, it stated: [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

EVs convert over 77% of the electrical energy from the grid to power at the wheels. Conventional gasoline vehicles only convert about 12%–30% of the energy stored in gasoline to power at the wheels.

with a disclaimer stating:

https://www.fueleconomy.gov/feg/atv-ev.shtml

EVs are 60% to 73% efficient, depending upon drive cycle. However, if the energy recaptured from regenerative braking is counted (i.e., recounted when it is re-used), EVs are 77% to 100% efficient. [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

Regenerative braking would add additional complexity in calculating conversion efficiencies and costs.

The university of Calgary agrees with the 2019 statement, https://energyeducation.ca/encyclopedia/Electric_vehicle

Modern EVs have an efficiency of 59-62% converting electrical energy from the storage system to the wheels.

Energy conversion from electrical grid to battery [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

Battery efficiency declines with age, temperature, and charging speed and the total state of charge capacity level. This means, range loss.

Charging to 100% at 60 degrees Celsius can reduce capacity to 60% after 3 months. Recommended state of charge capacities is from 30% to 70% which also means, range loss.

https://optiwatt.com/blog/the-comprehensive-guide-to-maximizing-your-teslas-battery-efficiency-and-battery-life [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

Even if the vehicle is not used for extended periods of time, it is recommended to keep it plugged in. This will result in total waste of energy that only goes for maintaining the battery to prevent degradation.

Battery charging efficiency is dependent upon internal resistance.

Rolls Battery Engineering states: [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

Charge efficiency for Flooded deep cycle models is typically ~80%. This should be reduced 1% per year after the third (3) year of operation. [EPA-HQ-OAR-2022-0829-0562, p. 2]

Energy power plant to electrical grid

More than 60% of energy used for electricity generation is lost in conversion. https://www.eia.gov/todayinenergy/detail.php?id=44436

Each conversion results in loss to the remaining energy. [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

More than 60% energy loss from the power plant to the electrical grid. 20% or more energy loss from the electrical grid to battery.

Up to 41% energy loss from battery to forward movement.

There will be a higher demand on our energy grid, leading to increased electrical costs and risks of additional brownouts and blackouts throughout the country. Electric vehicles have increased weight posing safety concerns with increased stopping distances, (including within school zones), increased damage in crashes, and yet more energy needed to move the vehicle forward. It also adds more wear and tear to the roads, adding yet more energy waste. It requires increased structural strength in parking garages with yet more energy waste. [EPA-HQ-OAR-2022-0829-0562, pp. 2-3]

I fear the whole picture has not been presented and that there is going to be a lot of energy wasted in startup construction, people moved over to something new, and then in a few years, charging and use efficiencies will have been reduced, the mistake will be realized, and it will be too late. [EPA-HQ-OAR-2022-0829-0562, p. 3]

I urge the EPA to hold off on requirements moving towards use of Electric Vehicles. The power grid is needed to be stabilized to support the dramatic electrical demand, there is lack of infrastructure to support charging stations, the battery capabilities is not yet up to speed, there are indirect environmental costs that may not yet be realized. There may be such a time for wide scale use of Electric Vehicles, but the time is not yet. [EPA-HQ-OAR-2022-0829-0562, p. 3]

Organization: Arizona State Legislature

3. The proposed rule fails to model its climate change impacts. EPA justifies the proposed rule on the basis that it will avoid climate change impacts, but EPA did not conduct modeling to determine the proposed rule's impact on temperature change or sea-level rise. [EPA-HQ-OAR-2022-0829-0537, p. 2]

Global damages. The 2021 Working Group departed from recent practice by considering not just domestic harms, but global anticipated climate damages in its analysis. 2021 TSD, at 3. The decision to consider not just damages to the United States of America, but all other countries potentially impacted by climate change, is not a scientific decision—it is a political decision. In fact, the Working Group did not make this decision—in E.O. 13990, the President commanded it to consider global damages. See E.O. 13990, 86 Fed. Reg. 7040; 2021 TSD, at 3 (acknowledging that "[t]he IWG was tasked with" publishing estimates that "tak[e] global damages into account"). The Working Group concedes that this is a policy decision, involving considerations of "climate risk, environmental justice, and intergenerational equity." 2021 TSD, at 3. [EPA-HQ-OAR-2022-0829-0537, p. 20]

Organization: BlueGreen Alliance (BGA)

Strong, technology-forcing vehicle standards are essential to meet climate goals, advance environmental justice, and create good jobs in the clean economy. The transportation sector is the single largest contributor to climate-warming greenhouse gas emissions in the U.S., and the local air pollutants emitted by vehicles, including particulate matter (PM), nitrous oxides (NOx), and volatile organic compounds (VOCs) have disproportionate impacts on low-income and non-white communities. Meanwhile, the supply chains for light- and medium-duty vehicles and the manufacturing jobs within them—are critical to the economic health and stability of auto manufacturing communities across the country (See Figure1). [EPA-HQ-OAR-2022-0829-0667, p. 2]

SEE ORIGINAL COMMENT FOR Figure 1: Light- and Medium-Duty Vehicle Assemblers and Component Manufacturers. Light and Medium Duty Vehicle Manufacturing. [EPA-HQ-OAR-2022-0829-0667, p. 2]

Source: BGA [EPA-HQ-OAR-2022-0829-0667, p. 2]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

The science could not be clearer. We must act now to reduce pollution to stabilize the climate and avoid the most serious consequences of climate change. In California and many other states, the changing climate is already increasing the frequency and severity of drought, wildfires, and extreme weather events like heat waves, jeopardizing public health and economic stability. [EPA-HQ-OAR-2022-0829-0780, p. 7]

In addition to ongoing air quality challenges, California is on the front lines of climate change. With the increasing severity and frequency of drought, wildfire, extreme heat, and other impacts, Californians need only look out their windows to know that climate change is real and rapidly getting worse. 4 The impacts we thought we would see in the decades to come are happening now and, as with air pollution, are disproportionately affecting low-income communities and communities of color. [EPA-HQ-OAR-2022-0829-0780, p. 8]

Cumulative impacts of climate change

U.S. EPA acknowledges that climate change can disproportionately affect people of color and low-income communities due to various factors, such as lower resilience to climate impacts. However, the analysis would benefit from an assessment of the cumulative impacts of multiple risk factors to thoroughly estimate climate vulnerability. The proposed rule would lower GHG emissions and mitigate the adverse effects of climate change on health outcomes and inequalities among these groups. [EPA-HQ-OAR-2022-0829-0780, pp. 54-55]

CARB's 2022 Scoping Plan for Achieving Carbon Neutrality 98 also recognizes that communities do not experience exposure to pollution sources and the resulting effects equally. Low-income communities and communities of color consistently experience significantly higher rates of pollution and adverse health conditions than others. Research has demonstrated that the "cumulative impacts" 99 of various social, economic, and environmental factors can worsen health conditions, and the combination of all these factors can compound the health effects of individual exposures. CARB has been working over the past decade to better understand and map cumulative impacts in California, in coordination with the California Office of Environmental Health Hazard Assessment (OEHHA), and to identify communities that are experiencing the highest levels of socioeconomic- and pollution-related vulnerability. CARB notes that U.S. EPA has also conducted research in this area, such as in its report, "Cumulative Impacts Research: Recommendations for EPA's Office of Research and Development." 100 CARB recommends U.S. EPA incorporate information from this report, which further illustrates the need to reduce climate stressors for vulnerable groups and the associated public health benefits of the proposed standards. [EPA-HQ-OAR-2022-0829-0780, pp. 54-55]

98 CARB. 2022 Scoping Plan for Achieving Carbon Neutrality. December 2022. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

99 Solomon GM, Morello-Frosch R, Zeise L, Faust JB. Cumulative Environmental Impacts: Science and Policy to Protect Communities. Annu Rev Public Health. 2016;37:83-96.

100 U.S. EPA. Cumulative Impacts Research: Recommendations for EPA's Office of Research and Development. U.S. Environmental Protection Agency, Washington, D.C., EPA/600/R-22/014a, 2022.

Co-benefits of climate action

Reducing GHG emissions can help mitigate climate impacts, as U.S. EPA has addressed. However, many actions to reduce GHG emissions also have health co-benefits that can improve the health and well-being of populations, as well as address climate change. CARB's 2022 Scoping Plan for Achieving Carbon Neutrality: Appendix G (Public Health) 101 included a qualitative analysis that evaluated the broad range of benefits of a dramatic reduction in fossil fuels by 2045 combined with healthier ecosystem management. This analysis supports the CARB Scoping Plan with scientific literature from eight health co-benefit areas: heat impacts, children's health and development, economic security, food security, mobility and physical activity, urban greening, wildfires and smoke impacts, and housing affordability. It indicates the directional effects of each health outcome and gives details on the magnitude and extent of health effects when possible. The analysis includes discussion of benefits to community health and climate resilience, as well as potential inequities experienced at a community level. For example, a study by Masri et al. 102 reported that census tracts with predominantly Native American populations, older adults, and low-income populations are more likely to be highly impacted by wildfires. Overall, the qualitative analysis shows an overwhelming health benefit for the State in moving forward to carbon neutrality while continuing efforts to increase health equity and resilience in individual communities. California is not alone in experiencing climate impacts, and CARB would expect similar results nationwide. CARB therefore recommends that U.S. EPA add discussion on potential health co-benefits that are related to the reduction of GHG emissions resulting from the proposed rule. [EPA-HQ-OAR-2022-0829-0780, pp. 55-56]

101 CARB. Scoping Plan for Achieving Carbon Neutrality: Appendix G (Public Health). December 2022. Access at https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-g-public-health.pdf.

102 Masri S, Scaduto E, Jin Y, Wu J. Disproportionate Impacts of Wildfires among Elderly and Low-Income Communities in California from 2000-2020. Int J Environ Res Public Health. 2021 Apr 8;18(8):3921.

Organization: California Attorney General's Office, et al.

Strong emissions standards are necessary now to stave off the worst impacts of human-induced climate change and to confront inequitably distributed threats to public health and the environment from climate change as well as other forms of pollution. From extreme heat to wildfires to drought, our States and Cities are already experiencing the devastating impacts of climate change, which will continue to mount and compound with rising concentrations of GHGs in the atmosphere. Moreover, vehicle emissions of oxides of nitrogen (NOx), particulate matter (PM), and other criteria pollutants continue to endanger the health and welfare of our residents. [EPA-HQ-OAR-2022-0829-0746, p. 1]

BACKGROUND

A. Our States and Cities Confront a Growing Climate Crisis

Our States and Cities are currently experiencing the devastating effects of climate change. Increased temperatures, extreme heat events, wildfires, sea level rise, and coastal flooding—to highlight just a few of the effects—are currently causing and projected to continue to cause significant damage to our States and Cities. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change ("IPCC") reconfirms these types of impacts are caused by anthropogenic climate change, and it projects that they will worsen.2 As average surface temperatures rise and the intensity and frequency of these types of extreme weather events increases, our States and Cities face direct and compounding challenges to protect the health and welfare of our residents, our economies, and our natural resources. [EPA-HQ-OAR-2022-0829-0746, pp. 2-3]

2 H.O. Pörtner et al., Intergovernmental Panel on Climate Change, Climate Change 2022: Impacts, Adaptation and Vulnerability, Summary for Policymakers (2022) ("IPCC Report 2022"), at 9, 20.

1. Increased Temperatures and Extreme Heat

Globally, "[t]he past nine years have been the warmest years since modern recordkeeping began in 1880;"3 and nine of the warmest eleven years on record in the United States have occurred since 2012.4 There is a "virtually certain" chance that 2023 will rank among the ten warmest years on record, with a 93% chance it will rank among the top five.5 The IPCC has determined that GHG emissions from human activities are already responsible for about 1.1 °C of warming since 1850-19006 and that "[h]uman influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years."7 [EPA-HQ-OAR-2022-0829-0746, pp. 2-3]

3 National Aeronautics and Space Administration ("NASA"), NASA Says 2022 Fifth Warmest Year on Record, Warming Trend Continues (Jan. 12, 2023), available at https://www.nasa.gov/press-release/nasa-says-2022-fifth-warmest-year-on-record-warming-trend-continues; see Henry Fountain and Mira Rojanasakul, The Last 8 Years Were the Hottest on Record, The New York Times (Jan. 10, 2023), available at https://www.nytimes.com/interactive/2023/climate/earth-hottest-years.html ("The eight warmest years on record [globally] have now occurred since 2014.").

4 National Weather Service, Average Annual Temperature by Year, available at https://www.weather.gov/media/slc/ClimateBook/Annual%20Average%20Temperature%20By%20Year.pdf.

5 National Oceanic and Atmospheric Administration ("NOAA"), April 2023 was Earth's fourth warmest on record (May 12, 2023), available at https://www.noaa.gov/news/april-2023-was-earths-fourth- warmest-on-record.

6 See V. Masson-Delmote et al., IPCC, Climate Change 2021: The Physical Science Basis, Summary for Policymakers (2021), at 5.

7 Id. at 6.

As temperatures rise, threats to public health and the environment in our States and Cities continue to mount. For example, extreme heat events are happening more frequently, with more intensity,8 and for longer duration.9 In June 2021, a four-day heat wave across the Pacific Northwest set heat records all over the region, including heat so intense that roads buckled.10 The region experienced 600 excess deaths during the heat wave.11 In September 2022, a historic heat wave punished California, breaking high-temperature records in Northern California; it was considered "extraordinary" in part because of its "mind-blowing duration."12 Extreme heat events like these are "likely to become the new normal."13 By 2053, the number of counties experiencing at least one day with a heat index above 125 degrees Fahrenheit is projected to increase from 50 to over 1,000.14 [EPA-HQ-OAR-2022-0829-0746, pp. 2-3]

8 H.O. Pörtner et al., IPCC, Climate Change 2022: Impacts, Adaptation and Vulnerability, Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2022) ("IPCC Report 2022"), at 1963.

9 Id. at 1937.

10 Tom Di Liberto, Astounding heat obliterates all-time records across the Pacific Northwest and Western Canada in June 2021, NOAA (Jun. 30, 2021), available at https://www.climate.gov/news-features/event-tracker/astounding-heat-obliterates-all-time-records-across-pacific-northwest.

11 Nadja Popovich & Winston Choi-Schagrin, Hidden Toll of the Northwest Heat Wave: Hundreds of Extra Deaths, The New York Times (Aug. 11, 2021), available at https://www.nytimes.com/interactive/2021/08/11/climate/deaths-pacific-northwest-heat-wave.html. Although Washington only reported 95 heat-caused deaths at the time of reporting and Oregon reported 96, these figures do not include all impacts of extreme heat.

12 Jill Cowan, Historic Heat Pushes California to the Brink, The New York Times (Sep. 7, 2022), available at https://www.nytimes.com/2022/09/07/us/historic-heat-california-power.html.

13 Rebecca Hersher, Climate change makes heat waves, storms and droughts worse, climate report confirms, NPR (Jan. 9, 2023), available at https://www.npr.org/2023/01/09/1147805696/climate-change-makes-heat-waves-storms-and-droughts-worse-climate-report-confirm.

14 John Muyskens et al., More dangerous heat waves are on the way: See the impact by Zip code, The Washington Post (Aug. 15, 2022), available at https://www.washingtonpost.com/climate-environment/interactive/2022/extreme-heat-risk-map-us/.

Extreme heat events threaten not only our quality of life, but our lives themselves.15 As temperatures rise, heat-related mortality is expected to increase, particularly in urban areas.16 One study found that by 2100, annual heat-related deaths in the United States are projected to increase from 12,000 to 36,000 in a moderate-warming scenario or 97,000 in a high-warming scenario.17 Another study predicted that by 2080 to 2099, hospital admissions for heat-related respiratory diseases in New York state will be 2 to 6 times higher than in 1991 to 2004.18 A third study concluded that extreme heat days were associated with higher all-cause mortality rates in the contiguous United States, and disproportionately affected some subgroups, including older adults and Black adults.19 On a global scale, new research indicates that for every 0.1 degree Celsius above present levels, about 140 million additional people will be exposed to dangerous levels of heat.20 [EPA-HQ-OAR-2022-0829-0746, p. 4]

15 See Peter Dizikes, Study: Extreme heat is changing habits of daily life¸ MIT News (Jan. 12, 2023), available at https://news.mit.edu/2023/study-extreme-heat-less-outside-activity-0112 (finding that extreme temperatures make people less likely to pursue outdoor activities); Gallup, Climate Change and Wellbeing Around the World (2022), available at https://www.gallup.com/analytics/397940/climate- change-and-wellbeing.aspx (describing August 2022 study that found that high-temperature days could decrease global well-being by 17% by 2030).

16 IPCC Report 2022, supra n. 8, at 1968.

17 Meredith Bailey, A warming climate may lead to dramatic increase in US deaths due to heat exposure, study shows, University of Washington School of Public Health (Jul. 29, 2020), available at https://sph.washington.edu/news-events/news/warming-climate-may-lead-dramatic-increase-us-deaths-due-heat-exposure-study-shows.

18 Shao Lin et al., Excessive Heat and Respiratory Hospitalizations in New York State: Estimating Current and Future Public Health Burden Related to Climate Change, 120 ENVIRONMENTAL HEALTH PERSPECTIVES 1571, 1527 (2012), available at https://doi.org/10.1289/ehp.1104728.

19 Sameed Ahmed M. Khatana, et al., Association of Extreme Heat With All-Cause Mortality in the Contiguous US, 2008–2017, JAMA Network Open (May 19, 2022), available at https://doi.org/10.1001/jamanetworkopen.2022.12957; see Muyskens, supra note 14 (indicating that by 2053, 80% of Black Americans and 60% of white Americans will be affected by dangerous heat).

20 Alex Morrison, Limiting global warming to 1.5 °C would save billions from dangerously hot climate, University of Exeter (May 22, 2023), available at https://news.exeter.ac.uk/research/limiting-global-warming-to-1-5c-would-save-billions-from-dangerously-hot-climate/.

2. Wildfires

Global warming is likely responsible for 66% to 88% of the atmospheric conditions fueling wildfires.21 It engenders warm and dry conditions,22 which have contributed to more extreme wildfires.23 Since the 1970s, the wildfire season in the western United States has extended from 5 months to over 7 months long.24,25 In the coming decades, climate change is projected to further increase fire activity across North America.26 [EPA-HQ-OAR-2022-0829-0746, pp. 4-6]

21 Alex Wigglesworth, Climate change is now the main driver of increasing wildfire weather, study finds, Los Angeles Times (Nov. 1, 2021), available at https://www.latimes.com/california/story/2021-11-01/climate-change-is-now-main-driver-of-wildfire-weather.

22 IPCC Report 2022, supra n. 8, at 1948.

23 Id. at 1939.

24 U.S. Department of Agriculture, Wildfire, available at https://www.climatehubs.usda.gov/taxonomy/term/398 (last accessed May 26, 2023).

25 IPCC Report 2022, supra n. 8, at 1948.

26 Id.

The annual numbers of large wildland fires and area burned in the western United States have risen in the past several decades,27 and the last few years have seen numerous record-setting wildfires. For example, multiple large wildfires burned hundreds of thousands of acres in Colorado in July and August 2020, including the second-largest fire in state history.28 The largest wildfire in New Mexico history burned in 2022,29 destroying hundreds of homes.30 [EPA-HQ-OAR-2022-0829-0746, pp. 4-6]

27 Id.

28 Tom Di Liberto, A Colorado summer: Drought, wildfires, and smoke in 2020, NOAA (Aug. 20, 2020), available at https://www.climate.gov/news-features/event-tracker/colorado-summer-drought-wildfires- and-smoke-2020.

29 NOAA, Assessing the U.S. Climate in 2022 (Jan. 10, 2023), available at https://www.ncei.noaa.gov/news/national-climate-202212.

30 Anna Phillips & Jason Samenow, Forest Service finds its planned burns sparked N.M.'s largest wildfire, The Washington Post (May 27, 2022), available at https://www.washingtonpost.com/climate-environment/2022/05/27/new-mexico-wildfire-service-controlled-burn/.

California is uniquely vulnerable to wildfires,31 and the projected impacts on California from an increase in wildfire risk are severe. In 2018, the Camp Fire burned 155,366 acres of land, destroying 18,804 structures—roughly 90% of the homes in the town of Paradise—and killing 85 people;32 it was then the deadliest and most destructive wildfire in California history. In 2021, a record number of acres burned in the Sierra Nevada, breaking the previous record set in 2020.33 The Dixie Fire, now the largest single wildfire in California history, also burned in 2021.34 As a result of climate change, the average annual area burned across California is projected to increase by around 77% by 2099, and the worst wildfire years could see burned area increases of more than 178% by the end of this century.35 [EPA-HQ-OAR-2022-0829-0746, pp. 4-6]

31 Scott Stephens et al., Prehistoric Fire Area and Emissions from California's Forests, Woodlands, Shrublands and Grasslands, 251 FOREST ECOLOGY AND MGMT. 205, 205 (2007); Jon Keeley, Fire in Mediterranean Climate Ecosystems—A Comparative Overview, 58 ISR. J. OF ECOLOGY & EVOLUTION 123, 124 (2012).

32 California Department of Forestry & Fire Protection, Top 20 Most Destructive California Wildfires (last accessed June 30, 2023), available at https://www.fire.ca.gov/our-impact/statistics; Kurtis Alexander, Reclaiming Paradise, The San Francisco Chronicle (May 3, 2019), available at https://projects.sfchronicle.com/2019/rebuilding-paradise/.

33 Sierra Nevada Conservancy, 2021: Another historic Sierra Nevada fire season (Jan. 24, 2022), available at https://sierranevada.ca.gov/2021-another-historic-sierra-nevada-fire-season/.

34 Id.

35 Anthony Westerling, California Energy Commission, Wildfire Simulations for California's Fourth Climate Change Assessment: Projecting Changes in Extreme Wildfire Events with a Warming Climate (2018), at 19.

Moreover, wildfires pose significant public health risks due to air quality degradation.36 Exposure to wildfire smoke may cause respiratory morbidity, especially exacerbations of asthma and chronic obstructive pulmonary disease.37 “[W]ildfire-specific PM2.5 is up to 10 times more harmful on human health than PM2.5from other sources.”38,39 This public health concern grows as the frequency and intensity of wildfires increase and is not limited to States where the wildfires are burning. The rising heat from the wildfires takes particulate matter and toxic gases in the smoke into the jet stream, which can carry those hazardous substances thousands of miles and cause harmful air pollution across the country. During the 2020 wildfire season and again in July of 2021, smoke from wildfires burning on the West Coast caused New York City to experience some of the worst air quality in the world.40 And in June 2023, New York City was once again blanketed in smoke, resulting in the highest measurements of 2.5 micron particles since recording began in 1999.41 The combination of fierce wildfires in Canada and airflow patterns prompted the U.S. National Weather Service to issue air quality alerts for most of the Atlantic seaboard.42 [EPA-HQ-OAR-2022-0829-0746, pp. 4-6]

36 IPCC Report 2022, supra n. 8, at 1949.

37 Colleen E. Reid et al., Critical Review of Health Impacts of Wildfire Smoke Exposure, 124 ENVIRONMENTAL HEALTH PERSPECTIVES 1334, 1336-37 (2016), available at https://doi.org/10.1289/ehp.1409277.

38 Rosana Aguilera, et al., Wildfire smoke impacts respiratory health more than fine particles from other sources: observational evidence from Southern California, 12 NATURE COMMUNICATIONS, at 3 (2021), available at https://doi.org/10.1038/s41467-021-21708-0.

39 Smoke from wildfires has also been found to exacerbate risks associated with the COVID-19 virus, and one study found that “[t]housands of COVID-19 cases and deaths in California, Oregon, and Washington between March and December 2020 may be attributable to increases in fine particulate air pollution (PM2.5) from wildfire smoke.” Karen Feldscher, Link Between Wildfires and COVID cases established, The Harvard Gazette (Aug. 13, 2021), available at https://news.harvard.edu/gazette/story/2021/08/wildfire-smoke-linked-to-increase-in-covid-19-cases-and- deaths/.

40 See, e.g., Oliver Milman, New York air quality among worst in world as haze from western wildfires shrouds city, The Guardian (Jul. 21, 2021), available at https://www.theguardian.com/us-news/2021/jul/21/new-york-air-quality-plunges-smoke-west-coast-wildfires.

41 Aatish Bhatia, Josh Katz, & Margot Sanger-Katz, Just How Bad was the Pollution in New York?, The New York Times (Jun. 9, 2023), available at https://www.nytimes.com/interactive/2023/06/08/upshot/new-york-city-smoke.html.

42 Tyler Clifford, US East Coast blanketed in veil of smoke from Canadian fires, Reuters (Jun. 8, 2023), available at https://www.reuters.com/business/environment/us-states-under-air-quality-alerts-canadian-smoke-drifts-south-2023-06-07/; see Julie Bosman, Smoky Air From Canadian Wildfires Blankets Midwestern Skies, The New York Times (Jun. 27, 2023), available at https://www.nytimes.com/2023/06/27/us/midwest-chicago-smoke-air-quality.html.

3. Sea Level Rise and Coastal Flooding

In the past three decades, rates of sea level rise have accelerated as a result of climate change,43 which causes ice sheets and glaciers to melt and seawater to warm and expand. By 2050, sea level along the contiguous United States’s coastline is conservatively estimated to rise by at least 1 foot,44 causing flooding, erosion, and infrastructure damage along the coastlines.45 By the middle of the century, flooding from rising sea levels and storms is likely to make billions of dollars of coastal property unusable,46 which is particularly problematic given that nearly 40% of Americans live in coastal counties.47 [EPA-HQ-OAR-2022-0829-0746, pp. 7-8]

43 IPCC Report 2022, supra n. 8, at 1936–37.

44 W.V. Sweet, et al., Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projects and Extreme Water Level Probabilities Along U.S. Coastlines¸ NOAA (Feb. 2022), available at https://aambpublicoceanservice.blob.core.windows.net/oceanserviceprod/hazards/sealevelrise/noaa-nos-techrpt01-global-regional-SLR-scenarios-US.pdf; Ezra David Romero, California Overhauls Its Sea Level Rise Plan as Climate Change Reshapes Coastal Life, KQED (Apr. 24, 2023), available at https://www.kqed.org/science/1979603/california-overhauls-its-sea-level-rise-plan-as-climate-change-reshapes-coastal-life.

45 IPCC Report 2022, supra n. 8, at 1950.

46 David Reidmiller et al., U.S. Global Climate Change Research Program, Fourth National Climate Assessment: Volume II (2018), at 330.

47 NOAA, Economics and Demographics (last visited Jun. 13, 2023), available at https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html.

"California is particularly vulnerable to sea level rise because approximately 80% of the population lives within 30 miles of the Pacific Ocean."48 Projections show that 31% to 67% of Southern California beaches may be completely lost by 2100, which will effectively eliminate their recreational and tourism value without large-scale intervention.49 Damages from the inundation of residential and commercial buildings under 20 inches of sea level rise could reach nearly $17.9 billion, and these costs would double if a 100-year coastal flood occurred on top of this sea level rise.50 In a worst case scenario, 6.6 feet of sea level rise combined with a 100-year storm would cause flooding in Southern California that could affect 250,000 people, $50 billion worth of property, and $39 billion worth of buildings.51 [EPA-HQ-OAR-2022-0829-0746, pp. 7-8]

48 NOAA, Understanding and Planning for Sea Level Rise In California (last visited Jun. 13, 2023), available at https://coast.noaa.gov/digitalcoast/stories/ca-slr.html.

49 Leah Fisher and Sonya Ziaja, California's Fourth Climate Change Assessment: Statewide Summary Report, California Energy Commission (2019), at 22.

50 Id.

51 Id.

Sea level rise also exacerbates coastal flooding. For example, by 2050, sea levels along the southern coastal region of Massachusetts are expected to rise over 2 feet, which will cause over 25 miles of road and more than 1,400 buildings in the region to flood every day at high tide.52 [EPA-HQ-OAR-2022-0829-0746, pp. 7-8]

52 Barbara Moran, Rising seas threaten Mass. South Coast and prosperous fishing port, report finds. Here are 5 takeaways, WBUR (Sep. 19, 2022), available at https://www.wbur.org/news/2022/09/19/massachusetts-south-coast-sea-level-rise-new-bedford.

The region also contains 4,900 acres of salt marsh, which filter water, offer wildlife habitat, and act as storm buffer; 23% of the salt marsh is expected to vanish by 2050.53 Coastal flooding may also contaminate groundwater.54 [EPA-HQ-OAR-2022-0829-0746, pp. 7-8]

53 Id.

54 See, e.g., Diana Felton et al.¸ Risks of Sea Level Rise and Increased Flooding on Known Chemical Contamination in Hawaii, State of Hawaii, Department of Public Health (Jun. 21, 2021), available at https://health.hawaii.gov/heer/files/2021/06/Climate-Change-and-Chemical-Contamination-memo-updated-June-2021.pdf.

1. Greenhouse Gas Emissions from Light-Duty and Medium-Duty Vehicles Require Urgent and Ambitious Action Now

It is critically important to reduce GHGs from light- and medium-duty vehicles and to do so as soon as is feasible. Transportation is the leading source of GHG emissions in the country, accounting for approximately 27.2% of total GHG emissions. 88 Fed. Reg. at 29,350 (citing U.S. GHG Emissions Inventory). Light-duty vehicles alone account for 57% of those transportation sector emissions, or approximately 15.5% of total U.S. GHG emissions. Id. Reductions of these emissions are thus crucial for the United States to achieve its climate targets and do its part to keep the rise in global mean temperatures below 1.5 °C to 2 °C.168 [EPA-HQ-OAR-2022-0829-0746, pp. 28-29]

168 United States, The United States of America Nationally Determined Contribution, Reducing Greenhouse Gases in the United States: A 2030 Emissions Target (2021), available at https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%2021%202021%20Final.pdf.

Urgent emissions reductions are necessary, because GHGs can remain in the atmosphere for long time periods. For example, 40% of carbon dioxide emitted as a result of human activities will remain in the atmosphere after 100 years, and 20% will remain after 1000 years; only after about 10,000 years will all the carbon dioxide emitted now break down.169 As explained in the Fourth National Climate Assessment, "[w]aiting to begin reducing emissions is likely to increase the damages from climate-related extreme events (such as heat waves, droughts, wildfires, flash floods, and stronger storm surges due to higher sea levels and more powerful hurricanes)."170 [EPA-HQ-OAR-2022-0829-0746, pp. 28-29]

169 Ask the Experts: The IPCC Fifth Assessment Report, 5 CARBON MANAGEMENT 17, 24 (2014), available at https://www.tandfonline.com/doi/pdf/10.4155/cmt.13.80.

170 Fourth National Climate Assessment: Volume II, supra note 46, at 1488.

Moreover, there may be "tipping points" in the climate system such that even a small incremental change in temperature could push Earth's climate into catastrophic runaway global warming.171 Indeed, a 2022 study published in the journal Science warned that six out of nine major climate tipping points (including the accelerating ice loss from the West Antarctic ice sheet) move from "possible" to "likely" to be triggered at 1.5 °C of warming.172 Therefore, serious efforts to reduce GHG emissions are urgently needed to avoid scenarios where steeper (and vastly more expensive) emission reductions are needed later. Delaying efforts to mitigate carbon dioxide emissions will have negative—and potentially irreversible—consequences for global warming and its impacts, including more extreme wildfires, rising sea levels, greater ocean acidification, and increased risks to food security and public health. Moreover, the uneven distribution of these impacts demands urgent action to protect our most vulnerable populations from additional climate harms and to prevent the exacerbation of existing climate injustices.173 [EPA-HQ-OAR-2022-0829-0746, pp. 28-29]

171 IPCC, Climate Change 2021: The Physical Science Basis, supra n. 6 at SPM-28.

172 David Armstrong McKay et al., Exceeding 1.5 °C global warming could trigger multiple climate tipping points, Science, Vol. 377, No. 6611 (Sep. 9, 2022), available at https://doi.org/10.1126/science.abn7950.

173 See USGCRP Study, supra n. 61, at 247-86; see e.g., EPA, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts, supra n. 65, at 35.

The science could not be clearer. We must act now to reduce pollution to stabilize the climate and avoid the most serious consequences of climate change. In California and many other states, the changing climate is already increasing the frequency and severity of drought, wildfires, and extreme weather events like heat waves, jeopardizing public health and economic stability. We likewise must continue to urgently pursue efforts to improve air quality and reduce toxic emissions and reduce the disparate impacts that have persisted for decades. In California and across the U.S., many low-income communities and communities of color are exposed to disproportionate levels of pollution from on-road vehicle emissions, which contributes to respiratory illness, cardiovascular disease, cancer, and premature death. These impacts are often compounded by the congregation of nearby industrial sources, including upstream, midstream, and downstream fuel production sources. Furthermore, many of these same communities are especially vulnerable to the effects of climate change, as the most severe harms from climate change fall disproportionately on these underserved communities who are least able to prepare for and recover from associated impacts. U.S. EPA's proposed standards are urgently needed to help address these issues. [EPA-HQ-OAR-2022-0829-0780, p. 7]

Despite significant progress reducing air pollution, California experiences some of the nation's poorest air quality, with more than 21 million Californians living in areas that exceed federal ozone standards. 3 Within these areas, there are many low-income and disadvantaged communities that are exposed to not only ozone, but also to particulate and toxic pollutant levels that are significantly higher than applicable federal standards and which have immediate and detrimental health effects. With new research demonstrating adverse health impacts even below NAAQS levels, it remains critically important to continue to reduce emissions wherever feasible. [EPA-HQ-OAR-2022-0829-0780, p. 8]

3 California Air Resources Board (CARB). 2022 State Strategy for the State Implementation Plan. October 2021.
https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf

In addition to ongoing air quality challenges, California is on the front lines of climate change. With the increasing severity and frequency of drought, wildfire, extreme heat, and other impacts, Californians need only look out their windows to know that climate change is real and rapidly getting worse. 4 The impacts we thought we would see in the decades to come are happening now and, as with air pollution, are disproportionately affecting low-income communities and communities of color. [EPA-HQ-OAR-2022-0829-0780, p. 8]

4 CARB. 2022 Scoping Plan for Achieving Carbon Neutrality. December 2022.
https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

The Proposal Will Protect Public Health

Reducing motor vehicle pollution is imperative to protect public health. U.S. EPA's proposed emission standards, or a stronger version, would effectively reduce both GHGs and criteria pollutants like PM, leading to a wide array of vital public health benefits. While U.S. EPA has comprehensively summarized the potential public health benefits of its proposal, CARB finds that there are additional public health benefits that go beyond those described. CARB has summarized its findings and notes that were U.S. EPA to include this information it would better encompass the tremendous potential benefits resulting from the proposal. [EPA-HQ-OAR-2022-0829-0780, p. 52]

Cumulative impacts of climate change

U.S. EPA acknowledges that climate change can disproportionately affect people of color and low-income communities due to various factors, such as lower resilience to climate impacts. However, the analysis would benefit from an assessment of the cumulative impacts of multiple risk factors to thoroughly estimate climate vulnerability. The proposed rule would lower GHG emissions and mitigate the adverse effects of climate change on health outcomes and inequalities among these groups. [EPA-HQ-OAR-2022-0829-0780, pp. 54-55]

CARB's 2022 Scoping Plan for Achieving Carbon Neutrality 98 also recognizes that communities do not experience exposure to pollution sources and the resulting effects equally. Low-income communities and communities of color consistently experience significantly higher rates of pollution and adverse health conditions than others. Research has demonstrated that the "cumulative impacts" 99 of various social, economic, and environmental factors can worsen health conditions, and the combination of all these factors can compound the health effects of individual exposures. CARB has been working over the past decade to better understand and map cumulative impacts in California, in coordination with the California Office of Environmental Health Hazard Assessment (OEHHA), and to identify communities that are experiencing the highest levels of socioeconomic- and pollution-related vulnerability. CARB notes that U.S. EPA has also conducted research in this area, such as in its report, "Cumulative Impacts Research: Recommendations for EPA's Office of Research and Development." 100 CARB recommends U.S. EPA incorporate information from this report, which further illustrates the need to reduce climate stressors for vulnerable groups and the associated public health benefits of the proposed standards. [EPA-HQ-OAR-2022-0829-0780, pp. 54-55]

98 CARB. 2022 Scoping Plan for Achieving Carbon Neutrality. December 2022. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

99 Solomon GM, Morello-Frosch R, Zeise L, Faust JB. Cumulative Environmental Impacts: Science and Policy to Protect Communities. Annu Rev Public Health. 2016;37:83-96.

100 U.S. EPA. Cumulative Impacts Research: Recommendations for EPA's Office of Research and Development. U.S. Environmental Protection Agency, Washington, D.C., EPA/600/R-22/014a, 2022.

Co-benefits of climate action

Reducing GHG emissions can help mitigate climate impacts, as U.S. EPA has addressed. However, many actions to reduce GHG emissions also have health co-benefits that can improve the health and well-being of populations, as well as address climate change. CARB's 2022 Scoping Plan for Achieving Carbon Neutrality: Appendix G (Public Health) 101 included a qualitative analysis that evaluated the broad range of benefits of a dramatic reduction in fossil fuels by 2045 combined with healthier ecosystem management. This analysis supports the CARB Scoping Plan with scientific literature from eight health co-benefit areas: heat impacts, children's health and development, economic security, food security, mobility and physical activity, urban greening, wildfires and smoke impacts, and housing affordability. It indicates the directional effects of each health outcome and gives details on the magnitude and extent of health effects when possible. The analysis includes discussion of benefits to community health and climate resilience, as well as potential inequities experienced at a community level. For example, a study by Masri et al. 102 reported that census tracts with predominantly Native American populations, older adults, and low-income populations are more likely to be highly impacted by wildfires. Overall, the qualitative analysis shows an overwhelming health benefit for the State in moving forward to carbon neutrality while continuing efforts to increase health equity and resilience in individual communities. California is not alone in experiencing climate impacts, and CARB would expect similar results nationwide. CARB therefore recommends that U.S. EPA add discussion on potential health co-benefits that are related to the reduction of GHG emissions resulting from the proposed rule. [EPA-HQ-OAR-2022-0829-0780, pp. 55-56]

101 CARB. Scoping Plan for Achieving Carbon Neutrality: Appendix G (Public Health). December 2022. Access at https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-g-public-health.pdf.

102 Masri S, Scaduto E, Jin Y, Wu J. Disproportionate Impacts of Wildfires among Elderly and Low-Income Communities in California from 2000-2020. Int J Environ Res Public Health. 2021 Apr 8;18(8):3921.

4. Environmental Justice Communities Disproportionately Bear the Burden of Climate Change Impacts

Climate change's impacts will continue to disproportionately fall on environmental justice communities.55 Environmental justice communities experience more severe climate impacts and are more vulnerable as the climate crisis worsens. [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

55 "Environmental justice" is defined by EPA as the "fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to development, implementation, and enforcement of environmental laws, regulations and policies." EPA, EJ 2020 Action Agenda: The U.S. EPA's Environmental Justice Strategic Plan for 2016-2020, EPA-300-B-1-6004, at 1 (Oct. 2016). For the purpose of this comment, the term "environmental justice community" refers to a community of color or community experiencing high rates of poverty that, due to past and/or current unfair and inequitable treatment, is overburdened by environmental pollution, and the accompanying harms and risks from exposure to that pollution because of past or current unfair treatment.

Severe climate harms are already a reality for many environmental justice communities. Globally, the last nine years have been the nine hottest on record, and that trend is expected to continue.56 Members of environmental justice communities tend to work in occupations with increased exposure to extreme heat, such as the agricultural, construction, and delivery industries.57 Farmworkers die of heat-related causes at 20 times the rate of the rest of the U.S. civilian workforce.58 Since 2005, the first year California began tracking the number of heat-related fatalities, 36% of California's heat-related worker deaths have been of farmworkers.59 Similarly, although construction workers comprise only 6% of the national workforce, they account for 36% of heat-related deaths.60 [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

56 NASA, NASA Says 2022 Fifth Warmest Year on Record, Warming Trend Continues, supra n. 3; Masson-Delmotte et al., supra n. 6, at 10.

57 See, e.g., Juley Fulcher, Boiling Point: OSHA Must Act Immediately to Protect Workers From Deadly Temperatures, Public Citizen (Jun. 28, 2022), available at https://www.citizen.org/article/boiling-point/; Union of Concerned Scientists, Too Hot to Work: Assessing the Threats Climate Change Poses to Outdoor Workers (2021), at 3, available at https://www.ucsusa.org/sites/default/files/2021-09/Too-Hot-to-Work_9-7.pdf; Ariel Wittenberg, OSHA Targets Heat Threats Heightened by Climate Change, E&E News (Oct. 26,

2021), available at https://www.eenews.net/articles/osha-targets-heaththreats-heightened-by-climate-change/.

58 See Union of Concerned Scientists, Farmworkers at Risk: The Growing Dangers of Pesticides and Heat (2019) at 4, available at https://www.ucsusa.org/sites/default/files/2019-12/farmworkers-at-risk-report-2019-web.pdf (citing Centers for Disease Control and Prevention, Heat-Related Deaths Among Crop Workers—United States, 1992–2006, available at https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5724a1.htm (last updated June 19, 2008)).

59 Teniope Adewumi-Gunn & Juanita Constible, Natural Resources Defense Council, Feeling the Heat: How California's Workplace Heat Standards Can Inform Stronger Protections Nationwide (2022), available at https://www.nrdc.org/sites/default/files/feeling-heat-ca-workplace-heat-standards-report.pdf.

60 Xiuwen Sue Dong et al., Heat-Related Deaths Among Construction Workers in the United States, 62 AM. J. INDUS. MED. (2019), at 1047-57.

At home, environmental justice communities suffer disproportionate impacts from extreme heat because they are more likely to lack air conditioning, tree canopy, and greenspace. Environmental justice communities have less access to air conditioning to cool down, and are less able to pay the utility bills required to run air conditioning units or fans.61 In urbanized environments, pavement, cement, and other non-vegetated areas contribute to the heat island effect, in which built environments retain heat, causing daytime temperatures to be from 1 °F to 6 °F hotter than suburban and rural areas and nighttime temperatures to be as much as 22 °F hotter.62 The heat island effect is inequitably distributed—it is most extreme in lower-income communities and communities of color.63 Contributing to this effect is the lack of tree canopy and greenspace in environmental justice communities, often due to lower historical and ongoing investment. Indeed, tree canopy and greenspace is highly correlated with historical redlining practices, in which federal housing policy directed investment away from lower-income communities, and especially communities of color, characterized as "risky" for loan servicing.64 Moreover, an EPA report found that individuals with lower incomes and individuals of color are respectively 11% to 16% and 8% to 14% more likely to live in areas with the highest projected increases in premature mortality from extreme heat.65 [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

61 Michelle Roos et al., California Energy Commission, California's Fourth Climate Change Assessment: Climate Justice Report, (2018), at 39-40, 45, available at https://resourceslegacyfund.org/wp-content/uploads/2018/09/Climate-Justice-Report-4CCCA-v.4-00455673xA1C15.pdf ("California Climate Justice Report"); Allison Crimmins, et al., The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment, U.S. Global Change Research Program (2016), at 252, available at https://health2016.globalchange.gov/low/ClimateHealth2016_FullReport_small.pdf ("USGCRP Study").

62 See EPA, Heat Island Effect, available at https://www.epa.gov/heatislands (last updated May 1, 2023); California Environmental Protection Agency, Understanding the Urban Heat Island Index, available at https://calepa.ca.gov/climate/urban-heat-island-index-for-california/understanding-the-urban-heat-island-index/ (last visited May 24, 2023).

63 EPA, Heat Islands and Equity, available at https://www.epa.gov/heatislands/heat-islands-and-equity (last updated Dec. 12, 2022); USGCRP Study, supra n. 61, at 252.

64 Dexter Locke et al., Residential Housing Segregation and Urban Tree Canopy in 37 US Cities, 1 NPJ URBAN SUSTAINABILITY 15 (2020), at 3-4; Ian Leahy & Yaryna Serkez, Since When Have Trees Existed Only for Rich Americans?, The New York Times (Jul. 4, 2021), available at https://www.nytimes.com/interactive/2021/06/30/opinion/environmental-inequity-trees-critical-infrastructure.html.

65 EPA, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts (2021), at 36, available at https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.

In addition, flooding and drought from extreme weather events disproportionately affect environmental justice communities, and the inequity will grow as climate impacts worsen. Due to disinvestment, environmental justice communities often lack sufficient infrastructure to control flooding or ensure steady water supplies.66 They also suffer from more severe impacts, such as contaminated water from pollutant flows during floods and increased concentration of contaminants during droughts.67 EPA has also determined that individuals with lower incomes are more likely to live in areas with the highest projected land losses from sea level rise inundation and are more likely to face substantial traffic delays due to climate-driven changes in high-tide flooding.68 [EPA-HQ-OAR-2022-0829-0746, pp. 8-10]

66 Lily Katz, A Racist Past, a Flooded Future: Formerly Redlined Areas Have $107 Billion Worth of Homes Facing High Flood Risk—25% More Than Non-Redlined Areas, Redfin (2021), available at https://www.redfin.com/news/redlining-flood-risk/; California Climate Justice Report, supra n. 61, at 41-42; USGCRP Study, supra n. 61, at 253-54.

67 USGCRP Study, supra n. 61, at 158-74.

68 EPA, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts, supra n. 65, at 49, 59.

The above impacts especially apply to tribal communities. Due to land dispossession and forced migration, tribal communities are more exposed to extreme heat and more likely to rely on local water sources that are less resilient to drought and more contaminated.69 Beyond those impacts, tribal communities also suffer cultural harms from the decimation or harm to local ecosystems and species of particular meaning to cultural practices.70 These cultural resources have intrinsic value, and they are also critical to tribal community identity and group cohesion, which translates into direct health benefits.71 Moreover, degradation of these cultural resources threatens traditional ecological knowledge, such as particularized understanding of local ecosystems, agriculture, and sustainable practices, that can help limit the impacts of climate change.72 Tribal communities with sovereign land holdings are also more vulnerable to climate impacts because they are unable to relocate.73 [EPA-HQ-OAR-2022-0829-0746, pp. 10-11]

69 Justin Farnell, et al., Effects of land dispossession and forced migration on Indigenous peoples in North America, Science (2021), at 374; USGCRP Study, supra n. 61, at 254.

70 Ron Goode et al., California Energy Commission, California's Fourth Climate Change Assessment: Summary Report from Tribal and Indigenous Communities within California (2018), at 19, available at https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-010_TribalCommunitySummary_ADA.pdf.

71 Id.

72 Id. at 13-16;

73 Farnell et al., supra n. 69.

Furthermore, environmental justice communities, including tribal communities, are environmentally overburdened due to greater existing pollution exposure.74 This disadvantage manifests in higher rates of chronic disease, premature death, and other adverse public health outcomes.75 Compounding these disparities, residents of environmental justice communities also have less access to health care—they are less likely to have health insurance and less likely to be able to afford necessary tests and procedures, and health care facilities are poorly staffed and equipped.76 Consequently, residents of environmental justice communities are less able to withstand climate impacts that further damage their health, such as increased local smog conditions.77 [EPA-HQ-OAR-2022-0829-0746, pp. 10-11]

74 California Climate Justice Report, supra n.61, at 40-41.

75 Id.; USGCRP Study, supra n. 61, at 253.

76 Samantha Artiga et al., Kaiser Family Foundation, Health Coverage by Race and Ethnicity, 2010-2021 (2022), available at https://www.kff.org/racial-equity-and-health-policy/issue-brief/health-coverage-by-race-and-ethnicity/; Benjamin Sommers, et al., Beyond Health Insurance: Remaining Disparities in US Health Care in the Post-ACA Era, 95 THE MILBANK QUARTERLY 1 (2017).

77 California Climate Justice Report, supra n.61, at 40-43.

In addition to being more vulnerable to the impacts of climate change, environmental justice communities endure structural disadvantages that blunt their ability to adapt to a changing climate. Environmental justice communities have less access to financial resources, such as income and wealth, that are critical to climate resilience.78 More financial resources equate to more mobility, more ability to spend (on utilities, health care, home adaptation, etc.) to reduce climate harms, and more safeguards (such as insurance) in the event of extreme climate events.79 Environmental justice communities have higher rates of limited English proficiency, which can reduce access to climate resilience programs and increase vulnerability in extreme climate events due to an inability to understand public health information.80 Social capital in the political process is critical to ensure environmental justice communities receive resources to increase climate resilience and to prevent further entrenching existing inequities. [EPA-HQ-OAR-2022-0829-0746, pp. 10-11]

78 Id. at 39.

79 Id.

80 Id. at 43; USGCRP Study, supra n.61, at 106.

Organization: Ceres BICEP (Business for Innovative Climate and Energy Policy) Network

BICEP Network companies see climate change as a significant business risk, reducing GHG emissions as a major economic opportunity, and recognize the urgency of ensuring near-term reductions. In its most recent March 2023 report,1 the International Panel on Climate Change (IPCC) emphasized the necessity to "massively fast-track climate efforts by every country and every sector and on every timeframe,"2 underscoring the urgency of drastically reducing GHG emissions by 2030. Given that the transportation sector is the largest source of U.S. GHG emissions,3 strong vehicle emission standards are critical to meeting U.S. climate goals. Recent analysis from the International Council of Clean Transportation (ICCT) concludes that aligning the light-duty vehicle sector with climate goals would require a 77% zero- emission vehicle (ZEV) sales share in 2030.4 A key finding of BloombergNEF's 2023 Electric Vehicle Outlook was that "(d)irect electrification via batteries is the most efficient, cost-effective and commercially available route to fully decarbonizing road transport."5 Although ICCT predicts that IRA incentives could stimulate up to 56-67% electric vehicle sales by 2032,6 even Alternative 1 falls short of this level of electric vehicle sales share, let alone what is needed to meet climate goals. Further, given that ICE vehicles will make up the majority of the fleet for many years, it is also necessary to ensure greater GHG reductions from these vehicles. [EPA-HQ-OAR-2022-0829-0600, pp. 1-2]

1 https://www.ipcc.ch/report/ar6/syr/.

2.https://www.unmultimedia.org/avlibrary/asset/3022/3022200/#:~:text=UN%20Secretary%2DGeneral%20Ant%C3%B3nio%20Guterres%20said%20that%20the%20new%20IPCC,on%20all%20fronts%20%2D%2D%20everything%2C.

3 https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

4 https://theicct.org/wp-content/uploads/2023/05/The-Global-Automaker-Rating-2022_final.pdf.

5 https://about.bnef.com/electric-vehicle-outlook/.

6 https://theicct.org/publication/ira-impact-evs-us-jan23/ (p. ii).

BICEP members' abilities to meet their own climate commitments are contingent on strong standards that will ensure the availability of clean vehicles across the U.S. and drive the necessary shift to electrification. Unfortunately, the U.S. currently lags behind the European Union and China in EV sales,7and a recent study projects a shortage of EVs needed to meet American consumer demand.8 Strong U.S. vehicle emission standards are necessary to ensure the availability of clean vehicles for our members and the global competitiveness of the U.S. auto industry. [EPA-HQ-OAR-2022-0829-0600, pp. 1-2]

7 https://theicct.org/epa-pr-rule-ldv-mdv-apr23/.

8 https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf.

Organization: Charles Forsberg

We conducted a series of workshops and wrote multiple papers on replacing all crude oil-domestically and internationally. By definition, this includes everything covered in the proposed EPA rule and all other uses of oil-based products. Based on those studies, the likely consequences of the proposed EPA rulemaking are much higher costs for light vehicles, failure to meet greenhouse gas reduction goals by decades, significant reductions in life expectancy and major reductions in incomes of the bottom 60% of the U.S. population. A summary of the basis for those conclusions and recommendations for EPA is provided herein. The recently published open-access paper (below) provides more detail and includes references to support these conclusions. [EPA-HQ-OAR-2022-0829-0738, p. 1]

C. W. Forsberg, "What is the Long-Term Demand for Liquid Hydrocarbon Fuels and Feedstocks?" Applied Energy, 341, 121104 (2023) https://doi.org/10.1016/j.apenergy.2023.121104 [EPA-HQ-OAR-2022-0829-0738, p. 1]

Organization: Charles Gordon

CLIMATE MODELS are HIGHLY SPECULATIVE

The world has gotten warmer over the past 150 years. We have the measurements and we know the mechanism by which CO2 warms the world. These are facts. But we do not know what will happen in 10, 25 or 100 years. We have made guesses based on complex models. The predictions are not scientific facts as they purport to be. They are easily manipulated. They are created using lots of subjective judgement. Dr. Kooning, an expert, in his book "Unsettled" attached, shows. [EPA-HQ-OAR-2022-0829-0747, pp. 3-5]

That 10500 scientists swear by the model's predictions is not as meaningful as it appears. Ten thousand of those scientists are following the herd in areas outside their expertise. I have seen this in the l00's of scientists who I have dealt with in my OSHA career. Five hundred of those are experts in relevant areas with high standards for studies in their fields. But few scientists know or pay any attention to the historical record or pay much attention to conflicting data. [EPA-HQ-OAR-2022-0829-0747, pp. 3-5]

The models are created by having a computer expert create a speculative model. Then they see if it fits past data. It never does. So, changes are made to the model to see if it reflects past data better. This process is repeated many times until the model fits past data. That doesn't prove that it will fit the future, that is still a guess. Dr. Kooning explains this much more elegantly. Also because of the process of adjustment, the biases of the researchers will be incorporated, consciously or unconsciously. [EPA-HQ-OAR-2022-0829-0747, pp. 3-5]

Consequently, the models are easy to manipulate. When I was at OSHA, industry presented a complex pharmacokinetic model to show that a chemical was less dangerous than OSHA's simple, statistical model showed. So, an OSHA staffer asked an expert friend to see if he could create a pharmacokinetic model that showed more risk than OSHA's statistical model. He did! [EPA-HQ-OAR-2022-0829-0747, pp. 3-5]

I, myself, manipulated a model for fun. I had visited an old factory that used carbon disulfide. They had extensive exposure data and a study had been done showing excess cardiovascular risk of workers. I thought why might not the risk follow an S shaped curve, common for biologic functions rather than a linear or quadratic model. I made some fairly sensible adjustments to the exposure data. Sure enough, the risk followed an S shaped curve. The OSHA scientists laughed at me for being unscientific. But that is exactly what the scientists who make climate models do. [EPA-HQ-OAR-2022-0829-0747, pp. 3-5]

Also, at OSHA I worked with a scientist who was considered the country's foremost biostatistician. He worked for both industry and OSHA. With some exaggeration, he could make anything correlate or not correlate with anything else. [EPA-HQ-OAR-2022-0829-0747, pp. 3-5]

Yes, climate models provide some evidence about future climate change and the impacts of that change. But because of their speculative nature, they should not used to make massive changes in our technology and life style in a hurried way that will slow growth. They should be cautiously used to make adjustments at a slower pace to let the future tell us what the future is and what changes are needed or not needed. They should not be used to scare the population. [EPA-HQ-OAR-2022-0829-0747, pp. 3-5]

The EPA PRESENTS DATA in a MISLEADING WAY

The EPA presents reductions in CO_2 in terms of estimated millions of tons kept out of the atmosphere, an impressively large number. But the important number is the degree of warming prevented. That number was presented in the Wall Street Journal. As I recall, the proposed rule would reduce global warming by about 0.01 deg. C. The marginal benefits of reducing warming by the proposed 2027 rule must be balanced by the disruption, massive expensive changes required, and inconvenience to citizens caused. [EPA-HQ-OAR-2022-0829-0747, p. 5]

Although it is not within EPA's purview, the real problem is the coal being burned by India and China and that will increase. That is the own way that India can raise the standard of living of its extremely poor citizens. The same is true of much of Africa. There are more carbon friendly ways of providing energy to households, but not to industry except nuclear. We as a country and EPA forget that the burning of hydrocarbons over the past 150 years providing cheap and efficient energy is what made the West prosperous. That prosperity is what allows the West to afford to reduce the burning of hydrocarbons. [EPA-HQ-OAR-2022-0829-0747, p. 5]

Though this is not EPA's doing, presenting a temperature increase of 1.5 deg. C as causing terrible things and an increase of 2 deg. C as causing worse things is misleading as every EPA scientist knows. Various things happen over varying continuums and not at specific points. The use of the points 1.5 deg. C and 2 deg. Chas been very successfully used to generate regulatory and political action and to scare people. [EPA-HQ-OAR-2022-0829-0747, p. 5]

EPA presents the proposed reductions of particulates a health benefit. But EPA has been reducing particulate emissions from gas engines since 1968. I think it keeps claiming the same health benefits over and over. But the exhaust of gasoline engines is now so clean that further reductions are marginal. The major causes of particulates in the air are blown dirt, dust, tire scrubbing and clothes rubbing against clothes. If EPA reads auto magazines it will see that the particulate filters required on European cars reduce performance and economy. [EPA-HQ-OAR-2022-0829-0747, p. 5]

SCIENTISTS and their MODELS IGNORE the HISTORICAL RECORD

Fifteen thousand years ago the glaciers in the Northern Hemisphere retreated at a remarkably fast rate. That retreat led to human life as we know it. [EPA-HQ-OAR-2022-0829-0747, p. 6]

What if the cavemen had the power to prevent the glaciers from retreating which dramatically changed their life style. Where would we be today? That point is made by the cover drawing. [EPA-HQ-OAR-2022-0829-0747, p. 6]

There have been many changes in climate that had nothing to do with mankind. The warming and retreat of the glaciers 15,000 years ago - a short time in geological history. The warm Roman period which led to much wealth and prosperity. The cold of the middle-ages led to an increase in poverty and a loss of Roman technology on roads, water systems, sewage systems, medicine, etc. [EPA-HQ-OAR-2022-0829-0747, p. 6]

The Mayan civilization ended with drought not caused by man as did the Saharan Civilization. The England of Dickens was cold and snowy. The late 19th century was warm and England put its water and sewer pipes outside houses. When I lived in England in the 1960's we lived with frozen pipes from the cold of the 1950's and 60's. Time Magazine had a cover on the new cold era. [EPA-HQ-OAR-2022-0829-0747, p. 6]

The current climate change probably is partially affected by non-human caused factors. The climate modelers claim their models show that man is causing all the current climate change. But those models can't show that other factors in nature are not causing some of the change. Those models are designed to show man has caused it all - they don't explore alternate hypothesis. To make an estimate of how much climate change is caused by non-human factors a model has to be created to show that and then tested against the historical record. Like current models, it then has to be modified to fit the record, and then used to make a prediction of how much current climate change is caused by non-human factors. [EPA-HQ-OAR-2022-0829-0747, p. 6]

MAJOR CHANGES often have UNEXPECTED CONSEQUENCES

In the 1980's we worried about the ozone hole and its impact on humans and the environment. Scientists predicted that the escape of the coolant then used in air conditioners caused it. Countries then banned the use of that coolant and required the use of another coolant. The prediction was right and the change in coolant le to the shrinking of the ozone hole. But it turns out the escape of the new coolant adds to global warming. So now we will have to change our air conditioners to use another coolant which hopefully will not contribute to global warming. [EPA-HQ-OAR-2022-0829-0747, pp. 6-7]

In the 1970's we worried about the acidification of our lakes caused by sulfites and sulfates in the atmosphere. So, we phased-out the burning of high sulfur soft coal. That did reduce the acidification of lakes. But it turns out that the sulfites and sulfates in the atmosphere reflect sun light and kept the world cooler. So another change made by man had the unexpected consequence of warming the world. It takes hubris to think that ending the burning of hydrocarbons will not have unexpected consequences. One expected consequence is that overall, it will make the world's people poorer as switching will take the investment that otherwise would go to growth. [EPA-HQ-OAR-2022-0829-0747, pp. 6-7]

BENEFITS of GLOBAL WARMING

If EPA employees looked out their windows, they would see that global warming has some benefits - though not as great as its costs. Washington residents can move about much easier in the winter because of less snow. Heating bill are less. Washington has always had hot, hazy and humid summers. The½ degree F of summer warming is not noticeable. [EPA-HQ-OAR-2022-0829-0747, pp. 8-9]

The milder Chicago winters resulted in my mother and other older people not being housebound. Indeed, the entire Northeast has benefited from this warming. Warmer temperatures in Canada and Siberia will permit more wheat to be grown. Places like Anchorage will have a much more livable climate. Many, but not all species will adjust their habitat to the warmer climate. Crops will grow quicker more CO2 in the atmosphere. [EPA-HQ-OAR-2022-0829-0747, pp. 8-9]

Organization: Clean Fuels Alliance America

When considering options to help reduce greenhouse gas emissions from vehicles and equipment, there are two essential elements to consider: the amount of the reduction and when it happens. This is because carbon emissions are persistent and accumulate. The resulting increased levels of GHGs in the atmosphere contribute to global warming now and for decades to come. A reduction in GHG emissions now can avoid decades of associated heating, thus having significantly more value than carbon reductions made in the future. The time value of carbon is key, and the next decade is critical.3 The importance of reducing carbon today cannot be understated as the Intergovernmental Panel on Climate Change (IPCC) clearly reaffirmed in their

Sixth Assessment Report: Carbon reductions today are more important than carbon reductions in the future.4 [EPA-HQ-OAR-2022-0829-0626, p. 2]

3 National Biodiesel Board. Biodiesel.org. (2021). Cutting Carbon: Comparing Biomass-Based Diesel & Electrification for Commercial Fleet Use.

4 Intergovernmental Panel on Climate Change. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

Our agencies strongly support EPA's development of national air pollution and GHG emission standards that are as robust as possible to ensure strong progress nationwide on air pollution and equity. A strong national light- and medium-duty vehicle standard is important to Colorado for at least three reasons. First, air pollution from nearby states crosses into Colorado and affects public health, and the longer duration and increased stringency of the proposed criteria air pollutant standards will reduce interstate air pollution transport into Colorado. Second, Colorado is already experiencing the impacts of climate change, including increased wildfires, floods, and drought. Climate change is a global issue that is impacted by all GHG emissions regardless of geographic source, and the reductions in GHG emissions from the proposed national rule will help reduce the long-term risks of climate change in Colorado. Finally, although the proposed national GHG emissions standards are not an explicit EV sales requirement like Advanced Clean Cars and Advanced Clean Cars II, complying with the standards will effectively require vehicle manufacturers to sell a significantly greater amount of EVs. The economies of scale encouraged by the proposed rules will support the production of more affordable EVs, easing the transition to zero emission vehicles and enabling greater access to their benefits for disproportionately impacted communities. [EPA-HQ-OAR-2022-0829-0694, p. 2]

Organization: Daniel Hellebuyck

Minimal Improvement on Global Warming: Reducing global warming requires a global effort. China and India- two countries with combined populations almost ten time the size of the Untied States- have not shown they are willing to do anything to reduce global warming. The US bearing the brunt of carbon emission reduction is an exercise in futility. In fact, global warming may actually be worse as companies shift jobs and factories from the United States to these low-wage countries to save money. [EPA-HQ-OAR-2022-0829-0526, p. 2]

Organization: David Hallberg

The Science is Incontrovertibly Clear

Contrary to OTAQ's false assurances, the rapid adoption of advanced engine technologies such as Gasoline Direct Injection (GDI) will dramatically increase emissions of the most harmful ultrafine particles (UFP) and secondary organic aerosols (SOAs) that bind with and insulate highly toxic polycyclic aromatic hydrocarbons (PAHs) and enable their long-range transport. The attached White Paper, authored by the UN Foundation's Special Advisor for Climate

Solutions and Chrysler's former Director for Regulatory Affairs, explains how the BTEX emissions threat is getting WORSE, not better. [EPA-HQ-OAR-2022-0829-0548, p. 2]

New White Paper Says The Real Cost of Gasoline …is to Our Health | Clean Fuels Development Coalition (cleanfuelsdc.org) [Link: https://cleanfuelsdc.org/2022/05/16/new-white-paper-says-the-real-cost-of-gasoline-is-to-our-health/] [EPA-HQ-OAR-2022-0829-0548, p. 2]

Many experts believe that the 20% BTEX fraction found in a typical gallon of U.S. gasoline poses the single greatest threat to public health and the environment. In their comments to the MY2023 LDV GHG Final Rule, the same two authors stated: "The effect of aromatics [BTEX] on pollution and human health is thus magnified twice over: Aromatics lead disproportionately to PAH formation, and PAHs lead disproportionately to SOA formation. Worse yet, PAHs hitch a ride on SOA for long distances and weaponize these particles as they travel through the human body…When SOA particles are formed in the presence of gas-phase PAHs, their formation and properties are significantly different from SOA particles formed without PAHs: They exhibit slower evaporation kinetics and have higher fractions of non-volatile components and higher viscosities, assuring their longer atmospheric lifetimes. This increased viscosity and decreased volatility act as a shield that protects PAHs from chemical degradation and evaporation, allowing for their long-range transport." [Detchon – Modlin MY2023 Final Rule comments, p. 17. RDRMCommentsEPA-HQ-OAR.pdf (cleanfuelsdc.org)] [Link: https://cleanfuelsdc.org/wp-content/uploads/2021/09/RDRMCommentsEPA-HQ-OAR.pdf] [EPA-HQ-OAR-2022-0829-0548, p. 2]

Organization: District of Columbia Department of Energy and Environment (DOEE)

As EPA mentions in Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Section II, without substantial changes to the way people drive, how people travel, or what people use to travel, the District, and the United States as a whole, will not avoid the worst consequences of climate change. EPA recognizes that vehicles, including passenger vehicles, are major sources of air pollution and poor health, yet the proposed rulemaking from EPA fails to be analogous to the severity of the ensuing climate change impacts. In fact, EPA proposes to find that standards substantially more stringent than Alternative 1 would not be appropriate because of uncertainties concerning the cost and feasibility of such standards. EPA proposes to find that standards substantially less stringent than Alternative 2 or 3 would not be appropriate because they would forgo feasible emissions reductions that would improve the protection of public health and welfare. 88 FR 29201. [EPA-HQ-OAR-2022-0829-0550, p. 2]

DOEE recognizes that the costs involved in implementing and meeting stringent emissions requirements would be high. However, DOEE disagrees that standards substantially more stringent than Alternative 1 would be inappropriate due to cost and feasibility. The cost of inaction or insufficient action toward eliminating vehicle emissions in conjunction with climate change will be far greater to both public and environmental health and welfare. [EPA-HQ-OAR-2022-0829-0550, p. 2]

Organization: Donn Viviani

1) Why the proposed emission reductions are insufficient:

EPA has made significant progress in the past two years toward reducing GHG emissions. However, both EPA and OMB estimate that significant and extremely dangerous emissions will remain in the pipeline after implemen- tation of the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles regulations (EV rule)2. This comment also takes into account other actions, i.e., the emission reduc- tions that will be achieved from the Infrastructure Investment and Jobs Act (IIJA)3 and the Inflation Reduction Act (IRA)4; implementation of the the new source performance standards for electrical generating units (EGU)5 and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 36 . My comment shows that these actions will fall far short of keep- ing temperature rise to safe level and this threatens the initiation of nonlin- ear climate feedbacks. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

1 cprclimate.org

2 https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf

3 https://www.govinfo.gov/content/pkg/PLAW-117publ58/html/PLAW-117publ58.htm

4 https://s3.documentcloud.org/documents/22122279/inflation-reduction-act-of-2022.pdf

5 https://www.federalregister.gov/documents/2023/05/23/2023-10141/new-source-perfor- mance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed

6 https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10178RN.pdf

The emissions remaining after implementation of these efforts will, accord- ing to EPA and OMB estimates, fail to restrict emissions sufficiently and in fact will consume the US share of the remaining carbon budget, which budget was conservatively calculated by the Intergovernmental Panel on Climate Change (IPCC)7. This budget must not be breached if we are to have a realistic chance to keep warming to 1.5 C, and avoid some of cli- mate change’s most catastrophic effects. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

7 https://www.ipcc.ch/sr15/chapter/chapter-2/

Here’s why additional reductions are needed. According to the IPCC spe- cial report “Global Warming of 1.5 C “ 8 the remaining carbon budget is ~ 580 GtCO2 in order to have a 50% probability of limiting warming to 1.5°C, and ~420 GtCO2 for a 66% probability. The US has 4.25% of world population, so proportionally and at minimum (due to the oversize contribu- tion to the climate crisis attributable to our nation) the US has a remaining budget of ~ 26 GtCO2 for a 50% probability of limiting warming to 1.5°C, and a budget of ~19 GtCO2 for a 66% probability.9 [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

8 https://www.ipcc.ch/sr15/

9 The 95th percentile is the most common exposure limit used today by EPA.regulators (USEPA, 2016: Guidelines for Human Exposure Assessment), using the 50th or 66th percentile for a heat exposure limit is not conservative, allowing little room for modeling or other errors

While the EV RIA does not calculate the emissions remaining as a result of the rule, the emissions can be calculated from the reduction estimates. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

The EV RIA predicts 7.3 Gt will be released from light and medium duty ve- hicles by 2055 if the EV penetration goals in the RIA10 are met. Transporta- tion is responsible for 28% of US

GHG emissions and the light and medium duty vehicles covered by the EV rule are responsible for ~57.5 % of that amount. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

10 https://www.epa.gov/system/files/documents/2023-04/420d23003.pdf

The 7.3 Gt remaining after the rule is either ~ 28 % (for a 50% probability of avoiding 1.5C) or ~38% (for a 66% probability of avoiding 1.5C) of the entire remaining carbon budget But this regulated sector is responsible for only ~16% of total US emissions. Additionally after 2055 there will still be internal combustion vehicles on the road, and EGU will continue to emit GHGs to charge the BEV vehicles. So the EPA estimate is a bottom line for remaining emissions. Unless EPA has plans that will reduce emissions astonishingly fast in the other sectors, e.g., agriculture, construction, indus- try, etc., these reductions are insufficient. If EPA does have such plans, it is imperative they be made public. The public sector may have useful in- sights and suggestions. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

OMB11 has calculated estimates of remaining emissions and time to zero emissions recently, these estimates were calculated prior to the EV pro- posal. However, these estimates don't properly meld or make sense with the emission reductions estimates found in three recent proposed rules: the light, medium and and heavy vehicle proposals; in the EGU proposal: or in the heavy duty vehicle proposal. For the OMB estimates to be correct, again, huge reductions would have to occur outside transportation and the power sector. I understand that these are all projections and estimates, but they are given weight in policy decisions, so they must fit together reason- ably well, or an explanation as to why they are so disparate is necessary. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

11 https://www.whitehouse.gov/wp-content/uploads/2022/08/OMB-Analysis-Inflation-Reduction-Act.pdf

OMB12 characterized 2023 as a hinge point at which GHG emissions take a sharp downward trajectory. OMB had calculated that the US will reach zero emissions anywhere from 2044 to 2065 with a medium estimate of zero by 2055. This range depends on how aggressively various US incen- tives and rules are adopted. OMB posits possible annual emission de- clines of approximately 2.4%, 3.4% or 5.4% starting in 2023, with the rate depending on adoption of incentives and rules. OMB’s stated justification for the steady decline in the analysis is that "it's reasonable to assume" the emission reduction trajectory estimated by several models for 2023-2030 will continue forward at the same rate. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

12 ibid

Based on OMB assumptions, the high, low and mid level adoptions give trajectories of emission reductions resulting in:
High adoption predicts a 5.4% decline and zero emissions in 2044 with ~58 Gt cumulative emissions left in the pipeline
Low adoption predicts a 2.4% decline and zero emissions in 2065 with ~115 Gt cumulative emissions left in the pipeline
Medium adoption predicts a 3.4% decline and zero emissions in 2055 with ~88 Gt cumulative emissions left in the pipeline [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

Emissions even at the most optimistic of these adoption rates would very quickly blow past the US share of the remaining carbon budget. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

In any case, these “rosy” predictions are hard to credit. First, the IRA in- centives that drive the (modeled) 2023-2030 decline will all expire by 2033. Second, the two sectors, transportation and power generation, which have regulations proposed and that account for 53% of current emissions, don't decrease at those rapid rates. Both of these sectors will have Gt emissions still ongoing in 2055 and beyond, according to EPA's RIAs (regulatory im- pact analyses) of the power and transportation proposed rules. Third, the RIA for the phase 3 NSPS for heavy duty vehicles estimates ~12.8 Gt of emissions in the pipeline to 2055, with the methane emissions decreasing to about 2045 and then rising thereafter13. Fourth, there are no regulatory proposals for the sectors that comprise 47% of the remaining emissions, other than incentives in the IRA, which again, expire by the end of 2032 [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

13 https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10178RN.pdf

To sum up, while the EPA and OMB estimates focussed on the GHG reduc- tions, this comment focusses on the GHG emissions that are still in the pipeline, i.e., will continue to be released after those reductions are real- ized. It laudatory that EPA is attempting to reduce emissions to the extent they have, but the important number is the emissions that EPA anticipates will still occur despite the incentives and regulations. These emissions un- dermine our decarbonization goals, in fact likely make them unreachable, and more importantly make much more probable catastrophic climate im- pacts and triggered irreversible feedbacks. EPA estimates that from the transportation sector (~20 Gt) and electric power sector (RIA estimates ~17 Gt through 2047)14 will release about 37 Gt through the mid 40s to mid 50s. None of these sectors will be at zero emissions, according to EPA by then, so these are minimum emission quantities. These are projections, and EPA must be congratulated for the complex modeling involved. They paint a dismal picture for achieving zero emissions by 2050. And a worse picture for avoiding the non-linear feedbacks that once they are triggered will act independent of additional emission. [EPA-HQ-OAR-2022-0829-0546, pp. 1-5]

14 https://www.epa.gov/system/files/documents/2023-05/utilities_ria_proposal_2023-05.pdf

Organization: Elders Climate Action

2. The Cost of Converting Auto and Truck Makers to ZEVs will be far less than the Cost to the National Economy of Climate Impacts

The Nation needs strong action from EPA now to achieve sharp reductions in CO2 emissions to slow the warming. Losses from climate related events cost the Nation an estimated $145 billion in 2021. Damage is expanding rapidly year over year. Delaying major reductions from the transport sector will have devastating consequences. [EPA-HQ-OAR-2022-0829-0737, p. 4]

The warmer climate has triggered a massive increase in damage from wildfire in the American West where an average of 1 million acres burned just 20 years ago, to over 15 million acres each in 2020 and 2021. Thousands of families have lost homes to fire, businesses were destroyed and communities lost schools, health care facilities, water and power supplies and other infrastructure. Smoke pollution smothered much of the West with dangerous levels of air pollution that added thousands of premature deaths across the region. The record setting heat wave in the Pacific NW in 2021 took hundreds of lives. Wildfire studies estimate deepening drought in the West will likely double the annual area destroyed by fire in this decade. We submit a review of the impacts of wildfire in the West and the expected impacts this decade because the social cost of carbon developed by the Interagency Working Group does not include wildfire impacts when estimating the damages associated with GHG emissions. [EPA-HQ-OAR-2022-0829-0737, p. 4]

In other regions of the U.S. more powerful hurricanes, extreme floods and massive tornadoes have caused devastation to hundreds of communities across the Gulf Coast, Mid- West and Northeast. These extreme weather events have become more powerful, more frequent and more destructive. [EPA-HQ-OAR-2022-0829-0737, p. 4]

The Nation needs your help now to slow the warming to protect our families and communities. Medium and heavy-duty vehicles are a major contributor to the warming. Medium- and heavy-duty trucks emit a quarter of climate pollution from transportation despite being only 10% of vehicles on the road. You must take action now that accelerates the transition to a zero emission transport sector. [EPA-HQ-OAR-2022-0829-0737, p. 4]

The latest climate modeling report (AR6) from the Intergovernmental Panel on Climate Change (IPCC) now makes clear that exceeding 1.5o C before 2050 is “more likely than not” even with implementation of the most aggressive GHG reduction scenario, but that the excursion above 1.5o C can be limited to a few decades if we reduce GHG emissions by half before 2030, and achieve net zero emissions by 2050. But if we fail to meet either of those targets, it is “more likely than not” that global temperatures will reach 2.0 o C with dire consequences for humanity. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

To achieve net-zero emissions economy wide by 2050, zero emission technologies currently available must be deployed as soon as possible to put GHG emissions from our largest source of emissions – transportation – on the path toward zero. EPA’s proposed rule merely reduces carbon fuel combustion by less than 1%. A zero emission economy cannot be achieved if vehicles continue to burn carbon fuels. Internal combustion engines (ICEs) must be replaced as quickly as possible by zero emission vehicles (ZEVs). [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

EPA’s proposed L/MDV rule does not chart a course toward implementing either the national policy declared by President Biden or reflect the urgent need to cut GHG emissions in half by 2030 to avoid much worse future climate catastrophes. The rule preamble acknowledges that the proposed rule changes will reduce L/MDV CO_2 emissions by only .2 MMT during MY 2027 from 29 MMT to 28.8 MMT. Over the 20 year useful life of vehicles sold in MYs 2027-29 the rule will allow millions of diesel and gasoline vehicles to be added to the Nation’s highways which will emit an estimated 1.7 billion MT of CO_2. These emissions will wipe out more than half of the 3.1 billion MT of CO_2 reduction achieved by EPA’s SAFE 2 rule for light duty vehicles. These L/MDV emissions are the equivalent of operating 21 new coal-fired power plants. A large fraction of these emissions could be avoided if EPA adopted the CARB zero emission standard for L/MDVs in the ACT rule. The rule does not achieve, or describe how it will contribute to achieving, zero emissions by 2050. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

We ask EPA to revise the rule to set a zero emission standard for all new L/MDVs by 2035, and establish a phase-in schedule for the standard that includes ZEV sales targets for MYs 2027-29 that are the same as the CARB ACT rule. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

ZEV sales targets are needed now –

- to establish benchmarks for all engine manufacturers to create a level playing field that promotes competitive market conditions for zero emission vehicles based on performance, reliability and cost;

- to ensure a market for ZEVs that will justify early investment by third parties in the development of supply chains needed for production of batteries and fuel cells;

- to ensure the capacity of the industry to ramp up to 100% of sales to ensure that ZEVs will be available in time to replace on-road ICE vehicles by 2050;

- for MY 2027 to give the industry enough lead time to develop supply chains, plan the conversion of production facilities and develop marketing campaigns designed to assure public acceptance of their products. [EPA-HQ-OAR-2022-0829-0737, pp. 10-11]

B. Urgent Need for Zero GHG Emission Standard to Achieve GHG Reductions.

Harm to public health and the environmental, property and economic resources of our communities incorporated into the CAA definition of "public welfare" was anticipated and comprehensively described in the Administrator's Endangerment Finding that established the basis for regulating six GHGs under the CAA.4 All of the harms anticipated in 2009 have now been demonstrated to varying degrees, and are accelerating rapidly as the planet continues to heat up. [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

4 74 Fed. Reg. 66,496 (December 15, 2009).

1. The IPCC Findings.

Since the Endangerment Finding, EPA's catalogue of risks have been augmented by much more comprehensive modeling of warming trends, the warming expected from a range of global emission scenarios, and a description of the emission limitations that must be implemented to avoid more catastrophic climate outcomes. [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

The IPCC's 2018 report reviews and analyzes the then-available scientific literature to provide the best information available to answer two critical questions posed by world leaders at the Paris Climate conference: [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

1) What are the differences between the consequences of allowing the planetary climate system to rise 1.5o C compared to 2o C above the pre-industrial background?

2) What limitations on CO2 and other GHG emissions must be achieved to avoid overshooting a 1.5o C or a 2o C rise in global temperature?

(a) Consequences of 1.5o C and 2o C rise in global temperatures are both unacceptable, but 2o C is significantly worse. [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

The IPCC's 2018 report catalogues numerous expected adverse consequences of both a 1.5o C and a 2o C rise and in global mean temperature.5 Some of the effects of greatest concern are – [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

5 Global Warming of 1.5o C, Chapter 3: "Impacts of 1.5o C of global warming on natural and human systems."

1) increases in mean summer temperatures and the frequency of hot days above the 99th%ile of the baseline temperature range, and the increased duration of the summer dry season that, together, will more quickly desiccate the coastal and Cascade forests each year, increase the ignitability of forest fuels, increase the frequency and intensity of wildfires, increase the production of hazardous concentrations of fine particle pollution (smoke), and increase the adverse health consequences of public exposure to multi-day extreme hazard pollution episodes; [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

2) diminished summer stream flows that force curtailment of water for agricultural operations dependent on irrigation water, and contribute to warmer surface water temperatures that interfere with the survival of cold water fish species (e.g., salmonids) and contribute to algalblooms that produce toxic contamination of municipal and agricultural water supplies and fishery habitats; [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

3) increasing ocean acidification and ocean temperatures that together prevent reproduction and survival of some marine species, cause some native local species to abandon Oregon waters in search of cooler waters, and diminish productivity of species remaining in the local water column which in turn will reduce the catch, make commercial fishing unprofitable, and further reduce the food supply for human populations dependent on marine sources of protein and resident coastal orca populations that are now starving because of diminished food supply; [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

4) the frequency and duration of extreme precipitation events that cause flooding, erosion, displacement of human populations in flood-prone areas, the destruction of freshwater and anadromous fish spawning habitat and contamination of municipal water supplies; [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

5) warmer winter temperatures that convert winter snow precipitation events to rainfall thereby reducing the high altitude storage of water which diminishes water resources available for agriculture and municipal uses during the spring and summer, and increases the severity of drought by reducing stream flows, causing crop loss, loss of fishery habitat, and inadequate water supplies for residential and industrial users and fire fighting. [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

6) longer wildfire seasons and expanded burn zones that increase human exposure to hazardous levels of air pollution, including multi-week exposure to levels of fine particles (smoke) known to cause pre-mature death and other adverse health outcomes among vulnerable populations, and elevated concentrations of ground level ozone harmful to public health exacerbated by warmer summer temperature regimes that govern the chemistry of ozone formation in the atmosphere.6 [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

6 More Days With Haze: How Oregon is Adapting to the Public Health Risks of Increasing Wildfires," p. 5 (Oregon Health Authority, 2019) available at OHA 2688 More Days with Haze (oregon.gov).

All of these effects are occurring now, and are expected to increase in severity as climate warming accelerates. [EPA-HQ-OAR-2022-0829-0737, pp. 11-13]

(b) Expanding Wildfire Destruction and Smoke Mortality Correlates with Warming Climate.

The IPCC found that global mean temperature was about 1.0o C above the pre-industrial baseline in 2010. By 2010, the climate regime had not yet triggered large increases in wildfire conditions compared to historical fire patterns in the American West. But as the global mean advanced from 1.1 o C to 1.2 o C, new records were being set. The World Meteorological Organization (WMO) concluded that "[i]n 2020 – one of the three warmest years on record – the global average temperature was 1.2 °C above the pre-industrial baseline."7 [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

7 World Meteorological Organization, State of the Global Climate, 6 (April 2021); available at doc_num.php (wmo.int). WMO uses the "1850–1900 baseline as an approximation of pre-industrial levels." Id.

As the global temperature approached 1.2 °C, the frequency, intensity, areal extent and duration of wildfires have increased significantly in the last five years. In 2020 burns set records across the American West. California's burn area grew to nearly 5 million acres, and the total area burned in the 11 Western states exceeded 10 million acres: 2020 Western United States wildfire season - Wikipedia. The increasing area burned by wildfire in the American West tracks the Australian experience where annual fire zones expanded rapidly in response to drought leading to a massive wildfire season burning 46 million acres (an area equal to the State of Washington) during their 2019-20 austral summer.8 [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

8 List of major bushfires in Australia - Wikipedia, see Sept. 2019-March 2020.

During the 2017 fire season, wildfire in Oregon destroyed one-half million acres for the first time in the State's history. In 2018 wildfire consumed 660,000 acres of forest. In 2020 Oregon wildfires consumed 1.2 million acres,9 forced 500,000 Oregonians to evacuate their homes ahead of the flames, incinerated 4,000 homes displacing 10,000 Oregonians, leaving many families homeless, and killed 11. The 2020 burn area doubles the 2017 burn area, and is an order of magnitude greater than the statewide average of 120,000 acres burned during the 1990-2010 period. [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

9 https://en.wikipedia.org/wiki/2020_Oregon_wildfires (1,221,324 acres burned in 2020).

The 2018 IPCC report states that the global mean temperature is rising about 0.2o C per decade,10 twice the warming rate during the 20th Century. This accelerated warming rate suggested in 2018 that 1.5o C rise would be reached about 2035 unless large reductions in GHG emissions were achieved before 2030. New modeling performed for the 2021 IPCC report, AR6, indicates that 1.5o C above the pre-industrial baseline will be reached by 2030 if GHG emissions are held to current rates, and 2o C rise reached by 2050.11,12 WMO has since announced its estimate that the first annual 1.5o C rise in global temperature will likely occur by 2026.13 [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

10 Global Warming of 1.5o C, Chapter. 1 (Section 1.2.1.3).

11 "Analysis: When might the world exceed 1.5C and 2C of global warming? | Carbon Brief (Dec. 4, 2020).

12 Climate Change 2021: The Physical Basis (IPCC, 2021), Summary for Policy Makers, B.1.2. available at 2108-09 IPCC_AR6_WGI_SPM.pdf.

13 World Meteorological Organization, press release (May 27, 2021) available at https://public.wmo.int/en/media/press-release/new-climate-predictions-increase-likelihood-of-temporarily-reaching- 15-%C2%B0c-next-5.

Given that the frequency and ferocity of wildfire in the American West began to increase significantly after 2015 under the climate conditions associated with 1.1° C to 1.2° C rise above the 1850–1900 baseline, the march higher toward a 1.5o C rise between 2025 and 2030 can be expected to accelerate the frequency, severity and areal extent of damage caused by wildfire. [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

The Oregon Climate Assessment (OCAR5.pdf | Powered by Box, January 5, 2021) anticipates that the destruction of property, disruption of daily life, large costs to the economy, pollution of the atmosphere and water supplies, impairment of human health, and damage to wildlife, the environment and habitats will worsen in coming years as the climate continues to warm more rapidly. The Assessment cites studies predicting the effects of warming on seasonal heat causing a six-fold increase in hot days (>####90o F) in Oregon counties west of the Cascades during future Oregon summers (pp. 12-13), and reductions in summer precipitation (Table 2). Summers will be hotter and drier, and summer heat will start earlier and persist longer.14 The Assessment concludes that these conditions are conducive to "high-severity" wildfires: [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

14 Id., 3.

High-severity fires dominate wet, cool forests, including remnant old growth forests, in Oregon's Coast Range and western Cascade Range. High-severity wildfires in wet, cool forests typically are … facilitated by extremely dry and warm springs and summers or high winds. [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

As these conditions become more extreme, the area incinerated by wild fires is expected to increase (pp. 48-54). A 2017 forest modeling analysis "projected a 200% increase in median annual area burned in Oregon" during the 2010-2039 period compared to 1961-2004.15 Another 2017 study looking at fires across the American West estimates a 200-400% increase in the "annual probability of very large fires."16 Going forward, the Assessment makes clear that all "empirical models … consistently project that the area burned in Oregon will increase."17 [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

15 Climate Assessment, 53.

16 Id., 54.

17 Id., 53.

The fire zone doubled between 2017 and 2020. As predicted by forest science modeling, another doubling of the acres burned annually by 2025-30 is highly plausible as global temperature approaches 1.5° C above the pre-industrial baseline. [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

If fire zones expand to predicted levels in the Pacific NW, 25% to 40% of Oregon (15 to 25 million acres) and Washington (11 to 20 million acres) will be incinerated during this decade, economic activity will collapse and hazardous air quality will make the Northwest inhospitable to human habitation for most residents during the fire season. [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

The data and modeling estimates presented in the Oregon Climate Assessment and other sources predict a future in which the destruction of Oregon's forest resources by wildfire will continue until either 1) the cool and wet conditions that sustained Cascadia's forests during the 8,000 years before 1980 are restored, or 2) most of the standing forests are reduced to shrub or grasslands. [EPA-HQ-OAR-2022-0829-0737, pp. 13-15]

2. Impacts of Climate Warming on Public Health are Significant and Widespread.

Fire smoke and unprecedented hot temperatures are having a significant impact on human health as an example of the regional impact of heat waves, drought and wildfires. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

The heat dome that raised temperatures above 110 F for three days in the Pacific NW in June 2021 caused over 200 heat-related deaths in Oregon and Washington. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

Recent research demonstrates that emissions from wildfire are the largest source of fine particle pollution in large regions of the U.S., and contributed to thousands of pre-mature deaths. Wildfire in the western U.S. now accounts for half of all fine particle pollution in some areas of the West, doubling the exposure to PM2.5 [18] from non-fire sources including motor vehicles, power plants and industrial operations.19 [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

18 PM2.5 are particles smaller than 2.5 micrometers in diameter.

19 Burke, M. et al., The changing risk and burden of wildfire in the United States | PNAS (Jan 11, 2021).

A warming climate is responsible for roughly half of the increase in burned area in the United States (4), and future climate change could lead to up to an additional doubling of wildfire-related particulate emissions in fireprone areas (36) or a many-fold increase in burned area (37, 38). Costs from these increases include both the downstream economic and health costs of smoke exposure, as well as the cost of suppression activities, direct loss of life and property, and other adaptive measure (e.g., power shutoffs) that have widespread economic consequences.20 [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

20 Id.

Using satellite measurements of smoke plumes integrated with ground level monitored PM2.5 (fine particle) concentration data, Burke et al. estimate that between 7,000 and 14,500 deaths per year (depending on the dose/response curve used to estimate mortality from observed exposures) are attributable to fire smoke in the contiguous U.S. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

Mortality and other health impacts such as asthma attacks and exacerbating COPD will be experienced most severely by communities already burdened by the adverse health effects of daily exposure to fine particle pollution emitted from tailpipes, power plants and industrial sources. Exposure to fire smoke in the American West during the 2020 fire season was universal. No communities were spared. But fire smoke at least doubled the annual exposure routinely suffered by BIPOC and low income communities living near major highways and industrial sources. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

In Oregon, mortality attributed to fire includes many hundreds more deaths than the lives lost directly to fires. Statewide smoke pollution during the 2020 fires threatened lives and well- being with extreme hazard concentrations of particles known to cause pre-mature death and cancer, exacerbate asthma, COPD and other respiratory conditions, and cardio-vascular diseases. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

The Oregon Health Authority (OHA) reports that “[t]he most severe recent air quality events in Oregon are due to wildfire smoke…”21 OHA cited a study finding that fire smoke in 2012 “caused hundreds of premature deaths, nearly 2,000 emergency room visits and more than $2 billion in health costs.”22 OHA points to the longer fire season as increasing the harm from exposure to smoke. “Fire seasons in Oregon are roughly 100 days longer than they were in the 1970s. Longer seasons mean more smoke in Oregon communities.”23 The greater density of smoke and longer duration of smoke exposure in 2020 likely at least doubled the mortality caused by smoke exposure compared to 2012. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

21 Oregon Climate and Health Report, 40 (Oregon Health Authority, 2020).

22 Id., 33.

23 Id.,

In addition, low income families without air conditioning are much less able to escape smoke pollution by closing doors and windows during the summer heat to keep themselves safe. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

Workers cannot avoid exposure to smoke pollution if required to work outdoors. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

Beyond the economic and environmental damage, social disruption, and harm to health that will result from a longer fire season and expanded fire zones, more deadly air quality will likely make parts of the American West uninhabitable during the fire season for the most vulnerable populations such as the elderly, children and those with existing respiratory and cardiovascular conditions. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

These recent data and other sources published since 2009, including the data discussed at length in the Administrator’s 2009 Endangerment Finding, 74 Fed. Reg. 66,496 (December 15, 2009), confirm the finding that EPA made 12 years ago: “The Administrator finds that the elevated atmospheric concentrations of the well-mixed greenhouse gases may reasonably be anticipated to endanger the public health and welfare of current and future generations.” Id., at 66,523. [EPA-HQ-OAR-2022-0829-0737, pp. 15-17]

3. Net-Zero Emissions Must be Achieved as Soon as Possible to Protect Public Health and the Public Welfare.

The climate will need to be stabilized as soon as possible to – [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

- protect public health from the deadly effects of heat waves and wildfire smoke particles;

- preserve the health, safety and quality of life in the American West from the devastation caused by massive uncontrollable wildfires;

- preserve the health, safety and quality of life for millions of Americans living along the Gulf Coast from the devastation caused by super hurricanes,

- preserve the health, safety and quality of life for hundreds of millions of Americans living in the Mid-West and Northeast from the deaths and devastation caused by massive flooding,

- to protect the health, safety and quality of life for millions living in Tornado Alley from the Great Plains to the upper South;

- to protect forests so that they may serve as a sink for CO2 rather than as an emission source;

- preserve habitat for wildlife and a resource for forest products and other industries dependent on them, and

- protect the vitality of the marine web of life from collapse as a result of acidification.

[EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

The IPCC provided clear guidance in its 2018 report that to stop the warming and stabilize the climate, the economy must transition to a zero carbon (CO2 and methane) emission energy system, and forests must be expanded to extract CO2 from the atmosphere. Climate stability can be achieved only by reducing GHG emissions to net-zero. [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

To stabilize global temperature at any level, 'net' CO2 emissions would need to be reduced to zero. This means the amount of CO2 entering the atmosphere must equal the amount that is removed. Achieving a balance between CO2 'sources' and 'sinks' is often referred to as 'net zero' emissions or 'carbon neutrality'.24 [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

24 Global Warming of 1.5o C, Chapter 2, FAQs.

Limiting warming to 1.5°C implies reaching net zero CO2 emissions globally around 2050 and concurrent deep reductions in emissions of non-CO2 forcers, particularly methane25 (high confidence). Such mitigation pathways are characterized by energy-demand reductions, decarbonization of electricity and other fuels, electrification of energy end use, deep reductions in agricultural emissions, and some form of CDR [carbon dioxide reduction] with carbon storage on land or sequestration in geological reservoirs.26 [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

25 Methane (CH4, i.e, unburned natural gas) is 20 times more powerful than CO2 as a climate forcer.

26 Id., Exec, Summary.

Zero GHG emissions to stabilize the climate must be achieved sooner than later to minimize the losses and deaths associated with devastating warmer climate effects. Zero emissions cannot be achieved without transforming transportation which is the largest source of GHG emissions. For most transportation sources such as on-road vehicles, zero emissions can be cost-effectively achieved by electrification with batteries or fuel cells. [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

The latest IPCC modeling report (AR6, 2021) concludes based on the latest climate data and updated modeling that – [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

Under the five illustrative [GHG emissions] scenarios, in the near term (2021-2040), the 1.5°C global warming level is very likely to be exceeded under the very high GHG emissions scenario (SSP5-8.5), likely to be exceeded under the intermediate and high GHG emissions scenarios (SSP2-4.5 and SSP3-7.0), more likely than not to be exceeded under the low GHG emissions scenario (SSP1-2.6) and more likely than not to be reached under the very low GHG emissions scenario (SSP1-1.9).27 [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

27 Climate Change 2021, Summary for Policymakers, B.1.3. (available at IPCC_AR6_WGI_SPM.pdf.)

The opportunity to stay below 1.5°C and to prevent the additional devastation that such level of warming will cause, has been frittered away by inaction and delay. At the current global mean temperature, the climate has warmed enough to endanger public health, cause devastating destruction of homes and businesses, loss of life and the disruption of natural systems by extreme floods, drought, wildfires, hurricanes and tornadoes. The harm we will experience above 1.5°C will be orders of magnitude greater. [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

But the IPCC offers the hope that "for the very low GHG emissions scenario (SSP1-1.9), it is more likely than not that global surface temperature would decline back to below 1.5°C toward the end of the 21st century, with a temporary overshoot of no more than 0.1°C above 1.5°C global warming."28 [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

28 Id.

That hope turns on cutting global CO2 emissions in half by 2030, and to net-zero by 2050 along with large reductions in non-CO2 climate forcers such as methane. EPA has not set out a regulatory path for achieving those reductions. EPA's current proposed rule will not achieve anywhere near those reductions, and fails to identify any future strategy for achieving those reductions. To fulfill the Agency's statutory mission to protect public health and welfare it must issue regulations that achieve these targets. [EPA-HQ-OAR-2022-0829-0737, pp. 17-19]

C. Petition for Finding --

Based on these data and other available evidence, we petition the Administrator to find that – climate warming already caused by GHG emissions harms the public health and is causing unacceptable adverse impacts on public welfare and the human environment, and the expected increase in the severity and frequency of harms to health and the public welfare that will be caused by more extreme events that will occur as the global mean temperature advances toward and above the 1.5°C level resulting from growing GHG concentrations in the atmosphere, establish the need for a zero GHG emissions standard for L/MDVs pursuant to section 202(a)(1) and (3)(A) of the Clean Air Act. [EPA-HQ-OAR-2022-0829-0737, p. 20]

We petition the Administrator to make this finding as the predicate for re-opening this rulemaking for the purpose of promulgating a zero emission standard for L/MDVs, and a phase-in schedule that prescribes for each automaker a share of total L/MDV sales that must be ZEVs beginning with the 2027 MY. [EPA-HQ-OAR-2022-0829-0737, p. 20]

Organization: Electrification Coalition (EC)

In addition to our national security challenges, the U.S. also faces the rapidly growing threat of climate change. The latest National Climate Assessment4, which Congress mandated in 1990 under the Global Change Research Act, shows that the U.S. has been observing the impacts of climate change for decades and that more frequent and extreme weather and climate-related events are creating new and increasing risks across U.S. communities – which we have recently seen with wildfires that have ravaged the country, more powerful hurricanes causing loss of lives and immense destruction, more intense tornadoes destroying communities, and extreme weather events in areas that we should not expect to see these weather events in. [EPA-HQ-OAR-2022-0829-0588, p. 2]

To overcome these national security concerns from climate change, the U.S. must reduce carbon emissions. The EPA notes that the transportation sector is the largest source of greenhouse gas emissions, representing 27% of total greenhouse gas emissions.5 [EPA-HQ-OAR-2022-0829-0588, p. 2]

Organization: Energy Innovation

I. The U.S. must transition LDVs and MDVs to zero-emission technologies [i] quickly to reduce their emissions, which contribute to climate change and air pollution—both of which endanger public health and welfare. Adoption of the most stringent tailpipe standards for new vehicles is the most effective tool to achieve this goal. [EPA-HQ-OAR-2022-0829-0561, pp. 1-2]

i This includes technologies that eliminate tailpipe GHG emissions and other pollutants, namely battery electric vehicles for LDVs and MDVs.

. THE U.S. MUST TRANSITION LIGHT-DUTY AND MEDIUM-DUTY VEHICLES TO ZERO-EMISSION TECHNOLOGIES QUICKLY TO REDUCE THEIR EMISSIONS, WHICH CONTRIBUTE TO CLIMATE CHANGE AND AIR POLLUTION—BOTH OF WHICH ENDANGER PUBLIC HEALTH AND WELFARE. ADOPTION OF THE MOST STRINGENT TAILPIPE STANDARDS FOR NEW VEHICLES IS THE MOST EFFECTIVE WAY TO ACHIEVE THESE GOALS. [EPA-HQ-OAR-2022-0829-0561, p. 3]

We appreciate and agree with the EPA's thorough articulation of the sizable impact LDVs and MDVs have on climate and public health. The transportation sector is the largest U.S. source of GHG emissions as of 2021,2 and LDVs and MDVs combined are the largest contributor within the sector (with LDVs alone accounting for more than 57 percent).3 These vehicles also emit pollutants such as ozone, particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and air toxics—all of which contribute to poor air quality and are linked to adverse health outcomes, with disproportionate impacts on children,4 people of color, and people with low socioeconomic status living near or attending school near major roads.5 [EPA-HQ-OAR-2022-0829-0561, p. 3]

2 "Fast Facts on Transportation Greenhouse Gas Emissions," United States Environmental Protection Agency (U.S. EPA), Green Vehicle

Guide, 2021, https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions. [EPA-HQ-OAR-2022-0829-0561, p. 3]

3 U.S. EPA, "Proposed Rules," May 5, 2023, 29186.

4 U.S. EPA, 29211.

5 U.S. EPA, 29186 and 29395-7.

The inherently slow stock turnover challenge in the ground transportation sector means that new vehicles—and the standards they are built to in the coming years—will have long-lasting effects on the vehicle fleet 10 and even 20 years from now. This, in turn, will have long-lasting impacts on climate, public health, and welfare. [EPA-HQ-OAR-2022-0829-0561, pp. 3-4]

The EPA clearly articulates the primary takeaways from the well-established body of scientific research regarding the public health impacts of climate change throughput the proposed rule, and we concur with their summary: “elevated concentrations of GHGs have been warming the planet, leading to changes in the Earth’s climate including changes in the frequency and intensity of heat waves, precipitation, and extreme weather events, rising seas, and retreating snow and ice. The changes taking place in the atmosphere as a result of the well- documented buildup of GHGs due to human activities are changing the climate at a pace and in a way that threatens human health, society, and the natural environment.”6 [EPA-HQ-OAR-2022-0829-0561, pp. 3-4]

6 U.S. EPA, 29207-8.

The latest Intergovernmental Panel on Climate Change report corroborates these findings and makes clear that this is the decade for action if we are to reverse course on untenable and dangerous climate change: “In this decade, accelerated action to adapt to climate change is essential to close the gap between existing adaptation and what is needed. Meanwhile, keeping warming to 1.5°C above pre-industrial levels requires deep, rapid and sustained [GHG] emissions reductions in all sectors. Emissions should be decreasing by now and will need to be cut by almost half by 2030, if warming is to be limited to 1.5°C.” [EPA-HQ-OAR-2022-0829-0561, pp. 3-4]

7 Intergovernmental Panel on Climate Change, “Press Release: Urgent Climate Action Can Secure a Liveable Future for All,” March 20, 2023,

https://www.ipcc.ch/report/ar6/syr/downloads/press/IPCC_AR6_SYR_PressRelease_en.pdf. [EPA-HQ-OAR-2022-0829-0561, pp. 3-4]

Organization: Environmental. and Public Health Organizations

EPA has both an opportunity and an obligation to dramatically reduce emissions of greenhouse gases (GHGs) and other pollutants from light-duty vehicles (LDVs) and medium-duty vehicles (MDVs). The Agency’s mandate to protect public health and welfare is made urgent by the ever more dire impacts of climate change, as well as the continuing harms to public health from vehicle criteria pollution. And the opportunity to significantly reduce these impacts is clear. Zero-emission vehicles (ZEVs) are not only feasible and cost-reasonable—they are rapidly penetrating the fleet, with more than 250,000 fully battery electric vehicles sold in the first quarter of 2023 alone, a 44.9% increase over the same period last year.1 In addition, numerous emission control technologies for combustion vehicles are also feasible, cost-reasonable, and already extensively deployed on the fleet, yet still have potential for greater application within the fleet of new combustion vehicles that will continue to be produced. [EPA-HQ-OAR-2022-0829-0759, p. 8]

1 Cox Automotive, Another Record Broken: Q1 Electric Vehicle Sales Surpass 250,000, as EV Market Share in the U.S. Jumps to 7.2% of Total Sales (Apr. 12, 2023), https://www.coxautoinc.com/market-insights/q1-2023-ev-sales/.

While the market is clearly heading in the right direction, EPA's standards should facilitate even greater deployment of zero-emission and combustion vehicle technologies to help protect the public from the destructive effects of climate change and air pollution generally. To this end, we urge EPA to finalize the strongest possible emission standards. While we do not believe it is necessary for EPA to set standards beyond 2032 at this point, it is critical that the final standards are sufficiently stringent through model year 2032 to ensure that the U.S. is on track to reach 100% new ZEV sales in 2035. The standards in Alternative 1, but with greater stringency after 2030, are feasible and would better serve EPA's statutory mandate to address the environmental and health impacts of air pollution from light- and medium-duty vehicles. Finalizing such standards will provide feasible, critical air pollution emission reductions, as directed by Congress in the Clean Air Act. [EPA-HQ-OAR-2022-0829-0759, pp. 8-9]

Once EPA makes an endangerment finding, it must set standards that are commensurate to the magnitude of the danger to public health and welfare posed by the covered emissions.12 The Clean Air Act defines "effects on welfare" broadly, including "effects on . . . weather . . . and climate."13 The dangers to public health and welfare posed by GHGs that EPA originally cited in the 2009 Endangerment Finding—"risks associated with changes in air quality, increases in temperatures, changes in extreme weather events, increases in food- and water-borne pathogens, and changes in aeroallergens,"14 to name a few—have only increased. EPA recognized that this was likely to happen in the Endangerment Finding itself, finding that these "risk[s] and the severity of adverse impacts on public welfare are expected to increase over time."15 As for criteria pollutants and air toxics—PM, ozone, VOCs, NOx, SOx, CO, diesel exhaust, formaldehyde, acetaldehyde, acrolein, benzene, butadiene, ethylbenzene, naphthalene, and POM/PAHs—their harmful health and environmental effects have long been known, and EPA has recognized the need for continued reductions in their emissions.16 [EPA-HQ-OAR-2022-0829-0759, p. 10]

12 See Massachusetts, 549 U.S. at 532 (noting that Section 202(a) "charge[s] [EPA] with protecting the public's 'health' and 'welfare'"); Coal. for Responsible Regulation v. EPA, 684 F.3d 102, 117, 122 (D.C. Cir. 2012) (stating that EPA must carry out "the job Congress gave it in § 202(a)—utilizing emission standards to prevent reasonably anticipated endangerment from maturing into concrete harm"). See also S. Rep. No. 91-1196, at 24 (1970), reprinted in A Legislative History of the Clean Air Amendments of 1970, at 424 (1974) (Section 202(a) requires EPA to "make a judgment on the contribution of moving sources to deterioration of air quality and establish emission standards which would provide the required degree of control."). Cf. 74 Fed. Reg. at 66505 ("the Administrator is required to protect public health and welfare, but she is not asked to wait until harm has occurred. EPA must be ready to take regulatory action to prevent harm before it occurs.").

13 42 U.S.C. § 7602(h).

14 74 Fed. Reg. at 66497.

15 74 Fed. Reg. at 66498–66499.

16 88 Fed. Reg. at 29186, 29208-24.

III. Further Reductions in Emissions of GHGs and Criteria Pollutants from Motor Vehicles Are Necessary to Protect Public Health and the Environment.

A. Vehicular emissions of greenhouse gases gravely endanger public health and welfare by intensifying the climate crisis.

Emissions of GHGs from the transportation sector pose mortal dangers to public health and the environment; EPA's exercise of its responsibilities under the Clean Air Act must take account of and mitigate these dangers. Over thirteen years ago, based upon a massive scientific record, the EPA found that new motor vehicles and engines contribute to emissions of GHGs that drive climate change and endanger the health and welfare of current and future generations.46 Specifically, EPA found that the intensifying climate crisis increased the frequency of warmer temperatures, heat waves, and other extreme weather, worsened air quality by increasing regional ozone pollution, increased the spread of food and water-borne illnesses, increased the frequency and severity of seasonal allergies, and increased the severity of coastal storm events due to rising sea levels.47 [EPA-HQ-OAR-2022-0829-0759, p. 14]

46 74 Fed. Reg. at 66496.

47 74 Fed. Reg. at 66525–26.

Since EPA issued the Endangerment Finding in 2009, dire evidence of the current and future impacts of climate change has continued to accumulate. Recent studies demonstrate that climate change continues to cause heat waves and extreme weather events across the United States.48 Between May and mid-September, 2022, "nearly 10,000 daily maximum temperature records were broken."49 Additionally, 2022 was "one of the top 10 hottest years on record for daily maximum temperatures" in 13 states, as well as one of the top 10 hottest for daily minimum (nighttime low) temperatures for 31 states.50 Warmer temperatures endanger public health by increasing the risk of heart disease, worsening asthma and chronic obstructive pulmonary disease from increases of ground-level ozone, and causing dehydration and many other ailments.51 Studies have also found that heat waves and extreme weather events cause severe psychiatric and mental health impacts.52 Climate change continues to lead to higher than normal pollen concentrations and earlier and longer pollen seasons, causing worse allergies and asthma.53 The intensifying climate crisis also increases the risk of drought across the U.S, which impacts water supply, agriculture, transportation, and energy, and increases the risk and magnitude of wildfires.54 And recent projections show that sea level rise is anticipated to be on the high end of model projections.55 Studies have found that many of the dangers wrought by climate change exact a higher toll on people with low incomes and people of color.56 [EPA-HQ-OAR-2022-0829-0759, pp. 14-15]

48 U.S. Dep't of Health & Hum. Serv. (HHS), Off. Climate Change & Health Equity, Climate and Health Outlook (May 2023) [hereinafter HHS, Climate and Health Outlook], https://www.hhs.gov/sites/default/files/climate-health-outlook-may-2023.pdf. See also Andrew Hoell et al., Water Year 2021 Compound Precipitation and Temperature Extremes in California and Nevada, 103 Bull. of the Am. Meteorological Soc'y E2905, E2910 (Dec. 2022), https://journals.ametsoc.org/view/journals/bams/103/12/BAMS-D-22-0112.1.xml?tab_body=fulltext-display(human-caused climate change led to increased extreme high temperatures in 2021 in California and Nevada); Kristy Dahl, Union of Concerned Scientists, Summer of 2022 Was a Hot One. What was Climate Change's Impact on Heat?, The Equation (Sept. 21, 2022), https://blog.ucsusa.org/kristy-dahl/summer-of-2022-was-a-hot-one-what-was-climate-changes-impact-on-heat/.

49 Dahl.

50 Id.

51 HHS, Climate and Health Outlook, at 2; Christopher Nolte et al., U.S. Global Change Rsch. Program, Air quality, in II Impacts, risks, and adaptation in the United States: Fourth national climate assessment 512, 515 (2018), https://nca2018.globalchange.gov/downloads/NCA4_Ch13_Air-Quality_Full.pdf (climate

change leads to worsened air quality by increasing concentrations of ozone and particulate matter in many parts of the U.S.); Am. Lung Ass'n, State of the Air 2023 Report 19 (2023), https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf (describing worsened air quality resulting from climate change).

52 See, e.g., Amruta Nori-Sarma et al., Association Between Ambient Heat and Risk of Emergency Department Visits for Mental Health Among US Adults, 2010 to 2019, 79 JAMA Psychiatry 341 (2022), https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2789481?; Marshall Burke et al., Higher temperatures increase suicide rates in the United States and Mexico, 8 Nature Climate Change 723 (2018), https://gspp.berkeley.edu/assets/uploads/research/pdf/s41558-018-0222-x.pdf; Sarita Silveira et al., Chronic Mental Health Sequelae of Climate Change Extremes: A Case Study of the Deadliest Californian Wildfire, Int'l J. Env't Rsch. & Pub. Health, Feb. 4, 2021, https://www.mdpi.com/1660-4601/18/4/1487 (demonstrating that climate-related extreme weather events such as wildfires can have severe mental health impacts).

53 HHS, Climate and Health Outlook, at 5.

54 See Marco Turco et al., Anthropogenic climate change impacts exacerbate summer forest fires in California PNAS, June 12, 2023, https://www.pnas.org/doi/10.1073/pnas.2213815120; Ctr. for Climate & Energy Sol., Drought and Climate Change, https://www.c2es.org/content/drought-and-climate-change/ (last visited June 2, 2023). See also Nolte et al., at 521.

55 Benjamin Hamlington et al., Observation-based trajectory of future sea level for the coastal United States tracks near high-end model projections, Commc'n Earth Env't, Oct. 6, 2022, https://www.nature.com/articles/s43247-022-00537-z.

56 See, e.g., Sameed Khatana et al., Association of Extreme Heat With All-Cause Mortality in the Contiguous US, 2008-2017, JAMA Network Open, May 19, 2022, at 1 https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2792389 (finding extreme heat was associated with higher mortality in the U.S., particularly among older adults and black individuals); Adam Schlosser et al., Assessing Compounding Risks Across Multiple Systems and Sectors: A Socio-Environmental Systems Risk-Triage Approach, Frontiers in Climate, Apr. 24, 2023, at 09, https://www.frontiersin.org/articles/10.3389/fclim.2023.1100600/full (identifying hot spots where flood risks and water stress disproportionately impact low-income and nonwhite communities); Dahl ("[M]ore than 80% of the counties with the most frequent heat alerts—21 or more days of heat alerts over the course of the summer—have moderate to high levels of social vulnerability."). See generally EPA, Climate Change and Social Vulnerability in the United States, A Focus on Six Impacts (2021), https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.

The transportation sector has been responsible for an increasing percentage of GHG emissions in the U.S. since 2009, thereby playing an outsized role in intensifying the climate crisis. When EPA made its Endangerment Finding for GHGs, the transportation sector was responsible for 23% of total annual U.S. GHG emissions.57 Since then, transportation sector GHG emissions have only increased as a share of U.S. emissions, surpassing the electric power sector as the largest U.S. source of GHG emissions and contributing 27.2% of total GHG emissions in 202058 and 28.5% in 2021.59 After dipping in 2020 due to the COVID-19 pandemic, carbon dioxide (CO2) emissions from the transportation sector increased by 11.5% between 2020 and 2021.60 Transportation as an end use sector "account[ed] for 1,757.4 [million metric tons] CO2 in 2021 or 37.9% of total CO2 emissions from fossil fuel combustion."61 Adopting stringent GHG emission standards for light- and medium-duty vehicles will lead to massive public health benefits by limiting these pollutants.62 [EPA-HQ-OAR-2022-0829-0759, p. 16]

57 74 Fed. Reg. at 66499.

58 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020, EPA 430-R-22-003, at ES-21 (2022), https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf.

59 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021, EPA 430-R-23-002, at 2-19, 2-28 (2023), https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf.

60 Id. at 2-13.

61 Id. at 2-17.

62 See generally Am. Lung Ass'n, Driving to Clean Air: Health Benefits of Zero-Emission Cars and Electricity (June 2023), https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf.

The IPCC's most recent synthesis of its Sixth Assessment Report confirms the danger to public health and welfare posed by GHG emissions from the transportation sector. The report found that global surface temperature was around 1.1°C higher in 2011-2020 than it was in 1850-1900.63 While average annual GHG emissions growth has slowed in certain sectors such as energy supply and industry, growth in GHG emissions from the transportation sector has remained relatively constant at about 2% per year.64 The latest IPCC report warned that "[d]eep, rapid and sustained GHG emissions reductions, reaching net zero CO2 emissions and including strong emissions reductions of other GHGs . . . are necessary to limit warming to 1.5°C . . . or less than 2°C . . . by the end of the century."65 To have a chance at limiting global temperature increase to 1.5? and avoid the worst impacts of climate change, current GHG emissions from the transportation sector must drop by 59% by 2050 compared to 2020 emissions.66 [EPA-HQ-OAR-2022-0829-0759, p. 16]

63 Intergovernmental Panel on Climate Change (IPCC), Synthesis Report of the IPCC Sixth Assessment Report (AR6): Longer Report, at 6 (2023), https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_LongerReport.pdf.

64 Id. at 10.

65 Id. at 33.

66 IPCC, Climate Change 2022: Mitigation of Climate Change 32 (2022), https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_FullReport.pdf.

Air pollution has become so significant that the public health burdens attributable to air pollution are "now estimated to be on a par with other major global health risks such as unhealthy diet and tobacco smoking, and air pollution is now recognized as the single biggest environmental threat to human health."70 Researchers at the University of Chicago studied the impact of air pollution on life expectancy and found that "the impact of particulate pollution on life expectancy is comparable to that of smoking, more than three times that of alcohol and unsafe water and sanitation, six times that of HIV/AIDS, and 89 times that of conflict and terrorism."71 [EPA-HQ-OAR-2022-0829-0759, p. 17]

70 World Health Organization (WHO), WHO Global Air Quality Guidelines (2021) at xiv, https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf.

71 Michael Greenstone, Christa Hasenkopf, & Ken Lee, Air Quality Life Index Annual Update, Energy Policy Institute at the University of Chicago (2022) at 6-7, https://aqli.epic.uchicago.edu/wp-content/uploads/2022/06/AQLI_2022_Report-Global.pdf/.

These reductions are significant on a national and global scale because greenhouse gas emissions from light- and medium-duty vehicles are a consequential portion of both national and international GHG emissions. Emissions from the transportation sector are the largest source

(29%) of GHGs in the country, and light- and medium-duty vehicles are the largest portion of that.77 The United States is responsible for a large portion of global CO2 emissions—approximately 14% as of 2019—and is the second largest emitter in the world.78 Reducing GHG emissions from light- and medium- duty vehicles is therefore one of the most consequential steps EPA—or the United States—can take to mitigate climate change harm. And, as the Supreme Court found in Massachusetts v. EPA, "[a] reduction in domestic emissions would slow the pace of global emissions increases, no matter what happens elsewhere." 549 U.S. 497, 500 (2007). [EPA-HQ-OAR-2022-0829-0759, p. 19]

77 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021, EPA 430-R-23-002, at 2-35 (Apr. 2023). https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf.

78 UCS, Each Country's Share of CO2 Emissions (updated Jan. 14, 2022), at https://www.ucsusa.org/resources/each-countrys-share-co2-emissions.

Organization: Environmental Defense Fund (EDF) (1of 2)

A. Protective standards are urgently needed to safeguard public health.

The transportation sector is now the single largest source of greenhouse gas emissions in the United States, and passenger cars and trucks are the largest contributor, at 58 percent of all transportation sources and 17 percent of total U.S. greenhouse gas emissions. [EPA-HQ-OAR-2022-0829-0786, p. 6]

Organization: Governing for Impact and Evergreen Action (GFI)

In addition to contributing to the climate crisis, light and medium duty passenger vehicles are responsible for emitting harmful pollutants including carbon monoxide, particulate matter, and nitrogen oxides, which can cause or contribute to significant negative public health outcomes such as lung and heart diseases.15 These harmful health outcomes disproportionately affect low income populations and communities of color, who are exposed to greater amounts of vehicle pollution.16 Unfortunately, these same communities are at the greatest risk of harm from the impacts of climate change, and often lack sufficient resources or support to protect themselves from these harmful impacts.17 Strong transportation emissions standards — for both GHGs and criteria pollutants — will limit the present and imminent public health threats that vulnerable populations face due to vehicle pollution. [EPA-HQ-OAR-2022-0829-0621, pp. 2-3]

15 See U.S. Dep't of Transp., "Cleaner Air," https://www.transportation.gov/mission/health/cleaner-air#:~:text=Vehicle%20emissions%20contribute%20to%20the,illnesses%2C%20including%20pneumonia%20and%20b ronchitis (last visited June 15, 2023).

16 See, e.g., Maria Cecilia Pinto de Moura and David Reichmuth, "Inequitable Exposure to Air Pollution from Vehicles in the Northeast and Mid-Atlantic," Union of Concerned Scientists (Jun 21, 2019), https://www.ucsusa.org/about/news/communities-color-breathe-66-more-air-pollution-vehicles.

17 See generally, EPA "Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts," 430-R-21- 003 (2021), available at: https://www.epa.gov/cira/social-vulnerability-report.

Organization: GreenLatinos et al.

The strongest possible HDV and L/MDV standards will help reach the urgent goal to cut greenhouse gas emissions by 60% by 2030 and will put American cars and trucks on a clear path towards achieving 100% zero emission electric vehicle (EV) sales by 2035 or earlier. [EPA-HQ-OAR-2022-0829-0789, p. 2]

The Biden administration's leadership in setting strong HDV and L/MDV standards is instrumental to mitigate the inequitable tailpipe pollution experienced by Latino/e and other frontline communities, which triggers asthma and other sometimes fatal respiratory illnesses. [EPA-HQ-OAR-2022-0829-0789, p. 2]

We need the cleanest possible vehicles now. Our lives literally depend on it. [EPA-HQ-OAR-2022-0829-0789, p. 2]

Organization: Institute for Policy Integrity at NYU School of Law et al.

Other key legal commitments compel this same conclusion. For instance, the United Nations Framework Convention on Climate Change—to which the United States is a party26— declares that national "policies and measures to deal with climate change should be cost- effective so as to ensure global benefits at the lowest possible cost."27 The Convention further commits parties to evaluate global climate effects in their policy decisions, by "employ[ing] appropriate methods, for example impact assessments . . . with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change."28 The unmistakable implication of the Convention is that parties—including the United States—must account for global economic, public health, and environmental effects in their impact assessments. In 2008, a group of U.S. senators—including then-Senator John Kerry, who helped ratify the framework convention on climate change—agreed with this interpretation of the treaty language, saying that "[u]pon signing this treaty, the United States committed itself to considering the global impacts of its greenhouse gas emissions."29 [EPA-HQ-OAR-2022-0829-0743, p. 5]

26 S. Treaty Doc. No. 102-38; S. Exec. Rept. No. 102-55.

27 U.N. Framework Convention on Climate Change art. 3(3), May 9, 1992, 1771 U.N.T.S. 107 (emphasis added); see also id. art. 3(1) ("The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.") (emphasis added); id. art. 4(2)(a) (committing developed countries to adopt policies that account for "the need for equitable and appropriate contributions by each of these Parties to the global effort").

28 Id. art. 4(1)(f) (emphasis added); see also id. art. 3(2) (requiring parties to give "full consideration" to those developing countries "particularly vulnerable to the adverse effects of climate change"); see also North American Agreement on Environmental Cooperation art. 10(7), Jan. 1, 1994, 32 I.L.M. 1480 (committing the United States to the development of principles for transboundary environmental impact assessments).

29 Comment Letter from U.S. Sens. Feinstein, Snowe, Nelson, Cantwell, Sanders, Kerry, Durbin, Reed, Boxer, & Cardin to Mary Peters, Sec'y, U.S. Dep't of Transp. on Proposed Rule for Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011–2015 (July 1, 2008).

This flurry of activity is just the latest evidence of reciprocity in international climate actions. Some past reciprocity has been explicit. The Kigali Amendment, for example, is the latest internationally negotiated climate treaty, with more than 120 parties so far committing to common but differentiated responsibilities to phase down hydrofluorocarbons.46 Previously, under the Copenhagen Accord and the Paris Agreement, some parties, including the European Union and Mexico, have at times explicitly made conditional pledges, promising to ratchet up their efforts if other countries make comparable reductions.47 By contrast, when the United States "failed to take action to reduce greenhouse gas emissions during the George W. Bush Administration and during . . . the Trump Administration," as economist Michael Greenstone has testified before the U.S. House of Representatives, "both periods were characterized by little [international] progress, and indeed many instances of backsliding, in reducing emissions globally."48 By failing to take international climate damages into account, in other words, EPA and other U.S. agencies would incentivize other countries to do the same, which in turn would cause greater greenhouse gas pollution originating in other countries that causes climate damage within the United States. [EPA-HQ-OAR-2022-0829-0743, p. 8]

46 See U.N., Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (2016), https://perma.cc/SEX3-HAQA (last visited June 8, 2021).

47 See Eur. Comm'n, Expression of Willingness to Be Associated with the Copenhagen Accord and Submission of the Quantified Economy-Wide Emissions Reduction Targets for 2020 at 2, Jan. 28, 2010, https://perma.cc/77DD- M4LS (committing to a 20% reduction but "reiterat[ing] its conditional offer to move to a 30% reduction by 2020 compared to 1990 levels, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities"); Gov't of Mex. Ministry of Env't & Nat. Res., Nationally Determined Contributions: 2020 Update at 22, https://perma.cc/VF4A-K5HK (making an unconditional pledge of 22% reduction of GHGs and 51% of black carbon by 2030; and making a conditional pledge of up to 36% reduction GHGs and 70% black carbon, conditioned on "an international price for carbon trading, adjustment of tariffs for carbon content" as well as technology transfers and financial resources).

48 Economics of Climate Change: Hearing before the U.S. H. Comm. on Oversight & Reform's Subcomm. on Env't at 6 (Dec. 19, 2019) (testimony of Michael Greenstone), https://perma.cc/H5JS-V4H6.

2. Use of the Global Values Recognizes Spillover Impacts from Climate Change

As EPA further recognizes, spillover impacts into the United States also support the use of global damage valuations.53 Significant costs to trade, human health, and security will inevitably "spill over" to the United States as other regions of the planet experience climate change damages.54 Due to its unique place among countries—both as the largest economy with trade- and investment-dependent links throughout the world, and as a military superpower—the United States is particularly vulnerable to effects that will spill over from other regions of the world. The use of global damage values recognizes these spillover effects, which were ignored under the Trump administration's domestic-only valuation. [EPA-HQ-OAR-2022-0829-0743, p. 9]

53 RIA at 10-11; see also Draft SC-GHG Update, supra note 9, at 11–13.

54 Though some positive spillover effects are also possible, such as technology spillovers that reduce the cost of mitigation or adaptation, see S. Rao et al., Importance of Technological Change and Spillovers in Long-Term Climate Policy, 27 ENERGY J. 123–39 (2006), overall climate spillovers are likely strongly negative, see Jody Freeman & Andrew Guzman, Climate Change and U.S. Interests, 109 COLUM. L. REV. 1531 (2009).

These spillover effects take many forms. In terms of trade-related impacts, for one, as climate change disrupts the economies of other countries, decreased availability of imported inputs, intermediary goods, and consumer goods will cause supply shocks to the U.S. economy, causing particularly damaging disruptions in sectors such as agriculture and technology. [EPA-HQ-OAR-2022-0829-0743, p. 9]

Similarly, the U.S. economy will experience demand shocks as climate-affected countries decrease their demand for U.S. goods. U.S. trade and businesses that rely on foreign-owned infrastructure, services, and resources will suffer.55 Financial markets will also suffer as foreign countries become less able to loan money to the United States and as the value of U.S. firms declines with shrinking foreign profits. As seen historically, economic disruptions in one country can cause financial crises that reverberate globally at a breakneck pace.56 [EPA-HQ-OAR-2022-0829-0743, p. 9]

55 U.S. Global Change Res. Prog., Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States, Chapter 16: Climate Effects on U.S. International Interests 608 (2018) [hereinafter "NCA4"].

56 See Steven L. Schwarcz, Systemic Risk, 97 GEO. L.J. 193, 249 (2008) (observing that financial collapse in one country is inevitably felt beyond that country's borders).

Climate change is also predicted to exacerbate existing security threats—and possibly catalyze new security threats—to the United States.57 Besides threats to U.S. military installations and operations at home and abroad from flooding, storms, extreme heat, and wildfires,58 climate change is also a "source[] of conflict around the world"59 and a "threat multiplier" that, as recognized by the Department of Defense, will "aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions—conditions that can enable terrorist activity and other forms of violence."60 Climate change will create and exacerbate new conflicts and humanitarian crises that will require a U.S. response, even as climate change also complicates the logistics of deploying forces and achieving missions. [EPA-HQ-OAR-2022-0829-0743, pp. 9-10]

57 See CNA Military Advisory Board, National Security and the Accelerating Risks of Climate Change (2014).

58 U.S. Gov't Accountability Off., GAO-14-446, Climate Change Adaptation: DOD Can Improve Infrastructure Planning and Processes to Better Account for Potential Impacts (2014); Union of Concerned Scientists, The U.S. Military on the Front Lines of Rising Seas (2016).

59 U.S. Dep't of Def., Report on Effects of a Changing Climate to the Department of Defense 8 (2019), https://perma.cc/4WPP-86EN.

60 U.S. Dep't of Def., Quadrennial Defense Review 2014 at vi, 8 (2014).

Climate change will also very directly cause spillover damages across transboundary resources. As illustrated by recent high-pollution events, the United States has already begun to experience increased smoke from Canadian wildfires and drought conditions that spread along the U.S.-Mexico border.61 The United States shares a maritime border with 21 other countries, shares water resources like the Columbia River with our neighbors, and shares ecosystems—including the oceans through which migratory species with high economic and ecosystem-service values, like the Pacific hake, travel and live.62 [EPA-HQ-OAR-2022-0829-0743, p. 10]

61 NCA4, supra note 55, at 607.

62 Id. at 615.

All of these individual spillover effects can also interact and trigger feedback loops that will propagate additional spillover damages.63 Economic shocks around the world can make it more difficult for other countries to continue investing in mitigation and abatement, thus hastening the pace of climate change.64 Conflict and political instability caused by climate change can further reduce the willingness or ability of countries to engage in domestic climate policy or international cooperation.65 Spillover effects can chain together: if climate change accelerates migration, the attendant economic ripple effects and spread of health risks may cause political instability, which in turn can cause more migration and further economic ripple effects, thus starting the feedback loop again.66 [EPA-HQ-OAR-2022-0829-0743, p. 10]

63 Peter Howard & Michael Livermore, Climate-Society Feedback Effects: Be Wary of Unidentified Connections, 15 INTL. REV. ENV'T & RES. ECON. 33 (forthcoming 2021).

64 Peter Howard & Michael A. Livermore, Sociopolitical Feedbacks and Climate Change, 43 HARV. ENV'T L. REV. 119, 122-23 (2019).

65 Id.

66 NCA4, supra note 55, at 621 (explaining that instability has economic effects, and economic risks create risk of conflict); Freeman & Guzman, supra note 54, at 1581–89; id. at 1581 (noting that climate-induced pandemics may cause political instability); id. at 1564 n.157 (noting that cross-sectoral interactions will "reinforce" international spillovers and create "a costly multiplier effect"). Howard & Livermore, supra note 63.

A. EPA Reasonably Relies on Climate-Damage Estimates from an Interagency Working Group, But Should Conduct Further Analysis With Its Own Estimates

To monetize the Proposed Rule's climate benefits, EPA appropriately relies on four valuations produced by the Interagency Working Group on the Social Cost of Greenhouse Gases ("Working Group"). Those values—though widely agreed to underestimate the full social costs of greenhouse gas emissions75—are appropriate to use for now as conservative estimates. They have been applied in dozens of previous rulemakings76 and upheld in federal court.77 Policy Integrity, along with five other non-profit organizations, has submitted separate comments to this docket in support of the Proposed Rule's use of the Working Group's climate-damage estimates. [EPA-HQ-OAR-2022-0829-0601, pp. 12-14]

75 Interagency Working Group on the Social Cost of Greenhouse Gases, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide – Interim Estimates Under Executive Order 13,990 at 4 (2021) [hereinafter 2021 TSD] (acknowledging that current social cost valuations "likely underestimate societal damages from [greenhouse gas] emissions"). Richard L. Revesz et al., Global Warming: Improve Economic Models of Climate Change, 508 NATURE 173 (2014) (co-authored with Nobel Prize-winning economist Kenneth Arrow).

76 Peter Howard & Jason A. Schwartz, Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon, 42 COLUM. J. ENV'T L. 203, 270–84 (2017) (listing all uses through mid-2016).

77 Zero Zone v. Dept. of Energy, 832 F.3d 654, 679 (7th Cir. 2016).

As those joint comments further explain, however, EPA should conduct additional analysis using draft climate-damage valuations that EPA recently published.78 Though the Working Group's valuations relied on the best science available at the time of their initial development in 2010, they are now widely recognized to understate the true costs of climate change. In

November 2022, EPA released updated draft climate-damage estimates.79 EPA's draft valuations faithfully apply recent advances in science and economics on the costs of climate change and implement the roadmap laid out in 2017 by the National Academies of Sciences for updating the social cost of greenhouse gases.80 And while EPA's draft valuations remain underestimates,81 they more fully account for the costs of climate change by incorporating the latest available research on climate science, damages, and discount rates. [EPA-HQ-OAR-2022-0829-0601, pp. 12-14]

78 EPA External Review Draft of Report on the Social Cost of Greenhouse Gases (2022) [Draft SC-GHG Update].

79 Id.

80 Nat'l Acads. Sci., Engineering & Med., Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide (2017).

81 Draft SC-GHG Update, supra note 78, at 4 ("[B]ecause of data and modeling limitations . . . estimates of the SC- GHG are a partial accounting of climate change impacts and, as such, lead to underestimates[.]"); id. at 72.

Unsurprisingly, given the developing state of the science and economics around climate change, EPA's draft valuations find that the incremental cost of greenhouse gas emissions is substantially higher than the Working Group projected. Using these valuations will provide a more complete picture of the climate damages from the Proposed Rule and its alternatives. While EPA should apply the Draft SC-GHG Update in sensitivity analysis if it finalizes this regulation before it finalizes that update, it should consider applying those valuations in its primary analysis (with the Working Group's estimates in sensitivity analysis) should it finalize the SC-GHG Update before this rule. [EPA-HQ-OAR-2022-0829-0601, pp. 12-14]

Table 2 shows the climate benefits of the Proposed Rule and Alternative 1 using EPA's "central" certainty-equivalent near-term discount rate of 2%,82 which Policy Integrity generated using OMEGA and inputting the climate-damage valuations from the Draft Update. For comparison, Table 2 presents these estimates alongside the four climate-damage estimates from the Working Group that EPA provides in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0601, pp. 12-14]

82 Id. at 9 (describing 2% as the "central" rate).

Table 2: Climate Benefits Using Draft SC-GHG Update (2020$ Billion)

	Proposed Program	Alternative 1
Working Group 5% Average	82	91
Working Group 3% Average	330	360
Working Group 2.5% Average	500	560
Working Group 3% 95th percentile	1000	1100
Draft Update (2% discount)83	1200	1300

[EPA-HQ-OAR-2022-0829-0601, pp. 12-14]

83 Emissions in future years are discounted back to present value using a 3% discount rate. This is consistent with EPA's approach to the climate-damage valuations using non-standard discount rates of 2.5% and 5%.

As Table 2 illustrates, the climate benefits of the Proposed Rule and its alternatives are higher under EPA's draft climate-damage valuations than using the four Working Group valuations that EPA now applies. [EPA-HQ-OAR-2022-0829-0601, pp. 12-14]

Organization: International Council on Clean Transportation (ICCT)

ALIGNMENT WITH GREENHOUSE GAS EMISSION REDUCTION TARGETS AND CLIMATE GOALS

ICCT strongly supports the proposed Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles and recommends its finalization. This rulemaking is critical to achieving the pace and scale of needed transportation emission reductions in the United States. There is a clear and urgent need to rapidly transition the transportation sector to zero-emission vehicles. Continued and strengthened standards are important to protect public health and deliver on national air quality and climate change goals. [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

On his first day in office, President Biden issued an executive order for the United States to rejoin the Paris Climate Agreement.33 With this executive order, the U.S. joined nearly every country on earth with the shared goal of limiting global warming to well below 2 degrees Celsius.34 Delivering on the goals of this Agreement will require a significant reduction in greenhouse gas emissions. The transportation sector is the largest contributor to climate pollution in the United States, with light-duty vehicles—passenger cars, SUVs, and pickup trucks—accounting for more than half of these emissions. Therefore, a shift to zero-emission vehicles like battery electric vehicles, along with increased efficiency of new gasoline vehicles, is needed. [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

33 U.S. Department of State. (2021, February 19). The United States officially rejoins the Paris Agreement. https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/

34 Denchak, M. (2021, February 19). Paris Climate Agreement: Everything you need to know. Natural Resources Defense Council. https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/

The ICCT's global modeling assessment for the Zero Emission Vehicle Transition Council shows that for the U.S. to be on a path to limiting global warming to well below 2° C, at least 67% of new passenger vehicle sales will need to be plug-in electric by 2030, with the vast majority (65%) being battery electric vehicles (BEVs).35 In parallel, new gasoline vehicles would need to improve at about 3.5% per year for the U.S. to be on a path to be Paris-compatible. Previous ICCT research estimated that the 2030 U.S. EPA standard would need to be about 57 grams CO_2/mile by 2030 to achieve this combination of new gasoline vehicle improvement with greatly increased BEV penetration that aligns with the Paris Agreement.36 [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

35 Sen, A., and Miller, J. (2022). Emissions reduction benefits of a faster, global transition to zero-emission vehicles. International Council on Clean Transportation. https://theicct.org/publication/zevs-global-transition-benefits-mar22/; ZEV Transition Council. https://zevtc.org/

36 Slowik, P., and Miller, J. (2022, December 19). Aligning the U.S. greenhouse gas standard for cars and light trucks with the Paris climate agreement. International Council on Clean Transportation. https://theicct.org/us-ghg- standard-paris-agreement-dec22/

The figure below summarizes the path from the current standard of 161 gCO2 per mile in 2026 to 57 gCO2e per mile in 2030 for the whole light duty fleet (top panel). This represents a combination of continued gasoline vehicle efficiency improvements (middle panel) and accelerated EV uptake to reach 67% sales in 2030 (bottom panel), including 65% BEVs and about 2% PHEVs. This assumed composition of battery electric vs. plug-in hybrid electric vehicles is based on BEVs' substantial economic and environmental benefits relative to PHEVs. Of course, if plug-in hybrids make up a greater share of EV sales than assessed here, then the fleetwide standards would have to be more stringent than 57 gCO2e per mile to be Paris-compatible.37 [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

37 Slowik. P., Isenstadt, A., Pierce, L, Searle, S. (2022). Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame. International Council on Clean Transportation. https://theicct.org/publication/ev-cost-benefits-2035-oct22/; Bieker, G. (2021). A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars. International Council on Clean Transportation. https://theicct.org/publication/a-global-comparison-of-the-life-cycle-greenhouse-gas-emissions-of- combustion-engine-and-electric-passenger-cars/

SEE ORIGINAL COMMENT FOR Figure 3. Stringency of model year 2030 GHG targets to be Paris-compatible [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

Graph 1: Fleetwide GHG Target including EVs (gCO2/mi)

Graph 2: Fleet average gasoline vehicle performance (gCO2/mi)

Graph 3: Electric vehicle share [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

This Paris-compatible path is ambitious yet achievable. As the middle panel shows, the 3.5% annual improvement for gasoline vehicles beyond 2026 is less than the rate of improvement needed to meet the current standards through 2026. As discussed above, EV uptake consistent with this scenario is possible through a combination of the new federal electric vehicle incentives and investments from the Inflation Reduction Act and state policies. [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

Although reaching 57 gCO2e per mile by 2030 requires a steeper decline in GHG emissions compared to the current EPA standards through 2026, ICCT's analysis finds this rate of improvement to be cost-effective for combustion and battery electric vehicles alike.38 In addition, the associated consumer benefits grow well into the tens of billions of dollars annually by 2027 due to greatly reduced upfront electric vehicle prices and lower fuel and maintenance costs compared to fossil fuel vehicles.39 [EPA-HQ-OAR-2022-0829-0569, pp. 12-15]

38 Lutsey, N., Meszler, D., Isenstadt, A., German, J., and Miller, J. (2017). Efficiency technology and cost assessment for U.S. 2025-2030 light-duty vehicles. International Council on Clean Transportation. https://theicct.org/publication/efficiency-technology-and-cost-assessment-for-u-s-2025-2030-light-duty-vehicles/; Slowik. P., Isenstadt, A., Pierce, L, Searle, S. (2022). Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame. International Council on Clean Transportation. https://theicct.org/publication/ev-cost-benefits-2035-oct22/

39 Ibid

INTERNATIONAL POLICY COMPARISON

The United States is not alone in its commitment to transition to cleaner cars. The number of national and subnational governments around the world that are committed to cleaner vehicles continues to rise. The sections below summarize and compare the U.S. EPA proposal with the standards in other leading markets around the world in terms of greenhouse gas emissions requirements, projections for electric vehicle uptake, and criteria pollutant emissions standards. [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

Greenhouse gas emissions standards

Figure 5 illustrates the U.S. trajectories of average CO2 emissions performance and CO2 emissions targets for new passenger cars and light trucks over the years, in comparison with other global vehicle markets that have CO2 emissions targets at least as of 2022. For a consistent basis of comparison, CO2 emissions values for all markets have been converted to the same U.S. test cycles (referred to as the CAFE cycle), where needed, using the ICCT cycle conversion factors44. The CO2 emissions targets are shown for both enacted and proposed targets for each country, where applicable including for the U.S. [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

44 Kühlwein, J. et al. (2014). Development of test cycle conversion factors among worldwide light-duty vehicle CO2 emission standards. International Council on Clean Transportation. https://theicct.org/publication/development-of- test-cycle-conversion-factors-among-worldwide-light-duty-vehicle-co2-emission-standards/; Yang, Z. (2014).

Improving the conversions between the various passenger vehicle fuel economy/CO2 emission standards around the world. International Council on Clean Transportation. https://theicct.org/improving-the-conversions-between- the-various-passenger-vehicle-fuel-economy-co2-emission-standards-around-the-world/ [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

SEE ORIGINAL COMMENT FOR Figure 5. Global comparison of historical data and standards for passenger car CO2 emissions and fuel consumption, normalized to CAFE cycle. [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

SEE ORIGINAL COMMENT FOR Figure 6. Global comparison of historical data and standards for light truck CO2 emissions and fuel consumption, normalized to CAFE cycle. [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

The historical trend shows that the U.S. CO2 emissions were historically one of the highest across the global markets, which began to reduce substantially through stringent GHG emissions standards starting from 2012. While the GHG emissions standards have significantly contributed to controlling emissions of the fleet over the years, the recent U.S. CO2 emissions and enacted targets are still higher than the average trajectories for a few markets such as the EU, Japan, South Korea, and UK for passenger cars and Chile, Japan, and UK for light trucks. [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

The proposed standards for 2027 and later model year vehicles make the U.S. one of the most ambitious, forward-looking markets for CO2 standards. The proposed standard levels are more stringent compared to most of the global markets, except for the EU and UK. The EU has already adopted 0 g CO2 per km standard by 2035. The UK targets are still in the proposal phase; however, the UK has set strong ZEV mandates for 100% ZEV sales of light-duty vehicles by 2035. [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

Thus, the proposed U.S. targets are more ambitious compared to the current trajectories for most of the global markets, yet not stringent enough to align with the most ambitious international targets. [EPA-HQ-OAR-2022-0829-0569, pp. 16-18]

Organization: MCS Referral & Resources (MCSRR)

The EPA does not mention CO in any of the sections of the proposed rule that discuss greenhouse gas (GHG) emissions. Some discussion of CO emissions should be added to these sections because, according to the IPCC, the indirect Global Warming Potential of CO over 20 years is 2.8 to 10, which is in addition to CO's direct GWG potential of approximately 1.3. While the GWP of CO is modest, the total annual CO emissions from vehicles in the US exceed those of all other criteria and toxic air pollutants combined, so EPA should not exclude CO. See: https://archive.ipcc.ch/ipccreports/tar/wg1/249.htm#tab69 [EPA-HQ-OAR-2022-0829-0615, pp. 3-4]

Organization: Metropolitan Washington Air Quality Committee (MWAQC) et al.

Strengthening the greenhouse gas emissions standards will also provide considerable support for metropolitan Washington and communities across the United States to meet their greenhouse gas emissions reduction goals. Unfortunately, our region is already experiencing the impacts of climate change. Observations in metropolitan Washington show that temperatures and the water surface level in the Potomac River are rising and will likely continue to rise. Extreme weather events and increases in the number of days with extreme heat or extreme cold will increase risks to health, energy usage patterns, plant and animal habitats, and infrastructure. These changes in our weather patterns are also affecting stormwater, drinking water, and wastewater. Broad-based climate change mitigation and adaptation strategies, such as national rules, are necessary to reduce the impacts of climate change and fight the adverse effects of climate change on our region and planet. [EPA-HQ-OAR-2022-0829-0503, p. 2]

The National Capital Region has goals to reduce greenhouse gas emissions 50% by 2030 and 80% by 2050, compared to 2005 levels. In 2022, the TPB adopted the same goals, but specifically for on-road transportation. As such, MWAQC, CEEPC, and the TPB believe that the newly proposed greenhouse gas emissions standards for model years 2027 and later light-duty and medium-duty vehicles, which are estimated by EPA to reduce carbon dioxide emissions by 47% in 2055 (Table 2 of the Federal Register Notice), are necessary for the region to achieve its greenhouse gas reduction goals. [EPA-HQ-OAR-2022-0829-0503, p. 2]

The metropolitan Washington region has implemented emissions reduction measures across all sectors, including on-road transportation, which contributes approximately 31% and 39% of the region's greenhouse gas and NOx emissions, respectively. The region relies heavily on federal control programs for a significant amount of additional greenhouse gas and NOx emissions reductions since these programs provide benefits across the economy. The federal government's leadership in delivering effective regulatory limits on greenhouse gas emissions from motor vehicles could also help reduce ozone and fine particle precursors and is a critical component of our ability to meet adopted environmental objectives and standards. [EPA-HQ-OAR-2022-0829-0503, p. 2]

Organization: Minnesota Pollution Control Agency (MPCA)

The MPCA has supported EPA's previous efforts to strengthen vehicle emissions standards and appreciates the opportunity to comment on the proposed rule. We see the proposed rulemaking as an opportunity to advance climate action, reduce harm to Minnesotans from criteria pollutants and air toxics, and accelerate the transition to electric vehicles in our state. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Importance of new federal greenhouse gas standards for climate action

The transportation sector represents the largest source of greenhouse gas emissions in Minnesota. The top three sources in the transportation sector are light-duty trucks, heavy-duty trucks, and passenger cars.1 These categories are inclusive of light and medium-duty vehicles discussed in this proposal. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Stronger vehicle emissions standards at the federal level have lowered greenhouse gas emissions from vehicles generally. However, the long-term consumer trend of choosing larger vehicles and the general trend of more miles driven (except during the pandemic) are counteracting more significant emissions reductions in this sector. Increased emissions stringency at the federal level is critical to continuing the trend of emission reductions in this sector. Accelerating light- and medium-duty vehicle electrification is vital for Minnesota to meet its climate and air pollution goals. Specifically, adopting new light- and medium-duty vehicle emissions standards would: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

1 Greenhouse gas emissions in Minnesota 2005-2020, https://www.pca.state.mn.us/sites/default/files/lraq-2sy23.pdf.

- Help the state meet economy-wide greenhouse gas emissions reduction goals. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

In 2022, as part of the publication of the state's Climate Action Framework,2 Governor Walz and Lieutenant Governor Flanagan endorsed the economy-wide greenhouse gas emissions reduction goal for the state to reduce emissions by 50% by 2030 and to become carbon-neutral by 2050. In May 2023, Minnesota codified these targets in statute. Achieving these goals will require action at all levels of government, across businesses, and by individuals. The proposed multipollutant standards will be critical for reducing emissions from the transportation sector. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

2 Minnesota's Climate Action Framework, https://climate.state.mn.us/minnesotas-climate-action-framework.

- Advance transportation actions and targets in the state's Climate Action Framework. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Minnesota's Climate Action Framework is a plan that sets a vision for how the state will address and prepare for climate change. The framework broadly guides the direction of climate action toward a carbon-neutral, resilient, and equitable future for Minnesota and contains immediate, near-term actions, as well as key progress indicators with measurable targets. The framework was developed based on significant input from stakeholders, the public, and the Tribal Nations located within Minnesota's modern borders. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

The proposed light- and medium-duty vehicle standards would advance the following actions in the Clean Transportation goal: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

-- Increase the use of clean fuels, including lower-carbon biofuels (Sub-initiative 1.2.1)

-- Expand electric vehicle (EV) charging infrastructure (Sub-initiative 1.2.2)

-- Increase EV availability and access (Sub-initiative 1.2.3)

-- Accelerate the transition to EVs and clean transportation (Sub-initiative 1.2.4)

-- Improve vehicle efficiency and emissions standards (Sub-initiative 1.2.5)

[EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Additionally, the proposed standards would advance the following targets for the Clean Transportation goal: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

-- Reduce greenhouse gas emissions from the transportation sector 80% by 2040

-- Reach 20% electric vehicles on Minnesota roads by 2030 [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Organization: National Farmers Union (NFU)

The results of climate change, brought on by GHG emissions to the earth's atmosphere resulting from human activity, will be detrimental to both human health and the economy. As a family farm organization, NFU is particularly concerned with the challenges that climate change poses to family farmers' ability to pursue improvements in global food security. Anticipated disruptions to agricultural production caused by climate include: rising temperatures; changes in precipitation; increasing frequency of extreme weather events; new pest, disease and weed pressures; and increases in heat stress on livestock. As formidable as these challenges may be, farmers, ranchers and rural communities can contribute to climate resilience and help circumvent serious harm to the economy and human health. Efforts by farmers, ranchers and rural communities along this front are supported by the biofuels industry that eases the burdens on farmers and provides additional markets to facilitate a move toward sustainable practices and climate mitigation actions. [EPA-HQ-OAR-2022-0829-0581, pp. 3-4]

Organization: National Parks Conservation Association (NPCA)

II. Pollution from Light and Medium-Duty Vehicles Furthers Climate Change and Harms our Parks and Communities.

The irrefutable consensus among leading scientists has demonstrated time and again that climate change poses an increasingly existential threat to America's national parks and the world around them. According to the Intergovernmental Panel on Climate Change (IPCC) in their recently released Synthesis for the 6th Assessment Report (AR6): [EPA-HQ-OAR-2022-0829-0607, p. 2]

[h]uman activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850–1900 in 2011–2020. Global greenhouse gas emissions have continued to increase, with unequal historical

and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals.8 [EPA-HQ-OAR-2022-0829-0607, p. 2]

8 IPCC, Synthesis Report of the IPCC Sixth Assessment Report (AR6): Summary for Policymakers, Doc. 4, p.4. Available at https://www.ipcc.ch/report/ar6/syr/.

The IPCC further states that current policies and laws "fall short of the levels needed to meet climate goals across all sectors and regions," and will likely result in warming that "will exceed 1.5°C during the 21st century and make it harder to limit warming below 2°C."9 [EPA-HQ-OAR-2022-0829-0607, p. 2]

9 Id. at 10.

Our national park system hosts some of America's most beloved natural and cultural resources, yet our parks are especially vulnerable to the changing climate because of their sensitive and fragile ecosystems and unique geographic locations.10 The burning of fossil fuels driving global warming has resulted in national park mean annual temperatures increasing "at double the rate of the U.S. as a whole" between 1895 and 2010.11 The ecological turmoil caused by this warming and the resulting extreme weather conditions is disastrous for the vast majority of national park units and is expected to only get worse. As temperatures increase, climate effects are felt across all park geographic regions and locations, from coastal areas to mountain ranges.12 These climate effects include: (1) rising sea levels; (2) increasingly intense wildfires; (3) threat and harm to wildlife habitats and lifestyles, particularly those at high altitudes with low adaptation buffers; (4) the rapid growth of disruptive, invasive species; (5) extreme weather damage; (6) drier conditions leading to difficult droughts; (7) loss of glaciers, snowpack and ice; (8) changing landscapes and disrupted ecosystems; (9) destruction of irreplaceable park structures and artifacts; and (10) altered visitation patterns and significant losses to valuable tourism revenue.13 [EPA-HQ-OAR-2022-0829-0607, pp. 2-3]

10 Patrick Gonzalez et al., Disproportionate Magnitude of Climate Change in United States National Parks, 13 ENVTL. RES. LETTERS 1, 6–10 (2018), https://perma.cc/99FL-CA3S.

11 Id. at 1.

12 Id. at 3.

13 NPCA, How the Climate Crisis Is Affecting National Parks, NPCA.org (last visited Apr. 30, 2022), https://www.npca.org/reports/climate-impacts; see also Patrick Gonzalez et al., Disproportionate Magnitude of Climate Change in United States National Parks, 13 ENVTL. RES. LETTERS 1 (2018), https://perma.cc/99FL-CA3S.

Due to the propensity of extreme events to damaging national parks, our findings indicate that climate change is a very real and significant concern for 80 percent of the nation's parks.14 If climate change continues at this rate, park wildlife and plant species' populations will plummet, and extinctions are likely to occur. In the decades to come, destruction from climate change could very well cause the near total loss of numerous namesake natural features across the park system, including, but not limited to, glaciers in Glacier National Park, everglade forests in Everglades National Park, saguaro cacti in Saguaro National Park, Joshua trees in Joshua Tree National Park, and giant sequoias in Sequoia National Park. Moreover, threats such as sea-level rise and storm related flooding and erosion put a long list of cultural park resources at risk, including historic structures from the National Mall in Washington, DC to the Golden Gate National Recreation Area in San Francisco. [EPA-HQ-OAR-2022-0829-0607, pp. 2-3]

14 NPCA, Air and Climate Report: Polluted Parks, NPCA.org (2019), https://www.npca.org/reports/air-climate-report.

The transportation sector is now the largest source of GHG emissions in the United States, and LDVs and MDVs are the single largest contributor of domestic GHGs within the sector.15 EPA's proposed light and medium-duty GHG standards will help address this top source of climate altering pollution, and, in so doing, help protect our parks from the worst of this devastation. Taking strong action to reduce greenhouse gas emissions from LDVs and MDVs will be an important step to limit warming below 2°C and protect our treasured national parks. [EPA-HQ-OAR-2022-0829-0607, pp. 2-3]

15 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018 at ES-25 (2020), https://perma.cc/98ZR- XNTR.

National parks are suffering some of the most dire effects of our warming world. We urgently need to cut significant levels of greenhouse gas emissions from light and medium-duty vehicles, which are among the single largest contributors to the global climate crisis. EPA's proposed MY 2027 and later LDV and MDV GHG rule represents a necessary step to reduce greenhouse gas emissions, but the alternatives fall short of both CAA requirements and what is needed to ensure the health and welfare of our parks, communities and climate. [EPA-HQ-OAR-2022-0829-0607, p. 5]

Organization: National Tribal Air Association (NTAA)

Climate Change and Greenhouse Gas Mitigation

The acute and continuous impacts of climate change on Native Americans and Alaska Native Villagers are well documented. Unfortunately, new consequences of this global crisis continue to be revealed. For multiple reasons including vulnerability and geographic constraints, Tribal communities are disproportionately suffering from these changes. The U.S. Fourth National Climate Assessment (NCA4)1 noted, in part, that "Climate change increasingly threatens indigenous communities' livelihoods, economies, health, and cultural identities by disrupting interconnected social, physical, and ecological systems." A more focused examination of Tribal needs to address the impacts of climate change is presented in 2021 publication The Status of Tribes and Climate Change (STACC)2. [EPA-HQ-OAR-2022-0829-0504, pp. 1-2]

1 USGCRP, 2018: Impacts, Risks, and Adaptation in the United States

2 The Status of Tribes and Climate Change (STACC), Institute for Tribal Environmental Professionals, 2021

The NTAA has a long history of information sharing with EPA and advocacy for reducing emissions of greenhouse gases. Multiple reports, policy statements, and comment letters are compiled and accessible on our organization's website3. NTAA's Status of Tribal Air Reports (STAR) including STAR 20224 document climate change impacts on Tribal lands and people. [EPA-HQ-OAR-2022-0829-0504, pp. 1-2]

3 National Tribal Air Association, www.ntaatribalair.org

4 Status of Tribal Air Report, National Tribal Air Association 2022

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

I. The Strongest Feasible Emissions Standards Are Needed.

Earth's climate is changing faster than it has at any point in the history of civilization, driven unequivocally by GHG emissions from human activities. The impacts—including more frequent and intense precipitation and wind events, flooding, heat waves, drought, wildfires, retreating snow and ice pack, ocean warming and acidification, accelerating sea level rise, and large-scale biodiversity loss—are being felt by communities across the globe and will worsen in coming years. Because GHGs can persist in the atmosphere for decades to centuries, how much worse these impacts will become depends on how deeply and rapidly humanity can decarbonize all economic sectors. Each additional ton of carbon dioxide (CO2) and other GHGs emitted into the atmosphere contributes to future climate warming and associated impacts.4 [EPA-HQ-OAR-2022-0829-0584, p. 2]

4 See Intergovernmental Panel on Climate Change (IPCC), Sixth Assessment Report of the IPCC (AR6), AR6 Synthesis Report: Climate Change 2023 (2023), https://www.ipcc.ch/report/ar6/syr/; see also IPCC, Climate Change 2022: Mitigation of Climate Change, Contribution of Working Group III to the AR6 (2022), https://www.ipcc.ch/report/ar6/wg3/; IPCC, Climate Change 2022: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the AR6 (2022), https://www.ipcc.ch/report/ar6/wg2/; IPCC, Climate Change 2021: The Physical Science Basis, Contribution of Working Group I to the AR6 (2021), https://www.ipcc.ch/report/ar6/wg1/.

Global CO2 emissions reached their highest ever annual level in 2022, surpassing the previous record high set in 2021.5 The United States has released more CO2 into the atmosphere than any nation in history and remains the second largest emitter today.6 At 28 percent, transportation is the largest source of U.S. GHG emissions and is expected to remain so through 2050, as population growth, expansion of urban centers, a growing economy, and increasing international trade will generate increased passenger and freight movement in coming years. Collectively, LDVs, MDVs, and Class 4-8 heavy-duty vehicles account for 82 percent of GHG emissions from the U.S. transportation sector, or 23 percent of total U.S. GHG emissions. LDVs alone are responsible for more than 15 percent of total U.S. GHG emissions.7 [EPA-HQ-OAR-2022-0829-0584, p. 2]

5 International Energy Agency (IEA), CO2 Emissions in 2022 (2023), https://www.iea.org/reports/co2-emissions-in- 2022; IEA, CO2 Emissions in 2021 (2022), https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2.

6 Climate Watch, Historical GHG Emissions, https://www.climatewatchdata.org/ghg-emissions?source=Climate%20Watch (visited June 8, 2023).

7 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021 (2023).

Organization: Our Children's Trust (OCT)

2. The federal government has long known that burning fossil fuels causes dangerous climate change that imperils the health and wellbeing of American children. The environmental consequences of vehicle emissions are well documented and are contributing to the catastrophic

heat, drought, and wildfires terrorizing the West coast and hurricanes, flooding and tornadoes horrifying the East coast. The costs of these climate change-induced disasters are staggering and many of the victims will be unable to recover. A study shows that children will experience many more of these extreme, life-threatening adults than their elders living today, including the ones making these policy decisions. [EPA-HQ-OAR-2022-0829-0542, p. 2]

There is simply no legal, scientific, or economic basis to continue burning fossil fuels, as was proven in the recent children's constitutional climate trial, Held v. Montana in Helena Montana, June 12-20, where leading scientists testified that fossil fuels endanger children's health and that powering every state in the nation with 100% clean renewable energy is not only technically feasible right now, but is economically beneficial and will save states and consumers billions of dollars in energy bills. [EPA-HQ-OAR-2022-0829-0542, p. 2]

Excess accumulation of greenhouse gases in our atmosphere results in an Earth energy imbalance and thus an accumulation of heat in our climate system. 6 The best available science informs that Earth's energy balance can only be restored by returning the atmospheric CO_2 concentration to below 350 ppm by 2100. [EPA-HQ-OAR-2022-0829-0542, p. 3]

Experts have opined that it is economically and technically feasible to achieve the science-based greenhouse gas emission reduction target of close to 100% by 2050, while simultaneously enhancing sequestration capacity of sinks to draw down historical cumulative CO_2 emissions, placing the U.S. on an emissions trajectory consistent with returning atmospheric CO_2 to below 350 ppm by 2100, which would bring long-term heating of the Earth back down to approximately 1.0°C above preindustrial temperatures, stabilizing the climate. 8 Please explain how the proposed rule aligns with restoring Earth's Energy Imbalance. [EPA-HQ-OAR-2022-0829-0542, p. 3]

6 Karina von Schuckmann et al., Heat Stored in the Earth System: Where Does the Energy Go?, 12 Earth Sys. Sci. Data 2013 (2020); Kevin E. Trenberth & Lijing Cheng, A Perspective on Climate Change from Earth's Energy Imbalance, 1 Env't Research Climate 013001 (2022).

7 James Hansen et al., Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature, 8 PLOS ONE e81648 (2013), https://doi.org/10.1371/journal.pone.0081648; Karina von Schuckmann et al., Heat Stored in the Earth System: Where Does the Energy Go?, 12 Earth Sys. Sci. Data 2013, 2014-15 (2020), https://doi.org/10.5194/essd-12-2013- 2020.

8 See Our Children's Trust, Government Climate and Energy Policies Must Target <######350 ppm Atmospheric CO2 by 2100 to Protect Children and Future Generations; Mark Z. Jacobson et al., Zero Air Pollution and Zero Carbon from all Energy at Low Cost and Without Blackouts in Variable Weather Throughout the U.S. with 100% Wind- Water-Solar and Storage, 184 Renewable Energy 430 (2022), https://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-USStatesPaper.pdf; Ben Haley et al., Evolved Energy Research, 350 PPM Pathways for the United States (2019), https://www.ourchildrenstrust.org/s/350-PPM-Pathways-for-the-United-States-gk6k.pdf; Ben Haley et al., Evolved Energy Research, 350 PPM Pathways for Florida 71 (2020) (See updated U.S. data in the Technical Supplement), https://www.ourchildrenstrust.org/s/350-PPM-Pathways-Florida-Report-pa2t.pdf; James H. Williams et al., Carbon- Neutral Pathways for the United States, 2 AGU Advances 2020AV000284 (2021); James Hansen et al., Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature, 8 PLOS ONE e81648 (2013), https://doi.org/10.1371/journal.pone.0081648; Karina von Schuckmann et al., Heat Stored in the Earth System: Where Does the Energy Go?, 12 Earth Sys. Sci. Data 2013, 2014-15 (2020), https://doi.org/10.5194/essd-12-2013-2020; Andrea Rodgers et al., The Injustice of 1.5ºC-2ºC: The Need

for a Scientifically Based Standard of Fundamental Rights Protection in Constitutional Climate Change Cases, 40 Va. Env't L.J. 102 (2022).

Current increased average temperatures of 1°C and greater (now at ~1.2°C) are already dangerous according to the IPCC. 9 Basing policies and decisions that align with temperature targets of 1.5°C is catastrophic for our children and posterity. 10 The IPCC special report on Global Warming of 1.5°C (2018) stated that allowing a temperature rise of 1.5°C "is not considered 'safe' for most nations, communities, ecosystems and sectors and poses significant risks to natural and human systems as compared to the current warming of 1°C (high confidence)." 11 The 2023 IPCC Summary for Policymakers for the Synthesis Report (AR6) stated: "Risks and projected adverse impacts and related losses and damages from climate change will escalate with every increment of global warming (very high confidence). They are higher for global warming of 1.5°C than at present, and even higher at 2°C (high confidence)." 12 Medical experts have recently recognized that "[t]he science is unequivocal; a global increase of 1.5°C above the pre-industrial average and the continued loss of biodiversity risk catastrophic harm to health that will be impossible to reverse." 13 As such, 1.5°C should not be used to guide U.S. policy that is required to be based on best available science. The EPA should not be advancing policies that knowingly make the climate crisis worse, and potentially unsolvable. [EPA-HQ-OAR-2022-0829-0542, pp. 3-4]

9 IPCC, Summary for Policymakers, in Synthesis Report of the IPCC Sixth Assessment Report (AR6) (2023), https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf.

10 See IPCC, Overarching Frequently Asked Questions: FAQ 3: How will climate change affect the lives of today's children tomorrow, if no immediate action is taken? in Climate Change 2022: Impacts, Adaptation and Vulnerability (2022) ("[T]oday's children and future generations are more likely to be exposed and vulnerable to climate change and related risks such as flooding, heat stress, water scarcity, poverty, and hunger. Children are amongst those suffering the most . . . [C]hildren aged ten or younger in the year 2020 are projected to experience a nearly four-fold increase in extreme events under 1.5°C of global warming by 2100[.]")

11 M.R. Allen et al., Technical Summary, in Global Warming of 1.5°C, at 44 (2018); see also Assessing "Dangerous Climate Change". This was similarly noted in the IPCC, Summary for Policymakers, in Climate Change 2022: Impacts, Adaptation and Vulnerability, at 13 (2022): "Global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans (very high confidence)." Note that global warming was at ~1.0°C when this report was finalized; it has now risen to 1.2°C.

12 IPCC, Summary for Policymakers, in Synthesis Report of the IPCC Sixth Assessment Report (AR6) (2023), https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf.

13 Lukoye Atwoli et al., Call for Emergency Action to Limit Global Temperature Increases, Restore Biodiversity, and Protect Health, 398 The Lancet 939 (2021) (emphasis added), https://doi.org/10.1016/S0140-6736(21)01915-2.

Climate change is causing a public health emergency that is already adversely impacting the physical and mental health of American children through, among other impacts, extreme weather events, rising temperatures and increased heat exposure, decreased air quality, altered infectious disease patterns, and food and water insecurity. 14 Children are uniquely vulnerable to climate change impacts because of their developing bodies, higher exposure to air, food, and water per unit body weight, unique behavior patterns, dependence on caregivers, political powerlessness, and longevity on the planet. 15 The protection of constitutional rights of children, by following the science, is of the utmost importance and must be incorporated in all relevant EPA rulemaking and policies. The Held v. Montana trial also put forward unrefuted expert testimony of the harms children face from the ongoing allowance of fossil fuel energy. EPA must listen to the pediatricians, psychiatrists, and public health experts on the damage every ton of emissions continues to have on our nation's children. See Expert Reports. [EPA-HQ-OAR-2022-0829-0542, pp. 4-5]

14 IPCC, Summary for Policymakers, in Climate Change 2022: Impacts, Adaptation and Vulnerability, at 11, 17 (2022). This summary found that the current level of global warming is already driving heat waves that cause human morbidity, heavy rains, flooding, extreme fires and drought, coral bleaching and demise, massive shifts in species habitats, loss of glaciers, snow and permafrost, as well as more destructive hurricanes. Id. at 11.

15 Samantha Ahdoot, Susan E. Pacheco & Council on Environmental Health, Global Climate Change and Children's Health, 136 Pediatrics e1468 (2015); Rebecca Pass Philipsborn & Kevin Chan, Climate Change and Global Child Health, 141 Pediatrics e20173774 (2018); Wim Thiery et al., Intergenerational Inequities in Exposure to Climate Extremes, 374 Science 158 (2021).

Organization: Pearson Fuels

As highlighted by the Sixth Assessment Report of the Intergovernmental Panel on Climate Change ("IPCC"), emissions from fossil fuels are the dominant contributor to climate change and continue to increase in scope:

Growth in anthropogenic emissions has persisted across all major groups of GHGs since 1990, albeit at different rates. By 2019, the largest growth in absolute emissions occurred in CO2 from fossil fuels and industry followed by CH4, whereas the highest relative growth occurred in fluorinated gases, starting from low levels in 1990 (high confidence).4 [EPA-HQ-OAR-2022-0829-0577, p. 3]

4 IPCC, 2022: Summary for Policymakers [P.R. Shukla, J. Skea, A. Reisinger, R. Slade, R. Fradera, M. Pathak, A. Al Khourdajie, M. Belkacemi, R. van Diemen, A. Hasija, G. Lisboa, S. Luz, J. Malley, D. McCollum, S. Some, P. Vyas, (eds.)]. In: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, U.S.A. doi: 10.1017/9781009157926.001. (hereafter "IPCC, 2022: Summary for Policymakers"), available at https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf, Finding B.1.2, at p. 6, chart at p. 7.

SEE ORIGINAL COMMENT FOR CHART of Global net anthropogenic emissions have continued to rise across all major groups of greenhouse gases. [EPA-HQ-OAR-2022-0829-0577, p. 3]

Organization: Sierra Club et al.

Under the U.S. Nationally Determined Contribution to the Paris Agreement, we committed to cut economy-wide greenhouse gas (GHG) emissions by 50 to 52 percent in 2030, compared to 2005 levels. Meeting that commitment is more important than ever. According to the Intergovernmental Panel on Climate Change's recently released Sixth Assessment Report, we are on course to exceed a 1.5° Celsius increase in global average temperature above pre-industrial levels within the coming decades. This level of warming would be catastrophic for our health, our welfare, and our planet. [EPA-HQ-OAR-2022-0829-0668, p. 1]

Organization: Southern Environmental Law Center (SELC)

Tailpipe emissions from light- and medium-duty vehicles cause significant environmental, public health, and economic impacts. [EPA-HQ-OAR-2022-0829-0591, pp. 1-2]

a. Light- and medium-duty vehicles are one of the largest sources of climate change- causing GHG emissions in the United States, resulting in tremendous harm. [EPA-HQ-OAR-2022-0829-0591, pp. 1-2]

The transportation sector is the largest source of GHG emissions in the United States,2 and this is also true in the South. In fact, transportation is the primary source of carbon dioxide (CO2)—the most prevalent GHG in our atmosphere—in every state in SELC's region except for Alabama, where it is the second largest source.3 In Georgia, North Carolina, South Carolina, Tennessee, and Virginia, emissions from transportation sources account for nearly half of all CO2 emissions.4 [EPA-HQ-OAR-2022-0829-0591, pp. 1-2]

2 The transportation sector generates 27.2 percent of all GHG annual emissions in the United States. See id. at 29186 (May 5, 2023).

3 Based on 2020 CO2 emissions. U.S. ENERGY INFO ADMIN., State Carbon Dioxide Emission Data Tables, tbl. 3 (Oct. 11, 2022), https://www.eia.gov/environment/emissions/state/.

4 Id.

Nationwide, light-duty vehicles are responsible for the majority of GHG pollution from the transportation sector, contributing 57.1 percent of all transportation sector GHG emissions—which amounts to 15.5 percent of total GHG emissions in the United States.5 Light-duty vehicles are also responsible for a disproportionate share of GHG pollution in the South. In Virginia, for example, emissions from light-duty vehicles generate 53 percent of all transportation-related GHG emissions in the state;6 in North Carolina, these vehicles produce 74 percent of all transportation-related GHG emissions.7 [EPA-HQ-OAR-2022-0829-0591, pp. 1-2]

5 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicle, 88 Fed. Reg. 29184, 29186 (May 5, 2023).

6 VA. DEP'T ENV'T QUALITY, Greenhouse Gases: 2016-2019 Inventory (2019), https://www.deq.virginia.gov/our- programs/air/greenhouse-gases (aggregating CO2, N2O, and CH4 emissions from light-duty vehicles).

7 N.C. DEP'T ENV'T QUALITY, North Carolina Greenhouse Gas Inventory 29 (Jan. 2022), https://www.deq.nc.gov/air-quality/ghg-inventory-report-2022/download?attachment.

GHG emissions are the primary driver of climate change,8 and the United States is already experiencing the environmental, public health, and economic impacts of a changing climate.9 While the effects of climate change are well-documented nationwide, the geography and demographics of the South make the region particularly vulnerable to climate change. A 2023 analysis of climate vulnerabilities across the United States found that the 100 census tracts with the highest overall climate vulnerability are located in 28 counties in nine southern states, including Alabama, Georgia, Tennessee, North Carolina, and South Carolina.10 Climate vulnerability, or the likely damage from climate change-related hazards due to "greater exposure to climate risks and lower ability to prepare, adapt, and recover from their effects," often correlates with race, income, and other socioeconomic factors.11 The two counties with the most census tracts among the 100 most vulnerable are located within SELC's region: Shelby County, Tennessee has 21 of the top 100 most vulnerable tracts, and Mobile County, Alabama has 14.12 [EPA-HQ-OAR-2022-0829-0591, pp. 2-4]

8 See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SYNTHESIS REPORT OF THE IPCC SIXTH ASSESSMENT REPORT (AR6): SUMMARY FOR POLICYMAKERS 4 (2023) ("Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020.").

9 See generally Kristie L. Ebi et al., Climate Change and Human Health Impacts in the United States: An Update on the Results of the U.S. National Assessment, 114 ENV'T HEALTH PERSPS. 1318 (2006); Solomon Hsiang, et al., Estimating Economic Damage from Climate Change in the United States, 346 SCIENCE 1362 (2017); FOURTH NATIONAL CLIMATE ASSESSMENT, U.S. GLOB. CHANGE RSCH. PROG. (2018), https://nca2018.globalchange.gov/.

10 P. Grace Tee Lewis et al., Characterizing Vulnerabilities to Climate Change Across the United States, 172 ENV'T INT'L 1, 6 (2023).

11 Id. at 1.

12 Id. at 6.

Rising temperatures are one of the many effects of climate change. The decade from 2010 to 2020 was the warmest on record in the South, and the region is already experiencing a higher percentage of heat waves than other parts of the country.13 Longer and more intense heat waves reduce air quality and cause heat-related illnesses like heat cramps, heatstroke, heat exhaustion, kidney-associated diseases, and asthma.14 These health effects are especially likely in vulnerable populations such as children, outdoor workers, and the elderly.15 In addition, the South is home to some of the fastest-growing metropolitan areas in the country.16 Sprawling, auto-oriented development like that typical in the South often increases impervious surfaces and reduces tree canopy cover, which combined with climate change can create and exacerbate heat island effects and result in greater emergency-room visits, reduced life expectancy, and worsened mental health outcomes in impacted communities.17 These impacts are often most acute in communities of color that have experienced a longstanding history of environmental injustice.18 [EPA-HQ-OAR-2022-0829-0591, pp. 2-4]

13 Southeast, U.S. CLIMATE RESILIENCE TOOLKIT (June 28, 2021), https://toolkit.climate.gov/regions/southeast.

14 See generally Mary L. Williams, Global Warming, Heat?Related Illnesses, and the Dermatologist, 7 INT'L J. WOMEN'S DERMATOLOGY 70 (2021). See also Daniel Helldén et al., Climate Change and Child Health: A Scoping Review and an Expanded Conceptual Framework, 5 LANCET PLANETARY HEALTH 164, 166 (2021).

15 Williams, vis note 14, at 75-76; Helldén et al., supra note 14, at 166.

16 See Andy Kiersz, This map shows the fastest growing and shrinking cities in America over the last decade, BUSINESS INSIDER (Aug. 13, 2021), https://www.businessinsider.com/2020-census-fastest-growing-and-shrinking- metro-areas-2021-8; Adam J. Terando et al., The Southern Megalopolis: Using the Past to Predict the Future of Urban Sprawl in the Southeast U.S., 9 PLOS ONE 1 (2014).

17 See Brad Plumer & Nadja Popovich, How Decades of Racist Housing Policy Left Neighborhoods Sweltering, N.Y. TIMES (Aug. 24, 2020),

https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global- warming.html (examining the health effects of a heat island in Richmond, Virginia).

18 See, e.g., Groundwork RVA, Climate Safe Neighborhoods, https://gwmke.maps.arcgis.com/apps/Cascade/ index.html?appid=9b784d9e79324d1f97210b25afe1b91d (analyzing historic redlining maps and satellite imagery to establish a relationship between housing segregation and vulnerability to extreme heat and flooding in Richmond, Virginia).

With over 12,000 miles of coastline,19 the South is also experiencing frequent flooding due to increased extreme storm events and sea level rise. Sea level has been rising at a rate about three times the global pace along the mid-Atlantic coast.20 In the Hampton Roads region of Virginia—which has the highest rate of sea level rise on the East Coast21—the sea level has risen by more than a foot over the last 80 years,22 and scientists predict an additional rise of 1.5 to 2 feet by 2050.23 As warmer ocean temperatures result in heavier, more frequent rainfalls and slower-moving hurricanes, inland flooding is also increasing.24 The number of Category 4 and 5 hurricanes in the mid-Atlantic basin—such as Hurricanes Ian, Irma, Michael, Matthew, and Florence—has grown substantially since the 1980s.25 These weather events cause serious injuries and fatalities,26 property damage, respiratory effects from mold exposure, and may lead to public emergencies and infrastructure disruptions, stressing health services and communities.27 [EPA-HQ-OAR-2022-0829-0591, pp. 2-4]

19 Shoreline Mileage of the U.S., NOAA OFFICE FOR COASTAL MGMT. (May 9, 2016), https://coast.noaa.gov/data/ docs/states/shorelines.pdf.

20 Sönke Dangendorf et al., Acceleration of U.S. Southeast and Gulf Coast Sea-Level Rise Amplified by Internal Climate Variability, 14 NATURE COMMS. 1 (2023).

21 Brett Buzzanga et al., Toward Sustained Monitoring of Subsidence at the Coast Using InSAR and GPS: An Application in Hampton Roads, Virginia, 47 GEO. RSCH. LETTERS 1, 1 (2020); see also Kasha Patel, Land Around the U.S. is Sinking. Here Are Some of the Fastest Areas, WASH. POST (May 30, 2023), https://www.washingtonpost.com/climate-environment/2023/05/30/land-sinking-us-subsidence-sea-level/ (finding that the Hampton Roads region is sinking at a rate of more than 3.5 millimeters per year).

22 Sea Level Rise and Tidal Flooding in Norfolk, Virginia, UNION OF CONCERNED SCIENTISTS (Mar. 30, 2016), https://www.ucsusa.org/resources/sea-level-rise-and-tidal-flooding-norfolk-virginia.

23 John D. Boon, et al., Anthropocene Sea Level Change: A History of Recent Trends Observed in the U.S. East, Gulf, and West Coast Regions, VA. INST. MARINE SCI. III-2 (2018); see also Peter Coutu, Sea Level Rise Continues to Accelerate; Hampton Roads Should Prepare for 1.7 Feet by 2050, Report Says, THE VIRGINIAN PILOT (Feb. 9, 2020), https://www.pilotonline.com/2020/02/09/sea-level-rise-continues-to-accelerate-hampton-roads-should- prepare-for-17-feet-by-2050-report-says/.

24 Craig E. Colton, Hurricane Michael Could Bring More Inland Flooding to Southeast States, THE CONVERSATION (Oct. 10, 2018), https://theconversation.com/hurricane-michael-could-bring-more-inland-flooding-to-southeast- states-104681; see also Inland Flooding, U.S. CLIMATE RESILIENCE TOOLKIT (Apr. 12, 2022), https://toolkit.climate.gov/topics/coastal-flood-risk/inland-flooding.

25 Southeast & The Caribbean, THIRD NATIONAL CLIMATE ASSESSMENT, U.S. GLOB. CHANGE RSCH. PROG. (2014), https://nca2014.globalchange.gov/report/regions/southeast.

26 See Angel Adegbesan, Hurricane Ian Death Toll in U.S. Hits 100 Across Three States, TIME (Oct. 8, 2022), https://time.com/6220855/hurricane-ian-death-toll/; Robbie M. Marks et al., Association of Tropical Cyclones With County-Level Mortality in the U.S., 327 J. AM. MED. ASS'N 946, 954 (2022).

27 Deborah N. Barbeau et al., Mold Exposure and Health Effects Following Hurricanes Katrina and Rita, 31 ANN. REV. PUB. HEALTH 165, 168 (2010); Carla Stanke et al., The Effects of Flooding on Mental Health: Outcomes and Recommendations from a Review of the Literature, PLOS CURRENT DISASTERS

2, 13 (2012); Hayley T. Olds et al., High Levels of Sewage Contamination Released from Urban Areas After Storm Events: A Quantitative Survey with Sewage Specific Bacterial Indicators, 15 PLOS MED. 1, 13-15 (2018).

There are also major economic costs to climate change, and studies have found that the future costs will be unequally distributed across the United States.28 Relative to the rest of the nation, the South will face the largest economic losses from climate change, with low-income and minority communities particularly affected.29 Lower income counties in the South may lose between 5 and 20 percent of gross domestic product per year—compared to an average yearly loss of 1.2 percent nationally—for every additional degree of warming by the 2080s.30 [EPA-HQ-OAR-2022-0829-0591, p. 4]

28 See, e.g., Hsiang, et al., supra note 9, at 1363.

29 Id.

30 Id. See also Brad Plumer & Najda Popovich, As Climate Changes, Southern States Will Suffer More Than Others,

N.Y. TIMES (June 29, 2017), https://www.nytimes.com/interactive/2017/06/29/climate/southern-states-worse- climate-effects.html. [EPA-HQ-OAR-2022-0829-0591, p. 4]

Organization: Steven G. Bradbury

Furthermore, EPA has deliberately left out of its cost-benefit equation entirely the upstream carbon dioxide emissions associated with EV production.49 The minerals and components used in EV batteries are mostly processed or manufactured in China using power generated from coal. While the U.S. has achieved huge reduc- tions in carbon dioxide emissions by converting coal-fired power plants to natural gas, China's and other Asian nations' carbon emissions are growing rapidly because of their heavy reliance on coal, and EPA's rules will only accelerate that dynamic.50 An automotive engineering analysis published in 2022 estimated that the carbon dioxide emissions from producing the battery used in one small EV (the Nissan Leaf) were equivalent to driving an ICE vehicle 24,000 miles (two years of driving), and those from producing the battery used in a large EV (the Tesla Model S) were equivalent to driving an ICE vehicle 60,000 miles (five years of driving).51 In these rulemaking proposals, EPA has completely ignored the fact that EVs start out their lives on the road with such a huge head start (two to five years worth) in carbon dioxide emissions over their ICE counterparts. [EPA-HQ-OAR-2022-0829-0647, pp. 17-18]

49 See id. at 29197, 29254.

50 See Robert Bryce, "The Iron Law of Electricity Strikes Again as Vietnam Boosts Coal Burn," June 17, 2023, https://robertbryce.substack.com/p/the-iron-law-of-electricity-strikes.

51 See Tristan Burton, et al., Convergent Science, Inc., "A Data-Driven Greenhouse Gas Emission Rate Analysis for Vehicle Comparisons," SAE Int'l Journal of Electrified Vehicles, April 13, 2022, https://doi.org/10.4271/14-12-01-0006 (also available at https://www.sae.org/publications/technical-papers/content/14-12-01-0006/).

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

Because of the urgency of the climate and air pollution crises worldwide and the challenges of predicting consumer acceptance, it is important to take an all-hands-on-deck approach and have multiple types of zero-emission car and truck technologies in the final regulation including Strong PHEVs. [EPA-HQ-OAR-2022-0829-0646, p. 25]

- Strong PHEVs offer more options for consumers which means a faster path to zero CO_2 worldwide when combined with BEV and FCEV options especially given supply chain, utility grid and charging infrastructure challenges we face today.

- Many areas of the world are relying on EPA's leadership to commercialize new zero carbon solutions to transportation such as Strong PHEVs.

- The longer-term goal should be PHEVs with 100% zero carbon electricity generation for almost all of their electric miles, and advanced biofuels or other ultra-low carbon fuel for the remaining miles. [EPA-HQ-OAR-2022-0829-0646, p. 25]

Organization: Tesla, Inc.

Tesla supports EPA's efforts to accelerate light-duty vehicle electrification as it is essential for reducing greenhouse gas (GHG) and criteria pollutants and addressing the rapidly escalating climate crisis. [EPA-HQ-OAR-2022-0829-0792, p. 6]

As the agency highlights, light-duty vehicles are major emitters of climate-warming GHGs, stating: [EPA-HQ-OAR-2022-0829-0792, p. 7]

The transportation sector is the largest U. S. source of GHG emissions, representing 27.2 percent of total GHG emissions. Within the transportation sector, light-duty vehicles are the largest contributor, at 57.1 percent, and thus comprise 15.5 percent of total U.S. GHG emissions, even before considering the contribution of medium-duty Class 2b and 3 vehicles which are also included under this rule.45 [EPA-HQ-OAR-2022-0829-0792, p. 7]

45 88 Fed. Reg. at 29816-17.

As EPA has already determined, vehicle GHG emissions endanger public health and welfare.46 Since the issuance of the Endangerment Finding continued peer-reviewed scientific analysis has further elucidated the level of GHG emission reduction needed to adequately protect the public welfare.47 In finalizing the requisite level of emissions reduction in the new light-duty standards, the agency should look first toward the consensus UNFCCC and IPCC goal of limiting global warming to below 1.5 degrees Celsius compared to pre-industrial levels as its baseline.48 The U.S. has adopted an international commitment to put policies in place consistent with this protective aim.49 To meet this new target the U.S. has committed to achieve a 50-52 percent reduction from 2005 levels in economy wide GHG pollution in 2030.50 This commitment is part of the national effort to prevent significant domestic impacts from climate change51 and embodies near term action commensurate with meeting this benchmark.52 Further, EPA recognizes the need to promulgate regulations that "would contribute toward the goal of holding the increase in the global average temperature to well below 2 °C above pre-industrial levels, and subsequently reduce the probability of severe climate change related impacts including heat waves, drought, sea level rise, extreme climate and weather events, coastal flooding, and wildfires."53 [EPA-HQ-OAR-2022-0829-0792, pp. 7-9]

46 74 Fed. Reg. 66496 (Dec. 15, 2009) (Endangerment Finding).

47 See, 88 Fed. Reg. at 29208.

48 See generally, UNFCCC, Key aspects of the Paris Agreement available at h ttps://unfccc.int/process-and-meetings/the- p aris-agreement/the-paris-agreement/key-aspects-of-the-paris-agreement.

49 The United States of America Nationally Determined Contribution Reducing Greenhouse Gases in the United States: A 2030 Emissions Target (April 21, 2021) at 23. available at h ttps://unfccc.int/sites/default/files/NDC/2022-0 6/United%20States%20NDC%20April%2021%202021%20Final.pdf ("As noted above, the United States' NDC is consistent with the Paris Agreement temperature goal of holding the increase in the global average temperature to well below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change (Article 2.1(a)").

50 White House: FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies (April 22, 2021) available at h ttps://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-g reenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on- c lean-energy-technologies/.

51 See, President Biden, Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, 86 Fed. Reg. 7619 (Feb. 1, 2021). available at h ttps://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-h ome-and-abroad.

52 See, Nature, Realization of Paris Agreement pledges may limit warming just below 2 °C (April 13, 2022) available at h ttps://www.nature.com/articles/s41586-022-04553-z ?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top (Limiting warming not only to 'just below' but to 'well below' 2 degrees Celsius or 1.5 degrees Celsius urgently requires policies and actions to bring about steep emission reductions this decade, aligned with mid-century global net-zero CO2 emissions.).

53 88 Fed. Reg. at 29199.

As part of this effort, numerous studies have highlighted that electrifying the light-duty fleet as rapidly possible will enable the U.S. to meet its commitment and equitably contribute to emissions reductions that adequately protect the country's health and welfare.54 For example, a central component of the U.S. long-term climate strategy in transportation is the "rapid expansion of zero-emission vehicles—in as many applications as possible across light-, medium-, and heavy-duty applications."55 Moreover, the American Lung Association (ALA) found that the environmental benefits from electrifying the transportation sector in the form of avoided climate change impacts, as expressed as the social cost of carbon,56 could surpass $113 billion in 2050 as transportation systems combust far less fuel and our power system comes to rely on cleaner, non-combustion renewable energy.57 [EPA-HQ-OAR-2022-0829-0792, pp. 7-9]

54 See e.g., IPCC, AR 6, Working Group III, Climate Change 2022: Mitigation of Climate Change (April 4, 2022) at 1109 available at h ttps://www.ipcc.ch/report/sixth-assessment-report-working-group-3/ (highlighting among other scenarios full light duty vehicle electrification being the most promising low-carbon pathway to meet a 1.75°C goal); See also, UNFCCC, Nationally determined contributions under the Paris Agreement; Synthesis report by the secretariat (Feb. 26, 2021) at 32 available at h ttps://unfccc.int/documents/268571https://unfccc.int/documents/268571 (In terms of specific technologies that Parties intend to use for achieving their adaptation and mitigation targets, the most frequently

identified were energy efficient appliances and processes, renewable energy technologies, low- or zero-emission vehicles and hydrogen technologies) (emphasis added).

55 United States Executive Office of the President, The Long-Term Strategy of The United States Pathways to Net-Zero Greenhouse Gas Emissions by 2050 (Nov. 2021) at 31. available at h ttps://www.whitehouse.gov/wp-c ontent/uploads/2021/10/US-Long-Term-Strategy.pdf.

56 See, White House, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990 (Feb. 2021). available at h ttps://www.whitehouse.gov/wp-c ontent/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

57 American Lung Association, The Road to Clean Air Benefits of a Nationwide Transition to Electric Vehicles (2020) at 6 available at h ttps://www.lung.org/clean-air/electric-vehicle-report/electric-vehicle-report-2
020#:~:text=The%20%22Road%20to%20Clean%20Air,diesel%20power)%20and%20toward%20electric.

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

In order to produce supplies of renewables, China is increasing its construction of coal- fired power plants. This increases carbon emissions and reduces EPA's benefits from U.S. emissions reduction. America has 225 coal-fired power plants, and China has 1,118 (half of all the coal-fired plants in the world).31 That is one reason why China has increased carbon emissions by over 5,000 million metric tons over the past 16 years.32 In contrast, America's carbon emissions have declined by over 1,000 million metric tons over the same period due to the use of clean natural gas.33 (See Figure 1.) [EPA-HQ-OAR-2022-0829-0674, pp. 7-8]

31 Jessica Aizarani, Statista, "Global operational coal-fired power stations by country 2022," January 30, 2023, https://www.statista.com/statistics/859266/number-of-coal-power-plants-by-country/ (accessed April 28, 2023).

32 "International Emissions." International - U.S. Energy Information Administration (EIA), www.eia.gov/international/data/world/other-statistics/emissions-by-fuel?pd=40&p=0000000000000000000000000000000000000000000000000000b0001&u=0&f=A&v=column&a=-&i=none&vo=value&t=C&g=none&l=71-- 71&s=1104537600000&e=1609459200000& (accessed 21 June 2023).

33 Ibid.

China has not committed to reducing emissions until 2027. Research has shown that even completely eliminating all fossil fuels from the United States would result in less than 0.2 degrees Celsius in temperature mitigation by 2100.34 Americans, particularly poor and middle class, would be bearing major costs in higher electricity prices, higher food prices, and a forced switch to costly electric vehicles without benefits for the environment. They would pay the price for President Biden's energy agenda. [EPA-HQ-OAR-2022-0829-0674, pp. 7-8]

34 Kevin D. Dayaratna, PhD, Katie Tubb, and David Kreutzer, "The Unsustainable Costs of President Biden's Climate Agenda," Heritage Foundation Backgrounder No. 3713, June 16, 2022, https://www.heritage.org/sites/default/files/2022-06/BG3713_0.pdf, (accessed May 1, 2023).

SEE ORIGINAL COMMENT FOR GRAPH CO2 Emissions Trends in Key Countries, 2005-2021 Figure 1 [EPA-HQ-OAR-2022-0829-0674, pp. 7-8]

Environmental benefits overstated

The study substantially overstates the environmental benefits of the rule. See Tables 172-187. All of the environmental benefits, even if accurately measured, are limited to benefits in local areas of the United States. There may well be reductions in CO2 and other emissions where a vehicle is driven. But the environmental harms elsewhere are substantial: [EPA-HQ-OAR-2022-0829-0674, p. 14]

- Environmental harms from the poorly supervised extraction of rare-earth minerals in developing countries;

- Environmental harms transporting the rare earth minerals to battery factories in other countries, but principally in China;

- Environmental harms from the manufacture of batteries in other countries, but principally in China; and

- In addition, environmental harms from the generation and transmission of electricity, even with renewable generation, in the United States.

For these and other reasons, the environmental benefits are substantially overstated and may well be negative. [EPA-HQ-OAR-2022-0829-0674, p. 14]

Best scientific practice uses models that work and does not seriously consider those that do not. This is standard when formulating the daily weather forecast, and should be the standard with regard to climate forecasts. [EPA-HQ-OAR-2022-0829-0674, p. 24]

The IPCC's recently released Sixth Assessment Report (AR6) uses a new suite of models, designated CMIP6. As shown by McKitrick and Christy (2020) however, the CMIP6 models are even worse.62 Of the two models that work, the Russian INM-CM4.8, has even less warming than its predecessor, with an ECS of 1.8°C, compared to the CMIP6 community value of around four degrees.63 The other one is also a very low ECS model from the same, group, INM-CM5. The model mean warming rate exceeds observation by more than two times at altitude in the tropics. [EPA-HQ-OAR-2022-0829-0674, p. 24]

62 R. McKitrick and J. Christy. 2020. Pervasive Warming Bias in CMIP6 Tropospheric Layers. Earth and Space Science Volume 7, Issue 9, https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2020EA001281.

63 Most (not all) of the CMIP-6 models were available for McKitrick and Christy (2020); this figure is the mean ECS of what was released through late 2020.

SEE ORIGINAL COMMENT FOR GRAPH OF 5-yr Running mean 300-200hPa Tropical Temperature Anomalies CMIP-6 (Historical + ssp245 after 2014) [EPA-HQ-OAR-2022-0829-0674, p. 24]

Quoting from McKitrick and Christy's conclusion: [EPA-HQ-OAR-2022-0829-0674, p. 24]

The literature drawing attention to an upward bias in climate model warming responses in the tropical troposphere extends back at least 15 years now … Rather than being resolved, the problem has become worse, since now every member of the CMIP6 generation of climate models exhibits an upward bias in the entire global troposphere as well as in the tropics. [EPA-HQ-OAR-2022-0829-0674, p. 24]

Zeke Hausfather, hardly a climate skeptic, has noted that while the CMIP6 models are warmer than the previous generation, the warmer they are, the more they over-forecast warming in recent decades, confirming what McKitrick and Christy found.64 [EPA-HQ-OAR-2022-0829-0674, p. 24]

64 Zeke Hausfather, “Cold Water on Hot Models,” The Breakthrough Institute, February 11, 2020, https://thebreakthrough.org/issues/energy/cold-water-hot-models.

Zhu, Poulsen, and Otto-Bliesner (2020) used a CMIP6 model called CESM2 to project warming from an emission scenario that reaches 855 parts per million by 2100—roughly three times the pre-industrial concentration. Despite being tuned to match the behavior of 20th century climate, CESM2 produced a global mean temperature “5.5°C greater than the upper end of proxy temperature estimates for the Early Eocene Climate Optimum.” That was a period when CO2 concentrations of about 1,000 ppm persisted for millions of years.65 Moreover, the modeled tropical land temperature exceeded 55°C, “which is much higher than the temperature tolerance of plant photosynthesis and is inconsistent with fossil evidence of an Eocene Neotropical rainforest.”66 [EPA-HQ-OAR-2022-0829-0674, p. 24]

65 NOAA National Centers for Environmental Information, Early Eocene Period, 54 to 48 Million Years Ago, https://www.ncdc.noaa.gov/global-warming/early-eocene-period.

66 Jiang Zhu, Christopher J. Poulsen & Bette L. Otto-Bliesner. 2020. High climate sensitivity in CMIP6 model not supported by paleoclimate. Nature Climate Change volume 10, pages 378–379, https://www.nature.com/articles/s41558-020-0764-6.

under more realistic assumptions regarding agricultural productivity and climate sensitivity, the mean SCC essentially drops to zero and in many cases has a substantial probability of being negative. At a minimum, Dayaratna et al. (2020) further demonstrates that the SCC is highly sensitive to very reasonable changes in assumptions. The models can therefore suggest a variety of outcomes of climate change - ranging from catastrophic disaster or continued prosperity to climate change – all under very reasonable assumptions. As a result of the uncertainty summarized in the above published analysis, the proposed rule is arbitrary and capricious and therefore should not be implemented. Miniscule Temperature Impact Not Discussed In the Proposed Rule The proposed rule begins by saying: [EPA-HQ-OAR-2022-0829-0674, p. 30]

Motor vehicle emissions contribute to ozone, particulate matter (PM), and air toxics, which are linked with premature death and other serious health impacts, including respiratory illness, cardiovascular problems, and cancer. This air pollution affects people nationwide, as well as those who live or work near transportation corridors. In addition, there is consensus that the effects of climate change represent a rapidly growing threat to human health and the environment, and are caused by GHG emissions from human activity, including motor vehicle transportation. Recent trends and developments in emissions control technology, including vehicle electrification and other advanced vehicle technologies, indicate that more stringent emissions standards are feasible at reasonable cost and would achieve significant improvements in public health and welfare. Addressing these public health and welfare needs will require substantial additional reductions in criteria pollutants and GHG emissions from the transportation sector. (p.29186) [EPA-HQ-OAR-2022-0829-0674, p. 30]

Subsequently, the rule states: “The transportation sector is the largest U.S. source of GHG emissions, representing 27.2% of total GHG emissions." (p. 29186). Since the policy is intended to avert climate change it is necessary to quantify the climate impact of the proposed rule. At The Heritage Foundation, we used the Model for the Assessment of Greenhouse Gas Induced Climate Change version 6, developed by researchers at the EPA to quantify the climate impact. We found that assuming a climate sensitivity of 5.0 degrees C (the upper bound of estimated climate sensitivities indicated by the Intergovernmental Panel on Climate Change), there would be less than 0.0305 degrees C temperature mitigation by 2050 and less than 0.0644 by 2100. [EPA-HQ-OAR-2022-0829-0674, p. 30]

If the objective of the proposed rule is to avert climate change, then it is insufficient for the rule to be based solely on GHG emission reductions; the EPA should go a step further to take these missions and calculate temperature impacts as done above. As a result, the proposed rule is arbitrary and capricious and should not be implemented. [EPA-HQ-OAR-2022-0829-0674, p. 30]

Organization: U.S. Conference of Catholic Bishops (USCCB)

4. Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles]. Docket ID No EPA–HQ–OAR–2022–0829

Personal vehicles—cars, light-duty trucks (including sport utility vehicles, crossover utility vehicles, minivans, and pickup trucks), and motorcycles—are responsible for 58 percent of U.S. transportation sector GHG emissions, in addition to being a major source of other pollutants with adverse effects to human health.16 The EPA's proposed rule for more stringent emissions standards for light and medium-duty vehicles addresses pollution from personal vehicles taking into account industry trends and investments in electric vehicles (EVs) outlined in the Inflation Reduction Act (IRA) and other policies. 88 Fed. Reg. 29184 (May 5, 2023). The EPA offers that these "more stringent emissions standards are feasible at reasonable cost and would achieve significant improvements in public health and welfare." 88 Fed. Reg. at 29186. The goals of improved public health, welfare and reduced GHG emissions are consistent with Catholic Social Teaching. As a general matter, it is good to consider strengthening vehicle emissions standards, as the USCCB stated in 2018: "If any modifications are made to existing fuel efficiency and greenhouse gas emission standards, we would urge these standards be strengthened, not weakened, to further protect human and environmental health."17 [EPA-HQ-OAR-2022-0829-0540, pp. 3-4]

16 Congressional Budget Office, Dec. 13, 2022, https://www.cbo.gov/publication/58566

17 USCCB Rulemaking comment, Oct. 23, 2018, https://www.usccb.org/about/general-counsel/rulemaking/upload/NPRM-CAFE-Comment-Draft-101118-AP-1.pdf

Organization: Wisconsin Department of Natural Resources

In addition to the criteria pollutant benefits, the rule's revised GHG standards are critical to achieving long-term climate goals in Wisconsin. Federally regulated mobile sources are a significant contributor to Wisconsin's greenhouse gas levels. On-road light- and medium-duty gasoline vehicles were responsible for about 23.2 million metric tons of carbon dioxide (CO2) equivalent (MMCO2E), or 16% of the state's total greenhouse gas emissions inventory in 2018.1 Given that Wisconsin lacks the authority to address GHG emissions from on-road vehicles, EPA's action to update these standards is needed to help Wisconsin meet its climate objectives. [EPA-HQ-OAR-2022-0829-0507, p. 2]

1 Wisconsin 2021 Greenhouse Gas Emissions Inventory Report, available at: https://widnr.widen.net/view/pdf/o9xmpot5x7/AM610.pdf?t_download=true.

Organization: Zero Emission Transportation Association (ZETA)

3. Emissions Standards are Necessary to Protect Public Health and the Environment

This rule will accelerate investment in electric technologies that will lead to significant emissions reductions and improved health outcomes. Americans are keeping their cars longer, meaning the need for EPA action to reduce emissions from these types of personal vehicles is even more urgent.55 Failing to rapidly electrify these classes of vehicles means that fossil fuel-powered vehicles rolling off assembly lines today will remain on the road for many years to come, adding millions of collective vehicle miles and associated deadly emissions over the coming decades. [EPA-HQ-OAR-2022-0829-0638, pp. 13-14]

55 "Americans are keeping their cars longer amid sky-high prices, rising interest rates," CNBC, (May 15, 2023) https://www.cnbc.com/2023/05/15/americans-are-keeping-their-cars-longer-amid-rising-interest-rates.html

As discussed in more detail below, ICEVs are a constant and ongoing hazard to public health and the environment. They are also major contributors to anthropogenic climate change. [EPA-HQ-OAR-2022-0829-0638, pp. 13-14]

Electrification presents the most commercially viable pathway to reducing pollution from the transportation sector and unlocking tangible environmental and public health benefits. [EPA-HQ-OAR-2022-0829-0638, pp. 13-14]

Accordingly, EPA should finalize emissions standards for LMDVs that result in deep cuts to GHG and criteria pollutant emissions through continued growth in the EV sector. Implementing and upholding robust emissions standards that decarbonize the transportation sector through electrification is a national public health, climate, and equity imperative. [EPA-HQ-OAR-2022-0829-0638, pp. 13-14]

b. Reducing Transportation Emissions Protects the Environment and the Climate

Never has the evidence been more clear that climate change is anthropogenic, and recent atmospheric research provides new indications of human-caused climate change associated with increases in CO2 emissions. Differences between tropospheric and lower stratospheric temperature trends have long been recognized as a fingerprint of human effects on the climate.68 A new study published in the Proceedings of the National Academy of Sciences has factored in temperature from the mid to upper stratosphere–25 to 50 kilometers above the Earth's surface–into these comparisons.69 The results further underscore the impact humans are having on our atmosphere and the potentially catastrophic effects that are increasingly likely to result such as more frequent wildfires, longer periods of drought in some regions, and an increase in the wind intensity and rainfall from tropical cyclones.70,71 [EPA-HQ-OAR-2022-0829-0638, p. 16]

68 B. Santer, et.al. "Exceptional stratospheric contribution to human fingerprints on atmospheric temperature," PNAS, (May 8, 2023) accessed May 15, 2023 https://www.pnas.org/doi/10.1073/pnas.2300758120

69 Id. at footnote 68

70 "The Effects of Climate Change," NOAA, accessed June 23, 2023 https://climate.nasa.gov/effects/

71 "AR6 Synthesis Report - Climate Change 2023" IPCC (March 2023) https://www.ipcc.ch/report/ar6/syr/

As the nature of anthropogenic climate change is becoming increasingly evident, the urgency needed in addressing its causes is becoming greater.72 Between 1971 and 2020, around 380,000,000,000,000,000,000,000 joules of energy—equivalent to 25 atomic bombs—have been trapped in the atmosphere as a result of warming, according to a 2023 study published in Earth System Science Data.73 In 2021, the U.S. emitted 6,340 million metric tons of CO2—of which, fossil fuel combustion was responsible for nearly 75%.74 A significant portion of that fossil fuel combustion occurs within the transportation sector, which accounts for 28% of total emissions and is the largest emitting sector.75 Light-duty vehicles account for 57% of transportation GHG emissions and light-duty ICEVs emit around 19 pounds of carbon dioxide and other global-warming gasses for every gallon of gasoline consumed.76 [EPA-HQ-OAR-2022-0829-0638, p. 16]

72 "Carbon dioxide levels in atmosphere mark a near-record surge," Washington Post, (June 5, 2023) https://www.washingtonpost.com/climate-environment/2023/06/05/carbon-dioxide-growing-climate-change/

73 von Schuckmann, K., et. al. "Heat stored in the Earth system 1960–2020: where does the energy go?," Earth Syst. Sci. Data, (April 17, 2023) https://doi.org/10.5194/essd-15-1675-2023

74 "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021," (2023) U.S. Environmental Protection Agency, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-andsinks-1990-2021

75 "Sources of Greenhouse Gas Emissions," U.S. Environmental Protection Agency, accessed June 26, 2023 https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

76 "Car Emissions and Global Warming," Union of Concerned Scientists, (July 18, 2014) https://www.ucsusa.org/resources/car-emissions-global-warming

As EPA explains in the proposed rule, automaker investments in electric technologies implicitly acknowledge that the sector believes electric vehicles are the cleaner alternative. EVs produce zero tailpipe emissions and studies have shown that in every state in the U.S.—even states with fossil fuel intensive electricity grids—driving an electric vehicle leads to significantly fewer GHG emissions.77 In Kentucky, for example, where the electricity mix is 71.8% coal and 20.6% natural gas, driving an EV results in 6,903 fewer pounds of CO2 annually than driving an ICEV.78 [EPA-HQ-OAR-2022-0829-0638, p. 17]

77 "Driving an EV Is Getting Greener, Especially in the U.S.," The Wall Street Journal (May 10, 2023) https://www.wsj.com/articles/how-clean-are-electric-cars-it-depends-4d1086d6?mod=hp_lista_pos2

78 "Emissions from Electric Vehicles," Department of Energy's Alternative Fuels Data Center, accessed June 26, 2023 https://afdc.energy.gov/vehicles/electric_emissions.html

Diesel emissions are of particular concern for environmental outcomes. Many class 2b and 3 vehicles continue to be powered by diesel engines.79 Emissions from diesel engines have detrimental impacts not only on human health, but on natural ecosystems as well. A study from the University of Southampton demonstrated that exposure to diesel exhaust has negative impacts on pollinators and that NOx emissions altered the smell of five out of the eleven most common single compound floral odors.80 In areas where diesel exhaust is present, a 2022 study found that there were 70% fewer pollinators and 90% fewer flower visits.81 A separate study from the Journal of Environmental Health Science and Engineering suggests that prolonged exposure to internal combustion engine exhaust has potentially significant impacts on agro-ecosystems and plant germination.82 [EPA-HQ-OAR-2022-0829-0638, p. 17]

79 “2023 Trucks With Diesel Engines: Cleaner, Meaner Torque Monsters,” MotorTrend, (May 1, 2023) accessed June 26, 2023 https://www.motortrend.com/features/trucks-with-diesel-engines

80 “Diesel fumes alter half the flower smells bees need,” University of Southampton, (October 19, 2015) https://www.southampton.ac.uk/news/2015/10/diesel-fumes-alter-flower-smell-for-bees.page

81 James M.W. Ryalls, et. al., ‘Anthropogenic air pollutants reduce insect-mediated pollination services’, Environmental Pollution, (March 15, 2022) https://doi.org/10.1016/j.envpol.2022.118847

82 Afsharnia F, Moosavi SA. “Effects of diesel-engine exhaust emissions on seed germination and seedling growth of Brassicaceae family using digital image analysis.” (September 28, 2021) ncbi.nlm.nih.gov/pmc/articles/PMC8617225/

EPA Summary and Response

Summary:

Many commenters (e.g., American Council for an Energy-Efficient Economy, American Lung Association (ALA), National Parks Conservation Association (NPCA), Southern Environmental Law Center (SELC), Zero Emission Transportation Association (ZETA)) stressed that climate change is a top public health priority and a public health emergency. These commenters stated that climate change is endangering the public health and welfare of all populations, including children, by increasing risks of heart disease, mental health, pollen seasons, allergies, drought, frequent flooding, and other listed impacts. One of these commenters stated that climate change also poses an increasing threat to America’s national parks (National Parks Conservation Association). These commenters stated that massive economic costs to climate change and studies have found that the future costs will be unequally distributed across the US. where, the geography and demographics of the South make the region particularly vulnerable to climate change.

Many of the commenters identified a litany of harms associated with the on-going climate crisis, and the light-duty sector’s contribution to the GHG emissions which are driving that crisis. Harms identified in the comments included:

- Worsening air quality (e.g., ACEEE, ALA, California Attorney General's Office, Metropolitan Washington Air Quality Committee (MWAQC))
- -- rise in vector borne disease (American Lung Association)
- -- flooding, drought, excessive heat, wildfires (e.g., California Attorney General's Office, Elders Climate Action, Institute for Policy Integrity at NYU School of Law, National Parks Conservation Association (NPCA), Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC), Southern Environmental Law Center (SELC), Tesla, Inc.
- Adverse mental health implications (e.g., American Lung Association (ALA), Environmental and Public Health Organizations Our Children’s Trust)
- -- impacts from sea level rise (e.g., National Parks Conservation Association (NPCA), Southern Environmental Law Center (SELC))

- -- disproportionate impact on disadvantaged communities and children, both domestic and worldwide (BlueGreen Alliance (BGA), Southern Environmental Law Center (SELC), Our Children's Trust)
- --national security implications (Institute for Policy Integrity)
- Disastrous impacts on parks from invasive species and loss of glaciers, snowpack and ice (National Parks Conservation Association)

Our Children's Trust also asserts that failure to manage, protect, and prevent substantial impairment to the earth, air, and climate would violate the federal government's fiduciary obligations under the Fifth Amendment of the Constitution and the Public Trust Doctrine. The commenter also asserted that in this rule the Ninth Circuit's findings in *Juliana v. United States*, 947 F.3d 1159, 1164 (9th Cir. 2020), on the federal government's role should guide EPA's policies and practices so that EPA can identify, and alter, those policies that exacerbate American youth's existing climate change injuries. Finally, the commenter argued that 1.5°C presents significant risks to the planet when compared to 1°C, and that therefore the EPA should not use a 1.5°C target to guide policy.

A few commentors assert that serious anthropogenic climate threats are inconsistent with evidence (American Enterprise Institute). Arizona State Legislature stated that the proposed rule is arbitrary and capricious because it fails to model and calculate the climate change impacts in order to weigh the benefits against the costs and what they claim is the transformative nature of the proposed rule. Without a showing that the rule will result in some type of quantifiable effect to prevent climate harms, this commenter questions its legality, and asserted that EPA's summary conclusion that the standards would contribute towards the goal is not good enough.

<u>Response:</u>

The EPA appreciates that many commenters are concerned about past, present, and future climate change and the many impacts on human health and welfare that result from climate change. The GHG reductions resulting from this rule will be a meaningful contribution to slowing the rate of future climate change. Importantly, EPA has found in the record for this rulemaking that the standards will reduce GHG emissions – almost 8 billion metric tons in net CO_2 equivalent cumulative emission reductions between 2027 and 2055. See preamble Section VI and RIA Chapter 8, which provide more detail on these emissions estimates and how they were calculated. This is a meaningful contribution, especially because it is due to one action, for one sector, for one nation. *See Coalition for Responsible Regulation*, 684 F. 3d at 332 ("EPA found that the emission standard would result in meaningful mitigation of greenhouse gas emissions. For example, EPA estimated that the Rule would result in a reduction of about 960 million metric tons of CO2e emission over the lifetime of the model year 2012-2016 vehicles affected by the new standards.") Climate change is not expected to be solved by any single action, but rather a large number of them. Moreover, as the Supreme Court recognized, "Agencies, like legislatures, do not generally resolve massive problems in one fell regulatory swoop. And reducing domestic automobile emissions is hardly a tentative step." Massachusetts v. E.P.A., 549 U.S. 497, 524 (2007) . Thus, EPA disagrees with the commenters that EPA has not provided a basis consistent with the requirements of CAA section 202(a)(1)-(2). See Section 3.3.1 of this RTC for response to comments regarding the stringency of the final rule relative to the proposal.

While EPA did not conduct additional climate modeling in support of this rulemaking, EPA is not required to do so in setting the standards under CAA section 202(a)(1)-(2). See *Coal. For Resp. Regulation*, 684 F. 3d at 128 (noting that EPA section 202(a)(1) authority is not "conditioned on evidence of a particular level of mitigation" but rather that authority is triggered by a showing of significant contribution, which was made in EPA's Endangerment Finding, and that, as just quoted above, furthermore the record for the vehicle standards rule at issue included an EPA estimate of the millions of tons that would be reduced by the rule). Indeed, CAA section 202(a)(1)-(2) does not require the agency to calculate the benefits of its rulemaking at all, and the commenter failed to adduce any statutory authority or other legal basis for the proposition that EPA must calculate benefits generally or specifically must model avoided temperature change or sea level rise.

We also note that, for purposes of E.O. 12866, EPA has estimated the value of the benefits of these reductions by applying the SC-GHG, which is a sufficient means of calculating benefits and so makes it unnecessary to conduct any further climate modelling for that purpose. The development of the SC-GHG involves the use of climate models in order to estimate the damages of an additional ton of emissions and is therefore a reasonable approach that uses the appropriate tool in benefit-cost analysis. When considering those monetized climate benefits, the monetized benefits of the rule far exceed its costs. EPA's reliance on SC-GHG to assess the climate benefits of this rulemaking is clearly reasonable. As we explain in preamble Section VIII.E and RIA Chapter 6.2, the SC-GHG is based on a voluminous record, significant public process, and the well-considered judgment of experts.

In response to Our Children's Trust, EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4 and EPA's Guidelines for Preparing Economic Analyses. With respect to the application of discount rates, EPA notes that we "use constant discount rates (1.5-percent, 2-percent, and 2.5-percent) similar to the near-term Ramsey discount rates to calculate the present and annualized value of SC-GHGs for internal consistency" (from the notes on Table VII-2 in the preamble for the final rule). That approach to discounting follows the same approach that the February 2021 TSD recommends "to ensure internal consistency—i.e., future damages from climate change using the SC-GHG at 2.5 percent should be discounted to the base year of the analysis using the same 2.5 percent rate." EPA has also consulted the National Academies' 2017 recommendations on how SC-GHG estimates can "be combined in RIAs with other cost and benefits estimates that may use different discount rates." The National Academies reviewed "several options," including "presenting all discount rate combinations of other costs and benefits with [SC-GHG] estimates." With regards to Our Children's Trust criticism and assertions regarding a 1.5°C target, the EPA is setting standards under Clean Air Act section 202(a)(1)-(2) as described in preamble sections I and II. With regards to Our Children's Trust discussion of the unique vulnerability of children to climate change, the EPA does recognize these vulnerabilities (see, e.g., the EPA report *Climate Change Impacts on Children's Health and Well-Being in the U.S.*), and the emissions reductions resulting from this rule will make an important contribution to efforts to limit climate change and its anticipated impacts to children relative to a future without this rule. The Agency does not dispute that climate change poses a serious threat, nor that addressing climate change requires the active involvement of the federal government. With regard to commenters' novel Constitutional and Public Trust legal theories, see Section 2.3 of the RTC for our response.

EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4 and EPA's Guidelines for Preparing Economic Analyses. With respect to the application of discount rates, EPA notes that it used the same discount rate as the rate used to discount the value of damages from future GHG emissions, for internal consistency. That approach to discounting follows the same approach that the February 2021 TSD recommends "to ensure internal consistency—i.e., future damages from climate change using the SC-GHG at 2.5 percent should be discounted to the base year of the analysis using the same 2.5 percent rate." EPA has also consulted the National Academies' 2017 recommendations on how SC-GHG estimates can "be combined in RIAs with other cost and benefits estimates that may use different discount rates." The National Academies reviewed "several options," including "presenting all discount rate combinations of other costs and benefits with [SC-GHG] estimates."

11 - Criteria and air toxics pollutants

11.1 - General comments

Comments by Organizations

Organization: A. Longo

Moreover, it is important to critically evaluate the direct correlation between these proposed regulations and substantial improvements in health conditions. While reducing emissions can have positive effects on respiratory health, it is essential to acknowledge that multiple factors influence overall health outcomes. A systematic review published in The Lancet Planetary Health journal analyzed various studies on air pollution and health outcomes. The review found that while reductions in air pollution are associated with improvements in health, the relationship between specific regulatory measures and health outcomes is complex and context-dependent [3]. [EPA-HQ-OAR-2022-0829-0517, pp. 1-2]

3 Fuller, Richard., et al. (2020). " Pollution and Health: a progress update." The Lancet Planetary Health, 4(6), e258-e269. Retrieved from https://www.thelancet.com/journals/lanplh/article/PIIS2542- 5 196(22)00090-0/fulltext

Organization: Alliance for Automotive Innovation

7. Environmental Justice Considerations

We agree with EPA that a reduction in heavy aromatics in gasoline will produce beneficial reductions in PM emissions that will further national environmental justice goals. EPA notes in the NPRM that people living and working near roadways will benefit from fuel improvements that reduce PM formation, that those individuals are more likely to be people of color and/or have a low socioeconomic status (SES), and that lower-SES neighborhoods are likely to have more vehicles with higher emissions than higher-SES neighborhoods.442 A fuel-based regulation to reduce PM emissions would do so for all vehicles in the on-road fleet. Importantly, the greatest absolute emissions reductions will occur in and benefit lower-SES communities, as those communities are more likely to have the highest-emitting vehicles, i.e., a higher proportion of older vehicles with the highest emissions levels (due to their vehicle's age). [EPA-HQ-OAR-2022-0829-0701, pp. 270-271]

Organization: American Fuel & Petrochemical Manufacturers

As previously mentioned, EPA did not fully consider the impact of the rule on fleet turnover. The Agency is aware that the higher purchase price of new ZEVs will keep older cars and trucks on the road longer and that new ZEVs will increase particulate matter ("PM") emissions through increased tire and road wear. In another example of EPA's biased analysis, EPA estimated the value of health benefits from reductions in PM2.5 emissions by multiplying PM2.5-related benefit-per-ton ("BPT") values by the annual reduction in tons of directly emitted PM2.5 and PM2.5 precursor emissions (NOx and SO2) from displaced ICEVs.206 However, EPA ignored the fleet turnover benefit that would result from replacing older ICEVs with new, more efficient, ICEVs.

EPA also ignored its own National Emissions Inventory, which shows that roadway dust contributes more PM2.5 emissions than the tailpipe. Roadway dust emissions, including particles from tire wear, are correlated with vehicle weight, so increases in fleet average vehicle weight would be expected to increase roadway dust PM2.5 emissions.207 Converting ICEs to ZEVs under the Proposal would significantly increase the average vehicle weight on U.S. roadways, which in turn would increase the entrained road dust emissions. Yet EPA did not include these PM sources or increases in the analysis. There also exist overall medium-duty truck weight restrictions, which could require a greater number of ZEVs to move the same tonnage of cargo, thus increasing the number of vehicles needed to haul the same amount of freight, vehicle miles traveled, and resulting PM emissions. [EPA-HQ-OAR-2022-0829-0733, p. 45]

206 DRIA at 7-36.

207 EPA, "2020 National Emissions Inventory (NEI) Data," available at https://www.epa.gov/air-emissions- inventories/2020-national-emissions-inventory-nei-data.

Those emissions are significant and may offset or eliminate the benefits that EPA calculates. [EPA-HQ-OAR-2022-0829-0733, p. 45]

Organization: American Lung Association (ALA) et al.

The American Lung Association's most recent "State of the Air" report noted that approximately 120 million Americans live in communities impacted by unhealthy levels of ozone and/or particle pollution.1 Exposure to air pollution can contribute to asthma attacks, heart attacks and stroke, lung cancer, low birthweight and premature birth, premature death and other health risks. Traffic pollution specifically is associated with premature death due to cardiovascular disease, lung cancer death, asthma onset in children and adults and other negative outcomes.2 The burdens of air pollution are not equally shared: people of color make up the majority of those living in the communities with unhealthy air and a person of color in the United States is 3.7 times more likely to live in a community with the worst air pollution in the nation than a white person. . [EPA-HQ-OAR-2022-0829-0745, p. 1]

1 American Lung Association. State of the Air 2023. April 2023. www.lung.org/sota

2 Health Effects Institute. "Systematic Review and Meta-analysis of Selected Health Effects of Long-Term Exposure to Traffic-Related Air Pollution." Special Report 23: 2022

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Despite significant progress reducing air pollution, California experiences some of the nation's poorest air quality, with more than 21 million Californians living in areas that exceed federal ozone standards. 3 Within these areas, there are many low-income and disadvantaged communities that are exposed to not only ozone, but also to particulate and toxic pollutant levels that are significantly higher than applicable federal standards and which have immediate and detrimental health effects. With new research demonstrating adverse health impacts even below NAAQS levels, it remains critically important to continue to reduce emissions wherever feasible. [EPA-HQ-OAR-2022-0829-0780, p. 8]

3 California Air Resources Board (CARB). 2022 State Strategy for the State Implementation Plan. October 2021.
https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf

In addition to ongoing air quality challenges, California is on the front lines of climate change. With the increasing severity and frequency of drought, wildfire, extreme heat, and other impacts, Californians need only look out their windows to know that climate change is real and rapidly getting worse. 4 The impacts we thought we would see in the decades to come are happening now and, as with air pollution, are disproportionately affecting low-income communities and communities of color. [EPA-HQ-OAR-2022-0829-0780, p. 8]

4 CARB. 2022 Scoping Plan for Achieving Carbon Neutrality. December 2022.
https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

The Proposal Will Protect Public Health

Reducing motor vehicle pollution is imperative to protect public health. U.S. EPA's proposed emission standards, or a stronger version, would effectively reduce both GHGs and criteria pollutants like PM, leading to a wide array of vital public health benefits. While U.S. EPA has comprehensively summarized the potential public health benefits of its proposal, CARB finds that there are additional public health benefits that go beyond those described. CARB has summarized its findings and notes that were U.S. EPA to include this information it would better encompass the tremendous potential benefits resulting from the proposal. [EPA-HQ-OAR-2022-0829-0780, p. 52]

Health Risk from Respiratory Infections like COVID

Exposure to elevated pollution levels is not only linked to worsening respiratory and cardiovascular diseases but also to increased vulnerability to illnesses. The recent COVID-19 pandemic raised new concerns about air pollution increasing the disproportionate burden of infectious illnesses, particularly among vulnerable communities of color because of higher PM exposures in their neighborhoods. U.S. EPA's 2022 Supplement to the 2019 PM ISA briefly described multiple recent studies in this area. CARB's recently funded research has also demonstrated the link between chronic exposure to elevated PM2.5 levels and increased cases of premature death and illness from COVID-19 in the State. 95, 96 For instance, English et al. (2022) determined that if all areas of California had PM2.5 levels below the 2022 PM2.5 NAAQS of 12.0 μg/m³, a total of 4,250 COVID-19 deaths could have been prevented during the period of this study. 97 CARB recommends that U.S. EPA add a discussion specifically about the benefits of improving air quality to reducing risks for infectious respiratory diseases, especially in the wake of the COVID pandemic [EPA-HQ-OAR-2022-0829-0780, pp. 53-54].

95 English PB, Von Behren J, Balmes JR, Boscardin J, Carpenter C, Goldberg DE, Horiuchi S, Richardson M, Solomon G, Valle J, Reynolds P. Association between long-term exposure to particulate air pollution with SARS- CoV-2 infections and COVID-19 deaths in California, U.S.A. Environ Adv. 2022 Oct;9:100270. doi: 10.1016/j.envadv.2022.100270. Epub 2022 Jul 26. PMID: 35912397; PMCID: PMC9316717.

96 Jerrett M, Nau CL, Young DR, Butler RK, Batteate CM, Su J, Burnett RT, Kleeman MJ. Air pollution and meteorology as risk factors for COVID-19 death in a cohort from Southern California. Environ Int. 2023 Jan;171:107675. doi: 10.1016/j.envint.2022.107675.

97 See English et al. 2022 p. 8

Disproportionate impact of exposure to Traffic-Related Air Pollution (TRAP)

While U.S. EPA conducted an extensive literature review on disparities in exposure to TRAP across U.S. populations, CARB has identified several national studies and a series of California studies that enrich the existing literature already documented by U.S. EPA for the proposed standards. [EPA-HQ-OAR-2022-0829-0780, pp. 56-57]

A recent nationwide study reported that people of color experience disproportionate exposures to PM2.5. 103 The study found that the systemic PM2.5 exposure disparity experienced by people of color is related to emission sources from almost all major emission categories. The largest sources of the disparities are industry, light-duty gasoline vehicles, construction, and heavy-duty diesel vehicles. Moreover, the disproportionate exposures have been seen in individual U.S. states, in individual urban and rural areas, across incomes, and across exposure levels. Another national study showed that zip codes with more White and Native American populations have lower average PM2.5 levels than ZIP codes with more Black, Asian, and Hispanic or Latino populations. 104 The disparities in PM2.5 exposure is also shown in zip codes with low-income populations compared to zip codes with high-income populations. Moreover, people of color in the U.S. not only face longer-term PM2.5 exposure but also short-term PM2.5 exposure (e.g., more days with PM2.5 concentrations above the thresholds) than non-Hispanic Whites. 105 [EPA-HQ-OAR-2022-0829-0780, pp. 56-57]

103 Tessum CW, Paolella DA, Chambliss SE, Apte JS, Hill JD, Marshall JD. PM2.5 polluters disproportionately and systemically affect people of color in the United States. Sci Adv. 2021 Apr 28;7(18):eabf4491.

104 Jbaily A, Zhou X, Liu J, Lee TH, Kamareddine L, Verguet S, Dominici F. Air pollution exposure disparities across US population and income groups. Nature. 2022 Jan;601(7892):228-233.

105 Collins TW, Grineski SE. Racial/Ethnic Disparities in Short-Term PM2.5 Air Pollution Exposures in the United States. Environ Health Perspect. 2022 Aug;130(8):87701.

Environmental pollutants affect children more than adults, and children in low-income and urban areas near industrial, rail, and traffic sources face particularly high health risks. Results from CARB’s groundbreaking, long-term children’s health study in Southern California demonstrated that particle pollution may significantly reduce lung function growth in children 106, 107, 108 and indicates these effects are likely permanent. 109 Additionally, increased exposure to vehicular traffic pollution was associated with adverse childhood health impacts, including slower lung development, 110 increased symptoms and medication use in asthmatic children, 111, 112 and increases in the development of asthma in children. 113 Compared with non-Hispanic White children, the cohort's Hispanic White children, especially those with more Native American ancestry, tended to live closer to a freeway or a major nonfreeway road. Furthermore, a higher percentage of asthma was observed among the Hispanic White children with more than 50 percent Native American ancestry who lived near a major nonfreeway road compared to those who lived farther away. 114 CARB is submitting these studies to U.S. EPA to further demonstrate the increased impacts on vulnerable populations from TRAP, pointing to the urgent need to adopt more stringent emission standards to protect these groups. [EPA-HQ-OAR-2022-0829-0780, pp. 56-57]

106 Peters JM, Avol E, Gauderman WJ, Linn WS, Navidi W, London SJ, Margolis H, Rappaport E, Vora H, Gong H Jr, Thomas DC. A study of twelve Southern California communities with differing levels and types of air pollution. II. Effects on pulmonary function. Am J Respir Crit Care Med. 1999 Mar;159(3):768-75.

107 Avol EL, Gauderman WJ, Tan SM, London SJ, Peters JM. Respiratory effects of relocating to areas of differing air pollution levels. Am J Respir Crit Care Med. 2001 Dec 1;164(11):2067-72.

108 Gauderman WJ, Gilliland GF, Vora H, Avol E, Stram D, McConnell R, Thomas D, Lurmann F, Margolis HG, Rappaport EB, Berhane K, Peters JM. Association between air pollution and lung function growth in southern California children: results from a second cohort. Am J Respir Crit Care Med. 2002 Jul 1;166(1):76-84.

109 Gauderman WJ, Avol E, Gilliland F, Vora H, Thomas D, Berhane K, McConnell R, Kuenzli N, Lurmann F, Rappaport E, Margolis H, Bates D, Peters J. The effect of air pollution on lung development from 10 to 18 years of age. N Engl J Med. 2004 Sep 9;351(11):1057-67.

110 Gauderman WJ, Vora H, McConnell R, Berhane K, Gilliland F, Thomas D, Lurmann F, Avol E, Kunzli N, Jerrett M, Peters J. Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study. Lancet. 2007 Feb 17;369(9561):571-7.

111 Gauderman WJ, Avol E, Lurmann F, Kuenzli N, Gilliland F, Peters J, McConnell R. Childhood asthma and exposure to traffic and nitrogen dioxide. Epidemiology. 2005 Nov;16(6):737-43.

112 See McConnell et al. 2006

113 See McConnell et al. 2010

114 Weaver GM, Gauderman WJ. Traffic-Related Pollutants: Exposure and Health Effects Among Hispanic Children. Am J Epidemiol. 2018 Jan 1;187(1):45-52.

CalEnviroScreen 4.0 is a screening tool developed by the California Office of Environmental Health Hazard Assessment to help identify California communities that are disproportionately burdened by multiple sources of pollution and socioeconomic indicators. Approximately 95 percent of the census tracts in this community are in the top 25 percent (75-100th percentile) of the CalEnviroScreen 4.0 120 (CES) scores within the State. The maximum overall CES score for any census tract in the community is the 99th percentile, which means that people living in that census tract are in the top 1 percent of the most impacted census tracts in the State. Most of the census tracts in this community are considered disadvantaged under California law. 121 [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

120 The Office of Environmental Health Hazard Assessment (OEHHA) released the California Communities Environmental Health Screening Tool: CalEnviroScreen 4.0 in October 2021. https://oehha.ca.gov/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf

121 Disadvantaged community designations per Senate Bill (SB) 535 (De León, Chapter 830, Statutes of 2012).

Table 4 and Table 5 present the number of census tracts in the community that are in the top 25 percent (75-100th percentile) of impacted tracts in the State, as well as the maximum percentile for exposure (e.g., ozone, PM2.5, diesel PM, traffic impacts), health status (asthma, cardiovascular disease, low birth weight), and socio-economic (education, linguistic isolation, poverty, unemployment, and housing burden) indicators for the census tracts in this community. [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

Table 4. CalEnviroScreen (CES) 4.0 Overall Score in the East LA/Boyle Heights/West Commerce Community

CES 4.0 Overall Score: CES Score

Number of Census Tracts with Highest CES Scores (Top 25%, 75-100th Percentile): 51
Percent of Census Tracts with Highest CES Scores (Top 25%, 75-100th Percentile): 91%
Maximum Percentile in Community: 99.9 – (122)

[EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

122 The percentages for the overall CES 4.0 score represent the number of census tracts in this community that are considered “disadvantaged” per SB 535 (75th percentile or top 25% of all census tracts in the State)

[See original for table titled “Table 5. CalEnviroScreen (CES) 4.0 Scores for Key Exposure, Health, and Socio-Economic Indicators in the East LA/Boyle Heights/West Commerce Community”]123 [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

123 The percentages for the individual CES 4.0 metrics present the number of census tracts in the community that are in the top 25 percent of census tracts for a given indicator.

Figure 6 compares the average scores for exposure (e.g., ozone, PM2.5 concentrations, diesel PM emissions, traffic impacts), health status (asthma, cardiovascular disease, low birth weight), and socio-economic (education, linguistic isolation, poverty, unemployment, and housing burden) indicators in the community against statewide averages—the community scores for these key indicators are generally higher compared to the statewide averages. [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

[See original for graph titled “Figure 6. CalEnviroScreen 4.0 Scores for Key Indicators in the East LA/Boyle Heights/West Commerce Community Relative to Statewide Averages”] [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

The indicators discussed above also explain the disparate effects of air pollution faced by other communities in California, which extends to numerous other communities across the nation. Figure 7 presents the average scores for PM2.5 concentrations and diesel PM emissions relative to statewide averages for a few communities across the State; vehicle emissions contribute predominantly to the particulate matter and diesel PM impacts in these communities. The chart includes asthma-related emergency room visits and linguistic isolation (i.e., limited English speaking) as proxies for demographic and socio-economic disadvantages faced by these communities. [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

[See original for graph titled "Figure 7. CalEnviroScreen 4.0 Scores for PM2.5 Concentration, Diesel PM Emissions, and Socio-economic Indicators in California Communities"] [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

Many California communities experience significantly higher levels of both regional and near-source air pollution, and the demographic and socio-economic characteristics of these communities exacerbate their susceptibility and vulnerability to the adverse effects of air pollution. A 2019 CARB research study revealed on-road vehicles and industrial activity to be the top two sources of exposure in California, each contributing to 24 percent of the total PM2.5 exposure, and disproportionately impacting non-white and low-income populations. 124 Existing scientific literature conclusively links air pollution to adverse health outcomes, including pre-mature mortality, and the disproportionate pollution and health burden on poor and socially disadvantaged communities. OEHHA's CES 4.0 report provides an exhaustive review of existing literature connecting each of the indicators used in the CES method to pollution burden and population sensitivities. 125 [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

124 Apte J. et al (2019). A Method to Prioritize Sources for Reducing High PM2.5 Exposures in Environmental Justice Communities in California. CARB Research Contract Number 17RD006. https://ww2.arb.ca.gov/sites/default/files/classic//research/apr/past/17rd006.pdf

125 OEHHA CES 4.0 Report. October 2021. pp. 29-197. https://oehha.ca.gov/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf

The East LA, Boyle Heights, West Commerce community is just one example of many such communities across the nation that bear the consequences of near-roadway emissions, in addition to impacts from other sources of air pollution in their neighborhoods. For these communities, reducing emissions from on-road vehicles is a priority. [EPA-HQ-OAR-2022-0829-0780, pp. 60-64]

Organization: California Attorney General's Office, et al.

Strong emissions standards are necessary now to stave off the worst impacts of human-induced climate change and to confront inequitably distributed threats to public health and the environment from climate change as well as other forms of pollution. From extreme heat to wildfires to drought, our States and Cities are already experiencing the devastating impacts of climate change, which will continue to mount and compound with rising concentrations of GHGs in the atmosphere. Moreover, vehicle emissions of oxides of nitrogen (NOx), particulate matter (PM), and other criteria pollutants continue to endanger the health and welfare of our residents. [EPA-HQ-OAR-2022-0829-0746, p. 1]

B. Public Health Challenges and Poor Air Quality

Our States and Cities also face public health challenges caused by emissions of criteria pollutants and air toxics, such as fine particulate matter ("PM2.5"), nitrogen oxides ("NOx"), and non- methane organic gases ("NMOG").81 While our States and Cities are committed to reducing emissions of these harmful air pollutants,82 among other actions, federal involvement is necessary to help States attain the National Ambient Air Quality Standards ("NAAQS")83 and to reduce emissions that are outside of our control. EPA's proposed PM and NMOG+NOx emissions standards will significantly reduce emissions of harmful air pollutants from new motor vehicles sold nationwide, 88 Fed. Reg. at 29,257-58, and these reductions are critical to our

States and Cities' ability to meet our public health and environmental justice goals as well as to protect our residents. [EPA-HQ-OAR-2022-0829-0746, pp. 10-12]

81 See, e.g., Lake Michigan Air Directors Consortium, Attainment Demonstration Modeling for the 2015 Ozone National Ambient Air Quality Standard: Technical Support Document (Sep. 21, 2022), available at https://www.ladco.org/wp-content/uploads/Projects/Ozone/ModerateTSD/LADCO_2015O3_ModerateNAASIP_TSD_21Sep2022.pdf ("Onroad mobile non-diesel sources are the largest contributor to ozone in all of Wisconsin's remaining 2015 ozone NAAQS nonattainment areas."); EPA, Current Nonattainment Counties for All Criteria Pollutants (May 31, 2023), available at https://www3.epa.gov/airquality/greenbook/ancl.html (listing 19 of the 67 counties in Pennsylvania as nonattainment areas); EPA, 8-Hour Ozone (2008) Nonattainment Areas (May 31, 2023), available at https://www3.epa.gov/airquality/greenbook/hnc.html (listing New York, northern New Jersey, and Long Island area as Severe 15 for 8-hour ozone nonattainment); NYC.gov, Environment and Health Data Portal, available at https://a816- dohbesp.nyc.gov/IndicatorPublic/beta/data-explorer/health-impacts-of-air- pollution/?id=2122#display=summary (last accessed Jul. 3, 2023) (tracking asthma emergency department visits due to ozone).

82 E.g., Washington Department of Ecology, Clean Fuel Standard, available at https://ecology.wa.gov/Air-Climate/Reducing-Greenhouse-Gas-Emissions/Clean-Fuel-Standard (last accessed Jun. 30, 2023).

83 E.g., California Air Resources Board, Revised Draft 2020 Mobile Source Strategy (Apr. 23, 2021), at 14, 68, available at https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf.

1. Particulate Matter, Nitrogen Oxides, and Ozone Pollution Negatively Impact Human Health

The transportation sector is one of the largest sources of emissions of PM2.5, NOx, and other harmful air pollutants in the United States.84 88 Fed. Reg. at 29,186 ("Light- and medium-duty vehicles will account for approximately 20 percent, 19 percent, and 41 percent of 2023 mobile source NOx, PM2.5, and VOC emissions, respectively.").85 In some states and urban areas, mobile sources are the primary contributors of emissions of these harmful air pollutants.86 EPA projects that its standards will significantly reduce emissions of PM in addition to NOx and NMOGs, both of which contribute to ozone formation. Id. at 29,198, 29,344, 29,351. These reductions are crucial to avoid the serious adverse health consequences associated with these pollutants. [EPA-HQ-OAR-2022-0829-0746, pp. 12-13]

84 Calvin A. Arter, et al., Mortality-based damages per ton due to the on-road mobile sector in the Northeastern and Mid-Atlantic U.S. by region, vehicle class and precursor, 16 ENVIRONMENTAL RESEARCH LETTERS 1-2, 5 (June 2021), available at https://doi.org/10.1088/1748-9326/abf60b ("The mobile source sector remains one of the largest contributors to PM2.5 and O3 [ozone] globally and in the U.S."); 88 Fed. Reg. at 29,214 ("The primary source of NO2 is motor vehicle emissions ").

85 Volatile organic compounds (VOCs) are certain carbon compounds "which participate[] in atmospheric photochemical reactions," 40 CFR § 51.100(s), and include several NMOGs.

86 See, e.g., Vermont Department of Environmental Conservation, Agency of Natural Resources, Mobile Sources, available at https://dec.vermont.gov/air-quality/mobile-sources (onroad mobile sources contribute 49% of the NOx emissions in Vermont); California Air Resources Board, 2020 Mobile Source Strategy (Oct. 28, 2021), at 19-20, available at https://ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf ("Every year, over 5,000 premature deaths and hundreds of illnesses and emergency room visits for respiratory and cardiovascular disease in California are linked to PM2.5 pollution, of which more than half is produced by mobile sources.").

Specifically, exposure to PM2.5 is causally related to premature mortality87 and cardiovascular impacts; consistently associated with asthma and chronic obstructive pulmonary disease exacerbation; and associated with birth outcomes, such as low birth weight and fetal growth outcomes.88 Exposure to NOx is causally related to asthma exacerbation; likely causally related to respiratory effects; and possibly causally related to cardiovascular effects, mortality, diabetes, cancer, and birth defects. 88 Fed. Reg. at 29,214. Exposure to ozone is causally related to respiratory effects, including lung function decrements, pulmonary inflammation, exacerbation of asthma, respiratory-related hospital admissions, and mortality; likely causally related to metabolic effects and complications due to diabetes; and possibly causally related to cardiovascular effects and central nervous system effects. Id. at 29,213-14. [EPA-HQ-OAR-2022-0829-0746, pp. 12-13]

> 87 Harvard T.H. Chan School of Public Health, Fossil fuel air pollution responsible for 1 in 5 deaths worldwide (Feb. 9, 2021), available at https://www.hsph.harvard.edu/c-change/news/fossil-fuel-air- pollution-responsible-for-1-in-5-deaths-worldwide/ ("[R]esearchers [were able] to directly attribute premature deaths from fine particulate pollution (PM2.5) to fossil fuel combustion") (citing Karn Vohra, et al., Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem, 195 ENVIRONMENTAL RESEARCH (Apr. 2021)); Arter, supra n. 84, at 5 ("The largest source of both PM2.5 and O3[ozone]-attributable premature mortalities are LDT [light-duty trucks] at 1234 and 1229 mortalities, respectively. LDT PPM emissions are responsible for 46% of PM2.5 mortalities, and LDT NOx emissions are responsible for 80% of O3 [ozone] mortalities.")

> 88 See Comment of California Air Resources Board on "Proposed Rule for National Ambient Air Quality Standards (NAAQS) for Particulate Matter" (Jun. 29, 2020), EPA-HQ-OAR-2015-0072-0975.

2. Air Toxics Threaten Public Health

EPA projects that its standards would result in the reduction of emissions of air toxics. 88 Fed. Reg. at 29,199, 29,359. These reductions will also benefit public health and welfare, given the link between toxic air pollutants and cancer and other serious health effects. Id. at 29,216 ("Light- and medium-duty engine emissions contribute to ambient levels of air toxics that are known or suspected human or animal carcinogens, or that have noncancer health effects."); 72 Fed. Reg. 8,428, 8,430 (Feb. 26, 2007). Of all the outdoor air toxics, benzene contributes the most to nationwide cancer risk, and most of the nation's benzene emissions come from mobile sources. Id. at 8,432. In New Jersey, for example, mobile sources are the largest contributors of air toxics emissions and responsible for over 50% of the state's ambient benzene.89 In Allegheny County in Pennsylvania, mobile sources account for over 9% of the estimated cancer risk from hazardous air pollutants, largely due to gasoline-powered vehicles.90 [EPA-HQ-OAR-2022-0829-0746, p. 13]

> 89 New Jersey Department of Environmental Protection, 2021 New Jersey Air Quality Report (Sep. 2022), at 10-1, 10-10, available at https://www.nj.gov/dep/airmon/pdf/2021-nj-aq-report.pdf.

> 90 Cancer & Environment Network of Southwestern Pennsylvania and Clean Air Task Force, National Air Toxics Assessment and Cancer Risk in Allegheny County Pennsylvania (updated May 2021), https://www.catf.us/wp-content/uploads/2021/07/NATAFactsheet- Final-May-2021.pdf.

3. Criteria Pollutant and Air Toxics Emissions from Light- and Medium-Duty Vehicles Disproportionately Impact Environmental Justice Communities

Criteria pollutant emissions from light- and medium-duty vehicles disproportionately endanger residents of environmental justice communities by exposing them to harmful air pollution that causes significant health impacts. Light- and medium-duty vehicles' emissions are concentrated along transportation corridors. 88 Fed. Reg. at 29,396. Aggravating historical injustices, decision-makers disproportionately site highways and other transportation infrastructure in lower-income communities and communities of color. The burden of vehicle emissions therefore falls inequitably on environmental justice communities, which also face industrial pollution cumulatively with vehicle emissions.91 [EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

91 See, e.g., EPA, Estimation of Population Size and Demographic Characteristics among People Living Near Truck Routes in the Coterminous United States (Feb. 16, 2022), EPA-HQ-OAR-2019-0055-0982, at 11-12, Fig. 3, 17-19, Fig. 9 (finding that individuals living near major truck routes are more likely to be people of color and lower-income); see also Michelle Meyer and Tim Dallmann, The Real Urban Emissions Initiative, Air quality and health impacts of diesel truck emissions in New York City and policy implications (2022), at 7 Fig. 5 (concluding that Black and Latino individuals in New York City are disproportionately exposed to PM2.5 along freight corridors); Gaige Hunter Kerr, et al., COVID-19 Pandemic Reveals Persistent Disparities in Nitrogen Dioxide Pollution, 118 PROC. NAT'L ACAD. SCIENCES 30 (2021); Mary Angelique G. Demetillo, et al. Space-Based Observational Constraints on NO2 Air Pollution Inequality from Diesel Traffic in Major US Cities, GEOPHYSICAL RESEARCH LETTERS 48 (2021); Paul Allen, et al., Newark Community Impacts of Mobile Source Emissions: A Community- Based Participatory Research Analysis (2020); Maria Cecilia Pinto de Moura, et al., Union of Concerned Scientists, Inequitable Exposure to Air Pollution from Vehicles in Massachusetts (2019); Iyad Kheirbek, et al., The Contribution of Motor Vehicle Emissions to Ambient Fine Particulate Matter Public Health Impacts in New York City: a Health Burden Assessment, 15 ENV'T HEALTH 89 (2016).

For example, EPA modeling has shown that race and income are significantly associated with living near major roadways nationally, even when controlling for other factors.92 EPA research has also indicated that people of color are more likely to live within 300 feet of major transportation facilities and go to school within 200 meters of the largest roadways.93 Environmental justice communities bear the effects of these land use patterns. In the Northeast and Mid-Atlantic Region, average concentrations of exposures to PM2.5 are 75%, 73%, and 61% higher for Latinx residents, Asian-American residents, and African American residents, respectively, than they are for white residents.94 PM2.5 and NO2 concentrations are also highest for Black and Latinx communities in Massachusetts, in part because of their proximity to industrial facilities and highways, and these concentrations have increased over time even though overall exposure to those pollutants has decreased in the Commonwealth.95 [EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

92 EPA, Estimation of Population Size and Demographic Characteristics among People Living Near Truck Routes in the Coterminous United States, supra n. 91, at 20-24.

93 Chad Bailey, EPA, Demographic and Social Patterns in Housing Units Near Large Highways and other Transportation Sources (2011), EPA-HQ-OAR-2019-0055-0126, at 3.

94 Union of Concerned Scientists, Inequitable Exposure to Air Pollution from Vehicles in the Northeast and Mid-Atlantic (2019), available at https://www.ucsusa.org/sites/default/files/attach/2019/06/Inequitable-Exposure-to-Vehicle-Pollution- Northeast-Mid-Atlantic-Region.pdf.

95 Office of Massachusetts Attorney General Maura Healey, COVID-19's Unequal Effects in Massachusetts (2020), at 5, available at https://www.mass.gov/doc/covid-19s-unequal-effects-in-massachusetts/download.

More granular data from California fully illustrate this phenomenon. The census tracts in California with the highest levels of exposure to ozone, PM2.5, and air toxics like diesel particulate matter are communities of color bordering major transportation corridors—Highway 99 in the San Joaquin Valley and Highways 10 and 60 in the Inland Empire: [EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

Census Tracts in California with Highest Levels of Ozone, PM2.5, and Diesel PM Exposure 96

Census Tract	Location	People of Color	Ozone	PM2.5	Diesel PM
6065041408	Riverside	78.1%	91st	92nd	97th
6071002109	Ontario	73.2%	91st	96th	93rd
6071003301	Fontana	91.6%	97th	93rd	94th
6065040303	Jurupa Valley	79.3%	95th	94th	97th
6029003113	Bakersfield	80.4%	94th	100th	96th
6029001801	Bakersfield	57.3%	94th	100th	95th
6029002812	Bakersfield	72.5%	94th	100th	96th
6029002813	Bakersfield	76.6%	94th	100th	95th

[EPA-HQ-OAR-2022-0829-0746, pp. 13-15]

96 Data from CalEnviroScreen 4.0, California Office of Environmental Health Hazard Assessment, available at https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40. Metrics for ozone, PM2.5, and diesel particulate matter exposure are the census tract's percentile ranking as compared to all census tracts in California, demonstrating that these census tracts are among those with the greatest pollution exposure statewide. The raw data for these percentile rankings are available on the CalEnviroScreen 4.0 website. The eight census tracts shown here are examples of the 29 census tracts in California that rank above the 90th percentile statewide for exposure to ozone, fine particulate matter, and diesel particulate matter, all of which are communities in Bakersfield or the Inland Empire near major transportation thoroughfares.

Refineries, drilling sites, and other upstream sources of emissions are also disproportionately located in or near environmental justice communities.97 These facilities routinely emit dozens of toxic air contaminants, such as formaldehyde and benzene, and can cause accidental releases of air toxics that require emergency response. 98 Many of these upstream emissions sources also release other pollution, such as water contaminants.99 Residents of communities near these sites tend to have higher rates of health problems, such as cancers, chronic disease, and adverse birth outcomes, even after accounting for other demographic factors.100 As with transportation corridors, census tract-level data from California demonstrate these concerns. For example, the census tracts near the California refinery with the largest output (the Marathon Refinery in Carson)101 are overwhelmingly communities of color with high cumulative pollution burdens and adverse health outcomes: [EPA-HQ-OAR-2022-0829-0746, pp. 15-16]

97 James Boyce & Manuel Pastor, Clearing the air: incorporating air quality and environmental justice into climate policy, 120 CLIMATIC CHANGE 801 (2013).

98 Karen Riveles & Alyssa Nagai, Analysis of Refinery Chemical Emissions and Health Effects, California Office of Environmental Health Hazard Assessment (2019), available at https://oehha.ca.gov/media/downloads/faqs/refinerychemicalsreport032019.pdf.

99 Louisa Markow, et al., Oil's Unchecked Outfalls: Water Pollution from Refineries and EPA's Failure to Enforce the Clean Water Act, Environmental Integrity Project (2023), available at https://environmentalintegrity.org/wp-content/uploads/2023/01/Oils-Unchecked-Outfalls-03.06.2023.pdf.

100 Jill Johnston & Lara Cushing, Chemical exposures, health and environmental justice in communities living on the fenceline of industry, 7 CURRENT ENVIRONMENTAL HEALTH REPORTS 48 (2020); Stephen Williams, et al., Proximity to Oil Refineries and Risk of Cancer: A Population-Based Analysis, 4 JNCI CANCER SPECTRUM 6 (2020).

101 California Energy Commission, California's Oil Refineries, available at https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/californias-oil-refineries (data as of Feb. 7, 2023).

Census Tracts near the Marathon Refinery in Carson, California 102

Census Tract	People of Color	Pollution	Toxic Releases	Asthma	Heart Disease
6037294120	98.0%	93rd	99th	83rd	93rd
6037543306	92.4%	96th	99th	57th	52nd
6037543905	97.2%	84th	99th	72nd	77th
6037294110	90.5%	88th	99th	75th	83rd

[EPA-HQ-OAR-2022-0829-0746, pp. 15-16]

102 Data from CalEnviroScreen 4.0, supra n.96. Metrics for overall pollution burden, toxic releases, asthma, and heart disease are the census tract's percentile ranking as compared to all census tracts in California, demonstrating that these census tracts are among those with the greatest pollution exposure and detrimental health impacts statewide.

Accordingly, achieving emissions reductions from light- and medium-duty vehicles is a critical step to begin dismantling historical patterns of environmental injustice burdening communities near transportation infrastructure and upstream emissions sources. See CARB's Comment at 84- 96. [EPA-HQ-OAR-2022-0829-0746, pp. 15-16]

2. Reductions in Criteria and Air Toxic Pollution Are Urgently Needed to Protect Public Health and Welfare

EPA's Proposal will advance another important, urgent objective of our States and Cities and of Congress: reductions in criteria and toxic air pollution. GHG reductions mitigate the public health harms from other pollutants, because "[i]n a warmer future world, stagnant air, coupled with higher temperatures and absolute humidity, will lead to worse air quality even if air pollution emissions remain the same."174 Additionally, the Proposal's tightened standards for criteria and toxics pollution will directly aid our States and Cities in attaining and maintaining NAAQS for criteria pollutants, securing better health and welfare outcomes for their residents, and promoting environmental justice in their communities. [EPA-HQ-OAR-2022-0829-0746, pp. 29-31]

174 Nat'l Research Council, Advancing the Science of Climate Change (2010) at 326, available at http://nap.edu/12782.

a. More stringent standards will help protect public health and support NAAQS attainment

Various locations throughout our States and Cities have been unable to attain, or face difficulty maintaining, the NAAQS—designed to protect public health—for ozone and

PM2.5.175 42 U.S.C.§ 7409(b). For example, multiple counties in California are registering serious, severe, or extreme nonattainment with the 8-Hour Ozone NAAQS. As EPA notes, the two major precursors of ozone are NOx and volatile organic compounds ("VOCs"). 88 Fed. Reg. at 29,210. The proposed standards would cut NOx emissions from light- and medium-duty vehicles by 41% and VOC emissions by 50% by 2055, while the Alternative 1 standards would cut these emissions by 44% and 55%, respectively. Id. at 29,198, 29,204. These major reductions are crucial to helping States attain and maintain the ozone NAAQS. [EPA-HQ-OAR-2022-0829-0746, pp. 29-31]

175 EPA, Current Nonattainment Counties for All Criteria Pollutants, supra n. 81 (providing NAAQS compliance status of all counties); CARB, Criteria Pollutant Emission Reductions from California's Zero-Emission Vehicle Standards for Model Years 2017-2025 (Jul. 6, 2021), at 5, App. A to Comments of States and Cities in Support of EPA Reversing Its SAFE 1 Actions.

While California has adopted stringent emission standards for ozone precursors for vehicles sold in-state, federal standards will further reduce ozone impacts from vehicles sold out of state that travel into California. Reductions in ozone due to the proposed standards would thus provide critical clean air benefits to these locations. Nonattainment areas outside of California will experience similar benefits. For example, more stringent standards may result in a reduction of ozone precursors in Colorado's Denver Metro/North Front Range, which includes a major transportation corridor and a refinery. In 2022, EPA reclassified this area from serious to severe nonattainment for the 2008 8-Hour Ozone NAAQS, and, thus, any and all reductions in ozone precursors are needed. Likewise, counties in Connecticut, New Jersey's and New York are in serious to severe nonattainment with the 2008 8-Hour Ozone NAAQS and are in moderate nonattainment with the 2015 8-Hour Ozone NAAQS. These challenges in attaining the NAAQS are due in part to ozone-forming pollution from out-of-state upwind sources, which EPA's standards will help reduce.176 84 Fed. Reg. 44,223, 44,245, 44,248, 44,251–44,252 (Aug. 23, 2019) ("EPA acknowledges the role interstate transport of precursors to ozone pollution plays in the efforts of downwind areas to attain and maintain the NAAQS."). New Jersey has taken action to reduce NOx and VOC emissions from mobile sources and from stationary sources, including power plants and refineries, in an attempt to attain the NAAQS.177 But New Jersey and other States cannot attain or maintain the NAAQS alone,178 and EPA's standards will provide important emissions reductions in upwind states and across the country.179 [EPA-HQ-OAR-2022-0829-0746, pp. 29-31]

176 EPA, Current Nonattainment Counties for All Criteria Pollutants, supra note 81.

177 State of New Jersey Department of Environmental Protection, New Jersey SIP Revision for the Attainment and Maintenance of the Ozone NAAQS (Dec. 2017), at x, 4-14.

178 Id. at xii.

179 EPA, Current Nonattainment Counties for All Criteria Pollutants, supra note 81.

Several counties in our States are in moderate to serious nonattainment for the 1997, 2006, and 2012 PM2.5 NAAQS,180 and the projected 35% reductions in PM2.5 that the proposed standards will yield by 2055 will help States attain and maintain NAAQS for PM2.5. See 88 Fed. Reg. at 29,198, 29,204 (describing expected emissions reductions). Moreover, PM2.5 exposure at any level is associated with adverse health impacts, so reductions in PM2.5 emissions will bring public health benefits to our States and Cities regardless of whether our regions have attained the NAAQS.181 Indeed, because PM2.5 exposure below the current NAAQS is clearly harmful, a multi-state coalition, which includes many of the signatories to this comment, petitioned EPA to reconsider its 2020 decision not to strengthen the current NAAQS for Particulate Matter. See CARB Comment at 76-77. On January 27, 2023, EPA proposed to find the current NAAQS are inadequate to protect public health with an adequate margin of safety and to tighten the primary NAAQS for PM2.5. 88 Fed. Reg. 5,558, 5,561 (Jan. 27, 2023). [EPA-HQ-OAR-2022-0829-0746, pp. 29-31]

180 EPA, Current Nonattainment Counties for All Criteria Pollutants, supra note 81.

181 EPA, Policy Assessment for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (May 2022), at 3-178, available at https://www.epa.gov/system/files/documents/2022-05/Final%20Policy%20Assessment%20for%20the%20Reconsideration%20of%20the%20PM%20NAAQS_May2022_0.pdf ("Studies that examine the shapes of concentration-response functions over the full distribution of ambient PM2.5 concentrations have not identified a threshold concentration[] below which associations no longer exist").

Organization: Center for American Progress (CAP)

It is critically important that EPA finalize the strongest possible standard by the end of 2023. Americans' health and the climate crisis cannot afford to wait for reductions in vehicle emissions. The American Lung Association's (ALA) 2023 State of the Air Report finds that 36 percent of Americans live in areas with failing grades for ozone or particulate pollution.1 Research from Harvard University finds 17,000 to 20,000 deaths per year in the U.S. can be attributed to particulate matter (PM) pollution from transportation alone.2 Achieving the Biden Administration's goal of zero transportation emissions by 2050, as called for in the National Blueprint for Transportation Decarbonization, would have immense health benefits.3 The ALA estimates that achieving zero transportation emissions as well as zero power sector emissions would avoid 110,000 premature deaths between 2020 and 2050 in addition to 2.78 million avoided asthma attacks and 13.4 million lost workdays. This translates to $1.2 trillion in health benefits and $1.7 trillion in climate benefits by 2050.4 [EPA-HQ-OAR-2022-0829-0658, p. 1]

1 American Lung Association, "State of the Air Report," April 2023, available online: https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf

2 Choma et al. "Health benefits of decreases in on-road transportation emissions in the United States from 2008 to 2017," Proceedings of the National Academy of Sciences, December 13, 2021, available online: https://www.pnas.org/doi/pdf/10.1073/pnas.2107402118

3 U.S. Department of Energy, "The U.S. National Blueprint for Transportation Decarbonization," September 2021, available online: https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation- decarbonization.pdf

4 American Lung Association, "Zeroing in on Healthy Air," March 2022, available online: https://www.lung.org/getmedia/13248145-06f0-4e35-b79b-6dfacfd29a71/zeroing-in-on-healthy-air- report-2022.pdf

Organization: Ceres BICEP (Business for Innovative Climate and Energy Policy) Network

Finally, on-road vehicles are largely responsible for the harmful pollutant emissions that disproportionally impact historically low-income and BIPOC16 communities located near fleet depots, major transportation corridors, distribution centers, and ports. 36% of Americans live in communities with unhealthy air pollution, and a person of color is 64% more likely than a white person to live in such a community.17 Further, the American Lung Association predicts that the

U.S. could see $978 billion in public health benefits from cleaner air by 2050 as the nation shifts to 100% zero-emission new passenger vehicle sales and clean electricity generation.18 EPA's decision to reduce multipollutant vehicle emissions is positive, and we urge EPA to finalize LMDV emission standards at least as strong as those proposed as soon as possible to protect the health of those in these vulnerable communities and realize these significant economic benefits. [EPA-HQ-OAR-2022-0829-0600, pp. 2-3]

16 BIPOC: Black, Indigenous, People of Color.

17 https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf.

18 https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf.

Organization: Clean Fuels Development Coalition et al.

The MY2027 and Later Multipollutant Emissions is an ambitious undertaking and Administrator Regan is to be commended as it appears to contain many worthwhile initiatives. However, unless significant changes are made to the NPRM before it is finalized—including those offered here—it will leave huge opportunities to improve climate and health unfulfilled. [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

In December 2021, EPA finalized the landmark MY2023 and Later LDV GHG Rule to which we registered strong opposition. Unfortunately, like this NPRM, EPA did not address the dramatic increases in SOA + PAH emissions that are already being caused by the rapid adoption of GDI engines in the absence of gasoline BTEX controls. Of even greater concern—as the U.S. LDV fleet rapidly adopts GDI engines, the most harmful UFP + PAH emissions will dramatically INCREASE. [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

We understand that the primary thrust of this rulemaking is to drive commercialization of electric vehicles. However, it is also widely understood that this process will take many years/decades, perhaps even generations. For many years, ICE-powered vehicles will require gasoline and other liquid fuels, and trillions of miles will be driven on them before EVs dominate the U.S. fleet. EPA staff recently pledged [Link: https://insideepa.com/node/238985] that the rule would reflect a "balanced approach" taking into account both electrification trends and a projection that 100 million conventional light- and medium-duty vehicles could be sold before any full transition to electric vehicles (EVs). [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

When Congress was banning leaded gasoline for its horrific health effects in the 1990 Clean Air Act Amendments, it went to extraordinary lengths to ensure that EPA avoided making the same mistake with BTEX compounds which are in many respects worse than lead. Congress knew that fuel quality and vehicle emissions control systems were part of an integrated system and that three-way catalysts were unable to capture BTEX combustion by-products. Consequently, Congress gave EPA the nondiscretionary duty to reduce BTEX emissions by the "greatest degree achievable", (Sec 202(l)(2)) as explained in more detail below. [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

Many experts believe that the 20% BTEX fraction found in a typical gallon of U.S. gasoline poses the single greatest threat to public health and the environment. "The effect of aromatics [BTEX] on pollution and human health is thus magnified twice over: Aromatics lead disproportionately to PAH formation, and PAHs lead disproportionately to SOA formation. Worse yet, PAHs hitch a ride on SOA for long distances and weaponize these particles as they travel through the human body…When SOA particles are formed in the presence of gas-phase PAHs, their formation and properties are significantly different from SOA particles formed without PAHs: They exhibit slower evaporation kinetics and have higher fractions of non-volatile components and higher viscosities, assuring their longer atmospheric lifetimes. This increased viscosity and decreased volatility act as a shield that protects PAHs from chemical degradation and evaporation, allowing for their long-range transport.” [Detchon – Modlin MY2023 Final Rule comments, p. 17. RDRMCommentsEPA-HQ-OAR.pdf (cleanfuelsdc.org)] [Link: https://cleanfuelsdc.org/wp-content/uploads/2021/09/RDRMCommentsEPA-HQ-OAR.pdf] [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

Americans cannot escape the harmful emissions produced by tens of billions of gallons of BTEX contained in U.S. gasoline. That is why last fall we wrote Administrator Regan to commend him on his aggressive actions to control emissions of highly persistent, pervasive, and toxic PFAS. ReganDuranteFinePMPFAs8-30-22 (cleanfuelsdc.org) [Link: https://cleanfuelsdc.org/wp-content/uploads/2022/09/ReganDuranteFinePMPFAs8-30-22.pdf] We urged the Administrator to apply those same exacting standards to regulating BTEX-produced MSATs under the Fine PM and MY2027 Multipollutant NPRMs, because “By any metric, gasoline PAH emissions are as bad or worse than PFAS for public health and the environment.” [p. 4] In fact, many experts believe that SOA-bound PAH are more pervasive, have a higher “deposition efficiency”, and are less susceptible to remediation than PFAS once they are emitted from the tailpipe and undergo atmospheric transformation. [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

PAHs are not only carcinogenic and highly carbon-intensive, they are also mutagenic and reprotoxic (CMR) and widely recognized by health experts as ubiquitous endocrine disruptor compounds (EDCs). [See discussion of 2018 EPA Riedel study on p. 9, ResearchGate https://www.researchgate.net/publication/315864231_Mutagenicity_an d_Carcinogenicity] [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

The science is indisputable: unless EPA recognizes and honors its legal obligation to substantially reduce gasoline BTEX levels in the final MY2027 rule, it will among other undesirable consequences violate President Biden’s Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks”. Beginning at p. 598 of the NPRM, EPA states “that the environmental health risks or safety risks of the pollutants addressed by this action may have a disproportionate effect on children”. It goes on to describe how children are more susceptible than adults to air pollutants. In fact, the SOA-bound PAHs that are either deliberately or inadvertently omitted from the NPRM have been widely acknowledged by health experts as a predominant cause of some of the most adverse health end points for children, including pre-term births, IQ loss, asthma, cardiopulmonary conditions, and a wide range of cancers. [EPA-HQ-OAR-2022-0829-0630, pp. 1-2]

Criteria Pollutant Standards for ICE Vehicles. At p. 42, EPA proposes a particulate matter (PM) standard of 0.5 mg/mi and makes the remarkable (and untrue) assertion that “the standards will reduce tailpipe PM emissions from ICE vehicles by more than 95 percent”! It goes on to say that the proposal will also “reduce emissions of mobile source air toxics.” According to the Health Effects Institute: “It is estimated that about 50% of the benzene produced in the exhaust is the result of decomposition of aromatic hydrocarbons in the fuel…two studies showed that lowering aromatics levels in gasoline significantly reduces toxic benzene emissions from vehicles exhausts.” [Detchon – Modlin, p. 6, FH #23. RDRMCommentsEPA-HQ-OAR.pdf (cleanfuelsdc.org)] [Link: https://cleanfuelsdc.org/wp-content/uploads/2021/09/RDRMCommentsEPA-HQ-OAR.pdf]

Despite OTAQ assurances, continuation of “business as usual” will ensure dramatic increases in the most harmful ultrafine particulates and their associated PAH and other toxics. False assurances like these threaten public health and the environment by lulling the public, health experts, and policymakers into a false sense of complacency that all is well, when the reality is that things are bad and rapidly getting worse. [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

Despite the magnitude and immediacy of the health threat, EPA attempts to address its gasoline quality “Achilles’ heel” beginning at p. 572, “Consideration of Potential Fuels Controls for a Future Rulemaking”. EPA states “there is an opportunity to further address PM emissions from the existing vehicle fleet, the millions of vehicles produced during the phase-in period…through changes in market fuel composition…we expect that tens of millions of gasoline-powered sources will remain in use well into the 2030s.” [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

However, despite the nondiscretionary duty Congress imposed on it in the 1990 CAAA, EPA does what it has done for more than 30 years—defers “potential” action to a “future rulemaking” by requesting comment on possible changes to “gasoline fuel property standards”. EPA falsely states that it must act under CAA section 211c and that “such changes are beyond the scope of this rulemaking”. In fact, the NPRM rests its authority upon CAA section 202, and section 202(l) imposes a clear nondiscretionary requirement that EPA must ensure that fuel quality improvement— specifically BTEX reduction—is employed as a co-equal regulatory tool to reinforce vehicle technology advances. [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

No action could be more germane to this rule than reducing gasoline BTEX content to achieve substantial, and immediate, reductions in the most toxic and carbon intensive ICE tailpipe emissions. In fact, after more than 30 years of inaction, EPA’s failure to comply with CAA section 202(l) unquestionably qualifies as “action unreasonably withheld”. Accepting more years of inaction will unnecessarily harm yet another generation of American children. [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

In a letter to Doug Sombke, South Dakota Farmers Union president, Christopher Grundler, then-director of OTAQ, described his view of CAA section 202(l): “With respect to CAA section 202(l), the EPA has acted twice under this specific authority, including the February 2007 rule that addresses the aromatics content of gasoline through required limits on benzene…Since Congress established section 202(l) in the CAAA of 1990, the net result of the EPA regulations and market shifts has been a reduction in gasoline benzene levels by roughly two thirds and aromatics levels by roughly one third…In combination, these fuel and vehicle standards have already dramatically reduced air toxics emissions. While the EPA continues to look for opportunities to further reduce air toxics, as required by CAA section 202(l), we must also consider technological feasibility and costs, among other factors. We take our regulatory authority very seriously and must ensure the appropriateness of taking further regulatory action before doing so.”1 [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

1 Christopher Grundler, EPA Office of Transportation and Air Quality, letter to Doug Sombke, SDFU president, March 15, 2018.

It should be noted that Mr. Grundler cites the non-benzene aromatics reductions which occurred not due to EPA's actions, but thanks to Congressional ethanol requirements under Renewable Fuel Standards 1 and 2. Experts have estimated that the RFS program—which made E10 the nation's in-use fuel—displaced nearly 10 billion gallons per year of aromatics as refiners adjusted their blendstocks to accommodate ethanol's higher octane. [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

The NPRM indirectly acknowledged the importance of ethanol's rise in the nation's gasoline pool at p. 579: "A common thread across the market shifts in T90 has been a decreasing gasoline-to-distillate ratio (GDR) in the product slates produced by refiners…Perhaps the most important factor affecting GDR was the influx of ethanol into gasoline. The increasing ethanol volume displaced a portion of petroleum, which caused refiners to move more of the midrange gasoline cut into the distillate pool. Ethanol's octane also allowed refiners to back out aromatic content." [Emphasis supplied.] [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

For many years, automakers have implored EPA to ensure the availability of higher- octane fuels (HOFs) because "octane is the single most important fuel property in designing an internal combustion engine", according to Mercedes Benz. In the U.S., only two commercially available octane boosting compounds are legally permitted for use in gasoline—benzene-based aromatic compounds commonly known as BTEX (benzene, toluene, ethyl-benzene, xylene) and ethanol. A typical gallon of U.S. gasoline contains approximately 20% BTEX and 10% ethanol. Congress has directed EPA to reduce the carcinogenic mobile source air toxics (MSATs) produced by the incomplete combustion of BTEX "the greatest degree of emission reduction achievable through the application of technology which will be available". RDRMCommentsEPA-HQ-OAR.pdf (cleanfuelsdc.org) [Link: https://cleanfuelsdc.org/wp-content/uploads/2021/09/RDRMCommentsEPA-HQ-OAR.pdf] [p. 2] [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

This comment will explain some of the many obstacles that stand in the way of EPA finalizing this proposed rule: an absence of statutory authorization, the commands of the APA, the infeasibility of electrification scheme, and the tremendous and overlooked costs associated with the plan. All these failures result from the Biden's Administration's myopic conclusion that electric vehicles are the best and only way to reduce greenhouse-gas emissions from the transportation sector. This is foolish. [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

Renewable fuels are a far more feasible, cost effective, and lawful way to reduce emissions from light-duty vehicles. The blending of 10 percent renewable ethanol in the nation's fuel supply already reduces greenhouse gas emissions from the light-duty fleet by tens of millions of tons a year. And we could do better. EPA has determined that E15 is suitable for use in all model year 2001 and later vehicles. Many newer vehicles on the road could run on mid-level blends like E25. Every automaker could readily make vehicles designed to run on mid-level blends with only minimal design changes. These mid-level blends reduce the carbon intensity of liquid fuels, enable more fuel-efficient engines, and reduce aromatics and particulate matter. EPA has the statutory authority to account for these savings in its standard setting, and it has done so in the past. Reinstituting such a system would incentivize the use of more renewable fuels, and allow automakers to achieve greater emissions reductions, in a shorter time frame, and at a net savings to consumers. At the very least, EPA can reform the way engines are tested to better align with reality. [EPA-HQ-OAR-2022-0829-0712, pp. 2-3]

Section 202(l)'s mandatory directive is unique for its "legislative endangerment" language, as well as the legislative history's clear Congressional expectation that EPA would employ "technology-forcing" regulatory strategies to improve gasoline quality by substantially reducing BTEX content. While it was banning the use of poisonous tetraethyl lead in leaded gasoline in the 1990 Clean Air Act Amendments, Congress took extraordinary steps to ensure that EPA used its authority to require petroleum refiners to improve fuel quality and thus complement automakers' efforts to improve vehicle technologies. In the ensuing years, OTAQ has ignored the "technology-forcing" requirements imposed by Congress by refusing to improve gasoline quality by requiring an orderly reduction in BTEX and replacement with ethanol's superior, low-carbon, low-toxics octane. [See Detchon – Modlin MY2023 Final Rule comments discussion on "EPA's response to a legislative mandate" pp. 21 – 31] [EPA-HQ-OAR-2022-0829-0630, pp. 3-5]

The Clean Air Act makes it perfectly clear that EPA requires only one "metric" for guidance on how best to reduce BTEX content—and it is not some permutation of the GDR. It is the mandatory language in CAA section 202(l). [EPA-HQ-OAR-2022-0829-0630, pp. 3-5]

> Technology-Forcing Legal Precedents Put the Burden on EPA to Encourage E30 HOLC Fuels. "Technology-forcing" language has been used by Congress throughout the Clean Air Act, not only in section 202(l) [see NRDC v. EPA, 655 F.2d 318, 328 (DC Circuit 1981): "Congress intended the agency to project future advances in pollution control technology. It was expected to press for development and application of improved technology rather than be limited by that which exists today." Ecology Law Quarterly, FN#126]. However, as the record makes clear, OTAQ has done the exact opposite. It has gone to extraordinary, even unlawful, lengths to OBSTRUCT the development of higher quality fuels which are required to complement advanced engine technologies.

EPA's sub-sim interpretation that prohibits the use of HOLC fuels like E30 in existing vehicles is unlawful and contrary to Congressional intent. Since EPA established E10 as the nation's certification fuel in January 2017, it cannot prohibit increased concentrations of ethanol for use in existing vehicles unless it complies with all of the steps that Congress set forth in CAA section 211c. The burden of proof is on EPA, including the legal precedents set by 42 U.S.C. 7545, which require EPA to prove that prohibiting increased ethanol use will NOT result in the use of another octane substitute—BTEX—that makes tailpipe emissions even worse. Especially now with the rapid adoption of GDI engines, EPA cannot make such a finding. Finally, section 202(l) and the 1990 CAAA also require EPA to apply Maximum Achievable Control Technology (MACT) standards to fuel quality improvements. The U.S. light-duty vehicle (LDV) fleet's ICE vehicles require gasoline of sufficient—ideally much higher than today's—octane or they will not operate properly. Fuel efficiency improvements and carbon reductions require the use of HOLC Fuels. EPA cannot comply with the statute's "greatest emissions reduction achievable" requirement unless it encourages an orderly transition to nationwide use of E30 "clean octane" fuels. By blocking such use, EPA is imposing a "de facto" BTEX mandate on U.S. consumers because there are only two commercially available, cost effective, and (at least thus far) legally permissible octane enhancing compounds: BTEX and ethanol. Subsequent Congressional decisions in both RFS1 and RFS2 (2005 EPACT and 2007 EISA) make it clear that Congress intended for ethanol to replace BTEX—and that EPA's duty is to promulgate the necessary regulations to optimize those results. [EPA-HQ-OAR-2022-0829-0630, p. 5]

Unfortunately, EPA has spent the past thirty years doing the exact opposite. In fact, EPA's fuel efficiency demands have driven automakers to accelerate the introduction of gasoline direct injection (GDI) engines which in the absence of BTEX controls dramatically increase emissions of the most harmful ultrafine particulates and their associated toxics, especially polycyclic aromatic hydrocarbons (PAHs). [EPA-HQ-OAR-2022-0829-0630, p. 5]

Restricting BTEX Controls to "High-Boiling" Aromatics Will Not Solve the Problem. [EPA-HQ-OAR-2022-0829-0630, p. 7]

At p. 572 of the NPRM, EPA introduced the concept of limiting "high-boiling compounds in gasoline" that have been linked to increased tailpipe PM emissions. The Agency noted that "the high-boiling tail of gasoline contains a high proportion of aromatics and that the heaviest few percent of this material has very high leverage on PM emissions". [EPA-HQ-OAR-2022-0829-0630, p. 7]

As interesting as this discussion is—and while it is a worthy goal to limit high-boiling compounds—we are concerned by EPA's apparent interest in limiting BTEX control to a "few percent" of the average twenty percent fraction contained in a typical gallon of U.S. gasoline. Limiting BTEX control to the small high-boiling fraction would most certainly not be consistent with the spirit and letter of the Congressional mandate in CAA section 202(l) that requires EPA to reduce BTEX by the "greatest degree of emission reduction achievable through the application of technology which will be available." In fact, OTAQ experts implicitly admitted that more is needed when they issued their 2016 report on the 2015 UFP Workshop when they said this: [EPA-HQ-OAR-2022-0829-0630, p. 7]

> OTAQ experts admitted that its MOVES Model was defective and in need of replacement more than seven years ago: "a new SOA paradigm has been developed". [see Detchon/Modlin comments, p. 19, FN#109].

"[SOA] particles play an important role in air quality but for many years available atmospheric models were not able to predict SOA formation. The main issue was the fact that all models relied on the assumptions that SOA particles were well-mixed low viscosity solutions and maintained equilibrium with the gas-phase by rapid mixing in the condensed phase with evaporation and condensation. Recent studies using the multidimensional characterization approach demonstrated that these assumptions were wrong and that SOA particles must be viscous semi-solid. These studies showed also that there is a synergetic effect between PAHs and SOA since PAHs trapped inside the SOA particles slow down SOA evaporation and increase SOA yield and lifetime. This can explain the long-range transport of toxic compounds like PAHs and other persistent pollutants. In conclusion, a new SOA paradigm has been developed."3 (Emphasis supplied] [EPA-HQ-OAR-2022-0829-0630, p. 7]

> 3 Richard W. Baldauf et al., "Ultrafine Particle Metric and Research Considerations: Review of the 2015 UFP Workshop," International Journal of Environmental Research and Public Health (2016):13(11): p.13: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5129264/pdf/jerph-13-01054.pdf (accessed Feb. 24, 2021).

For all these reasons, EPA cannot focus only on the few percent of the "high boiler" BTEX fraction of gasoline—it must reduce BTEX to the greatest degree achievable as required by Congress. [EPA-HQ-OAR-2022-0829-0630, p. 7]

Despite its enormous deterrent effect on EPA's regulation of mobile source air toxics, however, EPA has yet to correct MOVES. In fact, EPA continues to use the MOVES Model to support its most consequential rulemakings, including the MY2023 and Later LDV GHG Rule, see end notes, p. 20-22. [EPA-HQ-OAR-2022-0829-0630, p. 7]

SOA from Gasoline Aromatics. On p. 591, EPA noted that “Mobile sources are an important contributor to secondary aerosols formed from nitrate, sulfate and organic precursors. Studies have shown that secondary organic aerosol (SOA) formation from gasoline vehicle exhaust can exceed directly emitted (tailpipe) PM emissions, and that changes to gasoline formulation can have impacts on SOA that are larger than the associated shifts in direct PM emissions.” [EPA-HQ-OAR-2022-0829-0630, p. 8]

This statement seems at odds with the Agency’s claim that the proposed rule would reduce PM emissions by “more than 95 percent”. In fact, EPA historically has vastly understated the substantial contributions mobile sources—especially gasoline BTEX— make to SOA + PAH formation. [EPA-HQ-OAR-2022-0829-0630, p. 8]

Former OTAQ Director Grundler offered this explanation to SDFU President Sombke: “With respect to your concern that the EPA’s models incorrectly predict the contribution of light-duty gasoline vehicles to PM (e.g., as compared to leaf blowers) it is important to note that the EPA estimates cited in the Wall Street Journal refer only to directly emitted PM. We agree that ambient levels of PM are a result of secondarily formed particles in addition to direct PM emissions, and that light-duty gasoline vehicles are important sources of precursors to PM formation.”4 [Emphasis supplied] [EPA-HQ-OAR-2022-0829-0630, p. 8]

4 Supra, Grundler letter to Sombke, March 15, 2018.

It took several exchanges to elicit this admission five years ago. It is clear from EPA’s claim that the proposed rule would reduce PM emissions by “more than 95 percent” that the Agency continues to downplay the disproportionate role SOA plays in fine and ultrafine particulate emissions. [EPA-HQ-OAR-2022-0829-0630, p. 8]

Leading experts are convinced that aromatics (“organics”) are the primary culprit. “An important recent study, co-authored by the Nobel Prize winner Mario Molina, concluded that reducing the smallest (ultrafine) particles “without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem”. [Detchon/Modlin 2021 comments, p. 2.] This has implications not only for GDI engine emissions effects, but also for the NPRM’s gasoline particulate filter (GPF) strategies. [EPA-HQ-OAR-2022-0829-0630, p. 8]

Detchon and Modlin went on to note that “Emissions from aromatic compounds in gasoline were thought to be short-lived, thus posing little threat to human health. But that was wrong. A recent General Motors study found that nearly 96% of the fine particle emissions from gasoline are caused by the aromatics in the fuel”. [Ibid., p. 1] [EPA-HQ-OAR-2022-0829-0630, p. 8]

In a letter to Acting OAR Administrator Joseph Goffman, former Senate Majority Leader Tom Daschle cited these experts and then cautioned EPA that failure to control BTEX would severely compromise, perhaps doom, EPA’s PM control strategies DaschleGoffmanHOLCAexecutedjune2021.pdf: [Link: file:///C:/Users/dehbi/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/OFSN24IW/DaschleGoffmanHOLCAexecutedjune2021.pdf] [EPA-HQ-OAR-2022-0829-0630, p. 8]

"Given the role of aromatic hydrocarbons in PM formation and given the propensity of GDI engines to increase emissions of UFPs, EPA's strategies for regulating fine particle pollution in urban areas are doomed to failure unless they significantly reduce gasoline aromatics." A prescient statement that is proving itself to be even more true as GDI engines dominate the U.S. fleet. [EPA-HQ-OAR-2022-0829-0630, p. 8]

D. Higher ethanol blends enable reduced particulate matter and other criteria pollutant emissions.

Ethanol also improves gasoline fuel properties to reduce particulate matter emissions. EPA's proposed rule sets aggressive standards for particulate matter and justifies its electrification plan in part by the impact it will have on these criteria pollutants. But as explained above, millions of liquid fueled vehicles will remain on the road for decades, even under the most aggressive electrification standards. [EPA-HQ-OAR-2022-0829-0712, p. 42]

Increasing the blending of ethanol in liquid fuels can reduce the particulate emissions from all these vehicles. In EPA's most recent study of particulate matter emissions, it found that reducing the heavy aromatic content of liquid fuels reduced exhaust particulate matter. See Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources, EPA-420-R-23-008, Environmental Protection Agency (Apr. 2023). Of each of the four fuels examined in that study, the most promising results came from E15, which showed reductions of particular matter of nearly 40 percent. [EPA-HQ-OAR-2022-0829-0712, p. 42]

These results are corroborated by other studies. For example, a 2023 study published in Fuel examined the exhaust emissions from a fleet of 20 light-duty vehicles running on both E10 and E15. Tianbo Tang, et al., Expanding the ethanol blend wall in California: Emissions comparison between E10 and E15, 350 Fuel 128836 (Oct. 15, 2023), https://www.sciencedirect.com/science/article/pii/ S0016236123014497#ab010. While the study showed that total hydrocarbons, non- methane hydrocarbons, and carbon monoxide all had either marginally or statistically significant reductions when the fuel was switched to E15, reductions of PM emissions were even greater. Id. "The weighted PM emissions showed strong fuel effects, with E15 being 18% lower than E10 across the fleet of 20 vehicles at a statistically significant level. For the cold-start and hot-running phases, PM emissions demonstrated statistically significant reductions of 16% and 54%, respectively, for E15 compared to E10. The hot-start phase showed a 43% marginally statistically significant reduction in PM emissions for E15 compared to E10." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 42-43]

There are about twenty times as many vehicles on the road in the United States as will be sold in each model year that EPA projects, all of which emit far more on average than new internal combustion engine vehicles. Switching those existing vehicles from E10 to E15 would result in greater particulate matter emissions reductions than converting all new vehicles to electric vehicles for several model years.23 [EPA-HQ-OAR-2022-0829-0712, pp. 42-43]

23 And this only accounts for tailpipe emissions. As has been well documented, the higher weight of electric vehicles leads to increased road and tire wear, and thus higher particulate emissions from non-tailpipe sources.

Additional benefits include avoiding the air quality and health impacts from significant increases in tire wear from electric vehicles, as well as the increases in CO2 emissions that will result from manufacturing more electric generation infrastructure, transmission, distribution, and charging equipment, and the manufacturing of electric vehicles themselves, which produce far more upstream emissions than their internal combustion engine counterparts. [EPA-HQ-OAR-2022-0829-0712, pp. 6-7]

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

Environmental impacts from the transportation sector—and the resulting health and economic consequences—are a major concern. Vehicles are the top source of greenhouse gas (GHG) emissions in Colorado, and are also a top source of particulate matter, NOx, and other criteria air pollutants that have disproportionate impacts on communities living near highways and freight routes. Transportation is one of the two largest sources of ozone precursors in Colorado along with oil and gas production, largely due to NOx emissions from vehicles, and reducing transportation emissions is a critical strategy to meet federal health-based air quality standards. [EPA-HQ-OAR-2022-0829-0694, p. 1]

Our agencies strongly support EPA's development of national air pollution and GHG emission standards that are as robust as possible to ensure strong progress nationwide on air pollution and equity. A strong national light- and medium-duty vehicle standard is important to Colorado for at least three reasons. First, air pollution from nearby states crosses into Colorado and affects public health, and the longer duration and increased stringency of the proposed criteria air pollutant standards will reduce interstate air pollution transport into Colorado. Second, Colorado is already experiencing the impacts of climate change, including increased wildfires, floods, and drought. Climate change is a global issue that is impacted by all GHG emissions regardless of geographic source, and the reductions in GHG emissions from the proposed national rule will help reduce the long-term risks of climate change in Colorado. Finally, although the proposed national GHG emissions standards are not an explicit EV sales requirement like Advanced Clean Cars and Advanced Clean Cars II, complying with the standards will effectively require vehicle manufacturers to sell a significantly greater amount of EVs. The economies of scale encouraged by the proposed rules will support the production of more affordable EVs, easing the transition to zero emission vehicles and enabling greater access to their benefits for disproportionately impacted communities. [EPA-HQ-OAR-2022-0829-0694, p. 2]

Organization: David Hallberg

Toxicologists commenting on the health threat from Canadian wildfires—which are being widely covered by media as more than one hundred million Americans are being affected every day—confirm that the smaller fine PM/PAH/SOA emissions pose the greatest health threat. https://theconversation.com/wildfire-smoke-can-harm-human-a206057 However, due to EPA's false assurances that vehicle emissions control systems are capturing the SOA-bound PAHs and other toxics, the media and public don't know that they are being exposed to far worse on a 24/7 basis because OTAQ refuses to improve gasoline quality as required by Congress. [EPA-HQ-OAR-2022-0829-0548, p. 2]

The Reuters article linked below should more accurately read "Lacking Cleaner Gasoline, U.S. Cars Set to Emit a Septillion More Particles". It most certainly makes no sense to wait another fifteen or more years for the LDV fleet to transition to gasoline particulate filters (as the

EPA seems to propose in this rule) when these enormous quantities of highly potent UFP + PAH emissions can be substantially reduced immediately by replacing BTEX with ethanol. [EPA-HQ-OAR-2022-0829-0548, p. 2]

1,000,000,000,000,000,000,000,000 is a SEPTILLION, otherwise known as a googol. Experts say PAHs pose substantial threat to human health in the parts per trillion. [Detchon-Modlin comments, supra, p. 20-21] [EPA-HQ-OAR-2022-0829-0548, p. 2]

This means that a breathtaking number of highly lethal UFPs will be forced into Americans lungs over the next 20 years—septillions of the most HARMFUL PARTICLES THAT EPA REFUSES TO TELL THE AMERICAN PUBLIC WILL GET WORSE RATHER THAN BETTER. Millions of avoidable morbidities and premature mortalities will occur due to EPA's unlawful refusal to enforce section 202(l). It will cost U.S. taxpayers hundreds of billions of dollars in avoidable health expenditures and lost productivity. [EPA-HQ-OAR-2022-0829-0548, pp. 2-3]

Lacking filters, U.S. cars set to emit a septillion more particles - research | Reuters [Link: https://www.reuters.com/business/autos-transportation/lacking-filters-us-cars-set-emit-septillion-more-particles-research-2022-04-27/] [EPA-HQ-OAR-2022-0829-0548, pp. 2-3]

The Science is Incontrovertibly Clear

Contrary to OTAQ's false assurances, the rapid adoption of advanced engine technologies such as Gasoline Direct Injection (GDI) will dramatically increase emissions of the most harmful ultrafine particles (UFP) and secondary organic aerosols (SOAs) that bind with and insulate highly toxic polycyclic aromatic hydrocarbons (PAHs) and enable their long-range transport. The attached White Paper, authored by the UN Foundation's Special Advisor for Climate Solutions and Chrysler's former Director for Regulatory Affairs, explains how the BTEX emissions threat is getting WORSE, not better. [EPA-HQ-OAR-2022-0829-0548, p. 2]

New White Paper Says The Real Cost of Gasoline …is to Our Health | Clean Fuels Development Coalition (cleanfuelsdc.org) [Link: https://cleanfuelsdc.org/2022/05/16/new-white-paper-says-the-real-cost-of-gasoline-is-to-our-health/] [EPA-HQ-OAR-2022-0829-0548, p. 2]

Many experts believe that the 20% BTEX fraction found in a typical gallon of U.S. gasoline poses the single greatest threat to public health and the environment. In their comments to the MY2023 LDV GHG Final Rule, the same two authors stated: "The effect of aromatics [BTEX] on pollution and human health is thus magnified twice over: Aromatics lead disproportionately to PAH formation, and PAHs lead disproportionately to SOA formation. Worse yet, PAHs hitch a ride on SOA for long distances and weaponize these particles as they travel through the human body…When SOA particles are formed in the presence of gas-phase PAHs, their formation and properties are significantly different from SOA particles formed without PAHs: They exhibit slower evaporation kinetics and have higher fractions of non-volatile components and higher viscosities, assuring their longer atmospheric lifetimes. This increased viscosity and decreased volatility act as a shield that protects PAHs from chemical degradation and evaporation, allowing for their long-range transport." [Detchon – Modlin MY2023 Final Rule comments, p. 17. RDRMCommentsEPA-HQ-OAR.pdf (cleanfuelsdc.org)] [Link: https://cleanfuelsdc.org/wp-content/uploads/2021/09/RDRMCommentsEPA-HQ-OAR.pdf] [EPA-HQ-OAR-2022-0829-0548, p. 2]

The Law is Also Incontrovertibly Clear

OTAQ's experts are highly intelligent people, but they apparently missed the memo about the mandatory Clean Air Act provisions that require EPA to reduce gasoline BTEX content as much as technology (including technology improvements that EPA is expected by Congress to actively encourage) permits. In the 1990 Clean Air Act Amendments (1990 CAAA), Congress went to extraordinary lengths to avoid a repeat of the horrific societal and economic costs of leaded gasoline because it knew that BTEX health effects would be even worse. Section 202(l) of the CAA imposes a nondiscretionary duty upon EPA to reduce the mobile source air toxics (MSATs) produced by the incomplete combustion of BTEX by "the greatest degree of emission reduction achievable through the application of technology which will be available". RDRMCommentsEPA- HQ-OAR.pdf (cleanfuelsdc.org) [Link: https://cleanfuelsdc.org/wp-content/uploads/2021/09/RDRMCommentsEPA-HQ-OAR.pdf], p. 2. [EPA-HQ-OAR-2022-0829-0548, p. 3]

Since 1990, Congress has spoken many times about the critical need for EPA to encourage the substitution of ethanol's superior "clean octane" for BTEX "dirty octane". Three primary inflection points stand out: [EPA-HQ-OAR-2022-0829-0548, pp. 3-4]

1990 Clean Air Act Amendments

In the same law that finally banned the use of leaded gasoline, Congress overcame fierce opposition from oil interests in a bid to avoid a repeat of the leaded gasoline disaster. The most important provision was section 202(l), the express language of which constitutes a "legislative endangerment" finding (EPA has no discretion in the matter under 211c as it claims). [EPA-HQ-OAR-2022-0829-0548, pp. 3-4]

Technology-Forcing Legal Precedents Put the Burden on EPA to Encourage E30 HOLC Fuels. Importantly, Congress also used "technology-forcing" language and imposed for the first time Maximum Achievable Control Technology (MACT) standards on fuels. [EPA-HQ-OAR-2022-0829-0548, pp. 3-4]

> "Technology-forcing" language has been used by Congress throughout the Clean Air Act, not only in section 202(l) [see NRDC v. EPA, 655 F.2d 318, 328 (DC Circuit 1981): "Congress intended the agency to project future advances in pollution control technology. It was expected to press for development and application of improved technology rather than be limited by that which exists today." Ecology Law Quarterly, FN#126]

Unfortunately, OTAQ has done the exact opposite and made a mockery of the provision by imposing technology "advances" that increase harmful emissions while blocking the fuel quality improvements that automakers require to complement their GDI engines. It has gone to extraordinary, even unlawful, lengths to OBSTRUCT the development of higher quality fuels which are required to complement advanced engine technologies. EPA's sub-sim interpretation is unlawful—it cannot prohibit increased concentrations of ethanol for use in existing vehicles unless it follows the steps set forth in section 211c. The burden of proof is on EPA, including the legal precedents set by 42 U.S.C. 7545, which require EPA to conclusively prove that prohibiting increased ethanol use will NOT result in the use of another additive that will result in more harmful emissions (see below). [EPA-HQ-OAR-2022-0829-0548, pp. 3-4]

Finally, the MSAT provision sponsors—both Senate and House—made it clear that EPA should prioritize fuel quality controls as much, if not more, than vehicle technology improvements. Section 202(l) and the 1990 CAAA require EPA to apply Maximum Achievable Control Technology (MACT) standards to fuel quality improvements. The U.S. light-duty vehicle (LDV) fleet of 270+ million vehicles requires gasoline to have sufficient octane number or they will not operate properly. EPA cannot comply with the statute's "greatest emissions reduction achievable" requirement unless it encourages an orderly transition to nationwide use of E30 "clean octane" fuels. By blocking such use, EPA is imposing a "de facto" BTEX mandate on U.S. consumers because there are only two commercially available, cost effective, and (at least thus far) legally permissible octane enhancing compounds: BTEX and ethanol. [EPA-HQ-OAR-2022-0829-0548, p. 4]

1995 Renewable Oxygenate Requirement (ROR)

The Senate vote upholding EPA's ROR is often overlooked, but it sparked an extremely important DC Circuit Court of Appeals decision AMERICAN PETROLEUM INSTITUTE v. Renewable Fuels Association, Intervenor. (1995) | FindLaw [Link: https://caselaw.findlaw.com/court/us-dc-circuit/1104431.html] (decided in favor of oil interests) but that inadvertently set the stage for ultimate enactment of the Renewable Fuel Standards (RFS 1 and 2). [EPA-HQ-OAR-2022-0829-0548, pp. 4-5]

The ROR would have required an increasing scale of "renewable" oxygenate use under Section 211(k), the 1990 CAAA oxyfuel provision (up to a 30% market share). Inexplicably, EPA avoided any reference to the MSAT 202l provision in its rulemaking. Instead, EPA's exclusive emphasis was on ozone control, which handicapped ethanol (E10, not E30) use in the summertime, and forced the conversation to ethers. Had EPA informed the court about E30's lower volatility, the importance of higher octane, and ethanol's improved cost structure, the outcome would have been far different. [EPA-HQ-OAR-2022-0829-0548, pp. 4-5]

The Court struck down EPA's rule under Section 7545(k)(1) (the oxy fuel provision, not 202l) on the grounds "that the plain meaning of the statute…precludes the adoption of RFG rules that are not directed toward the reduction of VOCs and toxics emissions, and since the statute is unambiguous, EPA improperly interpreted the section as giving it the broader power to adopt the ROR…The whole purpose of the RFG program is to reduce air pollution…". [EPA-HQ-OAR-2022-0829-0548, pp. 4-5]

While API's attention was focused on the RFG section 211(k) provision, the court was cognizant of section 202(l). It emphasized the importance of EPA achieving maximum reductions in "year- round toxics" (which to the provision's sponsors was even more important than ozone controls over which OTAQ has prioritized for 30 years). While the oil industry got the outcome it wanted, it won the battle but lost the war: when MTBE contaminated water supplies in many cities several years later, and states banned MTBE use, it set the stage for Congressional enactment of the nationwide RFS standards. [EPA-HQ-OAR-2022-0829-0548, pp. 4-5]

One noteworthy piece of the court's ruling was its mention of 42U.S.C.7545, which prohibits EPA from blocking increased concentrations of any fuel additive already in commerce if that prohibition would result in an increase in harmful mobile source emissions "Our conclusion is supported by 42 U.S.C. § 7545(c), which authorizes EPA to control or prohibit the manufacture or sale of fuels or fuel additives if the agency finds that such fuels or fuel additives cause or contribute to air pollution or impair the performance of emission control devices.1 Before it can prohibit a fuel or fuel additive, EPA must do several things, including publish a finding that such prohibition will not cause the use of any other fuel or fuel additive which will produce emissions that will endanger the public health to the same or greater degree than use of the fuel or additive to be prohibited. 42 U.S.C. § 7545(c)(2)(C). [EPA-HQ-OAR-2022-0829-0548, pp. 4-5]

The MY2027 NPRM acknowledged the importance of ethanol's increased role in the nation's gasoline pool at p. 579: "A common thread across the market shifts in T90 has been a decreasing gasoline-to-distillate ratio (GDR) in the product slates produced by refiners…Perhaps the most important factor affecting GDR was the influx of ethanol into gasoline. The increasing ethanol volume displaced a portion of petroleum, which caused refiners to move more of the midrange gasoline cut into the distillate pool. Ethanol's octane also allowed refiners to back out aromatic content." [Emphasis supplied.] [EPA-HQ-OAR-2022-0829-0548, p. 6]

Key Takeaways If EPA Truly Wants to "Be Driven by Science and the Rule of Law"

I. Ethanol is the only technically effective, commercially viable and legally permissible alternative to BTEX as a gasoline octane enhancer. Despite EPA barriers, ethanol has already helped to significantly reduce BTEX levels while maintaining market gasoline octane levels. A gradual transition to nationwide E30 Clean Octane—patterned after EPA's successful and much more challenging transition from leaded to unleaded gasoline—would add hundreds of billions of dollars annually to the nation's balance sheet in the form of reduced health and oil import costs. It would also benefit petroleum refiners: they could use their existing crude oil slates and produce the same 84 sub-octane BOBs as they do now. Terminals and dispensers are ready to splash-blend the additional 20% ethanol on top of today's E10 to produce 100+ RON E30 finished gasoline at a much lower cost to consumers with enhanced performance and greatly reduced emissions. This is precisely what Congress envisioned when it enacted the 1990 CAAA. [EPA-HQ-OAR-2022-0829-0548, pp. 6-7]

BTEX poses the predominant—and dramatically expanding—threat to public health and the environment, in large part driven by the rapid adoption of GDI engine technology. [EPA-HQ-OAR-2022-0829-0548, p. 7]

III. EPA RFS "Set" Rule encourages RD cannibalization of ethanol D6 RINs, thus blocking ethanol from displacing BTEX with E30 HOLC Fuels.

"As in recent years, we believe that excess volumes of BBD beyond the BBD volume requirements will be used to satisfy the advanced biofuel volume requirement within which the BBD volume requirement is nested," the agency said in the final rule. "Historically, the BBD standard has not independently driven the use of BBD in the market. This is due to the nested nature of the standards and the competitiveness of BBD relative to other advanced biofuels. Instead, the advanced biofuel standard has driven the use of BBD in the market. Moreover, BBD can also be driven by the implied conventional renewable fuel volume requirement as an alternative to using increasing volumes of corn ethanol in higher level ethanol blends such as E15 and E85. We believe these trends will continue through 2025.
[read more [Link: https://www.governorsbiofuelscoalition.org/epa-explains-thinking-behind-biomass-based-diesel-volumes-other-reaction-to-rfs-volumes/] …] [EPA-HQ-OAR-2022-0829-0548, p. 7]

EPA's Actions constitute an unlawful violation of CAA section 202(l)'s nondiscretionary language to replace BTEX with ethanol.

"In the U.S., only two commercially available octane boosting compounds are legally permitted for use in gasoline—benzene-based aromatic compounds commonly known as BTEX (benzene, toluene, ethyl-benzene, xylene) and ethanol. A typical gallon of U.S. gasoline contains approximately 20% BTEX and 10% ethanol. Congress has directed EPA to reduce the carcinogenic mobile source air toxics (MSATs) produced by the incomplete combustion of BTEX "the greatest degree of emission reduction achievable through the application of technology which will be available". RDRMCommentsEPA-HQ-OAR.pdf (cleanfuelsdc.org) [Link: https://cleanfuelsdc.org/wp-content/uploads/2021/09/RDRMCommentsEPA-HQ-OAR.pdf] [EPA-HQ-OAR-2022-0829-0548, pp. 7-8]

Conclusion. Indirectly, by finally admitting to the undeniable linkage between BTEX and SOA bound PAH emissions, EPA's MY2027 Multipollutant NPRM requires it to encourage substantial reductions in BTEX content in the final rulemaking. Last year, in West Virginia vs. EPA, SCOTUS elevated the Major Questions Doctrine and relegated the Chevron Deference Doctrine. Most experts expect SCOTUS to take Chevron off life support next year. The bottom line: the test for endurable EPA regulations will be whether they are consistent with the statute's "plain meaning" and with Congressional intent. The courts will also look closely to ascertain how EPA regulations impact the nation's economy, energy security, and environment. [EPA-HQ-OAR-2022-0829-0548, pp. 7-8]

Substituting ethanol for toxic, expensive, and carbon intensive BTEX synthesized from crude oil meets the Supreme Court's criteria for sustainable EPA regulations. [EPA-HQ-OAR-2022-0829-0548, pp. 7-8]

EPA does not have the discretionary authority to embark on another 30 year "snipe hunt" to study whether BTEX "high boiling aromatics" are bad for public health and the environment. Congress has already made that determination and best available science confirms that Congress got it right thirty years ago. 30 years is long enough for the nation's public health and environment to wait: EPA must finally do its job and enforce the law. [EPA-HQ-OAR-2022-0829-0548, pp. 7-8]

2005 EPACT & 2007 EISA (RFS1 and 2)

In order to defuse the MTBE contamination crisis, maintain gasoline octane levels by substituting ethanol to compensate for MTBE's lost octane, and improve the nation's energy security, Congress enacted the landmark 2005 Energy Policy Act (EPACT) and the 2007 Energy Independence and Security Act (EISA). These two pieces of legislation were primarily driven by the nation's reaction to the 9/11 attacks and the Iraq War. [Another reminder of ethanol's many benefits: in addition to the enormous health and carbon reduction benefits, a nationwide E30 Clean Octane standard would reduce U.S. oil imports by approximately one billion barrels annually, or $100 billion/year assuming average oil costs of $100/barrel.] [EPA-HQ-OAR-2022-0829-0548, pp. 5-6]

Congress dropped the 1990 CAAA "fuel neutral" principle as oil companies raced to get out of the MTBE business and rescinded the section 211(k) RFG oxygenated fuel standard provision. However, when oil interests also pushed for elimination of section 202(l), Congressman Henry

Waxman, powerful chairman of the House Energy and Commerce Committee, insisted on retaining the provision he had championed in the 1990 act. Instead, Congress doubled down and in section 1504 of the 2005 EPACT law, required EPA to at long last promulgate the 2007 MSAT Final Rule within eighteen months. [EPA-HQ-OAR-2022-0829-0548, pp. 5-6]

EPA was only 12 years late in issuing the MSAT Rule. Predictably, its assumptions were laughable even then. The factual predicates upon which EPA relied in the 2007 MSAT Final Rule have changed so radically that legal precedents compel it to go back to the drawing board with a fresh set of facts and best available science. [EPA-HQ-OAR-2022-0829-0548, pp. 5-6]

EPA itself opened the door to revisiting the 2007 MSAT Final Rule when it said that it would be compelled to do so if “evidence supports a role for aromatics in secondary PM formation”. [Detchon-Modlin comments, supra, p. 23-24] In the MY2027 NPRM, EPA finally concedes that there is a direct linkage between aromatics/BTEX and SOA PM. At p. 572 of the NPRM, EPA introduced the concept of limiting “high-boiling compounds in gasoline” that have been linked to increased tailpipe PM emissions. The Agency noted that “the high-boiling tail of gasoline contains a high proportion of aromatics and that the heaviest few percent of this material has very high leverage on PM emissions”. As the CFDC et al. comments point out, the statute does not permit EPA to limit its BTEX control efforts to only the high boiling aromatics—reducing SOA-bound PAH by the greatest degree achievable requires substantial BTEX reductions. [EPA-HQ-OAR-2022-0829-0548, pp. 5-6]

EPA’s MSAT Rule did get one thing right in 2007—the U.S. ethanol industry did not have sufficient capacity to replace significant amounts of BTEX. So Congress called OTAQ’s bluff and enacted RFS1 and 2. Thanks to Congressional action, experts estimate that the RFS program—which made E10 the nation’s in-use fuel—displaced nearly 10 billion gallons per year of aromatics as refiners adjusted their blend stocks to accommodate ethanol’s higher octane. [EPA-HQ-OAR-2022-0829-0548, pp. 5-6]

Organization: District of Columbia Department of Energy and Environment (DOEE)

Particulate Matter Health Impacts

In addition, EPA’s proposed standards impede the District’s ability to achieve the World Health Organization’s (WHO) Air Quality Guidelines, which the District of Columbia has committed to achieving through the C40 Clean Air Accelerator.2 The WHO guidelines set the annual 24-hour PM2.5 guidelines at 5 μg/m3 and the 24-hour PM2.5 guidelines at 15 μg/m3. Meanwhile, the WHO annual PM10 guidelines are set at 15 μg/m3 and 45 μg/m3 for the 24-hour PM10 guidelines.3 The WHO used leading scientific evidence from an abundance of research and evaluation by air quality experts to determine that an annual PM concentration higher than 5 μg/m3 is detrimental to public health.4 In fact, according to the Lancet Planetary Health study released March 6, 2023, 99 percent of the world’s population is exposed to unhealthy levels of PM2.5–levels over 5 micrograms per cubic meter.5 [EPA-HQ-OAR-2022-0829-0550, pp. 2-3]

2 C40 Cities. Clean Air Accelerator. https://www.c40.org/accelerators/clean-air-cities/

3 World Health Organization. What are the WHO Air Quaility Guidelines? https://www.who.int/news-room/feature- stories/detail/what-are-the-who-air-quality-guidelines

4 Román Pérez Velasco, Dorota Jarosi?ska, Update of the WHO global air quality guidelines: Systematic reviews – An introduction, Environment International, Volume 170, 2022, 107556, ISSN 0160 4120, https://doi.org/10.1016/j.envint.2022.107556.

5 Wenhua, et al. Global estimates of daily ambient fine particulate matter concentrations and unequal spatiotemporal distribution of population exposure: a machine learning modelling study. The Lancet Planetary Health. https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(23)00008-6/fulltext

Annually, 100,000-200,000 people in the United States, and 7,000,000 worldwide, die from exposure to air pollution, figures that require an expeditious and substantial response.6 In the District alone, around 120 people die from diseases attributable to PM2.5 pollution annually, while approximately 30 people visit the Emergency Department annually.7 Particulate matter is singlehandedly responsible for up to 30,000 premature deaths each year in the United States and over 4,000,000 worldwide.8 EPA must put the health of people and the environment at the forefront of their decision-making and develop more stringent and protective vehicle emission standards. [EPA-HQ-OAR-2022-0829-0550, p. 3]

6 Thakrar, et. All. Reducing Mortality from Air Pollution in the United States by Targeting Specific Emission Sources. https://pubs.acs.org/doi/10.1021/acs.estlett.0c00424#

7 Castillo, et. All. Estimating Intra-Urban Inequities in PM2.5-Attributable Health Impacts: A Case Study for Washington, DC. https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2021GH000431

8 World Health Organization. Ambient Outdoor Air Pollution, December 19, 2022. https://www.who.int/news-room/fact- sheets/detail/ambient-(outdoor)-air-quality-and-health#:~:text=Ambient%20(outdoor)%20air%20pollution%20is,Asia%20and%20Western%20Pacific%20Regions.

Ozone Health Impacts

Based on the current preliminary data, the District of Columbia's current design value of 70 ppb means the District currently meets the federal ozone standards. This is determined by a 3-year average of the fourth-highest daily maximum ozone concentrations. Meeting this standard is a major priority for the District. However, air pollution from sources like vehicles results in challenges for the District to maintain clean data. The WHO also sets the annual 8-hour ozone at 100 µg/m3, which is approximately 51 ppb, far stricter than the current NAAQS. [EPA-HQ-OAR-2022-0829-0550, p. 3]

The District of Columbia requires more reductions to ensure that we can maintain clean data and progress toward meeting the WHO goals. This is especially important given how precarious our clean ozone data is and how much ozone results from emissions produced by light-duty and medium-duty vehicles operating in and around the District, but not registered in the District. According to source apportionment modeling conducted by the Ozone Transport Commission 17% of ozone caused by controllable sources on exceedance days is due to gasoline-powered vehicles, making it the highest source of controllable ozone precursors affecting the District's ozone levels on exceedance days.9 The reductions in ozone precursors that will result from Alternative 1 will be necessary to both maintain the ozone NAAQS and progress toward WHO goals. [EPA-HQ-OAR-2022-0829-0550, p. 3]

9 Ozone Transport Commission. Ozone Transport Commission/ Mid-Atlantic Northeastern Visibility Union 2016 Based Modeling Platform Support Document. January 2023. https://otcair.org/upload/Documents/Reports/2016TSD_January2023_withAppendices.pdf

In addition, data from the Centers for Disease Control and Prevention shows that, nationally, Black and Indigenous people statistically have significantly higher asthma rates than their counterparts in other races.11 In the District, children who live in predominately Black communities have 20 to 25 times more asthma-related emergency room visits than their counterparts in majority White communities.12 [EPA-HQ-OAR-2022-0829-0550, pp. 4-5]

11 Center for Disease Control. Most Recent National Asthma Data. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm.

12 Children's National Medical Hospital. 2017. "Asthma Surveillance in DC Emergency Departments and Hospitals." https://childrensnational.org/-/media/cnhs-site/files/departments/impactdc/impact-dc-surveillance.pdf?la=en&hash=4235C55A9C1DE9DE9725D8D5D99D30831FCA18CF

Studies also illustrate links between increased school absenteeism and ozone exposure.13 This is a District-wide concern as disparities already exist in the education system between students of color and White students. In particular, the literacy disparities have grown since the Covid-19 pandemic: 28% of Black and 30% of Hispanic students were proficient on a fall 2021 test, while 70% of White students were proficient. In the fall of 2019, 44% of Black students and 42% of Hispanic students hit these benchmarks, compared with 73% of White students.14 [EPA-HQ-OAR-2022-0829-0550, pp. 4-5]

13 Daniel L Mendoza et al 2020 Environ. Res. Lett. in press https://doi.org/10.1088/1748-9326/abbf7a

14 Perry Stein. 2022 The Washington Post. "Literacy scores show widening achievement gap in D.C. during pandemic." https://www.washingtonpost.com/education/2022/03/17/dc-schools-achievement-gap-pandemic-reading/

On-road vehicle emissions constitute one of the most significant individual contributors to local air pollution-related health burdens, making up 23% of all pollution-related premature deaths in the District. On-road vehicle emissions are estimated to contribute to 51% of NO2-attributable new asthma cases and 13% of pollution-attributable premature deaths in the District. Regional emissions from all sectors, which originate outside of the District's jurisdiction, contribute disproportionately to the District's air pollution- related new asthma cases and premature deaths (89% and 57%, respectively). [EPA-HQ-OAR-2022-0829-0550, p. 5]

These studies illustrate that air quality is an issue connected to all aspects of people's lives. The pollution from vehicle emissions affects District residents, creating poor air quality and living conditions and with it, a myriad of health, wellness, and educational discrepancies. The District strives to reduce pollution as much as possible; however, pollution from light-duty and medium-duty vehicles must be solved at a larger scale as light-duty and medium-duty vehicles from states across the United States travel into the District. Therefore, the District cannot solve all its pollution problems without action from EPA. EPA needs to set stronger light-duty and medium-duty vehicle emission standards to relieve overburdened and bystander communities experiencing the adverse impacts of vehicle emissions. [EPA-HQ-OAR-2022-0829-0550, p. 5]

Organization: Donn Viviani

Also not addressed is evidence that the increased weight of BEVs compared to comparable ICE vehicles, because of battery weight, will result in nonexhaust emissions (NEE) of particulate matter (PM) that will significantly lessen or even may exceed the proposal's anticipated reductions. While there is controversy as to whether NEE PM is as large as exhaust PM, with evidence on both sides. What is known for certain however, is that heavier vehicles produce more NEE PM and BEVs are significantly heavier than in-ternal combustion vehicles.17 While it is true BEVs regenerative braking removes most brake-NEE, the greater torque of BEVs will cause some aggressive drivers to produce increased NEE PM.18 This needs to be acknowledged and to the extent practicable included in the benefit assessment. In my view, the potential climate benefits of the necessary transition to EVs is too important to risk with an inadequate analysis as to other effects. [EPA-HQ-OAR-2022-0829-0697, pp. 5-6]

17 Liu, Ye, et al. "Comparative analysis of non-exhaust airborne particles from electric and internal combustion engine vehicles." Journal of Hazardous Materials 420 (2021): 126626.

18 Liu, Ye, et al. "Impact of vehicle type, tyre feature and driving behaviour on tyre wear under real-world driving conditions." Science of the Total Environment 842 (2022): 156950.

Organization: Elders Climate Action

3. Public Health Urgency.

Diesel trucks and buses are also major sources of other deadly air pollutants. Medium and heavy-duty diesel engines emit more than 60% percent of the deadly particle pollution from vehicles. Particle pollution cuts short tens of thousands of US lives per year and contributes to the heavy burden of asthma on our nation's children. Diesels are the primary source of particles in communities near heavily-trafficked highways where 65 million Americans are exposed to harmful concentrations. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

Vehicle pollution inequitably harms Black and Latinex communities that are much more likely compared to whites to reside near heavy truck traffic on highways, and at truck terminals, ports and distribution centers. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

NOx from diesels combines with heat and sunlight in the atmosphere to form ground level ozone, or smog, a lung irritant and asthma trigger. Heavy duty vehicle emissions are a major contributor to urban smog in the 230 urban counties where pollution concentrations violate national air quality standards. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

The need for national zero emission standards is greatest in the urban areas that EPA has designated "extreme" (South Coast AQMD) and "severe" (San Joaquin Valley AQMD), or recently bumped-up to "serious" for ozone. NOx emissions from L/MDVs are a primary contributor to their numerous elevated violations of the ozone NAAQS. These areas are not able to achieve sufficient emissions reductions to attain the NAAQS without significant NOx reductions from L/MDVs. [EPA-HQ-OAR-2022-0829-0737, pp. 4-5]

Organization: Energy Innovation

I. The U.S. must transition LDVs and MDVs to zero-emission technologies [i] quickly to reduce their emissions, which contribute to climate change and air pollution—both of which endanger public health and welfare. Adoption of the most stringent tailpipe standards for new vehicles is the most effective tool to achieve this goal. [EPA-HQ-OAR-2022-0829-0561, pp. 1-2]

i This includes technologies that eliminate tailpipe GHG emissions and other pollutants, namely battery electric vehicles for LDVs and MDVs.

In addition to improvements to public health and welfare that the EPA's proposed tailpipe GHG standards would achieve, the proposed multi-pollutant standards will help reduce criteria pollutants and air toxics from remaining internal combustion engine (ICE) vehicles. As LDVs and MDVs transition away from combustion and tailpipes that cause harmful air pollution, these multi-pollutant standards are critical to saving the lives and improving the health of the people and children harmed by transportation pollution.15 Although we do not provide detailed comments on this aspect of the proposed rule, we encourage the EPA to adopt the most stringent standards feasible to mitigate the harmful effects of these pollutants. The EPA aptly points out that "reducing human exposure to these pollutants results in significant and measurable health benefits,"16 especially to frontline communities, communities of color, and low-income communities and individuals that bear the burden of bad air quality from tailpipe emissions.17 Adopting more stringent multi-pollutant standards will also help states meet National Ambient Air Quality Standards18 and improve air quality in all communities. [EPA-HQ-OAR-2022-0829-0561, p. 7]

15 American Lung Association, "Health Impact of Air Pollution," American Lung Association State of the Air, n.d.,

https://www.lung.org/research/sota/health-risks. [EPA-HQ-OAR-2022-0829-0561, p. 7]

16 U.S. EPA, 29379.

17 "Disparities in the Impact of Air Pollution," American Lung Association, April 20, 2020, https://www.lung.org/clean-air/outdoors/who-isat-risk/disparities.

18 U.S. EPA, "Reviewing National Ambient Air Quality Standards (NAAQS): Scientific and Technical Information," U.S. EPA, n.d., https://www.epa.gov/naaqs and "Current Nonattainment Counties for All Criteria Pollutants," U.S. EPA, May 31, 2023, https://www3.epa.gov/airquality/greenbook/ancl.html.

Organization: Environmental. and Public Health Organizations

III. Further Reductions in Emissions of GHGs and Criteria Pollutants from Motor Vehicles Are Necessary to Protect Public Health and the Environment.

A. Vehicular emissions of greenhouse gases gravely endanger public health and welfare by intensifying the climate crisis.

Emissions of GHGs from the transportation sector pose mortal dangers to public health and the environment; EPA's exercise of its responsibilities under the Clean Air Act must take account of and mitigate these dangers. Over thirteen years ago, based upon a massive scientific record, the EPA found that new motor vehicles and engines contribute to emissions of GHGs that drive climate change and endanger the health and welfare of current and future generations.46 Specifically, EPA found that the intensifying climate crisis increased the frequency of warmer temperatures, heat waves, and other extreme weather, worsened air quality by increasing regional ozone pollution, increased the spread of food and water-borne illnesses, increased the frequency and severity of seasonal allergies, and increased the severity of coastal storm events due to rising sea levels.47 [EPA-HQ-OAR-2022-0829-0759, p. 14]

46 74 Fed. Reg. at 66496.

47 74 Fed. Reg. at 66525–26.

Since EPA issued the Endangerment Finding in 2009, dire evidence of the current and future impacts of climate change has continued to accumulate. Recent studies demonstrate that climate change continues to cause heat waves and extreme weather events across the United States.48 Between May and mid-September, 2022, “nearly 10,000 daily maximum temperature records were broken.”49 Additionally, 2022 was “one of the top 10 hottest years on record for daily maximum temperatures” in 13 states, as well as one of the top 10 hottest for daily minimum (nighttime low) temperatures for 31 states.50 Warmer temperatures endanger public health by increasing the risk of heart disease, worsening asthma and chronic obstructive pulmonary disease from increases of ground-level ozone, and causing dehydration and many other ailments.51 Studies have also found that heat waves and extreme weather events cause severe psychiatric and mental health impacts.52 Climate change continues to lead to higher than normal pollen concentrations and earlier and longer pollen seasons, causing worse allergies and asthma.53 The intensifying climate crisis also increases the risk of drought across the U.S, which impacts water supply, agriculture, transportation, and energy, and increases the risk and magnitude of wildfires.54 And recent projections show that sea level rise is anticipated to be on the high end of model projections.55 Studies have found that many of the dangers wrought by climate change exact a higher toll on people with low incomes and people of color.56 [EPA-HQ-OAR-2022-0829-0759, pp. 14-15]

48 U.S. Dep’t of Health & Hum. Serv. (HHS), Off. Climate Change & Health Equity, Climate and Health Outlook (May 2023) [hereinafter HHS, Climate and Health Outlook], https://www.hhs.gov/sites/default/files/climate-health-outlook-may-2023.pdf. See also Andrew Hoell et al., Water Year 2021 Compound Precipitation and Temperature Extremes in California and Nevada, 103 Bull. of the Am. Meteorological Soc’y E2905, E2910 (Dec. 2022), https://journals.ametsoc.org/view/journals/bams/103/12/BAMS-D-22-0112.1.xml?tab_body=fulltext-display(human-caused climate change led to increased extreme high temperatures in 2021 in California and Nevada); Kristy Dahl, Union of Concerned Scientists, Summer of 2022 Was a Hot One. What was Climate Change’s Impact on Heat?, The Equation (Sept. 21, 2022), https://blog.ucsusa.org/kristy-dahl/summer-of-2022-was-a-hot-one-what-was-climate-changes-impact-on-heat/.

49 Dahl.

50 Id.

51 HHS, Climate and Health Outlook, at 2; Christopher Nolte et al., U.S. Global Change Rsch. Program, Air quality, in II Impacts, risks, and adaptation in the United States: Fourth national climate assessment 512, 515 (2018), https://nca2018.globalchange.gov/downloads/NCA4_Ch13_Air-Quality_Full.pdf (climate change leads to worsened air quality by increasing concentrations of ozone and particulate matter in many parts of the U.S.); Am. Lung Ass’n, State of the Air 2023 Report 19 (2023), https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf (describing worsened air quality resulting from climate change).

52 See, e.g., Amruta Nori-Sarma et al., Association Between Ambient Heat and Risk of Emergency Department Visits for Mental Health Among US Adults, 2010 to 2019, 79 JAMA Psychiatry 341 (2022), https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2789481?; Marshall Burke et al., Higher temperatures increase suicide rates in the United States and Mexico, 8 Nature Climate Change 723 (2018), https://gspp.berkeley.edu/assets/uploads/research/pdf/s41558-018-0222-x.pdf; Sarita Silveira et al., Chronic Mental Health Sequelae of Climate Change Extremes: A Case Study of the Deadliest Californian Wildfire, Int’l J. Env’t Rsch. & Pub. Health, Feb. 4, 2021, https://www.mdpi.com/1660-4601/18/4/1487 (demonstrating that climate-related extreme weather events such as wildfires can have severe mental health impacts).

53 HHS, Climate and Health Outlook, at 5.

54 See Marco Turco et al., Anthropogenic climate change impacts exacerbate summer forest fires in California PNAS, June 12, 2023, https://www.pnas.org/doi/10.1073/pnas.2213815120; Ctr. for Climate & Energy Sol., Drought and Climate Change, https://www.c2es.org/content/drought-and-climate-change/ (last visited June 2, 2023). See also Nolte et al., at 521.

55 Benjamin Hamlington et al., Observation-based trajectory of future sea level for the coastal United States tracks near high-end model projections, Commc'n Earth Env't, Oct. 6, 2022, https://www.nature.com/articles/s43247-022-00537-z.

56 See, e.g., Sameed Khatana et al., Association of Extreme Heat With All-Cause Mortality in the Contiguous US, 2008-2017, JAMA Network Open, May 19, 2022, at 1 https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2792389 (finding extreme heat was associated with higher mortality in the U.S., particularly among older adults and black individuals); Adam Schlosser et al., Assessing Compounding Risks Across Multiple Systems and Sectors: A Socio-Environmental Systems Risk-Triage Approach, Frontiers in Climate, Apr. 24, 2023, at 09, https://www.frontiersin.org/articles/10.3389/fclim.2023.1100600/full (identifying hot spots where flood risks and water stress disproportionately impact low-income and nonwhite communities); Dahl ("[M]ore than 80% of the counties with the most frequent heat alerts—21 or more days of heat alerts over the course of the summer—have moderate to high levels of social vulnerability."). See generally EPA, Climate Change and Social Vulnerability in the United States, A Focus on Six Impacts (2021), https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.

The transportation sector has been responsible for an increasing percentage of GHG emissions in the U.S. since 2009, thereby playing an outsized role in intensifying the climate crisis. When EPA made its Endangerment Finding for GHGs, the transportation sector was responsible for 23% of total annual U.S. GHG emissions.57 Since then, transportation sector GHG emissions have only increased as a share of U.S. emissions, surpassing the electric power sector as the largest U.S. source of GHG emissions and contributing 27.2% of total GHG emissions in 202058 and 28.5% in 2021.59 After dipping in 2020 due to the COVID-19 pandemic, carbon dioxide (CO2) emissions from the transportation sector increased by 11.5% between 2020 and 2021.60 Transportation as an end use sector "account[ed] for 1,757.4 [million metric tons] CO2 in 2021 or 37.9% of total CO2 emissions from fossil fuel combustion."61 Adopting stringent GHG emission standards for light- and medium-duty vehicles will lead to massive public health benefits by limiting these pollutants.62 [EPA-HQ-OAR-2022-0829-0759, p. 16]

57 74 Fed. Reg. at 66499.

58 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020, EPA 430-R-22-003, at ES-21 (2022), https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf.

59 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021, EPA 430-R-23-002, at 2-19, 2-28 (2023), https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf.

60 Id. at 2-13.

61 Id. at 2-17.

62 See generally Am. Lung Ass'n, Driving to Clean Air: Health Benefits of Zero-Emission Cars and Electricity (June 2023), https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf.

The IPCC's most recent synthesis of its Sixth Assessment Report confirms the danger to public health and welfare posed by GHG emissions from the transportation sector. The report found that global surface temperature was around 1.1°C higher in 2011-2020 than it was in 1850-1900.63 While average annual GHG emissions growth has slowed in certain sectors such as energy supply and industry, growth in GHG emissions from the transportation sector has remained relatively constant at about 2% per year.64 The latest IPCC report warned that "[d]eep, rapid and sustained GHG emissions reductions, reaching net zero CO2 emissions and including strong emissions reductions of other GHGs . . . are necessary to limit warming to 1.5°C . . . or less than 2°C . . . by the end of the century."65 To have a chance at limiting global temperature increase to 1.5? and avoid the worst impacts of climate change, current GHG emissions from the transportation sector must drop by 59% by 2050 compared to 2020 emissions.66 [EPA-HQ-OAR-2022-0829-0759, p. 16]

63 Intergovernmental Panel on Climate Change (IPCC), Synthesis Report of the IPCC Sixth Assessment Report (AR6): Longer Report, at 6 (2023), https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_LongerReport.pdf.

64 Id. at 10.

65 Id. at 33.

66 IPCC, Climate Change 2022: Mitigation of Climate Change 32 (2022), https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_FullReport.pdf.

There is consistent evidence showing the relationship between short-term exposure to PM and mortality, particularly cardiovascular and respiratory mortality. Short- and long-term exposure to PM2.5 can cause harmful health impacts such as heart attacks, strokes, worsened asthma, and early death.72 In addition, short-term PM exposure has been linked to increases in infant mortality, hospital admissions for cardiovascular disease, hospital admissions and emergency visits for chronic obstructive pulmonary disease, and severity of asthma attacks and hospitalization for asthma in children. Year-round exposure to PM is associated with elevated risks of early death, primarily from cardiovascular and respiratory problems such as heart disease, stroke, influenza, and pneumonia.73 These findings show the critical need for EPA to minimize the harmful emissions from the transportation sector. Doing so will only improve public health and the environment. [EPA-HQ-OAR-2022-0829-0759, pp. 17-18]

72 See EPA, Supplement to the 2019 Integrated Science Assessment for Particulate Matter (Final Report, 2022), at ES-ii, 2-3, 2-4, https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=354490; EPA, Integrated Science Assessment (ISA) for Particulate Matter (Dec. 2019),https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=347534.

73 Am. Lung Ass'n, State of the Air 2023 Report (2023) at 25, https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf.

2. Reductions in criteria pollution emissions will bring health benefits to environmental justice communities.

This rulemaking presents a critical opportunity to mitigate the adverse health impacts plaguing communities that are overburdened by air pollution from motor vehicles and other sources. According to the American Lung Association's (ALA) 2023 State of the Air report, which grades counties on daily and long-term measures of particle pollution and daily measures of ozone, more than 119 million Americans live in places that received failing grades for unhealthy levels of ozone or PM in their air.88 The report notes:

88 Am. Lung Ass'n, State of the Air 2023 Report (2023) at 12, https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf?ext=.pdf.

Although people of color are 41% of the overall population of the U.S., they are 54% of the nearly 120 million people living in counties with at least one failing grade. And in the counties with the worst air quality that get failing grades for all three pollution measures, 72% of the 18 million residents affected are people of color, compared to the 28% who are white.89 [EPA-HQ-OAR-2022-0829-0759, pp. 21-22]

89 Id.

In addition to the disproportionate impact on people of color noted above, ALA outlines other "high-risk" groups that are impacted by the pollution in these regions. For example, low-income communities are particularly vulnerable and at risk of health impacts from pollution. More than 14.6 million people whose incomes meet the federal definition for living in poverty reside in counties that received a failing grade on at least one of the ALA's pollutant indicators, while nearly 2.6 million people living in poverty reside in counties that received failing grades on all three pollutant measures.90 In addition, around 27 million children (under age 18) and 18 million older adults (age 65 or older) live in counties that received a failing grade on at least one pollutant.91 [EPA-HQ-OAR-2022-0829-0759, p. 22]

90 Id. at 20.

91 Id.

In fact, it is well established that communities of color and economically disadvantaged communities are disproportionately exposed to environmental burdens from a variety of sources. The White House Council on Environmental Quality (CEQ) released (and recently updated) a Climate and Economic Justice Screening Tool, which identifies communities around the country that are "marginalized, underserved, and overburdened by pollution"92 and would therefore qualify for Justice4093 investments (President Biden's key environmental justice initiative). The Screening Tool identifies census tracts as "disadvantaged" if they are above the threshold for one or more environmental or climate indicators (e.g., exposure to diesel PM or PM2.5, traffic proximity and volume, or proximity to hazardous waste sites) and above the threshold for socioeconomic indicators related to income and education.94 A recent analysis found that 64% of the population in census tracts the Screening Tool identifies as disadvantaged are Hispanic/Latino, Black or African American, or American Indian or Alaskan Native.95 Overall, 50% of Hispanic/Latino, Black or African American, and American Indian or Alaskan Native individuals in the country reside in disadvantaged communities, compared to just 17% of White, Non-Hispanic/Latino individuals.96 [EPA-HQ-OAR-2022-0829-0759, pp. 22-23]

92 The White House, Biden-Harris Administration Launches Version 1.0 of Climate and Economic Justice Screening Tool, Key Step in Implementing President Biden's Justice40 Initiative (Nov. 22, 2022) https://www.whitehouse.gov/ceq/news-updates/2022/11/22/biden-harris-administration-launches-version-1-0-of-cli mate-and-economic-justice-screening-tool-key-step-in-implementing-president-bidens-justice40-initiative/. See CEQ, Preliminary Climate and Economic Justice Screening Tool, https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5.

93 The White House, The Path to Achieving Justice40 (July 20, 2021), https://www.whitehouse.gov/omb/briefing-room/2021/07/20/the-path-to-achieving-justice40/.

94 CEQ, Climate and Economic Justice Screening Tool: Technical Support Document, (Nov. 2022) at 4–8, https://static-data-screeningtool.geoplatform.gov/data-versions/1.0/data/score/downloadable/1.0-cejst-technical-supp ort-document.pdf.

95 Emma Rutkowski et al., Justice40 Initiative: Mapping Race and Ethnicity, Rhodium Group (Feb. 24, 2022), https://rhg.com/research/justice40-initiative-mapping-race-and-ethnicity/.

96 Id.

Once EPA makes an endangerment finding, it must set standards that are commensurate to the magnitude of the danger to public health and welfare posed by the covered emissions.12 The Clean Air Act defines "effects on welfare" broadly, including "effects on . . . weather . . . and climate."13 The dangers to public health and welfare posed by GHGs that EPA originally cited in the 2009 Endangerment Finding—"risks associated with changes in air quality, increases in temperatures, changes in extreme weather events, increases in food- and water-borne pathogens, and changes in aeroallergens,"14 to name a few—have only increased. EPA recognized that this was likely to happen in the Endangerment Finding itself, finding that these "risk[s] and the severity of adverse impacts on public welfare are expected to increase over time."15 As for criteria pollutants and air toxics—PM, ozone, VOCs, NOx, SOx, CO, diesel exhaust, formaldehyde, acetaldehyde, acrolein, benzene, butadiene, ethylbenzene, naphthalene, and POM/PAHs—their harmful health and environmental effects have long been known, and EPA has recognized the need for continued reductions in their emissions.16 . [EPA-HQ-OAR-2022-0829-0759, p. 10]

12 See Massachusetts, 549 U.S. at 532 (noting that Section 202(a) "charge[s] [EPA] with protecting the public's 'health' and 'welfare'"); Coal. for Responsible Regulation v. EPA, 684 F.3d 102, 117, 122 (D.C. Cir. 2012) (stating that EPA must carry out "the job Congress gave it in § 202(a)—utilizing emission standards to prevent reasonably anticipated endangerment from maturing into concrete harm"). See also S. Rep. No. 91-1196, at 24 (1970), reprinted in A Legislative History of the Clean Air Amendments of 1970, at 424 (1974) (Section 202(a) requires EPA to "make a judgment on the contribution of moving sources to deterioration of air quality and establish emission standards which would provide the required degree of control."). Cf. 74 Fed. Reg. at 66505 ("the Administrator is required to protect public health and welfare, but she is not asked to wait until harm has occurred. EPA must be ready to take regulatory action to prevent harm before it occurs.").

13 42 U.S.C. § 7602(h).

14 74 Fed. Reg. at 66497.

15 74 Fed. Reg. at 66498–66499.

16 88 Fed. Reg. at 29186, 29208-24

Organization: Environmental Defense Fund (EDF) (1of 2)

The American Lung Association (ALA) released its updated State of the Air report and finds that nearly 36% of Americans—119.6 million people—still live in places with failing grades for unhealthy levels of ozone or particle pollution.3 The number of people living in counties with failing grades for daily spikes in deadly particle pollution was 63.7 million, the most ever reported under the current national standard. The report also finds again that the burden of living with unhealthy air is not shared equally. Although people of color are 41% of the overall population of the U.S., they are 54% of the nearly 120 million people living in counties with at least one failing grade. And in the counties with the worst air quality that get failing grades for all three pollution measures, 72% of the 18 million residents affected are people of color, compared to the 28% who are white. [EPA-HQ-OAR-2022-0829-0786, pp. 6-7]

3 American Lung Association, State of the Air, Key Findings, 2023. https://www.lung.org/research/sota/key-findings (Attachment C)

ALA also recently released a new report that estimates the health and economic benefits of a transition to 100 percent zero-emission new passenger vehicle sales by 2035, coupled with non-combustion electricity generation.4 ALA find that, by 2050, the national public health benefits in the U.S. due to cleaner air could reach $978 billion in public health benefits, 89,300 fewer premature deaths, 2.2 fewer asthma attacks and 10.7 million fewer lost work days. [EPA-HQ-OAR-2022-0829-0786, pp. 6-7]

4 American Lung Association, “Driving to Clean Air: Health Benefits of Zero-Emission Cars and Electricity,” June 2023. https://www.lung.org/clean-air/electric-vehicle-report/driving-to-clean-air. (Attachment D)

These recent studies align with and reinforce the need for and the feasibility of protective emissions standards for passenger vehicles in the timeframe proposed by EPA. [EPA-HQ-OAR-2022-0829-0786, pp. 6-7]

Organization: Gabrielle Lawrence

I am a child psychologist and am speaking today as a climate activist who worries and loses sleep thinking of the damage that the pollution we have in our air is causing. Damage to both adults and most importantly to children. With poorer children being the most severely damaged. Daily, clouds of mercury, arsenic and dozens of other heavy metals from power plants and tail pipe fill our air and water, including one of the worst pollutant, the small particle, PM2.5, soot coming from our cars, trucks and buses. With all of those, we are poisoning ourselves and our children. [EPA-HQ-OAR-2022-0829-0455, pp. 1-2]

Daily in my office, I see children who struggle to sit still for even a moment, who struggle in school because of learning disorders impacting reading and math, with ADHD preventing them from focusing and Autism Spectrum Disorder that impacts them socially and in many other ways, All of these impairments have increased dramatically in the last decade. Concerning Autism Spectrum Disorder, we know that it is directly related to brain impairment and that impairment may be related to air-pollution. Today, the CDC indicated that 1 in 44 children, or 2.3 % of children in our country have been diagnosed with Autism Spectrum disorder.
That number is now 241 % higher than in 2020. For these children, multiple peer reviewed, scientific studies have been done using brain-imaging methods to investigate genetic variations in brain development. The studies investigating air-pollution exposure have found a deficit in white matter, brain connectivity, and vascularization (Chen et al. 2015). A relationship has also been found with air pollutants such as; nitrogen oxide (Kalkbrenner et al. 2015), the particulate matter, PM2.5, (Jung et al. 2013), polyaromatic hydrocarbons, diesel exhaust, and carbon monoxide. These are only three studies among dozens of studies that suggest a strong connection between Autism Spectrum Disorder and air-pollution. Numerous other studies with adults have investigated the relationship between air-pollution and cognitive impairment such as Alzheimer’s and other dementias. Those studies also give evidence that the same air-pollutants listed above, also create cognitive impairment in adults. [EPA-HQ-OAR-2022-0829-0455, pp. 1-2]

Organization: Governing for Impact and Evergreen Action (GFI)

In addition to contributing to the climate crisis, light and medium duty passenger vehicles are responsible for emitting harmful pollutants including carbon monoxide, particulate matter, and nitrogen oxides, which can cause or contribute to significant negative public health outcomes such as lung and heart diseases.15 These harmful health outcomes disproportionately affect low income populations and communities of color, who are exposed to greater amounts of vehicle pollution.16 Unfortunately, these same communities are at the greatest risk of harm from the impacts of climate change, and often lack sufficient resources or support to protect themselves from these harmful impacts.17 Strong transportation emissions standards — for both GHGs and criteria pollutants — will limit the present and imminent public health threats that vulnerable populations face due to vehicle pollution. [EPA-HQ-OAR-2022-0829-0621, pp. 2-3]

15 See U.S. Dep't of Transp., "Cleaner Air," https://www.transportation.gov/mission/health/cleaner-air#:~:text=Vehicle%20emissions%20contribute%20to%20the,illnesses%2C%20including%20pneumonia%20and%20b ronchitis (last visited June 15, 2023).

16 See, e.g., Maria Cecilia Pinto de Moura and David Reichmuth, "Inequitable Exposure to Air Pollution from Vehicles in the Northeast and Mid-Atlantic," Union of Concerned Scientists (Jun 21, 2019), https://www.ucsusa.org/about/news/communities-color-breathe-66-more-air-pollution-vehicles.

17 See generally, EPA "Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts," 430-R-21- 003 (2021), available at: https://www.epa.gov/cira/social-vulnerability-report.

Organization: GreenLatinos et al.

Pollution from vehicles makes us sick and kills us. The data shows this over and over again. We need long-term protective regulation now. [EPA-HQ-OAR-2022-0829-0789, p. 2]

For example, Latino/e children are three times more likely (https://www.jpedhc.org/article/S0891-5245(06)00737-1/fulltext) than white children to live in counties with low air quality. About 10% of Latino/e children (https://www.edf.org/blog/2014/04/22/why-latinos-are-disproportionately-affected-asthma-and-what-we-can-do#:~:text=Today%20in%20the%20United%20States,from%20this%20chronic%20respiratory%20illness.) suffer from asthma, and Latino/e children are 40% more likely to die from asthma than non-Latino white children. These disparities have only increased over time relative to the air quality standards set by the U.S. EPA. [EPA-HQ-OAR-2022-0829-0789, p. 2]

Organization: Growth Energy

A. Other Pollutants

In discussing the impacts of the rule on emissions of other pollutants, EPA entirely leaves out consideration of biofuels. As discussed above, ethanol has lower emissions of many pollutants than petroleum gasoline. Indeed, recent studies by the University of California Riverside and the University of Illinois at Chicago found that use of more ethanol and ethanol- blended fuel significantly reduces harmful pollutants such as particulate matter (PM), carbon monoxide, and benzene.19 Just as with GHGs, that failure renders EPA's assessment of emissions of other pollutants inaccurate. And just as with GHGs, EPA misses an opportunity to reduce emissions through incentivizing biofuel use. [EPA-HQ-OAR-2022-0829-0580, p. 12]

19 Patrick Roth et al., Investigating the Effect of Varying Ethanol and Aromatic Fuel Blends on Secondary Organic Aerosol (SOA) Forming Potential for a FFV-GDI Vehicle: Comparison of Exhaust Emissions Between E10 CaRFG and Splash Blended E15, University of California Riverside (2018); Steffen Mueller, The Impact of Higher Ethanol Blend Levels on Vehicle Emissions in Five Global Cities, University of Illinois at Chicago Energy Resources Center (November 2018).

That failure is particularly egregious in the context of EPA's efforts reduce aromatics in petroleum fuels that contribute to PM emissions. 88 Fed. Reg. at 29,401. As discussed above, ethanol has an excellent octane rating, and blending it into gasoline in greater quantities can therefore allow reductions in aromatics and associated PM emissions. EPA explicitly sought comment on ways to reduce aromatic content, but it completely ignored that increasing the ethanol content of gasoline is a simple way to do so that has significant benefits. Multiple studies continue to show that increasing ethanol content in gasoline reduces PM emissions.20 Indeed, the benefits of ethanol in reducing PM were recently confirmed in EPA's own work with Environment and Climate Change Canada.21 In that study, fuel with increased ethanol content showed the deepest reduction in PM compared to the baseline fuel with heavy aromatics. Growth Energy therefore urges EPA to explore the widespread use of higher ethanol blends to replace heavy aromatics to significantly reduce PM emissions. [EPA-HQ-OAR-2022-0829-0580, p. 12]

20 Growth Energy has provided such studies in previous submissions to EPA, including our comment in support of EPA's proposal to implement the "Request from States for Removal of Gasoline Volatility Waiver."

21 EPA, Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources (Apr 2023), Dkt ID: EPA–420–R–23–008.

Organization: HF Sinclair Corporation

Second, PEVs are heavier, and will increase particulate matter emissions through increased brake, tire, and road wear.

Organization: Interfaith Power & Light

In addition, electrifying cars and light trucks will be key to improving air quality and saving lives across the nation. More than 119 million American residents currently live in areas with unhealthy levels of air pollution. According to research from Harvard University, more than 8 million people died from the effects of fossil fuel combustion in 2018, meaning that fossil fuels like oil and coal are linked to 1 in 5 deaths worldwide. Pollutants caused by burning fossil fuels have been linked to early death, heart attacks, respiratory disorders, stroke, and asthma. [EPA-HQ-OAR-2022-0829-0530, p. 1]

Organization: International Council on Clean Transportation (ICCT)

Additionally, a full assessment of relative air quality and health benefits across demographics, as done for the heavy-duty multi-pollutant rule, is recommended for this light-duty and medium-duty multi-pollutant rule. It is widely understood that heavy-duty vehicles contribute to racial disparities in exposure to air pollution, and EPA reported the projected air quality impacts across demographics in their finalized heavy-duty multi-pollutant rule. Inequities in air pollution exposure exist for light-duty vehicle emissions as well. One study finds that on a national level, people of color are exposed to 46% more ambient PM2.5 from light-duty gasoline vehicles than

White people.142 This is a greater disparity than that of HDVs; the same study finds that people of color exposed to 35% higher ambient PM2.5 levels from heavy-duty diesel vehicles compared to White people. Additionally, the health benefits from the heavy-duty multipollutant rule, as projected by the EPA, are on similar scales to that of the proposed light-duty and medium-duty vehicle rule.143 Thus, as the environmental justice and health implications of the light-duty and medium-duty vehicle rule are significant, a full assessment of the projected distribution of changes in PM2.5 and ozone concentrations by geography, race/ethnicity, and income is recommended for the finalized rule. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

142 Tessum, C et al. (2021). PM2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States," Science Advances 7, no. 18: eabf4491, https://doi.org/10.1126/sciadv.abf4491.

143 EPA's proposed light-duty and medium-duty rule is estimated to result in $63 billion and $280 billion (for 7% and 3% discount rates, respectively) in total monetized health benefits from 2027 to 2055. EPA's finalized heavy-duty multipollutant rule is projected to result in $53–150 billion and $91–260 billion (for 7% and 3% discount rates, respectively) in total monetized health benefits from 2027 to 2045.

Benefits and cost-effectiveness of the proposal

The LDV and MDV proposal is projected to reduce 15,000 tons of PM2.5, 66,000 tons of NOx, and 220,000 tons of hydrocarbons from 2027 to 2055.144 These benefits are compared to 2055 levels without the proposal. Based on the previous section on Particulate Matter emission standards, health benefits associated with PM reductions could be greater than EPA's projections. The proposed standards would reduce air pollution near-road where affected populations are often low-income or communities of color. Reducing these emissions will provide cleaner air and are critical to improving public health. [EPA-HQ-OAR-2022-0829-0569, p. 55]

144 US EPA. (2023). Multi-Pollutant emission standards for Model years 2027 and later Light-duty and Medium-duty vehicles Program Announcement. https://www.epa.gov/system/files/documents/2023-04/420f23009.pdf

In addition to the feasible cost, the continuing technology improvement will bring greater climate and health benefits. As discussed in the DRIA Chapter 3.2.4, the introduction of more electric vehicles will help make the declining FTP NMOG + NOX fleet average fully feasible. The MY2021 test data shows 19 vehicles with emissions performance currently below 15 mg/mile, and two below 10 mg/mile from a range of automakers. Similarly, MDV 2022 and 2023 also show similar low emission performance compared to the proposal limit. [EPA-HQ-OAR-2022-0829-0569, p. 55]

Organization: John Graham

The heavier weight of BEVs not only increases cost, but also generates higher tire wear and brake wear particulate emissions. These impacts were not considered in the proposed rule.32 [EPA-HQ-OAR-2022-0829-0585, p. 21]

32 DRIA Section 9.6 page 9-26 states only, "Using the miles traveled (for tailpipe, tire wear and brake wear emissions) and liquid fuel consumed (for evaporative and fuel spillage emissions), we can then generate sets of emission rates for use in OMEGA." This suggests that weight was not a factor in evaluating tire wear and brake wear emissions.

Organization: Jonathan Walker

[*From Hearing Testimony, May 10, 2023*] I hope to offer a unique viewpoint as part of the supporting the strongest emission standards possible. You have heard about the health consequences of these kind of emissions and how the public health issues fall disproportionately on people of color and poverty and also support the greenhouse gas emission control, but I am here because I am an ophthalmologist and in particular, I am a retina specialist, which means I treat diseases that cause blindness which means macular degeneration and diabetic retinopathy, things you cannot fix with glasses or Lasik or cataract surgery. When the retina is damaged, it's gone forever and so is the vision. The tiny blood vessel in the retina are an early marker for that damage before that damage shows up elsewhere in the body. Basically the retina is like a canary in the coal mine when it comes to the effect of pollution on the human body and the research clearly shows that the emissions produced by the vehicles can worsen retina health in a way that risks permanent vision loss. There are measurable effects on the retina with even relatively low levels of exposure and I am going to drop some references in the chat and you can also just Google air pollution and retina damage and I'll also be submitting written comments on the docket. To thank you, you are all doing important work to protect us from the threats to the planet and our overall health but I want you to know that you are helping to avoid blindness too. And we know that industry representatives as have been pointed out have a duty to provide reasons to weaken the law and you guys need to balance all the viewpoints and what I am about to say sounds harsh but I think it applies, the tobacco industry in the 1950s when it was clear that smoking caused cancer yet their lobby sowed doubt and uncertainty when there was none causing untold harm as people kept smoking. So please continue to keep our air clean by continue to working to keep the law strong. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 2]

Organization: Metropolitan Washington Air Quality Committee (MWAQC) et al.

Poor air quality affects the residents living and working in metropolitan Washington. The region is currently designated as being in nonattainment of federal National Ambient Air Quality Standards (NAAQS) for ozone. Nitrogen Oxides (NOx) are a precursor pollutant of ground-level ozone. In addition, NOx is a precursor to secondary particulate matter, such as particulate matter 2.5 micrometers in diameter and smaller (PM2.5). Exposure to PM2.5, along with ground-level ozone, is associated with premature death, increased hospitalizations, and emergency room visits due to exacerbation of chronic heart and lung diseases and other serious health impacts.
Some communities in metropolitan Washington face higher rates of illnesses such as asthma than the national average, and these illnesses are aggravated by these pollutants. As such, reductions in NOx emissions will provide health benefits from both reduced ozone and PM2.5 pollution. [EPA-HQ-OAR-2022-0829-0503, pp. 1-2]

While significant progress has been made in metropolitan Washington to reduce NOx emissions, addressing sources of NOx, including those from on-road vehicles, is critical to continuing to deliver cleaner air for the residents of the region. Over the last five ozone seasons, the region recorded an annual average of eight unhealthy air days, which are in part caused by emissions transported into the region, making this not only a regional issue but a national one. EPA estimates that strengthening these standards will reduce NOx and PM2.5 emissions by 41%

and 35% in 2055, respectively, as shown in Table 4 of the Federal Register notice. [EPA-HQ-OAR-2022-0829-0503, pp. 1-2]

Organization: MCS Referral & Resources (MCSRR)

At II.B.5, EPA describes Carbon Monoxide as “a colorless, odorless gas emitted from combustion processes.” This is a true statement as far as it goes but incomplete and misleading. EPA should acknowledge that CO is concentrated in rainwater, freshwater, saltwater, and some soils to higher levels than found in air. CO also is released by some vegetation and higher in mammals, who excrete some of the CO they produce endogenously via their lungs, skin, and eyes whenever the level of CO in ambient air is lower. Lastly, CO also is produced in the atmosphere from the oxidation of methane, isoprene, terpene, and acetone.
See: https://www.ipcc.ch/site/assets/uploads/2018/03/TAR-04.pdf [EPA-HQ-OAR-2022-0829-0615, p. 4]

At II.B.6, EPA says “The lifetimes of the components present in diesel exhaust range from seconds to days.” This is not true of CO. According to a 2012 review by Louis Jaffe, “the exact duration of CO in the lower atmosphere is not known with certainty; however, the mean residence time has been variously estimated to be between 0.3 and 5.0 years.”
See: https://www.tandfonline.com/doi/abs/10.1080/00022470.1968.10469168 [EPA-HQ-OAR-2022-0829-0615, p. 4]

At II.C.5, EPA claims:

“Controlled human exposure studies of subjects with coronary artery disease show a decrease in the time to onset of exercise-induced angina (chest pain) and electrocardiogram changes following CO exposure. “[EPA-HQ-OAR-2022-0829-0615, p. 4]

EPA gives no reference for this claim, which is not true. While a few studies commissioned by EPA from Aronow et al in the 1970s and Allred et al in the 1980s claimed to find this result, both were undermined by falsifying their methods and results. See:
https://www.dropbox.com/s/fmwp8bmke2e8zfo/Donnay%202015%20SOT%20poster%20on%20EPA%20CO%20 NAAQS%20Fraud.pdf?dl=0 [EPA-HQ-OAR-2022-0829-0615, p. 4]

Not surprisingly, subsequent efforts to reproduce these findings have been unsuccessful. At least 14 studies have reported insignificant results: [EPA-HQ-OAR-2022-0829-0615, p. 4]

https://pubmed.ncbi.nlm.nih.gov/?term=29343136,24923364,21933352,17321552,16937915,11696871,104926
50,8210613,8441830,6695663,6750056,7304396,7389699,4640286&format=abstract [EPA-HQ-OAR-2022-0829-0615, p. 4]

Given this evidence, EPA should stop claiming that people with coronary artery disease show a decrease in time to exercise-induced angina or ECG changes after CO exposure. They do not. [EPA-HQ-OAR-2022-0829-0615, p. 4]

Organization: Minnesota Corn Growers Association (MCGA)

CRITERIA POLLUTANTS AND PARTICULATE MATTER

Bringing high octane fuel to market in the form of midlevel ethanol blends will be significantly less capital-intensive than attempting to increase blend stock octane with hydrocarbon components at refineries. It will also be incredibly cleaner. The avoided production cost and offset emissions lower end-costs to consumers, reducing both economic costs and social costs related to health and environment, key considerations in advancing environmental justice and avoiding adverse impacts from oil refineries on communities that have historically borne them. [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

Increased volumes of ethanol in fuel displace the most harmful compounds from gasoline.25 These aromatic hydrocarbon additives (i.e. benzene, toluene, ethylbenzene, xylene – or BTEX) have high cancer-causing potential. Increasing the ethanol volume in fuel to a midlevel blend has a positive impact on tailpipe emissions of toxins, including significant reductions in particulates and carbon monoxide. These same aromatic hydrocarbons are also precursors to the formation of secondary organic aerosols (SOA), which in turn are a major contributor to particulate matter emissions (PM 2.5). [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

25 Environmental and Energy Study Institute. Ethanol and Air Quality – Separating Fact from Fiction. October 12, 2018. https://www.eesi.org/articles/view/ethanol-and-air-quality-separating-fact-from-fiction.

According to EPA's review for the 2020 Anti-backsliding Study, ethanol does not form SOA directly or affect SOA formation. However, as EPA states, toluene is a large contributor to SOA. Ethanol's high-octane value "greatly reduces the need for other high-octane components including aromatics such as toluene."26 [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

26 U.S. Environmental Protection Agency, Clean Air Act Section 211 (v)(1) Anti-backsliding Study, (2020) Appendix A, Page 61.

As explained in EPA's Fuel Trends Report: Gasoline 2006-2016, "Ethanol's high-octane value has also allowed refiners to significantly reduce the aromatic content of the gasoline, a trend borne out in the data." EPA's data shows that aromatics' share of gasoline volume dropped from nearly 25 percent to 19.3 percent, and benzene volume dropped from 0.99 percent to 0.58 percent between 2000 and 2016, the same time as ethanol blending increased from 1 percent to at least 10 percent. [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

EPA's data demonstrates the air quality and human health benefits of increased ethanol blending in gasoline by replacing harmful aromatics with clean octane from ethanol. Limiting the aromatics content of gasoline and using higher ethanol blends in high octane fuel would further reduce risks from SOA formation and exposure to PM 2.5, which causes serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. The same GDI engine advancements that help lower GHG emissions have the unfortunate side effect of increasing particulate emissions, which could be reduced by use of midlevel ethanol blends. [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

Petroleum-based aerosol particles represent a significant source of pollution, especially in population-dense urban areas. Health issues related to PM and other emission-based pollutants can be reduced by lowering the volume of petroleum in the domestic gasoline pool, which can be accomplished by increasing octane with higher ethanol blends and replacing more hydrocarbon aromatics with ethanol. [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

It is well known that particulate emissions are a strong function of aromatic fuel components with a high double bond equivalent and low vapor pressure, and the particulate forming potential is well represented by the "PMI" metric developed by Honda.27 The value of the PMI metric has been validated in many other studies including the joint auto-oil Coordinating Research Council28 and the EPA.29 PMI and particulate emissions can be reduced by altering refinery processes to reduce heavy aromatic content of the fuel, and, as noted, ethanol can replace those aromatics. [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

27 Aikawa, Sakurai, and Jetter, "Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions", SAE paper 2010-01-2115, 2010; https://doi.org/10.4271/2010-01-2115.

28 Coordinating Research Council, "Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles," Report No. E- 94-2, March 2016; http://crcsite.wpengine.com/wp-content/uploads/2019/05/CRC_2017-3-21_03-20955_E94-2FinalReport-Rev1b.pdf.

29 Environmental Protection Agency, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources", report EPA-420-R-23-008, April 2023.

Perhaps the most credible and comprehensive study on the effects of ethanol on particulate emissions topic was published by the University of California Center for Environmental Research and Technology.30 The study showed statistically significant improvements in particulate emissions for E15 compared to E10. [EPA-HQ-OAR-2022-0829-0612, pp. 9-10]

30 Tang et al., "Expanding the ethanol blend wall in California: Emissions comparison between E10 and E15", Fuel, June 2023; https://doi.org/10.1016/j.fuel.2023.128836.

EPA should adopt rules to limit PMI of both finished fuels and the hydrocarbon blend stocks used for E10, E15, and E85. Limiting PMI of hydrocarbon blend stocks will ensure that the particulate emissions benefits of ethanol are not offset by negative changes at refineries. [EPA-HQ-OAR-2022-0829-0612, pp. 10-11]

Improved fuel property standards should be a high priority because they can achieve significantly lower particulate emissions and dramatically lower GHG emissions. California's Low Carbon Fuel Standard already recognizes the importance of fuel standards, and it has led to dramatic increases in sales of E85 and other low- carbon biofuels. High-octane low-carbon fuels are a key enabler for continued GHG emissions improvements in the millions of liquid-fueled vehicles which will be produced over the next 10+ years, as documented by the U.S. Department of Energy Co-Optimization of Fuels & Engines initiative and in numerous other studies, such as those by MIT and by automakers. A detailed proposed blueprint for future high-octane low-carbon fuels exists in the Next Generation Fuels Act, and EPA has the statutory authority to make these changes without waiting for Congress to act. [EPA-HQ-OAR-2022-0829-0612, pp. 10-11]

Organization: Minnesota Pollution Control Agency (MPCA)

The MPCA has supported EPA's previous efforts to strengthen vehicle emissions standards and appreciates the opportunity to comment on the proposed rule. We see the proposed rulemaking as an opportunity to advance climate action, reduce harm to Minnesotans from criteria pollutants and air toxics, and accelerate the transition to electric vehicles in our state. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Importance of new federal greenhouse gas standards for climate action

The transportation sector represents the largest source of greenhouse gas emissions in Minnesota. The top three sources in the transportation sector are light-duty trucks, heavy-duty trucks, and passenger cars.1 These categories are inclusive of light and medium-duty vehicles discussed in this proposal. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Stronger vehicle emissions standards at the federal level have lowered greenhouse gas emissions from vehicles generally. However, the long-term consumer trend of choosing larger vehicles and the general trend of more miles driven (except during the pandemic) are counteracting more significant emissions reductions in this sector. Increased emissions stringency at the federal level is critical to continuing the trend of emission reductions in this sector. Accelerating light- and medium-duty vehicle electrification is vital for Minnesota to meet its climate and air pollution goals. Specifically, adopting new light- and medium-duty vehicle emissions standards would: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

1 Greenhouse gas emissions in Minnesota 2005-2020, https://www.pca.state.mn.us/sites/default/files/lraq-2sy23.pdf.

- Help the state meet economy-wide greenhouse gas emissions reduction goals. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

In 2022, as part of the publication of the state's Climate Action Framework,2 Governor Walz and Lieutenant Governor Flanagan endorsed the economy-wide greenhouse gas emissions reduction goal for the state to reduce emissions by 50% by 2030 and to become carbon-neutral by 2050. In May 2023, Minnesota codified these targets in statute. Achieving these goals will require action at all levels of government, across businesses, and by individuals. The proposed multipollutant standards will be critical for reducing emissions from the transportation sector. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

2 Minnesota's Climate Action Framework, https://climate.state.mn.us/minnesotas-climate-action-framework.

- Advance transportation actions and targets in the state's Climate Action Framework. [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Minnesota's Climate Action Framework is a plan that sets a vision for how the state will address and prepare for climate change. The framework broadly guides the direction of climate action toward a carbon-neutral, resilient, and equitable future for Minnesota and contains immediate, near-term actions, as well as key progress indicators with measurable targets. The framework was developed based on significant input from stakeholders, the public, and the Tribal Nations located within Minnesota's modern borders [EPA-HQ-OAR-2022-0829-0557, pp. 1-2].

The proposed light- and medium-duty vehicle standards would advance the following actions in the Clean Transportation goal: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

-- Increase the use of clean fuels, including lower-carbon biofuels (Sub-initiative 1.2.1)

-- Expand electric vehicle (EV) charging infrastructure (Sub-initiative 1.2.2)

-- Increase EV availability and access (Sub-initiative 1.2.3)

-- Accelerate the transition to EVs and clean transportation (Sub-initiative 1.2.4)

-- Improve vehicle efficiency and emissions standards (Sub-initiative 1.2.5)

[EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Additionally, the proposed standards would advance the following targets for the Clean Transportation goal: [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

-- Reduce greenhouse gas emissions from the transportation sector 80% by 2040

-- Reach 20% electric vehicles on Minnesota roads by 2030 [EPA-HQ-OAR-2022-0829-0557, pp. 1-2]

Importance of new federal standards for reducing harm from non-greenhouse gas pollution

It is the MPCA's responsibility to protect Minnesotans' health and environment in collaboration with the federal government through cooperative federalism. Minnesota is attaining all National Ambient Air Quality Standards; however, as we better understand the health impacts of air pollution, EPA continues to make these standards more stringent. As emissions from stationary sources continue to decline, it is increasingly important to drive down emissions from vehicles. [EPA-HQ-OAR-2022-0829-0557, p. 2]

Organization: National Corn Growers Association (NCGA)

As explained in EPA's Fuel Trends Report: Gasoline 2006-2016, "Ethanol's high-octane value has also allowed refiners to significantly reduce the aromatic content of the gasoline, a trend borne out in the data." EPA's data shows that aromatics' share of gasoline volume dropped from nearly 25 percent to 19.3 percent, and benzene volume dropped from 0.99 percent to 0.58 percent between 2000 and 2016, the same time as ethanol blending increased from 1 percent to at least 10 percent. [EPA-HQ-OAR-2022-0829-0643, p. 8]

EPA's data demonstrates the air quality and human health benefits of increased ethanol blending in gasoline by replacing harmful aromatics with clean octane from ethanol. Limiting the aromatics content of gasoline and using higher ethanol blends in high octane fuel would further reduce risks from SOA formation and exposure to PM 2.5, which causes serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. The same GDI engine advancements that help lower GHG emissions have the unfortunate side effect of increasing particulate emissions, which could be reduced by use of midlevel ethanol blends. [EPA-HQ-OAR-2022-0829-0643, p. 8]

Petroleum-based aerosol particles represent a significant source of pollution, especially in population-dense urban areas. Health issues related to PM and other emission-based pollutants can be reduced by lowering the volume of petroleum in the domestic gasoline pool, which can be accomplished by increasing octane with higher ethanol blends and replacing more hydrocarbon aromatics with ethanol. [EPA-HQ-OAR-2022-0829-0643, p. 8]

It is well known that particulate emissions are a strong function of aromatic fuel components with a high double bond equivalent and low vapor pressure, and the particulate forming potential is well represented by the "PMI" metric developed by Honda. 27 The value of the PMI metric has been validated in many other studies including the joint auto-oil Coordinating Research

Council 28 and the EPA. 29 PMI and particulate emissions can be reduced by altering refinery processes to reduce heavy aromatic content of the fuel, and, as noted, ethanol can replace those aromatics. [EPA-HQ-OAR-2022-0829-0643, p. 8]

27 Aikawa, Sakurai, and Jetter, "Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions", SAE paper 2010-01-2115, 2010; https://doi.org/10.4271/2010-01-2115

28 Coordinating Research Council, "Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles," Report No. E-94-2, March 2016; http://crcsite.wpengine.com/wp-content/uploads/2019/05/CRC_2017-3-21_03-20955_E94-2FinalReport-Rev1b.pdf

29 US Environmental Protection Agency, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources", report EPA-420-R-23-008, April 2023

Organization: National Farmers Union (NFU)

Higher vehicle weight also increases wear and tear on vehicle tires, which causes higher particulate emissions, as illustrated in Figure 56 reproduced below.22 [EPA-HQ-OAR-2022-0829-0581, pp. 10-11]

22 Alan Stanard et al., Brake and Tire Wear Emissions-Project 17RD016: Final Report, Revision 2, Eastern Research Group, Inc. report prepared for California Air Resources Board, at 87, Feb. 11, 2021, available at https://ww2.arb.ca.gov/sites/default/files/2021-04/17RD016.pdf.

[See original comment for Figure 56. Total vehicle test cycle PM mass emissions vs simulated vehicle test weight, categorized by pad material] [EPA-HQ-OAR-2022-0829-0581, pp. 10-11]

EPA has regulated tailpipe particulate emissions for many years, but there is abundant evidence that wear particles from tires and brakes are at least as important as tailpipe emissions.23 According to one study, "[h]alf a tonne of battery weight can result in tire emissions that are almost 400 more times greater than real-world tailpipe emissions, everything else being equal."24 Moreover, minority and low-income communities are more likely to be exposed to higher traffic-related air pollution, causing environmental justice concerns.25 [EPA-HQ-OAR-2022-0829-0581, p. 12]

23 See, e.g., Xiaoliang Wang, et al., Evidence of non-tailpipe emission contributions to PM2.5 and PM10 near southern California highways, Environmental Pollution, Vol. 317, Jan. 15, 2023, https://doi.org/10.1016/j.envpol.2022.120691.

24 Emissions Analytics, Gaining Traction, Losing Tread – Pollution from tire wear now 1,850 times worse than exhaust emissions, May 10, 2022 Newsletter - Tyre Emissions, https://www.emissionsanalytics.com/news/gaining- traction-losing-tread.

25 Xiaoliang Wang, et al., supra n.23.

But the proposed emissions standards fail to address the large and growing problem of particulate emissions from tires, and instead focus on more stringent tailpipe particulate standards which will add cost without necessarily improving air quality. EPA should not artificially incentivize heavy BEVs by counting them as "zero emissions," when lighter weight solutions can provide similar GHG emissions benefits and better safety. EPA needs to look beyond the tailpipe and create holistic standards which incentivize real improvements. [EPA-HQ-OAR-2022-0829-0581, p. 12]

Organization: National Tribal Air Association (NTAA)

Air Toxics

As reflected in the title of the proposed rule, the benefits of reduced emissions from light-duty and medium-duty vehicles will include reduced exposures to multiple tailpipe emissions. In addition to greenhouse gases and smog-forming compounds, an array of pollutants will be addressed that are harmful to human health. These include benzene, a known human carcinogen6. Tribes in or near urban environments and those with residents near roadways will benefit from decreased exposure to these multiple toxic air pollutants. [EPA-HQ-OAR-2022-0829-0504, p. 2]

6 Benzene; CASRN 71-43-2, U.S.EPA, National Center for Environmental Assessment, Integrated Risk Information System (IRIS)

Organization: Reginald Modlin and B. Reid Detchon

We note the comment in the Proposed Rule that "in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet – especially important considerations during the transition to zero-emission vehicles." Most vehicles entering the market today use gasoline direct injection (GDI) to enhance performance. DOE studies have identified a notable increase in ultrafine particle emissions from GDI engines. The increased number of particles and their size include emissions of toxic polycyclic aromatic hydrocarbons (PAHs). [EPA-HQ-OAR-2022-0829-0570, pp. 2-3]

For mobile source air toxics, such as PAHs derived from gasoline emissions, the Clean Air Act requires "the greatest degree of emission reduction achievable through the application of technology which will be available." In that context, just as with greenhouse gas emissions, vehicles and fuels must be seen as parts of an integrated system. The Department of Energy clearly understands the need for such an approach. Since 2016, the Co-Optimization of Fuels & Engines initiative (known as Co-Optima) has explored how simultaneous innovations in fuels and engines can boost fuel economy and vehicle performance, while reducing emissions. The Co-Optima team views fuels "not as standalone elements in the transportation system, but as dynamic design variables that can work with modern engines to optimize and revolutionize the entire on-road fleet." Their work will be useful as EPA considers the adoption of improved fuels in current and future rulemakings. [EPA-HQ-OAR-2022-0829-0570, pp. 2-3]

Emissions from aromatic compounds in gasoline were commonly thought to be short-lived, thus posing little threat to human health. But that was wrong. A recent General Motors study found that nearly 96% of the fine-particle emissions from gasoline are caused by the aromatics in the fuel. Fine particle pollution from fossil fuel combustion is the leading cause of premature death in the world, responsible for cardiovascular, respiratory, and other health effects that kill more than 8 million people annually. [EPA-HQ-OAR-2022-0829-0570, pp. 4-5]

Not all particles are alike. Among the worst are polycyclic aromatic hydrocarbons (PAHs). Once inhaled, these ultrafine particles reach the deepest part of the lungs and enter the bloodstream, where they can cross biological membranes, even the placental barrier, and reach the brain. Fetal exposure to extremely low levels of PAHs has been associated with developmental delay at age 3 and reduced IQ at age 5. [EPA-HQ-OAR-2022-0829-0570, pp. 4-5]

Research has shown that PAHs attach themselves to ultrafine particles in the exhaust stream, extending their lives over long distances and durations. This new understanding is one reason why EPA's atmospheric models, by the agency's own admission, have been unable to predict the formation of secondary organic aerosols as a class – a major component of fine particle pollution in urban areas. [EPA-HQ-OAR-2022-0829-0570, pp. 4-5]

The Clean Air Act Amendments of 1990 required control of toxic emissions from motor vehicles. EPA responded in 2001 with standards based on the technologies and understanding of health effects at that time. However, time and science have moved on. Vehicle engine technologies have advanced, the composition of gasoline has changed, and the public health effects of aromatics have become better understood: Carburetors and port fuel injection have largely been replaced by gasoline direct injection (GDI) technology. More than half of the vehicles entering the market use this technology to enhance fuel economy performance. Unfortunately, GDI technology greatly increases emissions of ultrafine particles when using today's gasoline. [EPA-HQ-OAR-2022-0829-0570, p. 5]

It doesn't have to be this way. Technologies and products have come together to define a new solution for what the Clean Air Act requires: "the greatest degree of emission reduction achievable through the application of technology which will be available." Along with a rapid transition to electric vehicles, a complementary program should include adoption of higher ethanol blends, which have been shown by U.S. National Laboratories to enable higher fuel economy and vehicle performance. Such blends would enable a 40% reduction in the use of toxic aromatics in gasoline. An important recent study, co-authored by the Nobel Prize winner Mario Molina, concluded that reducing the smallest (ultrafine) particles "without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem." [EPA-HQ-OAR-2022-0829-0570, p. 5]

I. Emissions from the use of toxic chemicals in gasoline – aromatic hydrocarbons – are causing thousands of premature deaths annually in the United States and harming the cognitive development of children. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

1. The effect on public health in brief [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

a. Incomplete combustion of the aromatics in gasoline (comprising 20% of every gallon) results in tailpipe emissions of fine particles. Inhalation of fine particles from fossil fuel combustion is the leading cause of premature death in the world, killing more than 8 million people annually. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

1 Karn Vohra et al., "Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem," Environmental Research (2021): 195(110754): https://www.sciencedirect.com/science/article/abs/pii/S0013935121000487 (accessed Feb. 24, 2021).

b. A recent study found that reducing the smallest (ultrafine) particles without simultaneously limiting organics from automobile emissions "is ineffective and can even exacerbate the problem." [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

2 Song Guo et al., “Remarkable nucleation and growth of ultrafine particles from vehicular exhaust,” Proceedings of the National Academy of Sciences of the United States of America (2020): 117(7): pp. 3427-32: https://www.pnas.org/content/117/7/3427 (accessed June 11, 2021).

c. Once inhaled, ultrafine particles reach the deepest part of the lungs and enter the bloodstream, where they can cross biological membranes, even the placental barrier, and reach the brain. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

3 C. Vyvyan Howard, “Particulate Emissions and Health” (2009): pp. 13-16: http://www.durhamenvironmentwatch.org/Incinerator%20Health/CVHRingaskiddyEvidenceFinal1.pdf (accessed Feb. 24, 2021).

4 Russell A. Morales-Rubio et al., “In utero exposure to ultrafine particles promotes placental stress-induced programming of renin-angiotensin system-related elements in the offspring results in altered blood pressure in adult mice,” Particle and Fibre Toxicology (2019): 16(7): https://particleandfibretoxicology.biomedcentral.com/articles/10.1186/s12989-019-0289-1 (accessed Feb. 24, 2021).

5 Dean E. Schraufnagel, “The health effects of ultrafine particles,” Experimental & Molecular Medicine (2020): 52: pp. 311-17: https://www.nature.com/articles/s12276-020-0403-3 (accessed Feb. 24, 2021).

d. Not all particles are alike – some may be benign, while others are clearly toxic. Among the worst are polycyclic aromatic hydrocarbons (PAHs), which mix and combine with other gasoline emissions to persist over longer times and distances than previously thought possible. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

6 Alla Zelenyuk et al., “The Effect of Gas-Phase Polycyclic Aromatic Hydrocarbons on the Formation and Properties of Biogenic Secondary Organic Aerosol Particles,” Faraday Discussions (2017): 200: pp. 143-164: https://pubs.rsc.org/en/content/articlelanding/2017/FD/C7FD00032D#!divAbstract (accessed Feb. 24, 2021).

e. Fetal exposure to extremely low levels of PAHs – levels that are common in dense urban areas – has been associated with developmental delay at age 3 years and reduced IQ at age 5 years, similar to the effects reported for children with elevated concentrations of lead in their blood. [EPA-HQ-OAR-2022-0829-0570, pp. 6-7]

7 Frederica P. Perera et al., “Prenatal Airborne Polycyclic Aromatic Hydrocarbon Exposure and Child IQ at Age 5 Years,” Pediatrics (2009): 124(2): pp. e195-e202: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2864932/ (accessed Feb. 24, 2021).

1. A recent General Motors study found that nearly 96% of the PM emissions from gasoline are caused by the aromatics in the fuel. Due to an increase in heavy aromatics in the U.S. gasoline pool in the last three years, the gasoline particulate index has increased by more than 30% since 2016 and now is worse than in the EU and China. The authors observed: “Fuel quality improvements are not only important for new vehicles, which are designed for it, but also will benefit the whole fleet of legacy vehicles in the market and off-highway engines.” [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

33 Elana Chapman et al., “Global Market Gasoline Quality Review: Five Year Trends in Particulate Emission Indices,” SAE International (2021): SAE Technical Paper 2021-01-0623: https://saemobilus.sae.org/content/2021-01-0623/ (accessed June 17, 2021).

v. Ultrafine particles (UFPs) are so small that they can only be detected with an electron microscope, and they are more usefully measured by particle number, not mass. They comprise more than 80% of the particles in urban air but are a negligible fraction of PM2.5 mass. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

34 Christina H. Fuller et al., “Indoor and outdoor measurements of particle number concentration in near-highway homes,” Journal of Exposure Science and Environmental Epidemiology (2013): 23: p. 506: https://www.nature.com/articles/jes2012116.pdf (accessed Feb. 24, 2021).

1. Studies have shown associations between UFPs and increased asthma symptoms, cardiovascular disease markers, and decreased cognitive function. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

35 Ibid.

a. In a recent U.S. study, prenatal UFP exposure was linked to asthma development in children: Children whose mothers were exposed to high levels of UFPs during pregnancy were four times more likely to develop asthma than those whose mothers were exposed to lower levels – roughly the difference between a quiet street and a busy road. Most of the diagnoses occurred just after three years of age, and overall 18% of the infants developed asthma. The researchers took account of other factors, including the age of the mothers and obesity, as well as other air pollutants. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

36 Rosalind J. Wright et al., “Prenatal Ambient Ultrafine Particle Exposure and Childhood Asthma in the Northeastern United States,” American Journal of Respiratory and Critical Care Medicine (2021): https://www.atsjournals.org/doi/abs/10.1164/rccm.202010-3743OC (accessed June 11, 2021).

37 Damian Carrington, “Asthma in toddlers linked to in-utero exposure to air pollution, study finds,” The Guardian (May 21, 2021): https://www.theguardian.com/environment/2021/may/21/asthma-in-toddlers-linked-to-in-utero-exposure-to-air-pollution-ufps-study-finds (accessed June 11, 2021).

2. UFPs contain large amounts of toxic components, and their adverse health effects potential would not be predicted from their mass alone. Particle number, surface area, and chemical composition are more important than mass as a health-relevant metric. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

38 Paul A. Solomon, U.S. Environmental Protection Agency, “An Overview of Ultrafine Particles in Ambient Air,” EM: The Magazine for Environmental Managers (2012): 5: pp. 20-21: https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NERL&dirEntryId=241266 (accessed Feb. 24, 2021).

3. There is a growing concern in the public health community about the contribution of UFPs to human health. Despite their modest mass and size, they dominate in terms of the number of particles in the ambient air. A particular concern about UFPs is their ability to reach the most distal lung regions (alveoli) and circumvent primary airway defenses. Moreover, UFPs have a high surface area and a capacity to adsorb a substantial amount of toxic organic compounds. Harmful systemic health effects of PM10 or PM2.5 are often due to the UFP fraction. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

39 Hyouk-Soo Kwon et al., “Ultrafine particles: unique physicochemical properties relevant to health and disease,” Experimental & Molecular Medicine (2020): 52: pp. 318-28: https://www.nature.com/articles/s12276-020-0405-1.pdf (accessed June 11, 2021).

5. The ability of inhaled particles to be captured within the human body, called the deposition efficiency, is a function of particle size, with the particle deposition efficiency rapidly

increasing as the particles become smaller and smaller. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

40 Felipe Rodriguez et al., "Recommendations for Post-Euro 6 Standards for Light-Duty Vehicles in the EU" (2019), International Council on Clean Transportation, p. 8: https://theicct.org/sites/default/files/publications/Post_Euro6_standards_report_20191003.pdf (accessed June 11, 2021).

6. UFPs can cross biological membranes, and their mobility within the body is thought to be high. There is considerable evidence to show that inhaled UFPs can gain access to the bloodstream and are then distributed to other organs in the body. They can even cross the placental barrier. [EPA-HQ-OAR-2022-0829-0570, pp. 10-12]

41 Howard, op. cit., supra note 3, pp. 12-15.

7. UFPs have been shown to directly translocate to the brain along the olfactory nerves. In addition, they can pass intact into cells, where they can have direct access to cytoplasmic proteins and organelles – for example, the mitochondria impacting the respiratory chain and DNA in the nucleus – enhancing the toxic potential of these particles. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

42 Solomon, op. cit., supra note 38, p. 21.

8. Results indicating that particles may contribute to the overall oxidative stress burden of the brain are particularly troublesome, as these long-term health effects may accumulate over decades. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

43 Annette Peters et al., "Translocation and potential neurological effects of fine and ultrafine particles a critical update," Particle and Fibre Toxicology (2006): 3(13): https://pubmed.ncbi.nlm.nih.gov/16961926/ (accessed Feb. 24, 2021).

vi. Research also suggests that the introduction of excessive UFPs into the atmosphere results in surprising side effects, such as changes in the distribution and intensity of rainfall, causing either drought or flooding in extreme cases. Such drastic climate change affects the global hydrological cycle and thereby affects global public health both directly and indirectly. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

44 Kwon et al., op. cit., supra note 39.

vii. In most urban areas, on-road vehicles are the primary source of UFP emissions. These areas observe a peak in UFPs in the morning during rush hour associated with motor vehicle emissions and a second peak during the afternoon, enhanced during the summer, associated with photochemistry, or one slightly later in the afternoon due to rush hour traffic that is enhanced during cooler conditions. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

45 Ibid.

46 Solomon, op. cit., supra note 38, p.19.

viii.. An important recent study co-authored by Nobel Prize winner Mario Molina found "remarkable formation of UFPs from urban traffic emissions": [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

47 Guo et al., op. cit., supra note 2.

1. Photooxidation of vehicular exhaust yields abundant UFP precursors, and organics dominate formation of UFPs under urban conditions. Measurements of gaseous species inside the chamber showed high levels of aromatics, including toluene and C8 and C9 aromatics. [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

48 Ibid.

2. The authors concluded: “Recognition of this source of UFPs is essential to assessing their impacts and developing mitigation policies. Our results imply that reduction of primary particles or removal of existing particles without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem.” (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 12-13]

49 Ibid.

b. According to EPA’s 2011 National Air Toxics Assessment,: secondary formation is the largest contributor to cancer risks nationwide, accounting for 47% of the risk. On-road mobile sources contribute the most cancer risk from directly emitted pollutants (about 18%) and the most to non-cancer risks (34%).[EPA-HQ-OAR-2022-0829-0570, pp. 15-16]

66 U.S. Environmental Protection Agency, “Overview of EPA’s 2011 National Air Toxics Assessment,” online fact sheet (2015): https://www.epa.gov/sites/production/files/2015-12/documents/2011-nata-fact-sheet.pdf (accessed Feb. 24, 2021).

i. A recent study found higher toxicity in combustion aerosols than non-combustion aerosols, with emissions from vehicle engine exhaust scoring higher on overall toxicity than even those from coal combustion. [EPA-HQ-OAR-2022-0829-0570, pp. 15-16]

67 Minhan Park et al., “Differential toxicities of fine particulate matters from various sources,” Nature, Scientific Reports (2018): 8(17007): https://www.nature.com/articles/s41598-018-35398-0 (accessed Feb. 24, 2021).

c. EPA said in 2005: “Aromatic compounds … are considered to be the most significant anthropogenic SOA precursors and have been estimated to be responsible for 50 to 70% of total SOA in some airsheds. … The experimental work of Odum and others showed that the secondary organic aerosol formation potential of gasoline could be accounted for solely in terms of its aromatic fraction” (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 16-17]

68 Daniel Grosjean and John H. Seinfeld, “Parameterization of the formation potential of secondary organic aerosols,” Atmospheric Environment (1967): 23(8): pp. 1733-47: https://www.sciencedirect.com/science/article/abs/pii/0004698189900589 (accessed Feb. 24, 2021) and J.R. Odum et al., “The atmospheric aerosol-forming potential of whole gasoline vapor,” Science (1997): 276(5309): pp. 96-9: https://pubmed.ncbi.nlm.nih.gov/9082994/ (accessed Feb. 24, 2021), cited in U.S. Environmental Protection Agency, “Proposed Rule To Implement the Fine Particle National Ambient Air Quality Standards,” Federal Register (2005): 70(210): p. 65996: https://www.govinfo.gov/content/pkg/FR-2005-11-01/pdf/05-20455.pdf (accessed Feb. 24, 2021).

i. The effect of aromatics on SOA does not seem to be linear: Increasing the level of aromatics in test fuels by less than 30% (from 28.5% to 36.7%) was shown to cause a 3- to 6-fold increase in SOA formation. [EPA-HQ-OAR-2022-0829-0570, pp. 16-17]

69 Jianfei Peng et al., “Gasoline aromatics: a critical determinant of urban secondary organic aerosol formation,” Atmospheric Chemistry and Physics (2017): 17: pp. 10743-52: https://www.atmos-chem-phys.net/17/10743/2017/acp-17-10743-2017.pdf (accessed Feb. 24, 2021).

d. One study estimated that SOA from aromatics in gasoline is responsible for 3,800 annual premature deaths and annual social costs of $28.2 billion in 2006 dollars. [EPA-HQ-OAR-2022-0829-0570, pp. 16-17]

70 von Stackelberg et al., op. cit., supra note 24: https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-12-19 (accessed Feb. 24, 2021).

i. Those mortality numbers can be compared to the impact of EPA ozone regulation, a major focus of the Clean Air Act – predicted to reduce premature mortalities by 4,300-7,100 deaths per year. [EPA-HQ-OAR-2022-0829-0570, pp. 16-17]

71 U.S. Environmental Protection Agency, "Clean Air Act Overview: Progress Cleaning the Air and Improving People's Health," online fact sheet: https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health (accessed Feb. 24, 2021).

e. Ozone "forms in the atmosphere through a series of complex, non-linear chemical interactions of precursor pollutants." The cost of ozone regulation has been estimated to be more than $14 billion annually, with benefits of more than $55 billion per year. [EPA-HQ-OAR-2022-0829-0570, pp. 16-17]

72 U.S. Environmental Protection Agency, "The Benefits and Costs of the Clean Air Act from 1990 to 2020" (2011): p. 4-2: https://www.epa.gov/sites/production/files/2015-07/documents/fullreport_rev_a.pdf (accessed Feb. 24, 2021).

73 Ibid., p. 3-8.

74 Ibid., p. 7-5.

i. Many air toxics contribute to ozone formation, especially aromatics, so there is a double benefit to reducing them. However, an EPA assessment of the Clean Air Act found approximately 98% of avoided premature mortalities were due to reductions in PM concentrations, not ozone." [EPA-HQ-OAR-2022-0829-0570, pp. 16-17]

75 Ibid., p. 1-11

76 Barnes and Becker, op. cit., supra note 19.

77 U.S. EPA, "The Benefits and Costs of the Clean Air Act," op. cit., supra note 72, p. 8-12.

5. Emissions from aromatics: Polycyclic aromatic hydrocarbons (PAHs)

a. Not all particles are alike – some may be benign, while others are clearly toxic. Polycyclic aromatic hydrocarbons (PAHs) are among the worst. EPA has classified seven PAHs as probable human carcinogens. [EPA-HQ-OAR-2022-0829-0570, pp. 17-18]

78 U.S. Environmental Protection Agency, "Polycyclic Organic Matter," online fact sheet: https://www.epa.gov/sites/production/files/2016-09/documents/polycyclic-organic-matter.pdf (accessed June 17, 2021).

i. The Occupational Safety and Health Administration has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m3). [EPA-HQ-OAR-2022-0829-0570, pp. 17-18]

79 Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services, "ToxFAQs for Polycyclic Aromatic Hydrocarbons (PAH)" (1996): https://www.atsdr.cdc.gov/toxfaqs/tfacts69.pdf (accessed Feb. 24, 2021).

b. A subset of polycyclic organic matter (POM), PAHs consist of three to seven benzene rings. The PAH family includes more than 100 different compounds of a similar chemical nature, all products of incomplete combustion of organic materials. Among all sources, vehicular exhaust is the major source for PAH air pollution in most urban areas. [EPA-HQ-OAR-2022-0829-0570, pp. 17-18]

80 U.S. EPA, "Polycyclic Organic Matter," op. cit., supra note 78.

81 Z. Fan and L. Lin, "PAHs" in "Exposure Science: Contaminant Mixtures," Encyclopedia of Environmental Health (Second Edition) (2011), Elsevier Reference Collection in Earth Systems and Environmental Sciences: pp. 805-15: https://www.sciencedirect.com/topics/earth-and-planetary-sciences/polycyclic-aromatic-hydrocarbon (accessed June 21, 2021).

c. Complex mixtures of various PAH compounds are spread with the wind in the environment, where their presence poses a risk to human health through ingestion and inhalation. PAHs do not easily degrade in the environment – they undergo long-distance transport and accumulate in aquatic sediment, where some of them pose a threat to aquatic life. [EPA-HQ-OAR-2022-0829-0570, pp. 17-18]

82 Popek, op. cit., supra note 8: pp. 58-59.

d. PAHs are commonly divided into two categories based on their size. PAHs with two to three fused aromatic rings are considered low molecular weight PAHs, while those with four and more fused rings are high molecular weight PAHs, including the most carcinogenic PAH, benzo[a]pyrene (BaP). [EPA-HQ-OAR-2022-0829-0570, pp. 17-18]

83 Stephen Richardson, "Polycyclic Aromatic Hydrocarbons (PAH)": https://www.enviro.wiki/index.php?title=Polycyclic_Aromatic_Hydrocarbons_(PAHs) (accessed Feb. 24, 2021).

i. The larger PAHs are of greatest concern for human health due to their recalcitrance to degradation, persistence, bioaccumulation, carcinogenicity, genotoxicity and mutagenicity. Since these high molecular weight PAHs exist almost exclusively on fine particles, they travel deep into the human respiratory system and pose a serious health risk. [EPA-HQ-OAR-2022-0829-0570, pp. 17-18]

84 M.N. Igwo-Ezikpe et al., "High Molecular Weight Polycyclic Aromatic Hydrocarbons Biodegradation by Bacteria Isolated from Contaminated Soils in Nigeria," Research Journal of Environmental Sciences (2010): 4: pp. 127-37: https://scialert.net/fulltext/?doi=rjes.2010.127.137 (accessed Feb. 24, 2021).

85 Yan Lv et al., "Size distributions of polycyclic aromatic hydrocarbons in urban atmosphere: sorption mechanism and source contributions to respiratory deposition," Atmospheric Chemistry and Physics (2016): 16: p. 2976: https://acp.copernicus.org/articles/16/2971/2016/acp-16-2971-2016.pdf (accessed Feb. 24, 2021).

ii. More than 95% of the lung deposition of PAHs is due to fine particles, and ultrafine particles are responsible for 10 times more PAH deposition in the alveolar region than their share of PM mass. [EPA-HQ-OAR-2022-0829-0570, pp. 17-18]

86 Youhei Kanawaka et al., "Size Distributions of Polycyclic Aromatic Hydrocarbons in the Atmosphere and Estimation of the Contribution of Ultrafine Particles to Their Lung Deposition," Environmental Science & Technology (2009): 43(17): p. 6855: https://pubmed.ncbi.nlm.nih.gov/19764259 (accessed Feb. 24, 2021).

e. Combustion of vehicle fuels appears to be the principal source of inhalation exposure for the larger PAHs, such as BaP, that are associated with particulate matter. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

87 Health Effects Institute Air Toxics Review Panel, "Polycyclic Organic Matter" in Mobile-Source Air Toxics: A Critical Review of the Literature on Exposure and Health Effects, HEI Special Report 16 (2007): pp. 117-33: https://www.healtheffects.org/system/files/SR16-Polycyclic_Organic_Matter.pdf (accessed Feb. 24, 2021).

i. BaP is one of 12 Level 1 priority compounds among the "toxic, persistent and bioaccumulative" chemicals targeted for "virtual elimination" by the Great Lakes Binational Toxics Strategy signed by the U.S and Canada in 1997. It is almost entirely produced by vehicular emissions. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

88 The Great Lakes Binational Toxics Strategy: Canada - United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes: U.S. Environmental Protection Agency archive document (1997): https://archive.epa.gov/greatlakes/p2/web/pdf/bnssign.pdf (accessed Feb. 24, 2021).

89 Lv et al., op. cit., supra note 85, pp. 2978-79.

f. Motor vehicles account for as much as 90% of the particle-bound PAH mass in the urban air of major metropolitan areas. Roadway tunnel and dynamometer studies have shown that diesel vehicle emissions are rich in the lower molecular weight PAHs, whereas the higher molecular weight PAHs (of greatest concern for human health) are associated with gasoline vehicle emissions. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

90 A. Polidori et al., "Real-time characterization of particle-bound polycyclic aromatic hydrocarbons in ambient aerosols and from motor-vehicle exhaust," Atmospheric Chemistry and Physics (2008): 8: pp. 1277-91: https://www.atmos-chem-phys.net/8/1277/2008/acp-8-1277-2008.pdf (accessed Feb. 24, 2021).

91 Douglas R. Lawson et al., "DOE's Gasoline/Diesel PM Split Study" (2004), PowerPoint presentation: https://www.energy.gov/sites/prod/files/2014/03/f9/2004_deer_lawson.pdf (accessed Feb. 24, 2021).

i. In a tunnel study, for example, diesel trucks were the major source of lighter PAHs, whereas light-duty gasoline vehicles were the dominant source of higher molecular weight PAHs, such as BaP. PAH emissions from gasoline were almost entirely ultrafine particles (UFPs). [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

92 Antonio H. Miguel et al., "On-Road Emissions of Particulate Polycyclic Aromatic Hydrocarbons and Black Carbon from Gasoline and Diesel Vehicles," Environmental Science & Technology (1998): 32(4): pp. 450-55: https://pubs.acs.org/doi/10.1021/es970566w (accessed Feb. 24, 2021).

1. Only the high molecular weight aromatics markedly affect particle number. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

93 Fatouraie et al., op. cit., supra note 61.

2. As the molecular weight of a specific PAH increases, the carcinogenicity of PAHs also increases. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

94 Khaiwal Ravindra et al., "Atmospheric polycyclic aromatic hydrocarbons: Source attribution, emission factors and regulation," Atmospheric Environment (2008): 42(13): pp. 2895-2921: https://www.sciencedirect.com/science/article/abs/pii/S1352231007011351 (accessed Feb. 24, 2021).

3. A comparison of PM2.5 with smaller particles attributed about 86% of the total carcinogenic potency to the PM1 fraction (particles smaller than 1 micrometer in diameter). [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

95 Gordana Pehnec and Ivana Jakovljevi?, “Carcinogenic Potency of Airborne Polycyclic Aromatic Hydrocarbons in Relation to the Particle Fraction Size,” International Journal of Environmental Research and Public Health (2018): 15(11), p. 2485: https://www.mdpi.com/1660-4601/15/11/2485/htm (accessed Feb. 24, 2021).

4. UFPs contain a higher percentage of organic carbon than fine and coarse particles, which is relevant to their biologic potency, and the enhanced biologic potency of UFPs is correlated with the PAH content. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

96 Ning Li et al., “Ultrafine Particulate Pollutants Induce Oxidative Stress and Mitochondrial Damage,” Environmental Health Perspectives (2003): 111(4): p. 459: https://ehp.niehs.nih.gov/doi/pdf/10.1289/ehp.6000 (accessed Feb. 24, 2021).

ii. Just as with SOA, the effect of aromatics on PAH formation does not seem to be linear: Increasing the aromaticity of the fuel by 12% to 46% was found to increase PAH emissions by 8 to 74%. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

97 M.R. Guerin, Oak Ridge National Laboratory, “Energy Sources of Polycyclic Aromatic Hydrocarbons” (1977): p. 16: https://www.osti.gov/servlets/purl/7303055 (accessed Feb. 24, 2021), referencing: National Research Council, “Particulate Polycyclic Organic Matter” (1972): https://www.nap.edu/catalog/20453/particulate-polycyclic-organic-matter (accessed Feb. 24, 2021), citing G.P. Gross, “First Annual Report on Gasoline Composition and Vehicle Exhaust Gas Polynuclear Aromatic Content,” U.S. Department of Health, Education, and Welfare (1970), and Charles R. Begeman and Joseph M. Colucci, “Polynuclear Aromatic Hydrocarbon Emissions from Automotive Engines,” SAE Transactions 79 (1970), p. 1685: www.jstor.org/stable/44716200 (accessed Feb. 24, 2021).

iii. The presence of PAHs has a large effect on SOA formation – increasing mass loadings by factors of two to five, and particle number concentrations, in some cases, by more than a factor of 100. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

99 Zelenyuk et al., op. cit., supra note 6.

- Note: The effect of aromatics on pollution and human health is thus magnified twice over: Aromatics lead disproportionately to PAH formation, and PAHs lead disproportionately to SOA formation. Worse yet, PAHs hitch a ride on SOA for long distances and weaponize these particles as they travel through the human body. [EPA-HQ-OAR-2022-0829-0570, pp. 18-20]

g. Groundbreaking research at Pacific Northwest National Laboratory (PNNL) has led to new understanding of the process by which PAHs persist and are transported long distances. It was shown that the most carcinogenic PAH, benzo[a]pyrene (BaP) – often used as a marker for PAH content generally – is efficiently bound to and transported with atmospheric particles: [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

i. In the laboratory, particle-bound BaP degrades in a few hours, but field observations indicate it persists much longer in the atmosphere and is transported far from its sources – increasing its global lung cancer risk as much as fourfold. BaP from East Asia, for example, has been shown to travel thousands of miles over the Pacific Ocean, reaching the west coast of the United States. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

99 Manish Shrivastava et al., “Global long-range transport and lung cancer risk from polycyclic aromatic hydrocarbons shielded by coatings of organic aerosol,” Proceedings of the National Academy of Sciences (2017): 114(6): pp. 1246-51: https://www.pnas.org/content/114/6/1246 (accessed Feb. 24, 2021).

ii. When SOA particles are formed in the presence of gas-phase PAHs, their formation and properties are significantly different from SOA particles formed without PAHs: They exhibit slower evaporation kinetics and have higher fractions of non-volatile components and higher viscosities, assuring their longer atmospheric lifetimes. This increased viscosity and decreased volatility act as a shield that protects PAHs from chemical degradation and evaporation, allowing for their long-range transport. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

100 Zelenyuk et al., op. cit., supra note 6.

h. Based on numerous experimental studies, PAHs are also widely accepted to be precursors for soot, or black carbon – a major contributor to climate change. Products of toluene combustion (one of the BTEX aromatics) are known precursors of PAHs that are involved in soot formation. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

101 H. Richter and J.B. Howard, “Formation of polycyclic aromatic hydrocarbons and their growth to soot – a review of chemical reaction pathways,” Progress in Energy and Combustion Science (2000): 26(4-6), pp. 565-608: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.467.9757&rep=rep1&type=pdf (accessed Feb. 24, 2021).

102 Qian Mao et al., “Formation of incipient soot particles from polycyclic aromatic hydrocarbons,” Carbon (2017): 121: pp. 380-88: https://www.sciencedirect.com/science/article/pii/S0008622317305766 (accessed Feb. 24, 2021).

103 Gabriel da Silva et al., “Toluene Combustion: Reaction Paths, Thermochemical Properties, and Kinetic Analysis for the Methylphenyl Radical + O2 Reaction,” The Journal of Physical Chemistry A (2007): 111(35): pp. 8663-76: https://pubmed.ncbi.nlm.nih.gov/17696501/ (accessed Feb. 24, 2021).

i. Black carbon is considered the second most important human emission in terms of climate forcing; only carbon dioxide (CO2) has a greater overall effect. The short-term (20-year) global warming potential per ton of black carbon is 3200 times that of CO2. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

Black carbon emissions associated with the shift to GDI engines will lead to increased warming over the U.S., especially in urban regions. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

104 Raza et al., op. cit., supra note 25: p. 5.

ii. However, black carbon is rapidly removed from the atmosphere by deposition, and its atmospheric concentrations respond quickly to reductions in emissions. Reductions in black carbon are thus an attractive near-term mitigation strategy to slow the rate of climate change. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

105 T.C. Bond et al., “Bounding the role of black carbon in the climate system: A scientific assessment,” Journal of Geophysical Research Atmospheres (2013): 118(11): pp. 5380-5552: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/jgrd.50171 (accessed Feb. 24, 2021).

c. EPA sets air standards for PM2.5 based on mass, when the more important measure of health risk may be the number of extremely lightweight ultrafine particles. [EPA-HQ-OAR-2022-0829-0570, p. 22]

111 U.S. Environmental Protection Agency, "National Ambient Air Quality Standards (NAAQS) for PM," online fact sheet: https://www.epa.gov/pm-pollution/national-ambient-air-quality-standards-naaqs-pm (accessed Feb. 24, 2021).

i. This is particularly important because gasoline direct-injection (GDI) engines (the new automotive norm) emit a higher level of PM emissions measured by particle number than the prior technology, port fuel injection engines. [EPA-HQ-OAR-2022-0829-0570, p. 22]

112 Raza et al., op. cit., supra note 25: p. 1.

d. EPA's assessment of the health risks of PAHs, as reflected in its modeling protocols, is also based on a limited sample of the PAH universe. This approach understates the total carcinogenic potency of PAHs by an estimated 85.6%. [EPA-HQ-OAR-2022-0829-0570, p. 22]

113 Vera Samburova et al., "Do 16 Polycyclic Aromatic Hydrocarbons Represent PAH Air Toxicity?", Toxics (2017): 5(3): 17: https://www.mdpi.com/2305-6304/5/3/17/htm (accessed Feb. 24, 2021).

7. Health effects of PAH exposure

a. Toxic air pollutants can affect health and functioning over the course of life by launching a trajectory of adverse effects related to the initial physical or developmental impairment, and/or by "seeding" latent disease that becomes evident only in later life. [EPA-HQ-OAR-2022-0829-0570, pp. 23-24]

114 Frederica P. Perera, "Multiple Threats to Child Health from Fossil Fuel Combustion: Impacts of Air Pollution and Climate Change," Environmental Health Perspectives (2017): 125(2): p. 145: https://ehp.niehs.nih.gov/doi/full/10.1289/EHP299 (accessed Feb. 24, 2021).

b. In cells UFPs have been found to induce heme oxygenase-1 (HO-1) expression, a sensitive marker for oxidative stress, directly correlated with the high organic carbon and PAH content of UFPs. Oxidative stress is associated with numerous diseases, including cardiovascular disease, hypertension, and diabetes. [EPA-HQ-OAR-2022-0829-0570, pp. 23-24]

115 Li et al., op. cit., supra note 96: p. 455.

c. Fetal exposure to PAHs, as measured by prenatal air monitoring for the marker PAH benzo[a]pyrene during the third trimester of pregnancy, was assessed in a long-term observational epidemiological study in New York. Exposure levels were characterized relative to a median of 2.66 nanograms per cubic meter (ng/m3) – that is, 100,000 times less than the OSHA air standard of 0.2 mg/m3. (A nanogram is one-millionth of a milligram.) [EPA-HQ-OAR-2022-0829-0570, pp. 23-24]

116 Frederica P. Perera et al., "Effects of Transplacental Exposure to Environmental Pollutants on Birth Outcomes in a Multiethnic Population," Environmental Health Perspectives (2003): 111(2): p. 203: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241351/pdf/ehp0111-000201.pdf (accessed Feb. 24, 2021).

i. Fetal exposure above the median was associated with developmental delay at age 3 years and reduced IQ at age 5 years, as well as increased anxiety and depression, possibly by interfering with knowledge acquisition or slowing cognitive processing. The observed decrease in full-scale IQ is similar to that reported for children with elevated concentrations of lead in their blood. [EPA-HQ-OAR-2022-0829-0570, pp. 23-24]

117 Frederica P. Perera et al., “Prenatal Polycyclic Aromatic Hydrocarbon (PAH) Exposure and Child Behavior at Age 6–7 Years,” Environmental Health Perspectives (2012): 120(6): pp. 921-26: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3385432/ (accessed Feb. 24, 2021).

118 Perera et al., “Prenatal Airborne Polycyclic Aromatic Hydrocarbon Exposure and Child IQ at Age 5 Years,” op. cit., supra note 7.

1. The effects of lead exposure include neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits, and lowered IQ. [EPA-HQ-OAR-2022-0829-0570, pp. 23-24]

119 Texas Commission on Environmental Quality, “Air Pollution from Lead,” online fact sheet: https://www.tceq.texas.gov/airquality/sip/criteria-pollutants/sip-lead (accessed Feb. 24, 2021).

ii. DNA adducts are a form of DNA damage caused by attachment of a chemical entity to DNA. Adducts that are not removed by the cell can cause mutations that may give rise to cancer. The formation of PAH-DNA adducts has been widely studied in experimental models and has been documented in human tissues. Higher levels of PAH-DNA adducts found in umbilical cord blood were associated with reduced scores on neurocognitive tests. [EPA-HQ-OAR-2022-0829-0570, pp. 23-24]

120 “DNA adducts,” Nature.com: https://www.nature.com/subjects/dna-adducts (accessed Feb. 24, 2021).

121 M. Margaret Pratt et al., “Polycyclic Aromatic Hydrocarbon (PAH) Exposure and DNA Adduct Semi-Quantitation in Archived Human Tissues,” International Journal of Environmental Research and Public Health (2011): 8(7): pp. 2675-91: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3155323/ (accessed Feb. 24, 2021).

122 Frederica P. Perera et al., “Polycyclic Aromatic Hydrocarbons–Aromatic DNA Adducts in Cord Blood and Behavior Scores in New York City Children,” Environmental Health Perspectives (2011): 119(8): pp. 1176-81: https://ehp.niehs.nih.gov/doi/pdf/10.1289/ehp.1002705 (accessed Feb. 24, 2021).

d. A long-term study in California also found an association between exposure to airborne PAHs during the last 6 weeks of pregnancy and early preterm birth – with median exposure at the extremely low level of 3.6 ng/m3. [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

123 Amy M. Padula et al., "Exposure to Airborne Polycyclic Aromatic Hydrocarbons During Pregnancy and Risk of Preterm Birth,” Environmental Research (2014): 135: pp. 221-226: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4262545/ (accessed Feb. 24, 2021).

i. Preterm birth is a predictor of infant mortality and later-life morbidity. Despite recent declines, the rate of preterm birth remains high in the U.S. Research increasingly suggests a possible relationship between a mother's exposure to common air pollutants, including PM2.5 and preterm birth of her baby. [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

124 Jina J. Kim et al., "Preterm birth and economic benefits of reduced maternal exposure to fine particulate matter," Environmental Research (2019): 170: pp. 178-86: https://www.sciencedirect.com/science/article/abs/pii/S001393511830642X (accessed Feb. 24, 2021).

Groundbreaking research at Pacific Northwest National Laboratory (PNNL) has led to new understanding of the process by which PAHs persist and are transported long distances. It was shown that the most carcinogenic PAH, benzo[a]pyrene (BaP) – often used as a marker for PAH content generally – is efficiently bound to and transported with atmospheric particles: [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

i. In the laboratory, particle-bound BaP degrades in a few hours, but field observations indicate it persists much longer in the atmosphere and is transported far from its sources – increasing its global lung cancer risk as much as fourfold. BaP from East Asia, for example, has been shown to travel thousands of miles over the Pacific Ocean, reaching the west coast of the United States. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

99 Manish Shrivastava et al., "Global long-range transport and lung cancer risk from polycyclic aromatic hydrocarbons shielded by coatings of organic aerosol," Proceedings of the National Academy of Sciences (2017): 114(6): pp. 1246-51: https://www.pnas.org/content/114/6/1246 (accessed Feb. 24, 2021).

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100 Zelenyuk et al., op. cit., supra note 6.

h. Based on numerous experimental studies, PAHs are also widely accepted to be precursors for soot, or black carbon – a major contributor to climate change. Products of toluene combustion (one of the BTEX aromatics) are known precursors of PAHs that are involved in soot formation. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

101 H. Richter and J.B. Howard, "Formation of polycyclic aromatic hydrocarbons and their growth to soot – a review of chemical reaction pathways," Progress in Energy and Combustion Science (2000): 26(4-6), pp. 565-608: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.467.9757&rep=rep1&type=pdf (accessed Feb. 24, 2021).

102 Qian Mao et al., "Formation of incipient soot particles from polycyclic aromatic hydrocarbons," Carbon (2017): 121: pp. 380-88: https://www.sciencedirect.com/science/article/pii/S0008622317305766 (accessed Feb. 24, 2021).

103 Gabriel da Silva et al., "Toluene Combustion: Reaction Paths, Thermochemical Properties, and Kinetic Analysis for the Methylphenyl Radical + O2 Reaction," The Journal of Physical Chemistry A (2007): 111(35): pp. 8663-76: https://pubmed.ncbi.nlm.nih.gov/17696501/ (accessed Feb. 24, 2021).

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105 T.C. Bond et al., "Bounding the role of black carbon in the climate system: A scientific assessment," Journal of Geophysical Research Atmospheres (2013): 118(11): pp. 5380-5552: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/jgrd.50171 (accessed Feb. 24, 2021).

II. Thirty years ago Congress required EPA to control these hazardous air pollutants to the greatest degree achievable, yet aromatics still comprise a fifth of the nation's gasoline supply, amounting to more than 25 billion gallons a year. [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

1. EPA's response to a legislative mandate

a. The Clean Air Act Amendments of 1990 contained the following requirement, codified as Section 202(l)(2) of the Clean Air Act, Mobile source-related air toxics – Standards: [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

"Within 54 months after November 15, 1990, the [EPA] Administrator shall … promulgate (and from time to time revise) regulations … containing reasonable requirements to control hazardous air pollutants from motor vehicles and motor vehicle fuels. The regulations shall contain standards for such fuels or vehicles, or both, which the Administrator determines reflect the greatest degree of emission reduction achievable through the application of technology which will be available, taking into consideration the standards established under subsection (a), the availability and costs of the technology, and noise, energy, and safety factors, and lead time." (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

125 42 U.S. Code, sec.?7521, "Emission standards for new motor vehicles or new motor vehicle engines," P.L. 101-549, sec. 206, enacted Nov. 15, 1990: https://www.law.cornell.edu/uscode/text/42/7521 (accessed Feb. 24, 2021).

i. Congress made its intent clear by specifically naming the BTEX aromatics (benzene, toluene, ethylbenzene, and xylenes), along with polycyclic organic matter, as hazardous air pollutants. [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

126 42 U.S. Code, sec.?7412, "Hazardous air pollutants," P.L. 101-549, sec. 301, enacted Nov. 15, 1990: https://www.law.cornell.edu/uscode/text/42/7412 (accessed Feb. 24, 2021).

ii. Additionally, in the section requiring reformulated gasoline in areas with high summertime ozone levels, the statute requires "the greatest reduction in … emissions of toxic air pollutants (during the entire year) achievable through the reformulation of conventional gasoline" – with the term "toxic air pollutants" specifically defined as including polycyclic organic matter (POM). [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

127 42 U.S. Code, sec.?7545, "Regulation of fuels," at (k)(1)(A) and (k)(10)(c): P.L. 101-549, sec. 219, enacted Nov. 15, 1990: https://www.law.cornell.edu/uscode/text/42/7545 (accessed June 17, 2021).

iii. As EPA recently noted in its proposed rule setting new GHG standards for light-duty vehicles, the agency's obligation to act under this section is mandatory. [EPA-HQ-OAR-2022-0829-0570, pp. 24-25]

128 U.S. Environmental Protection Agency, "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards," Federal Register (2021): 86(151): p. 43751: https://www.govinfo.gov/content/pkg/FR-2021-08-10/pdf/2021-16582.pdf (accessed Aug. 18, 2021). e. In December 2020 EPA issued a "Fuels Regulatory Streamlining" rule that relieved refineries of their responsibility to report regularly on the aromatics levels in reformulated gasoline (approximately 30% of the national gasoline pool). An industry-led annual sampling program will be used instead. Refineries also are no longer required to estimate emissions of air toxics, including polycyclic organic matter. [EPA-HQ-OAR-2022-0829-0570, pp. 28-29]

143 U.S. Environmental Protection Agency, "Fuels Regulatory Streamlining," Federal Register (2020): 85(234), "Program Design," p. 78414, and "Key Differences Between Part 1090 and Part 80," p. 78436: https://www.govinfo.gov/content/pkg/FR-2020-12-04/pdf/2020-23164.pdf (accessed June 17, 2021).

f. In August 2021, EPA proposed revised greenhouse gas emissions standards for new cars that again failed to address the importance of vehicle fuels. EPA noted only that "in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet – especially important considerations during the transition to zero-emission vehicles." [EPA-HQ-OAR-2022-0829-0570, pp. 28-29]

144 U.S. EPA, "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards," op. cit., supra note 128: p. 43730.

i. Indeed, the very basis on which EPA proceeded, according to the Proposed Rule, was the requirement in Section 202(a) "to establish standards for emissions of air pollutants from new motor vehicles which, in the Administrator's judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare." The requirements of Section 202(l)(2), cited above, were enacted concurrently and explicitly based on that same provision of Section 202(a). [EPA-HQ-OAR-2022-0829-0570, pp. 28-29]

145 Ibid., p. 43728.

146 42 U.S. Code, sec.?7521, op.cit.,supra note 125.

IV. The urgency of action

Dr. Frederica P. Perera is Professor of Environmental Health Sciences and Founding Director of the Columbia Center for Children's Environmental Health, currently serving as Director of Translational Research. She is internationally recognized for pioneering the field of molecular epidemiology, utilizing biomarkers to understand links between environmental exposures and disease. Her research, cited above, addresses the multiple impacts of fossil fuel combustion on children's health and development – both from the toxic pollutants emitted, such as PAHs, and from climate change related to CO2 emissions. The following commentary, while not addressing aromatics specifically, is nonetheless eloquently on point. It is drawn from her paper "Multiple Threats to Child Health from Fossil Fuel Combustion: Impacts of Air Pollution and Climate Change": [EPA-HQ-OAR-2022-0829-0570, pp. 46-47]

255 Perera is the lead author of five works cited here. See supra notes 7, 114, 116, 117, and 122.

Fossil-fuel combustion by-products are the world's most significant threat to children's health and future and are major contributors to global inequality and environmental injustice. The emissions include a myriad of toxic air pollutants and carbon dioxide (CO2), which is the most important human-produced climate-altering greenhouse gas. Synergies between air pollution and climate change can magnify the harm to children. Impacts include impairment of cognitive and behavioral development, respiratory illness, and other chronic diseases – all of which may be "seeded" in utero and affect health and functioning immediately and over the life course. [EPA-HQ-OAR-2022-0829-0570, pp. 46-47]

By impairing children's health, ability to learn, and potential to contribute to society, pollution and climate change cause children to become less resilient and the communities they live in to become less equitable. The developing fetus and young child are disproportionately affected by these exposures because of their immature defense mechanisms and rapid development, especially those in low- and middle-income countries where poverty and lack of resources compound the effects. No country is spared, however: Even high-income countries, especially low-income communities and communities of color within them, are experiencing impacts of fossil fuel-related pollution, climate change and resultant widening inequality and environmental injustice. Global pediatric health is at a tipping point, with catastrophic consequences in the absence of bold action. [EPA-HQ-OAR-2022-0829-0570, pp. 46-47]

Fortunately, technologies and interventions are at hand to reduce and prevent pollution and climate change, with large economic benefits documented or predicted. All cultures and communities share a concern for the health and well-being of present and future children: This shared value provides a politically powerful lever for action. [EPA-HQ-OAR-2022-0829-0570, pp. 46-47]

256 Perera, “Multiple Threats to Child Health from Fossil Fuel Combustion,” op. cit., supra note 114.

Organization: Renewable Fuels Association (RFA)

d. Vehicle weight: Safety concerns and increased PM emissions

It is also well known that higher vehicle weight increases wear and tear on vehicle tires, which causes higher particulate emissions.39 EPA has regulated tailpipe particulate emissions for many years, but there is abundant evidence that wear particles from tires and brakes are at least as important as tailpipe emissions.40 According to one study, “battery weight can result in tire emissions that are almost 400 times greater than real- world tailpipe emissions.”41 But the proposed emissions standards fail to address the large and growing problem of particulate emissions from tires, and instead focus on more stringent tailpipe particulate standards which will add cost without significantly improving air quality. Again, EPA needs to look beyond the tailpipe and create holistic standards that incentivize real improvements. [EPA-HQ-OAR-2022-0829-0602, pp. 18-19]

39 Stanard et al., "Brake and Tire Wear Emissions Project 17RD016: Final Report, Revision 2", prepared for CARB, February 11, 2021; https://ww2.arb.ca.gov/sites/default/files/2021-04/17RD016.pdf.

40 Wang et al., "Evidence of non-tailpipe emission contributions to PM2.5 and PM10 near southern California highways" Environmental Pollution Volume 317, 15 January 2023; https://doi.org/10.1016/j.envpol.2022.120691.

41 Emissions Analytics, "Gaining Traction, Losing Tread"; https://www.emissionsanalytics.com/news/gaining-traction- losing-tread.

[See original comment for Figure 56: Total Vehicle test cycle PM mass emissions vs simulated vehicle test weight, categorized by pad material. [EPA-HQ-OAR-2022-0829-0602, pp. 18-19]

Organization: Satya Consultores

Satya began its DEP work with the goal of solving the tradeoff between reducing diesel soot and NOX emissions. At higher temperatures, diesel engines achieve more complete combustion, and emit less soot and other fine particulate matter as a result. However, under these conditions NOX emissions increase. In turn, lower engine temperatures result in lower NOX emissions but cause soot emissions to increase. This tradeoff is well known among fuel scientists.1 Both pollutants have significant adverse environmental impacts and health effects. [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

Satya's DEP resolves this conundrum. We call the resulting fuel "Next Diesel."

1 See, e.g., Narayan et al., Combustion Monitoring in Engines Using Accelerometer Signals, J. VIBROENGINEERING, Sep. 2019, at 4; Tie Li & Hideyuki Ogawa, Analysis of the Trade-Off between Soot and Nitrogen Oxides in Diesel- Like Combustion by Chemical Kinetic Calculation.

In DEP, two proprietary additives are mixed into the diesel fuel. The first additive ("A1") is an ethoxylated fatty acid ester, made with a mixture of stearic and palmitic acid esters of sorbitol and its mono- and dianhydrides. The second additive ("A2") is a complex water-based blend of aromatic solvents with methyl radicals mixed with ethoxylated phenol-derived surfactants. [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

Diesel fuel flows from a tank at the end of the refining process in a continuous stream through piping to a Shock Wave Power Reactor. En route, A1 is metered into the diesel fuel stream via a Progressive Cavity Injection Pump, and the combination is blended using a static mixer. Once the fuel/A1 mixture is homogenous, A2 is metered in, and that combination is blended in a second static mixer. The resulting diesel fuel/A1/A2 mixture then flows into the Shock Wave Power Reactor where it is subjected to controlled cavitation, a process which creates vapor bubbles in the fuel mixture. As a liquid passes through the SPR it is subjected to "controlled cavitation." The heart of the reactor is a specially designed rotor. The spinning action generates hydrodynamic cavitation in the rotor cavities away from the rotor to prevent damage to metal surfaces. As microscopic cavitation bubbles are produced and collapse, shockwaves are given off into the liquid which can heat and/or mix.2 [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

2 Hydro Dynamics, Inc. (n.d.). Retrieved from Harnessing the Power of Cavitation: https://www.hydrodynamics.com/cavitation-technology/.

The resulting diesel fuel exhibits improved properties, including significantly improved ignition characteristics. Its electrical conductivity is more than 1,000 times greater than regular diesel fuel, and the lubricity value is more than 100 times greater. These and other upgraded properties of Next Diesel enable more complete fuel combustion, which in turn results in less soot production and also reduces NOX emissions. The corresponding loss of fuel power, if any, is negligible. [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

The pilot- scale test results, which followed EPA-specified federal test procedures (or "FTPs"), demonstrated significant reductions in soot with accompanying reductions in NOX emissions. All Next Diesel emissions test results were compared to ultra-low sulfur diesel ("ULSD") emissions tests on the same engines. Only the fuels were changed; all other test parameters were identical. All tests were "engine out;" there was no after-treatment or particulate filtering. Combustion map parameters for both Next Diesel and ULSD were the same. [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

Satya and SwRI compared Next Diesel with ULSD in extensive tests. Two of the many test results illustrate Next Diesel's potential. As illustrated in Figure 1 below, transient cycle tests on a newer model diesel engine, the Navistar N13, documented a 14% reduction in soot emissions and an 8.6% reduction in NOX: [See original attachment for Navistar N13 Transient Tests] [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

As shown in Figure 2, on an older model DDC Series 60 engine, the reductions in soot were even more dramatic: a 29% reduction of soot, with no increase in NOX emissions. [See original attachment for DDC Series 60 Transient Tests] [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

The modified fuels produced by this pilot-scale plant conform to physical, mechanical, rheological, thermal, and chemical fuel standards promulgated by the American Society for Testing and Materials ("ASTM"), including ASTM-D975. The fuel has been tested in real-scale heavy duty certification engines. Based on the success of these evaluations, Satya has worked with SwRI and other internationally recognized research organizations to design a production-scale facility. The facility design meets ASTM and American National Standards Institute ("ANSI") standards and would be capable of processing 12,000 barrels of diesel fuel per day, or 150 million gallons per year. SwRI has concluded (Link: https://www.swri.org/press-release/swri-engineers-help-develop-cleaner-burning-diesel-fuels) that DEP and Next Diesel are ready for commercial development. [EPA-HQ-OAR-2022-0829-0687, pp. 3-5]

All of the testing conducted to date by Satya and SwRI has been conducted with ultra- low sulfur diesel ("ULSD") that meets current EPA fuel composition requirements. The introduction of ULSD in 2006 has led to dramatic reductions in particulate matter and NOX emissions from diesel engines, and the diesel engine requirements proposed by EPA in the current rulemaking promise additional reductions. Satya's DEP demonstrates that even more air quality gains are possible with additional diesel fuel controls. [EPA-HQ-OAR-2022-0829-0687, p. 5]

Emissions of pollutants like soot and NOX are generally highest immediately following a cold engine start because after-treatment systems tend to be inefficient during and just after ignition. Next Diesel reduces emissions during and after a cold engine start, and reductions continue to be achieved even after the engine and after-treatment systems reach steady operating temperatures. Engine manufacturers may choose to modify or reprogram new engines to maximize benefits of Next Diesel, but such modifications are not necessary. Next Diesel is an improved fuel that does not require modification of any part of a new or existing engine. [EPA-HQ-OAR-2022-0829-0687, p. 5]

The most obvious benefit of Next Diesel fuel will be its use in the large fleet of existing diesel engines, especially in heavy-duty vehicles, locomotives and other non-road vehicles, and diesel equipment. As EPA notes in the preamble, many of these engines will remain in service in the U.S. and around the world longer than light- and medium-duty gasoline engines. 88 Fed. Reg. at 29400; see also 88 Fed. Reg. at 29191 (most major manufacturers anticipate at least a decade before electrified vehicles dominate sales). DEP has not been tested yet on renewable diesel fuels like biodiesel or on aviation fuels, but Satya expects similar emissions improvements with those fuels. [EPA-HQ-OAR-2022-0829-0687, p. 5]

The reduction of soot achieved by Next Diesel also has benefits for engine operation. The more complete combustion of the soot in Next Diesel fuel increases the energy captured from the fuel. Diesel particulate matter filters can become clogged and fuel has to be diverted from engine operation to burn the collected soot and return the filter to service, resulting in a fuel penalty. [EPA-HQ-OAR-2022-0829-0687, pp. 5-6]

With Next Diesel, less soot generated in the engine translates to less soot that must be captured in the diesel particulate matter filter, and a reduced fuel penalty. Finally, modern diesel engines recirculate gases to reduce NOX emissions, but the particulate matter content causes engine wear and tear. With Next Diesel, less soot means less damage to the diesel engine and longer engine life. [EPA-HQ-OAR-2022-0829-0687, pp. 5-6]

Satya contracted with Baker and O'Brien, Inc. to prepare a Technology and Commercialization Assessment of DEP and Next Diesel. Among other findings, the report estimated significant net health benefits from widespread adoption of Next Diesel. The U.S. alone could see $7.8 billion in health benefits, and similar improvements in Europe and China.3 [EPA-HQ-OAR-2022-0829-0687, p. 6]

3 Baker and O´Brien, Inc., Technology and Commercialization Assessment of Diesel Fuel Technology (January 7, 2020).

To implement the production of Next Diesel, a refinery or fuel distribution terminal would need to install conditioning hardware and acquire the necessary additives. In Satya's commercialization study, the estimated capital hardware cost would be approximately $400,000 for a facility processing 12,000 barrels of diesel fuel per day. The cost of chemicals would be between one and eight cents per gallon. [EPA-HQ-OAR-2022-0829-0687, p. 6]

Organization: South Coast Air Quality Management District

Our region has long suffered from some of the worst air quality in the country and fails to meet Federal standards for ozone and fine particulate matter. Over 80% of the emissions that must be reduced to meet air quality standards are from mobile sources, including light-duty and medium-duty vehicles. As a local air agency, the South Coast AQMD has limited authority to regulate mobile sources. That authority instead rests primarily with the U.S. EPA and the California Air Resources Board (CARB). CARB has taken significant steps to reduce GHG and NOx emissions from light-duty and medium-duty vehicles through the Advanced Clean Cars (ACC) II regulations, which became effective on November 30, 2022. Other states, including a total of 17 other states to- date, have adopted all or part of California's ACC II low-emission and zero-emission vehicle regulations, as allowed by Section 177 of the Clean Air Act. This additional support for the clean vehicle market means that more than 35% of the national new light-duty vehicle sales will meet California's automotive emissions standards. These collective actions will greatly accelerate the adoption of ZEVs in the nationwide fleet, while supporting California's progress towards meeting the national ambient air quality standards. However, more needs to be done and without additional federal action on this and other mobile source sectors our region will be unable to meet air quality standards. The proposed rule offers an opportunity to achieve additional emission reductions so desperately needed in our region – both to assist in attaining national standards, and in supporting our environmental justice communities. [EPA-HQ-OAR-2022-0829-0659, pp. 1-2]

Organization: Southern Environmental Law Center (SELC)

Light- and medium-duty vehicles are also significant sources of criteria pollutants and other air toxics that harm communities and the environment. [EPA-HQ-OAR-2022-0829-0591, pp. 4-5]

In addition to GHG emissions, light- and medium- duty vehicles are a substantial source of harmful "criteria pollutants," like particulate matter (PM), sulfur oxides (SOX), nitrogen oxides (NOX), carbon monoxide (CO), and ozone.31 Light- and medium-duty vehicles account for approximately 20 percent of mobile source NOX emissions and 19 percent of mobile source PM2.5 emissions nationwide.32 Criteria pollutants have damaging effects on our environment and air quality. Among other things, NOX is a central precursor to photochemical smog, harmful ozone, and particulate pollution;33 acid rain results from sulfur dioxide (SO2) and NOX emissions;34 and PM is the primary cause of reduced visibility and regional haze in the United States.35 [EPA-HQ-OAR-2022-0829-0591, pp. 4-5]

31 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicle, 88 Fed. Reg. 29184, 29186 (May 5, 2023). See also Criteria Air Pollutants, U.S. EPA, https://www.epa.gov/criteria-air- pollutants (last visited June 8, 2023) (listing the six criteria pollutants).

32 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicle, 88 Fed. Reg. 29184, 29186 (May 5, 2023).

33 Nitrogen Oxides, UCAR CTR. FOR SCI. EDUC. (2017), https://scied.ucar.edu/learning-zone/air-quality/nitrogen- oxides; What Causes Smog, CALTECH SCI. EXCH., https://scienceexchange.caltech.edu/topics/sustainability/what- causes-smog (last visited June 22, 2023).

34 Id. See also What is Acid Rain?, U.S. EPA, https://www.epa.gov/acidrain/what-acid-rain (last updated June 1, 2023).

35 Particulate Matter Basics, U.S. EPA, https://www.epa.gov/pm-pollution/particulate-matter-pm-basics (last updated July 18, 2022).

These pollutants also negatively impact our health. Due to their detrimental biological effects, each of these criteria pollutants has a health-based National Ambient Air Quality Standard (NAAQS) established by EPA.36 Exposure to ozone and CO, for example, can result in nervous system effects including dementia and cognitive decline, birth defects, and developmental disorders.37 Exposure to PM and NOX can cause respiratory and cardiovascular problems such as an increased incidence of asthma and heart disease, reduced lung function, and exacerbated chronic obstructive pulmonary disease.38 According to a recent study, fine particulate pollution from cars and light trucks in Virginia costs the state $750 million annually and causes approximately 92 deaths, 71 non-fatal heart attacks, and 2,600 child asthma attacks every year.39 [EPA-HQ-OAR-2022-0829-0591, p. 5]

36 Criteria Air Pollutants, U.S. EPA, https://www.epa.gov/criteria-air-pollutants (last visited June 8, 2023).

37 U.S. EPA, Draft Regulatory Impact Analysis: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles 7-4, 7-12 (Apr. 2023), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey= P10175J2.pdf [hereinafter “2023 Regulatory Impact Analysis”].

38 Id. at 7-1-7-47.

39 INDUSTRIAL ECON., INC. & VA. CLINICIANS FOR CLIMATE ACTION, AN ASSESSMENT OF THE HEALTH BURDEN OF AMBIENT PM2.5 CONCENTRATIONS IN VIRGINIA 11-12 (Oct. 28, 2020),https://www.virginiaclinicians.org/_files/ugd/b42d13_16d1da1c63e84d328db4239aea371617.pdf.

Additionally, light- and medium- duty vehicle pollution contributes to high ambient concentrations of other air toxics, including benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and naphthalene.40 Within the transportation sector, more than 41 percent of these air toxics, collectively known as “volatile organic compounds” (VOCs), are produced by light- and medium-duty vehicles.41 The reaction between pollutants like NOX and CO and VOCs creates harmful fine particulate and smog pollution.42 Not only have VOCs been identified as national and regional cancer risk drivers by EPA,43 but they also cause a range of noncancer health effects such as eye and nose irritation, headaches, nausea, and dizziness.44 [EPA-HQ-OAR-2022-0829-0591, pp. 5-6]

40 2023 Regulatory Impact Analysis, supra note 37, at 7-15.

41 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicle, 88 Fed. Reg. 29184, 29186 (May 5, 2023).

42 Technical Overview of Volatile Organic Compounds, U.S. EPA, https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds (last updated Mar. 14, 2023).

43 2023 Regulatory Impact Analysis, supra note 37, at 7-15.

44 Volatile Organic Compounds' Impact on Indoor Air Quality, U.S. EPA, https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality (last updated Aug. 26, 2022).

The impacts of criteria pollutants and other air toxics from vehicle tailpipe pollution are widespread, making exposure to this type of pollution a serious public health issue nationwide. Even after decades of NAAQS implementation, 36 percent of Americans—nearly 120 million people—live in areas with unhealthy levels of ozone or particulate pollution.45 Many major metropolitan areas in the United States, including several in the South, continue to suffer from elevated concentrations of these pollutants. Washington, D.C. is currently a nonattainment area for ozone,46 and Augusta, Georgia and Birmingham, Alabama rank among the top 25 cities most polluted by annual PM emissions.47 [EPA-HQ-OAR-2022-0829-0591, pp. 5-6]

45 State of the Air: 2023 Report, AM. LUNG ASS'N 12 (2023), https://www.lung.org/getmedia/338b0c3c-6bf8-480f- 9e6e-b93868c6c476/SOTA-2023.pdf.

46 U.S. EPA, Greenbook 8-Hour Ozone (2015) Designated Area/State Information, www3.epa.gov/airquality/ greenbook/jbtc.html (last updated May 31, 2023) (identifying Washington, D.C. as a nonattainment area for ozone).

47 Id. at 16. See also ENV'T AM., U.S. PIRG & FRONTIER GRP., Trouble in the Air: Millions of Americans Breathed Polluted Air in 2018 (2020), https://uspirg.org/sites/pirg/files/reports/EnvironmentAmerica_TroubleintheAir_ scrn.pdf.

48 See 88 FR at 29303-04.

Organization: Tesla, Inc.

In addition to light-duty vehicles being one of the largest sources of GHG pollutants that negatively impact public health, they are also one of the largest sources of criteria and air toxic pollutants, including particulate matter (PM) and nitrogen oxides (NOX). To that end, Tesla fundamentally agrees with the agency that: [EPA-HQ-OAR-2022-0829-0792, pp. 9-10]

In 2023, mobile sources will account for approximately 54 percent of anthropogenic NOX emissions, 5 percent of anthropogenic direct PM2.5 emissions, and 19 percent of anthropogenic volatile organic compound (VOC) emissions. Light and medium-duty-vehicles will account for approximately 20 percent, 19 percent, and 41 percent of 2023 mobile source NOX, PM2.5, and VOC emissions, respectively.63 [EPA-HQ-OAR-2022-0829-0792, pp. 9-10]

63 88 Fed. Reg. at 29186.

These emissions contribute to poor air quality in many urban areas, including areas with vulnerable populations, and increased vulnerability and susceptibility for adverse health effects related to air pollution in children.64 [EPA-HQ-OAR-2022-0829-0792, p. 10]

64 Id., at 29211.

The widespread adoption of BEVs is leading to significant benefit from the elimination of tailpipe pollutants and slashing of ambient levels of air pollutants that have been linked to hundreds of thousands of early deaths annually around the world from cardiovascular and respiratory diseases, cancer, and other illnesses.65 Indeed, the public health, climate, and economic benefit from much more stringent, BEV-based GHG emission standards cannot be understated. Air pollution is estimated to cause over 200,000 premature deaths in the U.S. each year; with more than half are caused by transportation emissions.66 Recent findings indicate that the U.S. health care costs of air pollution and climate change exceed $800 billion per year.67 Air pollution impacts with pollutants like PM2.5 that are associated with the transportation sector not only cause premature mortality, cardiovascular disease and respiratory disease but also can affect neurological disorders.68 Other studies suggest that exacerbation of air pollution and heat exposure related to climate change may be significantly associated with risk to pregnancy outcomes in the U.S.69 [EPA-HQ-OAR-2022-0829-0792, p. 10]

65 PNAS, The other benefit of electric vehicles (Jan. 11, 2023) available at h ttps://www.pnas.org/doi/10.1073/pnas.2220923120

66 Atmospheric Environment, Air pollution and early deaths in the United States. Part I: Quantifying the impact of major sectors in 2005 (Nov. 2013) available at h ttps://www.sciencedirect.com/science/article/abs/pii/S1352231013004548; See also, PNAS, Fine-scale damage estimates of particulate matter air pollution reveal opportunities for location-specific mitigation of emissions (April 8, 2019) available at h ttps://www.pnas.org/doi/10.1073/pnas.1816102116 (Over 100,000 premature death just from PM 2.5).

67 Medical Society Consortium, The Costs of Inaction: The Economic Burden of Fossil Fuels and Climate Change on Health in the United States (May 20, 2021) available at h ttps://subscriber.politicopro.com/f/?id=00000179-8a79-de79-a9ff- a e7dbc420000&source=email

68 The Lancet, Long-term effects of PM2·5 on neurological disorders in the American Medicare population: a longitudinal cohort study (Oct. 19, 2020). available at h ttps://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30227- 8 /fulltext#.X44Xfg2Mloo.twitter

69 Bekkar, et al. JAMA Open Network, Association of Air Pollution and Heat Exposure with Preterm Birth, Low Birth Weight, and Stillbirth in the USA Systematic Review (June 18, 2020). available at h ttps://jamanetwork.com/journals/jamanetworkopen/fullarticle/2767260

Indeed, one recent report estimates that wide-spread transportation electrification across the U.S. translates into $72 billion in avoided health effects. Electrification would save approximately 6,300 lives per year and avoid more than 93,000 asthma attacks, and 416,000 lost workdays annually due to significant reductions in transportation-related pollution.73 Other studies have found dramatic localized air quality and public health benefits can result from vehicle electrification.74 [EPA-HQ-OAR-2022-0829-0792, p. 11]

73 American Lung Association, The Road to Clean Air Benefits of a Nationwide Transition to Electric Vehicles (March 31, 2022) at 5-6 available at h ttps://www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf; See also, ZETA, Medium- and Heavy Duty Electrification: Weighing the Opportunities and Barriers to Zero Emission Fleets (Jan. 26, 2022) at 8-9 available at h

ttps://fs.hubspotusercontent00.net/hubfs/8829857/ZETA-WP-MHDV- E lectrification_Opportunities-and-Barriers_Final3.pdf?utm_medium=email&_hsmi=201943899&_hsenc=p2ANqtz-8 eoZgga7znbaZR7rKv1BaBniH18i3bFI9C8FLIYVA9UYMBZ-H5_7edvGf11_aMiDLUt4tVYShiR-- I 9VYfDXozCMAQgQ&utm_content=201943899&utm_source=hs_email.

74 See e.g., Texas A&M, Tailpipe Emission Benefits of Medium- and Heavy-Duty Truck Electrification in Houston, TX (Apr 14, 2021) available at h ttps://carteehdata.org/library/document/tailpipe-emission-benefit-7ea6 (Finding that by electrifying 40% of the predominantly diesel-fueled MHDVs in the eight-county area, Texans could avoid 21 tons per day of NOX — over a quarter of the 80 tons per day emitted by greater Houston's on-road traffic. This could be achieved by electrifying a little over 60,000 MHDVs, about 1% of all the vehicles in greater Houston. By comparison, it would take 3.8 million light duty vehicles to achieve the same amount of NOX reductions. Electrification of MHDVs is the quickest way to take the biggest bite out of greater Houston's NOX emissions).

Organization: Wisconsin Department of Natural Resources

In this proposal, EPA concludes that people who live or attend school near major roadways are more likely to be non-White, Hispanic, or have a low socioeconomic status. As such, these populations are expected to directly benefit from reduced tailpipe emissions of criteria pollutants and mobile source air toxics that would result from these standards. EPA also notes that poorer or predominantly non-White communities can be especially vulnerable to climate change impacts, which these proposed GHG standards would help address. Reducing greenhouse gases, ozone, and particulate matter pollution from on-road vehicles will improve health outcomes throughout Wisconsin. Most importantly, it will take a critical step toward improving air quality in areas overburdened by pollution. [EPA-HQ-OAR-2022-0829-0507, p. 2]

Organization: Zero Emission Transportation Association (ZETA)

a. Reducing Transportation Emissions Protects Public Health

Finalizing stringent emissions standards will save lives, as human interaction with on-road emissions has proven to yield detrimental health outcomes. When inhaled into the lungs, criteria pollutant emissions cause inflammation, chest tightness, shortness of breath, and increased risk of permanent health issues such as asthma.56 Beyond respiratory health, new research also demonstrates that ground level ozone, exacerbated by LMDV tailpipe emissions, leads to worsening coronary disease. A 2023 study shows that "exceeding the World Health Organization ozone limit is associated with substantial increases in hospital admissions for heart attack, heart failure and stroke."57 The study looked at coronary disease over three years and found that increased concentrations of ground-level ozone led to 109,400 of 3,194,577 documented hospital admissions.58 [EPA-HQ-OAR-2022-0829-0638, p. 14]

56 "State of the Air Report 2023," American Lung Association, (April 2023) https://www.lung.org/research/sota

57 "Ozone pollution and hospital admissions for cardiovascular events," European Heart Journal, (2023) https://academic.oup.com/eurheartj/article/44/18/1622/7070974

58 Id. at footnote 57

LMDVs are major contributors to U.S. emissions of particulate matter (PM2.5), nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon dioxide (CO2).59 Such pollutants are directly linked to long-term respiratory, cognitive, and autoimmune impairment, and the rate of EV deployment is expected to have a direct relationship with improved health outcomes, particularly for millions of individuals living near high traffic areas.60 [EPA-HQ-OAR-2022-0829-0638, p. 14]

59 “Federal Vehicle Standards,” C2ES, accessed May 18, 2023 https://www.c2es.org/content/regulating-transportation-sector-carbon-emissions/

60 “PM2.5 polluters disproportionately and systemically affect people of color in the United States,” Science Advances (April 28, 2021) https://advances.sciencemag.org/content/7/18/eabf4491

Despite efforts to curtail emissions through ICEV efficiency improvements and various emissions control technologies, a large portion of the U.S. population remains vulnerable to the dangers of vehicle pollution. In the United States, 45 million people live within 300 feet of a major traffic facility or corridor.61 Proximity to these roadways exposes residents to needless health risks. Replacing combustion engine vehicles with electric alternatives will yield significant public health benefits. According to the American Lung Association, the widespread transition to zero-emission transportation and zero-emission generation over the next 30 years could bring $1.2 trillion in health benefits, save approximately 110,000 lives, prevent more than 2.7 million asthma attacks, and avoid 13.4 million lost workdays.62 Conversely, a recent study concludes that oil and gas consumption leads to negative health impacts totaling $77 billion annually in the U.S. alone.63 [EPA-HQ-OAR-2022-0829-0638, p. 15]

61 “Research on Near Roadway and Other Near Source Air Pollution,” Overviews and Factsheets, Environmental Protection Agency (December 15, 2022) https://www.epa.gov/air-research/research-near-roadway-and-other-near-source-air-pollution.

62 “Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles,” American Lung Association, accessed May 5, 2023 https://www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf

63 Jonathan J Buonocore, et. al. (2023) Environ. Res.: Health https://iopscience.iop.org/article/10.1088/2752-5309/acc886

EPA Summary and Response

Summary:

Many of the comments included in this section were supportive of EPA’s proposed program to reduce GHG and criteria emissions from light- and medium-duty vehicles. Commenters note the need for these standards to address air pollution and reduce the impacts of emissions on human health, including specifically impacts on EJ communities, impacts on nonattainment areas, and impacts on children.

As noted above, commenters in this section raised a number of concerns about harm to public health caused by emissions produced by vehicles. These comments primarily focused on combustion-related emissions like particulates, NOx, PAHs and other air toxics. Commenters mentioned that there are health effects below the level of the NAAQS and pointed to specific health effects associated with exposure to PM, like exacerbation of risks from infectious respiratory diseases, and impacts on retinal health. One commenter stated that it is important to critically evaluate the direct correlation between these proposed regulations and substantial improvements in health conditions, suggesting that the relationship between specific regulatory measures and health outcomes is complex and context-dependent. While reducing emissions can have positive effects on respiratory health, it is essential to acknowledge that multiple factors influence overall health outcomes.

Some commenters note that the rapid proliferation of GDI vehicles over the past decade has increased ultrafine particle (UFP) pollution significantly, which along with PAH emissions, have serious health impacts. They describe how the Clean Air Act requires control of such air toxics to the greatest extent achievable using technology which will be available and suggest that EPA could reduce GHGs and air toxics together by taking a systems approach to require simultaneous improvements in both vehicles and fuels. They highlight higher-ethanol blends as a way to increase octane and reduce aromatic content of gasoline and suggest requiring particle filters on all GDI vehicles as a highly effective way to reduce UFP emissions. Commenters also express support for reducing heavy aromatics content in gasoline as an additional way to reduce PM emissions. One commenter described a fuel additive that could reduce NOx and PM emissions from diesel engines.

In addition, some commenters raised concerns about non-combustion sources of emissions from vehicles, like brake and tire wear emissions, that may increase with an increasing number of EVs. Several commenters (American Fuel and Petrochemicals Manufacturers, Donn Viviani, HF Sinclair, John Graham, National Farmers Union and the Renewable Fuels Association) said that electric vehicles would have higher brake and tire emissions than comparable ICE vehicles due to higher weight from batteries and/or higher torque of electric vehicles and should be included in EPA's analysis. Several of these commenters also stated that there would be an increase in roadway dust and some also said that these higher emissions are likely to harm EJ communities. The commenters cite:

> 17 Liu, Ye, et al. "Comparative analysis of non-exhaust airborne particles from electric and internal combustion engine vehicles." Journal of Hazardous Materials 420 (2021): 126626.
>
> 18 Liu, Ye, et al. "Impact of vehicle type, tyre feature and driving behaviour on tyre wear under real-world driving conditions." Science of the Total Environment 842 (2022): 156950.
>
> 23Xiaoliang Wang, et al., Evidence of non-tailpipe emission contributions to PM2.5 and PM10 near southern California highways, Environmental Pollution, Vol. 317, Jan. 15, 2023, https://doi.org/10.1016/j.envpol.2022.120691.
>
> 24 Emissions Analytics, Gaining Traction, Losing Tread – Pollution from tire wear now 1,850 times worse than exhaust emissions, May 10, 2022 Newsletter - Tyre Emissions, https://www.emissionsanalytics.com/news/gaining- traction-losing-tread.
>
> 39 Stanard et al., "Brake and Tire Wear Emissions Project 17RD016: Final Report, Revision 2", prepared for CARB, February 11, 2021; https://ww2.arb.ca.gov/sites/default/files/2021-04/17RD016.pdf.

American Fuel and Petrochemicals Manufacturers also comments that it "could require a greater number of ZEVs to move the same tonnage of cargo, thus increasing the number of vehicles needed to haul the same amount of freight, vehicle miles traveled, and resulting PM emissions." A commenter, MCS Referral & Resources, pointed out an error in the description of the sources of CO and in the description of diesel exhaust component lifetimes.

Response:

In this RTC section, EPA is focusing on addressing comments related to the criteria and air toxic pollutant impacts associated with the rule. To the extent that these commenters raise other issues, those issues are addressed elsewhere in this RTC or in the preamble for the final rule.

Responses to comments about environmental justice or GHG emissions are included in sections 9 and 10 respectively of this response to comments document. Additionally, responses to comments about criteria pollutant benefits are included in Section 8.5 of this document.

In general, EPA agrees with commenters that actions to control emissions from light- and medium-duty vehicles are necessary to improve public health and welfare. In response to commenters who identify potential health or welfare effects of criteria pollutants from light- and medium-duty vehicles, or other scientific information, views, or analyses that were not specifically incorporated into our discussion in the proposed or final action (such as those noted by CARB, EDF, Jonathan Walker, and others), the EPA notes that the health and welfare impacts associated with exposure to criteria and air toxic pollutants are adequately described in Section II of the preamble that accompanies this rule. The EPA does not interpret these comments as indicating disagreement with the evidence on criteria pollutant health or welfare effects information that was presented in the proposal, but rather understands these comments to suggest that the additional information they provide adds support for finalizing the rulemaking.

The EPA concurs with commenters that there may be additional health outcomes, such as respiratory infections, for which reducing $PM_{2.5}$ concentrations may lead to public health benefits. Within the 2019 PM ISA, the EPA evaluated studies that examined both short- and long-term $PM_{2.5}$ exposure and respiratory infection, and while few studies examined these outcomes, there was some evidence indicating that daily or annual exposures may increase the risk of respiratory infection. In addition, the Supplement to the 2019 PM ISA evaluated recent studies that examined both short- and long-term $PM_{2.5}$ exposure and SARS-CoV-2 infection and COVID-19 deaths and concluded "[w]hile there is initial evidence of positive associations with SARS-CoV-2 infection and COVID-19 death, uncertainties remain due to methodological issues." As the Supplement to the 2019 PM ISA represented a targeted evaluation of the science published since the completion of the 2019 PM ISA, it did not encompass "the full multidisciplinary evaluation presented within the 2019 PM ISA as described in the Preamble to the Integrated Science Assessments that would result in weight-of-evidence conclusions on causality (i.e., causality determinations)."[400] As a result, the evidence for SARS-CoV-2 infection and COVID-19 death were not considered in the context of the causality determination for either short- or long-term PM2.5 exposure and respiratory effects. In addition, the literature cutoff date for the Supplement to the 2019 PM ISA, which included studies of SARS-CoV-2 infection and COVID-19 deaths, was March 2021, which is prior to the publication date of the references provided by the commenter. As such, EPA will consider these references as well as other newly published peer-review studies during the development of the next PM ISA.

EPA acknowledges and agrees with the commenter that noted that the relationship between regulatory measures and health outcomes is complex and context dependent. However, based on our expertise and past experience we anticipate that this rule will have substantial benefits for public health and welfare. As noted in RTC Section 8.5, EPA's analysis is consistent with applicable guidance and best practices for conducting benefit-cost analyses, including OMB Circular A-4 and EPA's Guidelines for Preparing Economic Analyses. We consider our analysis

[400] U.S. EPA. Preamble to the Integrated Science Assessments (ISA). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-15/067, 2015.

consistent with the guidance, methodologically rigorous, and a best estimate of the projected societal benefits and costs associated with the final program.

Air toxics reductions:

We are finalizing stringent PM standards for gasoline vehicles covering a range of operating conditions, including wintertime temperatures. We expect that manufacturers may choose to comply with these standards through widespread adoption of particulate filters (GPFs) on new light- and medium-duty vehicles by 2031.

Modlin and Detchon cite the requirements for mobile source air toxics standards issued under section 202(l) to reflect the greatest degree of emissions reduction achievable (taking into account several factors specified in the statute) as support for more stringent PAH controls. EPA, however, did not propose to further regulate mobile source air toxics under section 202(l), and new regulation under 202(l) is beyond the scope of this rulemaking. However, EPA anticipates that the PM standards will result in very effective control of PAHs. As discussed in Section III.D.3 of the preamble, emission characterization of GPF-equipped vehicles meeting the PM standards found that filter-based PAHs were reduced by more than 99%. As such, the PM standards are expected to also reduce PAH and other toxics very well. More detailed characterization of GPF benefits is described in Chapter 3.2.6.2 of the RIA. Furthermore, air quality modeling representing the net impacts of the standards on air toxics show average net reductions in all air toxics modeled. EPA will continue to consider the need for, and appropriate means of, further reductions in PAH by continuing to investigate costs and benefits of updated standards for market gasoline that would reduce the content of heavy aromatic compounds (including PAHs) that contribute most potently to PM and PAH emissions (several aspects are described in Section IX of the proposal).

Modlin and Detchon also suggest that EPA could achieve emissions reductions by requiring changes to fuel composition that displace aromatics (including BTEX) with additional ethanol. As discussed in RTC Section 19, such work and changes to fuel controls are beyond the scope of this final rule. Nonetheless, EPA offers some preliminary observations regarding this comment. Imposing limits on gasoline aromatics content would force refiners to reformulate their gasoline to use other high-octane components. Understanding the impact of such reformulations on overall air quality would necessarily include changes in a broad range of vehicle emissions (including refueling and evaporative processes), as well as changes in petroleum refining and increases in ethanol production and agricultural intensity. These things may reduce the overall air quality benefits significantly. We are not aware of any analyses integrating all these pieces at this time. Comments in response to EPA's request for comment on potential future fuel controls are contained in Appendix D to this document and will be further considered for a potential future rulemaking.

Non-exhaust PM:

With regard to non-exhaust emissions, including brake and tire wear, road wear and road dust, EPA did model these emissions for all vehicles, including BEVs, in the proposed rulemaking and for this final rule. However, for the reasons described below, we found it reasonable to assume for modeling purposes that BEVs produce non-exhaust emissions at the same level as their ICE counterparts. More information on modeling brake, tire and other vehicle emissions is available in a memo to the docket.[401]

First, EPA does not agree that increased sales of BEVs would necessarily result in a substantial increase in average vehicle weight. As shown in Table 8-5 of the RIA, the projected increase in weight within vehicle classes is small and is dwarfed by the increase in weight due from the shift from cars to light trucks and SUVs, which is unrelated to the increased sale of EVs.

Second, for brake wear, as one of the commenters noted, it is reasonable to expect BEVs to have lower brake wear emissions than comparable ICE vehicles. Most BEVs are equipped with regenerative braking systems. When a vehicle is using regenerative brakes, some of the kinetic energy from slowing the vehicle is directed to the motor. In a friction braking system, this kinetic energy is normally converted to heat, so there is less material wear and emissions from brakes. This effect is discussed by some of the non-exhaust emission studies cited by the commenters. In fact, a modeling study by Ye Liu et al. found in a literature review that regenerative braking decreases brake wear emissions from EVs by 68 percent. In their modeling, the reduced brake wear emissions offset the increased tire wear, road wear and resuspended road dust emissions associated with the assumed EV weight increase such that EVs have lower non-exhaust $PM_{2.5}$ emissions than comparable gasoline vehicles on urban roads, as can be calculated from Table 3 of their paper.[402]

Still, EPA investigated the possibility of updating our modeling assumptions on brake wear and tire wear emissions from electric vehicles. Updating these non-exhaust PM emission rates specific to BEVs would require having detailed emissions data in which brake wear and tire wear emissions can be calculated in various operating conditions. None of the sources cited by commenters support this level of detailed analysis, nor has EPA identified any sources of data or studies that allow this level of detailed analysis for tire wear. Many sources attempt to compare non-exhaust PM emissions from BEVs directly to ICE vehicles, but they are often modeling studies or studies done under conditions that may not be representative of typical real-world operation in the United States. Tire wear projections for BEVs are also difficult because BEV technologies are evolving rapidly and estimates of tire wear for current BEVs may not be representative of the future vehicle stock, when BEVs are more prevalent across all manufacturers, models, and drivers. In addition, we expect tire design will evolve over time in concert with changes in vehicle design and driving patterns. There are considerable technical difficulties with modeling such uncertainties, so we did not do so.

Overall, EPA is receptive to and appreciates the comments from stakeholders regarding the modeling of tire wear and brake wear. We accounted for brake wear, tire wear, road wear and road dust emissions in the proposal and do so in the final rulemaking. To estimate increased tire wear and road dust emissions from BEVs relative to ICE vehicles, as suggested by the commenters, without a corresponding decrease in brake wear emissions would bias the total

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[401] Mo, Tiffany, 2024. Revisions to MOVES for Air Quality Modeling to support the FRM for the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. Memorandum to Docket EPA-HQ-OAR-2022-0829. February 2024.

[402] Liu, Ye et al. "Exhaust and non-exhaust emissions from conventional and electric vehicles: A comparison of monetary impact values." Journal of Cleaner Production 331 (2022) 129965. https://doi.org/10.1016/j.jclepro.2021.129965

downstream PM inventory impacts. After consideration of the current data sources and literature, we have found that, at this time, there is no study or source of data with sufficient information to improve upon this modeling approach for the FRM.

VMT:

EPA does not agree that an increase in medium-duty ZEVs will result in an increase in overall VMT and associated PM emissions. Manufacturers of medium-duty vehicles have a strong incentive in a competitive market to produce vehicles that are capable of meeting the cargo hauling requirements of commercial owners. As such, EPA's analysis reasonably assumes that manufacturers will maintain the payload of BEVs by increasing GVWR and GCWR to compensate for the additional weight of batteries. EPA projects that most of the medium-duty BEVs will be vans and class 2b pickups, and will therefore not exceed the 14,000lbs GVWR upper limit for medium-duty vehicles under these final standards.

Carbon Monoxide:

After consideration of comments by MCS, clarifying edits have been made to the CO background section to indicate that CO can also be formed by photochemical reactions, as well as being formed by incomplete combustion. In addition, clarifying edits have also been made to the diesel exhaust background section to indicate that lifetimes of components of diesel exhaust can range from seconds to months, rather than seconds to days.

With respect to comments related to CO exposure and health effects, we note that the EPA's statement that "controlled human exposure studies of subjects with coronary artery disease show a decrease in the time to onset of exercise-induced angina (chest pain) and electrocardiogram changes following CO exposure," is based on findings of multiple studies reviewed in the 2010 CO Integrated Science Assessment (ISA).[403]

As the commenter notes, the underlying data for this claim is partially based on results from an HEI multicenter study that investigated the effects of CO exposure in individuals with coronary artery disease. This effort resulted in three peer-reviewed publications, which have been cited more than 250 times: Allred et al 1989a[404], Allred et al 1989b[405], and Allred et al 1991.[406] These studies found that exposures to CO decreased the time to onset of angina during exercise by 4.2% (low exposure group) or 7.1% (high exposure group) and decreased the time to development of ischemic ST-segment changes during exercise by 5.1% (low exposure group) or 12.1% (high exposure group). In addition, several other studies investigating individuals with stable angina also demonstrated that CO exposure during exercise decreases the time to onset of

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[403] U.S. EPA (2010). Integrated Science Assessment for Carbon Monoxide. U.S. Environmental Protection Agency. Washington, DC. EPA/600/R-09/019F.

[404] Allred EN; Bleecker ER; Chaitman BR; Dahms TE; Gottlieb SO; Hackney JD; Hayes D; Pagano M; Selvester RH; Walden SM; Warren J (1989a). Acute effects of carbon monoxide exposure on individuals with coronary artery disease. Health Effects Institute. Boston, MA.

[405] Allred EN; Bleecker ER; Chaitman BR; Dahms TE; Gottlieb SO; Hackney JD; Pagano M; Selvester RH; Walden SM; Warren J (1989b). Short-term effects of carbon monoxide exposure on the exercise performance of subjects with coronary artery disease. N Engl J Med, 321: 1426-1432.

[406] Allred EN; Bleecker ER; Chaitman BR; Dahms TE; Gottlieb SO; Hackney JD; Pagano M; Selvester RH; Walden SM; Warren J (1991). Effects of carbon monoxide on myocardial ischemia. Environ Health Perspect, 91: 89-132.

angina, as well as reduces the duration of exercise and increases ventricular arrhythmias.[407,408,409,410,411]

All ISAs undergo review by an independent Clean Air Scientific Advisory Committee (CASAC), whose members have expertise in a variety of scientific fields relevant to air pollution and air quality issues. In their final Advisory Report for the 2010 CO ISA, CASAC referenced the importance of the above studies ("The most compelling CO-related cardiovascular results remain those from the controlled human exposure studies of Allred et al; Kleinman et al; and Sheps et al.") and expressed support for the related causality determination ("The Panel members concur with the ISA's conclusion that a causal relationship is likely to exist between relevant short-term CO exposure and CV morbidity.").[412]

We have also reviewed the fourteen studies recommended by the commenter. Out of the fourteen studies, none were directly comparable to those discussed above (i.e., controlled human exposure to CO in individuals with coronary artery disease). Three of the recommended studies were review articles,[413,414,415] three were experimental animal studies,[416,417,418] and eight studies

[407] Adams KF; Koch G; Chatterjee B; Goldstein GM; O'Neil JJ; Bromberg PA; Sheps DS; McAllister S; Price CJ; Bissette J (1988). Acute elevation of blood carboxyhemoglobin to 6% impairs exercise performance and aggravates symptoms in patients with ischemic heart disease. J Am Coll Cardiol, 12: 900-909.

[408] Anderson EW; Andelman RJ; Strauch JM; Fortuin NJ; Knelson JH (1973). Effect of low-level carbon monoxide exposure on onset and duration of angina pectoris: a study in ten patients with ischemic heart disease. Ann Intern Med, 79:46-50.

[409] Kleinman MT; Davidson DM; Vandagriff RB; Caiozzo VJ; Whittenberger JL (1989). Effects of short-term exposure to carbon monoxide in subjects with coronary artery disease. Arch Environ Occup Health, 44: 361-369.

[410] Kleinman MT; Leaf DA; Kelly E; Caiozzo V; Osann K; O'Niell T (1998). Urban angina in the mountains: effects of carbon monoxide and mild hypoxemia on subjects with chronic stable angina. Arch Environ Occup Health, 53: 388-397.

[411] Sheps DS; Herbst MC; Hinderliter AL; Adams KF; Ekelund LG; O'Neil JJ; Goldstein GM; Bromberg PA; Dalton JL; Ballenger MN; Davis SM; Koch GG (1990). Production of arrhythmias by elevated carboxyhemoglobin in patients with coronary artery disease. Ann Intern Med, 113: 343-351.

[412] Brain JD; Samet JM.. (2010). Review of Integrated Science Assessment for Carbon Monoxide (Second External Review Draft). Clean Air Scientific Advisory Committee, Science Advisory Board. Washington, DC. EPA-CASAC-10-005.

[413] Andreadou, I.; Iliodromitis, E. K.; Rassaf, T.; Schulz, R.; Papapetropoulos, A.; Ferdinandy, P. (2015). The role of gasotransmitters NO, H2S and CO in myocardial ischaemia/reperfusion injury and cardioprotection by preconditioning, postconditioning and remote conditioning. Br J Pharmacol, 172(6): 1587–1606.

[414] Mennear J. H. (1993). Carbon monoxide and cardiovascular disease: an analysis of the weight of evidence. Regul Toxicol Pharmacol, 17(1): 77–84.

[415] Weir, F. W.; Fabiano, V. L. (1982). Re-evaluation of the role of carbon monoxide in production or aggravation of cardiovascular disease processes. J Occup Med, 24(7): 519–525.

[416] Varadi, J.; Lekli, I.; Juhasz, B.; Bacskay, I.; Szabo, G.; Gesztelyi, R.; Szendrei, L.; Varga, E.; Bak, I.; Foresti, R.; Motterlini, R.; Tosaki, A. (2007). Beneficial effects of carbon monoxide-releasing molecules on post-ischemic myocardial recovery. Life Sci, 80(17): 1619–1626.

[417] Rochetaing, A.; Barbé, C.; Kreher, P. (2001). Acute ischemic preconditioning and high subchronic CO exposure independently increase myocardial tolerance to ischemia. Inhal Toxicol, 13(11): 1015–1032.

[418] Foster J. R. (1981). Arrhythmogenic effects of carbon monoxide in experimental acute myocardial ischemia: lack of slowed conduction and ventricular tachycardia. Am Heart J, 102(5): 876–882.

were conducted in humans.[419,420,421,422,423,424,425,426] Out of the eight human studies, two did not investigate a CO exposure (37-38), and one was an epidemiologic study evaluating the effects of acute CO exposures at non-ambient levels(39). The remaining five studies investigated potential cardiovascular effects of CO exposure in healthy individuals (40 - 44), a topic which was discussed in the previous ISA. In reference to effects on exercise-induced angina, the 2010 CO ISA stated that "no such effects have been observed in healthy adults following controlled exposures to CO." Furthermore, it states, "Although some studies have reported CO-induced hemodynamic changes among healthy adults at COHb concentrations as low as 5%, this effect has not been observed consistently across studies."[21] These statements are consistent with the provided studies. Although EPA is not reopening the 2010 CO ISA in this proceeding, we note that these statements are also consistent with the conclusions from the ISA.

The 2010 CO ISA focused on publications from 1999 to May 2009, and no studies were identified which investigated potential carcinogenic effects of CO. The studies which the commenter provides, published from 2012 to 2020, will be considered for inclusion in the next ISA for CO.

11.2 - Upstream and downstream criteria pollutant emissions

Comments by Organizations

Organization: Steven G. Bradbury

Worsening air quality and increasing global carbon emissions. As the EPA touts the environmental benefits it hopes to achieve from the production of more EVs, it ignores the fact that as consumers turn away from new models and the overall U.S. fleet ages, the older cars left on America's highways will produce more smog and other traditional air pollutants that degrade local air quality. And if there truly were an explosion in the sale of EVs, those EVs would need to be charged using electricity produced mostly from fossil-fuel-fired power plants, increasing the national emissions of carbon dioxide.47 EPA largely dismisses this reality based on the wish-

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[419] Ghio, A. J.; Case, M. W.; Soukup, J. M. (2018). Heme oxygenase activity increases after exercise in healthy volunteers. Free Radic Res, 52(2): 267–272.
[420] Starling, M. R.; Moody, M.; Crawford, M. H.; Levi, B.; O'Rourke, R. A. (1984). Repeat treadmill exercise testing: variability of results in patients with angina pectoris. American Heart J, 107(2): 298–303.
[421] Aslan, S.; Uzkeser, M.; Seven, B.; Gundogdu, F.; Acemoglu, H.; Aksakal, E.; Varoglu, E. (2006). The evaluation of myocardial damage in 83 young adults with carbon monoxide poisoning in the East Anatolia region in Turkey. Hum Exp Toxicol, 25(8): 439–446.
[422] Keramidas, M. E.; Kounalakis, S. N.; Eiken, O.; Mekjavic, I. B. (2012). Carbon monoxide exposure during exercise performance: muscle and cerebral oxygenation. Acta Physiol, 204(4): 544–554.
[423] Adir Y; Merdler A; Haim SB; Front A; Harduf R; Bitterman H (1999). Effects of exposure to low concentrations of carbon monoxide on exercise performance and myocardial perfusion in young healthy men. Occup Environ Med, 56: 535-538.
[424] Turner, J. A.; McNicol, M. W. (1993). The effect of nicotine and carbon monoxide on exercise performance in normal subjects. Respir Med, 87(6): 427–431.
[425] Davies, D. M.; Smith, D. J. (1980). Electrocardiographic changes in healthy men during continuous low-level carbon monoxide exposure. Environ Res, 21(1): 197–206.
[426] Ekblom, B.; Huot, R. (1972). Response to submaximal and maximal exercise at different levels of carboxyhemoglobin. Acta Physiol Scand, 86(4): 474–482.

ful claim that America's future power generation will soon shift en masse to wind and solar.48 [EPA-HQ-OAR-2022-0829-0647, p. 17]

47 See Roger Pielke Jr., "The Energy Transition Has Not Yet Started: Global fossil fuel consumption is still increasing," The Honest Broker, June 29, 2023, https://rogerpielkejr.substack.com/p/the-energy-transition-has-not-yet; Robert Bryce, "The Energy Transition Isn't: Despite $4.1 trillion spent on wind and solar, they aren't even keeping pace with the growth in hydrocarbons," July 1, 2023, https://robertbryce.substack.com/p/the-energy-transition-isnt.

48 See 88 FR at 29303-04.

EPA Summary and Response

Summary:

Steven G. Bradbury expressed concerns regarding the potential for the proposed standards to slow adoption of newer, cleaner vehicles leaving older, dirtier vehicles on the road longer thereby producing more smog and pollution. This commenter also argued that an explosion of the sales of EVs would result in more electricity demand produced largely by fossil fueled power plants thereby increasing emissions.

Response:

We respond to fleet turnover and how our OMEGA modeling addresses this issue in Section 12.1.3 of this document. We respond to comments related to increased emissions from power plants in Section 11.3 of this document.

11.3 - Air quality modeling

Comments by Organizations

Organization: Alliance for Automotive Innovation

1. PM Standard Air Quality and Emissions Inventory Impact

EPA is proposing a PM exhaust emission standard of 0.5 mg/mi that is applicable over three test cycles and at cold temperature. The standard is phased-in between the 2027 and 2029 model years, at the same time that CARB's PM 1 mg/mile standard phases in. The current EPA standard is 3 mg/mi, so the 0.5 mg/mi standard represents an 83% reduction in the standard from the current standard. Similarly, EPA's proposed 0.5 mg/mile US06 standard is a 92% reduction from the current standard of 6 mg/mile and 83% lower than the 3 mg/mile US06 standard recently adopted by CARB. [EPA-HQ-OAR-2022-0829-0701, pp. 151-152]

a)PM Emission Inventory Impacts

EPA estimated PM emission reductions from the entire regulatory scenario and went on to evaluate nationwide PM air quality benefits. The emissions inventory benefits are summarized in Figure 41.269 [EPA-HQ-OAR-2022-0829-0701, pp. 151-152]

269 Illustrative Air Quality Analysis for the Light and Medium Duty Vehicle Multipollutant Proposed Rule, Technical Support Document, EPA-420-D-23-002, April 2023, Table 6-1, page 43.

Figure 41: Annual PM2.5 Benefits from the Regulatory Scenario

PM2.5 Source: On-road

2016 Base Year: 104,005

2055 Reference Case: 35,737

2055 LMDV Regulatory Case: 26,833

Reference- LMDV: 8,904 [EPA-HQ-OAR-2022-0829-0701, pp. 151-152]

PM2.5 Source: Upstream

2016 Base Year: 167,795

2055 Reference Case: 92,358

2055 LMDV Regulatory Case: 94,533

Reference- LMDV: -2,174 [EPA-HQ-OAR-2022-0829-0701, pp. 151-152]

PM2.5 Source: Total

2016 Base Year: 271,800

2055 Reference Case: 128,096

2055 LMDV Regulatory Case: 121,365

Reference- LMDV: 6,730 [EPA-HQ-OAR-2022-0829-0701, pp. 151-152]

For on-road vehicles, PM2.5 is reduced by 68,268 tons per year, or 66%, between 2016 and 2055 with existing regulations already in place. EPA estimates that the NPRM standards would reduce PM2.5 by an additional 8,904 tons, or an additional 9%, to 75%. However, upstream emissions increase by 2,174 tons under the NPRM (mainly from electricity generation). When upstream emissions are included with on-road emissions, the emission reduction from 2016 to 2055 with current regulations is 53% and is only an additional 2.5% with the RS. [EPA-HQ-OAR-2022-0829-0701, pp. 151-152]

The on-road PM benefits in Figure 41 are the result of two factors – the replacement of ICE vehicles with BEVs (with zero exhaust PM), and the implementation of the exhaust PM standard for remaining ICE vehicles. We searched the available documentation but were unable to determine how much of the on-road PM reduction was due to either factor. This is an important consideration in determining the overall effectiveness of the proposed exhaust PM standards. EPA should provide more information regarding the relative benefits of the two factors. [EPA-HQ-OAR-2022-0829-0701, pp. 151-152]

b) Air Quality Analysis

EPA's DRIA presents its air quality impacts for its proposal (Chapter 8).271 Section 8.1.1 of the DRIA lists the primary and secondary PM2.5 standards as shown in Figure 43, and indicates that "as of December 31, 2022, more than 19 million people lived in the 4 areas that are designated as nonattainment for the 1997 PM2.5 NAAQS, more than 31 million people lived in the 11 areas that are designated as nonattainment for the 2006 24-hour PM2.5 NAAQS, and more than 20 million people lived in the 5 areas designated as nonattainment for the 2012 annual

PM2.5 NAAQS.272 The report does not indicate what the model predicts as the nonattainment areas in 2055 without the proposal, or at least without the proposed exhaust PM standards. [EPA-HQ-OAR-2022-0829-0701, pp. 152-153]

271 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, Draft Regulatory Impact Analysis, April 2023.

272 Section 8.1.1, page 8-1 of Draft RIA.

Figure 43: EPA's Primary and Secondary PM2.5 Air Quality Standards (µg/m3) [EPA-HQ-OAR-2022-0829-0701, pp. 152-153]

Type: Primary

Annual Average: 12.0

24 Hour: 35.0

Type: Secondary

Annual Average: 15.0

24 Hour: 35.0

[EPA-HQ-OAR-2022-0829-0701, pp. 152-153]

The DRIA goes on to say that the “LMDV regulatory scenario would decrease annual average PM2.5 by 0.1 µg/m3… and that the population-weighted average change in annual average PM2.5 concentrations would be 0.03 µg/m3 in 2055.”273 These impacts are very small, or 0.08% and 0.25% of the annual average primary standard of 12.0 µg/m3. Again, some of the PM air quality impact is due to the replacement of ICE vehicles with BEVs, and some due to the PM standards on ICE vehicles. So, the air quality impact of the PM standards is even smaller than µg/mi in 2055. [EPA-HQ-OAR-2022-0829-0701, pp. 152-153]

273 Page 8-21 of DRIA.

EPA did not consider a viable alternative to its PM proposal – and that is the adoption of the California LEV4 standards for PM. The current Tier 3 PM standard for LDVs and LDTs less than 8500 lbs is 3 mg/mi.274 The California LEVIII standard is 3 mg/mi until model year 2025, when a 1 mg/mi standard is phased-in between model years 2025 and 2028 at 25% per year. 275 The California standard of 1 mg/mi represents a 66% reduction in PM emissions from the current EPA standard of 3 mg/mi. [EPA-HQ-OAR-2022-0829-0701, pp. 152-153]

274 Tier 3 PM regs

275 LEVII regs

c) Light-Duty Vehicle Contribution to PM Inventory

EPA has inadequately considered the exceedingly low contribution of light-duty vehicles to PM emission inventories

The NPRM proposes a PM standard of 0.5 mg/mi standard for the 25 ºC FTP, US06 and -7 ºC FTP. Auto Innovators and our member companies do not believe the air quality benefit warrants the additional development and testing issues that this proposal creates. In particular, even with the EPA proposal to increase in stringency of the PM2.5 NAQQS as low as 8 or 9 μg/m3 from the current 12 μg/m3 earlier this year, EPA has also announced it expects to achieve these levels in most counties except California—a state that chose an FTP PM standard of 1 mg/mi for its environmental benefits and in recognition that resources are more appropriately spent on advancing EV sales. [EPA-HQ-OAR-2022-0829-0701, pp. 153-154]

With that in mind, Toyota contracted Ramboll Environ US Corporation to conduct atmospheric research using similar simulation technology between EPA (CMAQ) and Ramboll (CAMx). Ramboll's results were similar to EPA's in finding that the new PM NAAQS will be broadly met in major regions. Additionally, Ramboll conducted a Source Contribution Study (PSAT) that indicates that the emission category "Other Anthropogenic Sources," which includes prescribed and agricultural fires and other area sources such as residential fuel combustion, solvent utilization (e.g., paint, printing), dry-cleaning, and fugitive dust emissions, are the largest source of PM. Ramboll also found that the LDV sector contribution is far less than 5% of total PM 2.5 emissions in most locations. For details on the Ramboll study, please refer to the presentation attached as "US Air Quality Studies by Toyota." [EPA-HQ-OAR-2022-0829-0701, pp. 153-154]

Organization: American Fuel and Petrochemical Manufacturers

1. EPA overstates the environmental benefits

EPA touts several emissions benefits in the Proposed Rule from shifting the light-duty vehicle fleet to ZEVs. But EPA's analysis is lopsided in favor of its preferred technology. In analyzing environmental costs and benefits, EPA overlooks negative environmental consequences of ZEVs from increased power generation, vehicle usage, ZEV tire wear, the EV manufacturing supply chain, and battery replacements and disposal at the end of their useful life. Notably, EPA fails to assess net emissions. Although EPA modeled changes to power generation anticipated by the Proposed Rule as part of its upstream analysis, EPA does not consider the potential degradation of air quality in areas in the direct vicinity of existing or new power plants.204 [EPA-HQ-OAR-2022-0829-0733, pp. 44-45]

204 Id. at 29,379 (noting that although "[e]missions from upstream sources would likely increase in some cases (e.g., power plants) and decrease in others (e.g., refineries), EPA projects that the Proposed Rule will result in a total decrease in emissions of certain pollutants").

Organization: Delek US Holdings, Inc.

EPA compounds this flaw by making unsupported assumptions regarding total emissions impacts of its proposal as well as broad conclusory assertions not based on sufficient data-based substantiation. For example, EPA asserts that "the air quality analysis does not represent the proposal's regulatory scenario, nor does it reflect the expected impacts of the [IRA]," that while its analysis includes "some increases in ambient pollutant concentrations, as the power sector becomes cleaner over time as a result of the IRA and future policies, these impacts would decrease," and "the specific locations of increased air pollution are uncertain, [EPA] expect[s] them to be in more limited geographic areas."20 The Proposed Rule did not quantify emissions changes associated with producing or extracting crude or manufacturing refined fuels.21 [EPA-HQ-OAR-2022-0829-0527, p. 5]

20 Proposed Rule at 29,361.

21 Proposed Rule at 29,353. EPA concluded that EGU emissions will decrease between 2028 and 2055…[but] the increase in EGU emissions associated with the proposal's increased electricity generation would peak in the late 2030's/early 2040's (depending on the pollutant) and then generally decrease or level off through 2055." Id.

c. BEVs increased demand for power generation will also result in greater emissions of criteria pollutant emissions.

The Proposed Rule predicts net emissions reductions but does not adequately evaluate local ambient air quality impacts from increased power generation spurred by the mass adoption of electric vehicles. Although EPA modeled changes to power generation anticipated by the Proposed Rule as part of its upstream analysis, EPA does not consider the potential degradation of air quality in areas in the direct vicinity of existing or new power plants, especially as the need for baseload generation at times when the sun is not shining and the wind is not blowing rises exponentially with rapid electrification.44 [EPA-HQ-OAR-2022-0829-0527, p. 9]

44 Proposed Rule at 29,361 (describing the illustrative air quality modeling analysis EPA used and conceding that there would be increases in ambient pollutant concentrations but failing to quantify the actual concentrations and volumes or identify the geographic areas impacted).

Organization: Elders Climate Action

EPA performed modeling for the 2022 HD vehicle rule to demonstrate the benefits of the HD rule. That modeling showed that the NOx reductions required by the rule for HD vehicles will not be sufficient to achieve the ozone NAAQS in severe and extreme ozone nonattainment areas. The L/MD vehicle rule does not contain any analysis to determine whether the NOx reductions required by the rule will be sufficient to achieve the NAAQS in the most polluted nonattainment areas. [EPA-HQ-OAR-2022-0829-0737, pp. 5-6]

Without effective action to achieve the emission reductions needed for attainment, many at risk groups will suffer harm. EPA's review of the NAAQS for ozone and particulate matter have identified groups especially at risk from vehicle pollution, including-- [EPA-HQ-OAR-2022-0829-0737, pp. 5-6]

Babies and children, whose bodies are rapidly developing,

Pregnant women who risk increased premature birth and low weight births when exposed to vehicle pollution.

Children who develop asthma.

Children and adults with asthma who suffer asthma attacks.

People with existing respiratory diseases including COPD, COVID-related breathing limitations, long-COVID, and people with active COVID or respiratory infections.

People with lung cancer or other chronic diseases including other cancers. People with or at risk for cardiovascular disease.

Elders (over age 65) who risk premature death with exposure to air pollution.

[EPA-HQ-OAR-2022-0829-0737, pp. 5-6]

The proposed rule fails to achieve the public health benefits that will flow from requiring LD vehicles and MD trucks and buses to emit zero particles, zero NOx and toxic pollutants that cause urban smog, childhood asthma, respiratory and cardiovascular diseases, and premature deaths. Equally objectionable is the failure of EPA to even consider zero emission standards for short-haul L/MDVs, and to evaluate the climate and public health benefits that would follow from the actions needed for attainment in the worst affected nonattainment areas. [EPA-HQ-OAR-2022-0829-0737, pp. 5-6]

Organization: Environmental Defense Fund (EDF) (1of 2)

In addition to the research presented in our previous comments, we are including additional, analyses that further demonstrate the impact of light- and medium-duty vehicle emissions on vulnerable populations and the need for and benefits of zero-emitting solutions, including for light-duty trucks. [EPA-HQ-OAR-2022-0829-0786, p. 6]

A recent study by Calvin Arter et. al. estimated the air quality and health impacts of on-road vehicular emissions from five vehicles classes, including light-duty autos and light-duty trucks, on PM2.5 and O3 concentrations at a 12 × 12 kilometer scale for 12 states and Washington D.C. as well as four large metropolitan statistical areas in the Northeast and Mid-Atlantic U.S. in 2016.2 In the region considered, the research found that light-duty trucks are responsible for the most PM2.5-and ozone-attributable premature mortalities, with 46% of those mortalities from directly emitted primary particulate matter and 80% of those mortalities from ozone-attributable NOx emissions. This study demonstrates the importance and urgent need to address tailpipe emissions from light-duty trucks and supports EPA's proposal to include Class 2b and 3 vehicles in the rulemaking. [EPA-HQ-OAR-2022-0829-0786, p. 6]

2 Calvin A Arter et al Mortality-based damages per ton due to the on-road mobile sector in the Northeastern and Mid-Atlantic U.S. by region, vehicle class and precursor, 2021 Environ. Res. Lett. 16. https://iopscience.iop.org/article/10.1088/1748-9326/abf60b (Attachment B)

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

Allowing Strong PHEV cars and trucks to be eligible in the final regulation brings air quality benefits. [EPA-HQ-OAR-2022-0829-0646, p. 28]

- Strong PHEVs accrue many of the benefits of electrified transportation: they produce no tailpipe emissions during charge-depletion operation (reducing local air pollution), they weigh less than comparable BEVs (reducing non-exhaust particulate emissions from tires), they refuel many fewer times per year than ICEVs (reducing refueling emissions) and address the different types of cold-start emissions. [EPA-HQ-OAR-2022-0829-0646, p. 28]

Organization: Valero Energy Corporation

J. EPA fails to adequately consider the regional air quality impacts associated with the proposed rule.

EPA describes in the Preamble that it conducted an "illustrative air quality modeling analysis of a regulatory scenario" involving LDV and MDV emission reductions and corresponding changes in upstream emission sources.321 EPA goes on to downplay the results of the analysis, explaining that [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

321 321 EPA's Multi-Pollutant LMDV Proposal at 29361 (emphasis added).

"Decisions about the emissions and other elements used in the air quality modeling were made early in the analytical process for the proposed rulemaking. Accordingly, the air quality analysis does not represent the proposal's regulatory scenario, nor does it reflect the expected impacts of the Inflation Reduction Act (IRA)"322 [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

322 Id (emphasis added).

…

"While the results of the illustrative analysis include some increases in ambient pollutant concentrations, as the power sector becomes cleaner over time as a result of the IRA and future policies, these impacts would decrease. Although the specific locations of increased air pollution are uncertain, we expect them to be in more limited geographic areas, compared to the widespread decreases that we predict to result from the reductions in vehicle emissions."323 [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

323 Id.

Despite EPA's claims of uncertainty regarding the upstream emissions inventory,324 peer-reviewed research by Argonne National Laboratory supports the conclusion that BEV adoption can result in increased regional emissions of criteria pollutants, noting that "gasoline vehicles currently have lower total NOx, urban NOx, total PM2.5, and urban PM2.5 in 33%; 15%; 70%; and 10% of states, respectively[, compared with BEV]."325 [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

324 DRIA at 8-20.

325 Burnham, A.; Lu, Z.; Wang, M.; Elgowainy, A. "Regional Emissions Analysis of Light-Duty Battery Electric Vehicles." Atmosphere 2021, 12, 1482. https://doi.org/10.3390/atmos12111482.

The results of the air quality modeling analysis to which EPA is dismissive are actually quite alarming. EPA's modelling of "a regulatory scenario" projects regions of increased annual average concentrations for particulate matter (PM2.5), ozone, nitrogen dioxide, sulfur dioxide (SO2), acetaldehyde, benzene, and formaldehyde, as well as regions of increased annual nitrogen and sulfur deposition.326 Specifically, EPA's modelling projects increased annual average concentrations of criteria or hazardous air pollutants in at least 39 states: Alabama, Arizona, Arkansas, Colorado, Delaware, Florida, Georgia, Idaho, Indiana, Illinois, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin and Wyoming.327 [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

326 DRIA at 8-20 to 8-34.

327 DRIA at 8-24 to 8-34, based on Figures 8-6, 8-8, 8-10, 8-12, 8-14 to 8-17, 8-22 and 8-23.

Of particular interest is EPA's modeling results for annual average SO2 concentrations, which show expansive regions of increased ground-level concentrations, in some areas greater than

0.050 parts per billion.328 Among the regions projected to be impacted are existing SO2 1- hour (2010) non-attainment areas in Arizona, Indiana, Illinois, Iowa, Michigan, Missouri, Ohio, Pennsylvania, Tennessee and Texas.329 [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

328 DRIA at 8-26.

329 EPA, "Green Book Sulfur Dioxide (SO2) (2010) Nonattainment Area Map," https://www3.epa.gov/airquality/greenbook/mapso2_2010.html.

The results of the "illustrative" modeling of "a regulatory scenario" are significant enough to warrant EPA's revisiting the impacts of its actual proposed standards on state and local air quality. [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

[See original for figure titled "Figure 8-12: Projected illustrative changes in annual average SO2 concentrations in 2055 due to LMDV regulatory scenario"] [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

Source: DRIA at 8-26. [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

[See original for figure titled "SO2 Nonattainment Areas (2010 Standard)"] [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

Source: EPA Green Book SO2 (2010) Nonattainment Area Map (June 30, 2023) [EPA-HQ-OAR-2022-0829-0707, pp. 58-61]

Organization: Wisconsin Department of Natural Resources

6. Air quality modeling results. EPA should make available, in the docket or website, the complete results of the illustrative air quality modeling it completed for this proposal, including results by individual receptors. This will allow state and local agencies to better understand the potential impacts of this rule on their jurisdictions, especially for ozone and fine particles (PM2.5). [EPA-HQ-OAR-2022-0829-0507, p. 3]

EPA Summary and Response

Summary:

The Alliance for Automotive Innovation (AAI) comments that EPA should provide more information on the fraction of projected onroad PM emissions reductions in the air quality analysis that are due to emission control of ICE vehicles as compared to the fraction of reductions due to electric vehicles. AAI also notes that the impacts on ambient PM from the rule are small. They present results of an air quality modeling analysis, done by Ramboll for Toyota, looking at source contributions to ambient concentrations of $PM_{2.5}$ which shows that light-duty vehicles contribute less than 5% of total $PM_{2.5}$ concentration in most locations.

A commenter, Valero Energy Corporation, noted that the air quality modeling analysis presented in the NPRM projected that the illustrative scenario would result in increases in annual concentrations of pollutants in some areas, and specifically pointed to projected increased ambient SO_2 concentrations. The commenter suggested that EPA should revisit the impacts of the proposal on air quality. Other commenters also noted that the air quality analysis was illustrative and not based on the proposed standards.

Commenters, e.g., Delek US Holdings, Inc. and American Fuel and Petrochemical Manufacturers, asserted that EPA has failed to assess localized air quality impacts due to increased criteria pollutant emissions in areas proximate to EGUs. They also noted that vehicle electrification will increase energy demand and emissions from power plants, and that this increased demand will result in even more emissions from power plants when renewables (wind and solar) are unavailable. And they noted that EPA overlooks negative environmental consequences of increased power generation and ZEV tire wear among others.

The Strong Plug-in Hybrid Electric Vehicle comment notes that allowing Strong PHEV cars and trucks to be eligible in the final regulation brings air quality benefits.

A commenter, WI DNR, noted that EPA should make the complete results of the air quality modeling available to the public, including results by individual receptors, and another commenter, Elders Climate Action, asked how the rule will impact attainment of the ozone and $PM_{2.5}$ NAAQS. Some commenters also noted that this rule is needed to help them meet their NAAQS attainment goals.

Response:

For the final rule, EPA conducted an air quality modeling analysis of the proposed standards (the NPRM action case, rather than an illustrative case) and used an updated version of IPM to project EGU emissions (the 2022 post-IRA version of IPM). EPA also included projected design value concentrations for $PM_{2.5}$ and ozone, see Chapter 7.4 of the RIA for more information. These updates are responsive to comments suggesting that EPA did not model the proposed program, and to comments suggesting that EPA include the impact on projected nonattainment in its analysis.[427] The air quality modeling used a photochemical model, not a source-receptor model, and the outputs of the photochemical model are available at the 12 km grid cell level. EPA docketed the inputs and grid-cell specific outputs to the CMAQ model for the illustrative air quality modeling documented in the NPRM and also has done so for the air quality modeling analysis done for the FRM.[428]

With regard to the request that EPA provide more information on the portion of the projected PM emission reductions that are due to emissions control of ICE vehicles versus the replacement of ICE vehicles with electric vehicles, EPA has not estimated this value; for purposes of the air quality analyses, we model the impacts of the standards, not of specific technologies that manufacturers may use to comply. We note, moreover, that the final standards do not mandate numbers of ICE vehicles with improved emissions control or of PEVs; rather, each manufacturer can comply with the performance-based standards using a mix of technologies that best suits their business.

EPA believes that the $PM_{2.5}$ emissions standards are adequately justified even without this information (see Section III.D.3 of the preamble and Section 4.1.3 of this document). There is no

[427] Decisions about the emissions and other elements used in the air quality modeling were made early in the analytical process for the final rulemaking. Accordingly, the air quality analysis does not fully represent the final regulatory scenario; however, we consider the modeling results to be a fair reflection of the impact the standards will have on air quality in 2055.

[428] EPA-HQ-OAR-2022-0829-0393 Docket memo modeling input and output files for the IPM runs used in the illustrative AQ and benefits analysis for the LMDV multipollutant proposed rule, EPA-HQ-OAR-2022-0829-0353 Modeling input files for the illustrative air quality and benefits analysis for the LMDV multipollutant proposed rule, and EPA-HQ-OAR-2022-0829-0418 Additional NPRM Illustrative Air Quality Modeling Outputs.

question that the $PM_{2.5}$ standards will yield significant reductions of $PM_{2.5}$ emissions from the light- and medium-duty vehicle fleets and that these reductions are important for public health. Section II of the preamble describes the health and environmental effects associated with exposure to pollutants, including $PM_{2.5}$. Emissions from light- and medium-duty vehicle and upstream sectors contribute to ambient concentrations of $PM_{2.5}$ at the local, regional, and national level, often disproportionally affecting communities of color and low-income populations. As set forth in Sections VI and VII of the final rule preamble, we project that this rule will result in significant reductions of emissions of GHGs, criteria pollutants, and air toxics from the light- and medium-duty vehicle sector. The reduction of emissions associated with vehicles will lead to air quality and health benefits improvements associated with the final rule (see Section VII.C of the final rule preamble).

EPA disagrees with the commenter who notes that the air quality benefit is not enough to warrant the costs of the rule; for responses to comments on the benefit-cost analysis, please see Section 8.5 of this RTC document. The analysis done by Ramboll to assess the contribution of light-duty gasoline vehicles to ambient $PM_{2.5}$ concentration and earlier work done by EPA indicate that light-duty gasoline vehicles contribute to ambient concentrations of $PM_{2.5}$.[429] States with nonattainment areas are required to take action to bring those areas into attainment. Since this rule will reduce onroad light- and medium-duty emissions across the country, this rule could help states and municipal areas in their efforts to attain the $PM_{2.5}$ NAAQS as expeditiously as practicable and may relieve areas with already stringent local regulations from some of the burden associated with adopting additional local controls. The final rule could also assist counties with ambient concentrations near the level of the ozone and $PM_{2.5}$ NAAQS who are working to ensure long-term attainment or maintenance of the ozone and $PM_{2.5}$ NAAQS.

Additionally, to the extent that the information introduced by commenters was intended to advocate for more or less stringent standards, we refer the reader to Sections 3.3 and 4 of this RTC document.

EPA acknowledges and agrees with commenters who note that the air quality analysis models increased energy demand and increased emissions from EGUs. EPA also notes that for this final rule, we modeled the air quality impacts of the proposed standards (not an illustrative scenario), which was a suggestion from a few commenters. Our modeling of projected emissions from the power sector was done using the Integrated Planning Model (IPM), which we note accounts for the fact that renewables are not always available and considers alternative ways that clean power can be supplied during those times. Please see Chapter 7.2.2.1 of the RIA for more information on the IPM modeling used to project emissions from the power sector for the air quality modeling and the EPA Power sector website for more details on the post-IRA 2022 version of IPM (https://www.epa.gov/power-sector-modeling/post-ira-2022-reference-case).

In addition, our air quality modeling finds significant reductions of pollutants across the nation. One commenter specifically mentioned that there were modeled increases in SO_2 concentration presented in the illustrative air quality modeling analysis in the NPRM, see Chapter 8 of the DRIA. The air quality modeling for the final rule (see Chapter 7 of the RIA) projects on average a decrease in annual SO_2 concentration of 0.001 ppb in 2055 and a

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[429] Zawacki et al, 2018.Mobile source contributions to ambient ozone and particulate matter in 2025. Atmospheric Environment, vol 188. https://doi.org/10.1016/j.atmosenv.2018.04.057

population-weighted average decrease in annual SO_2 concentration of 0.003 ppb. We also project some increases in SO_2 concentration in our final rule air quality modeling analysis, although the increases are smaller and impact fewer locations than the illustrative modeling in the NPRM. Although our air quality modeling is not of sufficient resolution to capture impacts at a smaller than 12 km grid scale, we do expect that increased emissions from EGUs may increase ambient concentrations of some pollutants, including SO_2, in some areas downwind of EGUs. The impact of these increases is limited and dwarfed by the decreases elsewhere in the nation; indeed, we project that more than 99 percent of the population will experience reductions in annual average SO_2 concentrations as a result of this rule. We also expect the power sector to become cleaner over time as a result of the IRA and future policies, which will reduce the air quality impacts of EGUs. Further, none of the grid cells that are projected to have increases in SO_2 concentration are located in nonattainment areas, as was highlighted by this commenter as a concern based on the results of the illustrative analysis described in the NPRM. On average the final rule AQ modeling projects a decrease in annual SO_2 concentration of 0.001 ppb in 2055 and a population-weighted average decrease in annual SO_2 concentration of 0.003 ppb.

Comments related to plug-in hybrids are addressed in Sections 3.1.6 or 12.2.4 of this RTC. Comments related to tire wear are addressed in RTC Section 11.1.

12 - Modeling of compliance pathways, associated costs, and emissions reductions

12.1 - General comments about OMEGA

<u>Comments by Organizations</u>

Organization: American Fuel & Petrochemical Manufacturers

EPA's Proposal fails to evaluate how government credits are embedded in vehicle pricing. For example, neither federal or state governments, or auto manufacturers explain how state ZEV credits, EPA GHG multiplier credits, and NHTSA CAFE EV multiplier credits are accounted for in both ZEV and ICEV vehicle price. There is increasing evidence that regulations which mandate EV sales—along with the cross-subsidies from gasoline and diesel vehicle buyers—are leading manufacturers to abandon sales of the least expensive and higher fuel economy gasoline and diesel vehicles that do not receive similar subsidization.236 Cox Automotive found that "in December 2017, automobile makers produced 36 models priced at $25,000 or less. Five years later, they built just 10," pushing low-income buyers out of the new-car market and into the used-car market. Conversely, in December 2017 automobile manufacturers offered 61 models for sale with sticker prices of $60,000 or higher and in December 2022, they offered 90.237 This is unacceptable. EPA and its sister agencies cannot create credits and then claim they do not affect vehicle price solely because they have not sought to quantify them. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

236 Steven G. Bradbury, Distinguished Fellow, The Heritage Foundation, Prepared Statement for the hearing entitled "Driving Bad Policy: Examining EPA's Tailpipe Emissions Rules and the Realities of a Rapid Electric Vehicle Transition," before the Subcommittee on Economic Grown, Energy Policy, and Regulatory Affairs of the U.S. House of Representatives Committee on Oversight and Accountability, at 10

(May 17, 2023) available at https://oversight.house.gov/wp-content/uploads/2023/05/Bradbury-Prepared-Statement-for-17-May-2023-Oversight-Hearing.pdf

237 See Sean Tucker, Are we witnessing the demise of the affordable car? Automobile makers have all but abandoned the budget market (MarketWatch Feb. 28, 2023), available at https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have-all-but-abandoned-the-budget-market-a68862f0 (last visited May 24, 2023).

Tellingly, EPA never estimates the annual price of a comparable ZEV and ICEV, for each year in which EPA proposes standards. EPA's bias towards EVs is demonstrated by EPA's statement that its OMEGA modeling "now incorporates a consumer choice element. This means that the impacts of, for example, a $40,000 BEV versus a $35,000 ICE vehicle of similar utility (i.e., a 14 percent increase for the BEV) is a much different consideration than a $6,000 incremental BEV cost versus a $1,000 incremental ICE cost (a 500 percent increase for the BEV)."238 In other words, EPA set up its model to show the consumer price (not the actual real-world cost) of EVs have a lower percentage cost increase than the incremental absolute cost of switching from ICEVs to ZEVs. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

238 See RIA page 2-42, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf.

Organization: Alliance for Automotive Innovation

. We recommend that EPA provide more thorough documentation of the OMEGA input and output files, and descriptions of data used in the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 66-67]

H. OMEGA Model

EPA introduced OMEGA 2.1.0 to improve the model boundaries by including pre- and post-processing steps to occur within the model, as well as adding an independent policy module, modeling of strategic producer decisions, and a consumer response component. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

EPA's OMEGA modeling team provided a helpful tutorial of the model's basic operation and answered numerous manufacturer questions. Despite the assistance, it has been difficult for Auto Innovators and its member companies to figure out how to exercise the model's new features to determine how accurately they replicate reality. Auto Innovators' attempts to maneuver through the model have uncovered information access barriers that make it difficult to understand how key assumptions supporting the proposed standards affect manufacturer compliance and the associated costs and environmental improvements over time. Overall, the model the lacks necessary transparency and user-friendly access needed for stakeholders to evaluate the feasibility claims in the proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

The 60-day comment period is insufficient to provide a thorough assessment. With the limited time provided, we have discovered difficulties such as: [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- Many complex aspects of the model are not found or clearly stated in the model documentation. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- A baseline fleet of 2021 discussed, but a 2019 fleet appears to have been used. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- There are circular definitions applied to basic terms such as “engine cost.” [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- We encountered unreasonable difficulty in creating a technology walk to be able to understand incremental technology penetration and cost to compare to GHG improvements over time. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

It is possible, given the limited comment period, that there is some nuance that explains the apparent deficiencies, and we welcome dialogue with EPA on these concerns. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

Auto Innovators recommends that the final rule and associated documentation: [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- Provide model documentation with clear steps to develop a technology walk. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- Provide a glossary of technology definitions. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- Provide full details on cost assumptions (as in previous rulemakings). [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

- Provide a straight forward way to identify BEVs, PHEVs, strong hybrids, or conventional ICE technologies in model output files. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

We also note that, despite the importance of the OMEGA model in informing its proposed standards, EPA does not appear to have engaged its Science Advisory Board in a review of the model’s structure, inputs, or outputs. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

EPA conducted a peer review of the model through its contractor ERG.247 The peer review report describes that four independent reviewers, free from conflicts of interest, were selected by ERG. However, one of the reviewers, Rick Rykowksi, is described as an “Independent Engineering Contractor, Environmental Defense Fund” and is a former EPA employee.248 As EPA staff is well-aware, Environmental Defense Fund (EDF) is a frequent commenter on environmental regulations, including those affecting the automotive industry, generally taking supportive positions on EPA’s proposals and advocating for even more stringent requirements. While Mr. Rykowski may technically be an independent contractor, his close ties to EDF have likely given that organization an unfair advantage relative to other stakeholders in understanding and commenting on the operation of the OMEGA model and its input / output structure as it applies to the NPRM, particularly given the limited comment period. Furthermore, although the OMEGA model is intended to represent potential manufacturer responses to proposed and alternative standards, not a single one of the reviewers selected has recent experience in the automotive industry. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

247 U.S. Environmental Protection Agency, External Peer Review of EPA’s OMEGA Model: Final Peer Review Summary Report, EPA-420-R-23-010 (Apr. 2023).

248 Id. at A-59.

We recommend that EPA proactively engage all stakeholders to familiarize them with new and significantly revised models well in advance of their use in rulemaking. EPA should also consider providing notice in the Federal Register of the availability of new modeling tools (again in advance of their formal use) and take public input in addition to limited peer reviews. Finally, for a thorough and appropriate peer review, Auto Innovators recommends that EPA provide an additional peer review now by an independent reviewer with automotive experience and incorporate the peer review input into OMEGA prior to finalizing a rule. [EPA-HQ-OAR-2022-0829-0701, pp. 137-139]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA's Reliance on Its OMEGA Model Is Misplaced

EPA unreasonably relies throughout the proposed rule on a barely tested optimization modeling tool called "OMEGA." All of EPA's projections relat-ing to the number of combustion-engine and electric vehicles in compliant fleets during the relevant period were calculated using OMEGA. See 88 Fed. Reg. at 29,294–95. Those projections in turn inform many aspects of the proposed rule, including feasibility, estimated overall emissions, and the agency's cost-benefit calculation. See, e.g., id. at 29,318 (relying on OMEGA projections to analyze grid reliability); id. at 29,303, 29,347–59 (using OMEGA to estimate emission inventories); id. at 29,370, 29,379, 29,383, 29,385–86, 29,392 (using OMEGA to estimate costs and benefits). If OMEGA is flawed, then so too is the rest of the rule that relies on it. And OMEGA is flawed for multiple reasons. [EPA-HQ-OAR-2022-0829-0683, p. 53]

EPA misleadingly asserts that the model underwent peer review before it was released. See 88 Fed. Reg. at 29,185, 29,294. Rather than granting anony- mous reviewers access to the model and permitting them to pressure-test it and provide comments, EPA contracted with one entity (the Eastern Research Group) to handpick just four reviewers to assess and critique the model. See External Peer Review of EPA's OMEGA Model: Final Peer Review Summary Report, EPA, at 1–2 (Apr. 2023) ("External Review Summary"). EPA does not purport to have distributed the model to any other reviewers. A lack of widespread quality-assessment of the model alone renders the decision to adopt it unrea- soned and arbitrary. [EPA-HQ-OAR-2022-0829-0683, pp. 53-54]

Organization: American Honda Motor Co., Inc.

F. EPA Analysis of Market Impacts

For this proposed rule, EPA utilized an updated and peer reviewed version of their Optimization Model for reducing Emissions of Greenhouse gases from Automobiles (OMEGA 2.0) to model vehicle manufacturer compliance with GHG standards. OMEGA 2.0 builds on the previous version and includes some notable new capabilities:

[T]he updated version of OMEGA extends the prior version's projections of cost-effective manufacturer compliance decisions by also accounting for the relationship between manufacturer compliance decisions and consumer demand and including important constraints on technology adoption. Also, the updated OMEGA allows for evaluation of the influence of other policies beyond the GHG standards being evaluated, such as state-level ZEV policies.43 [EPA-HQ-OAR-2022-0829-0652, pp. 24-25]

43 88 Fed. Reg. 29294 (May 5, 2023)

As in previous rulemakings, the agency has included the OMEGA model and accompanying data files associated with each policy "run" in the regulatory Docket. Although the data files and model documentation were, in our opinion, too opaque for a rulemaking of such significance, Honda found agency staff to be helpful in answering our questions and providing further clarity. Such support was greatly appreciated, particularly for a model with this level of complexity. [EPA-HQ-OAR-2022-0829-0652, pp. 24-25]

Organization: POET, LLC

Future Work, including by EPA

While relatively straightforward to run, the OMEGA model comprises hundreds of inputs and equations across both behavioral, policy, and technological aspects of the LDV market. While the results in this memo demonstrate some salient characteristics of proposed policies, a more thorough evaluation by EPA of these issues are warranted. With additional resources and more time allowed than the short comment period provided by EPA on the proposal, a more comprehensive analysis of LDV policies using the OMEGA module could be performed leading to a more complete understanding of the consequences of this Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, p. 50]

Organization: Valero Energy Corporation

B. Despite feedback from peer reviewers, EPA fails to provide adequate time for stakeholder review of the OMEGA v2.1.0 Model.

OMEGA v1.0 was created to support new LDV GHG standards proposed by EPA in 2011; OMEGA v2.1.0, released to support EPA's proposed standards, reflects "significant changes in the light duty vehicle market including technological advancements and the introduction of new mobility services" in the period since the release of OMEGA v1.0.82 Peer reviewers of the OMEGA v2.1.0 model offered the feedback "OMEGA 2 is not just updated, it is essentially a new model"83 and "OMEGA2 a major expansion of the prior OMEGA model in scope."84 [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

82 DRIA at 2-2.

83 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23- 010) at 6, April 2023.

84 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23- 010) at 22, April 2023.

In the peer review of OMEGA v2.1.0, "the most common category of comments consisted of recommendations for improving the model's documentation by adding further explanations or specifics to enhance the user's understanding."85 Specific comments from peer reviewers include:

85 DRIA at 2-7.

• "'The logical decision-making process in OMEGA2 seems too complex for the necessary level of review (consisting of a review of at least 90+ pages out of total 300+ pages containing some source code of the model documentation besides the model running) due to the limited effort available to reviewers. Some additional documentation would be useful in terms of logical explanation of various iterative producer consumer vehicle choice process (suited to a general non-economist audience) before the public model release."86 [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

86 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23- 010) at 3, April 2023.

- "The policy-oriented model seems too complex for a novice user. A professional economics background is necessary for interpretation of model results and so it'd be useful if the model documentation could be made more simpler for the general users."87 [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

87 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23- 010) at 4, April 2023.

- "Would be helpful for the novice EPA model users to include a short section on the other EPA complementary ALPHA model with differences between it and OMEGA2 model."88 [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

88 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23- 010) at 4, April 2023.

- "Steps for running the model seem not very straight forward to a novice user using the existing model GUI. It was hard to locate some of the listed files in the model documentation. Additional step-by-step flow diagrams including the file listing with a clear indication of necessary user inputs for both necessary preprocessing and post-processing would be useful to be included in User's manual. In addition, a definition glossary of major variables including a data dictionary would be useful."89 [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

89 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23-010) at 5, April 2023.

In EPA's response to the peer review comments, EPA generally disagreed with the feedback concerning complexity for the novice user but vowed that it would "continue to look for ways to make the documentation clearer and more useful for a broad range of readers and users."90 While EPA "continues to look for ways" to facilitate the use and understanding of the OMEGA model by its stakeholders, these same stakeholders were granted only 60 days to review the model code, input and output files, run the model themselves, and provide comments to EPA – not enough time, given the scope of changes since the OMEGA v1.0 model and the magnitude and complexity of the model itself. [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

90 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23-010) at 4, April 2023.

EPA Summary and Response

The Alliance recommended that EPA provide additional documentation of the OMEGA input and output files, and descriptions of data used in the final rule. In response, EPA has updated the model documentation (https://omega2.readthedocs.io/en/2.5.0/) to provide a description of the model version that was used for the compliance analysis of this final rulemaking. The model documentation also provides a description of the variables in the input and output files, and a description of the data types and file formatting. The input assumptions and values used for this rulemaking's central and sensitivity case analyses are described in the appropriate sections of the Preamble and RIA. For example, consumer modeling inputs are described in RIA Chapter 2.6.3; vehicle powertrain cost inputs in RIA Chapter 2.6.1, and IRA incentive inputs in RIA Chapter 2.6.8. EPA has added a table of OMEGA topics in RIA 2.1 with chapter and section numbers to help guide the reader to the relevant details in the RIA and Preamble.

AmFree was critical of the process used by EPA to have the OMEGA model peer reviewed prior to the NPRM. The commenter describes what in their view was "a lack of wide-spread quality assessment" of the model, and commented that EPA had not distributed the model to other reviewers. The commenter describes an alternative process which involves EPA granting "anonymous reviewers access to the model and permitting them to pressure-test it and provide comments." In response, EPA disagrees with the commenter's view that the review process was deficient. EPA's OMEGA model was subject to a thorough peer-review process that meets the standards outlined by the Peer Review Advisory Group and EPA's Science and Technology Policy Council, as documented in EPA's peer review handbook (https://www.epa.gov/osa/peer-review-handbook-4th-edition-2015). As a result of this thorough peer review process, EPA implemented multiple model revisions and improvements that were incorporated into the version used for the NPRM analysis. In response to the commenter's assertion that the model was not broadly available for comment beyond the formal peer-review, EPA notes that the complete full model and inputs were made available publicly for the NPRM. This includes the model documentation, model code, full peer review report, model inputs and outputs, model executable file, and an introductory video tutorial. Multiple commenters, including AmFree, used the public comment process to submit their observations and recommendations for improving the OMEGA model based on the extensive materials that were available for review.

AmFree commented that EPA's reliance on the OMEGA model is misplaced, since in the commenters view, the model was "barely tested", and is the source for "all of EPA's projections relating to the number of combustion engine and electric vehicles." In response EPA disagrees that the use of the OMEGA model as a tool to project possible compliance pathways is inappropriate. EPA notes that the OMEGA model's compliance logic for this rulemaking is consistent with the modeling for all previous light-duty GHG rulemakings. This logic, to describe briefly, is an optimization approach that applies technologies to comply with GHG standards at the lowest cost. As discussed above, EPA disagrees with the same commenter's assertion that the peer-review process was deficient. It is relevant to the perceived lack of model testing to note that during the formal peer review process, EPA responded to extensive comments on the OMEGA model's optimization algorithm. Additional comments on the same topic were submitted for this rulemaking and are discussed further in RTC Section 12.1.1. The extent and depth of these comments serve to illustrate the intensive review and testing of the model's algorithm. EPA considers that the OMEGA model's refinement is an ongoing process spanning over a decade; the process began with previous rulemakings that utilized OMEGA modeling and continued with development and testing within the Agency over the past several years. Importantly, the process includes the second peer review of OMEGA to which the commenter refers, as well as stakeholder engagement that continues up to and including this current public comment process. Finally, we note that this particular comment regarding EPA's reliance upon OMEGA modeling does not distinguish between the model and the model inputs. The discussion above is in response to the review and testing of the model algorithms and the

OMEGA model itself. It is appropriate to consider input assumptions and values independently, apart from a discussion of model algorithms. Inputs to the OMEGA model are described in RIA Sections 2.4, 2.5 and 2.6, and discussed throughout this RTC Section 12.

AAI commented that it was difficult to navigate through the model and understand how key assumptions were used, while Honda commented that the data files and model documentation were "too opaque for a rulemaking of such significance." These commenters acknowledged that the model, model documentation, and complete input and output files were published and available for public review for the proposal. EPA recognizes that a large volume of materials was posted to the docket, and took several steps to assist stakeholders, including updating and expanding the model documentation based on the peer review and publishing a video tutorial showing how to conduct a run and navigate some of the key output files. One notable step taken by EPA at the time of the NPRM was the establishment of an OMEGA "help desk" in the form of a dedicated email contact for the sole purpose of responding to questions about model operation and interpretation of input and output files. Between April and August of 2023 alone, EPA fielded inquiries on dozens of topics, and shared responses via more than 100 email correspondences. Honda expressed appreciation for these engagement efforts in their comments. Overall, while we agree that it is challenging to navigate a model involving so many inputs and outputs, we believe that the steps taken by EPA to be responsive to requests for clarification and increase transparency were appropriate for providing a sufficient understanding of the modeling during the comment process.

12.1.1 - Producer side modeling

Comments by Organizations

Organization: Alliance for Automotive Innovation

8. Reliance on Credit Trading in Analysis of Compliance Pathways

EPA models a potential compliance pathway for each manufacturer as part of its analysis and justification of proposed GHG standards. Unlike prior rulemakings, EPA has assumed credit trading between manufacturers as part of its central analysis, rather than as a sensitivity case.215 [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

215 NPRM at 29343.

In EPA's own words,

We have incorporated a 'credit market efficiency' parameter that can be set by the user. A value of '1' represents a perfect credit market; a value of '0' represents no credit trading provisions. Values between 0 and 1 represent imperfect trading, where manufacturers with cost-minimizing compliance pathways that involve the purchase of credits will apply more technology than they would under perfect trading. And as a result, some of the industries credits will expire, unused.216 [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

216 U.S. Environmental Protection Agency, Final Peer Review Summary Report (Apr. 2023) at 9. ("We have incorporated a 'credit market efficiency' parameter that can be set by the user. A value of '1' represents a perfect credit market; a value of '0' represents no credit trading provisions. Values between 0 and 1 represent imperfect trading, where manufacturers with cost-minimizing compliance pathways that

involve the purchase of credits will apply more technology than they would under perfect trading. And as a result, some of the industries credits will expire, unused.")

By implication, a value of 1 in EPA's model would generally result in a perfect balance of industry performance better and worse than target such that any manufacturer needing to purchase credits would have access to them through a different manufacturer (or multiple manufacturers) that chose to over-comply with the standards. Put another way, a value of 1 would imply that each individual manufacturer has perfect foreknowledge of other manufacturers' product plans and of the distribution of sales for ongoing and future model years, and that they collude in such a manner that they collectively minimize average compliance costs. Such an outcome is clearly not realistic. Automobile manufacturers are highly competitive and do not act in a collective manner in planning products and regulatory compliance.217 Nor is it possible to have perfect knowledge of future sales. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

217 Auto Innovators strictly follows all U.S. antitrust laws, and expressly discourages its members from engaging in any collusive or anti-competitive behavior.

For the NPRM, EPA assumed a 'credit market efficiency' of 0.8.218 In other words, that manufacturers would have an 80% ability to act collectively together and predict future markets and sales. Auto Innovators was unable to locate any justification from EPA for its choice of 80% efficiency in collective planning in either the NPRM or RIA, leading us to believe that its choice was completely arbitrary. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

218 EPA NPRM OMEGA central analysis batch input file (2023-03-14-22-42-30-ld-central-run-to2055.zip\2023-03-14- 22-42-30-ld-central-run-to2055\batch-expanded_ld_central.csv), parameter "Credit Market efficiency" set to a value of 0.8).

Although we agree that some credit trading is occurring, and thus a 'credit market efficiency' setting greater than 0 may be warranted, the reality is a much more constrained credit market than a credit market efficiency value of 80% would imply. The U.S. auto market and manufacturers are highly competitive. The market for compliance credits is closed, with each participating buyer and seller of credits individually seeking each other out and coming to unique terms. Historically, only three manufacturers have sold any significant quantity of GHG credits, and purchases have been dominated by a single manufacturer with a couple of other manufacturers purchasing significant quantities, and a number of others purchasing relatively small amounts of credit.219 Moreover, EPA's approach in general ignores that most manufacturers prefer to maintain some level of banked credits as insurance against unexpected events that could affect future compliance.220 Maintaining a buffer against unexpected events will likely become increasingly important as standard stringency rapidly increases after MY 2022, and even more-so in the later half of this decade as compliance relies more heavily on electric vehicle market share and its present uncertainties. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

219 EPA Trends Report at 119.

220 EPA Trends Report at 122. (A number of manufacturers are maintaining positive credit balances.)

EPA's assumption of 0.8 (or 80%) credit market efficiency is not insignificant. EPA's central analysis of the proposed standards projects two major manufacturers will rely on purchased credits for compliance in most years after MY 2022. Another three major manufacturers are projected to need to purchase credits in at least three years after MY 2022. Despite projections of small volume manufacturers exceeding fleet average BEV market share, they would also need to purchase credits in nearly every year under EPA's projections.221 EPA projects that thirteen manufacturers will generally exceed regulatory requirements, but the two manufacturers with the greatest degree of credit generation would not have enough surplus credit to cover the two manufacturers projected to purchase the most credits.222 Generalizing, it appears that EPA's projected compliance pathways assume virtually all manufacturers participating as buyers or sellers (or both) of credits. Again, these assumptions do not seem realistic, particularly given EPA's lack of support for them. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

221 Auto Innovators examination of the proposal central analysis OMEGA [. . .]credit_transactions.csv output files, noting where EPA's analysis results in a "PAST_DUE" result.

222 Auto Innovators examination of the proposal central analysis OMEGA [. . .]credit_transactions.csv output files, noting where EPA's analysis results in an "EXPIRATION" of credits. In other words, credits that would expire unused unless sold to another manufacturer.

Perhaps more important than the intricacies and assumptions of compliance modeling, which is almost always an over-simplified projection of potential future outcomes, are the practical realities that should be considered. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

Auto Innovators believes that it is inappropriate to set a standard so stringent as to effectively require many manufacturers to rely on other manufacturers to maintain compliance. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

The decision to sell credits, who to sell them to, what price to sell them at, and when to sell them (or to keep them for later use or future value) is a business decision. There is nothing that requires a manufacturer to sell its credits, to sell them to a particular party, or to sell them at a particular price. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

Even if a credit-generating manufacturer is willing to sell credits, the credits may be purchased by other parties before other manufacturers can purchase them. Manufacturers engage in multi-year planning. While a small spot purchase of credits might be made to cover an unforeseen gap in a single year, it is just as likely that manufacturers will seek to purchase credits for multiple years. Such behavior is observable in EPA's records of credit transactions. One can clearly identify manufacturers that have purchased more credit than needed in a current model year, that is then used over the course of multiple years. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

Setting aside EPA's specific projections, the availability of credits for purchase may also shrink in the future. Standards that rapidly increase in stringency, as do the MY 2023-2026 standards and EPA's proposed standards for 2027 and later, are challenging to comply with, let alone exceed. Available investment capital limits the number of models that can be redesigned and improved or transformed into electric vehicles in a given year. The faster the rate of stringency increase, the more difficult it is to stay ahead of the standard. Also, as the fleet average emission standard is decreased, vehicles above their target become even more of a compliance burden, and vehicles below their target become less of a compliance benefit. Even manufacturers that only sell electric vehicles (such as Tesla) will not generate the same quantity of credits assuming relatively constant production. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

Moreover, compliance with EPA's proposed standards is largely premised on rapidly growing EV market share. If EPA's projections are incorrect, and sales of electric vehicles are not as high as expected, many manufacturers are likely to need more credits than projected to maintain compliance with GHG standards. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

Auto Innovators recommends that EPA finalize standards that are not premised on projections of readily available purchasable credits. [EPA-HQ-OAR-2022-0829-0701, pp. 117-120]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA misleadingly asserts that the model underwent peer review before it was released. See 88 Fed. Reg. at 29,185, 29,294. Rather than granting anony- mous reviewers access to the model and permitting them to pressure-test it and provide comments, EPA contracted with one entity (the Eastern Research Group) to handpick just four reviewers to assess and critique the model. See External Peer Review of EPA's OMEGA Model: Final Peer Review Summary Report, EPA, at 1–2 (Apr. 2023) ("External Review Summary"). EPA does not purport to have distributed the model to any other reviewers. A lack of widespread quality-assessment of the model alone renders the decision to adopt it unrea- soned and arbitrary. [EPA-HQ-OAR-2022-0829-0683, pp. 53-54]

Worse, even that limited review raised significant concerns about OMEGA's basic functionality that EPA has not addressed. One reviewer pointed out that OMEGA has "limitations that restrict its ability to model some important aspects of policy compliance in practice," including "firm profit- seeking compliance behavior." External Review Summary at 22. That reviewer suggested that EPA "consider implementing functionality" that would permit users to model multiple firms competing for market share. Id. at 24. As he ex- plained, the current version "uses a single monopolist producer with a fleet of products," and that a single producer may respond to a regulation different than a producer that is competing for market share. Id. at 25. Those concerns regard- ing market share and structure have substantial grounding in academic litera- ture. As one scholar has explained, environmental regulation, particularly in industries with few producers and high fixed costs, may have a significant im- pact on new market entrants and overall market structure. See Stephen P. Ryan, The Costs of Environmental Regulation in a Concentrated Industry, 80 Econometrica 1019, 1021 (May 2012). For that reason, by ignoring the effects on competition, EPA's OMEGA model may significantly underestimate the negative effects on consumers of the proposed rule. See id. at 1059. EPA declined to change OMEGA in response to those concerns, see External Review Summary at 22, 24— and it nowhere explains why OMEGA's projections are accurate without hav- ing addressed his comments. [EPA-HQ-OAR-2022-0829-0683, pp. 53-54]

Organization: American Fuel & Petrochemical Manufacturers

EPA requests comment on their approach to determining charging time, as set forth in the DRIA, Chapter 4.155 EPA's analysis is contingent on unsupported assumptions regarding (1) U.S. consumers' adoption of and ability to purchase more expensive ZEVs (see Sections IV.B.2 and IV.E.2.ii); (2) the type of ZEV purchased (used ZEVs or PHEVs compatible with slower charging units or new ZEVs that can use DCFC) (Section IV,B.2 addresses charging times); (3) the availability of critical minerals and metals to expand the supply of reliable and renewable electricity (see Section I.B); and (4) the availability of reliable and affordable charging for all users (see Sections IV.B.4). Given the flaws in EPA's methodology that omits significant data sources and other factors and makes unsupported assumptions, EPA should revise its analysis concerning charging time and continue with promulgating a final rule for future emissions standards, that accounts for the reality of today's automotive market and not the public pronouncements of the automotive industry, a single state or group of states, or other unsupported estimates of future market growth. [EPA-HQ-OAR-2022-0829-0733, pp. 33-34]

155 88 Fed. Reg. at 29,367.

EPA's Proposal fails to evaluate how government credits are embedded in vehicle pricing. For example, neither federal or state governments, or auto manufacturers explain how state ZEV credits, EPA GHG multiplier credits, and NHTSA CAFE EV multiplier credits are accounted for in both ZEV and ICEV vehicle price. There is increasing evidence that regulations which mandate EV sales—along with the cross-subsidies from gasoline and diesel vehicle buyers—are leading manufacturers to abandon sales of the least expensive and higher fuel economy gasoline and diesel vehicles that do not receive similar subsidization.236 Cox Automotive found that "in December 2017, automobile makers produced 36 models priced at $25,000 or less. Five years later, they built just 10," pushing low-income buyers out of the new-car market and into the used- car market. Conversely, in December 2017 automobile manufacturers offered 61 models for sale with sticker prices of $60,000 or higher and in December 2022, they offered 90.237 This is unacceptable. EPA and its sister agencies cannot create credits and then claim they do not affect vehicle price solely because they have not sought to quantify them. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

236 Steven G. Bradbury, Distinguished Fellow, The Heritage Foundation, Prepared Statement for the hearing entitled "Driving Bad Policy: Examining EPA's Tailpipe Emissions Rules and the Realities of a Rapid Electric Vehicle Transition," before the Subcommittee on Economic Grown, Energy Policy, and Regulatory Affairs of the U.S. House of Representatives Committee on Oversight and Accountability, at 10 (May 17, 2023) available at https://oversight.house.gov/wp-content/uploads/2023/05/Bradbury- Prepared-Statement-for-17-May-2023-Oversight-Hearing.pdf

237 See Sean Tucker, Are we witnessing the demise of the affordable car? Automobile makers have all but abandoned the budget market (MarketWatch Feb. 28, 2023), available at https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have-all-but-abandoned-the-budget-market-a68862f0 (last visited May 24, 2023).

Tellingly, EPA never estimates the annual price of a comparable ZEV and ICEV, for each year in which EPA proposes standards. EPA's bias towards EVs is demonstrated by EPA's statement that its OMEGA modeling "now incorporates a consumer choice element. This means that the impacts of, for example, a $40,000 BEV versus a $35,000 ICE vehicle of similar utility (i.e., a 14 percent increase for the BEV) is a much different consideration than a $6,000 incremental BEV cost versus a $1,000 incremental ICE cost (a 500 percent increase for the BEV)."238 In other words, EPA set up its model to show the consumer price (not the actual real-world cost) of EVs have a lower percentage cost increase than the incremental absolute cost of switching from ICEVs to ZEVs. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

238 See RIA page 2-42, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf.EPA incorrectly assumes that ZEV owners will pay the national average residential electricity price to charge their vehicles. EPA fails to consider that the majority of ZEVs in the U.S. are located in utility service territories with some of the highest electricity rates in the country and that the average EV owner currently pays a much higher price to charge their ZEV at home than the

national average residential electricity rate. Given that EV penetration has varied widely across the U.S., it would be arbitrary to assume that EVs will, unlike in the past, penetrate uniformly across the U.S. and thus that the average electricity price would be representative of the actual cost electricity. For example, California, which has roughly 40 percent of all registered ZEVs in the U.S., has a residential electricity rate that is roughly double the national average. Considering that EPA is modeling its rule after a California-like approach to mandate ZEVs, it would be more appropriate for EPA to assume similar real-world costs (at a minimum, given California's temperate climate). Moreover, EPA fails to consider that mandating such a high ZEV sales rate will necessarily require exponential increases in commercial ZEV charging at rates that are currently three, four or five times higher than the current national average residential electricity rate, depending on location and charging speed. Those customers who are not homeowners and not able to install their own charging stations and take advantage of charging at low-cost times will be adversely impacted. Instead, EPA uses a residential rate for electricity and does not consider peak power or time of use charges. California electric prices rose 42 percent - 78 percent between 2010 and 2020 and are projected to rise an additional 50 percent by 2030 as shown in Figure 9. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

SEE ORIGINAL COMMENT FOR Historic and Forecasted Residential Average Rates Based on Most Recent 5-year Average Rate Increase. Figure 9:

Source: Michael Shellenberger, Twitter (citing California Public Advocate's Office data), April 27, 2021). [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Heaping additional demand for EV charging into this market could exacerbate already high electricity prices. This will be especially impactful to lower-income homeowners who may not be able to install dedicated charging units, forcing them to pay more out of pocket for charging during peak demand periods.265 [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

265 Hardman, Scott, et al., "A Perspective on Equity in the Transition to Electric Vehicles." MIT Science Policy Review, (Aug. 20 2021), available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/ (accessed June 29, 2023).

EPA must revise its analysis to account for realistic electricity prices. The proposed ZEV mandate will require an enormous investment in power generation and distribution, resulting in nationwide increases in electricity bills that EPA has not considered. Of course, considering the additional trillions of dollars in costs would paint a clear picture that the costs of forced electrification far exceed even the inflated benefits EPA presented in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Organization: American Fuel & Petrochemical Manufacturers

Ignoring actual ZEV production costs, including credit trading costs, is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0733, p. 54]

iii. EPA Must Consider Automobile Manufacturer Cross-Subsidies in Determining the Costs of the Proposal

While the purchase price differential between comparable ICEVs and ZEVs may be relevant for forecasting consumer demand, it does not reflect the true costs of the ZEVs required under the Proposed Rule. A ZEV typically costs tens of thousands of dollars more to produce than a comparable ICEV due primarily to the surging costs of critical minerals and resulting high costs of batteries.245 Additionally, the Proposed Rule will force manufacturers to sell an increasing percentage of ZEVs each year that goes far beyond the consumer demand for the product at its true cost. To ensure compliance with the ZEV mandate under the Proposal, manufacturers will be forced to incentivize ZEV purchases through a practice called cross-subsidization. [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

245 See PCMag, Profit vs. the Planet, (Sept. 26, 2022), Profit vs. the Planet: Here's Why US Automakers Are All-In on Electric Vehicles | PCMag last accessed July 3, 2023 ("EVs are currently more expensive to manufacture than gas-powered vehicles because of spiking battery costs. The cost of lithium, the main ingredient, has skyrocketed since demand far exceeds the number of working mines that can supply it.").

Automobile cross-subsidization is a pricing strategy to spread the high cost of ZEVs across a manufacturer's other product offerings. Under this pricing convention, manufacturers set the prices of certain ICEVs higher than their production costs to generate additional profits that can then be used to offset losses incurred by selling ZEVs below their actual production costs. This operates as a hidden tax on ICEVs and results in the purchasers of ICEVs subsidizing the sale of ZEVs. Without cross-subsidies, ZEV mandates would fail. [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

While opaque, the magnitude of ZEV cross-subsidies is significant.246 Ford's decision to report EV financial information separately beginning in 2023 provides an additional glimpse into the magnitude of cross-subsidization. Ford lost approximately $58,000 for each ZEV car it sold during the quarter.247 This reported per-vehicle loss is more than an order of magnitude greater than EPA's estimates of the price differential between the two technologies. While cross-subsidization, tax credits, emissions trading, and other EV subsidies may hide the true costs of a ZEV mandate from consumers, EPA has a duty to quantify and present those costs that are attributable to the Proposed Rule. Pursuant to Executive order 12866: [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

246 EPA's methodology ignores current EPA, DOE, NHTSA, and state regulations that add hundreds of billions of dollars in costs of ICEVs to cross-subsidize buyers of ZEVs. These cost transfers are in the form of: (1) state-mandated ZEV credit payments from ICEV manufacturers (i.e., ICEV buyers) to ZEV manufacturers (i.e., ZEV buyers); (2) current and future potential EPA GHG ZEV multiplier credit payments from ICEV manufacturers (i.e., ICEV buyers) to ZEV manufacturers (i.e., ZEV buyers); and, (3) NHTSA-mandated fuel economy ZEV multiplier credit payments from ICEV manufacturers (i.e., ICEV buyers) to ZEV manufacturers (i.e., ZEV buyers). A NHTSA presentation suggests that NHTSA EV multiplier credits alone subsidize each EV by more than $25,000, increasing the true average cost of every EV sold to over $90,000. See https://www.nhtsa.gov/sites/nhtsa.gov/files/2015sae-powell-altfuels_cafe.pdf; https://www.nhtsa.gov/sites/nhtsa.gov/files/2022-04/Model-Documentation_CAFE-MY-2024-2026_v1-tag.pdf; https://one.nhtsa.gov/cafe_pic/home/ldreports/manufacturerPerformance. Per the NHTSA information above, since MY2017 standards were ~35mpg and MY2017 Tesla FE performance (with multipliers) was 518.7 mpg, and since Tesla sold ~46,979 MY2017 vehicles in the U.S., then Tesla in MY2017 generated 227 million excess credits. If the market-value of these credits is ~$5.50 per 0.1 mpg shortfall per vehicle under the MY2017 CAFE standard of ~35 mpg, then these credits were worth approximately $1.25 billion, or $26,600 per EV that Tesla sold. [Calculation of estimated value: Credits = (518.7 – 35) x 46979 x 10 x CAFE Penalty of $5.50 per 0.1 mpg shortfall per vehicle]. Tesla may have banked, traded, or sold these credits. Tesla MY2022 sales in the U.S. were 484,351 and the CAFE civil penalty is now $15 per 0.1 mpg shortfall per vehicle.

247 See Luc Olinga, TheStreet, Ford Loses Nearly $60,000 for Every Electric Vehicle Sold, (May 2, 2023) available at Ford Loses Nearly $60,000 for Every Electric Vehicle Sold - TheStreet (last accessed July 3, 2023).

EPA is to "assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider.248 [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

248 E.O. 12866, Section 1(a), Sept. 30, 1993.

Astonishingly, EPA makes no attempt to account for these real-world costs, nor to communicate to the public that, as the Proposal mandates a higher percentage of ZEV sales, the cross-subsidies must be paid for by a shrinking number of ICEV buyers and, therefore, must significantly increase the average price of EVs. As EV prices rise, their sales and ICEV fleet turnover will slow, reducing environmental benefits and creating a significant drag on the economy. [EPA-HQ-OAR-2022-0829-0733, pp. 54-55]

Organization: American Honda Motor Co., Inc.

Of particular interest to Honda when evaluating the model was OMEGA's new capability of assessing consumer-producer interactions, described by the agency below:

Among the key new features of OMEGA is the representation of consumer-producer interactions when modeling compliance pathways and the associated technology penetration into the vehicle fleet. This capability allows us to project the impacts of the producer and consumer incentives contained in the IRA and BIL legislation. Compared to the previous model version, the updated version of OMEGA has extended capability to model a wider range of GHG program provisions, and it has been critical in the assessment of various policy alternatives that were considered for this proposal.44 [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

44 88 Fed. Reg. 29294 (May 5, 2023)

In addition to being able to model incentives such as those offered as part of the IRA, OMEGA also models (within user-specified bounds, and market classes) the price adjustments (incentives and disincentives) placed on vehicles by producers to reach an equilibrium between ICE and BEV sales share, also known as a cross subsidized price. This new aspect of the model provides fascinating insight into the agency's logic of optimized OEM compliance, and the broader impact of regulatory policies on both industry and consumers. By examining OMEGA model output files associated with the agency's official regulatory proposal, one can ascertain which vehicles and market classes the agency reasonably believes would require discounts in order to drive greater sales in support of the proposal's compliance goals and, conversely, which vehicles would be expected to shoulder the burden of offsetting those discounts by means of increased prices. [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

When aggregating the agency's output data by powertrain technology type (ICE, HEV and BEV), a clear pattern emerges. For the agency proposal, which includes an assumption that IRA provisions for both battery production and consumer tax credits will see near-full utilization, the model's optimized solution set suggests BEVs are the logical cost-effective technology pathway. In fact, during the regulation's years in which incentives are assumed to be in effect (MY2027-2032), OMEGA assumes that BEVs will shoulder a modest cost increase (of about $650 per vehicle, on average) to cross-subsidize reductions in ICE and hybrid vehicle prices required to reach a producer and consumer equilibrium. [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

Beginning in MY2033, however – when IRA provisions are no longer available – the agency's modeling results show a staggeringly different calculus. While BEVs are still needed to meet the agency's stringent emissions standards, the phase-out of 45X and sudden loss of consumer purchase incentives means that the non-subsidized price of EVs suddenly become much higher relative to the gasoline vehicle equivalent, and are no longer economically viable for consumers at the mix shares predicted by the compliance model just one year prior. In order to maintain the high levels of producer EV penetration achieved to date, the model assumes that a sudden and substantial cross-subsidization occurs from ICE and HEV models (i.e., the producer increases the prices of ICE and HEV vehicles and applies that additional revenue to accommodate a price reduction on EVs). [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

The levels of cross-subsidization required for EVs absent IRA 45X and 30D are not small. The agency's own model calculates that in order to support the sales mix of EVs required by the proposed rule, $10-14 billion per year in price subsidies would be required in MYs 2033-2035. These BEV price subsidies would need to be offset by higher costs of an ICE fleet that is, by the agency's own design, dwindling in size. According to OMEGA model outputs, this amounts to an increase (relative to 2032) of between $2,626 and $3,368 for every ICE and HEV vehicle sold in MYs 2033-2035, as shown in Figure 4. Moreover, should the agency's optimistic forecasts about future battery costs not materialize as envisioned by the agency, these costs will be even higher. It is unclear whether the agency considered these costs – which will ultimately be borne by consumers – in its regulatory analysis, or whether 2033-2035 is being considered "outside the scope" of the 2027-2032 regulatory window. [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

SEE ORIGINAL COMMENT FOR GRAPH of Figure 4. OMEGA 2.0 annual producer cross subsidization results for ICE (includes conventional and hybrid vehicles) under EPA's Proposed Scenario. Positive numbers indicate price increases to subsidize BEV technologies; negative numbers indicate decreases in prices. [EPA-HQ-OAR-2022-0829-0733, pp. 53-54]

Not surprisingly, the situation would become even more problematic if IRA provisions do not pan out in a manner consistent with the agency's expectant predictions. To investigate this, Honda created two custom OMEGA runs, both of which are based on EPA's Proposed Regulatory Scenario stringency and retain all other EPA proposal assumptions except for those relating to 45X and 30D. One scenario reduces the agency's assumed amount of utilized IRA 45X and 30D incentives by 50 percent. The other scenario eliminates the 45X and 30D incentives entirely. [EPA-HQ-OAR-2022-0829-0652, pp. 25-26]

The cumulative cross subsidization impacts for these two OMEGA 2.0 runs for MYs 2027-2035 are shown in Figure 5 below. Unlike the agency's Proposed Scenario shown in Figure 4, in which the IRA provisions buoy the high costs of electric vehicles through 2032, these alternate scenarios illustrate that BEV technology would need to be cross-subsidized by ICE technology from year one of the regulation, reaching extraordinary cumulative amounts by the mid-2030s. While there could be some additional application of emissions reduction technology to ICE vehicles, the severity of the standards still dictates large-scale adoption of BEVs. As such, the OMEGA 2.0 model cross subsidization outputs (which are, incidentally, bounded and thus conservative) show that partial or full loss of IRA incentives under the agency's proposed standards would drive a "regulatory premium" of $632-$1,461 for every ICE and HEV vehicle sold in 2027, and $1,025-$2,344 for every ICE and HEV vehicle sold in 2032.45 It is important to note that these runs retain the agency's battery cost assumptions (with the exception of IRA

45X incentives) which, as noted in our comments above, we believe to be optimistic for a number of reasons. As such, Honda believes the numbers output by OMEGA and reflected in this chart represent a conservative estimate. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

45 The range reflects OMEGA 2.0 results in which IRA provisions are cut in half vs. eliminated.

SEE ORIGINAL COMMENT FOR GRAPH of Figure 5. Cumulative OMEGA 2.0 cross subsidization for BEV models under three scenarios: EPA's Proposal, a "50% IRA" scenario, and a "No IRA" scenario. Positive values indicate a subsidization of BEVs by other technologies. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

It is critical that the impact of a potentially significantly higher new vehicle transaction price on total sales be accounted for by the agency. Unfortunately, the agency's analysis is extremely limited, as their sensitivity cases are independently analyzed and omit the possibility of IRA being weakened. Honda attempted to quantify the impact that a "stacking" of uncertainties would have on average new vehicle price. We examined average new vehicle price from OMEGA 2.0 under EPA's proposal (shown in light blue in Figure 6, below), as well as the resulting increase in price that would occur under two additional stacked scenarios: (1) elimination of IRA incentives, and (2) EPA's high battery cost assumptions. As shown in Figure 6, the cumulative impact of these two uncertainties could increase the average new vehicle price by more than $8,600 (a 25% increase) in 2030, relative to the agency's proposal. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Qualitatively, one would assume that such a significant increase in price would have a noticeable quelling effect on new vehicle sales. Strangely, the agency's OMEGA output files show very little impact on overall sales, despite the significant price increase. The agency's modeled sales impacts show a long run demand elasticity of just -0.21, notably different than values cited in EPA's Draft RIA as well as by other industry experts.46 47 As shown in Table 3 below, the implication of a different demand elasticity has a significant impact on the magnitude of overall new vehicle sales. If actual demand elasticities are closer to -0.40 (EPA estimate) or -0.61 (CAR estimate), loss of sales due to a 25% price increase would be between 1.5 million and 2.3 million new vehicle sales annually. One can speculate on the potential impact that such a loss of sales would have both on the industry and the economy, as well as the impact on consumer choice, vehicle affordability and equity. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

46 EPA, 2023. Draft RIA, p. 4-43. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

47 McAlinden et al., 2016. The Potential Effects of the 2017-2025 EPA/NHTSA GHG/Fuel Economy Mandates on the U.S. Economy. Center for Automotive Research. Available online at https://www.cargroup.org/wp-content/uploads/2017/02/The-Potential-Effects-of-the-2017_2025-EPANHTSA-GHGFuel-Economy-Mandates-on- the-US-Economy.pdf

While one could argue these are merely modeling outputs, and that automakers would pursue countermeasures to minimize such impacts, the fact remains that the agency is predicating its proposed standards on this very same model. This model confirms that the economic viability of the agency's proposal rests heavily – one might argue entirely – on a suite of policy incentives that nobody, including the agency, can guarantee will exist through 2032. It is these considerations of uncertainty and risk that manufacturers must take into account when developing future products and, similarly, that the agency must consider when developing future regulations. In our opinion, the agency has not adequately addressed this uncertainty. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

SEE ORIGINAL COMMENT FOR GRAPH Figure 6. Average new vehicle price from OMEGA 2.0 under proposal and two alternate scenarios. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Table 3.Magnitude of new vehicle sales impacts caused by higher battery cost and loss of IRA incentives. Calculations were performed using OMEGA 2.0. For comparison, sales impacts with alternate demand elasticities are shown. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Market Conditions: OMEGA 2.0: High Battery Cost & No IRA

Avg. New Vehicle Price Change Relative to Proposal: +25%

Elasticity of Demand: -0.21

New Vehicle Market Sales Change Relative to Proposal: (372,194) [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Market Conditions: Impact assuming Demand Elasticity of -0.4

Avg. New Vehicle Price Change Relative to Proposal: +25%

Elasticity of Demand: -0.40 a

New Vehicle Market Sales Change Relative to Proposal: (1,511,130) [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Market Conditions: Impact with Demand Elasticity of -0.61

Avg. New Vehicle Price Change Relative to Proposal: +25%

Elasticity of Demand: -0.61 b

New Vehicle Market Sales Change Relative to Proposal: (2,304,473) [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Recommendation: Should the agency continue to set standards based on an inclusion of IRA and BIL incentives, the agency should similarly provide a mechanism for alternate standards subject to their removal or weakening. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Organization: California Attorney General's Office, et al.

1. The Lead Time and Costs of Applying Zero-Emission Technologies Are Adequate and Reasonable

As EPA observes, its modeling anticipates auto manufacturers will meet the proposed standards primarily through increased application of zero-emission technologies and secondarily through application of certain advanced combustion technologies. 88 Fed. Reg. at 29,329-30. Thus, the majority of the proposed standards' costs are likely attributable to EPA's projected increase of electric vehicle penetration rates in model-year 2032 from 39% in the no-action case to 67% under the Proposal. EPA's analysis properly accounts for the key challenges in applying zero- emission technologies on this scale—especially the need to build out critical mineral, battery, and chip supply chains—by simulating likely constraints on auto manufacturers' electric vehicle production in its modeling. Id. at 29,295; Draft RIA, at 3-22 to 3-26. EPA's approach to mineral supply constraints appropriately incorporates the effect the battery component supply chain has on its standards without asserting authority over sectors outside its regulatory purview. [EPA-HQ-OAR-2022-0829-0746, pp. 33-34]

First, EPA assumes that auto manufacturers will produce electric vehicles to comply with standards in a "purely cost-minimizing" way. 88 Fed. Reg. at 29,296. As EPA acknowledges, however, auto manufacturers have planned for far higher rates of electric vehicle sales in response to both policies that recognize the significant role of the internal combustion engine in the climate crisis and the surging demand for electric vehicles. Id. A model of industry behavior that minimizes costs without accounting for these other drivers of electric vehicle adoption likely understates electric vehicle penetration in a no-action scenario.186 And, given that respected organizations like Bloomberg New Energy Finance are estimating battery electric vehicle penetrations rates near 52% by 2030 even without considering EPA's proposed standards,187 EPA's no-action scenario projection of 40% penetration is likely an underestimation. See 88 Fed. Reg. at 29,329 (Table 81). [EPA-HQ-OAR-2022-0829-0746, pp. 33-34]

186 See Consumer Reports Amicus Brief, Doc. No. 1988445 in Texas v. EPA, Case No. 22-1031 (D.C. Cir. Mar. 3, 2023), at 4-15.

187 Ira Boudway, More Than Half of US Car Sales Will Be Electric by 2030, Bloomberg (Sep. 20, 2022), available at https://www.bloomberg.com/news/articles/2022-09-20/more-than-half-of-us-car-sales-will- be-electric-by-2030.

Organization: Clean Fuels Development Coalition et al.

And the real costs will be far higher than EPA projects. As the comment will show, EPA's cost analysis is flawed in at least a dozen ways. Most egregiously, EPA assumes without support—and with scarcely a mention in the proposed rule or Draft Regulatory Impact Analysis (DRIA)—that baseline vehicle manufacturing costs it uses to determine all future costs are two-thirds of a vehicle's current MSRP. But EPA knows this is not true. As far as commentors can tell, every electric vehicle currently on the market costs significantly more to make than it sells for. Ford, for example, loses about $60,000 on every electric vehicle it sells. If EPA used accurate vehicle manufacturing costs in its projections, compliance costs would rise proportionately, and the cornerstone of EPA's feasibility analysis would crumble. Fixing just the underestimated vehicle technology costs would raise the proposal's price tag to more than $4,700 per ton of CO_2, while making EPA's projected electric vehicle penetration rates, and thus proposed standards, unachievable. [EPA-HQ-OAR-2022-0829-0712, p. 2]

These aggregate costs include:

- Real electric vehicle costs. Not what manufacturers sell their vehicles for, but the actual cost to build these vehicles. EPA incorrectly assumes that there is currently no cross subsidization between electric vehicles and internal combustion engine vehicles, despite relying on California's Advanced Clean Cars programs which create subsidies of at least $3,500 per electric vehicle through ZEV credits. See Cristian Agatie, Tesla Sits on a Billion dollar Chest of ZEV Credits That Other Carmakers Are Keen to Buy, Auto Evolution (Sep. 12, 2022), https://www.autoevolution.com/news/tesla-sits-on-a-billion-dollar-chest-of-zev-credits-that-other-carmakers-are-keen-to-buy-198418.html ("To give you an idea, Tesla posted $2.1 billion in revenue from ZEV credit sales in 2021 and Q1 2022 combined. Automotive News estimates Tesla sold its ZEV credits at an average of $3,500.") Most vehicles receive 3 or 4 credits. [EPA-HQ-OAR-2022-0829-0712, pp. 5-6]

A. The proposed rule underestimates the current manufacturing cost of electric vehicles, skewing future vehicle technology costs.

All of EPA's projections for vehicle sales were calculated using the OMEGA model. See 88 Fed. Reg. 29,294–95. The OMEGA model takes as input a bevy of information about vehicles currently sold by every manufacturer and uses this to project how each manufacturer can update its current fleet with by adding new technologies to meet EPA's proposed standards most cost-effectively. These projections are the basis of all of EPA's calculations about the rule: feasibility, vehicle costs, emissions reductions, etc. [EPA-HQ-OAR-2022-0829-0712, pp. 15-16]

Crucial to OMEGA's projections is its simulation of the adoption of new vehicle technologies. See OMEGA 2.1.0 Documentation (last accessed July 5, 2023), https://omega2.readthedocs.io/en/latest/. The model assumes that every vehicle on the road has some baseline manufacturing costs. These manufacturing costs change as auto manufacturers add new technologies to existing vehicles to reduce emissions as they seek to comply with the standards. Every new technology comes with some "cost curve," which represents the added cost of using this new technology over time. Id. When a vehicle adopts a new technology, this cost curve is added to a vehicle's baseline manufacturing cost, which the model then uses to project the vehicle price or MSRP. Id. This means that future projections of vehicle prices are critically dependent on an accurate picture of current vehicle manufacturing costs. If the model underestimates current manufacturing costs, all future manufacturing costs—and thus future MSRP's—will be underestimated proportionately. [EPA-HQ-OAR-2022-0829-0712, pp. 15-16]

But OMEGA cannot accept vehicle manufacturing cost as an input. Instead, the model uses "the base year vehicle's MSRP value as the [manufacturing cost] for the base year" making the assumption that current MSRPs are just "a marked up value of direct manufacturing costs using a 1.5X retail price equivalent (RPE) multiplier." Email of Kevin Bolon, EPA, to Taylor Myers, Boyden Gray & Associates (June 27, 2023) (Attached as Appendix A). EPA acknowledges that "there may be existing cross subsidies that are already inherent in the empirical MSRP values," i.e., manufacturers may raise the MSRPs of internal combustion engine vehicles while lowering those of electric vehicles to meet regulations while sustaining overall profitability. Id. But because the agency "cannot observe" these cross subsidies, it has designed the OMEGA to assume a "cross_subsidy_multiplier of 1.0 for all vehicles" in the baseline year. Id. [EPA-HQ-OAR-2022-0829-0712, pp. 16-17]

This is an unreasonable assumption. There is overwhelming evidence that the manufacturing costs for electric vehicles far exceed their current MSRPs and that current prices are the result of (large) cross subsidization. For example, Ford recently split its electric vehicle sales off from its internal combustion engine sales for accounting purposes: Ford e Segment sells the former while Ford Blue sells the latter. The company's 2023 Q1 SEC filings show the revenue and costs per unit for both types of vehicles. See Ford Motor Company, Form 10-Q, 2023 Q1, https://s201.q4cdn.com/693218008/files/doc_financials/2023/q1/ford-q1-2023-10-q-report.pdf. The filing shows that while the company as a whole was profitable, Ford e Segment was not. ICE vehicles returned a profit of about $3,700 per vehicle, or about 10 percent of average vehicle revenue. By contrast, electric vehicles lost $60,000 per vehicle, meaning that each vehicle represented a more than 100 percent loss. Id. [EPA-HQ-OAR-2022-0829-0712, pp. 16-17]

Figure 1: Ford's electric vehicles cost $60,000 more to make on average than they were sold for.

Ford Blue (ICE)

Units: 706,000

Revenue: $ 25,124,000,000

EBIT: $ 2,623,000,000

Revenue per unit: $ 35,586

Cost per unit: $ 31,871

Profit per unit: $ 3,715

Ford e Segment (EV)

Units: 12,000

Revenue: $ 707,000,000

EBIT: $ (722,000,000)

Revenue per unit: $ 58,917

Cost per unit: $ 119,083

Profit per unit: $ (60,167)

[EPA-HQ-OAR-2022-0829-0712, pp. 16-17]

Other companies' statements confirm similar losses. Chrysler Automobiles CEO Sergio Marchionne explained that while the electric Fiat 500e has an MSRP of about $33,000, the company is losing about $20,000 per car on each sale: a 60 percent loss. Matthew DeBord, FCA Loses a Staggering $20,000 on Every One of Its All Electric Cars, Business Insider (Oct. 2, 2017), https://www.businessinsider.com/fca-loses- 20000-on-every-one-electric-car-2017-10. General Motors' Chevrolet Volt and Bolt EV both lost approximately $16,000 per unit. [EPA-HQ-OAR-2022-0829-0712, pp. 17-18]

Manufacturers are willing to sustain a high loss on electric vehicles because, under EPA, NHTSA, and California's regulatory schemes, these vehicles are helpful (and now, necessary) to meet fleet standards.10 As Marchionne explained, the company is willing to sell each vehicle for a loss because electric vehicles like the "500e also ha[ve] value as [ ] 'compliance vehicle[s],' helping FCA meet government-mandated fuel-economy requirements for [an] automaker's fleet." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 17-18]

10 Historically, the benefit of EVs towards compliance obligations has been largely due to the prevalence of unlawful "EV multipliers," discussed infra.

These losses are accepted because of the value of the regulatory cross subsidies. An automaker charges less for an electric vehicle—expecting to take a loss—so it can sell more of them, and take advantage of their favorable regulatory treatment to com ply with federal standards. But to ensure that it is not losing money as a whole, the manufacturer simultaneously raises prices—and thus profits—on its internal combustion engine vehicles to offset the electric vehicle losses. And because electric vehicles are treated more favorably in all relevant regulations, these cross subsidies always go one way: from internal combustion engine vehicles to electric vehicles. [EPA-HQ-OAR-2022-0829-0712, pp. 17-18]

EPA acknowledges that cross subsidization has a real impact. The OMEGA model expects manufacturers to cross subsidize into the future to encourage sales of lower emitting, but more expensive, technologies. Figure 2 below shows the cross- subsidization multiplier, or what multiple of a natural, unsubsidized MSRP it expects the vehicles to sell for. The OMEGA modeling used in the proposal arbitrarily limits this cross-subsidization multiplier to values of between 0.9 and 1.1, or 10 percent. It also unreasonably permits manufacturers to cross subsidize internal combustion engine vehicles with electric vehicles, a result that would never be logical because electric vehicles are always treated more favorably by the regulations. [EPA-HQ-OAR-2022-0829-0712, pp. 17-18]

SEE ORIGINAL COMMENT FOR Figure 2: The cross-subsidization multiplier for all electric vehicles calculated in the proposal. [EPA-HQ-OAR-2022-0829-0712, pp. 17-18]

Even more unreasonably, EPA assumes that current vehicles are not cross subsidized at all. While the exact magnitude of cross subsidies may be difficult to calculate precisely, EPA knows that at minimum each electric vehicle is cross subsidized by in an amount equivalent to the number of California ZEV Credits it earns. California's ZEV mandate requires automobile manufacturers to acquire a minimum number of ZEV credits either by producing ZEVs for sale in California or purchasing credits from another auto manufacturer who has done the same. Of all the manufacturers, Tesla had earned the most credits in California. Simon Alvarez, Tesla's ZEV Credits in the United States are Poised to Become Even More Valuable, Teslarati (Sep. 12, 2022), https://www.teslarati.com/tesla-zev-credits-usa-more-valu- able-inflation-reduction-act/. At the end of 2020, Tesla had logged a stockpile of 752,445 credits, with each new vehicle sold qualifying for between 3 and 4 credits. Id. "Tesla booked about $2.1 billion in revenue from credit sales in 2021 and Q1 2022. And while the value of a ZEV credit could be flexible depending on demand, it appeared that Tesla averaged about $3,500 each." Id. In other words, every Tesla was subsidized by at least $10,500. [EPA-HQ-OAR-2022-0829-0712, pp. 18-20]

Based on the above information, reasonable estimates of cross subsidies for electric vehicles must be between $10,500 and $60,000 per electric vehicle sold. These cross subsidies are equivalent to the difference between EPA's estimated vehicle manufacturing costs and the true vehicle manufacturing costs. While EPA is free to—and obligated to—conduct its own (perhaps different) analysis of the precise magnitude of cross subsidization, it cannot ignore it. Accounting for these cross subsidies results in a much higher new vehicle manufacturing costs for electric vehicles.11 When these overlooked manufacturing costs are applied to each of the additional 15 million electric vehicles EPA projects its proposal to require between 2027 and 2032,12 vehicle technology costs rise by between $160–915 billion over the compliance period. See Figure 3. [EPA-HQ-OAR-2022-0829-0712, pp. 18-20]

11 The same cross subsidization also implies a lower new vehicle manufacturing cost for internal combustion engine vehicles, which the proposal also ignores.

12 This assumes 13.7 million cars sold per year and electric vehicle penetrations for the no action case and the proposal to follow Tables 129 and 80 of the proposal, respectively.

SEE ORIGINAL COMMENT FOR Figure 3: Projected additional manufacturing costs EPA missed as a result of overlooking cross subsidization. [EPA-HQ-OAR-2022-0829-0712, pp. 18-20]

Accounting for cross subsidization is critical for the feasibility analysis because it will have a direct impact on future vehicle prices. As EPA forces electric vehicles to grow from 6 percent to 67 percent of light-duty sales, automakers will lose the ability to accommodate large cross subsidies in electric vehicle price with small increases across conventional vehicle prices because there will no longer be 12 times as many internal combustion engine vehicles as electric vehicles, but instead 2 times as many electric vehicles as internal combustion engine vehicles. If, for example, it continues to cost Ford $120,000 to manufacture an electric vehicle, EPA's proposed fleet would raise the average Ford vehicle price from around $36,000 today to $92,000 in 2032. Like all Ponzi schemes, EPA's plan will inevitably hit a wall. [EPA-HQ-OAR-2022-0829-0712, pp. 20-21]

Failing to account for these costs, and how cross subsidization will become less feasible as the fleet is electrified, papers over the most important aspect of the problem. EPA must make these calculations when projecting the feasibility of the rule. [EPA-HQ-OAR-2022-0829-0712, pp. 20-21]

Organization: Environmental. and Public Health Organizations

2. The OMEGA2 model produces unlikely results for combustion vehicles.

As noted above, the OMEGA2 model suffers from significant shortcomings in terms of capturing the potential improvement available from technologies applicable to combustion vehicles. However, there is also a problem with the way in which the OMEGA2 model assumes manufacturers then apply those technologies: not only can manufacturers add new technology, but they can remove it. The level of so-called "decontenting" that occurs in the OMEGA2 model is neither unrealistic, and it drastically underestimates the improvements from combustion vehicles that would likely be deployed for a given PEV scenario. [EPA-HQ-OAR-2022-0829-0759, p. 40]

In the Proposal modeling, 40% of the combustion vehicle models have worse 2-cycle tailpipe GHG emissions in 2032 than in 2022. On average, that 40% of the fleet has increased its emissions by 13%, or 27 g/mi. For reference, this decline in emissions performance approximates a return to 2016 levels of tailpipe emissions for those vehicles (i.e., those vehicles would achieve no net progress over a 16-year period). Of course, the remaining combustion vehicle fleet sees plenty of backsliding in this time as well. While manufacturers may not have fully slipped back to 2022 levels, OMEGA2 modeling finds that through the course of the 2022-2032 period, manufacturers are more than twice as likely to make the direct CO2 emissions from a combustion vehicle worse year-to-year, increasing year-to-year emissions 22% of the time, keeping them unchanged 69% of the time, and reducing emissions just 9% of the time. And this percentage increases dramatically between the years governed by the current standards and the

Proposal: the modeling shows that manufacturers are much more likely to decrease the emissions of a combustion vehicle to achieve compliance with the MY 2023-2026 standards (15%, compared to 9% for the proposed MY 2027-2032 standards), and are 6 times more likely to decontent a combustion vehicle in the 2027-2032 period than in the 2023-2026 period. [EPA-HQ-OAR-2022-0829-0759, p. 41]

Notably, the modeling of manufacturer behavior described above does not distinguish between the magnitudes of the reduction/increase in emissions. On average, emissions reductions from the combustion vehicle fleet under the existing standards greatly outweigh the average increases, since improving combustion vehicles is a significant compliance mechanism for the current standards. Interestingly, the magnitude of the average increase vs. decrease does not vary substantially over the entire decade (2022-2032). Instead, the disparity in outcome (combustion vehicles increasing, rather than decreasing, emissions) is entirely driven by the massive increase in decontenting that begins to occur in the modeling in the post-2026 period. [EPA-HQ-OAR-2022-0829-0759, p. 41]

EPA provides no explanation for this rapid shift in modeled manufacturer behavior in the documentation for the rule, and such behavior makes little sense, particularly when examining cases of decontenting that occur in the modeled compliance for the Proposal. To the extent that manufacturers may consolidate engine platforms as they reduce the number of available combustion vehicles, that consolidation is not likely to happen on the oldest, lowest technology options but rather on the newest engine platforms, in order to avoid accelerated depreciation of new investments. While there may be some simplification, it is more likely that the simplification would be elimination of a lower-volume technology package, such as a high-performance (and higher emission) option, which again would not result in increases in emissions. Below we present two examples to illustrate the unrealistic aspects of the compliance model for technology content, in consideration of industry behavior. [EPA-HQ-OAR-2022-0829-0759, p. 41]

a. Example: Volvo S60

The Volvo S60 is available in multiple configurations and is represented by three different vehicles in the OMEGA2 model: two conventional vehicles (one of which is a high-performance trim with greater horsepower), and one strong hybrid (incidentally utilizing the Miller cycle engine benchmarked by EPA). The modeled technology packages for these vehicles are illustrated in Table VI.A-1. In 2026, the first redesign opportunity is available for the model. The vehicles undergo one major change to the platform (a shift from steel to aluminum cuts a significant amount of weight), and then the three engines move to the same exact configuration, a 48V mild hybrid with a high compression ratio (HCR) engine utilizing discrete cylinder deactivation. The power output for the former-hybrid and the high-performance trim are virtually identical, which is why the emissions numbers are so similar in 2026, effectively reducing the trims available to two. This type of consolidation could happen, though eliminating the high-tech Miller cycle engine (part of one of the most efficient technology packages implemented by EPA) from the vehicle after just one product cycle is unlikely. And, at least in this case, on net the former-hybrid vehicle still sees a reduction in emissions due to the weight reduction. [EPA-HQ-OAR-2022-0829-0759, pp. 41-42]

Table VI.A-1: Comparison of technology packages, fuel economy, and emissions for the Volvo S60 at each redesign

Volvo S60 T8 (313 hp)

Year: 2021

Tech package: SHEV-PS, Miller cycle

Body Material: Steel

Tailpipe CO2 (lab) [g/mi]: 194

Label Fuel Economy [mpg]: 35.4

Year: 2026

Tech package: MHEV (P0), HCR + continuous cyl. deac., advanced 8-speed AT

Body Material: Aluminum

Tailpipe CO2 (lab) [g/mi]: 181

Label Fuel Economy [mpg]: 38.9

Year: 2031

Tech package: HCR + continuous cylinderdeactivation, 5-speed AT

Body Material: Steel

Tailpipe CO2 (lab) [g/mi]: 236

Label Fuel Economy [mpg]: 33.5

Volvo S60 T5 (316 hp)

Year: 2021

Tech package: Start-stop, Turbo, advanced 8-speed AT

Body Material: Steel

Tailpipe CO2 (lab) [g/mi]: 225

Label Fuel Economy [mpg]: 32.7

Year: 2026

Tech package: MHEV (P0), HCR + continuous cyl. deac., advanced 8-speed AT

Body Material: Aluminum

Tailpipe CO2 (lab) [g/mi]: 183

Label Fuel Economy [mpg]: 38.2

Year: 2031

Tech package: HCR + continuous cylinder deactivation, 5-speed AT

Body Material: Steel

Tailpipe CO_2 (lab) [g/mi]: 268

Label Fuel Economy [mpg]: 30.7

Volvo S60 T4 (250 hp)

Year: 2021

Tech package: Start-stop, Turbo, advanced 8-speed AT

Body Material: Steel

Tailpipe CO_2 (lab) [g/mi]: 206

Label Fuel Economy [mpg]: 34.4

Year: 2026

Tech package: MHEV (P0), HCR + continuous cyl. deac., advanced 8-speed AT

Body Material: Aluminum

Tailpipe CO_2 (lab) [g/mi]: 170

Label Fuel Economy [mpg]: 40.1

Year: 2031

Tech package: HCR + continuous cyl. deac., 5-speed AT

Body Material: Steel

Tailpipe CO_2 (lab) [g/mi]: 237

Label Fuel Economy [mpg]: 32.2

In 2031, however, the vehicle platform reverts from aluminum back to steel, gaining weight in the process. All three vehicles drop the mild hybrid configuration but introduce three completely distinct engine technologies, again less efficient than the prior offerings, and now paired with a 2007-era 5-speed transmission instead of the advanced 8-speed transmission of the previous generation. To summarize, under EPA's modeling, the S60 in 2031 will: 1) revert to an old body platform and an ancient transmission; 2) adopt engine technology that will reduce fuel economy for consumers by 8 mpg, below what the vehicle started at in 2022 for all configurations; and 3) not do anything to consolidate engines or platforms, or do anything else that could justify decontenting, because there remain three distinct engine offerings. There is little reason to suppose that Volvo (or any other manufacturer) would be able to find consumers for a combustion vehicle, such as the modeled S60, that gets notably worse over time. [EPA-HQ-OAR-2022-0829-0759, p. 43]

b. Example: Jeep Cherokee

A similar trajectory is observed in the case of the Jeep Cherokee (Table VI.A-2). In this case, the modeled vehicle does not correspond directly to each of the real vehicle's trims but is instead averaged into a high- and low-throughput engine option for the 2WD and 4WD versions.126 However, the pattern of vehicle change in the modeling is the same: each vehicle is first upgraded and then downgraded, with 3 of the 4 model variants ending up worse than they started a decade prior. [EPA-HQ-OAR-2022-0829-0759, p. 43]

126 While Jeep has since dropped the 2WD version of the Cherokee, this is not reflected in EPA's model due to the use of a 2019 baseline fleet.

SEE ORIGINAL COMMENT FOR Table VI.A-2: Comparison of technology packages, fuel economy, and emissions for the Jeep Cherokee at each redesign [EPA-HQ-OAR-2022-0829-0759, pp. 43-44]

What makes this behavior particularly unrealistic in the case of the Jeep Cherokee is that the parent company (Stellantis) is, according to the model, purchasing credits from other manufacturers in order to comply with the standards after the 2029 model year (Figure VI.A-3). In other words, the model projects that it is in Stellantis' interest to increase emissions from its combustion-powered vehicles (even though there is no concurrent improvement in performance-related vehicle attributes), and this strategy results in the manufacturer falling short of its regulatory requirements, which then forces the company to purchase credits from its competitors. [EPA-HQ-OAR-2022-0829-0759, p. 44]

SEE ORIGINAL COMMENT FOR Figure VI.A-3: Year-over-year average certification for Stellantis (formerly FCA), from EPA's Proposal modeling run [EPA-HQ-OAR-2022-0829-0759, p. 45]

In all years modeled, Stellantis is reliant upon banked credits in order to comply with the standards, as indicated by the difference between the target curve (blue dots) and the calendar year certification (red circles). Stellantis is able to use its own banked credits (indicated through credit transactions via arrows) in order to comply with the standards through the 2026 model year, indicated by the overlap between the model year certification (orange line) and target curve. However, beginning with the 2026 model year, those credits (including credits carried back from the 2029 model year) are no longer sufficient for Stellantis to meet its requirements. Therefore, Stellantis is required to make up the remaining gap between model year and target year curves with credits purchased on the general market (not modeled explicitly by the Agency). [EPA-HQ-OAR-2022-0829-0759, p. 45]

3. In allowing combustion vehicles to backslide, the OMEGA2 model fails to capture readily achievable emissions reductions; adjusting these features would further support the feasibility of stronger standards.

By allowing combustion vehicles to backslide in its modeling, EPA fails to consider a significant pathway for potential emissions reductions. By 2032, this backsliding results in nearly a 10% increase in tailpipe emissions from the fleet. In terms of feasibility, it is beyond question that the decontented combustion vehicle technologies can be deployed in the timeframe of the rule, since these technologies had previously been on those vehicles. Since manufacturers will not incur any new costs for research and development and will simply be elongating the period for which they can utilize their investments, it would be more reasonable for the model to assume that manufacturers would not remove such technologies, thus preserving emissions levels already achieved. [EPA-HQ-OAR-2022-0829-0759, pp. 45-46]

We urge EPA to take this "no backsliding" approach in its modeling for the final rule. The impact would be significant: if manufacturers simply adopted a strategy of not removing technology from their combustion vehicle fleet, they could nearly achieve the more stringent Alternative 1 standards with no increase in ZEV sales as compared to ZEV sales in the modeling supporting the Proposed Rule (Figure VI.A-4). [EPA-HQ-OAR-2022-0829-0759, p. 46]

SEE ORIGINAL COMMENT FOR Figure VI.A-4: Fleet-wide average certification levels, as modeled compared to a scenario where manufacturers do not remove technology from combustion vehicles[EPA-HQ-OAR-2022-0829-0759, p. 46]

4. Summary of available improvement for combustion vehicles

By leaving a significant amount of available and feasible combustion vehicle emission reduction technologies on the table—including technology improvements EPA identified in prior rulemakings—the Agency has underestimated the potential emissions reductions available to the fleet. This problem is compounded because the Agency's compliance model assumes that a large share of the combustion vehicle fleet will get worse over time, even for manufacturers that the model projects will fall short of compliance and therefore will be dependent upon purchasing credits from their competitors. [EPA-HQ-OAR-2022-0829-0759, pp. 46-47]

By adjusting its modeling to reflect the full range of combustion vehicle technology improvements available to manufacturers, and by aligning its modeled manufacturing behavior with a strategy that reflects continued deployment of the technologies already available and incorporated into vehicles instead of allowing backsliding, EPA's modeling would better capture the full range of emissions reductions pathways that are feasible. Improving the OMEGA2 modeling in this way will affirm that manufacturers can easily achieve a standard at least as stringent as Alternative 1, with little to no increase in ZEV penetration compared to the model runs supporting the Proposal. [EPA-HQ-OAR-2022-0829-0759, p. 47]

Organization: International Council on Clean Transportation (ICCT)

As explained above and shown in the table, the ICE fleet emits more in 2032 than in 2027. In fact, based on analysis of OMEGA results, the car fleet has higher 2-cycle tailpipe emissions in MY2032 than in MY2022, with its lowest 2-cycle emissions levels occurring in MY2027.108 Similarly, the truck fleet shows its lowest GHG emissions levels in MY2028, with a net increase in 2-cycle emissions by MY2032. Much of this backsliding is explained by individual ICE models getting worse over time. Of all the 719 ICE models, 438 show higher emissions in MY2032 than in MY2027, and 333 show worse emissions in MY2032 than in MY2022. This modeling result presented in EPA's proposal highlights the risk that backsliding on GHG emissions could occur in real-world compliance with EPA's standards. If BEV penetration occurs faster than modeled by EPA, there is risk of further ICE backsliding on GHG emissions. ICCT recommends EPA include in its regulation a mechanism to prevent the backsliding of new ICE vehicles or the new ICE fleet. [EPA-HQ-OAR-2022-0829-0569, pp. 40-43]

108 Based on analysis of 2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv.

Organization: Steven G. Bradbury

Finally, the $1,200-per-vehicle cost figure touted by EPA is simply borrowed and carried over from the EPA's 2021 rulemaking without additional substantive analysis.32 It is not reasonable to assume that the per-vehicle cost of the current proposal for model years 2027 through 2032 would be anywhere close to the same as the estimated cost figure for the 2021 rule covering model years 2023 through 2026 (even if the figure was accurate for the 2021 rule). The current proposal is far more expansive and involves much more dra- conian reductions in emissions limits. [EPA-HQ-OAR-2022-0829-0647, pp. 13-14]

32 See 86 FR 74434, 74497, https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model-year-light-duty-vehicle-greenhouse-gas-emissions-standards.

The true per-vehicle technology costs of the proposed rules must be far higher than the figure thrown out by EPA. Even accepting the thoroughly implausible "no action" base- line that EPA has posited for future EV sales, EPA is projecting that the regulatory force of the current proposal, considered in isolation, will by itself cause the overall percentage of EV sales nationally to go from 39 percent to 67 percent—a huge increase, nearly a doubling in EV production and sales. Notably, based on EPA's own assumptions, this regu- lation-forced increase would have to come after all the early adopters have already pur- chased their EVs. Such an industry-wide transformation in production volumes and sales of EVs to non-early-adopters would involve a massive capital investment and marketing surge, and all the costs associated with that transformation would be attributable to the EPA's administrative rule, if the rule were indeed expected to be the forcing action. [EPA-HQ-OAR-2022-0829-0647, pp. 13-14]

Organization: Tesla, Inc.

Third, the agency's production modelling underestimated BEV production levels on several fronts. Foremost, the modeling significantly underestimates Tesla vehicle sales and projects them out at less 100,000 vehicles per year. See Figure 5. EPA's Under Projections of Tesla's Implied U.S. Sales MY 2027-2032. This under projection is inexplicable, unjustified, and needlessly undermines the stringency of the rule, as the Tesla Model Y was just recognized as the world's best-selling vehicle, and second to only the Ford F-150 in the U.S.120 In 2022, Tesla's U.S. sales already approached 500,000 vehicles.121 Further, at Tesla's 2022 shareholder meeting, the company has established a goal of producing 20M vehicles globally by 2030.122 While this goal does not speak to Tesla's annual U.S. sales, the agency's modelling already vastly underestimates Tesla's current and future sales. This data should be updated to recognize both Tesla's current market status and the ambition of Tesla's future ramp of U.S. sales during the MY 2027-2032 timeframe. To address this under projection, Tesla has confidentially provided production and sales estimates to EPA. See Appendix I, submitted as CBI. [EPA-HQ-OAR-2022-0829-0792, p. 18]

120 See, Yahoo Finance, Tesla Model Y was the best-selling car worldwide in the first quarter (May 30, 2023) available at h ttps://finance.yahoo.com/news/tesla-model-y-was-the-best-selling-car-worldwide-in-the-first-quarter-154909234.html; Inside EVs, Tesla Model Y Second Only To Ford F-150 As Best-Selling Vehicle In US (June 19, 2023) ("Data from Experian picked up by Automotive News show that Tesla's best-selling model doubled registrations to 127,541 in the first four months of 2023 over last year. Remarkably, the Model Y was the second most popular vehicle of any kind in the US after only the Ford F-150 pickup truck, which posted almost 240,000 sales during the period.") available at h ttps://insideevs.com/news/672690/tesla-model-y-second-only-ford-f-150-best-selling-vehicle-us/

121 See, GoodCarBadCar.Com, Tesla Sales Figures – US Market (showing 2022 sales at 540,000) available at https://www.goodcarbadcar.net/tesla-us-sales-figures/

122 See, Tesla Impact Report 2022 at 64; See also, Reuters, Analysis: Musk's bold goal of selling 20 million EVs could cost Tesla billions (Aug. 30, 2022) available at https://www.reuters.com/technology/musks-bold-goal-selling-20-mln-evs-could- c ost-tesla-billions-2022-08-30/

SEE ORIGINAL COMMENT FOR Figure 5. EPA's Under Projections of Tesla's Implied U.S. Sales MY 2027-2032 [EPA-HQ-OAR-2022-0829-0792, p. 18]Organization: Valero Energy Corporation

4. The analysis fleets modeled by OMEGA are highly implausible, and EPA fails to account for the actual costs to produce such fleets. [EPA-HQ-OAR-2022-0829-0707, pp. 5-6]

As described in Section 9.2 of the DRIA, when running the OMEGA model, EPA starts with a "base year fleet" that represents a comprehensive list of vehicles sold in MY 2019.28 OMEGA then "produces a fleet of new light-and medium-duty vehicles for each analyzed model year."29 [EPA-HQ-OAR-2022-0829-0707, pp. 5-6]

28 DRIA at 9-1.

29 DRIA at 2-1.

Starting in MY 2021, OMEGA creates a BEV "clone" of every ICEV, HEV and PHEV in the base year fleet, and the BEV clones enter into production when the vehicle ID reaches its next redesign year.30 Ultimately OMEGA phases all of the BEV clones into production over MY 2021- 2028, with the original ICEVs, HEVs and PHEVs remaining in production alongside the BEV clones. This means that between the base year and MY 2028, the number of vehicle IDs in the OMEGA LDV analysis fleet essentially doubles, growing from 740 to 1,459. [EPA-HQ-OAR-2022-0829-0707, pp. 5-6]

30 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), "vehicles.py" in 2023-03-25-11-46-49-ld-central-compliance-run.zip. This approach is adopted for every modeled scenario (e.g., "No Action" as well as proposed and alternate scenarios). No clone vehicles are created for the BEVs and FCVs in the base year fleet.

[See original for graph titled "Figure 1 – LDV Models by Powertrain in OMEGA Analysis Fleet"] [EPA-HQ-OAR-2022-0829-0707, pp. 5-6]

EPA's approach to modeling future LDV fleets in OMEGA is disingenuous and inconsistent with the cost analysis presented in the rulemaking. Doubling the number of LDV models available for sale in the U.S. would entail a significant increase in vehicle design, engineering, production, and assembly costs,31 to support flat-to-declining LDV sales numbers. The loss in economies of scale would be staggering, dropping from an average of 22,000 new vehicle sales per production model in the base year to 10,000 new vehicle sales per production model in MY 2028.32 EPA does not account for this in its analysis of vehicle costs associated with the proposed rule. [EPA-HQ-OAR-2022-0829-0707, pp. 5-6]

31 DRIA at 2-84. EPA notes that it "did not specifically impose a limit on vehicle assembly capacity."

32 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), "vehicles.py" in 2023-03-25-11-46-49-ld-central-compliance-run.zip. For the base year, new LDV sales totaled 16,149,471 vehicles ("vehicles_ldv_20221017_cleanedredesigne.csv"), spanning 740 vehicle IDs (0 to 739) ("2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicles.csv"). For MY

2028, new LDV sales projected to total 14.8 million vehicles across 1,459 vehicle IDs (calculated from “2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicles.csv).

EPA fails to present a feasible compliance scenario to accompany its proposed MY 2027-2032 standards, and it fails to adequately quantify the impacts of the compliance scenario that it does present. [EPA-HQ-OAR-2022-0829-0707, pp. 5-6]

Organization: Zero Emission Transportation Association (ZETA)

The case for emissions standards more stringent than Alternative One is even stronger when considering the agency’s apparent omission of ZETA member Rivian from its analysis. [EPA-HQ-OAR-2022-0829-0638, p. 26]

Specifically, OMEGA’s Manufacturers File, an input file listing vehicle producers considered as distinct entities for GHG compliance, does not list Rivian.128 Even the agency’s survey of manufacturer commitments, presented as Table 1 in the NPRM, does not include the company.129 Omitting Rivian from the agency’s analysis could affect EPA’s analysis and proposal. EPA should update its model inputs to account for Rivian’s sales and revise its evaluation of the alternatives accordingly. [EPA-HQ-OAR-2022-0829-0638, p. 26]

128 Purpose and description of the Manufacturers File per https://omega2.readthedocs.io/en/2.1.0/index.html#document-1_overview. List of producers found in the “manufacturers.csv” in the OMEGA zip file.

129 See 88 FR 29192 (May 5, 2023)

ZETA notes that EPA’s modeling appears to show a decline in BEV sales in the MD pickup segment in the early model years covered by these proposed standards.136 EPA should establish standards stringent enough to drive increasing electrification across all MD vehicle categories. The technology can meet the needs of many duty cycles performed by MD pickups, including those involving towing, but the rapid uptake of BEVs in the van fleet coupled with credit multipliers in the early years of the program could pad credit banks and allow BEV development and sales in the MD pickup category to stall. EPA should evaluate the feasibility of even stricter emissions requirements. [EPA-HQ-OAR-2022-0829-0638, p. 28]

136 See DRIA at 13-53

As in the LDV segment, EPA’s modeling appears to omit ZETA member Rivian. Yet, Rivian’s order book includes 100,000 all-electric Class 2b-3 vans, several thousand of which already operate on U.S. roads. The agency should assess to what extent the addition of 100,000 BEV vans to the national fleet by MY 2030 could support a lower fleet average emissions target. [EPA-HQ-OAR-2022-0829-0638, p. 28]

EPA Summary and Response

The Alliance commented that EPA’s assumption of credit trading in the central analysis is a departure from the approach taken in previous rulemakings, and that it is “inappropriate to set a standard so stringent as to effectively require many manufacturers to rely on other manufactures to maintain compliance.” The commenter also asserted that the choice of an 80 percent value for modeling credit market efficiency is “completely arbitrary.” In response, EPA disagrees that the approach used for modeling credit trading for the NPRM and for this final rulemaking analysis is either inappropriate or unjustified. The justification for the analytical assumptions for EPA's modeling of credit trading was outlined in the NPRM Preamble RIA Chapter 2.6.4.4, and is explained further here. On this topic, the primary difference between the 2012 rulemaking and this one is that we now have over a decade of observations upon which to base our trading assumptions, compared to no GHG credit trading evidence at the time the earlier rulemakings were promulgated in 2010 and 2012. For more recent rulemakings, including the 2020 and 2021 light-duty GHG rules, the primary difference is capability of the available modeling tools. EPA has continued to refine the OMEGA model, including as described in RTC Section 12.1 above. The version of OMEGA used for this rulemaking analysis has, for the first time in any GHG rulemaking, the capability to model the expiration of a portion of credits. The analytical question is then what portion of credits should EPA assume will be allowed to expire. The empirical evidence from the prior decade of credit trading would suggest a value of zero. In other words, consistent with EPA's observation that to-date, no GHG credits have expired unused. Conversely, EPA also recognizes that manufactures might choose to generate and bank at least some additional credits through technology application to act as a buffer against uncertainty. Other program flexibilities, such as credit carry-forward and carry-back within a company, serve the same purpose, but EPA concluded that it was reasonable to assume that, to some extent, manufacturers would incorporate a buffer against uncertainties into decisions about credit trading between firms. The value of 80 percent chosen by EPA means that for companies with cost-minimizing compliance plans where GHG targets are not met entirely through the application of technology (i.e., plans that involve the purchase of credits), 20 percent of credits would act as a buffer against uncertainty, and would be expected to expire unused. EPA acknowledges that there is not any historical evidence or studies that would indicate what the future credit efficiency and associated compliance buffer will likely be (apart from the supporting evidence for 100 percent mentioned above). In lieu of empirical studies on this specific topic, EPA approximated a compliance buffer that is analogous to the five-year credit carry forward provision, where a manufacture might accumulate a 20 percent credit buffer in each year for five years to address an unexpected case in the future where no credits can be procured for any reason. Notably, this idea of a compliance buffer is also identified by the commenter as a potential business strategy. EPA does not agree with the commenter's assertion that these standards "effectively require many manufacturers to rely on other manufacturers to maintain compliance." While the central case does assume some level of credit purchases (with a level of imperfect trading defined by the "Credit Market Efficiency" parameter of 20 percent, as described in RIA Chapter 2.6.4.4), other compliance pathways and sensitivities analyzed for this rulemaking demonstrate that it is feasible for manufactures to comply without a reliance on credit purchases at still reasonable, although higher, costs than in the central case. (See preamble Section IV.F.5. "no credit trading case").

CARB, ICCT, and Environmental and Public Health Organizations commented that in EPA's compliance modeling of the proposed standards, individual ICE vehicles were projected to have higher tailpipe GHG emissions in 2032 than they did in 2022. In response, EPA acknowledges these observations that some modeled ICE vehicles exhibited emissions "backsliding" as a result of EPA's approach of modeling producer decisions to seek the most cost-effective compliance pathway. Although EPA accounted for various constraints in vehicle production, for the proposal we did not apply any restriction on the removal of emission-reducing technology from ICE vehicles. However, we agree with the commenters that it is not likely that there will be a wide-spread removal of technologies that have been previously developed, produced, and implemented, and we do not anticipate manufacturers spending money towards development and integration of higher GHG-emitting powertrains on a widespread level – for this reason, we have prevented increases in tailpipe emissions from base year vehicles in the version of OMEGA for the final rulemaking. Furthermore, the fleet averaging standards ensure that if even if backsliding were to occur in a few isolated models, those vehicles would need to be offset with additional cleaner technologies so that the fleet would achieve the GHG reduction performance called for by the standards.

AmFree, [and others] commented on the OMEGA model's optimization logic or the choice of the objective function used to define the model's optimization problem. AmFree commented that by not accounting for the strategic decisions of firms in an oligopoly, the peer-reviewed version of the OMEGA model may underestimate the negative effects of the proposed rule on consumers. The example provided from the academic literature was based on a model an oligopoly in the U.S. Portland cement industry, where firm decisions to enter and leave the market were simulated, along with the resulting effect on consumer welfare. However, the U.S. Portland cement industry is an entirely different industry than the motor vehicle industry, with different market characteristics. EPA does not believe that there is a sufficient basis upon which such a model could be constructed for this rulemaking's analysis of the light- and medium-duty vehicle markets. Also, and most significantly, EPA does not draw any conclusion from existing studies of firm behavior, including the one given by the commenter, that these final regulations will tend to increase the cost of entry for new firms in the light- and medium-duty vehicle market. Among the auto manufacturers that submitted comments on the proposed standards, the most strongly supportive comments were from the newest entrants into the market which specialize in the production of low-emission PEV models. For these reasons, the OMEGA model does not attempt to simulate the strategic decisions of firms to leave or enter the vehicle market.

EPA acknowledges comments from the California Attorney General's office that EPA's modeling properly accounts for constraints on BEV manufacturing such as that automakers must account for, such as critical material supply for battery production. EPA responds to comments about the availability of critical minerals in RTC Section 15.

The Clean Fuels Development Coalition asserted that EPA's BEV cost estimates for the NPRM were under stated, and that "the real costs will be far higher than EPA projects." The commenter's assertion appears to be based on the incorrect presumption that EPA's future incremental costs (Action case minus No Action case) are influenced by existing BEV prices. The commenter contends that because BEV's prices are, in some cases, significantly discounted today, any incremental cost between an ICE and existing BEV would be lower than the real costs. This is an incorrect characterization of OMEGA's costing methodology, and in general, EPA does not agree that the approach used for the NPRM and this final rulemaking analysis will tend to underestimate incremental costs. In actuality, EPA's approach does not use MSRP to determine the incremental costs between technologies (e.g. ICE vs BEV). Instead, the incremental costs are based on the bottom-up cost estimations of powertrain costs and vehicle structure costs, which are informed by the engineering analyses and contracted vehicle teardowns that have been the foundation of EPA's cost estimates over multiple previous rulemakings. The commenter refers to MSRP, but in our analysis that is only relevant for the estimation of the non-structural glider costs. And because those costs are determined individually for each base year vehicle, and carried forward unchanged into future years and across policy scenarios, it has no influence on incremental costs. In other words, the average incremental vehicle manufacturing cost presented in our analysis is influenced only by our estimates for technology costs (i.e. powertrain, battery, structure material). And while vehicle price, MSRP, and cross subsidies are relevant for the consumer demand modeling within OMEGA, those values do not factor into the incremental vehicle manufacturing costs.

Valero commented that EPA's projection of future new vehicle production is implausible, and that we failed to account for the actual costs to produce such fleets because we overestimated the number of vehicles with both a BEV and ICE variant. EPA disagrees. EPA's OMEGA model does, as the commenter describes, create "clones" of base year vehicles to act as potential placeholder options for ICE, PHEV, of BEV powertrain variants. However, the presence of those placeholder vehicles does not automatically mean that the model is projecting production volumes for those vehicles, beyond the placeholder value of 1 vehicle. EPA vehicle production projections are representative of an aggregation of vehicles which, in reality, would have many individual differences in options, and trim levels. The level of aggregation we have chosen, at the manufacturer and model type level, is appropriate for this rulemaking since it allows enough differentiation for emissions performance and incremental cost as a result of the analyzed polices, while avoiding extraneous details that would not help to inform questions about compliance costs and feasibility. EPA notes that our marked up production costs account for vehicle design, development and manufacturing overhead, so even if our modeled results generate more variants than will be produced in the future, as the commenter suggests, the costs of producing those variants is appropriately considered in our overall cost estimates.

Steven G. Bradbury commented that EPA simply carried over the $1,200 cost estimate in the Proposal from the 2021 rulemaking, and that the actual costs would be higher. In response, EPA disagrees with this comment. We did not carry over the incremental cost estimates from the prior rulemaking. The Preamble and RIA provide extensive explanations for the modeling tools, inputs and assumptions that were developed and applied specifically for this rulemaking.

Zero Emission Transportation Association commented that EPA's analysis for the proposal excluded Rivian from the manufacturers represented in the base year vehicle fleet. Tesla similarly commented that the MY 2019 base year fleet used in the NPRM has lower volumes for their vehicles than today. In response, EPA notes that we have updated the base year fleet for this final rulemaking analysis, consistent with our general practice of using the most recent data whenever possible. The MY 2022 base year fleet used for the updated analysis now includes Rivian vehicles, and Tesla production volumes (and volumes of other manufacturers) that represents MY 2022 instead of the MY 2019 base year used for the NPRM analysis.

12.1.2 - Consumer side modeling

Comments by Organizations

Organization: Alliance for Automotive Innovation

B. Comparison of EPA's Projected U.S. BEV Market Share to Other Projections

EPA projects that manufacturers can reach 60% BEV U.S. market share by 2030 and 67% share by 2032. In context, for all light-duty auto sales in 2022, less than 6% were BEV (or just over 7% when including PHEVs). Effectively, EPA's proposed BEV requirements would be roughly ten times higher than 2022 levels. [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

Given the degree of electrification that EPA projects in association with its proposed standards, it is helpful to compare EPA's projections to those of industry analysts. EPA does provide some third-party projections of U.S. BEV market share, but does so only in the context of supporting its finding that demand for BEVs is rapidly increasing.22 [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

22 NPRM at 29189.

Auto Innovators compares EPA's projections23 to those of the U.S. Energy Information Agency (EIA),24 S&P Global Mobility,25 Bloomberg,26 Benchmark Minerals Intelligence (BMI),27 and the International Council on Clean Transportation (ICCT)28 in Figure 1. EPA's projections exceed those of other government agencies (EIA) and of the industry and financial analysts (S&P Global Mobility, Bloomberg, and BMI). The only projection close to EPA's is that from ICCT (a well- known non-governmental organization that advocates for stronger standards), but EPA's projections still exceed even those of ICCT. While projections can and certainly do vary based on input assumptions, EPA has not adequately explained how increasing GHG standards in and of itself would enable greater BEV-only market share than those projected by multiple other analyses that include both BEVs and PHEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

23 For this assessment, Auto Innovators used EPA's projected BEV market share from the ACC II sensitivity case for the proposed standards. (NPRM at 29335, Table 108.)

24 U.S. Energy Information Administration, Annual Energy Outlook 2023, High Uptake of the IRA side case, Table 38. (Market share calculated by Auto Innovators based on EV sales and total sales of light-duty vehicles.)

25 S&P Global Mobility, U.S. light vehicles sales forecast by propulsion system design (Jan. 2023). Obtained via personal correspondence. Used with permission.

26 Bloomberg NEF, Electric Vehicle Outlook 2023 (Jun. 2023) at 22 (Figure 30; reflects BloombergNEF economic transition scenario). Data obtained via BloombergNEF subscription.

27 Benchmark Minerals Intelligence, 1Q2023 model for Auto Innovators (proprietary).

28 The International Council on Clean Transportation, Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States (Jan. 2023) at 27. (Table A5, IRA Moderate with increased state ACC II adoption scenario.)

The projection from S&P Global Mobility, a well-respected third-party analyst of the automotive industry, suggests approximately 47% EV market share (including PHEVs) in 2030 and 59% in 2032. In comparison, EPA projects a BEV-only market share of 61% by 2030 and 67% in 2032 under its proposed standards. The projection from Bloomberg is very similar to that of S&P Global Mobility, reaching 51% combined EV sales in 2030 and 60% combined EV sales by 2032. The S&P Global Mobility and Bloomberg projections are generally consistent with Auto Innovators belief that 40-50% EV market share by 2030 is an aspirational, yet achievable goal if suffcient complementary policies are in place. [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

[See original comment for Figure 1: Comparison of EPA-projected BEV market share under the proposed standards to projections from EIA, S&P Global Mobility, Bloomberg, and ICCT.] [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

4. Modeling the geographic diffusion of BEVs is important for accurately gauging the customer acceptance of the national standards.

The OMEGA least-cost compliance modeling suggests that, by model year 2032, 67% of new vehicle sales will be BEVs, a remarkably different figure than the 8% BEV share observed in the U.S. in early 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

Modeling a highly segmented and geographically dependent market as a single entity is spurious. The agency's assumption that all consumers will respond with the same elasticity of demand pegged to the same diffusion of innovation curve is simplistic and not appropriate. As we know, there are many factors outside of the relative price of powertrains that come into play when purchasing a new vehicle. These include the robustness of the charging ecosystem, inclement weather, relative price of fuels, and even political affiliation. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

It is crucial that EPA model accurately the diffusion of BEVs into different parts of the country, since the pattern of spatial diffusion influences key issues in this rulemaking: [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

-the amount of electricity required to support BEVs in different areas;

-the degree of grid investments and public-charging investments required to support BEVs;

-the amount of emissions from the electric utility sector (as some regions are more carbon intensive than others);

-and the prospects for customer acceptance of BEVs (as regions vary in attitudes toward BEVs, the pace of the public charging build out, cold weather climates, and the availability of state incentives and public outreach to facilitate BEV deployment). [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

In its analysis EPA adapts a "vehicle adopter model" (VAM) developed by the National Renewable Energy Laboratory. The model includes some plausible predictor variables such as income, housing type, housing tenure, population density, and rural vs urban location. The authors also acknowledge the model omits crucial variables relevant to predicting whether a household will purchase or lease a BEV such as environmental attitudes, interest in advanced technology, whether the household has a place at home or at work to charge their BEV, commuting distance, and long-trip frequency. The model explained little of the variation in BEV ownership in the sample (R-square = 0.04). The authors explain that the model seemed to perform better statistically at the county level, but with so many omitted variables it seems doubtful the model coefficients are useful for prediction. A deeper problem is that the data set included only 224 households that owned at least one BEV, about 6% of the sample, and it is not clear whether the sample is representative of the U.S. Since the 224 households are, as the authors note, early BEV adopters, it seems unlikely that information about them will be relevant in predicting which households adopt BEVs as the technology diffuses from 8% of new vehicle purchasers in early 2023 to 67% in 2032. For the purposes of the rulemaking, it is more important to model carefully, for example, those who are open to a BEV but have not yet purchased one. The authors were careful to state that their results have limited utility [EPA-HQ-OAR-2022-0829-0701, pp. 284-285] :

The absolute values of the estimates and the predictive capability of the model are not the priorities for this purpose—instead, we emphasize the relative scale of these coefficients (for example, how much influence housing type has on PEV adoption compared with income). [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

EPA then decided to use the absolute coefficients to forecast PEV adoption, exactly contrary to what the authors suggested. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

Auto Innovators appreciates that EPA may have been inclined to use this survey because the results can be linked to the IPM model of the electric utility sector. Unfortunately, the survey and modeling have so many weaknesses for use in this rulemaking that a different modeling strategy is required [EPA-HQ-OAR-2022-0829-0701, pp. 284-285].

In the long run, Auto Innovators suggests that EPA develop an improved BEV adopter model.

Source:

1. Ge, Yanbo, Christina Simeone, Andrew Duvall, and Eric Wood. 2021. There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5400-81065. https://www.nrel.gov/docs/fy22osti/81065.pdf. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

Organization: American Fuel & Petrochemical Manufacturers

EPA requests comment on their approach to determining charging time, as set forth in the DRIA, Chapter 4.155 EPA's analysis is contingent on unsupported assumptions regarding (1) U.S. consumers' adoption of and ability to purchase more expensive ZEVs (see Sections IV.B.2 and IV.E.2.ii); (2) the type of ZEV purchased (used ZEVs or PHEVs compatible with slower charging units or new ZEVs that can use DCFC) (Section IV,B.2 addresses charging times); (3) the availability of critical minerals and metals to expand the supply of reliable and renewable electricity (see Section I.B); and (4) the availability of reliable and affordable charging for all users (see Sections IV.B.4). Given the flaws in EPA's methodology that omits significant data sources and other factors and makes unsupported assumptions, EPA should revise its analysis concerning charging time and continue with promulgating a final rule for future emissions standards, that accounts for the reality of today's automotive market and not the public pronouncements of the automotive industry, a single state or group of states, or other unsupported estimates of future market growth. [EPA-HQ-OAR-2022-0829-0733, pp. 33-34]

155 88 Fed. Reg. at 29,367.

EPA's Proposal fails to evaluate how government credits are embedded in vehicle pricing. For example, neither federal or state governments, or auto manufacturers explain how state ZEV credits, EPA GHG multiplier credits, and NHTSA CAFE EV multiplier credits are accounted for in both ZEV and ICEV vehicle price. There is increasing evidence that regulations which mandate EV sales—along with the cross-subsidies from gasoline and diesel vehicle buyers—are leading manufacturers to abandon sales of the least expensive and higher fuel economy gasoline and diesel vehicles that do not receive similar subsidization.236 Cox Automotive found that "in December 2017, automobile makers produced 36 models priced at $25,000 or less. Five years later, they built just 10," pushing low-income buyers out of the new-car market and into the used- car market. Conversely, in December 2017 automobile manufacturers offered 61 models for sale with sticker prices of $60,000 or higher and in December 2022, they offered 90.237 This is unacceptable. EPA and its sister agencies cannot create credits and then claim they do not affect vehicle price solely because they have not sought to quantify them. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

236 Steven G. Bradbury, Distinguished Fellow, The Heritage Foundation, Prepared Statement for the hearing entitled "Driving Bad Policy: Examining EPA's Tailpipe Emissions Rules and the Realities of a Rapid Electric Vehicle Transition," before the Subcommittee on Economic Grown, Energy Policy, and Regulatory Affairs of the U.S. House of Representatives Committee on Oversight and Accountability, at 10 (May 17, 2023) available at https://oversight.house.gov/wp-content/uploads/2023/05/Bradbury- Prepared-Statement-for-17-May-2023-Oversight-Hearing.pdf

237 See Sean Tucker, Are we witnessing the demise of the affordable car? Automobile makers have all but abandoned the budget market (MarketWatch Feb. 28, 2023), available at https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have-all-but-abandoned-the-budget-market-a68862f0 (last visited May 24, 2023).

Tellingly, EPA never estimates the annual price of a comparable ZEV and ICEV, for each year in which EPA proposes standards. EPA's bias towards EVs is demonstrated by EPA's statement that its OMEGA modeling "now incorporates a consumer choice element. This means that the impacts of, for example, a $40,000 BEV versus a $35,000 ICE vehicle of similar utility (i.e., a 14 percent increase for the BEV) is a much different consideration than a $6,000 incremental BEV cost versus a $1,000 incremental ICE cost (a 500 percent increase for the BEV)."238 In other words, EPA set up its model to show the consumer price (not the actual real-world cost) of EVs have a lower percentage cost increase than the incremental absolute cost of switching from ICEVs to ZEVs. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

238 See RIA page 2-42, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf.EPA incorrectly assumes that ZEV owners will pay the national average residential electricity price to charge their vehicles. EPA fails to consider that the majority of ZEVs in the U.S. are located in utility service territories with some of the highest electricity rates in the country and that the average EV owner currently pays a much higher price to charge their ZEV at home than the national average residential electricity rate. Given that EV penetration has varied widely across the U.S., it would be arbitrary to assume that EVs will, unlike in the past, penetrate uniformly across the U.S. and thus that the average electricity price would be representative of the actual cost electricity. For example, California, which has roughly 40 percent of all registered ZEVs in the U.S., has a residential electricity rate that is roughly double the national average. Considering that EPA is modeling its rule after a California-like approach to mandate ZEVs, it would be more appropriate for EPA to assume similar real-world costs (at a minimum, given California's temperate climate). Moreover, EPA fails to consider that mandating such a high ZEV sales rate will necessarily require exponential increases in commercial ZEV charging at rates that are currently three, four or five times higher than the current national average residential electricity rate, depending on location and charging speed. Those customers who are not homeowners and not able to install their own charging stations and take advantage of charging at low-cost times will be adversely impacted. Instead, EPA uses a residential rate for electricity and does not

consider peak power or time of use charges. California electric prices rose 42 percent - 78 percent between 2010 and 2020 and are projected to rise an additional 50 percent by 2030 as shown in Figure 9. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

SEE ORIGINAL COMMENT FOR Historic and Forecasted Residential Average Rates Based on Most Recent 5-year Average Rate Increase. Figure 9:

Source: Michael Shellenberger, Twitter (citing California Public Advocate's Office data), April 27, 2021). [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Heaping additional demand for EV charging into this market could exacerbate already high electricity prices. This will be especially impactful to lower-income homeowners who may not be able to install dedicated charging units, forcing them to pay more out of pocket for charging during peak demand periods.265 [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

265 Hardman, Scott, et al., "A Perspective on Equity in the Transition to Electric Vehicles." MIT Science Policy Review, (Aug. 20 2021), available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/ (accessed June 29, 2023).

EPA must revise its analysis to account for realistic electricity prices. The proposed ZEV mandate will require an enormous investment in power generation and distribution, resulting in nationwide increases in electricity bills that EPA has not considered. Of course, considering the additional trillions of dollars in costs would paint a clear picture that the costs of forced electrification far exceed even the inflated benefits EPA presented in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Organization: American Petroleum Institute (API)

iii. Review of Annual Energy Outlook (AEO) data and projections.

EPA's BEV projections differ significantly from other federal agencies and reflect that EPA is improperly mandating that a significant proportion of new LDV and MDV must be powered by electric drivetrains and setting unrealistic tailpipe emission standards. The EIA published market share projections for light-duty BEV and PHEV sales in its Annual Energy Outlook35 2023 (AEO 2023). The AEO 2023 Reference Case modeling includes laws, such as the IRA and the BIL, and other adopted regulations in its analysis. The AEO 2023 incorporates the IRA by adjusting EV purchase prices to account for the Clean Vehicle Credit using offcial estimates of vehicles that will be eligible for tax credits. In addition to the Reference Case, the AEO conducts a range of scenario modeling, that considers different assumptions and uncertainties. Across the range of modelled scenarios in AEO 2023, EIA36 concluded that sales of BEVs and PHEVs do not exceed 29% and the share of the on-road light-duty vehicle stocks comprised of BEVs and PHEVs did not exceed 26%, over the projection period to 2050. [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

35 U.S. Energy Information Administration. "Annual Energy Outlook 2023." March 2023. https://www.eia.gov/outlooks/aeo/.

36 U.S. Energy Information Administration. "Incentives and lower costs drive electric vehicle adoption in our Annual Energy Outlook." Today in Energy. Accessed May 15, 2023. https://www.eia.gov/todayinenergy/detail.php?id=56480.

Analysis of BEV-only37 sales data from the AEO 2020 (pre-COVID) and 2023 (most recent) editions indicate BEVs sales are projected to increase in comparison to the respective Reference Cases. For example, in 2032, BEV sales are projected to reach 13% in the AEO 2023 Reference Case up from 5% in the AEO 2020 Reference Case. Increased BEV sales in AEO 2023 compared to AEO 2020 likely reflect emerging trends, technological improvements, relative manufacturing costs and purchase prices, subsidies, consumer behavior, and other factors. Also, minimum projections for BEV sales in the AEO 2023 are nearly identical to the AEO 2020 Reference Case (see chart below). However, projections for maximum BEV sales in AEO 2023 reach only 23% in2032. Figure 1 below illustrates BEV sales across a wide range of scenarios as projected by EIA. [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

37 Transportation supplemental tables for AEO 2020 and AEO 2023 can be found here: https://www.eia.gov/outlooks/aeo/.

BEV sales projected by EPA,38 under a scenario to meet the proposed standards and a "no action" scenario, are included in the chart. BEV sales required to meet EPA's proposed standards or "no action" scenario are significantly higher than any scenario projected by EIA in its AEO 2023 analysis. Differences in trajectories between EPA's proposed standards and the AEO projections illustrate EPA selecting and essentially forcing one technology over others and setting an unrealistic stringency for tailpipe emission standards. Although EIA has projected BEV sales to increase (i.e., AEO 2023 vs. AEO 2020) because of recently enacted federal subsidies and expenditures (i.e., BIL and IRA), along with technological advancements, 2032 BEV sales are projected to reach to only 13% in the AEO 2023 Reference Case compared to EPA's proposed standard at 67%. This is a significant difference in projected BEV sales and the agency has not provided adequate information to explain this major difference. EPA must explain why its projections differ so significantly from its sister agency with far more expertise in such projections than EPA. [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

38 Table 108, 88 Fed. Reg. 29335 (May 5, 2023).

[See original for graph titled "Figure 1. Battery Electric Vehicle Sales Projected by EIA and EPA"] [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

Organization: Anonymous

2. EPA's consumer demand module isn't explained and leads to strange results

EPA's analysis includes an estimate of consumer demand of vehicles by powertrain, which it describes as "the share weight parameter changes over time to account for factors that are not included in the generalized costs, such as greater access to charging infrastructure or greater availability and awareness BEVs". EPA does not explain how they built their S curve or how it behaves and relies on a single paragraph in its draft RIA to describe this approach (it reserves conversation of the 'cost' metrics for a different section of the RIA). More importantly, EPA does not explain why consumer demand increases because of their proposal across the alternatives when their proposal shouldn't impact these considerations. EPA's proposal does not increase the amount of chargers available or reduce range anxiety. If these things are assumed to change because of EPA's rule, the explanation should be clear in EPA's analysis, and EPA should also carry the costs of forcing increases to the grid and charger access as a cost to their rule. [EPA-HQ-OAR-2022-0829-0565, p. 3]

In considering costs, EPA states "consumers assume that approximate annual VMT is 12,000 miles, annual non-fuel ownership costs for BEVs are $1,600, and annual non-fuel ownership costs for ICE vehicles are $2,000" but does not explain where those assumptions come from and deprives commenters from being able to meaningfully comment and contribute. This basis of non-fuel costs for ICE vehicles being higher by 20% leads to ICE vehicles being disadvantaged. [EPA-HQ-OAR-2022-0829-0565, p. 3]

EPA analysis also seems to gloss over range anxiety which is a leading consideration for many consumers in whether to purchase a BEV (https://www.caranddriver.com/news/a40119553/survey-range-anxiety-evs/#:~:text=The%20bad%20news%3F,list%20their%20top%20three%20concerns) or the time it takes to charge a vehicle, in their analysis of consumer demand. These oversights seriously undermine the value of EPA's model. [EPA-HQ-OAR-2022-0829-0565, p. 3]

Ironically, EPA also assumes 0% rebound for BEVs. Rebound is a sign that consumers value driving a vehicle more and will do so as cost decreases. However, EPA's assumption assumes that there is no additional value to driving a BEV as it becomes more efficient. So on the one hand, BEVs confer the same or better benefits to their drivers, on the other, consumers do not value additional BEV miles. [EPA-HQ-OAR-2022-0829-0565, p. 3]

Organization: International Council on Clean Transportation (ICCT)

The notion that MDV have different use cases than LDV also suggests that consumer and manufacturer purchase and production decisions may differ between MD and LD. As MDV are generally used in commercial applications, consumers likely consider the purchase of MDV as a business decision. Consequently, MDV purchasers are more likely than LD purchasers to consider the full cost of ownership when making such a decision. In particular, MDV buyers may fully value the fuel savings from efficiency technologies or BEVs. Because of this full valuation of fuel savings, ICCT recommends EPA model MDV consumers as valuing at least 5 years of fuel savings (double the 2.5 years of fuel savings currently used for both LD and MD164). According to ICCT's 2022 MD EV cost study, over the first 5 years of ownership, before 2030 both MD BEV pickups and vans are expected to cost less to own and operate than their diesel and gasoline counterparts.165 [EPA-HQ-OAR-2022-0829-0569, pp. 62-64]

164 According to producer_generalized_cost-body_style_20220613.csv—used in both the LD and MD central analyses

165 Mulholland, E. (2022). Cost of electric commercial vans and pickup trucks in the United States through 2040. International Council on Clean Transportation. https://theicct.org/publication/cost-ev-vans-pickups-us-2040-jan22/

Organization: Jeremy Michalek et al.

The EPA assesses the potential for future demand for electric vehicles by first simulating a "No Action" scenario, representing a future scenario without the proposed policy but accounting for other policies such as the IRA. They then simulate a future scenario that includes the additional effects of the proposed policy. In both cases, the consumer demand model's parameters (the "share weights," which we refer to as alternative specific constants to be consistent with the discrete choice literature) are calibrated so that future shares in the "No

Action" scenario match those projected in an IHS report (Fiske et al., 2021), resulting in the projections summarized in Figure 1. We compare these projections to new results from our research based on an empirical investigation of (1) past trends in consumer preferences and (2) expected technology trends. [EPA-HQ-OAR-2022-0829-0705, p. 4]

[See original for graph titled "Graphical summary of EPA's assessment of expected BEV adoption by vehicle class in the proposed rule (US Environmental Protection Agency, 2023)"] [EPA-HQ-OAR-2022-0829-0705, p. 4]

1.1 Cars and SUVs

In an attached study, published this year in Proceedings of the National Academy of Sciences, we compare results from a discrete choice survey experiment conducted with over 1500 people in 2020-2021 with those of a similar survey conducted in 2012-2013 (Forsythe et al., 2023a). This experiment importantly investigates the likelihood of mainstream U.S. new vehicle consumers choosing BEVs, where our sample is weighted to be representative of the U.S. new car and SUV buying population across household income, age, education, gender, marital status, and household size. We find that technological improvements in battery elec-tric vehicles (BEVs) - particularly increasing range of these vehicles - have driven increases in consumers' likelihood of choosing these vehicles over their conventional gasoline vehicle counterparts. We find that the consumer preference parameters defining what consumers want in vehicle characteristics and what they are willing to pay for have not changed (in to- day's dollars) enough to identify statistically significant trends over this 8 year period. This implies that consumer preferences (independent of technology improvements) have been rel-atively static. The findings suggest that consumers are buying more electric vehicles today because the technology has improved, and that as BEV technologies continue to improve in the future, it will further increase consumer likelihood of choosing BEVs over conventional vehicle counterparts. [EPA-HQ-OAR-2022-0829-0705, p. 4]

Using the consumer preferences estimated from the choice experiment, we examine con-sumers' likelihood of purchasing a BEV when choosing between two vehicles: one that has a conventional gasoline powertrain and one that has a battery electric powertrain, but oth-erwise have very similar characteristics (such as the BMW i4 and the BMW BMW 4-Series Gran Coupe, and the Nissan Leaf and the Nissan Versa). We find that, if consumer prefer-ence parameters continue at today's values and if the technology for range and cost improve to levels predicted by the National Academies (NASEM, 2021), then consumers will become roughly indifferent, on average, between electric and gasoline versions of several car and SUV models by 2030 (see Figure 2 from Forsythe et al. (2023a)). [EPA-HQ-OAR-2022-0829-0705, p. 5]

We further simulate market shares for BEVs across the full U.S. new car and new SUV markets. We find that in a case where BEVs are equally available as conventional gasoline vehicles (every conventional gasoline vehicle has a counterpart BEV with the same body style, brand, and other characteristics important to consumers), BEV technology improvements follow those projected by the National Academies (NASEM, 2021), and consumer preference parameters remain steady at today's values, we find that simulated BEV market shares of both new cars and new SUVs would be approximately 50% by 2030 (see Figure 3 from (Forsythe et al., 2023a)). [EPA-HQ-OAR-2022-0829-0705, p. 5]

Our findings support that large increases in consumer demand for BEVs in the near future is feasible. The research suggests that mainstream consumer demand for BEVs is likely to sharply increase due to expected BEV technology improvements alone. It also supports that BEV demand could grow high enough by 2030 so that BEVs become the majority of new passenger cars, and SUVs nearly the majority, through expected BEV technology improvements and equal availability of BEVs and conventional vehicles. It is important to note that these findings do not incorporate the reduced cost of maintenance and repair or the cost of at-home charger installation. If the net balance of these provides cost savings to consumers as the EPA predicts, then we would expect consumer demand for BEVs would be even larger than predicted in our study. [EPA-HQ-OAR-2022-0829-0705, p. 5]

The proposed EPA rule may further increase consumer demand for BEVs trends by (1) encouraging automakers to shift price margins to encourage more BEV sales, (2) encouraging automakers to reduce gasoline vehicle offerings in favor of increasing BEV offerings, (3) encouraging automakers to invest in electrification technology advancement, potentially exceeding National Academy projections, (4) triggering network effects, such as vehicle buyers being more likely to purchase a BEV as they know more friends and family who own them, and (5) encouraging other efforts - including adver- tising, dealership practices, and other actions - that would increase consumers' likelihood of purchasing BEVs over conventional vehicles. [EPA-HQ-OAR-2022-0829-0705, p. 5]

Recommendation 1. We recommend that EPA pursue (internal and/or external) re- search to develop models for future versions of OMEGA such as the one we present here that are capable of explicitly modeling improvements in BEV characteristics that drive consumer choices, such as range, so that alternative assumptions beyond the IHS projections can be investigated in future OMEGA model versions and so that trends can be more explicitly and transparently investigated and communicated. [EPA-HQ-OAR-2022-0829-0705, pp. 5-7]

[See original for Figure 2, titled "Car and SUV head-to-head comparisons over time.] [EPA-HQ-OAR-2022-0829-0705, pp. 5-7]

[See original for Figure 3:, titled "Hypothetical share of BEV cars and SUVs for model year 2020 and 2030 if all gasoline cars and SUVs offered a BEV option and technology trends followed those predicted by the National Academies (NASEM, 2021). From (Forsythe et al., 2023a)"] [EPA-HQ-OAR-2022-0829-0705, pp. 5-7]

In a working paper, we conducted a similar discrete choice experiment of 52 pickup truck owners across the U.S. to characterize their preferences. This sample represented a range of pickup truck consumer household incomes, ages, education, gender, and household size and was weighted to be representative of the U.S. new pickup truck buying population. We find that most pickup truck owners (78%) are open to purchasing electric pickup trucks if the technology provides sufficient performance attributes, including range, operating cost, towing capacity and payload capacity. We find that the largest group, representing 43% of our consumers, choices between a BEV or conventional gasoline pickup truck are driven primarily by what the vehicle can do, rather than its powertrain type (we call this group "tech indifferent" because the don't value the powertrain technology in and of itself, only what it can deliver). Another group, representing an additional 13% cared about payload capacity and operating cost, but did not otherwise value the powertrain technology in and of itself. 17% of pickup truck owners were "BEV enthusiasts" who were willing to pay significantly more for a BEV pickup truck than a conventional gasoline pickup truck, even if they had identical characteristics (including operating costs, towing, payload, and brand). We find that 22% of pickup truck owners are strongly opposed to all types of electrification, including hybrid, plug-in hybrid and battery electric pickup trucks. For this group, a substantial change in consumer preferences would be necessary for the group to opt for electric pickup trucks over gasoline pickup trucks. [EPA-HQ-OAR-2022-0829-0705, p. 8]

We simulate market shares for BEVs across the full U.S. new pickup truck market. We find that in a case where BEV pickup trucks are equally available and diverse as conventional gasoline pickup trucks (every conventional gasoline and diesel truck has a counterpart BEV with the same towing, payload, brand, and other characteristics important to consumers), BEV technology improvements follow those projected by the National Academies (NASEM, 2021), and consumer preference parameters remain steady at today's values, where all gaso- line or diesel pickup trucks offer a BEV powertrain option and technology trends match those suggested by the National Academies (NASEM, 2021), we estimate that, despite the notable group opposed to electrification of pickup trucks, over half of pickup truck owners would choose the electric powertrain by 2030 (Figure 4), exceeding EPA's assessment of expected BEV pickup truck adoption in 2030 (Figure 1). [EPA-HQ-OAR-2022-0829-0705, p. 8]

Implications for EPA. Our findings support that large increases in consumer demand for BEV pickup trucks in the near future is feasible. The research suggests that mainstream consumer demand for new BEV pickup trucks is likely to sharply increase due to expected BEV technology improvements in the future. It also supports that, although some pickup truck owners are strongly opposed to purchasing BEV pickup trucks, the majority of pickup truck owners value BEV pickup trucks equally to conventional gasoline pickup trucks as long as they have sufficient performance characteristics. The research supports that consumer de- mand for BEV pickup trucks may exceed EPA's scenario of BEV pickup truck adoption in 2030. It is important to note that our study does not incorporate the reduced cost of main- tenance and repair or the cost of at-home charger installation. If the net balance of these [EPA-HQ-OAR-2022-0829-0705, pp. 8-9]

[See original for Figure 4, titled "Hypothetical share of BEV pickup trucks for model year 2020 and 2030"] [EPA-HQ-OAR-2022-0829-0705, pp. 8-9]

provides cost savings to consumers as the EPA predicts, then we would expect consumer demand for BEVs would be even larger than predicted in our study. The proposed EPA rule may further increase consumer demand for BEV trucks by (1) encouraging automak- ers to shift price margins to encourage more BEV sales, (2) encouraging automakers to reduce gasoline pickup truck offerings in favor of increasing BEV pickup truck offerings, (3) encouraging automakers to invest in electrification technology advancement, potentially ex- ceeding National Academy projections for pickup trucks, (4) triggering network effects, such as pickup truck buyers being more likely to purchase a BEV as they know more friends and family who own them, and (5) encouraging other efforts - including advertising, dealership practices, and other actions - that would increase consumers' likelihood of purchasing BEV pickup truck over conventional trucks. [EPA-HQ-OAR-2022-0829-0705, pp. 8-9]

We show in the attached report that the GCAM-based demand model formulation used to compute vehicle choice shares, described on pg. 4-5 of the Draft Regulatory Impact Analysis (DRIA), is mathematically equivalent to a multinomial logit model. This means that the demand model fits within the random utility model (RUM) paradigm used in the scientific literature and is grounded in expected utility theory, which has a long history of use in economics and the decision sciences (McFadden, 1972; von Neumann et al., 1944). It also means that the parameters EPA uses in the demand model are directly interpretable using expected utility theory. We find that increases in the ”share weight” parameter of BEVs relative to conventional vehicles represents consumer utility of BEVs associated with factors other than generalized cost (including but not limited to BEV range, styling, towing capability, and other factors consumers consider during the purchasing decision). [EPA-HQ-OAR-2022-0829-0705, p. 10]

Specifically, we find that the formulation used in EPA’s proposed rule is equivalent to a multinomial utility model with a consumer utility function composed of the log of generalized cost plus an alternative specific constant (ASC). We show in the attached report how the GCAM ”share weight” parameter maps to the ASC in the standard logit form. The logit model falls within the class of random utility discrete choice models, which all assume the following (Train, 2009): [EPA-HQ-OAR-2022-0829-0705, p. 10]

1. Consumers choose the alternative in a choice set that provides them the highest utility [EPA-HQ-OAR-2022-0829-0705, p. 10]

2. Utility is partly observable to the modeler, modeled as a function of the product’s attributes [EPA-HQ-OAR-2022-0829-0705, p. 10]

3. Utility is partly unobservable to the modeler, modeled as a random variable [EPA-HQ-OAR-2022-0829-0705, p. 10]

Upon reviewing over 200 automotive demand model studies in the scientific literature and government reports, we found random utility discrete choice models to be the dominant paradigm for modeling automotive demand, with the logit model and its variants most commonly used. Thus, EPA’s demand model follows the dominant paradigm and inherits the properties of random utility discrete choice models. [EPA-HQ-OAR-2022-0829-0705, p. 10]

The equivalence of GCAM and the logit model implies several important properties of EPA’s choice model, which we summarize in this section and the sections below. The logit model, and, by extension, the GCAM model form used by EPA, has a well-known property called Independence from Irrelevant Alternatives (IIA) that restricts the kinds of substitution patterns the model can represent (Train, 2009). IIA implies that when a new alternative is introduced or when an existing alternative is improved, it will draw consumer choice share proportionally from the other alternatives. Figure 5 shows an illustrative example, where a gasoline vehicle and an electric vehicle are valued equally by consumers with equal observable utility v and therefore equal choice shares of 1/2 each. If an additional electric vehicle were introduced that is effectively identical to the first, then all three alternatives would have equal choice shares, resulting in 1/3 of consumers choosing gasoline vehicles and 2/3 of consumers choosing one of the two electric vehicle options. This example (a variation on the classic “red-bus blue-bus problem” (Train, 2009)), illustrates why predictions made with models that exhibit the IIA property can be sensitive to how the choice set is modeled. [EPA-HQ-OAR-2022-0829-0705, p. 11]

[See original for Figure 5: Substitution Patterns Implied by the GCAM logit model's Independence of Irrel- evant Alternatives (IIA) Property] [EPA-HQ-OAR-2022-0829-0705, p. 11]

In EPA's current OMEGA implementation, as we understand it, the GCAM logit model is used in scenarios that predict demand independently for the sedan/wagon, CUV/SUV, and pickup truck markets as separate markets. In each of these demand simulations, consumer demand is determined between an aggregate representation of conventional gasoline vehicles and an aggregate representation of BEVs. Based on the fact that GCAM is equivalent to a RUM, we believe that this representation is equivalent to representing two ”composite” vehicles, one representing the portfolio of conventional vehicle offerings, and one representing the portfolio of BEV offerings (see (Yip et al., 2021)), as shown in Figure 6. When there are only two alternatives in a choice set (e.g., only BEV or a conventional vehicle), the IIA property is not relevant. Therefore, we do not believe that the IIA property causes concerns in EPA's current simulations. [EPA-HQ-OAR-2022-0829-0705, pp. 11-12]

The IIA property may cause concerns when simulations include choice sets with more than two alternatives that do not compete proportionally. In these cases, the model produces substitution patterns among the vehicle offerings that are determined by implicit assumption from the model form rather than empirical evidence and has the potential to produce un- realistic predictions. Issues could arise if future versions of OMEGA were to include choice sets with more than two alternatives, such as by: [EPA-HQ-OAR-2022-0829-0705, pp. 11-12]

1. Combining sedan/wagon, CUV/SUV, and pickup truck markets into a single choice set with 6 alternatives (BEV and conventional for each body style) [EPA-HQ-OAR-2022-0829-0705, pp. 11-12]

2. Adding additional technology alternatives to the existing choice set, such as a PHEV [EPA-HQ-OAR-2022-0829-0705, pp. 11-12]

3. Including disaggregated vehicle alternatives or less coarse composite vehicles [EPA-HQ-OAR-2022-0829-0705, pp. 11-12]

Recommendation 2. If EPA considers model variations that involve larger vehicle choice sets, EPA should carefully consider the implications of the IIA property of the GCAM logit model and/or augment the model to relax the IIA restriction. Potential options for relaxing the GCAM logit IIA restriction include:

1. Modeling heterogeneity of consumer preferences, such in latent class logit models (sum of demand from multiple consumer groups with distinct demand model parameters) or mixed logit models (sum of demand from a set of consumers drawn from a population distribution of demand model parameters); or [EPA-HQ-OAR-2022-0829-0705, pp. 11-12]

2. Making alternative assumptions about the unobserved consumer utility error term, such as in the nested logit or probit models. [EPA-HQ-OAR-2022-0829-0705, pp. 11-12]

We expect that modeling heterogeneity is possible within the GCAM framework; it could be achieved by modeling multiple different consumer groups and determining demand as the sum across these consumer groups. This would require specifying the variation of consumer preferences across the consumer population. We present an example of empirical data below that could potentially be used to specify these parameters. [EPA-HQ-OAR-2022-0829-0705, p. 12]

In contrast, we expect that alternative assumptions about the error term would require models that deviate from the GCAM model form (but remain within the broader RUM framework). Therefore, relaxing the IIA property through consumer heterogeneity may be more feasible than relaxing it through alternative assumptions of the error term. [EPA-HQ-OAR-2022-0829-0705, p. 12]

Finally, we note that there is no single “right” way to model consumer demand – all models have assumptions and limitations. Among possible model forms, it is important to select models whose properties are appropriate for the application. The GCAM logit form’s IIA property is not restrictive for EPA’s current implementation predicting demand among two alternatives. However, if applied to larger choice sets in the future or in response to other comments on the proposed rule, it may overly restrict predicted substitution patterns among different vehicle types to ones that are based purely on the assumptions of the model form and may not accurately represent consumer substitution behavior. [EPA-HQ-OAR-2022-0829-0705, p. 12]

Because the GCAM logit model is a special case of the logit model, it effectively assumes that the only source causing different consumers to make different choices is random noise captured in the error term of the discrete choice model. There are two advantages to expand- ing the demand model in future iterations of OMEGA to model systematic heterogeneity:

[See original for Figure 6: Illustration of the 3 independent markets, each with 2 composite vehicles, in EPA’s OMEGA model] [EPA-HQ-OAR-2022-0829-0705, pp. 12-13]

1. Capturing systematic heterogeneity in consumer preference parameters, such as with a latent class logit or mixed logit model, relaxes the IIA substitution pattern restrictions of the logit model, enabling the ability to capture alternative substitution patterns driven by data rather than modeling assumptions. [EPA-HQ-OAR-2022-0829-0705, pp. 12-13]

2. Capturing systematic heterogeneity in consumer preference parameters allows assess- ment of differential effects across consumer groups, potentially allowing assessment of equity implications. [EPA-HQ-OAR-2022-0829-0705, pp. 12-13]

While future adaptations of EPA’s demand model to incorporate consumer heterogeneity would bring these advantages, it is important that the representation of consumer hetero- geneity appropriately represents consumer behavior. Ideally, the consumer parameters would be estimated based on empirical data and peer reviewed. [EPA-HQ-OAR-2022-0829-0705, pp. 12-13]

Recommendation 3. We recommend that EPA not modify the GCAM logit model to capture heterogeneity when finalizing the proposed rule (provided that only two alternatives remain in each of the demand simulations as described above) because doing so may introduce additional complications and take substantial time to execute correctly with peer review. We recommend that EPA begin internal and/or external research to advance the consumer de- mand model so that future iterations of OMEGA have the potential to incorporate consumer heterogeneity. [EPA-HQ-OAR-2022-0829-0705, pp. 12-13]

2.1.3 Share weights and alternative-specific constants

We show in the attached report and mathematical proof that the share weights in the GCAM model are equivalent to well-established alternative-specific constants (ASCs) in the logit model.1 This means that they represent the average utility of all unobserved attributes (such as BEV range, towing capability, accessories, aesthetics, etc.) that are considered by consumers in their purchasing decisions but are not included in the generalized cost. ASCs, and therefore share weights, have the following properties: [EPA-HQ-OAR-2022-0829-0705, pp. 13-14]

1 More precisely, the log of the share weight of vehicle j is equal to the alternative specific constant, $\ln(\alpha j) = \xi j$, where the alternative-specific constant, ξj, represents the average utility associated with all other attributes of the vehicle not represented by xj in the logit consumer utility, $uij = \beta jxj + \xi j + ?ij$.

1. ASCs (and therefore share weights) are only interpretable in relative terms. The value of an ASC has no meaning in and of itself; it can only be interpreted in relation to another ASC (e.g., if one vehicle's ASC is larger or smaller than another's and by how much). A common practice in estimating ASCs is to normalize the value of one alternative, which will act as a reference, and all other ASCs will be interpreted relative to that reference. [EPA-HQ-OAR-2022-0829-0705, pp. 13-14]

Implications for EPA:

Implications for EPA. In the draft regulatory impact analysis (DRIA), share weights are interpreted as being a measure of "consumer acceptance of the technology" (DRIA, p.4-5). The language in the DRIA implies that the interpretation is in absolute, rather than relative terms. This language should be modified to clarify the correct interpre- tation of the share weights. [EPA-HQ-OAR-2022-0829-0705, p. 14]

Specifically, the DRIA states "A constant share weight of 1 reflects the long-established nature of ICE technology in the light-duty vehicle market and the expectation that consumer attitudes toward ICE vehicles is stable," (DRIA, p.4-5). This does not have to be the case. Setting a share weight (ASC) to 1 for the ICE vehicles is a normalization, where the ASC of the BEV is measured relative to this baseline. This normalization is arbitrary (it could be set to any value), and it does not imply or reflect the idea that preferences for ICEVs are stable. What matters for model predictions is only the difference in ASCs (and thus share weights) between the ICE vehicle and the BEV. [EPA-HQ-OAR-2022-0829-0705, p. 14]

Recommendation 4. Revise model documentation to interpret share weights as interpretable only in relative terms. An increase in the BEV share weight relative to the ICEV share weight over time means that consumer utility for BEVs (due to factors other than generalized cost) is improving over time. [EPA-HQ-OAR-2022-0829-0705, p. 14]

2. ASCs (and therefore share weights) that change over time relative to the ref- erence represent the combined effect of changing technology and changing consumer preferences: ASCs (and therefore share weights) are lumped parameters representing the consumer utility associated with all other factors influencing their pur- chasing decisions that are not otherwise captured in the utility equation. This includes all other vehicle attributes as well as external considerations, such as ease of finding charging stations, network effects, and other factors influencing consumer preferences for BEVs relative to ICEVs. [EPA-HQ-OAR-2022-0829-0705, pp. 14-15]

Implications for EPA: The increasing share weights for BEVs relative to ICEVs over time represents improvements in BEV attributes other than generalized cost and/or improvements in consumer preferences for BEVs due to other factors than the ve- hicle's attributes. EPA's calibration of ASCs to IHS's share projections implicitly follows IHS's assumptions of the reasons why BEV market shares may increase over time. These are not explicitly described. We find evidence that consumer likelihood of purchasing BEVs could increase in the future if BEV range increases as expected and BEVs are as widely available across the market as ICEVs (Forsythe et al., 2023a) (see Appendix). We did not find evidence that consumer preferences for BEVs indepen- dent of the vehicle's technology improvements statistically significantly changed over a recent 8 year period. As we describe above in Section 1, it is possible that network effects and other factors could increase consumer preferences for BEVs in the future, but our study suggests that technology improvements were the larger factor over the past 8 years. [EPA-HQ-OAR-2022-0829-0705, pp. 14-15]

Recommendation 5. A more transparent approach of justifying increases in BEV share weights over time relative to ICEV share weights would be to use projected im- provements in vehicle attributes from a credible source, like the National Academies. We recommend that in future versions of OMEGA, EPA consider revising the calibra- tion of the share weights combining projected BEV improvements and credible estimates of how these changes would affect consumer willingness to pay for BEVs relative to ICEVs. We discuss such an example in Section 1. [EPA-HQ-OAR-2022-0829-0705, pp. 14-15]

2.2 Choice set

In the demand model used in the proposed rule, as we understand it, EPA models three independent markets (sedan/wagon, CUV/SUV, pickup truck) assumed not to interact. In each market, an aggregated representation of two different types of vehicles compete. This type of demand model is referred to as using ”composite” alternatives Yip et al. (2021). In EPAs model, consumer share is predicted for two composite vehicle types: an internal combustion engine vehicle (ICEV) and a battery electric vehicle (BEV), as illustrated in Figure 6. We discuss, in turn, implications of assuming independent markets, implications of using composite vehicle representations, and potential issues that may arise if the choice sets were changed. [EPA-HQ-OAR-2022-0829-0705, p. 15]

2.2.1 Implications of independent markets

The assumption that these markets are independent restricts substitution patterns, by assuming exogenously that a policy regulating cars and trucks differently will not shift con- sumers from one vehicle class to the other. In practice, policy may induce consumers to shift among these classes. [EPA-HQ-OAR-2022-0829-0705, p. 15]

Recommendation 6. We think EPA's decision to model these markets as independent is a reasonable simplification. We make similar assumptions in our work, described in Sec- tion 1. We do not recommend changing this assumption in the proposed rule because allowing markets to interact can introduce other kinds of substitution pattern issues, such as IIA, and substantial time, critique and peer review would be needed to successfully implement such a generalization. EPA's current assumptions are simple and transparent. However, we do recommend that EPA begin internal and/or external research on choice models that may be capable in future iterations of OMEGA of modeling the potential for policy intervention to induce consumers to shift across vehicle classes. [EPA-HQ-OAR-2022-0829-0705, p. 15]

2.2.2 Implications of composite vehicles

EPA's use of composite vehicle representations of ICEV and BEV offerings has two key advantages:

1. It avoids potential problems from substitution pattern restrictions from the IIA property of the GCAM logit model, as discussed in Section 2.1.1.

2. It reduces the search space so that the grid-search approach used by OMEGA is computationally tractable. [EPA-HQ-OAR-2022-0829-0705, p. 16]

However, the use of composite vehicles carries important implications. Yip et al. (2018) show that using composite vehicles with sales-weighted average attributes can produce substan- tially different choice share predictions than modeling all disaggregated vehicle alternatives (e.g.: make-model-trim), which we call the "elemental" alternatives. Two correction factors, one capturing the number of offerings represented by each composite and another captur- ing the heterogeneity of those offerings, can be used in a model with composite vehicles to recover the choice probabilities of the elemental-level choice set (Yip et al., 2018). [EPA-HQ-OAR-2022-0829-0705, p. 16]

The use of ASCs calibrated to market share data, as used by EPA, can eliminate the discrepancy between composite level choice sets and elemental level choice sets for some, but not all, counterfactual scenarios. Figure 6 of Yip et al. (2018) shows that ASCs eliminate the discrepancy in a baseline scenario and in a counterfactual scenario where BEV and PHEV subsidies are removed (price change only), whereas, without correction factors, models with composite level choice sets predict different choice shares than models with elemental level choice sets for counterfactual scenarios where BEV battery cost is reduced and/or the number of BEV offerings increases. This suggests that the use of composite vehicles can induce changes in predictions for certain counterfactual scenarios relevant to the proposed rule. [EPA-HQ-OAR-2022-0829-0705, p. 16]

Importantly, it is difficult to know the "right" level to model vehicle alternatives to most accurately represent consumer choices. Choice share predictions with the elemental level choice set need not necessarily imply a better match with reality than more aggregated vehicle alternatives. However, modelers should be aware that the use of composites introduces modifications to choice predictions in some counterfactual scenarios. These differences can also affect which vehicle design and pricing decisions are optimal (Yip et al., 2021). [EPA-HQ-OAR-2022-0829-0705, p. 16]

Recommendation 7. Because the current version of OMEGA uses the GCAM logit model, which has the IIA property substitution pattern restriction, we do not think an elemental level vehicle choice set would provide better estimates, and we do not recommend using correction factors to adjust the composite choice set choice shares. However, we do recommend that EPA begin (internal and/or external) research on how future versions of OMEGA that may examine larger choice sets should account for the implications of the use of composite vehicle representations on outcomes, including the potential use of correction factors described in Yip et al. (2018) and other sources. [EPA-HQ-OAR-2022-0829-0705, p. 16]

When using composite vehicle representations with correction factors, increases in the number of vehicles (e.g., different vehicle models) the composite is representing and the heterogeneity of these vehicle offerings increase the consumer utility of the composite. [EPA-HQ-OAR-2022-0829-0705, p. 17]

Recommendation 8. If the proposed rule induces automakers to increase BEV offerings, those increased offerings would increase the ASC (and therefore the share weight) for the BEV composite via composite correction factors, which would increase consumer demand for BEVs further than the simulations currently imply. We recommend that EPA avoid quantitatively accounting for this possibility unless there is credible evidence or justification of the magnitude that the proposed rule may have on vehicle offerings. We recommend that EPA note qualitatively that the proposed rule could increase BEV adoption more than estimated in the model by inducing new vehicle offerings, because new offerings would increase the composite's share weight. We also recommend that EPA begin (internal and/or external) research to investigate the implications of composites and policy-induced vehicle offerings for future versions of OMEGA that may model such effects. [EPA-HQ-OAR-2022-0829-0705, p. 17]

2.2.3 PHEVs

EPA's analysis focuses on internal composition vehicles and battery electric vehicles, ignoring plug-in hybrid electric vehicles (PHEVs) that use electricity for short trips and gasoline for long trips. We expect PHEVs to represent a substantial portion of the fleet mix over the period of the proposed rule. [EPA-HQ-OAR-2022-0829-0705, p. 17]

Recommendation 9. While we do think it would be valuable to assess the implications of PHEVs, we do not recommend doing so with the current automotive choice model ap- proach except potentially as a sensitivity case. The reason is that if a composite PHEV were added to each of the markets in Figure 6, the IIA property substitution pattern restrictions discussed in 2.1.1 would imply that PHEVs compete proportionally with ICEVs and BEVs. Unless there is evidence to support such substitution patterns, we would be concerned that modeled implications of the proposed policy would be partly driven by this substitution pat- tern restriction and could be misleading. Instead, we recommend that EPA pursue (internal and/or external) research described in Section 1 toward developing a future OMEGA model to support future rules that avoids this restriction and informs substitution patterns more directly from empirical data, rather than model assumption. [EPA-HQ-OAR-2022-0829-0705, p. 17]

2.3 Data

As we understand it, EPA's GCAM logit model effectively has three parameters:

1. The discount rate

2. The gamma parameter (which we show in the attached report is equivalent to the utility coefficient for log generalized cost in a logit model)

3. The share weight (which we show is equivalent to a function of the vehicle's alternative- specific constant in a logit model) [EPA-HQ-OAR-2022-0829-0705, pp. 17-18]

Of these parameters, the share weight parameters are calibrated to exogeneous projections from IHS to define the baseline, while the discount rate and gamma parameters are as- sumed exogeneously and determine the consumer response to changes in vehicle efficiency and purchase price induced by the proposed policy. We discuss each in turn and provide recommendations:

1. The discount rate defines the relative importance of purchase cost vs. annual costs (fuel, maintenance, etc.) paid in the future. EPA assumes it to be 10%. This is within the range of empirical estimates that appear in the literature [CITE], and it is consistent with the kinds of opportunity cost opportunities that many consumers have (e.g.: opportunity to pay down loans, credit card debt, etc.). [EPA-HQ-OAR-2022-0829-0705, pp. 17-18]

Recommendation 10. EPA's assumption for discount rate is reasonable and con- sistent with theory and empirical evidence, though a range of equally reasonable as- sumptions could be made. Because the effect of the proposed rule on consumer demand outcomes depends on the discount rate parameter assumption, we recommend that EPA conduct sensitivity analysis to alternative assumptions for the discount rate that are consistent with empirical estimates. Specifically, we recommend testing assumptions x and y because [CITE rationale in literature]. [EPA-HQ-OAR-2022-0829-0705, pp. 17-18]

The gamma parameter defines how much generalized cost weighs in consumer de- cisions relative to the unobserved attributes captured in the ASC (share weight) term. In extremes, if $\gamma = 0$ we expect consumers to choose only due to unobserved attributes in the ASC and for demand to be unaffected by vehicle price, fuel cost, and other costs. As $\gamma \rightarrow \infty$ we expect consumers to deterministically select the alternative with the lowest generalized cost. EPA is using $\gamma = 0.8$, but it is not clear from the model documentation how EPA selected this value or what empirical basis it has. [EPA-HQ-OAR-2022-0829-0705, p. 18]

Recommendation 11. Provide justification for the value of the gamma parameter and conduct sensitivity analysis to determine the degree to which variation in this parameter may change predictions of policy implications. [EPA-HQ-OAR-2022-0829-0705, p. 18]

The share weight, which maps directly to alternative-specific constants (ASCs) in a logit model, represent the utility of all attributes not otherwise captured by generalized cost (e.g., range, accessories, aesthetics, etc.).2 EPA calibrates these ASCs so that the model's resulting choice shares match those predicted by IHS in a baseline ”No Action” scenario: “We calibrated absolute shareweight values so that the overall BEV shares produced by the OMEGA model would align with an external projection of BEV sales published by IHS Markit (IHS Markit 2021)” (EPA, p. 4-8). We reviewed the IHS projects and found that, although IHS states that “the forecast combines both a top down and bottom up approach for transparency, flexibility and traceability”3, the modeling assumptions behind these projections are not fully in the public domain: “The Light Vehicle Sales Forecast and most modules are delivered via AutoInsight, a proprietary web application.”4 ... . Because all vehicle attributes outside generalized cost are captured in the ASC term, which includes potential improvements in vehicle attributes and potential future changes in consumer preferences separate from the vehicle's attributes, there is limited transparency about what kinds of vehicle and consumer changes could produce these outcomes. Our work suggests that consumer preferences may be relatively stable and that some attributes unobserved in EPA's model, like BEV range, may be critical to driving adoption (Forsythe et al., 2023a). The current approach assumes that the proposed policy does not affect unobserved attributes such as by incentivizing automakers to increase BEV range or trade off performance or cargo capacity. [EPA-HQ-OAR-2022-0829-0705, pp. 18-21]

2 More precisely, the log of the share weight of vehicle j is equal to the alternative specific constant, ln(αj) = ξj, where the alternative-specific constant, ξj, represents the average utility associated with all other attributes of the vehicle not represented by xj in the logit consumer utility, uij = βjxj + ξj + ?ij.

3 IHS Markit Automotive Advisory, Slide 11

4 IHS Markit Light Vehicle Sales Forecast, Page 6

Recommendation 12. We recommend that EPA begin (internal and/or external) research to develop consumer choice models based on empirical choice data to charac- terize consumer responses to attributes beyond generalized cost so that future versions of OMEGA can be more transparent in the implied assumptions of the share weight calibration. We provide an example in Section 1. We do not recommend that EPA pursue such a model change for the current rule, since it takes substantial time to de- velop a high quality model, and such models should be subjected to critique and peer review before use. We view EPA's current OMEGA 2.0 model as reasonable for in- forming the current rule. We recommend EPA examine how the model could be further improved in future versions of OMEGA to more clearly justify the assumptions of the share weight callibration. [EPA-HQ-OAR-2022-0829-0705, pp. 18-21]

3 Supporting Information

We provide in an appendix the following supporting documents:

1. Forsythe, C.R., K.T. Gillingham, J.J. Michalek and K.S. Whitefoot (2023) "Technology advancement is driving electric vehicle adoption," Proceedings of the National Academy of Sciences 120(23) e2219396120.

2. Forsythe, C.R., K.T. Gillingham, J.J. Michalek and K.S. Whitefoot (2023) "Will pickup truck owners go electric?" working paper, Carnegie Mellon University and Yale University.

3. Vicente, J., C. Forsythe, K. Gillingham, J.J. Michalek and K.S. Whitefoot (2023) "A review of automotive demand models for informing public policy," working paper, Carnegie Mellon University and Yale University.

4. Yip, A., J.J. Michalek and K. Whitefoot (2018) "On the implications of using composite vehicles in choice model prediction," Transportation Research Part B: Methodological 116 p163-188.

5. Yip, A. H. C., Michalek, J. J., and Whitefoot, K. S. (2021) "Implications of Competitor Representation for Profit-Maximizing Design." ASME Journal of Mechanical Design January 2022; 144(1): 011705. [EPA-HQ-OAR-2022-0829-0705, pp. 18-21]

Organization: POET, LLC

OnLocation also identifies factual issues that call into question the robustness of EPA's assumptions regarding future EV penetration rates. For instance, EPA's projections of BEV sales are almost nine times higher than those of EIA.122 EPA may also be making overly optimistic assumptions regarding battery manufacturing capacity and domestic lithium production.123 [EPA-HQ-OAR-2022-0829-0609, p. 27]

122 Id. at 2.

123 Id.

EPA Summary and Response

The consumer module of OMEGA and RIA Chapter 4.1 have been revised for the FRM and now address many of the comments received on this topic. Before we list those revisions and respond to comments, we note that comments on consumer side modeling allude to consumer demand, PEV acceptance, projected technology shares, third party estimates, heterogeneity among consumers, and technology diffusion. We respond to those comments here only to the extent that they are related to modeling structure, assumptions, and inputs. See Section 13 of this RTC for more on those topics. For example, we discuss the calibration of shareweight parameters here and discuss the factors influencing consumer acceptance that underlie shareweight parameter estimation in Chapter 13. In addition, where commenters make additional recommendations not directly relevant to consumer side modeling such as electricity price, grid reliability, and charging, we refer readers to respective sections of the Preamble, RIA, and this RTC.

Revisions to consumer side modeling and corresponding RIA text include the following:

- EPA has revised vehicle choice sets to include PHEVs.
- EPA has estimated re-calibrated shareweights to include PHEVs, recent research of PEV acceptance, and recent third party-projections of PEV market shares that include BIL and IRA.
- EPA has assumed that consumers include in their purchase decision estimated annual vehicle miles traveled equal to 15,000 miles.
- EPA has revised RIA Chapter 4 text to reflect the correct value of the logit parameter and describe the rationale behind the value of the logit parameter.
- EPA has revised RIA Chapter 4 text to provide additional information on the annual non-fuel ownership costs consumers incorporate into their purchase decision.
- EPA has revised Chapter 4 text to include reasons for increases in BEV and PHEV shareweights over time, while reference case shareweights for ICE vehicles remain static.

These revisions, documented in RIA Chapter 4, address most of the comments on consumer side modeling. We discuss comments in more detail below. Note that commenters Jeremy Michalek et al. provided a comprehensive description of EPA's consumer side modeling in their comments. We refer readers to their excellent exposition. In addition, they situated EPA's consumer side modeling in the broader context of "random utility discrete choice models" and their own review of "over 200 automotive demand model studies in the scientific literature and government reports." Importantly, they state "random utility discrete choice models to be the dominant paradigm for modeling automotive demand, with the logit model and its variants most commonly used. Thus, EPA's demand model follows the dominant paradigm and inherits the properties of random utility discrete choice models." For those reasons, and because Jeremy Michalek et al. very clearly highlight the comments that require response (i.e., what they call recommendations), we employ the structure they provide to organize our response to all comments relevant to consumer side modeling. Importantly, we exclude the recommendations for future research and future rulemakings.

"Recommendation 2. If EPA considers model variations that involve larger vehicle choice sets, EPA should carefully consider the implications of the Independence of Irrelevant Alternatives (IIA) property of the GCAM logit model and/or augment the model to relax the IIA restriction." In response, EPA has included PHEVs in vehicle choice sets, representing consumer choice among three technology options – BEVs, PHEVs, and ICE vehicles.[430] We have effectively made "alternative assumptions about the unobserved consumer utility error term." In lay terms, we have assumed in the absence of evidence to the contrary, that consumers view BEV, PHEVs, and ICE vehicles as three distinct choices. In other words, when it comes to choosing a vehicle, PHEVs are in a category of their own, just like BEVs and ICE vehicles are..

"Recommendation 3. We recommend that EPA not modify the GCAM logit model to capture heterogeneity when finalizing the proposed rule (provided that only two alternatives remain in each of the demand simulations as described above) because doing so may introduce additional complications and take substantial time to execute correctly with peer review." In response, EPA has not modified the logit model to capture heterogeneity (despite adding a third alternative) because current PEV sales and registration data are not sufficiently representative of mainstream consumers to adequately support a model that captures heterogeneity. Relatedly, the Alliance for Automotive Innovation suggests that modeling the geographic diffusion of BEVs is important for accurately gauging the customer acceptance of the national standards. In response, we disagree. Empirical evidence is insufficient to support a modeling endeavor of that granularity, nor is it imperative. As Jeremy et al. points out and every good modeler knows, models require are a simplifications, and there are pros and cons to every modeling approach. EPA has opted for an approach that is well-situated as the dominant paradigm and chosen a level of granularity that is consistent with available data.

"Recommendation 4. Revise model documentation to interpret share weights as interpretable only in relative terms. An increase in the BEV share weight relative to the ICEV share weight over time means that consumer utility for BEVs (due to factors other than generalized cost) is improving over time." In response, EPA has revised the corresponding text accordingly.

"Recommendation 5. A more transparent approach of justifying increases in BEV share weights over time relative to ICEV share weights would be to use projected improvements in vehicle attributes from a credible source, like the National Academies." In response, EPA has revised RIA Chapter 4 text to include reasons for increases in BEV and PHEV shareweights over time due to increased awareness and access, while reference case shareweights for ICE vehicles remain static.

"Recommendation 6. We think EPA's decision to model these markets [i.e., model consumer decision making within body style] as independent is a reasonable simplification. …We do not recommend changing this assumption in the proposed rule." In response, EPA continues to model consumer choice within body styles.

[430] Note that the producer module includes a larger choice set of technology to choose from in meeting the standards, including different levels of non-plug-in hybrid technology. These are combined into "ICE" for the purposes of consumer choice in the consumer module.

"Recommendation 7. Because the current version of OMEGA uses the GCAM logit model, which has the IIA property substitution pattern restriction, we do not think an elemental level vehicle choice set would provide better estimates, and we do not recommend using correction factors to adjust the composite choice set choice shares." In response, EPA continues to use composite vehicles and does not use correction factors.

"Recommendation 8. If the proposed rule induces automakers to increase BEV offerings, those increased offerings would increase the ASC (and therefore the share weight) for the BEV composite via composite correction factors, which would increase consumer demand for BEVs further than the simulations currently imply. We recommend that EPA avoid quantitatively accounting for this possibility unless there is credible evidence or justification of the magnitude that the proposed rule may have on vehicle offerings. We recommend that EPA note qualitatively that the proposed rule could increase BEV adoption more than estimated in the model by inducing new vehicle offerings, because new offerings would increase the composite's share weight." In response and consistent with Recommendation 4, EPA has revised RIA Chapter 4 text to include reasons for increases in BEV and PHEV shareweights over time due to increased awareness and access, where "access" includes the availability of PEVs with desired body style.

Recommendation 9. While we do think it would be valuable to assess the implications of PHEVs, we do not recommend doing so with the current automotive choice model approach except potentially as a sensitivity case" due to concerns related to Independence from Irrelevant Alternatives. In response, EPA disagrees. As stated in response to Recommendation 2, In response, EPA has included PHEVs in vehicle choice sets, representing consumer choice among three technology options – BEVs, PHEVs, and ICE vehicles. We have assumed in the absence of evidence to the contrary, that consumers view BEV, PHEVs, and ICE vehicles as three distinct choices. In other words, PHEVs are not any more like a BEV than they are like an ICE vehicle. We have also recalibrated shareweights to be consistent with moderate third-party projections of technology market shares.

"Recommendation 10. EPA's assumption for discount rate is reasonable and consistent with theory and empirical evidence, though a range of equally reasonable assumptions could be made. Because the effect of the proposed rule on consumer demand outcomes depends on the discount rate parameter assumption, we recommend that EPA conduct sensitivity analysis to alternative assumptions for the discount rate that are consistent with empirical estimates." In response, EPA appreciates that Jeremey Michalek et al. state that our assumption for discount rate is reasonable and consistent with theory and empirical evidence. As a result, we did not conduct sensitivity analysis of the discount rate.

"Recommendation 11. Provide justification for the value of the gamma parameter and conduct sensitivity analysis to determine the degree to which variation in this parameter may change predictions of policy implications." In response, we have corrected RIA Chapter 4 text to show that the logit parameter is -8. The negative sign of the logit parameter reflects that alternatives are represented with costs (i.e., lower cost items are generally preferred) and the magnitude of the logit parameter regulates the degree to which relative costs affect choice among battery electric, plug-in hybrid electric, and ICE vehicle technologies. In our modeling, the magnitude of the logit is specified to allow for market penetration of lower and higher priced vehicles which is consistent with other models and with shareweight parameters.

This concludes the consumer side modeling comments provided by Jeremy Michalek et al.

In addition, ICCT recommends EPA model MDV consumers as valuing at least 5 years of fuel savings. In response, EPA offers a clarification. In OMEGA, the consumer purchase decision for MDV is not modeled the same way as it is for LD consumers. LD consumers' purchase decisions differ from producers' assumptions about consumers' purchase decision, however MDV consumers incorporate fuel savings exactly as producers assume they do, which is set to 2.5 years for this analysis. We appreciate the logic of ICCT's argument. We also note that there is no consensus around the role of fuel consumption in vehicle purchase decisions, and the evidence discussed in RIA Chapter 4.4.1.1 states that automakers "perceive that typical consumers would pay upfront for only one to four years of fuel savings." Thus, EPA finalized this rule assuming 2.5 years of fuel savings are incorporated into MDV purchase decisions. See RIA Chapter 4.4 or RTC Section 14 for more information on the choice of 2.5 years of fuel savings in purchase decisions.

Commenters suggested that the estimates of PEV market shares are too high and offer comparisons to, for example, U.S. Energy Information Administration.[431] Annual Energy Outlook 2023, S&P Global Mobility, Bloomberg, Benchmark Minerals Intelligence (BMI), and the International Council on Clean Transportation (ICCT). In response, we note that we have revised OMEGA projections since the NPRM (See RIA Chapter 8) and demonstrated several compliance pathways. We have also updated consumer side modeling to include PHEVs in addition to BEVs, hybrids, and ICE vehicles and re-calibrated shareweight parameters accordingly. In addition, we have re-calibrated PEV acceptance parameters, taking into account recent third-party studies that include the BIL and IRA (See RIA Chapter 4.1.2). As a result, we conclude that projections of PEV market shares in the FRM central case are reasonable estimates of vehicle technology market shares. Our parametrization of PEV acceptance is based on the scientific literature on consumer acceptance, and the resulting central case estimate of future PEV market shares is consistent with moderate third-party estimates (See RIA Chapter 4.1.2). Importantly, we reviewed lower and higher third-party estimates of PEV market shares, and calibrated to the moderate cases. Furthermore, we acknowledge the uncertainty inherent in any estimate, and as a result, we have projected PEV market share for slower and faster PEV acceptance. These sensitivities, along with others shown in RIA Chapter 12, lead us to conclude that compliance can be achieved under a broad range of PEV acceptance and adoption rates. (See RIA Chapter 4.1.3 and RIA Chapter 12.1.4).

12.1.3 - Effects/emissions reductions modeling

Comments by Organizations

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA's Analysis Of Net Emissions Is Flawed

[431] Some commenters characterize EPA estimates of technology market shares as "assumptions" To be absolutely clear, EPA has not assumed growth in PEV adoption. Rather, we have estimated vehicle technology adoption usingt OMEGA. PEV adoption estimates are model outputs that follow from several modeling inputs, including acceptance, technology costs, and consumer costs. They also follow from the modeled interaction of producer and consumer decision making. See RIA Chapters 8.1, 8.2, and 8.3.

EPA estimates that the proposed rule will result in a net reduction of GHG, criteria air pollutant, and air toxic emissions in 2055. See 88 Fed. Reg. at 29,198. That estimate is dubious. In numerous ways, EPA has underestimated the up- stream emissions—i.e., those that do not come from the vehicle itself but can still be attributed to its manufacture and operation—that will result from a widespread shift to electric vehicles. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

First, EPA improperly cabins its upstream analysis to only those emissions caused by electricity generating units ("EGUs") and refineries. See 88 Fed. Reg. at 29,198, 29,347, 29,353, 29,355; Draft RIA at 9-32–33. But the emissions as- sociated with powering a vehicle—whether by electricity from an EGU or fuel from a refinery—are far from the only ones reasonably attributed to its opera- tion. Depending on the vehicle, there are also emissions associated with pro- ducing, recycling, and disposing of batteries; operating charging infrastructure; and extracting, refining, transporting, and storing petroleum fuels. These emis- sions can be substantial and, when considered together, may undermine EPA's assumption that swapping internal-combustion-engine vehicles for electric ones will necessarily result in an environmental good. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

The International Energy Agency's discussion of emissions from mining il- lustrates this point. According to the IEA, "the production and processing of energy transition minerals are energy-intensive" and involve "relatively high emission[s]." Role of Critical Minerals at 15, 130; see also Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet, Am. Transp. Rsch. Inst., https://ti- nyurl.com/3ktjd85v ("Mining and processing produce considerable CO2 and pollution issues."). For this reason, producing an electric vehicle is a more car- bon-intensive process than producing a conventional one. Role of Critical Miner- als at 194. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

EPA never explains why emissions from EGUs and refineries are the only ones relevant to the analysis. Instead, it acknowledges that "[t]he upstream emissions inventory does not account for all upstream sources related to vehicles, fuels, and electricity generation, such as charging infrastructure, stor- age of petroleum fuels, battery manufacture, etc." Draft RIA at 8-14. But EPA makes no attempt to justify that selective, incomplete approach. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

Moreover, EPA's current position marks a change from settled agency prac- tice. In earlier GHG and criteria-pollutant rulemakings, the agency did con- sider additional upstream sources in assessing net emissions. See SAFE Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, 85 Fed. Reg. 24,174, 24,872 (Apr. 30, 2020) (noting that emissions "model accounts for up- stream emissions" from "extraction, transportation, refining, and distribution of . . . fuel"); Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57,106, 57,301 (Sept. 15, 2011) ("To project these impacts, EPA estimated the impact of reduced pe- troleum volumes on the extraction and transportation of crude oil as well as the production and distribution of finished gasoline and diesel."); Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, 81 Fed. Reg. 73,478, 73,852 (Oct. 25, 2016) ("To project these impacts, Method B estimated the impact of reduced petroleum volumes on the extraction and transportation of crude oil as well as the production and distribution of finished gasoline and diesel."). The agency has not acknowl- edged its change in position here, let alone explained "why the new approach" of ignoring these upstream emissions "better comports with . . . the provisions that Congress enacted." Am. Fed'n of Gov't Emps. v. FLRA, 25 F.4th 1, 12 (D.C. Cir. 2022). That is reason enough to conclude that "the [agency] has not, in fact, engaged in reasoned decisionmaking." Id. (internal quotation marks and brackets omitted). Nor could EPA offer a valid explanation for its change. Up- stream emissions are more important in the current rulemaking than they were in previous regulations given that EPA, for the first time, intends to effectively mandate widespread adoption of electric vehicles, which (as explained above) produce emissions primarily through upstream sources. [EPA-HQ-OAR-2022-0829-0683, p. 56]

Second, EPA's assessment of EGU emissions is flawed. EPA assumes that emissions associated with increased demand for electricity will decrease over time because of projected changes in the future generation mix, including "in- creasing use of renewables." 88 Fed. Reg. at 29,303–04, 29,198, 29,353. That expectation is based on speculation that various provisions of the IRA will sub- stantially alter the power-generation mix. See id. at 29,303–04; Draft RIA at 5-9–10. But even if the power-generation mix changes in the way EPA predicts— i.e., even if EGUs alter the sources they use to power their base loads in the way EPA anticipates—analysis of EGU emissions must also account for the pro- spect that EGUs will switch to other sources to address peak loads, including those that will inevitably occur if the proposed rule is adopted. [EPA-HQ-OAR-2022-0829-0683, pp. 56-58]

Providing electricity to meet peak loads can have a disproportionately high impact on emissions, which cannot be adequately captured by looking at "av- erage emissions" (i.e., carbon intensity) across the electricity sector. Stephen P. Holland et al., Why Marginal CO2 Emissions Are Not Decreasing for US Electricity: Estimates and Implications for Climate Policy, Nat'l Acad. of Scis., at 1 (2022). For example, according to a recent study, changes in the electricity sector have caused EGUs to rely increasingly on coal to meet demand that exceeds their typical capacity. Id. ("More recently, however, changes in the electricity sector have pushed coal, which has the greatest CO2 intensity, to more frequently be used as the marginal fuel for generation, thereby increasing marginal emissions."). "[E]stimates of marginal emissions" thus "are needed to accurately evaluate the impacts of policies or behaviors that cause changes in the demand or supply of electricity." Id. at 2. [EPA-HQ-OAR-2022-0829-0683, pp. 56-58]

The authors of the study demonstrated the importance of this point in the context of electric vehicles. They analyzed the Biden Administration's goal to make half of new vehicle purchases electric by 2030 and concluded that, when taking marginal emissions into account, "the increase in electricity sector CO2 emissions . . . would undo more than half of the reductions from reducing the number of gasoline-fueled, light-duty vehicles." Holland et al., Why Marginal CO2 Emissions Are Not Decreasing, supra, at 2. By contrast, if they had instead looked only at average emissions, "the emissions reductions would [have been] overestimated by somewhere between 27% and 114%." Id. [EPA-HQ-OAR-2022-0829-0683, pp. 56-58]

EPA does not explain whether or how it takes marginal emissions into ac- count when estimating EGU emissions. Although the agency indicates that its power-sector modeling shows an increase of renewables, it makes clear that, even under its predictions, renewables will not entirely displace coal or natural gas. See 88 Fed. Reg. at 29,303–04 (explaining that its "[p]ower sector modeling results showed that the increased use of renewables will largely displace coal and (to a lesser extent) natural gas EGUs" (emphases added)). Neither the notice of proposed rulemaking nor the draft regulatory impact analysis discusses the marginal-emissions concept, and stakeholders were denied an opportunity to study the agency's complicated modeling given the exceedingly short window for public comment. [EPA-HQ-OAR-2022-0829-0683, pp. 56-58]

Given the importance of this issue, EPA should clearly explain whether it considered marginal emissions. If it has, EPA should explain how it analyzed that aspect of the problem and how it affects EPA's projection of reduced emis- sions. If EPA has not considered the issue, it should do so, or at a minimum, explain why it believes that omission to be justified.6 [EPA-HQ-OAR-2022-0829-0683, pp. 56-58]

6 EPA does not even address the impact that hydrogen production—necessary for powering fuel-cell vehicles—would have on net emissions.

Finally, EPA may be substantially overestimating the decrease in refinery emissions. The agency's "central analysis estimates that . . . reduced liquid fuel demand results in reduced domestic refining." 88 Fed. Reg. at 29,358; see also id. at 29,198, 29,353. But at the same time, EPA "recognize[d] that there is significant uncertainty in the impact on refinery emissions due to decreased demand." Draft RIA at 8-12. Indeed, there is a distinct "possibility that reduced domestic demand for liquid fuel would have no impact on domestic refining." 88 Fed. Reg. at 29,358 (emphasis added); see Draft RIA at 8-12 ("If refineries do not decrease production in response to lower domestic demand" and "in- crease exports" instead, total upstream emissions "would be higher," not lower. (emphasis added)). EPA must explain the basis for its assumption that refiner- ies will decrease production before it factors these sizeable reductions into the calculation. See Int'l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 645 (D.C. Cir. 1973) (explaining that EPA must "support its methodology as reliable" with more than "speculation"). [EPA-HQ-OAR-2022-0829-0683, p. 58]

In sum, EPA's analysis of upstream emissions rests on unfounded assump- tions and methodological choices that are skewed in favor of the proposed rule. EPA should withdraw its proposal and conduct a more thorough assessment of the ways in which a widespread shift to electric vehicles will impact overall emissions.7 [EPA-HQ-OAR-2022-0829-0683, p. 58]

7 EPA's superficial analysis of upstream emissions also undermines its discussion of "the envi- ronmental justice impacts of [its] proposal." 88 Fed. Reg. at 29,393; see id. at 29,199, 29,393–97. Although the agency acknowledges that upstream emissions can negatively affect certain populations, it improperly discounts those negative effects by failing to consider emissions as- sociated with anything other than EGUs and refineries, speculating that the emissions from EGUs will decrease over time due to changes in the future generation mix, and overestimating the decrease in refinery emissions.

Organization: American Fuel & Petrochemical Manufacturers

1. EPA overstates the environmental benefits

EPA touts several emissions benefits in the Proposed Rule from shifting the light-duty vehicle fleet to ZEVs. But EPA's analysis is lopsided in favor of its preferred technology. In analyzing environmental costs and benefits, EPA overlooks negative environmental consequences of ZEVs from increased power generation, vehicle usage, ZEV tire wear, the EV manufacturing supply chain, and battery replacements and disposal at the end of their useful life. Notably, EPA fails to assess net emissions. Although EPA modeled changes to power generation anticipated by the Proposed Rule as part of its upstream analysis, EPA does not consider the potential degradation of air quality in areas in the direct vicinity of existing or new power plants.204 [EPA-HQ-OAR-2022-0829-0733, pp. 44-45]

204 Id. at 29,379 (noting that although "[e]missions from upstream sources would likely increase in some cases (e.g., power plants) and decrease in others (e.g., refineries), EPA projects that the Proposed Rule will result in a total decrease in emissions of certain pollutants").

EPA assumes the power sector is expected to shift over time to using significantly more wind/solar generation and electricity storage (i.e., batteries), but ignores the environmental impacts of the overall increase in critical minerals demand for electrical grid storage and how that compounds the stress on critical minerals for the ZEVs themselves. But the expansion of electrical grids—even ignoring the Proposed Rule's increased demand—requires a large amount of earth minerals and metals. Copper and aluminum, which are both needed for ZEVs, are also the two main materials in wires and cables and, as described above, higher prices could have a major impact on future grid investments and EV costs.205 The need for expanded grid capabilities simultaneous to expanded ZEV production places a more pressing demand on materials like copper and aluminum thereby increasing extraction and refining efforts throughout the global market. [EPA-HQ-OAR-2022-0829-0733, pp. 44-45]

205 IEA Report 2022.

EPA's Proposal unreasonably relies on comparing ICEV's and ZEV's performance based on EPA's own vastly different fuel economy testing procedures for these two different technologies and incorrectly assumes it is an apples-to-apples comparison. This error significantly undermines EPA's estimates of potential environmental benefits. EPA has cherry- picked the data underlying its analysis to boost the estimated environmental benefits from EVs compared to ICEVs by a significant percentage. EPA's proposal is based on performance data estimates of ICEV fuel economy using EPA's "5-cycle method", i.e., Federal Test Procedure-75 ("FTP") at regular and cold temperatures, Highway Fuel Economy Test ("HWFET") and High- Speed Driving (US06) and Use of Air Conditioning (SC03). EPA's proposal is also based on performance data estimates of ZEV fuel economy that (unlike the testing for ICEVs) never account for EVs operating: above a top speed of 60 mph (whereas ICEVs are tested at 80 mph), above an acceleration rate of 3.2 mph/sec (whereas ICEVs are tested at 8.46 mph/sec); in real world temperatures (ZEVs are tested at optimal battery performance temperatures of approximately 75 degrees F, while ICEVs are tested at 20 degrees F and 95 degrees F); with air conditioning and heating (EPA assumes ZEVs never used air conditioning or heating). See AFPM Comments on the Department of Energy Petroleum-Equivalent Fuel Economy Calculation and Petition for Rulemaking, 88 Fed. Reg. 21525 (April 11, 2023) (Attachment 3) [EPA-HQ-OAR-2022-0829-0733, pp. 46-47]

These discrepancies are unreasonable and arbitrary. If EPA's analysis were based on real-world fuel economy testing of ZEVs, it would show they use vastly higher amounts of electricity to travel the same distance, with a corresponding increase in power sector emissions and ZEV maintenance and battery replacement and associated environmental impacts. EPA must account for these differences and environmental impacts. [EPA-HQ-OAR-2022-0829-0733, pp. 46-47]

EPA incorrectly assumes that ZEV owners will pay the national average residential electricity price to charge their vehicles. EPA fails to consider that the majority of ZEVs in the U.S. are located in utility service territories with some of the highest electricity rates in the country and that the average EV owner currently pays a much higher price to charge their ZEV at home than the national average residential electricity rate. Given that EV penetration has varied widely across the U.S., it would be arbitrary to assume that EVs will, unlike in the past, penetrate uniformly across the U.S. and thus that the average electricity price would be representative of the actual cost electricity. For example, California, which has roughly 40 percent of all registered ZEVs in the U.S., has a residential electricity rate that is roughly double the national average. Considering that EPA is modeling its rule after a California-like approach to mandate ZEVs, it would be more appropriate for EPA to assume similar real-world costs (at a minimum, given California's temperate climate). Moreover, EPA fails to consider that mandating such a high ZEV sales rate will necessarily require exponential increases in commercial ZEV charging at rates that are currently three, four or five times higher than the current national average residential electricity rate, depending on location and charging speed. Those customers who are not homeowners and not able to install their own charging stations and take advantage of charging at low-cost times will be adversely impacted. Instead, EPA uses a residential rate for electricity and does not consider peak power or time of use charges. California electric prices rose 42 percent - 78 percent between 2010 and 2020 and are projected to rise an additional 50 percent by 2030 as shown in Figure 9. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

SEE ORIGINAL COMMENT FOR Historic and Forecasted Residential Average Rates Based on Most Recent 5-year Average Rate Increase. Figure 9:

Source: Michael Shellenberger, Twitter (citing California Public Advocate's Office data), April 27, 2021). [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Heaping additional demand for EV charging into this market could exacerbate already high electricity prices. This will be especially impactful to lower-income homeowners who may not be able to install dedicated charging units, forcing them to pay more out of pocket for charging during peak demand periods.265 [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

265 Hardman, Scott, et al., "A Perspective on Equity in the Transition to Electric Vehicles." MIT Science Policy Review, (Aug. 20 2021), available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/ (accessed June 29, 2023).

EPA must revise its analysis to account for realistic electricity prices. The proposed ZEV mandate will require an enormous investment in power generation and distribution, resulting in nationwide increases in electricity bills that EPA has not considered. Of course, considering the additional trillions of dollars in costs would paint a clear picture that the costs of forced electrification far exceed even the inflated benefits EPA presented in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

As previously mentioned, EPA did not fully consider the impact of the rule on fleet turnover. The Agency is aware that the higher purchase price of new ZEVs will keep older cars and trucks on the road longer and that new ZEVs will increase particulate matter ("PM") emissions through increased tire and road wear.

Organization: American Honda Motor Co., Inc.

Marginal abatement cost of shifting from 1.0 mg/mi to 0.5 mg/mi is exceedingly high

Using EPA's own cost estimate for a GPF, one can compute a marginal abatement cost of PM emissions. On a per-vehicle basis, improving from 1.0 mg/mi (Honda's suggested alternative of aligning with California's LEV IV program nationwide) to 0.5 mg/mi will result in an additional emissions savings of 0.0001075 metric tons over the life of a vehicle. As shown in Table 2 below, EPA estimates $128.60 per GPF, a conservative estimate as that excludes any costs associated with testing, development or updating of laboratory hardware. In spite of this, the agency's estimated GPF costs still amount to a marginal abatement cost of approximately $1.2 million per metric ton of PM2.5. This number stands in stark contrast to the $160,000/ton maximum marginal abatement cost threshold for control strategies which EPA set for their December 2022 PM 2.5 NAAQs rulemaking.28 Comparatively, the PM2.5 marginal abatement cost being considered for this multipollutant rule is nearly 7.5 times as high. [EPA-HQ-OAR-2022-0829-0652, p. 16]

28 EPA, 2022. Regulatory Impact Analysis for the Proposed Reconsideration of the National Ambient Air Quality Standards for Particulate Matter. Available online at https://www.epa.gov/system/files/documents/2023- 01/naaqs-pm_ria_proposed_2022-12.pdf

Table 2. PM2.5 Marginal Abatement Cost, EPA Proposal vs. Nationwide LEV IV adoption

*Based on Average Cost of GPFs for ICE Vehicles represented in EPAs central case proposed vehicle standards

Program: LEV IV

Emissions Rate (mg/mi): 1.0

GPF needed?: No

GPF Cost ($): $0

Lifetime Emissions (metric tons): 0.000215

Marginal Abatement Cost ($/metric ton): none

Program: EPA Proposal

Emissions Rate (mg/mi): 0.5

GPF needed?: Yes

GPF Cost ($): $128.60

Lifetime Emissions (metric tons): 0.000108

Marginal Abatement Cost ($/metric ton): none

Program: Marginal Benefit of EPA Proposal

Emissions Rate (mg/mi): none

GPF needed?:none

GPF Cost ($): none

Lifetime Emissions (metric tons): 0.0001075

Marginal Abatement Cost ($/metric ton): $1,196,279

[EPA-HQ-OAR-2022-0829-0652, p. 16]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Maintaining reductions from conventional vehicles

While CARB notes the tremendous benefits associated with ZEV deployment, it is also important to continue to reduce GHG emissions across the fleet. Due to the inherent flexibility of a performance standard, U.S. EPA's proposal does not specify or require manufacturers to meet any particular technology mix to comply with the fleet average standards so long as a manufacturer's calculated compliance values can meet the fleet average; manufacturers are not limited in the emission rates of any individual vehicle model as long as their overall sales-weighted fleet average does not exceed the standard. Indeed, combining the estimated BEV penetration rates U.S. EPA's model projects with its proposed GHG standards, the standards allow for the GHG emission rates for the remaining non-BEVs to increase from approximately 240 g/mi in 2027 to approximately 250 g/mi in 2032 with the fleet overall still achieving compliance with the standards. [EPA-HQ-OAR-2022-0829-0780, pp. 13-15]

To understand this potential increase, CARB analyzed U.S. EPA's modeled fleet results for the 2022 through 2032 MYs. To remove the possibility that the higher average emissions in the later years is simply a result of the types or sizes of vehicles remaining as conventional vehicles, this analysis evaluated only the vehicles that U.S. EPA's model projected to remain as internal combustion engine vehicles from the 2022 through 2032 MYs (approximately 33 percent of the 2032 MY sales). As shown in Figure 1, the projected sales-weighted average tailpipe emissions from this subset of vehicles initially declines to approximately 240 g/mi by the 2028 MY but then increases to 255 g/mi by the 2032 MY. 9 Although not all of the individual vehicle models in this subset display this trend, the average trend is not driven by a few high-volume models; the individual emission profiles of the majority of vehicle models decrease and then increase to a higher emission rate in 2032 than in earlier MYs. Furthermore, this projected increase in emission rates is not trivial. Three-quarters of the vehicles in this subset increase their emissions by more than 20 g/mi, with some models increasing by as much as 80 g/mi. These increases represent roughly a 10 to 40 percent increase in emissions from their lowest levels. Such a finding indicates that GHG-reducing technologies would be removed from the vehicles at scheduled redesign intervals for cost savings or other reasons. [EPA-HQ-OAR-2022-0829-0780, pp. 13-15]

9 The 255 g/mile emission level represents the 2-cycle tailpipe emission levels before any credits, which is most reflective of the technologies installed on the vehicles. The 250 mg/mi figure mentioned above represents the certification value after accounting for credits used for compliance.

[See original for graph titled "Figure 1: Average GHG Tailpipe Emission Values for Internal Combustion Vehicles in U.S. EPA Proposal"] [EPA-HQ-OAR-2022-0829-0780, pp. 13-15]

While some may suggest this is an artifact of the model solving for the lowest-cost method to comply and that any increased emissions are offset by additional more cost-effective reductions on other vehicle models, the proposed standards allow for such a backsliding by manufacturers as they implement increased levels of BEVs. And, to the extent that a manufacturer implements even more BEVs than U.S. EPA has modeled, the increase in GHG emission levels from the remaining conventional vehicles could be even larger. Although removing or undoing certain emission control strategies may involve additional costs that would prevent an auto manufacturer from actually decontenting as the model projects, there are some that would be relatively easy, such as replacing an aluminum hood with a steel one. Additionally, manufacturers could eliminate some of the lower-emitting model variants and instead offer variants that would effectively result in greater emissions over time. The complementary, proposed Tier 4 criteria pollutant standards would not provide any protections against such changes due to different control technologies and strategies used for controlling different pollutants. [EPA-HQ-OAR-2022-0829-0780, pp. 13-15]

While the fleet average approach ensures that this portion of the fleet getting dirtier is offset by other portions of the fleet getting cleaner, there currently is no guard against a backwards step in GHG emission levels on a significant portion of vehicles. At a time where every GHG reduction feasible needs to be considered, there should be additional protections against vehicles redesigning in later years to remove cost-effective technologies and emit at higher levels. Simply because those technologies are superseded in cost-effectiveness by BEVs does not mean they are no longer cost-effective themselves, especially relative to more costly emission reductions outside of the light-duty vehicle sector. Additionally, there is a risk of increased real-world GHG emissions not accounted for in the regulatory impact analysis of the proposed standards if those who continue to purchase conventional vehicles (while most new vehicle offerings are ZEVs) drive more miles than U.S. EPA estimates. [EPA-HQ-OAR-2022-0829-0780, pp. 13-15]

If non-ZEVs were required to stay at their lowest levels throughout the regulatory period, manufacturers could meet a more stringent fleet average standard than U.S. EPA's proposal without increasing the projected ZEV share. Maintaining these lowest emission levels would also provide consumer benefits; as U.S. EPA has analyzed in its proposal, operating cost- savings are an important metric in assessing emission standards and these savings are generally expected to be higher for lower-emitting vehicles. Furthermore, to the extent that conventional vehicles are purchased by lower-income households, operating cost-savings associated with lower-emitting conventional vehicles may be especially beneficial given that transportation costs are typically a larger share of their household budgets. [EPA-HQ-OAR-2022-0829-0780, pp. 13-15]

Organization: Clean Fuels Development Coalition et al.

B. The proposed rule misstates emissions benefits because it neglects upstream electric generating unit emissions, among others.

In addition to underestimating costs, the proposal also overstates benefits. The most egregious of these comes from the way EPA accounts for upstream emissions for electric generating units ("EGU"). See DRIA 8-10, 11. To realize substantial reductions in GHG emissions—and thus benefits from such emissions—the rule relies on the decrease in emissions from petroleum-fueled vehicles replaced by electric vehicles. But these vehicles are themselves still responsible for emissions from the electricity that powers them. Current electricity GHG emissions factors are approximately 442,000 U.S. Tons of CO2 / Terawatt-Hour. How much carbon dioxide is produced per kilo watt hour of U.S. electricity generation, Energy Information Administration, https://www.eia.gov/tools/faqs/faq.php?id=74&t=11 (last accessed July 5, 2023). [EPA-HQ-OAR-2022-0829-0712, pp. 34-35]

This is unrealistic. Emissions reduction on the U.S. electric grid have thus far come primarily from natural gas replacing coal. To continue to lower CO2 emissions in this manner would require an almost complete conversion to low carbon sources. But barriers to wind, solar, and nuclear adoption will not enable these changes on EPA's timeframe. Furthermore, researchers estimate that the 350 million EVs required to decarbonize the fleet in 2050 could use as much as half of US national electricity demand. Thea Riofrancos et al., Achieving Zero Emissions with More Mobility and Less Mining, U.C. Davis Climate + Community Project (Jan. 2023), https://sub- scriber.politicopro.com/eenews/f/eenews/?id=00000185-e562-de44-a7bf-ed7751a00000. [EPA-HQ-OAR-2022-0829-0712, pp. 34-35]

These costs also ignore that realizing these reductions requires the installation of new solar and wind generation, which itself has a cost. Without additional wind and solar generation, upstream emissions from electricity generating units will not decrease as much as EPA expects, diminishing those benefits. In addition to the direct costs of this generation, the proposal also ignores the greenhouse gas emission associated with manufacturing more, less dense, remotely located intermittent generation sources, and the battery back-up; transmission, substation, and transformer investment to integrate these technologies into the power grid; and natural gas peaking capacity necessary to sustain their intermittency. These emissions are significant and must be accounted for in the calculation of any benefits of the proposed rule. [EPA-HQ-OAR-2022-0829-0712, pp. 34-35]

Organization: Donn Viviani

Also not addressed is evidence that the increased weight of BEVs com- pared to comparable ICE vehicles, because of battery weight, will result in nonexhaust emissions (NEE) of particulate matter (PM) that will significant- ly lessen or even may exceed the proposal's anticipated reductions. While there is controversy as to whether NEE PM is as large as exhaust PM, with evidence on both sides. What is known for certain however, is that heavier vehicles produce more NEE PM and BEVs are significantly heavier than in-ternal combustion vehicles17. While it is true BEVs regenerative braking removes most brake-NEE, the greater torque of BEVs will cause some ag- gressive drivers to produce increased NEE PM18. This needs to be ac- knowledged and to the extent practicable included in the benefit assess- ment. In my view, the potential climate benefits of the necessary transi- tion to EVs is too important to risk with an inadequate analysis as to other effects. [EPA-HQ-OAR-2022-0829-0546, pp. 5-6]

17 Liu, Ye, et al. "Comparative analysis of non-exhaust airborne particles from electric and in- ternal combustion engine vehicles." Journal of Hazardous Materials 420 (2021): 126626.

18 Liu, Ye, et al. "Impact of vehicle type, tyre feature and driving behaviour on tyre wear under real-world driving conditions." Science of the Total Environment 842 (2022): 156950.

Organization: Elders Climate Action

II. MODELING ANALYSIS

To estimate the emission reduction benefits of the regulatory approach that we ask EPA to adopt, we have performed modeling using Emfac to quantify the emission reductions that would be achieved in the South Coast and San Joaquin Valley (SJV) Air Quality Management Districts (AQMDs). [EPA-HQ-OAR-2022-0829-0737, pp. 8-10]

CARB has developed estimates of the NOx reductions needed for attainment in South Coast and SJV AQMDs. CARB has identified emissions from federally regulated transportation source sectors as the primary cause of nonattainment after the implementation of stationary and area source measures included in the draft ozone SIP. These source sectors include out-of-state (OOS) trucks traveling into and through California, commercial shipping and aircraft operations in CA. [EPA-HQ-OAR-2022-0829-0737, pp. 8-10]

In these comments we fault EPA for not identifying the degree of emission needed to help states achieve the emission reductions needed for ozone and PM2.5 attainment. To address that objection, we have prepared modeling analyses of two scenarios to estimate the contribution to attainment in the two most polluted ozone NAs in the U.S. where 20 million Americans are at risk from exposure to frequent (more than 100 days per year) daily violations of the ozone NAAQS, that include the most extreme daily peak concentrations measured in the U.S. [EPA-HQ-OAR-2022-0829-0737, pp. 8-10]

The two scenarios we test are the emission reductions achieved by applying the proposed NOx standards for L/MDVs in Option 1 to OOS trucks operating in the AQMDs, and a scenario that reduces emissions from those trucks to zero based on a zero emission standard. [EPA-HQ-OAR-2022-0829-0737, pp. 8-10]

III. CLIMATE CRISIS REQUIRES ZERO EMISSION STANDARDS TO ACCELERATE TRANSITION TO ZERO GHG ECONOMY

The science is clear: stabilizing the climate before it becomes too hot to support human civilization is another reason beyond attaining the ozone NAAQS in all of America's 230 nonattainment counties why GHG emissions from on-road vehicles must be reduced to zero as soon as possible. In his Climate Executive Order President Biden declared that the policy of the United States is to "put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050."1 [EPA-HQ-OAR-2022-0829-0737, pp. 8-10]

1 Executive Order to Tackle Climate Change (January 27, 2021). Sec. 201. Policy. Even as our Nation emerges from profound public health and economic crises borne of a pandemic, we face a climate crisis that threatens our people and communities, public health and economy, and, starkly, our ability to live on planet Earth. Despite the peril that is already evident, there is promise in the solutions— opportunities to create well-paying union jobs to build a modern and sustainable infrastructure, deliver an equitable, clean energy future, and put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050. We must listen to science — and act. We must strengthen our clean air and water protections. We must hold polluters accountable for their actions. We must deliver environmental justice in communities all across America. The Federal Government must drive assessment, disclosure, and mitigation of climate pollution and climate-related risks in every sector of our economy, marshaling the creativity, courage, and capital necessary to make our Nation resilient in the face of this threat. Together, we must combat the climate crisis with bold, progressive action that combines the full capacity of the Federal Government with efforts from every corner of our Nation, every level of government, and every sector of our economy. It is the policy of my Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure. Successfully meeting these challenges will require the Federal Government to pursue such a coordinated approach from planning to implementation, coupled with substantive engagement by stakeholders, including State, local, and Tribal governments.

The President's declared policy responds to and is supported by the science which makes clear that the climate will continue to heat up so long as humanity continues to increase GHG levels in the atmosphere. The global mean temperature reached 1.2 o C above the pre-industrial baseline in 2020 [2] which has produced massive damage and destruction to property and natural systems, and caused hundreds of deaths, displacement, homelessness and loss of livelihoods for tens of thousands of Americans from extreme floods, drought, wildfires, hurricanes and tornadoes. [EPA-HQ-OAR-2022-0829-0737, pp. 8-10]

2 World Meteorological Organization, State of the Global Climate, 6 (April 2021); available at doc_num.php (wmo.int). WMO uses the “1850–1900 baseline as an approximation of pre-industrial levels.” Id.

Organization: Energy Innovation

Alternative 1 projects a fleet-wide CO2 target that is 10 g/mile lower on average than the proposed rule targets, representing a 67 percent reduction in average GHG emissions targets, from the MY 2026 standards, compared with the projected 56 percent reduction for the proposed rule.27 While the stringency in Alternative 1 does not represent a huge jump from the proposed rule, the adjustment from the proposed rule would boost BEV penetration rates from 67 to 69 percent in the year 2032. See Table 96 below from the proposed rule.28 [EPA-HQ-OAR-2022-0829-0561, pp. 11-12]

27 U.S. EPA, 29331.

28 U.S. EPA, 29332-3.

[See original attachment for Table 96 – Fleet BEV Penetration Rates, by Body Style, Under Alternative 1] [EPA-HQ-OAR-2022-0829-0561, pp. 11-12]

According to the EPA’s modeling, Alternative 1 will also further reduce GHG emissions and other pollutants, compared with the proposed rule and other alternatives.29 See Tables 8 and 9 from the proposed rule below. As the EPA aptly states, “[r]educing GHG emissions, including the three GHGs (CO2, CH4, and N2O) affected by this program, will contribute toward the goal of holding the increase in the global average temperature to well below 2[degrees]C above pre-industrial levels, and subsequently reducing the probability of severe climate change related impacts including heat waves, drought, sea level rise, extreme climate and weather events, coastal flooding, and wildfires.”30 Similarly, Alternative 1 would result in greater reductions in criteria pollutants and air toxics, which would result in greater public health benefits and improvements to air quality. [EPA-HQ-OAR-2022-0829-0561, pp. 11-12]

29 U.S. EPA, 29350-3.

30 U.S. EPA, 29199.

[See original attachment for Table 8 – Comparison of Proposed Car Standards to Alternatives, and Table 9 -Comparison of Proposed Truck Standards to Alternatives] [EPA-HQ-OAR-2022-0829-0561, pp. 11-12]

Organization: Marathon Petroleum Corporation (MPC)

Renewable liquid fuels can play a critical role in a multifaceted solution for reducing carbon emissions, particularly those from the transportation sector. The renewable liquid fuel industry is well-positioned to produce the renewable fuels needed to help attain the EPA’s emissions goals.

However, EPA has ignored the emission-reduction benefits provided by renewable liquid fuels in its proposed vehicle emissions standards because EPA did not account for the assumption that the CO2 emissions from renewable liquid fuel combustion are zero. [EPA-HQ-OAR-2022-0829-0593, pp. 1-2]

Organization: POET, LLC

EPA should leverage all available technologies to begin reducing carbon emissions from LDVs as promptly as is technologically feasible. This position is consistent with EPA's own statements. The Proposed Rule explains "EPA's rules have historically not required the use of any particular technology" and EPA sets standards "without a priori limiting its consideration to a particular set of technologies."13 [EPA-HQ-OAR-2022-0829-0609, p. 7]

13 See id. at 29232.

Yet EPA contradicts its own stated approach by proposing a rule that effectively requires one technology for LDVs—BEVs. POET engaged OnLocation to use EPA's own OMEGA model to determine what might happen if the auto industry falls short, even by a little, of EPA's optimistic predictions for BEV adoption. OnLocation's modeling, set out in its report attached to this letter as Attachment 1, shows that "no amount of technological improvements for ICE vehicles incorporated by EPA for their supporting analysis with the OMEGA model for ICE vehicles can compensate for even a relatively small reduction in the penetration rate of BEVs."14 OnLocation also finds that, when one accounts for the upstream emissions from BEVs, the Proposed Rule's target of 86 grams per mile in 2032 cannot be met. If BEV deployments drop only a few percentage points below EPA's very aggressive projections, and if BEV upstream emissions are accounted for, the proposed standards are impossible to meet, even with BEVs. Given this microscopic margin for error, EPA must not omit other technologies, such as renewable fuels, and in particular, bioethanol, that can immediately begin to dramatically reduce LDV emissions on a lifecycle basis. [EPA-HQ-OAR-2022-0829-0609, p. 7]

14 Attachment 1, OnLocation Report, at 3 (June 30, 2023).

B. EPA Has Relied on Unreasonable and Unsupported Assumptions in Its Assessment of GHG Emissions Reductions.

The Trinity report also addresses certain unfounded assumptions in EPA's assessment of GHG emissions reductions and has identified the following flaws. [EPA-HQ-OAR-2022-0829-0609, pp. 24-25]

First, EPA ignores upstream emissions from BEVs other than emissions from electricity generation.105 EPA's assessment assigns 710 metric tons of GHG emissions from the increased electricity needed to power BEVs incentivized by the Proposed Rule. However, the Trinity report demonstrates that EPA's assessment significantly undercounts those emissions. The report cites a recent study showing that between "56 to 494 kilograms of CO2eq emissions per kWh of battery pack capacity which translates to between about 5 and 50 metric tons of GHG emissions per 100 kWh battery pack."106 Using this study and EPA's estimate of 80 million BEVs on the road by 2055, Trinity calculates additional upstream emissions between 400 and 4,000 metric tons.107 That is in addition to the 710 metric tons EPA calculates for electricity generation. [EPA-HQ-OAR-2022-0829-0609, pp. 24-25]

105 Attachment 2 at 10.

106 Id.

107 Id.

V. OMEGA Modeling Highlights the Feasibility Challenges of EPA's Proposed Rule and How Biofuels Could Make the Rule More Workable.

After conducting a series of runs using EPA's OMEGA model, OnLocation in the attached report concludes that EPA's Proposed Rule on light-duty vehicle emissions "has significant shortcomings in achieving its stated goal of reducing GHG emissions."111 OnLocation finds that compliance with the Proposed Rule "can only be achieved through a narrow range of BEV vehicle penetration pathways."112 While EPA relies on BEV penetrations around 67% of new light-duty vehicle sales in 2032, OnLocation finds that if a production limit of 60% is imposed on BEVs in that general timeframe, compliance with the target emission goals is prevented through 2034.113 When a BEV production limit of 50% is similarly imposed, compliance is generally not achieved throughout the timeframe covered by the Proposed Rule and not even through the year 2050.114 Furthermore, ICE vehicles cannot make up the difference in GHG emissions reductions.115 This result occurs because EPA does not consider the lifecycle benefits of biofuels while artificially assigning zero emissions to BEVs (ignoring the upstream emissions of BEVs), and for other reasons that may include EPA assigning unduly low battery costs to BEVs. [EPA-HQ-OAR-2022-0829-0609, p. 26]

111 Attachment 1, at 2, 16.

112 Id. at 1.

113 Id. at 7 & Fig. 4.

114 Id. 4 & Fig. 1.

115 OnLocation found "no amount of technological improvements for ICE vehicles incorporated by EPA for their supporting analysis with the OMEGA model for ICE vehicles can compensate for even a relatively small reduction in the penetration rate of BEVs." See id. at 3.

Introduction

Peter Whitman and Michael Schaal of OnLocation ("Authors") have been asked to review the assumptions and modeling in support of the U.S. Environmental Protection Agency's ("EPA's") proposed "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," under Docket ID No. EPA–HQ–OAR–2022–0829–0451 ("Proposed Rule"), that addresses standards for criteria pollutants and greenhouse gases (GHG) for light-duty vehicles and Class 2b and 3 (''medium-duty'') vehicles for model years 2027 through 2032. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

OnLocation's Analysis

In this analysis, we reviewed EPA's assumptions and then we performed a series of test scenarios to observe the robustness of the results obtained using EPA's OMEGA (Optimization Model for reducing Emissions of Greenhouse Gases from Automobiles) model. This OMEGA model is the same model that EPA used in the Proposed Rule for its analysis of compliance scenarios.1 [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

1 Available at https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions- greenhouse-gases

EPA's Assumptions

We focus on two interrelated aspects of the rulemaking: using only tailpipe emissions for compliance with the MY 2027 – 2032 standards and only a narrow range of BEV penetration trajectories that will allow compliance to be achieved. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

Our key insight is that compliance can only be achieved through a narrow range of BEV vehicle penetration pathways. We demonstrate this through a set of runs using EPA's OMEGA model described below. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

In addition, we note that upstream emissions are a significant contributor to GHG emissions and ignoring them has implications for aligning the incentives for compliance to the Proposed Rule with its intent, reductions in GHG emissions. This leads to the following observations:

- Should upstream emissions for all fuels, including electricity, be incorporated in compliance, projections of grid carbon emissions vary widely, and according to our modeling using the OMEGA model, EPA's proposed standard of 86 grams/mile in 2032 cannot be met when using EIA's projected electric grid carbon intensities. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

- Upstream manufacturing emissions are an important differentiator between vehicles but are not accounted for. Using only tailpipe emissions provides inconsistent incentives between BEVs and ICE vehicles, while EPA's optimistic projections for the grid carbon intensity and BEV penetration could reduce the effectiveness of the Proposed Rule in reducing carbon. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

- Because upstream emissions are ignored in the Proposed Rule, the shape of the GHG footprint-based compliance curve depends on the assumed BEV penetration, even though it is only applicable to ICE vehicles. If BEVs penetration is different than EPA projections, then EPA's proposed compliance curves are likely to be inconsistent with the analysis used in their development and penalize larger footprint vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

Per the Summary at the end of this report, our analysis of the EPA's Proposed Rule on light-duty vehicle emissions finds it has significant shortcomings in achieving its stated goal of reducing GHG emissions. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

Uncertainty in BEV Penetration Rate

In its proposal, EPA forecasts almost 70% BEV penetration will occur in MY 2032 across the light duty categories (passenger car, crossover/SUV, and light truck), or over 10 million BEVs. In addition, this compliance pathway would require almost 40% BEV penetration in the medium-duty van and pickup truck categories. By comparison, EIA projects approximately 1.5 million BEVs in 2050, with only 1.2 million in 2032.2 Thus, EPA's projections of sales of approximately 11 million BEVs are almost nine times higher than those of EIA, the leading U.S. governmental source for independent energy statistics and analysis.3 [EPA-HQ-OAR-2022-0829-0609, p. 36]

2 Annual Energy Outlook (AEO) 2023 Reference Table 38, https://www.eia.gov/outlooks/aeo/tables_ref.php

3 Regarding BEV sales in EPA's analysis, EPA finds 15,834,010 total light duty vehicle sales in 2032 (Draft Regulatory Impact Analysis Table 4-18) multiplied by 70% BEV penetration (Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Fact Sheet, EPA-420-F-23-009 pg. 5).

Battery production is a key constraint in the EV penetration rate. Supporting material on the battery production from S&P Global and Argonne National Laboratories5 are based on battery manufacturing plant announcements rather than more definitive metrics such as plants under construction. EPA has focused on lithium as the constraining critical material for battery production, and growth in domestic lithium production is based on infrastructure that has not yet been built. None of the studies referenced directly incorporate the level of U.S. EV penetration proposed in the Proposed Rule. The assumptions underlying EPA's proposed path merit further analysis by EPA and call into question the robustness of EPA's assumptions regarding future EV penetration rates. [EPA-HQ-OAR-2022-0829-0609, p. 36]

5 "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Federal Register Vol. 88, No. 87, pg. 29317

OnLocation's analysis using OMEGA

OnLocation executed numerous runs of the OMEGA model to test the boundaries of its domain and the robustness of the supporting analysis. We describe the model and then the scenarios executed to illustrate some of the limitations of the modeling and the lack of robustness of the Proposed Rule to changes in market assumptions. [EPA-HQ-OAR-2022-0829-0609, p. 37]

About the OMEGA Model

The OMEGA model was designed by the EPA to visualize the future of the car industry and its environmental effects. OMEGA can produce predictions about a wide range of the light-duty vehicle (LDV) market. Within OMEGA, there are different parameters that act as preset events, of which those specified in the Proposed Rule are used for this investigation. The specific outputs of importance for this project are the emissions (CO_2g/mi) per vehicle class (pickup, sedan, crossover, and SUV) and the market share of battery electric vehicles (BEVs) versus internal combustion engines (ICE). [EPA-HQ-OAR-2022-0829-0609, p. 37]

Description of Scenarios Using the OMEGA Model

In order to demonstrate the fairly narrow set of conditions that would allow compliance with the Proposed Rule, we executed the following runs of the OMEGA model to test the robustness of the Proposed Rule:

Scenario 1: 50% Market Share Production Limit on BEVs

Scenario 2: Relaxed (60%) Market Share Production Limit on BEVs Scenario 3: Modified Battery Cost Learning [EPA-HQ-OAR-2022-0829-0609, p. 37]

These scenarios demonstrate that no amount of technological improvements for ICE vehicles incorporated by EPA for their supporting analysis with the OMEGA model for ICE vehicles can compensate for even a relatively small reduction in the penetration rate of BEVs. [EPA-HQ-OAR-2022-0829-0609, p. 37]

Finally, we look at three scenarios showing the effect of upstream emissions and low-carbon fuels on meeting the Proposed Rule.

Scenario 4: Adding Upstream Emissions to the Compliance Values Scenario 5: 10% Reduction in Carbon Intensity of Gasoline, Scenario 6: 75% Reduction in Carbon Intensity of Gasoline [EPA-HQ-OAR-2022-0829-0609, p. 37]

The first three OMEGA runs show a narrow range of BEV penetration pathways will allow sufficient reductions to support compliance with the Proposed Rule, and that reductions in BEV market share cannot be compensated for by ICE technology improvements. The latter three runs show that low carbon fuels could potentially play an important role in GHG emission reductions. [EPA-HQ-OAR-2022-0829-0609, p. 37]

Testing the Robustness of the Proposed Rule using OMEGA

OnLocation executed numerous runs of the OMEGA model to test the boundaries of its domain and the robustness of the supporting analysis. The following scenarios explore some of the limitations of the modeling and the lack of robustness of the Proposed Rule to changes in market assumptions. [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

Scenario 1: Production Limit on BEV Production

[See original attachment for Figure 1 Compliance Path with Production Limit] [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

[See original attachment for Figure 2 Market Shares] [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

In Scenario 1, only tailpipe emissions were included for compliance purposes, while potential BEV penetration was limited to 30% in 2025, 40% in 2030, and 50% from 2035 onwards. Figure 1 shows the effects of BEV production limits. From 2027 through 2051, the target is not reached. Figure 2 below shows the evolution of the market share of different vehicle categories for this scenario, where the BEV production limits are binding at 30%, 40%, and then 50%. It is clear that the BEV penetration constraints limit the ability of manufacturers to meet the target, as the fuel efficiency improvements available for ICE vehicles are insufficient to compensate for the zero tailpipe emissions of the BEV vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

In Figure 1 and in each of the following figures labeled “Compliance Path,” the blue line indicates the target emissions while the red line indicates achieved emissions. Yellow circles indicate banked credits from previous periods, while the green lines indicate inter-temporal credit trades. The red circles indicate fleet does not reach compliance in that year. [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

Scenario 2: Relaxed Production Limit on BEV Production [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

[See original attachment for Figure 3 Compliance Path with Relaxed Production Limit] [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

[See original attachment for Figure 4 Market Shares with Relaxed Production Limit] [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

Scenario 2 follows the CO2 targets in the Proposed Rule, with no upstream emissions. In this scenario, production limits on BEVs were relaxed relative to Scenario 1. BEV penetration was initially limited to 40%, rising to 50% in 2030 and 60% in 2035 for the remainder of the scenario. Even these relaxed production limits on BEV market penetration were binding throughout the simulation (Figure 3), preventing compliance with the target emission goals through 2034 (Figure 4). [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

Scenario 3: Modified Learning Coefficient

[See original attachment for Figure 5 Compliance Path with Modified Learning Coefficient] [EPA-HQ-OAR-2022-0829-0609, pp. 41-42]

[See original attachment for Figure 6 Market Shares with Modified Learning Coefficient] [EPA-HQ-OAR-2022-0829-0609, pp. 41-42]

Scenario 3 involves modifying the battery learning curve (i.e., the extent to which EPA projects battery costs will decline) by setting the learning equation to be constant. As shown in Figure 5 and Figure 6, BEV market share collapses after 2025 to the 2021 level, and emissions are far from the target level even as total costs over the model horizon (e.g., through 2055) are over $2.5 trillion dollars more expensive than in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, pp. 41-42]

However, we believe this is an artifact of model inputs, not likely to be representative of slow learning for batteries. Nonetheless, the significance of this potential impact merits a thorough evaluation of this issue by EPA, and an updated analysis of the impacts of learning curve rates on costs in in its OMEGA model. [EPA-HQ-OAR-2022-0829-0609, pp. 41-42]

The effect of low-carbon fuels

The first three scenarios all identified the risks of developing a new set of rules which are highly dependent on a high BEV market share being achieved. In the next three scenarios, we examine the effect of upstream emissions and low-carbon fuels in achieving the targets of the Proposed Rule. The first scenario evaluated in this regard follows on the next page. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

Scenario 4: Adding Upstream Emissions

[See original attachment for Figure 7 Compliance Path with Upstream Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

[See original attachment for Figure 8 Market Shares with Upstream Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

In Scenario 4, upstream emissions were added to the compliance calculations for gasoline, diesel, and electricity (these upstream emissions for BEVs include grid impacts, but BEV battery manufacturing impacts are not included). The AEO2023 EIA Reference Scenario was used to calculate upstream emissions of grid electricity. As shown in Figure 7 and Figure 8, with the addition of upstream emissions, the BEV market share rises to over 80%, much greater than the 67% market share in the central case of the Proposed Rule. To achieve this BEV market share, the domestic infrastructure would have to grow at an accelerated rate. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

This figure shows that using the OMEGA model, EPA's proposed standard of 86 grams/mile in 2032 cannot be met if upstream emissions are also included. Furthermore, actual BEV lifecycle emissions would be even higher if battery manufacturing impacts are considered. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

In this scenario, the LDV fleet does not reach the modelled target emission until 2036, and compliance is intermittent throughout the model forecast. EPA's having such stringent target emission goals. which rely to such a degree on the implementation of BEVs into the market, ignores the importance of upstream emissions, as model runs indicate upstream emissions generally render any achievable fleet of BEVs and ICE vehicles (within the current technology packages of the model, which don't include biofuels carbon intensity reductions) out of compliance with EPA's proposed standard. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

Scenario 5: Low Carbon Fuel

[See original attachment for Figure 9 Compliance Path with Low Carbon Fuel (gasoline with 10% lower Carbon Intensity)] [EPA-HQ-OAR-2022-0829-0609, pp. 45-46]

[See original attachment for Figure 10 Market Shares with Low Carbon Fuel] [EPA-HQ-OAR-2022-0829-0609, pp. 45-46]

In Scenario 5, starting in 2030, gasoline combustion emissions were reduced by 10% to represent the introduction of low-carbon biofuels such as bioethanol. No upstream emissions were included within the model. This scenario effectively provides compliance flexibility for the Proposed Rule, leading to a 0.2% to 0.4% reduction in the absolute market share of BEVs from 2035-2050. Greater reductions in the need for high BEV shares could potentially result if the model is revised to (i) assess a broader range of battery learning curve algorithms, and (ii) the "zero emissions" treatment assigned to BEVs is refined. Further evaluation of these issues is warranted by EPA to ensure that small changes in BEVs under this scenario 5 (e.g., lower carbon intensity gasoline) are not a result of artifacts of the modelling. [EPA-HQ-OAR-2022-0829-0609, pp. 45-46]

Scenario 6: Adding Low Carbon Fuel and Upstream Emissions

[See original attachment for Figure 11 Compliance Path with Low Carbon Fuel and Upstream Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

[See original attachment for Figure 12 Market Shares with Low Carbon Fuel and Upstream Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

Scenario 6 presents a 75% reduction in fuel carbon intensity for gasoline, though including upstream emissions including those for BEVs. Figure 11 and Figure 12 show that using the model compliance with the Proposed Rule's targets still could be achievable, though outside of 2027 – 2032 timeframe when considering both upstream emissions and the impact if biofuels reduce ICE vehicle carbon intensity by 75%. In this scenario, the market share of BEVs only changes slightly from the Proposed Rule, however in the model greater total emission reductions (i.e., those that consider upstream emissions) are achieved by deploying low-carbon ICE vehicles. This scenario shows that with lower-carbon ICE fuels (such as low carbon bioethanol), and considering upstream emissions, compliance within the range of EPA's proposed target is possible. [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

2. Similarly, U.S. EPA has used assumptions to estimate the GHG reductions associated with the Proposed Rule that are unreasonable and unsupported. These lead to the benefits of the Proposed Rule being overstated. [EPA-HQ-OAR-2022-0829-0609, p. 53]

Review of U.S. EPA's Assessment of Reductions in GHG Emissions Due to BEVs

At a high level, the U.S. EPA's assessment of the reductions in GHG emissions due to the Proposed Rule, presented in Chapter 9 of the DRIA, is straightforward. The agency uses its MOVES emissions inventory model to estimate GHG emissions from conventional vehicles and then subtracts the GHG emissions associated with the electricity used to power BEVs. The methodology used to estimate emissions from electricity generation is presented in Chapter 5.2 of the DRIA. In estimating GHG emissions associated with electricity, U.S. EPA assumes that all BEVs will be charged using grid electricity. Unfortunately, while the basic approach used in the assessment is straightforward there are a number of concerns resulting from the way it was implemented by U.S. EPA. [EPA-HQ-OAR-2022-0829-0609, p. 62]

The first of these concerns is that U.S. EPA has ignored upstream sources of GHG emissions other than electricity generation. This is of particular concern given that there are significant upstream emissions associated with the manufacturer of batteries for BEVs that do not occur with conventional vehicles. A paper published by ICCT4 notes that estimates of these GHG emissions range from 56 to 494 kilograms of CO2eq emissions per kWh of battery pack capacity which translates to between about 5 and 50 metric tons of GHG emissions per 100 kWh battery pack. Using U.S. EPA's assumption that the Proposed Rule will result in an additional 80,000,000 BEVs on the road in the U.S. by 2055 relative to the no[1]action case, and these estimates of GHG emissions from battery production, the cumulative increase in GHG emissions by would be between 400 and 4000 metric tons. This value can be compared to U.S. EPA's 710 metric ton estimate of the cumulative GHG emissions increase due to electricity generation for BEVs and the 8,000 ton reduction from conventional vehicles (see DRIA Table 9-21) to show the importance of accounting for battery production emissions. U.S. EPA might respond by noting that they have not accounted for upstream GHG emissions associated with the production of gasoline and diesel, but those are small compared to the GHG emissions from fuel combustion and accounting for them would assume a net global reduction in the use of those fuels which would likely, even with the Proposed Rule, still be used in other parts of the developing world. [EPA-HQ-OAR-2022-0829-0609, p. 62]

The next concern is with U.S. EPA's assumptions regarding the mix of electricity generation sources which are shown in DRIA Figure 5-8. This figure is reproduced below and compared to similar projections prepared by EIA as part of AEO 2023.5 The EIA projections reflect the impacts of the IRA for several cases including a "high uptake" (e.g. most optimistic case) case of solar and wind generation technologies which are depicted in yellow and green, respectively that can be compared directly to the green portion of the bars in Figure 5-8. By 2050, EIA estimates maximum amounts of solar and wind generation that are about 20% less than U.S. EPA's estimates with the difference being made up by coal and natural gas generation. What this means is that U.S. EPA is overstating the contribution of low emissions generation (solar and wind) and thereby underestimating the magnitude of upstream GHG emissions that will result from BEV operation. [EPA-HQ-OAR-2022-0829-0609, p. 62]

Continuing, U.S. EPA uses the emission factor equations presented in DRIA Table 9-12 to estimate GHG from electricity generation as a function of time over the period from 2020 through 2050. These equations predicted that emissions of CO2, methane, and nitrous oxide due to electricity generation will decline by 89, 96, and 98% respectively over the 2020 to 2050 period and if extrapolated to 2054 that there will be no emissions in the U.S. occurring from Power Plants. Even accounting for the increase in demand for electricity over the period, U.S. EPA claims that GHG emissions from electricity generation will be reduced by about 80% from 2020 through 2030 compared to EIA's forecast of about 50%. At a minimum, U.S. EPA should explain in detail the reasons why their forecast of future GHG emissions from electricity generation are so much lower than those generated by EIA and more appropriately perform a sensitivity analysis to quantify the GHG reductions associated with the Proposed Use using EIA's emission forecasts. [EPA-HQ-OAR-2022-0829-0609, pp. 62-63]

[See original attachment for U.S. net electricity generation by fuel] [EPA-HQ-OAR-2022-0829-0609, pp. 62-63]

[See original attachment for Figure 5-8: 2028 through 2055 power sector generation and grid mix] [EPA-HQ-OAR-2022-0829-0609, pp. 62-63]

The U.S. EPA Emission Inventory analysis in Chapter 9 also overstates the GHG reductions associated with the Proposed Rule by failing to account for the fact that conventional vehicles operate on fuels that are a mixture of fossil and low-carbon renewable fuels – including ethanol, renewable diesel fuel and biodiesel fuel. Based on data from EIA,6 the average ethanol content of gasoline sold in the U.S. is expected to increase from about 10% to 12% between now and 2050 while the average content of the combination of renewable and biodiesel is expected to increase from about 7% to 10% over the same range. Although the actual impact of proper accounting for renewable fuels on CO2 emissions from the Proposed Rule will be slightly smaller than the percentages listed above, they should clearly be accounted for by U.S. EPA. It is also important to note that use of ethanol and other renewable fuels capable of reducing GHG emissions from both new and in-use HD vehicles could be increased through incentives like those that have been provided to electricity and hydrogen through the IRA and the structure of the Proposed Rule. In addition, the magnitude of GHG reductions due to the use of ethanol and other renewable fuels could be increased by greater use of carbon capture and storage during their production, which would further lower their carbon intensity. [EPA-HQ-OAR-2022-0829-0609, p. 64]

6 https://www.eia.gov/outlooks/aeo/data/browser/#/?id=11-AEO2023&cases=ref2023&sourcekey=0.

Taken together, all of the concerns discussed above suggest that GHG emission benefits of the Proposed Rule are likely to be substantially less than claimed by U.S. EPA. [EPA-HQ-OAR-2022-0829-0609, p. 64]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

We believe the uncertainty in CARB's report on 2045 fuel neutrality26 argues for EPA to be broad minded and nimble in adopting regulations, plans and incentives to reach the 2045 carbon neutrality goal and implies long-term use of low carbon fuels with Strong PHEVs. In addition, reaching very high levels of ZEV sales in the next decade frees up large amounts of biofuels for use in spark-ignited and compression-ignited engines such as the strong PHEVs allowed in the proposed rule. [EPA-HQ-OAR-2022-0829-0646, p. 26]

26 E3 report for CARB at 11. “ Many key uncertainties remain around the achievement of carbon neutrality in California. One of these uncertainties is the optimal use and deployment of zero-carbon fuels in hard-to-electrify sectors, including certain high temperature industrial processes, heavy-duty long-haul trucking, aviation, trains and shipping. These fuel uses may be met with a combination of fossil fuels, hydrogen, synthetic zero-carbon fuels or biofuels. It is still uncertain how the relative costs of these technologies will evolve over time. As the cost of wind and solar decline, the cost of renewable hydrogen production is also falling, making hydrogen a more attractive solution than biofuels for some applications. The market for sustainable biofuels remains nascent, making it uncertain how much sustainable biomass supply will be available, and what the best uses for these biomass resources will be through mid-century.” See https://ww2.arb.ca.gov/resources/documents/achieving-carbon- neutrality-california-final-report-e3

Organization: Toyota Motor North America, Inc.

6.2. Technology Assessments Should Incorporate Critical Mineral Supply and Lifecycle Emissions

The modeling should also include a sensitivity analysis of BEV/PHEV mix on critical mineral usage for any assumed overall PEV penetration. PHEVs can make the most efficient use of the limited battery supply and constrained infrastructure network forecast through the period of the rulemaking. The below example compares different vehicle powertrain emissions for a mid-size SUV using peer-reviewed data from carghg.com. The same amount of lithium in the battery of one 300-mile plus BEV can be used for up to six PHEVs –or more than eighty conventional hybrids. See Figure 10 for the CO2 saved from replacing a mid-sized SUV powered by a conventional gasoline engine with electrified alternatives under a constrained lithium supply. This analysis assumes average US electric grid emissions for BEVs and the electric operation of PHEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

[See original for attachment for Figure 10 CO2 Saving from Replacing ICEs Under Constrained Mineral Supply] [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

PHEVs can rival the emissions performance of BEVs under many real-world operating conditions. PHEVs are not always the best-performing option but can have as good or better lifecycle performance because of lower manufacturing emissions for smaller batteries and lower well-to- tank emissions while still covering a significant fraction of daily trips in electric drive. Given most average daily trips are under 50 miles, this results in a significant portion of all-electric miles like a BEV. [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

Organization: Valero Energy Corporation

2. The charging efficiencies adopted by EPA for purposes of this proposed rule are arbitrarily inconsistent with other contemporaneously proposed rules.

EPA adopts the following charging efficiency rates for use in this rulemaking:13: [EPA-HQ-OAR-2022-0829-0707, p. 3]

13 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023-03-25-11-46-49-ld-central-compliance-run.zip, “onroad_fuels_20220325.csv”

[EPA-HQ-OAR-2022-0829-0707, p. 3]

fuel_id	start year	unit	Refuel efficiency	Transmission efficiency

US electricity	2020	kWh	0.9	0.935

The EV charging efficiencies used by EPA in this rulemaking are inconsistent with those used in other proposed rulemakings: [EPA-HQ-OAR-2022-0829-0707, p. 3]

- In the "Draft Regulatory Impact Analysis: RFS Standards for 2023-2025 and Other Changes," to support the generation of eRINs, EPA used an EV charging efficiency of 85% and a line loss factor of 5.3%, yielding a total loss rate of 19.5%.14 [EPA-HQ-OAR-2022-0829-0707, p. 3]

14 EPA "Draft Regulatory Impact Analysis: RFS Standards for 2023-2025 and Other Changes" (EPA-420-D-22-003) at 329, November 2022.

- EPA's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 15 assume charging efficiencies ranging from 88.0 to 89.25% across MY 2027-2032, failing to account for transmission line losses. [EPA-HQ-OAR-2022-0829-0707, p. 3]

15 EPA "Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles: Phase 3 Draft Regulatory Impact Analysis" (EPA-420-D-23-001) at 227, April 2023.

- Here, EPA proposes a third distinct set of charging efficiency and line loss. [EPA-HQ-OAR-2022-0829-0707, p. 3]

EPA provides no explanation for why the efficiency values should differ among the three proposed rules. [EPA-HQ-OAR-2022-0829-0707, p. 3]

7. The upstream emission factor that EPA uses for transportation electricity is not consistent with other EPA sources and does not represent full lifecycle emissions from electricity generation. [EPA-HQ-OAR-2022-0829-0707, p. 10]

EPA's OMEGA modeling uses the following GHG emission factors for electricity:42 [EPA-HQ-OAR-2022-0829-0707, p. 10]

42 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "policy_fuels_20220722.csv."

fuel_id	start year	unit	direct_co2e_grams_per_unit	upstream_co2e_grams_per_unit
Electricity	2020	kWh	0	325 [EPA-HQ-OAR-2022-0829-0707, p. 10]

EPA explains the origin of the 325 gCO2e/kWh upstream emissions factor with the note "20220722 electricity upstream set at midpoint of high BEV 353 g/mi and low BEV 297 g/mi effects values."43 But the correct units for this emission factor are gCO2e/kWh – not g/mi – so the origin note does not make sense. [EPA-HQ-OAR-2022-0829-0707, p. 10]

43 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "policy_fuels_20220722.csv."

By contrast, EPA's 2021 eGRID reports a U.S. grid average 857.0 lbsCO2e/MWh, which is equivalent to 389 gCO2e/kWh. However, this factor represents emissions from electricity generation only and does not account for line losses or for the "well-to-power plant" GHG emissions associated with the extraction and processing of the power plant fuel. [EPA-HQ-OAR-2022-0829-0707, p. 10]

EPA must correct the emission factor adopted for transportation electricity and adequately explain any discrepancies with other EPA sources. [EPA-HQ-OAR-2022-0829-0707, p. 10]

8. EPA must update its gasoline emission factors to reflect a Tier 3 E10 certification fuel.

EPA's OMEGA modeling uses the following GHG emission factors for electricity:44

44 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "policy_fuels_20220722.csv."

fuel_id	start_year	unit	direct_co2e_grams_per_unit	upstream_co2e_grams_per_unit
gasoline	2020	gallon	8887	2478

[EPA-HQ-OAR-2022-0829-0707, p. 10]

The direct emission factor of 8,887 gCO_2e/gallon of gasoline is based on Tier 2 E0 gasoline.45 However, EPA is proposing in this rulemaking to update the gasoline certification fuel to a Tier 3 E10 gasoline, so it must update the direct CO_2e emissions accordingly. [EPA-HQ-OAR-2022-0829-0707, p. 10]

45 75 Fed. Reg. 25330 (May 7, 2010).

Organization: Wisconsin Department of Natural Resources

3. Compliance flexibilities. Throughout the rule, EPA proposes a variety of compliance flexibilities (e.g., allowing several compliance pathways and proposing changes to the compliance factor adjustment) that are intended to facilitate implementation of the standards and encourage earlier emissions reductions. EPA should carefully assess those flexibilities to ensure they do not unintentionally reduce the stringency of the rule or result in real world emissions that would exceed the standards. [EPA-HQ-OAR-2022-0829-0507, p. 2]

EPA Summary and Response

Summary:

Commenters argued that EPA's estimated emissions reductions were wrong because they ignore vehicle production, recycling, and disposing of batteries; mining and processing of battery minerals; operating charging infrastructure; extracting, refining, transporting, and storing petroleum fuels; etc., and considering these emissions may undermine EPA's assumption that swapping ICE for BEV will necessarily result in an environmental good (AmFree, American Fuel & Petrochemical Manufacturers, POET).

Commenters also expressed concern over peak loads and the impact of peak load demands on EGU emissions. Commenters encouraged EPA to consider marginal emissions, i.e., those occuring from high peak loads that might be supplied via coal, rather than considering only average emissions, i.e., those occuring from routine power generation (AmFree).

Commenters provided feedback to EPA on which upstream emissions sources were modeled and how that affects the modeled net emission impacts of the final standards. They also noted that this reflects a change in how EPA has modeled upstream emissions for previous GHG rules and argued that EPA may be overestimating the decrease in refinery emissions since it is possible that refinery throughput will not change as evidenced by EPA's own statements in the NPRM (AmFree).

Commenters stated that EPA had not considered the impacts of changes in power generation on the potential degradation of air quality in areas around power plants (American Fuel & Petrochemical Manufacturers).

Commenters argued that EPA was treating ICE vehicles and BEVs differently with respect to real world fuel and energy consumption by considering 5-cycle, cold temperatures and air conditioning use when estimating ICE real world fuel consumption but considering only 2-cycle energy consumption in estimating BEV real world energy consumption (American Fuel & Petrochemical Manufacturers). Commenters argued that this underestimated power sector demand and emissions as a result (American Fuel & Petrochemical Manufacturers).

Commenters argued that EPA should not have used the national average electricity price in estimating charging costs (American Fuel & Petrochemical Manufacturers). Commenters argued that the majority of BEVs are in areas with the highest electricity rates in the country and that EPA failed to consider peak rates of time of use charges (American Fuel & Petrochemical Manufacturers).

Commenters also argued that EPA did not consider the impact of the rule on fleet turnover suggesting that the higher purchase price of new electrified vehicles will keep older cars and trucks on the road longer thus increasing particulate matter emissions through increased tire and road wear (American Fuel & Petrochemical Manufacturers).

Commenters argued that the marginal abatement cost of shifting from 1.0 mg/mi to 0.5 mg/mi is exceedingly high (American Honda).

Commenters expressed concern about ICE vehicles increasing their emissions as more BEVs enter the fleet (CARB). Comments stressed the importance of continuing to reduce GHG emissions across the fleet and to not allow the penetration of electrified vehicles to be offset by ICE vehicles whose GHG emissions increase which could be possible given the fleet average nature of the standards (CARB).

Commenters argued that EPA had neglected upstream EGU emissions (Clean Fuels Development Coalition et al.). Commenters also argued that the 350 million EVs required to decarbonize the fleet in 2050 could use as much as half of US national electricity demand (Clean Fuels Development Coalition et al.). Commenters argued that EGU emissions can only decrease if EPA considers the costs of installing new solar and wind generation and the emissions of such remote and less dense generating sources, back up storage and transmission along with peak capacity generation must be considered (American Fuel & Petrochemical Manufacturers, Clean Fuels Development Coalition et al.).

Commenters stated that BEVs, being heavier, will result in more PM emissions associated with increased brake and tire wear (Donn Viviani).

Commenters faulted EPA for not identifying the degree of emission reduction needed to help states achieve ozone and PM2.5 attainment (Elders Climate Action).

Commenters expressed support for the NPRM's Alternative 1 since it provided greater emissions reductions (Energy Innovation).

Commenters argued that EPA had failed to consider efficiency improvements that were possible with hybrid architectures even at small costs (John Graham). Commenters also argued that renewable liquid fuels can play a role in reducing carbon emissions (Marathon Petroleum Corporation, POET).

Commenters argued that, if one accounts for upstream emissions from BEVs, the Proposed Rules' target of 86 grams per mile in 2032 cannot be met (POET). If BEV deployments drop only a few percentage points below EPA's very aggressive projections, and if BEV upstream emissions are accounted for, the proposed standards are impossible to meet, even with BEVs (POET).

Commenters claimed that EPA uses its MOVES emissions inventory model to estimate GHG emissions from conventional vehicles and then subtracts the GHG emissions associated with the electricity used to power BEVs (POET). Commenters expressed concerns over EPA's assumption that all BEVs will be charged using grid electricity with one concern being ignoring other sources of upstream emissions similar to comments already summarized above and another being EPA's mix of generation sources which were different than those projected by AEO even though the AEO projections include impacts of the IRA (POET).

Commenters argued that EPA's emission factor equations presented in Chapter 9 of the DRIA implied that there will be no EGU emissions by 2054 and that EPA had failed to consider that conventional vehicles operate on fuels that are a mixture of fossil and low-carbon renewable fuels – including ethanol, renewable diesel fuel and biodiesel fuel (POET).

Commenters argued that EPA's modeling should include a sensitivity analysis of BEV/PHEV mix on critical mineral usage for any assumed overall PEV penetration (Toyota). PHEVs can make the most efficient use of the limited battery supply and constrained infrastructure network forecast through the period of the rulemaking (Toyota). The same amount of lithium in the battery of one 300-mile plus BEV can be used for up to six PHEVs–or more than eighty conventional hybrids (Toyota).

Commenters argued that EPA was using charge efficiency estimates that were inconsistent with an RFS NPRM and the recent heavy-duty GHG NPRM (Valero). Commenters argued that EPA had used an EGU emission rate inconsistent with other sources and that the rate did not account for the full life-cycle emissions from electricity generation (Valero). Commenters also argued that EPA should update the CO2/gallon factor for gasoline in compliance modeling to be consistent with Tier 3 test fuel (Valero).

Commenters encourage EPA to carefully consider compliance flexibilities to ensure that they do not unintentionally reduce the stringency of the rule or result in real world emissions that would exceed the standards (Wisconsin Department of Natural Resources).

<u>Response:</u>

We respond more fully to comments regarding life cycle analysis in Section 19.2 of this document. We respond to comments regarding tire wear and brake wear in Section 11.1 of this document. We respond to issues specific to air quality in Section 11.3 of this document. We respond to issues related to electricity prices in Section 17 and 18 of this document. We respond to comments regarding critical minerals and battery production in Section 15 of this document. We respond to comments regarding our power sector modeling efforts in Section 18 of this document.

Regarding comments related to the production of a BEV being more carbon intensive than production of an ICE vehicle, one commenter pointed to the study "The Role of Critical Minerals in the Clean Energy Transitions."[432] Page 194 of this study has the heading, "Emissions from minerals development do not negate the climate advantages of clean energy technologies." On page 192, the study does point out that, "if poorly managed, mineral development can lead to a myriad of negative consequences," but the key to this warning is the management of this development. Also on page 192, the study points to companies having a clear business case to address the risks and consumers and investors demanding that companies do so. We note that similar risks apply to the production of fossil fuels; for example, improper management at petroleum refineries can cause oil spills and enormous harm to the environment. We further respond to comments about life cycle emissions in RTC Section 19.2.

Regarding EPA not including emissions associated with elements of both the BEV and ICE supply chain (transportation, storage, charging infrastructure, etc.), EPA acknowledges that there are other potential emissions further upstream than those EPA included in our analysis. EPA has not historically modeled most of the upstream sources listed by AmFree et al. We expect some of the emissions sources they listed (for example, the operation of charging infrastructure and the transportation of petroleum fuels) to have only marginal impacts on the magnitude of the net emission impacts. This is discussed throughout this RTC section, and more discussion of the consideration of life cycle emissions in setting standards can be found in Section 19.2 of this RTC document.

AmFree et al. also commented that the upstream sectors included in the analysis for this rule represents a change in how EPA has modeled upstream emissions for previous GHG rules. In this comment, they are referring to EPA's modeling for the SAFE and HD GHG Phase 2 rules, which included the extraction and transportation of crude oil and distribution of finished gasoline and diesel.

It is true that, as discussed in RIA Chapter 8.6, EPA's analysis of upstream emissions is limited to EGUs and refineries. EPA's judgment is that this approach represents a reasonable balance between considering indirect effects of the rule on emissions and limiting that consideration to reasonably proximate and predictable effects. Because we lack the data and capacity to predict every indirect effect of the rule throughout the supply chain and the broader economy, we judge that by examining the upstream emissions of EGUs and refineries we have taken into consideration the most significant indirect effects of the rule on air quality, such that our analysis is sufficiently complete for consideration in the rulemaking. In addition, EPA's OMEGA modeling of upstream emission impacts from the final standards includes the three most significant sectors in terms of understanding the impact of the standards on overall GHG and CAP/HAP emissions (downstream, EGUs, and refineries). In the NPRM illustrative air quality modeling analysis, we did consider impacts on crude production wells and pipeline pumps, and natural gas production wells and pipeline pumps. The NPRM air quality modeling

[432] "The Role of Critical Minerals in Clean Energy Transitions," International Energy Agency, https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf, accessed January 30, 2024.

analysis suggests that emission reductions from crude production wells and pipeline pumps are partially offset by increases from natural gas production well and pipeline pumps. The net oil and gas sector emissions changes are therefore small relative to those of the onroad and power sectors.

EPA also notes that accounting for further upstream emission processes in the context of an increase in PEV production while failing to do equivalent accounting for a reduction in the production of other vehicles, including ICE with a range of electrification, would unreasonably skew the emission impacts estimates. Many of the same metals that are in demand for PEV production would also be in demand for ICE production, so whether the standards would truly result in an increase in all mining, resource extraction, and production emissions is not clear. And, because such a broad accounting of these emission processes for the range of vehicles would include emissions from around the world, accounting for these emissions presents scope challenges.

In addition, modeling EGU and refinery emissions is balanced in considering the operation of ZEV versus ICE vehicles. For both vehicle types, our analysis considers the emissions and energy consumption of the vehicle itself plus the production of the fuel it uses, be it refined liquid fuels for ICE vehicles or electricity for ZEVs. It would skew the emission results if EPA calculated reduced transport of fuels caused by a reduction in ICE vehicle usage but no corresponding increase in the transport of fueling sources, such as natural gas, used to power the increased electric vehicle usage. Similarly, EPA does not assess comparable emissions associated with refinery waste generation and management (many of those wastes are listed as hazardous under the RCRA subtitle hazardous waste program, 40 CFR Part 261 hazardous wastes K 048-052).

There were also technical and practical reasons, in OMEGA, for EPA to model upstream emissions only from EGUs and refineries. EPA has available tools that are well suited to modeling the impacts of the standards on EGUs (i.e., IPM) and on refineries (i.e., a combination of the emissions modeling platform and EIA’s Annual Energy Outlook to generate emission factors for refineries). Both the CAFE model and EPA’s spreadsheet model used in previous GHG rules incorporated upstream emission factors from GREET. These emission factors from GREET were process-level emission factors and often encompassed several upstream emissions sources together, such as both crude extraction and transport. EPA finds that this approach may not be adequate to capture the complexities associated with major shifts in transportation fuels. Furthermore, matching GREET's emission factors to more specific emissions and activities estimates from EPA's detailed models, including the emissions modeling platform, would introduce additional uncertainty. EPA determined that other modeling tools, in particular GREET and EPA’s previous upstream modeling tool for emissions from previous GHG rules, did not have the same advantages as our chosen methodology for the purposes of modeling quantitative and detailed upstream emission impacts from the final standards.

While EPA included fewer upstream emission sources for this rule than some previous GHG rules, it’s important to note that this modeling is more detailed and rigorous, for the purposes of this rulemaking, than if we had used the same approach as we did for previous rules. Neither EPA’s spreadsheet tool nor GREET are dynamic models, in which projections of future time periods depend on the simulation of prior time periods. IPM, however, is a dynamic model. Because of its dynamic nature, the inclusion of rule-specific IPM runs allows for a better understanding of how the standards (especially possible ZEV adoption driven by the standards) impact the full U.S. energy system.

Nevertheless, EPA does not dispute the utility of other upstream emissions modeling tools, especially GREET, for other purposes. Also, there is ongoing work to develop the capability to capture upstream and cross-sector impacts in more detail, including the use of multi-sector modeling tools such as EPA's GLIMPSE framework.[433]

Regarding EPA's estimated real world fuel and energy consumption, EPA disagrees with the commenter's assertion that ICE and BEV onroad energy consumption and associated emissions are calculated using different drive cycles. EPA uses the same onroad drive cycle assumptions for both BEV and ICE vehicles in the effects calculations. These weighted onroad cycles include a significant portion of the higher speed US06 cycle, as described in Chapter 8.5.1 of the final RIA.

Regarding use of average EGU emissions rather than marginal emissions, we have done so because the expectation is that transportation charging will be closely monitored and most charging will be done at times during which grid loads are low (i.e., overnight, see Figure 5-5 in Chapter 5.1.1 of the RIA for example load profiles). Several strategies exist to alleviate the concerns associated with peak demand (see Chapter 5.3 and 5.4 of the RIA).

Regarding refinery emissions, EPA has updated the analysis and calculation methodology for the final analysis and has also updated the estimates of impacts on imports and exports with much more detail supporting our estimates (see Chapter 8 of the final RIA).

Regarding electricity prices, we have updated our effects modeling and no longer rely on AEO national average retail electricity prices to estimate costs associated with charging electrified vehicles. We respond in greater detail in Section 17 of this document.

Regarding fleet turnover, EPA disagrees that our OMEGA modeling does not reflect any shift towards older vehicles relative to the No Action scenario. EPA projects changes in new vehicle sales as a result of the standards and associated changes in new vehicle purchase prices. EPA also accounts for the distributions of vehicle age and VMT across the vehicle stock. The net effect of the analysis approach is that the slight reduction in new vehicle sales tend to increase the portion of miles driven by older vehicles, and therefore tend to increase their overall impacts relative to a case where there is no change in new sales. Our modeling includes a consumer choice element that considers out-of-pocket expenses when purchasing a new vehicle, projected operating savings, and incentives available by the IRA. While our modeling normalizes total sales to projections in AEO, the producer-consumer interaction elements of OMEGA determine the share of BEVs to PHEV to ICE. In other words, OMEGA is not forcing a level of BEV penetration. Rather, it is determining a level based on producer requirements to meet standards and consumer desire to purchase their preferred vehicle. As a result, while we do not model delayed scrappage per se, OMEGA will show an increased number of older vehicles in the event that new vehicle sales decrease in response to a policy, and those vehicles will drive more total miles than driven by older vehicles in the No Action scenario; this shifting of VMT distribution

[433] U.S. EPA. "GLIMPSE – A computational framework for supporting state-level environmental and energy planning". February 1, 2024. Available online: https://www.epa.gov/air-research/glimpse-computational-framework-supporting-state-level-environmental-and-energy

across the vehicle stock has the same practical effect as changing the scrappage rates of older vehicles.

Regarding Honda's comment that the marginal abatement costs for the new PM standard are exceedingly high, we disagree with their assessment. EPA is moving from a higher current Federal standard to the new Federal standard, so a marginal impact relative to the CARB standard is not relevant. The CARB ACC II program includes both PM reductions from more stringent PM standards from ICE-based vehicles and PM reductions from a ZEV mandate. As noted in RTC Section 4.1, EPA is not adopting a ZEV mandate, as the CARB standards use; instead, EPA is setting performance-based standards for both criteria pollutants and GHG emissions. EPA believes it would not be appropriate to project CARB's ACC II program emission reductions across the entire country, including a ZEV mandate, and then attempting to calculate the marginal benefits of EPA's final PM standard. In addition, EPA projects that the PM standard in this FRM will result in the adoption of control technologies which are effective over the broadest range of environmental and vehicle operating conditions, in other words, EPA anticipates that PM controls adopted as the result of this rulemaking will be effective both on-cycle and off-cycle. CARB, on the other hand, has adopted standards which are focused on on-cycle PM emissions conducted at 25°C. Finally, because at the time of this final rulemaking EPA has not yet granted a waiver to California for the ACC II program, the agency believes it would be inappropriate to prejudge the outcome of the waiver request process and project PM emission reductions and benefits incremental to a program that is still under consideration by the Administrator.

Regarding backsliding of conventional ICE vehicles as more electrified vehicles enter the fleet, EPA does not believe that it is likely to happen in any significant manner. See comments from other commenters, specifically Consumer Reports in Section 12.3.1 of this document where they state, "Consumer demand for EVs is rapidly increasing, and technology improvements will mean that the remaining gasoline powered vehicles will have to compete with better and better EV offerings. In order to continue to find buyers for their remaining gasoline powered vehicles, automakers will need to make them better, not worse." Also, such an outcome, if it were to happen, is inherent in any performance standard. Provided performance is achieved, the standard is met. And there is no indication that the higher GHG vehicles will be driven more miles as hypothesized by the commenter. Our long-standing practice of setting performance-based fleet average GHG standards gives the industry the flexibility to achieve emissions reductions in the most cost-effective and efficient manner. If we set requirements for specific technologies, it would eliminate manufacturers' flexibility to identify and apply potentially more cost-effective compliance solutions.

Regarding claims that EPA had failed to consider EGU emissions, this is incorrect. See Sections VI and VII of the preamble. We did and continue to estimate emission impacts associated with power generation. Extensive modeling efforts have been undertaken to estimate charge demand and power sector emissions and those efforts are reflected in our analysis. We respond to more comments regarding our power sector modeling efforts in Section 18 of this document. Importantly, we have not estimated full fleet conversion to BEV (presuming that was the meaning behind the mention of 350 million vehicles by 2050). Indeed, none of the many pathways that EPA has modeled reflects 100% fleet conversion to BEV by 2050. In contrast, we project, under just one potential pathway, that roughly 48 percent of the light- and medium-duty fleet will be BEV with roughly an additional 5 percent being PHEV by 2030. Further, our EGU modeling suggests that light- and medium-duty electricity demand will be roughly 12 percent of U.S. generation in 2050 (see Table 5-3 of the RIA).

Regarding the expectation that EPA would identify the level of emissions needed to achieve compliance with the NAAQS, we respond to this in Section 2.

We appreciate comments from Energy Innovation regarding the NPRM's Alternative 1 and address this comment in Section 3.3.1 of this document.

Regarding EPA's failure to consider some technologies, specifically efficiency improvements available in hybrid architectures, we recognize that manufacturers may develop and apply additional efficiency improvements in hybrid vehicles. We take the comment to suggest that our NPRM analysis was conservative since it failed to consider some cost-effective technologies that could have been used toward compliance. Importantly, our analysis should be viewed as identifying a set of possible pathways toward meeting the standards and we have included additional pathways in our sensitivity analysis presented in Sections IV.F and IV.G of the preamble. Our analysis should not be viewed as an endorsement of specific technologies and, if the commenter is correct that hybridization can be used more widely and more cost-effectively than our analysis has estimated, the auto makers are free to choose such technologies. The same is true of PHEVs. Similarly, renewable liquid fuels may be another means of reducing carbon emissions and nothing in this final rule precludes Marathon or other fuels producers from providing those fuels. However, setting standards that would require such fuels is outside the scope of this action.

Regarding inclusion of upstream emissions for BEVs, we presume that this comment is directed at the issue of including upstream emissions in the compliance determination because we have, in fact, included upstream emissions in our effects calculations (i.e., emissions inventory impacts). The inclusion of upstream emissions in the compliance determination and the possibility that it makes the standards infeasible even for BEVs is not relevant because we are not including those emissions in the compliance determination. See Section 3.1.5 of this RTC.

Regarding the infeasibility of the standards should BEV penetrations fall short of EPA projections, we note that we have conducted several analyses showing different possible pathways to compliance including one that involves no additional BEV penetration beyond current levels in the U.S. market. We present these in Sections IV.F and IV.G of the preamble.

Regarding the claim that we had subtracted the GHG emissions associated with electricity used to power BEVs from the emissions inventory associated with conventional vehicles, this claim is incorrect. We account for vehicle emissions (note that BEVs have tirewear and brakewear emissions) and add to those the EGU emissions. Regarding other upstream sources, we addressed that issue earlier in this response. Regarding the mix of generation sources in the EPA modeling compared to that in AEO, we note that part of the reasons we continued to rely on IPM modeling, as we did in the NPRM, was our disagreement with the AEO projections and the way that AEO had characterized the impact of the IRA (i.e., AEO 2023 projected very little BEV penetration). We stand by the IPM modeling we have conducted and the expertise of those behind that model. We discuss our IPM modeling in Chapter 5 of the final RIA and we respond to comments regarding use of IPM over AEO in Section 18 of this document.

Regarding comments related to the EGU emission rates presented in Chapter 9 of the RIA, we note that the emission rates presented there were used only through calendar year 2050 with the rates held constant at the 2050 rate thereafter. This is done because the IPM modeling results for the next to last year modeled (in this case 2050 since the last year modeled was 2055) are considered the last set of results for use. Importantly, for the final analysis, we have revised our approach to estimating EGU emission rates and, instead of using emission rate curves as done in the NPRM, we now use the IPM results directly with linear interpolations between years (IPM results are done for several but not all calendar years up to 2055). As done in the NPRM, the IPM results beyond 2050 are not used and the EGU emission rates beyond 2050 are kept at the 2050 rates. One result of this change is that, while the NPRM analysis held rates constant beyond 2050 thereby ensuring that rates never went negative, our final rates give no impression that perhaps rates could go negative.

Regarding claims that EPA had failed to consider that gasoline consumed in the U.S. contains both fossil and renewable fuels like ethanol, we disagree. We do adjust for the ethanol and biodiesel content of retail or pump gasoline when calculating our emissions inventory and fuel consumption effects. See Chapter 8.5.3 of the RIA. We have improved the transparency of the calculation approach since the NPRM.

Regarding Valero's claim that EPA had used an inconsistent EGU emission rate, this is a misunderstanding on the part of the commenter. The emission rate noted by the commenter—325 grams CO_2e—is meant only for possible use in compliance determinations. Note that the commenter found the file containing the 325 value in a set of compliance modeling runs. Because upstream emissions are not included in the compliance determination of any vehicles, that 325 value is not used. We do not use that value in calculating the upstream inventories associated with EGUs and instead use the emission rates described in Chapter 8.6.1 of the RIA which are based on the IPM modeling described in Chapter 5 of the RIA.

Regarding Valero's comment about inconsistent charge efficiencies across EPA analyses, we note that the final RFS rule did not make use of the value noted by the commenter and slightly different efficiencies for the light-duty and heavy-duty markets (90 percent in light-duty and 88 percent to 89.25 percent in the heavy-duty NPRM) is not inappropriate from our perspective given differences in the markets.

Regarding the gasoline CO_2/gallon factor used in compliance modeling, this value is not actually used and we apologize for any confusion. Importantly, all of the response surface equations used in estimating gasoline vehicle CO_2/mile and used for determining gasoline vehicle compliance within OMEGA were generated using characteristics of in-use retail gasoline (i.e., pump gasoline containing ethanol). Since the CO_2/gallon value noted by the commenter is not actually used, this comment is essentially moot.

Regarding compliance flexibilities, EPA has carefully considered those flexibilities in the context of determining the final standards. We present those flexibilities and the rationale behind them in Section III of the preamble and further respond to comments in Sections 3.1.3 and 3.1.4 of this RTC.

12.1.4 - Other

Comments by Organizations

Organization: American Honda Motor Co., Inc.

Base Year Fleet

The proposed rule and supporting documentation make numerous references to a MY2021 base year fleet, suggesting that agency modeling of low-carbon technology pathways "builds upon" an automaker's MY2021 fleet. As we have noted in previous sets of comments to the agency, it is Honda's belief that selection of the base year fleet can have meaningful impact on modeling results, at least at an OEM-based level of granularity. As Honda noted in comments submitted to the agency in September 2021:

Fundamentally, the base year defines the sets of technologies already applied in the market, and therefore sets constraints regarding "technology walks" to further emissions reductions. In other words, it defines the low-hanging fruit that are available for providing further improvement to the fleet. By selecting an overly dated base year fleet, the agency's modeling could erroneously assume application of technology that, in reality, did not occur. Use of [an older] base year permits the modeling to apply "imagined" technology to model years that have already passed, ignoring actual technology application decisions and potentially widening the gap between simulated results and what is achievable with the current vehicle fleet.53 [EPA-HQ-OAR-2022-0829-0652, pp. 31-32]

53 American Honda Motor Co., Inc. comments on Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions. September 27, 2021. Docket ID No. EPA–HQ–OAR–2021–0208.

Honda was encouraged by the references to a MY2021 base year fleet in the agency's proposal and supporting documentation. Upon closer examination of the OMEGA 2.0 computer model, however, it is clear that the agency is not using a MY2021 base year, but rather is using a MY2019 fleet. For the reasons noted above, we request that the agency update its model assumptions to reflect a more up-to- date and accurate base year fleet. [EPA-HQ-OAR-2022-0829-0652, pp. 31-32]

Recommendation: Honda respectfully requests that the agency use the most up-to-date and accurate base year fleet available as part of its modeling activities. [EPA-HQ-OAR-2022-0829-0652, pp. 31-32]

Organization: Institute for Policy Integrity at New York University School of Law

C. EPA Should Update the Baseline to Ensure Full Consideration of the Inflation Reduction Act

In regulatory impact analysis, the baseline refers to "the best assessment of the way the world would look absent the proposed action."90 Developing an accurate baseline is important for conducting benefit-cost analysis, but challenging when baseline conditions are in flux. That is the case here given last year's passage of the Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

90 Circular A-4, supra note 86, at 15.

To model the baseline for the Proposed Rule, EPA adopts key variables from the Annual Energy Outlook 2021 (AEO 2021), such as fleet size, new vehicle sales shares, fuel prices, electricity prices, and vehicles miles traveled.91 However, AEO 2021 was developed before the IRA's passage and thus does not include the effects of that law. While it was reasonable for EPA to rely on AEO 2021 in this proposal, it should consider adjusting the baseline in the final rule to fully incorporate the IRA's impacts. In particular, according to the 2023 version of Annual Energy Outlook (AEO 2023), the IRA will decrease both short-run and long-run electricity prices relative to the no-IRA case.92 AEO 2023 also projects that the IRA will decrease long-run gas prices, with a minimal short-run impact.93 Gasoline and electricity prices are important modeling inputs, as they affect the relative cost of ownership between ICE vehicles and BEVs and thereby influence the sales of these vehicles. These prices also affect the fuel-cost savings, the rebound effect, and related environmental impacts. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

91 See RIA at 9-1.

92 See infra p. 30 fig.2 (difference between AEO 2023 with IRA (solid-blue line) and AEO 2023's "No IRA" case (dotted-blue line)).

93 See infra p. 30 fig.1 (difference between AEO 2023 with IRA (solid-blue line) and AEO 2023's "No IRA" case (dotted-blue line)).

There are several potential options for EPA to consistently account for the IRA across modeling inputs. One option is for EPA to adopt AEO 2023 for parameters where it currently uses AEO 2021. This would presumably also entail updating future BEV penetration, which, although EPA models separately, is based in part on parameters from AEO 2021. If EPA updates its baseline to incorporate AEO 2023, it should beware that AEO 2023 models only certain aspects of the IRA but does not include the producer-side battery tax credit.94 To blunt the resulting potential underestimate of the IRA's full impact, EPA should consider using the "High uptake of the IRA" sensitivity case provided in AEO 2023. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

94 U.S. Energy Information Administration, Transportation Demand Module Assumptions 26 (Mar. 2023), https://www.eia.gov/outlooks/aeo/assumptions/pdf/TDM_Assumptions.pdf.

If updating the baseline to AEO 2023 is infeasible, a more feasible alternative may be for EPA to continue to use AEO 2021 as its baseline and then add the IRA's impact on other parameters on top of that. Data within AEO 2023 enables this type of assessment, as AEO 2023 provides sensitivity analysis in which it models the world with and without the IRA.95 This enables a direct comparison to assess the IRA's effect on key parameters, including electricity prices and gas prices.96 As noted above, EPA should consider adopting the "High uptake of the IRA" sensitivity case in AEO 2023 for comparison purposes.97 [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

95 See Projection Tables for Side Cases, Annual Energy Outlook 2023, https://www.eia.gov/outlooks/aeo/tables_side_xls.php (providing tables for "No IRA" case).

96 EPA acknowledges that it has estimates of future retail electricity prices that account for the IRA and that these estimates exhibit lower prices compared to a scenario without the IRA. But due to the absence of corresponding information on gasoline price estimates under the IRA and a desire for consistency across variables and model components, EPA opts not to use these estimates. RIA at 2-84.

97 See Projection Tables for Side Cases, supra note 95 (providing tables for “High uptake of the IRA” case).

This modeling adjustment could have meaningful effects (though it’s unclear whether this would increase or decrease net benefits overall, and it would almost certainly not change the sign or ordering of net benefits). According to projections from AEO 2023, the retail electricity price for transportation could be lower by an average of 0.45 cents per kWh from 2027 to 2032 under a high-IRA uptake scenario compared to a scenario without the IRA. This could translate to a decrease of about $50 in the “generalized cost,” 98 i.e. the purchase price net of vehicle ownership and operation costs.99 The lower cost of operating an electric vehicle would translate to greater BEV uptake than EPA projects in its baseline fleet. This suggests, among other implications, that the Proposed Rule’s compliance costs may be lower than EPA projects, since automakers may already be closer to complying with the proposed standards under the baseline than EPA recognizes. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

98 Considering the average EV efficiency at 3 miles per kWh, a reduction of 0.45 cent per kWh equates to a savings of 0.15 cents per mile. Incorporating EPA’s assumptions for consumer fuel-cost calculations in their purchase decision—with an annual mileage of 12,000 miles, a 2.5-year fuel-cost valuation period, and a fueling efficiency factor of 0.9—this saving translates to around $50 = 2.5(years) ×{0.15(¢/mile)×12,000(miles/year)÷100(¢/$)}÷0.9.

99 Both producers and consumers use this metric in their decisionmaking processes. See RIA at 4-2 to 4-4.

The Appendix below includes four figures illustrating the data presented in this section. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

Organization: Rivian Automotive, LLC

EPA Does Not Appear to Account for Rivian’s Production

The case for Alternative 1 is even stronger when considering the agency’s apparent omission of Rivian from its analysis. Specifically, OMEGA’s Manufacturers File, an input file listing vehicle producers considered as distinct entities for GHG compliance in the model, does not list Rivian.16 Even the agency’s survey of manufacturer commitments, presented as Table 1 in the NPRM and reproduced below, does not include the company.17 [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

16 List of producers found in the file, “manufacturers.csv.” Purpose and description of the Manufacturers File per U.S. Environmental Protection Agency, “OMEGA 2.1.0 Documentation (rev. 5/8/2023)” (May 8, 2023), available at https://omega2.readthedocs.io/en/2.1.0/index.html#document-1_overview.

17 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 87 (May 5, 2023) (revising 40 C.F.R. Parts 85, 86, 600, 1036, 1037, and 1066), Table 1, 29,192.

See original attachment for: Figure 3. EPA’s Table 1 reports stated manufacturer EV commitments but does not include Rivian. In calendar year 2022, Rivian produced approximately 25,000 EVs. We have a planned annual production capacity for later this decade of 600,000 units. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

Rivian produced and sold four distinct vehicle models in MY22 as recorded in EPA’s “Certified Vehicle Models” data.18 Over the course of calendar year 2022, we produced approximately 25,000 units across all our product lines. The R1T was the tenth bestselling EV in the U.S. that year.19 We expect to double production in 2023 as we build toward our planned production capacity of over half a million units annually across two manufacturing facilities. Rivian would be pleased to meet directly with the agency to discuss our historical production volume and plans, and to address any related questions, concerns, or data availability. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

18 U.S. Environmental Protection Agency, "Annual Certification Data for Vehicles, Engines, and Equipment," available at www.epa.gov/compliance-and-fuel-economy-data/annual-certification-data-vehicles-engines-and-equipment. See "Certified Vehicle Models (Model Years: 2014 – Present) (xlsx)."

19 Mark Kane, InsideEVs, "US: Top Selling BEVs in 2022 Were Long Range Ones," April 18, 2023, available at www.insideevs.com/news/663012/us-top-selling-bevs-2022-long-range/.

We believe omitting Rivian from the agency's analysis could have material implications for EPA's findings of feasibility and the final regulatory proposal. EPA should update its model inputs to account for Rivian's sales and revise its evaluation of the alternatives accordingly. [EPA-HQ-OAR-2022-0829-0653, pp. 2-7]

Update the Baseline Fleet

We have concerns about EPA's reliance on MY19 as the base year fleet for its analysis, a baseline now several years in the past during a time of rapid change in the industry.20 Most significantly for purposes of this rulemaking and EPA‘s analysis, the EV sales share grew from just 1.7 percent in MY19 to 4.4 percent in MY21.21 Preliminary data show the sales share roughly doubling in MY22 to approximately 8 percent.22 In previous regulatory proceedings, the agency stated that the vintage of the base year will "not normally have a significant impact" but that certain broad shifts in the market, such as the average vehicle power- to-weight ratio, can affect the incremental cost-effectiveness of technology application in the modeling.23 The significant growth in the EV market in recent years—a trend not yet visible in the MY19 data—would seem to constitute a "broad market shift" with potential impacts on the OMEGA model runs. For example, could greater BEV volumes in the base year fleet could affect credit-trading and technology application decisions in the model? If nothing else, greater EV volumes in the base year fleet would imply greater growth potential and higher penetrations of this technology by the end of the regulation window and could support greater stringency than currently proposed. Finalized compliance data through MY21 were available during the analysis and development phase. We encourage incorporation of the most recent base year data available for the final rule in accordance with best practice.24 [EPA-HQ-OAR-2022-0829-0653, pp. 7-8]

20 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 9-1.

21 U.S. Environmental Protection Agency, "Explore the Automotive Trends Data," available at www.epa.gov/automotive-trends/explore-automotive-trends-data#DetailedData.

22 U.S. Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles: Draft Regulatory Impact Analysis (April 2023), 3-5.

23 Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 151, 43,769 - 43,770 (Aug. 10, 2021) (revising 40 C.F.R. Parts 86 and 600).

24 EPA "will often attempt to utilize the most recent base year data," per Revised 2023 and Later Model Year Light- Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 151, 43,769 (Aug. 10, 2021) (revising 40 C.F.R. Parts86 and 600).

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

EPA has selected an arbitrary vehicle range, 300 miles, as the standard for the Omega model. This is carried over into the cost analysis since the analysis is based on $/kWh and the range of a BEV or PHEV is linked to battery capacity along with other factors. [EPA-HQ-OAR-2022-0829-0674, pp. 8-9]

The mileage regularly advertised is in best-case scenarios, such as flat highway driving conditions. The introduction of terrain, adverse weather, traffic, excess drag, or load from something such as a trailer can have a significant negative effect on the advertised range. This is not acknowledged and is detrimental to the EPA proposal in several ways. [EPA-HQ-OAR-2022-0829-0674, pp. 8-9]

First, for Americans to maintain their current type of usage of their vehicles—including professional and recreational activities such as landscaping, construction, hotshot trucking, equestrian sports, boating, camping, road trips, etc.—battery packs will need to become much larger. This renders the EPA's cost per vehicle analysis invalid. [EPA-HQ-OAR-2022-0829-0674, p. 9]

Second, larger packs will mean more weight and potentially more aerodynamic drag and therefore less efficiency. Unlike an internal combustion engine vehicle, the weight is not reduced upon energy consumption. The F150 Lightning is a perfect example of a 300-mile EV that struggles to tow a lightweight camper 100 miles.35 [EPA-HQ-OAR-2022-0829-0674, p. 9]

35 Tingwall, Eric. "Tow No! The Ford F-150 Lightning Struggled in Our Towing Test."MotorTrend, 12 July 2022, www.motortrend.com/reviews/ford-f150-lightning-electric-truck-towing-test/ (accessed 5 July 2022).

As a rudimentary example of comparison, consider the scenario of a diesel truck pulling a trailer a short distance of 150 miles. The truck has a tank size of 36 gallons and achieves 12.5 MPG during the trip. This equates to 12 gallons of burned diesel, well within the no-stop capability of the truck. With modern diesel engines having an efficiency of just over 40%, and diesel having 37.95 kWh/gal of energy, the minimum energy required for a no-stop trip is 182.16 kWh. [EPA-HQ-OAR-2022-0829-0674, p. 9]

With an optimistic motor efficiency of 94% the battery pack must have 193.79 kWh of usable energy. With high-performance batteries capable of 95% usable capacity this means that for the battery pack to make this short trip without stopping it must be no less than 203.99 kWh. With GM's Ultium battery cells having a capacity of 0.1157 kWh per pound, the battery cells alone for this scenario would weigh in excess of 1700 pounds. While the diesel can complete this task nearly three times before refueling, the EV must have a 200 kWh battery, twice the size of the EPAs chosen capacity, to complete the task even once. [EPA-HQ-OAR-2022-0829-0674, p. 9]

Organization: Valero Energy Corporation

I. EPA's OMEGA modeling does not support the proposed standards.

EPA relies on an Optimization Model for reducing Emissions of Greenhouse Gases from Automobiles ("OMEGA") to model manufacturer compliance with the proposed tailpipe emission standards for light-and medium-duty vehicles by "finding cost-efficient pathways for manufacturers to achieve compliance with desired emissions standards."1 The model projects producer and consumer behavior in response to policies and their physical and cost effects. While EPA relies on the modeling results to conclude that the proposed emission standards can be attained in a range of scenarios, the model inputs are riddled with errors and unreasonable assumptions. Further, although EPA notes that the model was peer-reviewed, important qualifications from the peer reviewers were inappropriately dismissed. [EPA-HQ-OAR-2022-0829-0707, p. 1]

1 EPA "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis" ("DRIA"), April 2023, at 2-1.

A. EPA's modeling of technological suitability based on hypothetical future light and medium duty (LMD) BEVs is significantly compromised by pervasive unreasonable assumptions in the modeling inputs. [EPA-HQ-OAR-2022-0829-0707, p. 1]

The highly complex OMEGA model relies on a multitude of user inputs, upon which the model results are highly sensitive.2 Notwithstanding this high degree of sensitivity to specific inputs, EPA applies numerous unsupported, unreasonable, and in some cases plainly incorrect assumptions in the model. Consequently, the results of the model are arbitrary and provide an unsuitable basis for concluding that the proposed standards are feasible. [EPA-HQ-OAR-2022-0829-0707, p. 1]

2 EPA's Multi-Pollutant LMDV Proposal at 29295 to 29297.

1. The EVSE (charging infrastructure) installation costs adopted by EPA are unrealistic. [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

2. The charging efficiencies adopted by EPA for purposes of this proposed rule are arbitrarily inconsistent with other contemporaneously proposed rules. [EPA-HQ-OAR-2022-0829-0707, p. 3]

3. EPA arbitrarily excludes viable LMDV technologies from its compliance modeling. [EPA-HQ-OAR-2022-0829-0707, pp. 3-4]

4. The analysis fleets modeled by OMEGA are highly implausible, and EPA fails to account for the actual costs to produce such fleets. [EPA-HQ-OAR-2022-0829-0707, pp. 5-6]

5. EPA overstates BEV adoption and associated benefits by failing to calibrate model projections to reflect current vehicle offerings.

In the OMEGA modeling to support the proposed rulemaking, EPA adopts a MY 2019 base year fleet, from which the OMEGA model then produces an analysis fleet for each subsequent year.33 At the time that EPA published the proposed standards in May 2023, the base year fleet adopted by EPA for this rulemaking was already four years old. Between the outdated base year fleet and EPA's lack of calibration of the OMEGA inputs and algorithms, the MY 2023 analysis fleet generated by OMEGA is wildly inaccurate, as demonstrated below for just one auto manufacturer. [EPA-HQ-OAR-2022-0829-0707, pp. 7-8]

33 DRIA at 9-1 and 2-1.

The MY 2023 Ford fleet generated by OMEGA includes 13 vehicle IDs with a BEV powertrain, spanning six distinct body styles and size classes. By comparison, Ford's actual MY

2023 light-duty vehicle offerings include only the 2023 Mustang Mach-E® and the 2023 F-150 Lightning®. [EPA-HQ-OAR-2022-0829-0707, pp. 7-8]

[See original for table titled "OMEGA MY 2023 analysis fleet for Ford] 34 35 [EPA-HQ-OAR-2022-0829-0707, pp. 7-8]

34 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicles.csv," Columns A, C, I and V.

35 Ford Showroom, https://shop.ford.com/showroom#/, accessed on April 27, 2023. The 2023 Ford E-Transit has a maximum GVWR of 9,500 lbs and is not a light-duty vehicle, per https://www.ford.com/commercial-trucks/e- transit/models/cargo-van/, accessed April 27, 2023.

While it is understood that OMEGA is intended to be an analytical tool and not a prognostication, in recognition of the significant impact that the OMEGA analysis fleets have on future tailpipe standards, EPA has the responsibility to calibrate the OMEGA model and true-up the legacy analysis fleets using the most current vehicle offerings and attributes. Otherwise, EPA is knowingly using inaccurate data to support the rulemaking, and in the case of Ford, overestimating BEV production and the associated benefits of the proposed rule. [EPA-HQ-OAR-2022-0829-0707, pp. 7-8]

Peer reviewers of the OMEGA v2.1.0 model commented to EPA "[i]t'd be good to have a model calibration/validation, if not already done so," to which EPA responded "[c]alibration/validation of inputs unique to the user's analysis are the responsibility of the user."36 As EPA is the "user" of the OMEGA modeling performed to support the proposed standards, EPA has the responsibility to appropriately calibrate and validate its inputs. [EPA-HQ-OAR-2022-0829-0707, pp. 7-8]

36 EPA "External Peer Review of EPA's OMEGA Model Final Peer Review Summary Report" (EPA-420-R-23- 010) at 4, April 2023.

6. EPA's application of price modifications is inconsistent with the Inflation Reduction Act ("IRA") and IRS's proposed implementation of 26 U.S.C. §30D and §45W. [EPA-HQ-OAR-2022-0829-0707, p. 9]

7. The upstream emission factor that EPA uses for transportation electricity is not consistent with other EPA sources and does not represent full lifecycle emissions from electricity generation. [EPA-HQ-OAR-2022-0829-0707, p. 10]

8. EPA must update its gasoline emission factors to reflect a Tier 3 E10 certification fuel. [EPA-HQ-OAR-2022-0829-0707, p. 10]

9. EPA fails to account for the rising cost of electricity over the regulatory period. [EPA-HQ-OAR-2022-0829-0707, p. 10]

10. EPA's baseline and sensitivity analysis is flawed. [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

EPA Summary and Response

The Heritage Foundation commented that EPA's choice of a 300 mile range for BEVs was arbitrary, and that real world driving often does not achieve the advertised range. EPA disagrees that this choice of range is arbitrary. EPA considers this to be representative of today's BEVs and a good "middle ground" for the typical range of BEVs going forward (see Section 3.1.1 of the final RIA). Importantly, when we size batteries within OMEGA, we size them for 300 miles of onroad operation, not 300 miles of test cycle operation. Additionally, the choice of BEV range in OMEGA impacts battery sizing and ultimately, the cost of the battery. The range does not impact our results calculations. All vehicles of a given body-style and model year and age will operate the same number of non-rebound miles regardless of powertrain. For ICE vehicles, all of those miles are driven using the ICE powertrain. For BEVs, all miles are driven by the BEV powertrain, but it would be the same number of miles driven within a body-style, model year, age cohort regardless of the range.

Valero asserted that a number of EPA's modeling inputs are unreasonable or incorrect, and consequently the results of the model provide an unsuitable basis for concluding that the proposed standards are feasible. EPA's discussion and response to these comments is provided throughout the RTC in the relevant topic sections as follows. Topic 1: EVSE installation cost comments are discussed in RTC Chapter 17, Topic 2: charging efficiencies are discussed in RTC Section 17, Topic 3: the exclusion of LMDV technologies from compliance modeling is discussed in RTC Section 12.2.4, Topic 4: analysis fleet and number of vehicle variants is discussed in RTC Section 12.1.1, Topic 5: base year fleet is discussed immediately below, Topic 6: IRA incentive modeling is discussed in RTC Section 12.4, Topic 7: electricity upstream emissions factor is discussed in RTC Section 12.1.3, Topic 8 gasoline emissions factor is discussed in RTC Section 12.1.3, Topic 9: electricity prices are discussed in RTC Section 8.3, and Topic 10: modeling of the No Action case is discussed in RTC Section 12.5.6.

Several commenters (Honda, Rivian, and Valero) suggested that EPA should update its base year fleet for the final rule analysis. For example, Valero commented that EPA's use of a MY 2019 base year fleet was already four years old at the time of the NPRM issuance in 2023. The commenter provided an example where the projected number of BEV models for a vehicle manufacturer in MY 2023 differed from the actual number of models in that same year. In response, EPA notes that there will necessarily be some delay between when the vehicle specifications and end-of-year production volume data becomes available and when the analysis is conducted. EPA agrees with the underlying point of the comment, which is that it is normally preferable to use the latest data possible. For this final rulemaking analysis, EPA has updated the base year fleet to MY 2022, which is the latest available, allowing time to process the data and quality check the resulting modeling inputs. EPA notes that even though the first Rivian model was introduced for MY 2022, the certification data for that model year was not available. As a result, the relatively small volume of Rivian vehicles produced for MY 2022 are not included in EPA's updated base year fleet for this final analysis.

12.2 - Battery/electrification technologies

12.2.1 - Battery costs

Comments by Organizations

Organization: Alliance for Automotive Innovation

F. Lithium-ion Battery Cost

The high cost of batteries, a crucial component, contributes to the affordability challenge of EVs. EPA has made ambitious assumptions on future battery raw material and manufacturing costs for battery packs that include aggressive learning rates that have not been proven with the new and rapidly evolving technology and manufacturing. From the Proposed Rule and Draft Regulatory Impact Analysis82 (DRIA), it appears that the agency's basis for setting stringent standards, which in turn drive significant levels of BEV adoption, is an assumption that battery costs will be substantially less expensive in the coming years. Given the fundamental importance of battery costs projections in this rulemaking, we examine the agency's assessment more closely, below. [EPA-HQ-OAR-2022-0829-0701, pp. 47-48]

82 U.S. Environmental Protection Agency, Draft Regulatory Analysis: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium Duty Vehicles, EPA-420-D-23-003 (Apr. 2023). Hereinafter "DRIA".

EPA uses Argonne National Laboratory's BatPaC 5.0 model as the basis for battery pack costs, developing a baseline cost of $120/kWh for an exemplar 75 kWh battery in 2022, based on a per factory production rate of 250,000 packs/year and NMC811-G battery chemistry among other features.83 EPA then applies a learning factor based on cumulative battery production without consideration for the cost of raw materials.84 EPA also assumes that by 2027 all automotive batteries sold in the U.S. will qualify for IRA 45X credits totaling $45/kWh and that the savings associated with them will pass through to consumers. The modeling inputs and assumptions EPA makes culminate in unrealistically low battery costs. In fact, in combination with additional assumptions regarding IRA 30D/45W EV purchase incentives, EPA's analysis leads to implied negative battery costs in a number of years of the rulemaking. [EPA-HQ-OAR-2022-0829-0701, pp. 47-48]

83 DRIA at 2-44 et seq. (Base year battery cost estimation).

84 DRIA at 2-49 (Development of battery pack cost reduction factors for future years).

1. Comparison of EPA's Base Cost (2022) to Third-Party Sources

EPA compares its base 2022 battery cost of $120/kWh to only one third-party source, Bloomberg New Energy Finance (BNEF), which documented a current average BEV pack price of $138/kWh,85 15% higher than EPA's projected cost. EPA promptly dismisses the BNEF value as too difficult to compare to their analysis based on speculation of potential differences before concluding, "EPA believes that our proposed battery cost estimates are reasonable based on the record at this time."86 [EPA-HQ-OAR-2022-0829-0701, pp. 48-49]

85 NPRM at 29301.

86 Ibid.

The article cited by EPA with the BNEF cost projection87 is based on BNEF's 2022 Lithium-Ion Battery Price Survey.88 More detailed data in that report suggests EPA's assessment of a base battery cost of $120/kWh in 2022 is even more dubious than it appears in comparison to the BNEF-reported average BEV pack price of $138. BNEF reports an average price of NMC-based packs (the same type of cell chemistry that EPA used in its modeling) of $184/kWh (53% higher than EPA's estimate), with a range of $139 to $523/kWh (Figure 12). EPA described concerns that it is diffcult to know for sure how closely average costs match its specific assumptions for production, pack size, specific chemistry, etc.89 However, using even the minimum $139 cost reported by BNEF for NMC packs, EPA's base price in 2022 appears to be about 15% too low. [EPA-HQ-OAR-2022-0829-0701, pp. 48-49]

87 Id. at 29301, FN 561.

88 Bloomberg New Energy Finance, 2022 Lithium-Ion Battery Price Survey (Dec. 6, 2022).

89 NPRM at 29301.

Figure 12: BNEF 2022 Battery Price Survey Pack Volume-Weighted Price by Chemistry90 [EPA-HQ-OAR-2022-0829-0701, pp. 48-49]

90 Bloomberg New Energy Finance, 2022 Lithium-Ion Battery Price Survey (Dec. 6, 2022) at 9 (Figure 10). Available via Bloomberg New Energy Finance subscription. Used with permission.

Moreover, data from the same BNEF price survey provides an average U.S. battery pack price of $157/kWh91 (31% higher than EPA's estimate of $120/kWh). Regardless of whether the current average pack matches EPA's specific assumptions, EPA should be concerned that its specific assumptions fail to align to known, current data. [EPA-HQ-OAR-2022-0829-0701, pp. 48-49]

91 BloombergNEF (Dec. 6, 2022), Lithium-ion Battery Pack Prices Rise for First Time to an Average of $151/kWh, available at https://about.bnef.com/blog/lithium-ion-battery-pack-prices-rise-for-first-time-to-an-average-of-151- kwh/. (Battery pack cost of $127/kWh; U.S. prices 24% higher implies $157/kWh U.S. pack price.)

Data from Benchmark Minerals Intelligence (BMI) also contrasts sharply with EPA's base pack price assessment of $120 in 2022. BMI estimates the current cost of NMC811-G cells at a cost of $120-130 per kWh.92 Pack costs would be higher, $150 to $163 per kWh assuming cell cost is approximately 80% of pack cost. [EPA-HQ-OAR-2022-0829-0701, pp. 49-50]

92 BMI Study at 28.

EPA also relies on data from EDF/ERM to provide a qualitative comparison to its projected battery price curves.93 That data indicates as pack price of $135/kWh in 2022,94 12.5% higher than EPA's $120 projection. It is unclear how EPA could use this data to justify its own projection of uncertain future costs, yet completely ignore it for comparison to base costs in 2022. [EPA-HQ-OAR-2022-0829-0701, pp. 49-50]

93 DRIA at 2-51 et seq.

EPA's projections also diverge from those of Argonne National Laboratory (ANL). Using the same model as EPA, ANL estimates a 2022 battery pack cost of $130/kWh for an NMC811-G battery of 94 kWh, 8% higher than EPA's estimate for a smaller pack size.95 Battery pack costs tend to decrease as pack size increases, so ANL's modeling would likely yield a slightly higher pack cost for a 75 kWh battery. Although EPA discusses its modeling inputs and attempts to justify them, EPA's analysis ignores the inputs chosen by ANL, the developer of the model used by EPA, for the same battery chemistry and year. No explanation is given for the differences in assumptions, or why ANL's inputs are not appropriate in EPA's view. EPA makes no mention of ANL's estimate. Similar to EPA's analysis, the ANL analysis is based on a specific chemistry, and the broader question of interest is the alignment of EPA's modeling to known data such as BNEF's and BMI's. [EPA-HQ-OAR-2022-0829-0701, pp. 49-50]

94 Environmental Defense Fund, Electric Vehicle Market Update (Sep. 2022) at 27. Available at https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2022/09/ERM-EDF-Electric-Vehicle-Market-Report_September2022.pdf.

95 Ahmed, S., et al., 2022. Estimated Cost of EV Batteries 2018-2022. Online slide presentation available at htps://www.anl.gov/cse/batpac-model-sotiware. Retrieved June 28, 2023. (Slide 6.)

The trend is clear. Third-party sources for current battery pack prices, including those cited for other purposes by EPA, and those developed by a national laboratory using the same model as EPA, all agree that the cost of a battery pack in 2022 is higher than that estimated by EPA. The inescapable conclusion is that EPA's modeling of base battery pack cost is incorrect and yields too low of a value even before EPA starts adding additional modifiers to it. EPA must reconsider its assessment of base battery pack costs for the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 50-51]

Figure 13 shows the more accurate 2022-2023 U.S.-specific battery pack cost (about $153/kWh based on BNEF's and Benchmark Minerals Intelligence industry survey data) compared to EPA's battery cost projections in its central and high battery cost cases. The BNEF/BMI data is approximately 33% higher than EPA's Central Case 2022 battery costs and is 10% higher than even the High Battery Cost Sensitivity Case. If future years are adjusted according to today's higher pricing, it would affect 2030-2032 battery pack-level costs similarly, about 33% higher. This makes it abundantly clear that EPA's reference 2022 battery cost96 and its Central Case 2022-2032 costs are clearly far too low. As shown, EPA's "High Battery Cost Case" is a much more representative (but still too low) reflection of actual current and projected future battery costs than EPA's Central Case battery costs. [EPA-HQ-OAR-2022-0829-0701, pp. 50-51]

96 DRIA at 2-53 (Figure 2-26).

[See original comment for Figure 13: Table of Battery Pack Direct Costs] [EPA-HQ-OAR-2022-0829-0701, pp. 50-51]

Furthermore, this deeper exploration of EPA's battery analysis examined the associated cell-level battery costs that relates to the above pack-level battery costs, and similarly shows that EPA's assumed battery costs are far too low. Auto Innovators could not locate EPA's projected cell-level battery costs, which are critical in vetting the accuracy of their projections against the leading research and industry battery cost estimates. As a result, Auto Innovators assumes, based on general industry and research data, that cell-level costs are equivalent to 80% of battery pack-level costs97 in order to estimate EPA's implied cell-level cost. [EPA-HQ-OAR-2022-0829-0701, pp. 51-52]

97 Cost-to-pack ratios differ by battery technology. In the absence of clarity on EPA's assumption, we assume that the U.S. automotive industry average battery cell cost is 80% of the overall pack cost, which is the approximate average of the last two years of BNEF industry surveys. See htps://about.bnef.com/blog/lithium-ion-battery-pack-prices- rise-for-first-time-to-an-average-of-151-kwh/ and htps://about.bnef.com/blog/battery-pack-prices-fall-to-an- average-of-132-kwh-but-rising-commodity-prices-start-to-bite/.

A key cell-level data source in this regard is Benchmark Minerals Intelligence, which rigorously assesses supply chain and commodity dynamics and prices. Benchmark finds significantly higher battery prices than what the EPA is assuming. For example, as illustrated in Figure 14 below, industry-wide North America 2022 battery cell-level prices are around $130 per kilowat-hour.98 Figure 14 shows NCM811, a representative battery technology for batteries that meet the technical and market specifications in the U.S. market. The real-world estimated industry cost that the auto industry experiences are substantially higher than EPA's assumed reference battery cost. Comparing Benchmark Minerals Intelligence data to EPA's estimated 2022 cost, considering cell-level costs are approximately 80% of pack-level costs, EPA's reference Central Case 2022 battery cell-level cost is approximately $92/kWh (or approximately 8% too low). [EPA-HQ-OAR-2022-0829-0701, pp. 51-52]

98 Simon Moores, Benchmark Minerals Intelligence (Feb 2023). Benchmark prismatic NCM811 cell price, htps://twiter.com/sdmoores/status/1627979954892816384/photo/1

Figure 14: Benchmark Prismatic NCM811 Cell Price Figures [EPA-HQ-OAR-2022-0829-0701, pp. 51-52]

Critically, we observe a key oversight in EPA's research into future battery costs. The EPA regulatory analysis fails to incorporate what appears to be the most rigorous and representative peer-reviewed research on the applicable dynamics with battery innovations, battery chemistries, and critical mineral prices from Mauler et. al (2022).99 The Mauler study more comprehensively analyzes the associated dynamics for lithium, nickel, manganese, cobalt, and graphite than EPA or any of the underlying data that EPA cited. [EPA-HQ-OAR-2022-0829-0701, pp. 52-53]

99 Mauler, L., Lou, X., Duffner, F., Leker, J. (2022). Technological innovation vs. tightening raw material markets: falling battery costs put at risk. Energy Advances. Issue 3: 136-145. htps://pubs.rsc.org/en/content/articlelanding/2022/ya/d1ya00052g

From our analysis of EPA's data, the BNEF and BMI baseline 2022 data, and the Mauler research, we compare cell-level battery costs in Figure 15 below. In the figure we convert EPA's projected pack-level costs to cell-level costs by multiplying by 0.80. BNEF and Benchmark indicate 2022 (and likely 2023) U.S. cell-level costs are approximately $125 per kWh. Mauler et al (2022) cell- level estimates for 2030 are shown, including its lowest ($77) and highest ($104) presented values, as well as the midpoint ($90). As indicated, EPA's implied Central Case direct manufacturing battery cost for 2030 (at $62/kWh) is 32% lower than the Mauler midpoint, and 20% lower than the Lowest value in Mauler (2022). Considering the Mauler et al (2022) analysis more accurately and rigorously accounts for the technology and market dynamics related to batteries, we recommend that EPA revisit its battery cost analysis and align its 2027-and-later projections with Mauler analysis. [EPA-HQ-OAR-2022-0829-0701, pp. 52-53]

[See original comment for Figure 15: Battery Cell Direct Costs] [EPA-HQ-OAR-2022-0829-0701, pp. 52-53]

Based on this analysis into the underlying research literature, for the final rule's central analysis, we recommend that EPA increase its reference direct manufacturing battery pack cost per kilowat-hour for 2022 and 2023 to be approximately $153 per kilowat-hour. Further, we recommend that EPA adjust its central case battery projection through 2032 to match the midpoint of the Mauler et al (2022) analysis (i.e., $90/kWh cell-level, approximately equal to $113/kWh at a pack-level in 2030). To better reflect these key inputs, we also recommend that the final rule's low battery case sensitivity analysis go no lower than the "Lowest" value in Mauler et al 2022 (i.e., $77/kWh cell-level, approximately equal to $96/kWh at a pack-level in 2030). This adjustment better matches the U.S.-specific battery characteristics as seen by U.S. automakers and tailored for the U.S. market, better reflects the actual underlying data that EPA references for battery costs, and incorporates research that was not cited in EPA's NPRM and DRIA. In addition, we recommend EPA clearly present its EV sales-weighted $/kWh values in pack-level and cell-level estimates for all model years 2022-2032 to transparently allow comparisons between EPA's projections and the applicable research literature and industry estimates. [EPA-HQ-OAR-2022-0829-0701, pp. 52-53]

Argonne National Laboratory's BatPaC model itself has reflected increased materials costs over the past few years, directionally consistent with Auto Innovators' understanding of the market. For example, between 2021 and 2022, updates to BatPaC reflect a 14% increase in the $/kg cost of cathode active material and a 50% increase in the $/kg cost of positive binder.100 While Auto Innovators appreciates EPA's use of the most recent version of BatPaC to reflect the latest information regarding material costs, these recent cost increases are a further indication that – contrary to EPA's assumptions – costs are unlikely to remain static at 2022 levels for the next decade. It is unreasonable for EPA to assume that a site, regulation-driven ten-fold increase in demand for critical minerals in a tight, volatile and geopolitically sensitive global market would have no impact on electrode and other materials costs beyond levels assessed in 2022. EPA should consider supply / demand impacts in a volatile and still-developing mineral commodities market for batteries. [EPA-HQ-OAR-2022-0829-0701, pp. 53-54]

100 Ahmed, S., et al., 2022. Estimated Cost of EV Batteries 2018-2022. Online slide presentation available at htps://www.anl.gov/cse/batpac-model-sotiware.

2. Battery Pack Production Rate Assumptions

Battery pack production rates are an important consideration in estimating the cost of a battery. Generally, as production rates increase, the cost per kWh of batteries produced decreases due to economies of scale. [EPA-HQ-OAR-2022-0829-0701, p. 54]

EPA chooses to model batteries for all manufacturers and all years of its analysis based on a battery plant production rate of 250,000 packs/year.101 EPA's entire reasoning is provided in a single sentence: "The annual volume of 250,000 is similar to that being produced in the largest plants today, such as those of Tesla, and also is appropriate for the purpose of causing the BatPaC model to calculate costs applicable to a production plant of 30 to 40 GWh capacity, which is a common plant capacity among the largest manufacturers today."102 [EPA-HQ-OAR-2022-0829-0701, p. 54]

101 DRIA at 2-46. ("The equation for a production volume of 250,000 packs was then used as an input to OMEGA to represent a base year cost . . .")

102 Ibid.

The source of EPA's assertion that 30-40 GWh battery manufacturing plant capacity is common among the largest manufacturers is unclear. Whether or not this is the case, EPA's own descriptions make clear that this assumption applies to "the largest" plants and "the largest" manufacturers. No consideration is given that there will likely be a range of battery plant production capacities, nor that smaller automotive manufacturers may only utilize a portion of a larger plant's total capacity for cells and packs built to their individual specifications. Likewise, this assumption fails to contemplate the production efficiencies of new battery plants versus those that have been fully operational for years, including variations in battery chemistry. [EPA-HQ-OAR-2022-0829-0701, p. 54]

To the extent that some manufacturers begin to vertically integrate and technically differentiate on battery systems, Auto Innovators encourages EPA to consider costs and specifications that are reasonable for the industry as a whole to inform policy analysis, and not to assume that intellectual property and proprietary production processes that have been the result of billions of dollars of research and development paid by one manufacturer will be readily available to all manufacturers. In the BatPac model, production volume can affect direct manufacturing cost estimates, and Auto Innovators points out that many battery cells vary (size, shape, chemistry) to suit the application. Even battery packs that share cells may require different housings and assembly processes, requiring separate production lines, resulting in economies of scale lower than would be projected if all these parts were the same. Total industry volumes of BEVs are not an appropriate volume assumption for BatPac. [EPA-HQ-OAR-2022-0829-0701, pp. 54-56]

Furthermore, EPA's battery cost modeling and application in its OMEGA compliance model implicitly assumes a 100% capacity, 250,000 pack per year production rate from a battery plant's initial start of production. As shown in Figure 16, the vast majority of anticipated North American battery cell manufacturing capacity is yet-to-be built. [EPA-HQ-OAR-2022-0829-0701, pp. 54-56]

[See original comment for Figure 16: Benchmark Mineral Intelligence assessment of N. American battery cell manufacturing capacity, 2020-2032, and country of ownership.] [EPA-HQ-OAR-2022-0829-0701, pp. 54-56]

Such a production ramp-up is unrealistic. For example, Tesla's gigafactories have a decade of experience. It took Tesla three years to build its first gigafactory, then another three years to reach a production capacity of 35 GWh per year (Figure 17).103 [EPA-HQ-OAR-2022-0829-0701, pp. 54-56]

103 htps://www.tesla.com/sites/default/files/blog_atachments/gigafactory.pdf

[See original comment for Figure 17: Gigafactory Projected Timeline] [EPA-HQ-OAR-2022-0829-0701, pp. 54-56]

Auto manufacturers also need to consider machine makers for battery facilities and the lack of a trained workforce. Auto manufacturers need to be careful with ramp-up rates because a manufacturing defect equates to a potential safety recall which in turn could result in billions of dollars of unplanned losses. [EPA-HQ-OAR-2022-0829-0701, pp. 54-56]

For the final rule, EPA should adjust its estimated battery pack production rate to account for average (instead of largest) battery manufacturers, the potential split of total capacity into multiple cell variants, and production ramp-up associated with all-new manufacturing plants. [EPA-HQ-OAR-2022-0829-0701, pp. 54-56]

1. Consideration of Labor Costs in Battery Cost Projections

EPA uses default BatPaC model labor costs. Presumably those costs reflect global production of batteries today. Yet given the agency's assumption that all batteries in all electric vehicles sold in the United States will be domestically produced, it seems likely that default labor values currently hard coded into the BatPaC model would need some degree of reconsideration. Neither of these issues, nor other potential issues pertaining to default assumptions applied elsewhere in the model, are addressed, or even acknowledged by the agency in its proposal. [EPA-HQ-OAR-2022-0829-0701, p. 56]

2. Consideration of Critical Mineral Costs in Battery Cost Learning Curve

EPA's use of effectively static 2022 material costs from BatPaC 5.0 is problematic. EPA does not appear to make any upward adjustments to the core BatPaC material costs to account for the current cost of critical minerals, nor for potentially elevated prices during the timeframe of the rulemaking due to the exponential expansion in supplies that are needed to support global electrification goals. We believe these are gross oversights that likely result in an underestimation of true vehicle electrification costs. [EPA-HQ-OAR-2022-0829-0701, pp. 56-57]

Why is this so important? According to Argonne National Laboratory, the NMC811-G, graphite, separator, and electrolyte add up to 86% of material costs.104 Material costs, in turn, represent about 68% of battery pack costs.105 And as the agency is well aware, batteries represent the largest cost associated with an electric vehicle. To put it more plainly, as go material costs, so go electric vehicle costs. Poorly or improperly forecasted future battery costs have a very real potential of yielding directionally different conclusions regarding the economic viability of vehicle electrification at the market share project for the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 56-57]

104 Ahmed, S., et al., 2022. Estimated Cost of EV Batteries 2018-2022. Online slide presentation available at htps://www.anl.gov/cse/batpac-model-sotiware. Retrieved June 28, 2023. (Slide 11.)

105 Ahmed, S., et al., 2022. Estimated Cost of EV Batteries 2018-2022. Online slide presentation available at htps://www.anl.gov/cse/batpac-model-sotiware. Retrieved June 28, 2023. (Slide 9.)

The agency's consideration of the critically important topic of battery costs is inadequate. Of the 688-page DRIA, EPA devotes precisely three paragraphs to this issue, in which it generically points to two recent forecasts to justify its position. Additionally, it is difficult for stakeholders to provide feedback on one of those forecasts (Wood Mackenzie), as the agency has excluded it from the docket on grounds that it is a paid subscription service and not licensed for publication.106 The other forecast (EDF/ERM), commissioned by Environmental Defense Fund, an environmental advocacy group that has long supported stringent vehicle standards and electric vehicle mandates, simply observes that "supply chain disruptions have affected EV and battery pricing,"107 and does not at all contemplate the potential impact of a more than 10-fold increase in demand over the next eight years. [EPA-HQ-OAR-2022-0829-0701, pp. 56-57]

106 Safoutin, M. 2022. Agency memorandum. htps://www.regulations.gov/document/EPA-HQ-OAR-2022-0829- 0316

107 EDF/ERM 2022. Electric Vehicle Market Update: Manufacturer Commitments and Public Policy Initiatives Supporting Electric Mobility in the U.S. and Worldwide. htps://www.regulations.gov/document/EPA-HQ-OAR- 2022-0829-0154

a) Need for Two-Stage Learning Curve to Address Critical Mineral Costs

As EPA notes, average lithium-ion battery prices declined by 85-90% from 2010 to 2020, paving the way for the spillover of lithium-ion batteries from consumer electronics to automotive. In fact, the National Research Council in 2021 – based on data before the unexpected events of 2021-2022 – was naively forecasting an annual 7% decline in battery prices from 2022 to 2030.108 Other sources were predicting that, due to rapid declines in battery prices, electric vehicles would be cheaper to produce than gasoline vehicles by the early part of the 2020-2030 period. [EPA-HQ-OAR-2022-0829-0701, pp. 57-58]

108 National Academies of Sciences, Engineering, and Medicine 2021. Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy 2025-2035. Washington, DC: The National Academies Press. https://doi.org/10.17226/26092.

In 2019, an MIT report cautioned that it is naïve to believe that battery prices will continue to fall steadily through 2030 as they fell in the previous decade.109 The reason is that, according to Benchmark Minerals Intelligence, raw materials accounted for about 70% of the cost of a lithium-ion battery in 2022, up from 40% in 2015 and less than 20% in 2010. Over half of the materials costs are for the cathode alone. As economies have been achieved in manufacturing of batteries, the costs of raw materials have become relatively more important. Some of the learning factors that apply in battery manufacturing (e.g., economies of scale) are not applicable – or apply with less potency -- in the raw materials sector. Instead of the one stage model used by EPA, the MIT report illustrates a two-stage model where the first stage covers “battery production” (e.g., cell production, battery assembly, and battery-pack assembly) and the second stage covers “materials synthesis” (e.g., mining of raw materials, immediate processing for use by component producers). The MIT report estimates that the learning curve is 4.7 times larger in the battery production phase than in the materials synthesis stage. They also show that the costs of materials synthesis place a floor on learning in the battery production stage. Using the two-stage model, the MIT report concludes that it is “unlikely” that battery prices will fall below $100 kWh by 2030. [EPA-HQ-OAR-2022-0829-0701, pp. 57-58]

109 MIT Energy Initiative. Insights into Future Mobility. Cambridge, MA. 2019, 77-79.

Sources:

1. National Academies of Sciences, Engineering, and Medicine 2021. Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy 2025-2035. Washington, DC: The National Academies Press. https://doi.org/10.17226/26092. [EPA-HQ-OAR-2022-0829-0701, pp. 57-58]

2. MIT Energy Initiative. Insights into Future Mobility. Cambridge, MA. 2019, 77-79. [EPA-HQ-OAR-2022-0829-0701, pp. 57-58]

3. Jacky Wong. Commodity Prices Are Risk for EV Batteries. Wall Street Journal. July 23, 2021, B12. [EPA-HQ-OAR-2022-0829-0701, pp. 57-58]

4. Scott Patterson. Metal Price Surge Threatens EV Growth. Wall Street Journal. February 7, 2022, B4. [EPA-HQ-OAR-2022-0829-0701, pp. 57-58]

The events of 2021-2022 were a shock to the battery industry and have given credence to the technical concern raised in the MIT report. The decade-long decline in lithium-ion battery prices stopped for 2021 and 2022. Indeed, battery prices rose 7% in 2022, primarily due to an explosive surge in the prices of raw materials that support cathode and battery-cell production. Since battery producers cannot instantly switch the materials used in their cathodes and battery cells, higher materials prices flowed through to battery prices. As a result, stunned forecasters have been busily delaying their forecasts of when battery prices would fall below $100/kWh. [EPA-HQ-OAR-2022-0829-0701, pp. 58-59]

In our comments on the model year 2023-2026 light-duty rulemaking, Auto Innovators urged EPA to begin modeling the raw materials synthesis stage separately from battery production, building on the insight from the MIT report. In response to our comments on the final rule, EPA acknowledged the key role of raw material costs:

EPA agrees that mineral and other material costs are a large component of the cost of the currently prevailing family of lithium-ion chemistries . . . [and those chemistries] may not have the potential to reach as low a cost as suggested by other commenters. . . and these costs might decline more slowly or increase if supply fails to meet demand in a timely manner.110 [EPA-HQ-OAR-2022-0829-0701, pp. 58-59]

110 86 Fed. Reg. 74478 (Dec. 30, 2021).

Auto Innovators was therefore disappointed to read the 2021 final rule's treatment of battery prices (for MY 2023 to 2026) as well as the current NPRM for model years 2027 to 2032. EPA continues to lump the raw materials synthesis stage with battery production, thereby producing highly optimistic forecasts for battery prices. [EPA-HQ-OAR-2022-0829-0701, pp. 58-59]

What EPA needs is a model of the materials synthesis stage – a separate model from the BatPaC model, which focuses on battery manufacturing. The materials model would forecast which battery chemistries will be implemented each year, the required amounts of specific materials for each battery design, and the prices for specific materials. The prices should reflect a global sub-model of supply and demand for specific materials since those prices are determined in global commodity markets. This materials synthesis model, and the inputs used in the model, should be subject to independent expert peer review. The explicitness and transparency of such a model would subject EPA's analysis of raw materials to accountability over time. [EPA-HQ-OAR-2022-0829-0701, pp. 58-59]

3. Other Considerations for Battery Cost Analysis

a) Omitted Upward Pressures on Battery Prices

One of the obvious biases in EPA's battery-price analysis is that they emphasize factors that might contribute to a continuing fall in battery prices but omit consideration of several factors – beyond materials prices -- that are working to keep battery prices high. Here are some key factors working to increase battery prices:

-Increased energy density to enhance driving range – automakers and their suppliers are under increasing market pressure to produce batteries with higher energy density, especially for the large SUV and pickup truck segments to provide adequate range for buyers. [EPA-HQ-OAR-2022-0829-0701, pp. 59-60]

-Improved safety systems and designs to minimize the risk of battery fires, as several automakers have experienced NHTSA investigations as well as stigmatizing and costly recalls. [EPA-HQ-OAR-2022-0829-0701, pp. 59-60]

-New battery designs that can accommodate, without battery degradation, frequent use of DC fast chargers (150 kWh to 350 kWh), which provide higher charging speeds and greater convenience to consumers. [EPA-HQ-OAR-2022-0829-0701, pp. 59-60]

-Improved battery management systems that can help protect the battery pack under extremely cold and hot outdoor temperatures. [EPA-HQ-OAR-2022-0829-0701, pp. 59-60]

-Adherence to responsible sourcing guidelines that establish environmental, social and governance standards for an auto maker's supply chains, including third-party validation of compliance with those standards. [EPA-HQ-OAR-2022-0829-0701, pp. 59-60]

-Expectations to source raw materials, processing, component facilities and battery production in the United States, or at least in North America or with free-trade partners, even though the lowest cost suppliers in the EV supply chain may be based in China or in other countries that have no free-trade agreement with the United States. [EPA-HQ-OAR-2022-0829-0701, pp. 59-60]

Given the competing pressures on battery prices between now and 2032, Auto Innovators is not confident that a net decrease in battery prices will occur; an increase in battery prices is a distinct possibility due to global demand for limited resources. [EPA-HQ-OAR-2022-0829-0701, pp. 59-60]

b) Electricity Price Impacts on Costs of Battery Production

Electricity prices have an indirect effect on the cost of producing EVs because the supply chain of an EV is much more energy-intensive than the supply chain for an ICE vehicle. At battery manufacturing facilities, for example, large furnaces are required to evaporate the solvents from the coated electrodes; since battery cells are sensitive to moisture, cell assembly must occur in a dry room, which incurs high electricity costs. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

State and national policies are shifting electricity generation from fossil fuels and nuclear power to renewables, especially wind and solar. At low levels of renewables, the effect on electricity prices may be minimal. Moreover, the cost disadvantages of renewables are declining over time, but the renewables transition may increase electricity prices at higher levels of renewables penetration and will likely raise them further when investments are made (e.g., in grid-scale energy storage solutions) to address the intermittent nature of wind and solar. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

It is difficult to estimate how much electricity prices will rise in a precise time frame (e.g., 2024- 2026) because they are often determined in utility rate-setting processes in each of the 50 states, and the EIA forecasts of future electricity prices do not account for all the policy changes that are underway or will soon be adopted to promote or compel increased use of renewables. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

One way for the agencies to bound the potential magnitude of rising electricity prices is to undertake a scenario analysis where all of the U.S. – residences and businesses – face the higher electricity prices now experienced by Germany or the State of California, both jurisdictions that have made determined efforts to boost renewables and phase out coal and nuclear power. Germany has the highest household electricity prices in Europe, about $0.30 per kWh. In May 2021, the average price of residential electricity in California was $0.21 per kWh, about 7% higher than the price in May 2020. In the U.S. as a whole, the average residential electricity price is about $0.13-0.14 per kWh. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

The electricity prices paid by businesses need to be analyzed separately, as they tend to be higher than the residential rates (in part due to demand charges). The business rate for electricity is appropriate to use when computing the energy costs in the supply chain of battery production. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

c) Electrolyte Costs in BatPac 5.0

Finally, it appears that the version of BatPaC 5.0 utilized for this rulemaking may contain errors. The version of BatPaC utilized in the rulemaking and included by EPA in the docket assumes an electrolyte cost of $10/L for 2022. Materials price assumptions presented by Argonne National Laboratory in October 2022 and included on the anl.gov website show a $15/L cost for electrolyte in 2022.111 We assume this is an oversight, and request that the agency investigate and address this discrepancy. [EPA-HQ-OAR-2022-0829-0701, pp. 61-62]

111 Ahmed, S., et al., 2022. Estimated Cost of EV Batteries 2018-2022. Online slide presentation available at htps://www.anl.gov/cse/batpac-model-sotiware.

6. Battery Cost Conclusion

As EPA points out, including references to automakers' direct public statements, the automobile industry is absolutely focused on making the transition to EVs. However, it is critical that EPA also acknowledge the auto industry's direct statements about EV and battery costs, as well as related comments addressing the consumer, supply chain, and charging and refueling infrastructure challenges. Auto Innovators views the NPRM analysis as fundamentally flawed. EPA needs to update its modeling to align with current battery costs and future critical mineral costs in its analysis for the final rule. Relatedly, we also recommend that the EPA show a full cost-benefit analysis for each of its sensitivity cases, including for high and low battery cost cases, and also for varying assumptions on IRA tax credit eligibility, phase-out, or elimination. [EPA-HQ-OAR-2022-0829-0701, p. 67]

Organization: American Coalition for Ethanol (ACE)

Among the rosy forecasts are battery costs. EPA states that "battery costs continue to decline," but this is not true. Battery costs increased in 2022 and have been generally stagnant over the last four years.6 [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

6 Lithium-ion Battery Pack Prices Rise, Bloomberg NEF (Dec. 6, 2022). https://about.bnef.com/blog/lithium-ion-battery-pack- prices-rise-for-first-time-to-an-average-of-151-kwh/.

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

As for battery costs, EPA elsewhere concedes that those costs have actually increased—not decreased—in recent years. See 88 Fed. Reg. at 29,301. Bloom- berg recently released a report showing that "the global average price for lith- ium-ion battery packs . . . climbed by about 7 percent in 2022." Id. EPA dis- misses this study by asserting that the survey respondents are "likely to include both large and small purchasers of diverse battery packs," while EPA's own modeling looks to "a specific class of pack design manufactured in large quan- tities at a large manufacturing facility[] to fulfill large orders for a major [origi- nal equipment manufacturer]." Id. But as major original-equipment manufac- turers have noted, as recently as a few months ago, high battery prices are the key factor standing in the way of price parity. The CEO of the Renault

Group, for example, says that prices for electric vehicles are unlikely to match those of internal-combustion-engine vehicles "anytime soon" because "of the ever in- creasing cost of batteries." Charette, Convincing Consumers. Likewise, the Chief Technology Officer of Mercedes notes that he "does not see . . . price parity" between electric and internal-combustion-engine vehicles given "the battery chemistry we have today." Id. [EPA-HQ-OAR-2022-0829-0683, p. 25]

Organization: American Fuel & Petrochemical Manufacturers

While we have not had sufficient time to fully analyze EPA's cost analyses, we have been able to identify several significant deficiencies, each of which understates the true costs of the Proposal: (1) EPA significantly understated the costs of batteries required by the rule; [EPA-HQ-OAR-2022-0829-0733, pp. 48-49]

i. Battery costs

We start with a discussion of EPA's analysis of battery costs because it has significant impacts on ZEV production, operating, and disposal costs. EPA "substantially underestimates the costs of batteries,"223 providing an inadequate analysis and ignoring the cost and long-term affordability of battery production. In the DRIA, EPA states that "despite recent short-term fluctuations in price, the price of lithium is expected to stabilize at or near its historical levels by the mid- to late-2020s, suggesting that the elevated battery costs being reported today will not persist."224 [EPA-HQ-OAR-2022-0829-0733, pp. 49-50]

223 AAI Comments at iv.

224 DRIA at 2-51.

This analysis misses the mark. Between January 2021 and March 2022, the cost of lithium increased by 738 percent.225 2022 battery costs were $153 per kWh,226 and cost reduction curves have already begun to flatten out. Indeed, battery costs rose 7 percent in 2022. With EPA's and other developing nations' push to electrify transportation and the concomitant need to deploy utility-scale batteries, the demand for lithium (and other critical minerals) is expected to grow exponentially. Even so, EPA assumes declining battery costs will reach $120 per kWh in 2032.227 [EPA-HQ-OAR-2022-0829-0733, pp. 49-50]

225 See Canada Energy Regulator, "Market Snapshot: Critical Minerals are Key to the Global Transition" (Jan. 18, 2023), available at https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2023/market-snapshot-critical-minerals-key-global-energy-transition.html.

226 Dept. of Energy, "Electric Vehicle Battery Pack Costs in 2022 Are Nearly 90% Lower than in 2008, according to DOE Estimates," (Jan. 9, 2023) available at https://www.energy.gov/eere/vehicles/articles/fotw-1272-january-9-2023-electric-vehicle-battery-pack-costs-2022-are-nearly.

227 DRIA at 2-46 (resulting 75kWh battery).

EPA's reliance on an ICCT study to justify its estimate of falling battery costs is misplaced. ICCT ignored literature that PHEVs depreciate with certain models and makes losing greater value than others, like Tesla, especially those with long-range features. A May 2023 CBS article highlighted a statement from Kelley Blue Book, an automotive research company, that PHEVs generally depreciate faster than ICEVs.228 Kelley Blue Book said that three-year-old PEVs hold 63 percent of their value compared to 66 percent for ICEVs.229 Additionally, ICCT's battery cost curve does not account for the potential of rising PEV-related metal prices which can cause the price of battery packs to increase, as seen in 2022 and 2023. If ICCT's estimates of PEV battery pack costs were revised to be higher, PEVs are likely to be priced at a substantial premium compared to ICEVs. [EPA-HQ-OAR-2022-0829-0733, pp. 49-50]

228 Joe D'Allegro, What to know about buying a used electric vehicle as more hit the auto sales market, CNBC (May 21, 2023), https://www.cnbc.com/2023/05/21/what-to-know-about-buying-a-used-ev-as-more-hit-the-car-market.html. See also AAA Survey Shows EV Owners Should Be Concerned About Depreciation (insideevs.com).

229 Id.

While prices have since declined, price volatility should be expected to continue. Despite these very public findings, EPA asserts that "battery costs have continued to decline."230 EPA points to the IRA as a mechanism to reduce battery prices, yet this law simply extended the existing battery subsidy and even limited its applicability through domestic sourcing and income requirements. Thus, EPA is relying on an existing program for the proposition that it will lower battery prices in the future. EPA is simultaneously ignoring that the increase in demand for batteries will raise their price. [EPA-HQ-OAR-2022-0829-0733, pp. 49-50]

230 Proposed Rule at 29,188.

Further complicating the projection of future battery prices is the fact that battery raw materials are not commodities, they are classified as specialty chemicals. As such pricing will not follow traditional commodity pricing structures, especially because these supplies are geographically concentrated in areas with geopolitical instabilities. Each OEM, cathode or anode producer, and battery manufacturer have their own specifications for the materials, and thus the raw materials must be refined and tested to meet their bespoke specification. Spot markets for battery materials are virtually non-existent and unlikely to develop in the near term. For example, most lithium contracts are written as long-term agreements, which are based on Fastmarkets' lithium index and a discount, and sometimes with a floor/ceiling mechanism to hedge against pricing volatility. [EPA-HQ-OAR-2022-0829-0733, p. 50]

Ultimately, the volatility of material pricing will directly affect whether certain battery projects even materialize. And if they do, OEMs will need to increase their prices to ensure a steady supply. Morgan Stanley estimates ZEV makers will need to increase prices by 25 percent to account for rising battery prices.231 EPA must consider these data and correct this aspect of its cost-benefit analysis. [EPA-HQ-OAR-2022-0829-0733, pp. 50-51]

231 James Thornhill, Bloomberg, "Morgan Stanly Flags EV Demand destruction as Lithium Soars" (Mar. 24, 2022), Chart 7, available at https://www.bloomberg.com/news/articles/2022-03-25/morgan-stanley-flags- ev-demand-destruction-as-lithium-soars#xj4y7vzkg.

EPA ignores that battery prices have begun to rise due to limited supply of minerals.240 [EPA-HQ-OAR-2022-0829-0733, pp. 52-53]

240 BLOOMBERGNEF "Lithium-ion Battery Pack Prices Rise for First Time to an average of $151/kWh" (Dec. 6, 2022) available at https://about.bnef.com/blog/lithium-ion-battery-pack-prices-rise-for-first-time-to- an-average-of-151-kwh/

Organization: American Honda Motor Co., Inc.

A. Battery Cost Projections

The agency's rationale for setting stringent standards – achieved through significant levels of battery electric vehicle (BEV) adoption – appears to be driven largely by an assumption that BEV prices will significantly decrease. These modeled consumer price decreases rest largely on agency findings that batteries will be substantially less expensive in the coming years. The accuracy of this claim is perhaps the most important aspect of the entire proposed regulation, one that will determine whether or not this program and transformation of the auto industry ultimately occurs on the timeline suggested by the agency. Regulatory stringencies set using a reasonably accurate forecast of future battery costs would result in standards that are both feasible in achievement and effective in decarbonizing the transportation fleet. Conversely, stringencies set using inaccurate (overly optimistic) forecasts of future battery costs would likely result in unachievable compliance obligations and ultimately an ineffective regulatory program [EPA-HQ-OAR-2022-0829-0652, p. 7]

Surprisingly, the agency did not appear to consider one of the few peer-reviewed papers that does speak to this issue, Technological innovation vs. tightening raw material markets: falling battery costs put at risk, by Mauler et al., published in the journal Energy Advances. This important paper notes that cell cost reductions expected to occur between 2020 and 2030 (akin to those anticipated by the agency) "could be significantly slowed down," or potentially even "fully vanish": [EPA-HQ-OAR-2022-0829-0652, p. 8]

The combined impact of material-specific price increases on cell cost in 2030…ranges from +6.9 to +34.3 $ kW h−1, meaning that cell cost reductions from technological innovations could be significantly slowed down or, under the most pessimistic raw material price expectations, fully vanish in 2030.13 [EPA-HQ-OAR-2022-0829-0652, p. 8]

13 Mauler et al., 2022. Technological innovation vs. tightening raw material markets: falling battery costs put at risk. Energy Advances. https://pubs.rsc.org/en/content/articlelanding/2022/YA/d1ya00052g

In our view, the NPRM would benefit from a more meaningful consideration of battery material costs. Of the near 700-page Draft Regulatory Impact Analysis (RIA), EPA devotes only a few paragraphs to this issue, highlighting two recent forecasts to justify its position. Upon closer examination, one of those forecasts (Wood Mackenzie) was found to not even be made available in the Docket, as the agency has excluded it on grounds that it is a paid subscription service and not licensed for publication.11 The other forecast (EDF/ERM), commissioned by Environmental Defense Fund, an environmental advocacy group that has long supported stringent vehicle emissions standards, is available in the Docket, but falls well short of an analysis upon which one could make a reasonable decision that materials costs will not meaningfully climb in the 2027-2032 timeframe. The EDF/ERM forecast was conducted recently enough to acknowledge that "supply chain disruptions have affected EV and battery pricing,"12 but it does not contemplate the potential impact of a meaningful expected increase in battery demand over the next eight years. [EPA-HQ-OAR-2022-0829-0652, p. 8]

11 Safoutin, M. 2022. Agency memorandum. https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829- 0316

12 EDF/ERM 2022. Electric Vehicle Market Update: Manufacturer Commitments and Public Policy Initiatives Supporting Electric Mobility in the U.S. and Worldwide. https://www.regulations.gov/document/EPA-HQ-OAR- 2022-0829-0154

The very real possibility that battery material costs will climb during the window of this regulation needs to be considered by the agency. According to Argonne researchers, the NMC811, graphite, separator and electrolyte add up to 86% of material costs.14 Poorly or improperly forecasted future battery costs can result in directionally different conclusions regarding the viability of vehicle electrification. [EPA-HQ-OAR-2022-0829-0652, pp. 8-9]

14 Ahmed, S., et al., 2022. Estimated Cost of EV Batteries 2018-2022. Online slide presentation available at https://www.anl.gov/cse/batpac-model-software

As we have witnessed over the past few years, numerous critical minerals used in EV and plug-in hybrid- electric vehicle (PHEV) batteries have seen significant price volatility. Even BloombergNEF, known for its optimistic (low price) forecasts of battery cost, recently acknowledged that pack costs will see increases in price, at least in the near term, due in part to supply chain issues and higher demand for critical minerals. The BatPaC model has also noted increased materials costs over the past few years. Between 2021 and 2022, for example, updates to BatPaC resulted in a 14% increase in the $/kg cost of cathode active material and a 50% increase in the $/kg cost of positive binder.15 While we appreciate EPA's use of the most recent version of BatPaC to reflect the latest material cost assumptions, these cost increases are a further indication that – contrary to EPA's assumptions – costs are unlikely to remain at 2022 levels for the next decade. For EPA to assume that a swift, regulation-driven exponential increase in demand for critical minerals in a tight, volatile and geopolitically sensitive global market would have no impact on electrode and other battery materials costs calls into question the fundamental validity of the agency's analysis. [EPA-HQ-OAR-2022-0829-0652, p. 9]

15 Ahmed, S., et al., 2022. Estimated Cost of EV Batteries 2018-2022. Online slide presentation available at https://www.anl.gov/cse/batpac-model-software

Recommendation: Honda strongly urges the agency to revise its battery price forecasts used in the Final Rule to include the impact of increased global demand on materials costs. Specifically, Honda requests that the agency rely on impartial sources of information, including the peer-reviewed paper by Mauler et al., to support its position. [EPA-HQ-OAR-2022-0829-0652, p. 9]

Use of default costs

The agency notes in its proposal that "default costs provided in BatPaC for electrode powders and other constituents were used."16 Based on our read of the proposal and Draft RIA, it is not clear where these cost assumptions came from. Are they predicated on a certain set of assumptions, such as a globally- sourced mining/refining/production supply chain? If so, such assumptions should be revisited and adjusted accordingly, since EPA also assumes in this proposed rule that OEMs will significantly utilize IRA tax incentives, some of which have particular content and sourcing requirements that may limit their utility (depending on the outcome of yet-to-be-released IRS guidance). [EPA-HQ-OAR-2022-0829-0652, p. 9]

16 EPA, 2023. Draft RIA, p. 2-45. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Recommendation: Honda respectfully requests that EPA revisit all default values with Argonne National Laboratory's materials cost experts to ensure that cost estimates extrapolated from the BatPaC model are factually consistent with other IRA-based assumptions being made by EPA in this rulemaking. [EPA-HQ-OAR-2022-0829-0652, p. 9]

Lack of transparency regarding BatPaC inputs

EPA claims that "the BatPaC spreadsheet models used to develop the costs for BEVs, HEVs, and PHEVs are available in the Docket…and fully describe the BatPaC inputs."17 Honda respectfully disagrees. Investigation into the BatPaC model revealed that numerous key inputs and default values utilized by the agency were in fact undocumented numbers, hard coded into the model. Investigation into key battery cost assumptions (as noted above) required separate examination outside of the Docket to better understand the agency's analysis. This should not be required. EPA's lack of transparency on this potentially critical topic of model assumptions, particularly given the short 60-day comment period provided by the agency, undermines stakeholders' abilities to provide meaningful feedback on the agency's proposal. [EPA-HQ-OAR-2022-0829-0652, p. 10]

17 EPA, 2023. Draft RIA, p. 2-45. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Recommendation: Honda respectfully requests that the Final Rule include greater transparency regarding BatPaC-based values used in its rulemaking. [EPA-HQ-OAR-2022-0829-0652, p. 10]

Projecting future battery material and labor costs

The agency assumes that the IRA 45X tax credits will be fully utilized by all OEMs through MY2032 (subject to phase-down in the final years of the program) and applies those reductions to the overall cost of batteries in EPA's OMEGA modeling. This has resulted in profoundly low battery cost estimates, for example, below $40/kWh in 2029.10 The agency does not, however, appear to make any upward adjustments to the core Argonne National Laboratory BatPaC 5.0 material costs to account for exponential growth in critical minerals demand that will occur during this time frame, or to the increased labor cost associated with domestically produced packs. We believe these are significant oversights that likely result in a meaningful underestimation of true vehicle electrification costs. [EPA-HQ-OAR-2022-0829-0652, pp. 7-8]

10 EPA, 2023. Draft RIA, Figure 2-27. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Organization: American Petroleum Institute (API)

Battery Cost Modeling

The NPRM includes several citations112 of battery cost analysis used by the EPA in developing the technical feasibility of the regulation based on Argonne National Laboratory's BatPaC Model Software. This software includes an analysis of several different battery chemistries and a breakdown of the individual costs for various components needed to manufacture an automotive battery at scale.113 Argonne's assessment of the 2022 battery cost concludes that 63% of the total battery cost is from raw materials on the anode and cathode of the individual cells. This is an important fact for EPA to consider in the assessment of long-term battery cost modeling as the model for parts and raw materials are fundamentally different. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

112 40 CFR Parts 85, 86, 600, 1036, 1037, and 1066 [EPA–HQ–OAR–2022–0829; FRL 8953–03– OAR] pages 29295, 29299, 29301, 29302.

113 https://www.anl.gov/cse/batpac-model-software.

The NPRM then applies a modeling equation to these initial cost/kWh values to develop long-term costs on a year-by-year basis. This model is detailed in the DRIA in section 2.5.2.1.3.114 [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

114 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles - Draft Regulatory Impact Analysis (EPA-420-D-23-003, April 2023).

1) Calculate the cumulative GWh needed by BEVs placed into the analysis fleet through the last model year. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

2) Calculate the cost reduction factor due to learning:

factor = 4.1917 × (cumulative ?W ? through last year) −0.225 [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

3) Calculate battery cost in the base year, as a function of pack kWh, according to the equation in RIA 2.5.2.1.2: $/????? = 261.61 × (gross ?????) −0.184 [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

4) Multiply the result of Step 3 by the result of Step 2.

This model makes several unrealistic assumptions:

- No lower bound with increasing volume – at some point in the future, the real cost of battery cells will be $0.00 based on the model used in the NPRM due to cumulative GWh production. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

- Cumulative GWh calculation based on production of batteries in the U.S. but it needs to be based on the global production of batteries to establish a baseline. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

  - o It is global economics that support the costs of battery production, not the economics of the U.S. alone. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

  - o Global battery volume is expected to rise from ~700GWh to 5,300GWh by 2035. 115 [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

115 https://emobilityplus.com/2023/04/21/global-electric-vehicle-battery-market-to-reach-616-billion-by-2035- report/.

- $75/kWh was selected for 2035; however, the modeling cited above implies a $46/kWh value based on the model parameters. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

  - o The cost model cited in the NPRM appears to be voided by several assumptions for cost reduction milestones in section 2.5.2.1.3. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

- Manufacturing battery cells operates on the same cost curve as manufacturing standard automotive parts - the cost of the materials in manufacturing battery cells operates on a different cost curve to standard automotive part production and this is not accounted for in the model. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

o Resource modeling is not capital-dependent but resource dependent. This curve follows an increasing cost as production levels are increased and not a reduction as cited in the regulatory framework of the NPRM. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

• Biasing the model with the initial development phase will not represent the long-term trend and therefore a more appropriate model should be used to represent real-world costs and volume impacts. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

Since Argonne has established a 63% critical raw material value in their development of the BatPaC, it is important for the regulation to follow the economics of raw materials rather than capital depreciation and learning models for purposes of accuracy. Perhaps following the economics of oil production would be more representative of modeling the costs of 63% of the batteries in automotive applications. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

[See original for graph titled “Figure 1”] [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

As shown in Figure 1, over the last 40 years the global supply of oil has increased by ~50%.116 During that same period, the price increased by ~200%. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

116 EIA Global crude oil production and price sourced in May 2023.

[See original for graph titled “Figure 2”] [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

As shown in Figure 2, lithium has followed a similar trend to oil – Global production117 is up 400%, and prices are up 600%. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

117 USGS Global lithium production and price sourced in May 2023.

[See original for graph titled “Figure 3”] [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

Nickel also follows a similar trend shown in Figure 3. Rising in price with increased demand and falling with reduced demand over the last 10 years.118 [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

118 USGS Global nickel production and price sourced in May 2023.

These examples show how real-world resource costs are impacted by demand. Unlike the automotive parts model used in the regulation, price and volume tend to move in the same direction for critical battery raw materials. This is because these raw materials are produced in the lowest-cost locations, to begin with, and then move to higher-cost locations to meet demand over time. We see this with oil resources as well. The lowest cost-to-produce sources are used first and only after those sources are at capacity are the higher cost sources then consumed by the market. We fully expect to see the same trend with all critical raw materials for battery production long term, contrary to the assumptions in the NPRM. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

Based on the Argonne value of 63% raw material cost in an average automotive battery, we suggest the agency develop a new costing model to properly account for the 63% resource- based costs and use the current model only for the remaining 37% to account for the capital depreciation and learning on the remaining value of the battery. [EPA-HQ-OAR-2022-0829-0641, pp. 43-46]

Organization: Clean Fuels Development Coalition et al.

B. The proposal rule underestimates future battery costs.

EPA estimates that battery costs will continually decline over the next decade, decreasing from around $12,000 per pack in 2022 to around $7,000 per pack in 2032.13 This projection isn't realistic. For some segments, 2022 battery costs were $153 per kWh, Electric Vehicle Battery Pack Costs in 2022 Are Nearly 90% Lower than in 2008, according to DOE Estimates, Office of Energy Efficiency & Renewable Energy (Jan. 9, 2023), https://www.energy.gov/eere/vehicles/articles/fotw-1272-january-9-2023- electric-vehicle-battery-pack-costs-2022-are-nearly. While there has been a decrease in cost over the last decade, prices have not continued to drop. Instead, cost reduction curves have already begun to flatten out and battery costs rose 7 percent in 2022. [EPA-HQ-OAR-2022-0829-0712, p. 21]

13 Projections assume a 100 kWh battery pack and per kWh prices as described by EPA in the Draft Regulatory Impact Analysis. DRIA 2-53.

Further, many studies project battery costs to rise over the next few years. For example, E Source estimates battery cell prices will surge 22% from 2023 through 2026. Phil LeBeau, EV battery costs could spike 22% by 2026 as raw material short- ages drag on, CNBC (May 18, 2022), https://www.cnbc.com/2022/05/18/ev-battery- costs-set-to-spike-as-raw-material-shortages-drags-on.html. And Benchmark Mineral Intelligence projects that prices could become worse at the end of the decade as an increase in global electric vehicle manufacturing leads to massive lithium short- ages beginning in 2029 and getting increasingly worse as through 2032. Eric Onstad et al., Lithium prices bounce after big plunge, but surpluses loom, Reuters (May 2, 2023), https://www.reuters.com/markets/commodities/lithium-prices-bounce-after- big-plunge-surpluses-loom-2023-04-28/.[EPA-HQ-OAR-2022-0829-0712, pp. 21-22]

An analysis based on the E Source study and the Benchmark Mineral Intelligence Project, suggests that battery prices for a 100 kWh battery will rise from $12,800 per pack in 2022 to a peak of $13,000 per pack in 2027, before stabilizing at $12,000 per pack from 2029 through 2032. See Figure 4. When these additional costs are added to the manufacturing of each of the 15 million electric vehicles needed to comply with the proposed standards, an additional $64 billion in vehicle technology costs are added to EPA's projections. [EPA-HQ-OAR-2022-0829-0712, pp. 21-22]

SEE ORIGINAL COMMENT FOR Figure 4: Projected battery pack costs for 100 kWh battery pack. [EPA-HQ-OAR-2022-0829-0712, pp. 21-22]

Organization: Energy Innovation

III. THE EPA'S FINAL STANDARDS SHOULD ACCOUNT FOR ADDITIONAL FACTORS THAT MAY ACCELERATE ADOPTION OF ZERO-EMISSION TECHNOLOGIES AND IMPACT LEARNING CURVES FOR BEV ECONOMICS.

We appreciate the EPA's attention to vehicle technologies and trends in the proposed rule and draft regulatory impact analysis (DRIA)31 to inform the analysis underpinning the proposed rule. The EPA notes that, “in designing the scope, structure, and stringency of the proposed standards, the Administrator considered previous rulemakings, as well as the increasing availability of vehicle technologies that can be utilized by manufacturers to further reduce emissions.”32 Section 202(a) of the Clean Air Act directs the EPA to regulate emissions from new vehicles or engines that cause or contribute to air pollution that may endanger public health or welfare— and the EPA is authorized and directed under the same statute to consider emerging technologies when determining the level of stringency and feasibility of the standards. As with prior rules, the “EPA is assessing the feasibility of new standards on light of current and anticipated progress by automakers in developing and deploying new technologies.”33 [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

31 “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Draft Regulatory ImpactAnalysis” (Assessment and Standards Division Office of Transportation and Air Quality U.S. Environmental Protection Agency, April 2023), https://www.epa.gov/system/files/documents/2023-04/420d23003.pdf. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

32 U.S. EPA, “Proposed Rules,” May 5, 2023, 29187.

33 U.S. EPA, 29187.

Notably, as the EPA GHG standards have increased in stringency over the past decade, “automakers have relied to a greater degree on a range of electrification technologies…[and] as these technologies have been advancing rapidly in just the past several years, the battery costs have continued to decline….As a result, zero- and near- zero emission technologies are more feasible and cost-effective now than at the time of prior rulemakings.”34 We agree and believe these cost declines will continue for the foreseeable future and exceed projections, due to the effect of battery learning curves, which we discuss further below. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

34 U.S. EPA, 29188.

Both of these trends reflect learning curves, which affect the rate of deployment of newer technologies and advances in performance and production. As the market scales up, technologies achieve greater economies of scale, which lowers the cost of production.37 A relevant example of a learning curve is illustrated in Figure 9, which shows the cost to the public to buy Henry Ford’s Model T automobile in the early 1900s—the beginning of the age of the automobile. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

37 Hal Harvey and Justin Gillis, The Big FIx: 7 Practical Stesps to Save Our Planet (Simon & Schuster, 2022), 9-35.

[See original attachment for line graph “The Learning Curve of the Model T”] [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

Figure 9. Learning curve of the Model T, 1909-1925. adjusted for inflation and including all trim lines of the Model T. Source: Harvey, Hal et al., The Big Fix, Simon & Schuster, 2022, 19. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

Learning curves affect how quickly BEVs can outcompete ICE vehicles on purchase price, which is a primary factor in market adoption and consumer acceptance. Rapid innovation and falling battery prices have changed the economics of EVs because batteries are the main driver of purchase price differences between EVs and ICE vehicles.38 [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

38 Chris Busch and Anand Gopal, “Electric Vehicles Will Soon Lead Global Auto Markets, But Too Slow to Hit Climate Goals Without New Policy” (Energy Innovation, November 2022), https://energyinnovation.org/wp-content/uploads/2022/11/Electric-Vehicles-Will-Soon-Lead-Global-Auto-Markets-But-Too-Slow-To-Hit-Climate-Goals-Without-Policy.pdf.

According to a recent analysis from ICCT, “with declining electric vehicle battery and assembly costs, shorter- range BEVs of 150 to 200 miles are projected to reach price parity by 2024-2026, followed by mid-range BEVs with 250 to 300 miles around 2026-2029, and the longest-range BEVs with 350 to 400 miles around 2029-2032.”39 See Figure 10. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

39 Peter Slowik et al., “Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Time Frame,” International Council on Clean Transportation, October 2022, https://theicct.org/wp-content/uploads/2022/10/ev-cost-benefits-2035-oct22.pdf, iii.

[See original attachment for table described below] [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

Figure 10. Summary of year by which battery electric vehicle price parity is reached. Source: Slowik, Peter, et al., Assessment of Light- Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Time Frame, ICCT, October 2022, ii-iii. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

These findings align with the EPA’s finding: “[w]hile the retail price of PEVs is typically higher than for comparable ICE vehicles at this time, the price difference is widely expected to narrow or disappear, particularly for BEVs, as the cost of batteries and other components fall in the coming years.”40 [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

40 U.S. EPA, “Proposed Rules,” May 5, 2023, 29190.

From our research, we have identified the following factors related to learning curves that may further accelerate future cost declines and improvements to BEV technologies. Based on our assessment, we believe the estimated costs of the proposed rule and Alternative 1 will likely be lower than projected, making compliance more feasible, more cost-effective, and more beneficial to consumers and the economy. We summarize these factors below and urge the EPA’s consideration of them as it develops the final rule. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

1. Tendency of battery outlooks to underestimate future learning curves

Historic forecasts of battery prices have largely underestimated the impact of future learning curve effects. Recent, open-source, peer-reviewed research by the Institute for New Economic Thinking (INET) at Oxford University41 shows the persistent underestimation of future innovation for batteries and develops an empirical forecasting approach that performs better.42 [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

41 “Institute for New Economic Thinking, University of Oxford,” n.d., https://www.inet.ox.ac.uk.

42 Rupert Way et al., “Empirically Grounded Technology Forecasts and the Energy Transition,” Joule 6, no. 9 (September 21, 2022): 2057–82, https://doi.org/10.1016/j.joule.2022.08.009.https://www.cell.com/joule/fulltext/S2542-4351(22)00410-X.

Figure 11 is reproduced from the INET article to help illustrate this point. The figure denotes historical prices for lithium-ion (Li-ion) consumer battery cell prices and Li-ion EV battery packs with black and red data points, respectively, while red line segments trace historical forecasts for the most optimistic scenarios by leading energy-economy modelers such as the International Energy Agency. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

The figure's graphing of historical data alongside past forecasts of battery cell and EV battery pack prices reveals the persistent gap between actual and forecasted innovation for batteries. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

Even the most optimistic projections for prior forecasts underestimated future learning curves. For each, empirical price reductions trace a steeper trajectory, with cost dropping faster, compared to the forecast's shallower slope. The result is even more compelling considering the comparison to the most optimistic of each battery forecast sampled. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

[See original attachment for graph described below] [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

Figure 11. Empirically grounded technology forecasts and the energy transition, reproduced from Figure 5 from INET. Source: https://www.cell.com/cms/attachment/e50686b6-4cba-47f7-85b6-04ab5411bb7f/gr5.jpg. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

2. Battery pack economies of scale

As battery size increases, the added cost of the pack needed to contain battery cells falls, reducing cost ($/kWh), keeping other factors constant. The larger the battery size, the more the costs associated with the packaging and management system can be distributed among more cells. These fixed costs remain largely the same whether the battery is small or large, so increasing the size of the battery allows for a lower cost per cell. A larger battery pack generally allows for more efficient design and packaging of the battery cells. For example, in a larger pack, cells can be arranged more closely together, reducing the amount of wasted space and materials. This again reduces the ratio of battery pack to cell. The ICCT cost analysis shows that larger batteries yield lower costs.43 See Figure 12. Comparing the 2030 cost outlook for a car battery providing 300 miles vs. 150 miles of range, the larger battery costs $68 per kWh vs. $79 per kWh, offering a 14 percent advantage. Pack-level scale economies of scale will be an advantage for battery packs for all vehicles, especially trucks and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

43 Slowik et al., "Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Time Frame," 10.

[See original attachment for table described below] [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

Figure 12. Technical characteristics of electric vehicles for 2022 and 2030. Source: Slowik, et al., Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Time Frame, 10. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

3. Faster-than-expected moderation of pandemic-induced supply chain disruption

Key mineral inputs to battery production have dropped in price over the last six months more quickly than had been anticipated. Lithium prices have also fallen, dropping by half from a November 2022 peak.44 The downward trend in cobalt has been even more severe, partly because of the reduction in global cobalt demand due to lithium-ion phosphate batteries' growing market share. In June, the cobalt price had dropped to $14 per pound, down 65 percent from its 2022 peak.45 See Figure 13. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

44 Junaid Shah, "Crash in Lithium Prices: A Boon for EV Buyers or Unsustainable Trend?," Saur Energy International, April 4, 2023, https://www.saurenergy.com/solar-energy-blog/crash-in-lithium-prices-a-boon-for-ev-buyers-or-unsustainable-trend.

45 Sophie Caronello, "Five Key Charts to Watch in Global Commodities This Week," Bloomberg.Com, June 11, 2023, https://www.bloomberg.com/news/articles/2023-06-11/five-key-charts-to-watch-in-global-commodity-markets-this-week#xj4y7vzkg.

Trends in cobalt and lithium prices are part of a broader trend in moderation of supply-chain pressures on EV batteries. Goldman Sachs Group Inc. is forecasting "softness for battery metals including cobalt, lithium and nickel in the second half of 2023 amid an oversupply."46 [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

46 "Cobalt Price Has Fallen Nearly 30% This Year," Mining.com, June 12, 2023, https://www.mining.com/cobalt-price-has-fallen-nearly-30-this-year/.

[See original attachment for graph "Global cobalt metal price"]

Figure 13. Global cobalt metal price, 2020-2023. Source: BloombergNEF, available at: https://www.bloomberg.com/news/articles/2023- 06-11/five-key-charts-to-watch-in-global-commodity-markets-this-week. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

4. Novel battery chemistries and battery recycling

Novel battery chemistries nearing commercial availability will open new avenues for innovation, and their effects will not be limited to technological change. Novel battery chemistries will also have economic benefits by spreading EV battery demand across a greater array of raw inputs. More diverse mineral input supplies will disperse demand instead of concentrating it, reducing supply-side price pressure. New battery chemistries will also increase competition between battery technologies, reducing producer profit margins and improving consumer economics. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

[See original attachment for graph "Changing Chemistries: Demand for cobalt is now less than previously expected as battery chemistries shift"] [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

Figure 14. Demand for cobalt is now lower than previously expected due to shifting battery chemistries. Source: BloombergNEF, available at: https://about.bnef.com/blog/race-to-net-zero-the-pressures-of-the-battery-boom-in-five-charts/. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

In response to supply pressures and other market factors, cobalt-free lithium-ion-phosphate batteries are gaining traction because they can be built at a lower cost than other battery chemistries.47 The result is a dampening effect on cobalt demand. BloombergNEF analysis finds that global demand for cobalt would be 52 percent higher if lithium-ion-phosphate batteries had not experienced this rapid growth.48 [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

47 Taylor Kuykendall and Avery Chen, “Battery Next: Metal Supply Concerns Push EV Makers to New Battery Chemistries,” S&P Market Intelligence, June 6, 2023.

48 “Race to Net Zero: The Pressures of the Battery Boom in Five Charts” (BloombergNEF, July 21, 2022), https://about.bnef.com/blog/raceto-net-zero-the-pressures-of-the-battery-boom-in-five-charts/.

Two new battery chemistries entering commercial use this year in EV battery packs are sodium-ion batteries49 and lithium-sulfur batteries.50 BloombergNEF estimates that sodium-ion uptake, substituting for lithium-based chemistries, could lower lithium demand by 40 percent in 2035.51 See Figure 15. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

49 Casey Crownhart, “How Sodium Could Change the Game for Batteries,” MIT Technology Review, May 11, 2023, https://www.technologyreview.com/2023/05/11/1072865/how-sodium-could-change-the-game-for-batteries/.

50 Kate McAlpine, “1,000-Cycle Lithium-Sulfur Battery Could Quintuple Electric Vehicle Ranges,” Michigan News, University of Michigan Vice President for Communications (blog), January 12, 2022, https://news.umich.edu/1000-cycle-lithium-sulfur-battery-could-quintuple-electricvehicle-ranges/.

51 Colin McKerracher, “EV Sales Are Soaring And Oil Use Is About to Peak: Hyperdrive,” Bloomberg, June 8, 2023, https://www.bloomberg.com/news/articles/2023-06-08/ev-sales-are-soaring-and-oil-use-is-about-to-peakhyperdrive?srnd=premium#xj4y7vzkg.

[See original attachment for graph “Impact of Sodium-Ion Battery Uptake on Lithium Demand”] [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

Figure 15. Impact of sodium-ion battery uptake on lithium demand, 2020-2035. Source: BloombergNEF, available at: https://www.bloomberg.com/news/articles/2023-06-08/ev-sales-are-soaring-and-oil-use-is-about-to-peak-hyperdrive#xj4y7vzkg. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

A research team from the University of Michigan is demonstrating the viability of a new battery membrane (made from a network of aramid nanofibers, recycled from Kevlar) that can enable lithium-sulfur batteries to have five times the capacity of lithium-ion batteries, increasing the number of times the battery can be charged and discharged. Sulfur is more abundant than the cobalt, and the aramid fibers of the battery membrane can be recycled from old bulletproof vests. The University of Michigan has patented the membrane and the lead researcher is developing a company to bring it to market.52 [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

52 McAlpine, “1,000-Cycle Lithium-Sulfur Battery Could Quintuple Electric Vehicle Ranges.”

Finally, battery recycling is on the rise and slated for substantial growth over the coming decades. Numerous factors are fueling the battery-recycling industry, including technological progress, supply-chain stability considerations, decarbonization targets, new IRA incentives for recycled battery materials, and ongoing research & development efforts.53 [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

53 McKinsey & Company, “Battery Recycling Takes the Driver’s Seat,” Our Insights: Automotive & Assembly, March 13, 2023, https://www.lung.org/research/sota/health-risks.

These and other evolving factors impacting the BEV market are highly likely to result in lower costs to manufacturers and consumers as learning rates improve, faster adoption of zero-emission technologies, and greater emissions reductions over the timeline of the proposed rule.

We recommend the EPA fully consider these factors and other relevant market trends as it develops the final rule. [EPA-HQ-OAR-2022-0829-0561, pp. 16-19]

Organization: Environmental. and Public Health Organizations

C. Battery costs will continue to decline, and EPA should include lithium-iron phosphate batteries in its modeling of battery pack costs.

Developments in battery technology and reductions in battery costs also support the promulgation of strong standards. EPA is correct that battery costs will continue to decline. Improvements in battery chemistries are one reason for that, and EPA should include batteries with lithium-iron phosphate (LFP) chemistry in its modeling. [EPA-HQ-OAR-2022-0829-0759, p. 49]

1. EPA should include lithium-iron phosphate battery chemistries in its BatPaC modeling of battery pack costs.

When modeling the cost of BEV batteries, EPA should consider the use of iron-phosphate cathodes. The use of LFP batteries in current BEV models is growing; these batteries have potential benefits beyond lower material prices, including higher fast-charging rates and greater durability.128 [EPA-HQ-OAR-2022-0829-0759, p. 49]

128 Ford Media Center, Ford Taps Michigan for New LFP Battery Plant; New Battery Chemistry Offers Customers Value, Durability, Fast Charging, Creates 2,500 More New American Jobs (Feb. 13, 2023), at https://media.ford.com/content/fordmedia/fna/us/en/news/2023/02/13/ford-taps-michigan-for-new-lfp-battery-plant-- new-battery-chemis.html (last accessed July 3, 2023).

EPA cites the lower specific energy and energy density of LFP batteries as being less appropriate to the 300-mile range BEVs modeled in its analysis. While there is demand for longer-range BEVs, there is still likely to be a role for BEVs with a range of 200-300 miles; in fact, many current BEV models have a rated range of less than 300 miles. Even if the average range of BEV vehicles is 300 miles, the actual product mix will include vehicles with ranges both above and below that average. And as fast-charging infrastructure with higher-power (>##300 kW) EVSE is deployed, consumers may be more willing to choose a BEV with less than 300 mile range, as mid-trip recharging would require less time. Vehicles with lower range are good candidates for LFP batteries. [EPA-HQ-OAR-2022-0829-0759, p. 49]

For these reasons, EPA should evaluate the potential cost savings if a portion of PEV models use LFP batteries. Using BatPaC version 5,129 switching to LFP from the default of NMC811 reduces battery pack cost 7-10%, depending on battery production volume assumptions and battery capacity. As supported by findings in BloombergNEF's latest Electric Vehicle Outlook, LFP batteries are forecasted to be used in an increasing number of passenger BEVs in the United States, reaching around 30% of new demand in 2032.130 [EPA-HQ-OAR-2022-0829-0759, pp. 49-50]

129 U.S. EPA, Battery Cost Estimation Spreadsheets for US EPA LMDV NPRM, EPA-HQ-OAR-2022-0829-0356_attachment_3, available at https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0356.

130 Dr. Andy Leach, Lithium-Ion Batteries: State of the Industry 2022, US demand, chemistry mix, and recycling Capacity, BloombergNEF, Sept. 9, 2022. Subscription required.

2. Battery costs will continue to decline.

We concur with EPA's assessment that battery costs will continue to decline. We provide support for EPA's battery cost-per-kWh inputs for its OMEGA modeling and the continued downward price trend of batteries. [EPA-HQ-OAR-2022-0829-0759, p. 50]

In its modeling, EPA used an average battery cost ($/kWh) at the pack-level based on a proprietary analysis by Wood Mackenzie and a report by the Environmental Defense Fund (EDF) and Environmental Resources Management (ERM) compiling battery cost projections from a number of sources.131 The Agency also noted that according to BloombergNEF, global average pack prices were expected to reach $100/kWh by 2026, as the price increase in 2022 due to mineral price volatility will be resolved within a couple of years.132 We believe these costs are an appropriate representation of the market. Our own analysis based on data available to BloombergNEF subscribers in the Electric Vehicle Outlook 2023 yields numbers just slightly below the costs EPA used in its modeling, as shown in the table and figure below, assuming that EPA's costs were shown in 2021$. [EPA-HQ-OAR-2022-0829-0759, p. 50]

131 See DRIA at 2-50.

132 88 Fed. Reg. at 29323

SEE ORIGINAL COMMENT FOR TABLE Pack-Level Cost Comparison (2021$/kWh) [EPA-HQ-OAR-2022-0829-0759, p. 50]

SEE ORIGINAL COMMENT FOR Figure LD Battery Pack-Level Cost Comparison, Cost EPA Used in OMEGA and Alternate Cost Prediction [EPA-HQ-OAR-2022-0829-0759, p. 51]

To develop our estimates, we used battery global cost data (2022$/kWh) for BEVs, global battery demand forecasts, and the most updated learning rate used by BloombergNEF after the 2022 price increase, as well as a 7.02% inflation rate between June 2021 and June 2022 to convert the data back to 2021$/kWh.133 [EPA-HQ-OAR-2022-0829-0759, p. 51]

133 Evelina Stoikou, 2022 Lithium-Ion Battery Price Survey, BloombergNEF (Dec. 6, 2022), at 13-15 & 24-27 (Subscription required).

Lastly, as EPA noted, its analysis does account for access to § 45X Advanced Manufacturing Production tax credits, but there are several other tax credits from the IRA available to battery manufacturers that will reduce costs below what is represented in EPA's analysis, such as the 10% tax credits for electrode active material or critical mineral production. As a result, this is a conservative assumption, which further supports the reasonableness of EPA's battery cost projections. [EPA-HQ-OAR-2022-0829-0759, p. 51]

In sum, EPA's forecast of battery cost per unit of battery power output ($/kWh) aligns with the best available knowledge and prediction of the market at this time. However, EPA's forecast of some of the other factors related to battery technologies, like specific energy, are behind where the market is currently and where it is trending for the future. These inputs can therefore cause the full cost of a passenger BEV and the associated mineral demand to be modeled higher than the most likely real-world scenarios. Therefore, even though the cost per kWh input is appropriate, the cost and minerals needed per BEV are likely overestimated under the EPA's current approach meaning that technological feasibility and benefits are higher than predicted by the EPA. [EPA-HQ-OAR-2022-0829-0759, p. 51]

B. Alternative battery-related modeling inputs increase the feasibility and benefits of PEVs.

EPA's OMEGA modeling likely overestimates the battery cost and material demand per passenger PEV due to conservative technical assumptions made about advancements in lithium-ion batteries that would replace materials, increase specific energy, or allow for the longer use of batteries through refurbishment or reuse. Additionally, the variables discussed below can also cause mineral demand forecasts to be higher than actual future material demand. [EPA-HQ-OAR-2022-0829-0759, p. 142]

1. Technological advancements resulting in decreased mineral demand can also further decrease battery costs.

In addition to the substitution of lithium discussed above, advanced lithium-ion batteries such as solid-state batteries could decrease the amount of lithium required to provide the same kWh and miles traveled. Innovation will increase battery specific energy and energy density, therefore reducing the amount of materials needed per kWh as well as battery cost. [EPA-HQ-OAR-2022-0829-0759, p. 143]

Solid-state battery startups, such as QuantumScape,379 are already partnering with automakers to ensure the technology is suitable for PEVs. Solid Power has partnered with Ford and BMW and has provided BMW with a research and development license to its all-solid-state cell design and manufacturing knowledge, and QuantumScape in December 2022 shipped its first lithium metal battery cells for trial.380 Solid-state batteries have increased specific energy, with QuantumScape reporting their Li-Metal NMC batteries having up to 400 Wh/kg or 1,100 Wh/L depending on the anode. This increase is graphically represented in Figure XVIII.B-1 below, which was produced by QuantumScape. [EPA-HQ-OAR-2022-0829-0759, p. 143]

379 QuantumScape, Delivering on the promise of solid-state technology, https://www.quantumscape.com/technology/ (last accessed, June 29, 2023).

380 Steve Hanley, Solid Power & QuantumScape Begin Shipping Solid-State Batteries For Trials, CleanTechnica (Dec. 22, 2022), at https://cleantechnica.com/2022/12/22/solid-power-quantumscape-begin-shipping-solid-state-batteries-for-trials/ (last accessed June 29, 2023).

SEE ORIGINAL COMMENT FOR Figure XVIII.B-1: Energy Density Improvements as Projected by QuantumScape

Sources: Cell energy densities for commercialized chemistries based on Ding, et al.381 and Yang et al.382; Li-metal cell densities based on QuantumScape estimates

381 Yuanli Ding, et al., Automotive Li-Ion Batteries: Current Status and Future Perspectives. Electrochem. Energy Rev. 2:1–28 (2019), available at https://doi.org/10.1007/s41918-018-0022-z (last accessed June 29, 2023).

382 Xiaofei Yang, et al., Recent advances and perspectives on thin electrolytes for high-energy-density solid-state lithium batteries, Royal Society of Chem. (2020) DOI: 10.1039/d0ee02714f, available at https://www.eng.uwo.ca/nanoenergy/publications/2020/pdf/xiaofei-ees-thin-SSE-2020.pdf (last accessed June 29, 2023).

Sodium-ion batteries are also making their way to the market, providing an alternative to lithium minerals and potentially reducing future lithium demand. CATL (the world's largest PEV battery maker) invested in the technology in 2021,383 and the Chery iCar will be the first EV to use the technology.384 There are already 20 sodium-ion battery factories under construction or planned around the world, demonstrating the uptake of this technology.385[EPA-HQ-OAR-2022-0829-0759, p. 144]

383 Magdalena Petrova, Here's why sodium-ion batteries are shaping up to be a big technology breakthrough, CNBC (May 10, 2023), at https://www.cnbc.com/2023/05/10/sodium-ion-batteries-shaping-up-to-be-big-technology-breakthrough.html (last accessed June 29, 2023).

384 Jiri Opletal, CATL's sodium-ion batteries will debut in Chery Auto EVs, Car News China (Apr. 16, 2023), at https://carnewschina.com/2023/04/16/catls-sodium-ion-batteries-will-debut-in-chery-auto-evs/ (last accessed June 29, 2023).

385 Steve Hanley, The Sodium-Ion Battery Is Coming To Production Cars This Year, CleanTechnica (Apr. 22, 2023), at https://cleantechnica.com/2023/04/22/the-sodium-ion-battery-is-coming-to-production-cars-this-year/ (last accessed June 29, 2023).

2. Specific energy assumed in the model is lower than expected for LDVs.

"Specific energy" is the amount of energy a battery can store per unit of its weight, and "energy density" is the amount of energy a battery can store per unit of its volume. As shown in Figures XVIII.B-2 and XVIII.B-3 below, both of these metrics have increased dramatically over time for lithium-ion batteries. Improving battery specific energy and energy density increases the amount of energy that can be stored using the same amount of materials. This is important not only for reducing demand for battery minerals but also for improving the range of PEVs. These increases are the result of various factors, including battery chemistry and design improvements. Battery chemistries have different specific energies; nickel- and cobalt-containing chemistries have higher specific energy than LFP. For example, the Tesla Model Y uses an NCA battery with a reported 276-333 Wh/kg, while the Model S and Model X use a battery with slightly less at 250 Wh/kg.386 While lower, this 250 Wh/kg is still a dramatic increase from Sony's commercialization in 1991 when it was 80 Wh/kg.387 [EPA-HQ-OAR-2022-0829-0759, p. 145]

386 Aditya Dhage, Cylindrical Cell Comparison 4680 vs 21700 vs 18650 (Jan. 8, 2023), at https://www.batterydesign.net/cylindrical-cell-comparison-4680-vs-21700-vs-18650/ (last accessed June 29, 2023).

387 Tobias Placke, et al., Lithium ion, lithium metal, and alternative rechargeable battery technologies: the odyssey for high energy density, J Solid State Electrochem, 21:1939–1964 (2017) (hereinafter Placke et al. - Odyssey).

SEE ORIGINAL COMMENT FOR Figure XVIII.B-2: Specific energy and energy density of nickel-based lithium-ion batteries continue to increase [EPA-HQ-OAR-2022-0829-0759, p. 145]

Source: Placke et al.

LFP batteries have similarly seen advancements in their specific energy, from below 90 Wh/kg in 2010388 (shown in the figure below) to current reports from Proterra of 170 Wh/kg389 and BYD of 166 Wh/kg.390 BYD has recently announced the blade LFP battery, which is estimated to reach 180 Wh/kg391 due to the use of "cell to pack" design, therefore not using the "cell to module to pack" design that has been historically seen.392 [EPA-HQ-OAR-2022-0829-0759, p. 146]

388 Dr. Andy Leach, Lithium-Ion Batteries: State of the Industry 2022, Historic and estimated changes to battery-pack energy density, BloombergNEF, Sept. 9, 2022. Subscription required

389 Proterra, Proterra battery pack features and specifications (2020), at https://www.proterra.com/wp-content/uploads/2020/08/Proterra-EV-Battery-Pack-Specs-2020.pdf (last accessed June 29, 2023).

390 Nigel, Battery Design from Chemistry to Pack: BYD Blade (July 4, 2022), at https://www.batterydesign.net/byd-blade/ (last accessed June 29, 2023).

391 Yiwen Shi, Feasibility of BYD blade batteries in electric vehicles, Highlights in Sci., Engineering and Tech., Vol. 32 (2023), at https://drpress.org/ojs/index.php/HSET/article/view/5087/4928#:~:text=The%20ratio%20of%20energy%20density,t o%2030%25%20%5B2%5D (last accessed June 29, 2023).

392 International Energy Agency, Global EV Outlook 2022, at 140, available at https://iea.blob.core.windows.net/assets/ad8fb04c-4f75-42fc-973a-6e54c8a4449a/GlobalElectricVehicleOutlook2022.pdf (last accessed June 29, 2023).

SEE ORIGINAL COMMENT Figure XVIII.B-3: Specific energy of LFP lithium-ion batteries continues to increase [EPA-HQ-OAR-2022-0829-0759, p. 146]

Data Source: BloombergNEF Electric Vehicle Outlook 2022 (subscription required)

a. Specific energy forecasts

U.S. PEV sales are currently dominated by nickel- and cobalt-containing cathode chemistries, representing 100% of sales in 2019.393 The NCA cathode, used by Tesla, represents the most sold PEV batteries in the United States over the last couple of years.394 More recently, Tesla began selling PEVs in the United States that use LFP,395 a trend that is being followed by Ford and Rivian. [EPA-HQ-OAR-2022-0829-0759, pp. 146-147]

393 Jessica Dunn, et al., Circularity of Lithium-Ion Battery Materials in Electric Vehicles, Envtl. Sci. & Tech., 55 (8), 5189, 5192, Fig. 4 (2021), DOI: 10.1021/acs.est.0c07030 (hereinafter Dunn - Circularity).

394 Id. at 5192, Fig. 4.

395 Michael Wayland, Tesla will change the type of battery cells it uses in all its standard-range cars, CNBC (Oct. 20, 2021), at https://www.cnbc.com/2021/10/20/tesla-switching-to-lfp-batteries-in-all-standard-range-cars.html (last accessed June 29, 2023).

If reviewed globally, NMC of different ratios (particularly 622 and 811) is the most prevalent chemistry today,396 and LFP is more frequently used globally than in the U.S., with around 40% of global passenger PEV sales expected to contain LFP batteries in 2023.397 While LFP batteries have lower specific energy, and therefore less range than nickel- and cobalt-based chemistries, they are cheaper to manufacture due to the lack of cobalt and nickel, and technological advances are closing the gap between LFP and nickel- and cobalt-based specific energies.398 [EPA-HQ-OAR-2022-0829-0759, p. 147]

396 Colin McKerracher et al. Electric Vehicle Outlook 2023, Figure 202, BloombergNEF. June 8, 2023. Subscription required

397 Id.

398 Id. at 157-158

Although the prevalence of different ratios of nickel- and cobalt-based chemistries (NMC and NCA) vary with time, those chemistries are currently predicted to hold nearly half the global passenger PEV market into the early 2030s, with NMC811 and NMC955 being the most popular chemistries in that category in 2027.399 U.S.-based forecasts similarly assume nickel- and cobalt-based chemistries to be dominant over the next decade, despite the increasing use of LFP.400 [EPA-HQ-OAR-2022-0829-0759, p. 147]

399 Id. at Figure 202

400 Dr. Andy Leach, Lithium-Ion Batteries: State of the Industry 2022, US demand, chemistry mix, and recycling Capacity, BloombergNEF, Sept. 9, 2022. Subscription required.

The OMEGA model uses the NMC811 cathode for a base technology and 180-200 Wh/kg as the base specific energy. There are a few issues with these assumptions: 1) while NMC811 is representative of a technology sold today, NMC611 is currently more common, and NMC955 along with other chemistries like NCA and LFP are expected to be more common than NMC811 in 2027-2032; and 2) the specific energy used in OMEGA does not align with real-world NMC811 specific energy.401 NMC811 has one of the highest specific energies, behind only NCA.402 When paired with a graphite anode, the specific energy of the battery should be at least 250 Wh/kg, as shown in Figure XVIII.B-4 below, compared to the 180-200 Wh/kg used by EPA.403 [EPA-HQ-OAR-2022-0829-0759, p. 147]

401 Id.

402 Id. at Historic and estimated changes to battery-pack energy density

403 Marc Wentker, A Bottom-Up Approach to Lithium-Ion Battery Cost Modeling with a Focus on Cathode Active Materials, Energies 12(3):504, at 6, Fig. 2 (2019), available at https://doi.org/10.3390/en12030504

SEE ORIGINAL COMMENT FOR Figure XVIII.B-4: Specific energy of lithium-ion batteries with various cathodes and anodes [EPA-HQ-OAR-2022-0829-0759, p. 148]

Source: Wentker et al., 2019

BloombergNEF's specific energy forecast used linear interpolation to demonstrate that in 2030, the 95% confidence lower limit of specific energy is 210 Wh/kg, with a higher limit of 275 Wh/kg, as shown in Figure XVIII.B-5 below.404 This linear interpretation includes both LFP and NMC, but does not account for the high amount of nickel- and cobalt-containing cathodes used in the U.S. The forecast also does not account for material substitution and large specific energy gains expected from quickly-advancing technology. For example, the use of silicon in the anode can increase specific energy,405 and while it is not yet used widely, startups are progressing this technology and constructing commercial-scale manufacturing facilities.406 [EPA-HQ-OAR-2022-0829-0759, p. 148]

404 Dr. Andy Leach, Lithium-Ion Batteries: State of the Industry 2022, Historic and estimated changes to battery-pack energy density, BloombergNEF, Sept. 9, 2022. Subscription required

405 Placke et al. - Odyssey, supra.

406 Matt Blois, Silicon anode battery companies get a major boost, Chemical and Engineering News (2022), at https://cen.acs.org/energy/energy-storage-/Silicon-anode-battery-companies-major/100/web/2022/12; see also Group14 Begins Construction of World's Largest Commercial Factory for Advanced Silicon Battery Materials (Apr. 4, 2023), at https://group14.technology/en/news/group14-technologies-begins-construction-of-the-worlds-largest-commercial-fa ctory-for-advanced-silicon-battery-materials-

SEE ORIGINAL COMMENT FOR Figure XVIII.B-5: Historic and forecasted battery-pack specific energy for different battery chemistries [EPA-HQ-OAR-2022-0829-0759, p. 149]

Data Source: BloombergNEF Electric Vehicle Outlook 2022 (subscription required)

b. An updated specific energy forecast

The relatively low pack-level specific energy described in section 2.5.2.1.1 (Battery sizing) of the DRIA (180-200 Wh/kg) appears to only account for the use of LFP, even though the following section, 2.5.2.1.2 (Base year battery cost estimation), states that vehicles were assumed to contain batteries with the more efficient NMC811 chemistry in the cost analysis. Therefore, EPA's inputs for specific energy are conservative considering that nickel- and cobalt-containing cathodes are used in the vast majority of passenger PEVs sold in the US, and recent advancements, such as the Blade Battery (10 Wh/kg increase), demonstrate specific energy gains faster than historically seen. The EPA forecasts generally align with the lowest limit of specific energy forecasts by BloombergNEF in Figure XVIII.B-5 in the prior section, although it would be more accurate to align with a high forecast scenario considering the share of NMC chemistries in use. [EPA-HQ-OAR-2022-0829-0759, p. 149]

Updating the specific energy forecast would likely lead to lower costs and mineral demand for passenger PEVs, and therefore increased feasibility and cost benefits of PEV technologies compared to EPA's current analytical approach. EPA's assumptions must be revised to reflect what is actually occurring in the market and what the currently predicted trends are for the future. [EPA-HQ-OAR-2022-0829-0759, p. 149]

SEE ORIGINAL COMMENT FOR Table XVIII.B-1 Estimated Specific Energy for Passenger PEVs407 [EPA-HQ-OAR-2022-0829-0759, p. 150]

407 Colin McKerracher et al. Electric Vehicle Outlook 2023, Figure 201, BloombergNEF. June 8, 2023. Subscription required

Table XVIII.B-1 is calculated based on historical energy densities for LFP and cobalt-containing cathodes (NCX) provided by BloombergNEF.408 When specific energy for LFP and cobalt-containing cathodes are individually calculated based on linear interpolation, Table XVIII.B-2 shows the results. If the ratio of 30% LFP and 70% nickel-based is kept, we get the average specific energy in Table XVIII.B-1. [EPA-HQ-OAR-2022-0829-0759, p. 150]

408 Id.

SEE ORIGINAL COMMENT FOR Table XVIII.B-2: Estimated Specific Energy for LFP and Nickel-Based Battery Chemistries [EPA-HQ-OAR-2022-0829-0759, p. 150]

Data Source: BloombergNEF Electric Vehicle Outlook 2023 (subscription required)

Appropriately representing higher specific energies that align with today's technologies and forecasts also has implications for vehicle range, weight, and mineral demand. Batteries with higher specific energies can provide the same amount of power while using fewer minerals, therefore weighing less than batteries with lower specific energies. This means that vehicles with more efficient batteries can travel further with the same amount of energy because the battery significantly impacts the weight, and therefore, the efficiency of PEVs. [EPA-HQ-OAR-2022-0829-0759, p. 151]

Organization: Environmental Defense Fund (EDF) (1of 2)

i. ZEV costs are rapidly declining.

The costs of batteries and ZEVs have declined significantly over the last few years. Recent analyses project that costs will continue to decline, even when IRA investments are not considered. The decline has been dramatically accelerated by the IRA. [EPA-HQ-OAR-2022-0829-0786, pp. 16-17]

3. Rapidly declining ZEV costs are also supported by manufacturers' projections of battery cost declines.

A key driver of BEV costs (and future cost projections) is the projected decline of battery costs. According to a report by ERM for EDF, the cost of battery packs fell dramatically from over $1,000/kilowatt-hour (kWh) in 2010 to approximately $132/kWh in 2021 and analysts and automakers project that battery pack prices will continue to fall overall, reaching $100/kWh between 2023 and 2025 and $61-72/kWh by 2030.51 As early as 2021, companies like Renault and Ford had publicly announced targets of $80/kWh by 2030.52 While ongoing supply chain disruptions caused battery pack prices to rise slightly in 2022, it is expected that the IRA, which provides up to $45/kWh battery cell credit and provides significant incentives for increasing EV manufacturing, will help further lower the cost of battery packs.53 In its Q1 2023 earnings report, General Motors reported that it intends to reduce battery costs down to roughly $87 per kWh by calendar year 2025, a significant decrease from its original projection of $100 per kWh by 2025.54 [EPA-HQ-OAR-2022-0829-0786, pp. 21-23]

51 Electric Vehicle Market Update: Manufacturer Commitments and Public Policy Initiatives Supporting Electric Mobility in the U.S. and Worldwide, ERM for EDF, September 2022, https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf. (Attachment Q).

52 BNEF, Battery Pack Prices Fall to an Average of $132/kWh, But Rising Commodity Prices Start to Bite, November 30, 2021. https://about.bnef.com/blog/battery-pack-prices-fall-to-an-average-of-132-kwh-but-rising- commodity-prices-start-to-bite/

53 Id.

54 Trey Hawkins, "GM Expects Battery Cells To Cost $87 Per kWh By 2025," GM Authority (May 5, 2023), https://gmauthority.com/blog/2023/05/gm-expects-battery-cells-to-cost-87-per-kwh-by-2025/.

For a 75 kWh battery pack, EPA modeled battery prices as $120/kWh through 2025 falling to $90/kWh by 2029, $75/kWh by 2035, and finally $65/kWh by 2050. EPA's choice is reasonable but conservative. EPA assumed that the per kWh price for battery packs decreases as packs get larger, consistent with modeling by ANL. In Figure 2-26 in the DRIA, EPA plots the average battery pack for vehicles modeled in OMEGA 2 by year. The average battery pack for vehicles throughout the model is roughly 100 kWh. [EPA-HQ-OAR-2022-0829-0786, pp. 21-23]

Plotted below in Figure 4 are EPA's battery pack costs as well as eight projections and DOE's target battery price all made within the last three and a half years. They clearly demonstrate that EPA's battery cost estimates are reasonable, consistent with, and even conservative when compared to manufacturer and expert projections. [EPA-HQ-OAR-2022-0829-0786, pp. 21-23]

[See original attachment for Figure 4: Projected Battery Price Costs]55

55 https://insideevs.com/news/551144/nissan-proprietary-solid-state-batteries/https://about.bnef.com/blog/battery-pack-prices-fall-to-an-average-of-132-kwh-but-rising-commodity-prices-start-to-bite/ ; https://news.ihsmarkit.com/prviewer/release_only/slug/2020-09-23-milestone-average-cost-of-lithium-ion- battery-cell-to-fall-below-100-per-kilowatt-hour-in-2023

https://nap.nationalacademies.org/download/26092 https://www.carexpert.com.au/car-news/volvo-ceo-price-parity-between-electric-and-combustion-vehicles-by-2025

Research into next generation battery chemistries also has the potential to dramatically drive down costs for BEVs. These types of step changes that occur with significant technological breakthroughs are not represented in the battery cost projections discussed above nor are they included in EPA's modeling. Novel technologies such as solid-state batteries and sodium-ion batteries are both promising avenues to reduce battery costs and increase performance. Additionally, many lithium-ion chemistries are being explored that reduce the reliance on rarer metals such as cobalt including lithium nickel manganese oxide, lithium sulfur, nickel iron aluminum oxide, and nickel manganese aluminum oxide.56 [EPA-HQ-OAR-2022-0829-0786, pp. 21-23]

56 V. Nair, S. Stone, G. Rogers, and S. Pillai, "Medium and Heavy-Duty Electrification Costs for MY 2027- 2030," February 2022. Roush for EDF. (Attachment R)

Improvements in the manufacturing of battery cells and packs also have the potential to substantially reduce costs. The dry battery electrode (DBE) process eliminates the need for the wet slurry coating, drying, and solvent recapture steps in conventional battery manufacturing. These steps account for 50% of the energy consumption and 23% of the cost for cell manufacturing. Creating tables electrodes can improve yields, reduce cell costs, reduce internal resistance, reduce battery wear, and improve thermal management, all changes that could increase battery performance and drive down costs. Improvements in battery pack construction are also being investigated. [EPA-HQ-OAR-2022-0829-0786, pp. 21-23]

In their 2022 study Roush only considered conventional NMC and LFP batteries but stated "given the number of technologies that the industry is working on that have the potential to significantly reduce the cost and increase cell and pack energy density, it is likely that the future battery costs will be below those projected in this study [$68/kWh for an NMC battery pack in 2027]".57 [EPA-HQ-OAR-2022-0829-0786, pp. 21-23]

57 V. Nair, S. Stone, G. Rogers, and S. Pillai, "Medium and Heavy-Duty Electrification Costs for MY 2027- 2030," February 2022. Roush for EDF.

Organization: International Council on Clean Transportation (ICCT)

BATTERY ELECTRIC VEHICLE COST

While ICCT strongly supports the proposed rule, we believe there is evidence available to support lower BEV costs than EPA has modeled. EPA analysis shows clear and significant benefits associated with achieving a reduced combined fleet gram CO2/mile standard and an associated increase in battery electric vehicle penetration. However, the cost of compliance may be overstated due to the use of outdated technology data and information. Electric vehicle and battery technology has been improving rapidly and technology costs have been greatly reduced. Automakers are investing heavily in BEV R&D and manufacturing capacity and are achieving higher production volumes with more advanced technologies at lower costs. We reviewed EPA's analysis on electric vehicle and battery costs and identified a few key parameters within EPA's analysis that we believe could be updated to better reflect the latest evidence and analysis. We make observations below that would reduce the incremental BEV costs and accelerate the timing for cost parity, which further strengthen the case for adopting the proposed rule and would result in relatively greater benefits at lower cost. [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

New 2022 ICCT research assessed light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame and found that without any federal, state, utility, or local incentives, BEV purchase price parity is coming before 2030 for BEVs with up to 300 miles of range across all light-duty car, crossover, SUV, and pickup truck classes.65 Continued technological advancements and increased battery production volumes mean that pack-level battery costs are expected to decline to about $105/kWh by 2025 and $74/kWh by 2030. These developments are critical to achieving electric vehicle initial price parity with conventional vehicles, which the 2022 ICCT analysis finds to occur between 2024 and 2026 for 150- to 200-mile range BEVs, between 2027 and 2029 for 250- to 300-mile range BEVs, and between 2029 and 2033 for 350- to 400-mile range BEVs. These results—along with others discussed below—from ICCT's 2022 EV cost parity study are aligned with those found in similarly recent studies of EV cost parity.66 The cost parity findings are further reinforced by new Energy Innovation and Consumer Reports research showing that in 2023 most new electric vehicles are already cheaper to own than gasoline-powered vehicles in the United States from day one.67 [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

65 Slowik. P., Isenstadt, A., Pierce, L, Searle, S. (2022). Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame. International Council on Clean Transportation. https://theicct.org/publication/ev-cost-benefits-2035-oct22/

66 H. Saxena, V. Nair, S. Pillai, "Electrification Cost Evaluation of Light-Duty Vehicles for MY 2030," 2023. Roush. https://www.edf.org/sites/default/files/2023-05/Electrification_Cost_Evaluation_of_LDVs_for_MY2030_Roush.pdf and Transport and Environment. (2021). Hitting the EV inflection point. Retrieved from https://www.transportenvironment.org/discover/hitting-the-ev-inflection-point/

67 Orvis, R. (2022). Most electric vehicles are cheaper to own off the lot than gas cars. Energy Innovation. https://energyinnovation.org/wp-content/uploads/2022/05/Most-Electric-Vehicles-Are-Cheaper-Off-The-Lot-Than- Gas-Cars.pdf and Consumer Reports (2023). Electric vehicles save consumers money. https://advocacy.consumerreports.org/research/cr-fact-sheet-electric-vehicles-save-consumers-money/

Total battery pack costs on average in the ICCT analysis are about $3,700 less than in EPA's analysis in 2027 and about $5,200 less than in EPA's analysis in 2032. This is due to several factors, including average BEV pack size (kWh), efficiency (kWh/mile) and pack-level cost ($/kWh). Table 3 summarizes the findings of the underlying technical specifications for 300-mile range BEVs in 2027, 2030, and 2032 in the EPA and ICCT analyses. As shown, on average in the ICCT analysis the pack size is smaller for the same range, the efficiency is higher, and the per-pack costs are lower. As shown in the bottom row, the total pack cost in the ICCT study is about $3,200 to about $4,400 less than EPA in 2027, about $2,800 to $4,100 in 2030, and about $4,200 to $6,000 in 2032. The pack cost per kWh in the EPA analysis increase from 2030 to 2032 along with the phaseout of the 45X battery production tax credit. The pack cost per kWh in the ICCT analysis do not include the 45X tax credit; applying the 45X tax credit to the ICCT battery costs would further reduce BEV costs and the gap between the findings of incremental costs in the ICCT and EPA analyses (Figure 9). [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

SEE ORIGINAL COMMENT FOR Table 3. Summary of key BEV technical specifications in EPA and ICCT (2022) Note. Numbers in table are rounded [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

The combination of reduced per kWh costs and smaller pack size for the same range (due to improved efficiency) in the ICCT analysis is the driver for lower costs compared to EPA. The ICCT conducted a thorough battery cost review and applied the best available data and analysis of current and future electric vehicle and battery technical specifications.68 Figure 10 shows the ICCT's 2022 battery cost review, which was based on expert sources, research literature projections, and automaker announcements. Our battery cost review includes the most recent projections by expert sources including the California Air Resources Board (2022), Roush Industries Inc. (see Saxena, Stone, Nair, & Pillai, 2023), Bloomberg New Energy Finance (2020, 2021), UBS (2020) and technical research studies, including Mauler, Lou, Duffner, and Leker (2022), Nykvist, Sprei, and Nilsson (2019), Penisa et al. (2020), Hsieh, Pan, Chiang, and Green (2019), and Berckmans et al. (2017). The automaker announcements shown include Volkswagen for $135 per kilowatt-hour in 2021–2022 (Witter, 2018), Tesla for $55/kWh in 2025 (Tesla, 2020), and Renault and Ford for $80/kWh in 2030 (Automotive News, 2021a, 2021b; Ford, 2021). Not shown due to uncertainties related to timing, General Motors in 2020 announced continued improvements toward below $100/kWh at the cell level, and Volkswagen in 2021 announced developments toward "significantly below" $100/kWh at the pack-level (General Motors, 2020; Volkswagen, 2021).69 [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

68 Slowik. P., Isenstadt, A., Pierce, L, Searle, S. (2022). Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame. International Council on Clean Transportation. https://theicct.org/publication/ev-cost-benefits-2035-oct22/

69 Complete referencing is available at https://theicct.org/publication/ev-cost-benefits-2035-oct22/

SEE ORIGINAL COMMENT FOR Figure 10. Electric vehicle battery pack costs from technical studies and automaker statements [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

Figure 10 also shows the battery pack cost per kWh applied in EPA's OMEGA analysis, illustrated by the brown hashed line. The EPA (2023) cost curve in the figure is based on the volume weighted average pack marked-up cost from EPA Figure 2-27 from the DRIA with the value of the 45X battery production tax credit incentive removed so that it can be directly compared to the ICCT's 2022 battery cost review.70 The EPA (2023) battery cost curve clearly stands out with much higher per-kWh costs than nearly every other study identified in the ICCT battery cost review. On average over the 2023-2035 timeframe, the annual per kWh battery pack costs in the EPA model are about 55% greater than those applied in ICCT (2022). To provide context to these values, industry surveys showed that the volume-weighted average global BEV pack-level prices were approximately $126 per kWh in 2020 and $118 per kWh in 2021.71 EPA is applying about $126 kWh in 2029 and about $115 per kWh in 2030, which is about nine years later than the 2020 and 2021 volume-weighted average global pack prices reported by BNEF. [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

70 EPA (2023). Multi-pollutant emissions standards for model years 2027 and later light-duty and medium-duty vehicles. Draft Regulatory Impact Analysis. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

71 Bloomberg New Energy Finance. (2020). Battery pack prices cited below $100/kWh for the first time in 2020, while market average sits at $137/kWh. Retrieved from https://about.bnef.com/blog/battery-pack-prices-cited-below-100- kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/ and Bloomberg New Energy Finance. (2021). Battery pack prices fall to an average of $132/kWh, but rising commodity prices start to bite. Retrieved from https://about.bnef.com/blog/battery-pack-prices-fall-to-an-average-of-132-kwh-but-rising-commodity-prices-start-to-bite/

For BEV efficiency, the technical specifications applied in the ICCT study are based on official electric vehicle range and efficiency values from the U.S. Department of Energy and reflect consumer label efficiency.72 The ICCT study applies a charging efficiency factor of 93% for all years. A useable-to-total battery pack size ratio is also applied based on average high-volume MY 2022 electric vehicles such that BEVs can use 92% of the kWh, which increases for new vehicles by less than 1% per year through 2030, based on the best available models from 2022. For context, several BEV models including the BMW i4, Chevrolet Bolt EV, Chevy Bolt EUV, Hyundai Ioniq 5, Nissan Leaf, Polestar 2, and Volvo C40 and XC40 have a useable-to-total battery ratio of 96% or greater in 2022. [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

Retrieved from https://www.fueleconomy.gov/feg/download.shtml] [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

72 United States Department of Energy. (2022b). “Download fuel economy data”.

The initial 2022 electric vehicle efficiencies applied in the ICCT study are based directly on existing MY 2022 BEV and PHEV models, accounting for increased electricity-per-mile for longer-range electric vehicles. We apply average technical specifications based on several high-volume MY2022 electric vehicle models within each class. For example, our BEV crossover efficiency is based on the Tesla Model Y, Ford Mach-e, Volkswagen ID 4, Hyundai Kona, Kia Niro, Kia EV6, and Volvo XC40. Electric vehicle efficiency improves annually due to electric component (battery, motor, power electronic) and vehicle-level (mass reduction, aerodynamic, and tire rolling resistance) improvements. The 2030–2035 electric vehicle efficiencies are based on modeling by CARB (2022), accounting for range and adjusting for charging losses.73 Between 2022 and 2030, we apply an average annual improvement that links the high-volume 2022 average electric vehicle model specifications with the 2030 CARB values. By 2030, the efficiencies are somewhat better than those of the “best in class” models from 2022. For example, our representative 350-mile range battery electric car is 0.23 kWh/mile compared to the 358-mile range 2022 Tesla Model 3 at 0.26 kWh/mile. Our representative 350-mile range crossover in 2030 is 0.25 kWh/mile, compared to the 330-mile range 2022 Tesla Model Y at 0.28 kWh/mile. [EPA-HQ-OAR-2022-0829-0569, pp. 26-29]

73 California Air Resources Board. (2022). Advanced Clean Cars II Rulemaking: ZEV Cost Modeling Workbook March 2022. https://ww2.arb.ca.gov/our-work/programs/advancedclean-cars-program/advanced-clean-cars-ii

Very recent BEV-related automaker announcements and developments from automotive suppliers reflect the continued rapid pace of innovation in BEV technologies. For example, Toyota recently announced its 2026 plans to produce battery packs capable of over 600 miles of range at lower cost than its current packs.75 Toyota also plans to produce solid-state battery packs with 20%-50% more range, and bipolar lithium iron phosphate packs at 40% lower cost starting around 2028.76 Beyond reducing costs through battery improvements and vehicle efficiency increases, Toyota plans to reduce vehicle manufacturing costs through improvements in factory operation, giga-casting to reduce parts and complexity, and reduced development times.77 Similarly, Volvo announced its plans to reduce EV costs through cell-to-body battery packaging, integrated motor, inverter, transmission units, and giga-castings.78 Meanwhile, the advent of two-speed transmissions for BEVs from automotive suppliers increases motor efficiency and performance, allowing battery and motor downsizing.79 Another supplier innovation that improves EV efficiency especially for induction motors is Tula’s Dynamic Motor

Drive.80 Still other areas of innovation include higher voltage EV platforms, axial flux motor improvements, and current-source inverters.81 These recent examples go beyond the technology improvements assumed in the 2022 ICCT EV cost study. With these innovations, BEVs become even more cost-effective as a technology option for manufacturers. [EPA-HQ-OAR-2022-0829-0569, pp. 29-31]

75 Greimel, H. (2023, June 12). Newly revealed Toyota EV plans include batteries with 900-plus miles of range." Automotive News. https://www.autonews.com/mobility-report/toyota-future-ev-plans-include-batteries-900-mile- range

76 Ibid.

77 Ibid.

78 Karkaria, U. (2023, June 14). Volvo EX30 electric crossover will approach price parity. Automotive News. https://www.autonews.com/retail/how-volvos-electric-ex30-crossover-will-approach-price-parity

79 Brooke, L. (2021, February). Gearing EVs for greater efficiency." SAE Automotive Engineering. https://www.nxtbook.com/smg/sae/21AE02/index.php#/p/16

80 Wolfe, M. (2022, December). Tula's DMD promises gains in EV efficiency. SAE Automotive Engineering. https://www.nxtbook.com/smg/sae/22AE12/index.php#/p/14

81 Madasamy, K. (2023, May 7). Guest commentary: The next frontier of EV innovation: The powertrain. Automotive News. https://www.autonews.com/guest-commentary/ev-powertrain-next-frontier-innovation

Based on the above analysis, we believe that the relative BEV costs may be overstated in the EPA proposal and accompanying OMEGA analysis. If EPA were to update the analysis with the data and evidence regarding BEV cost and technical specifications based on the ICCT cost study, BEV costs would be lower, the costs of compliance would be lower, and the net benefits would be greater. [EPA-HQ-OAR-2022-0829-0569, pp. 29-31]

The above analyses and comparisons were conducted almost entirely relying on OMEGA output files, which can obscure important modeling assumptions. To allow for more complete independent comparisons among the proposal, prior EPA analyses, and third-party studies, ICCT recommends EPA expand its documentation of assumptions and cost breakdowns of underlying technologies or cost components. For example, EPA could provide average or exemplary vehicle and component costs across various body styles or classes over time, similar to tables in prior rulemakings. The general lack of clarity on cost applies to certain combustion technologies, too, which are identified and discussed in the next section. [EPA-HQ-OAR-2022-0829-0569, pp. 29-31]

Organization: Jaguar Land Rover NA, LLC (JLR)

Battery Cost Modeling

JLR would like to highlight to EPA our serious concerns with regards to their battery pack modeling. The overarching assumption that costs "are assumed to decline over time as production volumes grow and manufacturing efficiencies improve" is overly optimistic and the factors considered do not fully account for all of the uncertainties that contribute towards the final cost. JLR's forecast $/kWh cost reduction is considerably lower than EPA's forecasts, [REDACTED]CBI [EPA-HQ-OAR-2022-0829-0744, pp. 10-11]

In response to EPA's request for comment on how they "should consider the issue of global battery production in the context of our application of learning for the final rule analysis", JLR recommends that the modeling should consider in greater detail the increase of global net zero pledges and policies to increase EV uptake and the possible effect on critical mineral supply chains. The International Energy Agency (IEA) noted in their Energy Technology Perspectives 2023 report, "Anticipated supply expansion suggests that production could fall well short of Net Zero Emissions (NZE) Scenario requirements for 2030, with deficits of up to 35% for lithium mining and 60% for nickel sulfate production. If this prediction is correct, despite increased investment announced across multiple continents to expand the supply chains, critical minerals will rise in price. With lead times of up to 10 years for new mines16, we urge EPA to err on the side of caution and amend the learning factor used in the cost reduction calculation to more accurately reflect the potential risks. [EPA-HQ-OAR-2022-0829-0744, pp. 10-11]

16 IEA (2023), Energy Technology Perspectives 2023, IEA, Paris https://www.iea.org/reports/energy-technology-perspectives- 2023, License: CC BY 4.0

JLR requests that EPA acknowledge the risk of further market volatility for critical mineral pricing and take a more conservative approach when modeling battery prices. This will also impact the GHG reductions OEMs can practically achieve, therefore a reduction in stringency is paramount in the early years of the program. [EPA-HQ-OAR-2022-0829-0744, pp. 10-11]

Organization: John Graham

BEV costs assume, implausibly, that shortages of raw materials will be resolved after the mid-2020s. [EPA-HQ-OAR-2022-0829-0585, p. 9]

Finally, the prices of batteries may not fall as rapidly in the future as they have since 2010. There are logistical, regulatory, and political barriers to rapidly expanding the mining and processing of raw materials required to make enough BEVs for motorists in China, Europe, North America, and the rest of the world. [EPA-HQ-OAR-2022-0829-0585, p. 9]

The batteries for HEVs and BEVs are designed differently, and thus the HEV battery costs need to be estimated separately and carefully. It is revealing that the agency devoted much more analysis to the costs of BEV batteries, especially future learning factors, than to the cost of HEV batteries, for which future learning factors are assumed to be extremely small. [EPA-HQ-OAR-2022-0829-0585, p. 10]

5. BEV Costs

EPA defines the costs of the BEV's propulsion system as the sum of battery and "non-battery" costs, where the non-battery costs are driven primarily by the cost of the electric motor. The agency uses differential "learning factors" that cause the predicted costs of BEVs to fall much faster over time than the predicted costs of hybrids. We discuss first the battery costs and then the non-battery costs. [EPA-HQ-OAR-2022-0829-0585, pp. 16-17]

Battery Cost

Baseline battery costs. The DRIA reports a baseline BEV battery cost of $120/kWh for 2022 to 2025, determined using the BatPaC model for a 75 kWh battery pack and 250,000 vehicles produced per year. BatPaC's estimate of $120/kWh in 2022 seems reasonable, assuming that potential issues with battery material supplies are not included in the $120/kWh estimate. [EPA-HQ-OAR-2022-0829-0585, pp. 16-17]

Battery learning factors. Starting in 2026, EPA introduces “learning factors” that slash the cost of producing batteries by 25% by 2029 ($90/kWh), by another 25% by 2035 ($75/kWh), and by yet another 13% by 2050 ($65/kWh). In contrast, HEV costs (which are embedded in “ICE Powertrain Costs and Glider Costs”), decline by only 4% in 2035 and 9% in 2050. [EPA-HQ-OAR-2022-0829-0585, pp. 16-17]

The cumulative learning rates for battery cost are very high and, since no one has a crystal ball, no one knows whether those learning rates will truly apply. Note that the writeup in the DRIA on battery learning just states how it is done – there is no real justification for the learning assumptions. Below we show that the EPA is applying a one-stage learning model to the entire battery supply chain, a simplistic model that has already been shown to be implausible in the peer-reviewed scientific literature. [EPA-HQ-OAR-2022-0829-0585, pp. 16-17]

The agency’s learning model is “one stage” because the agency applies the same learning factors to the mining/processing stage that it applies to the later stages when battery cells are produced and assembled into battery packs. EPA does not disclose that the production-volume model of cost savings that it relies upon was estimated for assembly-like operations, not mining and early- stage processing of mined materials. [EPA-HQ-OAR-2022-0829-0585, pp. 16-17]

In 2019 the MIT Energy Institute produced a report illustrating why treating the entire battery supply chain as one stage leads to erroneous learning factors.21 A simulation was performed where the battery supply chain was broken into two stages – “materials synthesis” (mining and processing) and battery production. Separate learning factors were derived for the two stages. The analysts found that derived learning factors were almost 80% smaller for materials synthesis than for battery production. Moreover, the costs of raw materials and their synthesis place a floor on the amount of cost reduction that can occur for the entire supply chain. The MIT simulation shows that battery costs are “unlikely” to fall below $100/kWh prior to 2030. EPA forecasts them below $80/kWh in 2030 and below $70/kWh in 2032 (DRIA Figure 2-26). [EPA-HQ-OAR-2022-0829-0585, p. 17]

21 MIT Energy Initiative. 2019. Insights into Future Mobility. Cambridge, MA: MIT Energy Initiative, 76-80 http://energy.mit.edu/insightsintofuturemobility; also see Hsieh, I-Yun Lisa, Menghsuan Sam Pan, Yet-Ming Chiang, and William H. Green. 2019. “Learning Only Buys You So Much: Practical Limits on Battery Price Reduction.” Applied Energy 239, (April): 218–224. https://doi.org/10.1016/j.apenergy.2019.01.138.

The folly of EPA’s one-stage model was revealed in 2021 and 2022 when battery prices stopped declining for the first time in a decade. Indeed, EPA acknowledges that battery prices rose 7% in 2022, principally due to an unexpected surge in prices of lithium, nickel, cobalt, and other raw materials used in battery-cell production. Since raw materials account for a much larger share (70%) of battery costs in 2022 than they did in 2015 (40-50%), it is crucial for the agency to analyze the future paths of raw material prices. Decades from now, when recycling of batteries and/or components is widespread, the prices of raw materials may moderate, but for the next two decades, as the battery sector grows explosively and batteries are recycled only 15-25 years after new BEV sales, dependence on mining and processing of raw materials is unavoidable. [EPA-HQ-OAR-2022-0829-0585, p. 17]

The solution to this analytic problem is not to simply suspend learning factors for an arbitrary number of years, as EPA suggests in the NPRM. EPA needs to build a global model of raw material prices, including global demand as well as supply. One of the principal reasons that battery prices are unlikely to drop dramatically between now and 2035 is that global supplies for raw materials will have difficulty keeping up with the explosive growth in demand for batteries from China, Europe, and North America. We examine the raw materials issues in more detail in the next section on The Global Supply and Demand for Raw Materials. [EPA-HQ-OAR-2022-0829-0585, pp. 17-18]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

To determine a realistic maximum volume of EVs the market can support for each of the model years covered by the rule, we believe EPA should consider certain critical factors. Among these factors, we believe EPA must make a thorough and realistic year-by-year assessment of key factors like projected battery costs, projected supply of battery critical-minerals, projected residential and public charging infrastructure availability, projected electrical grid capacity, and consumer acceptance of BEV technology in the broader arena. [EPA-HQ-OAR-2022-0829-0682, p. 2]

EVs currently cost significantly more to produce than equivalent gasoline cars or trucks. The average price of a BEV today is about $9,000 higher than that of a comparable ICE vehicle13. That price difference is driven mostly by the cost of the batteries. Battery cost have come down significantly in the past, but, contrary to EPA's assumption that the price of EV batteries will be substantially lower in coming years, that trend is not likely to continue. Given the anticipated exponential growth in demand for battery critical minerals to meet the proposed GHG standards, combined with the continued limited supply of those materials for the foreseeable future (resulting from the long lead time needed to ramp up mining and processing capacity), costs of these materials and batteries are expected to rise, thereby widening the price gap between ICEs and BEVs. Mitsubishi agrees with Auto Innovators' assertion that the Agency has not adequately addressed projected battery critical minerals availability and associated cost. [EPA-HQ-OAR-2022-0829-0682, pp. 10-11]

13 New-Vehicle Transaction Prices Trend Downward as Incentives Rise, According to Kelley Blue Book - Mar.8, 2023 (kbb.com).

Organization: Paul Bonifas and Tim Considine

Another glaring inconsistency in the EPA's analysis is they assume "the [EV vs ICE] price difference is likely to narrow or become insignificant as the cost of batteries fall…" As economies of scale are deployed, conventional wisdom would anticipate the continued decrease in cost of batteries. However, this may not be the case going forward. BloombergNEF's annual lithium-ion battery price survey shows a "7% increase in average pack prices in 2022 in real terms. This is the first increase in the history of the survey"16. [EPA-HQ-OAR-2022-0829-0551, p. 6]

16 https://about.bnef.com/blog/increase-in-battery-prices-could-affect-ev-progress/

Organization: POET, LLC

Apart from those flawed assumptions about technological feasibility, EPA also makes unfounded assumptions in its analysis regarding costs. EPA first assumes that the cost of batteries for BEVs will drop dramatically in the short term—by about $40 kWh or 33% between 2027 to 2032—and then by a more modest amount—about $14 kWh or 12%—from 2032 to 2050.87 EPA then adds a significant, additional reduction—from about $80 to $90 per kWh from 2027 to 2032 to $40 to $60 per kWh—because of the IRA tax credits.88 This amounts to a total cost reduction of about 50 to 67% in "as few as two to three years" simply because of increased demand and the IRA.89 These large reductions are not justified. First, the battery production capacity that would support these cost reductions has yet to be built. Second, even assuming it is built as EPA predicts, there is no reason to assume that battery manufacturers will pass cost savings from the IRA directly onto customers on a one-to-one basis.90 Additionally, EPA's battery cost assessment appears to ignore the impact of other provisions in the Proposed Rule regarding battery durability and warranty.91 Those requirements will almost certainly impose additional costs that EPA has omitted.92 [EPA-HQ-OAR-2022-0829-0609, pp. 22-23]

87 Id.

88 Id.

89 Id.

90 Id.

91 Id at 6.

92 Id.

OnLocation also finds that additional review by EPA of its battery learning curve (i.e., the extent to which EPA projects battery costs will decline) is warranted, for reasons including that EPA could be substantially understating the total cost of the rule.[434] [EPA-HQ-OAR-2022-0829-0609, pp. 28]

In addition to the technical feasibility of producing BEVs in dramatically greater numbers than at present and relative to the already aggressive forecasts of BEV penetration without the Proposed Rule, the assumed cost of BEVs is of course another key driver in U.S. EPA's BEV penetration forecasts. U.S. EPA's analysis of battery cost is presented in Chapter 2.5 of the DRIA. The agency's basic assumptions regarding the cost of battery production are shown in Figure 2-25 of the DRIA which is reproduced below. As shown, U.S. EPA assumes that the production cost of batteries drops substantially over the period from 2027 through 2032 (~$40 kWh or 33%) but then by only modest additional amounts during the period from 2032 through 2050 (~$14 kWh or 12%). [EPA-HQ-OAR-2022-0829-0609, pp. 57-58]

The next step in the agency's analysis is to lower the $80-90 cost per kWh over the period from MY 2027 to MY 2032 shown in Figure 2-25 to $40-60 per kWh as shown in DRIA Figure 2-27 based on U.S. EPA's assumptions regarding the impact of the tax credits provided by the Inflation Reduction Act (IRA). Overall, U.S. EPA assumes that the current battery production cost of about $120 kWh will fall by 50 to 67% in as few as two to three years because of

[434] *Id*. at 8.

increased demand for batteries and federal tax credits under the IRA. U.S. EPA also assumes similar changes in the marked up prices of batteries as is shown in Figure 2-27. While federal tax credits may lower the ultimate cost of battery production, there is no reason to assume that battery manufacturers will pass these cost savings through by lower battery prices, particularly given the projected worldwide demand for batteries. It is unclear that these credits will continue to be in place over the period from 2027 through 2032 as they could easily be eliminated or modified by future legislation. Therefore, U.S. EPA should perform a sensitivity analysis that shows how dependent the high levels of BEV penetration forecast would be impacted by the elimination of these tax credits. [EPA-HQ-OAR-2022-0829-0609, pp. 57-58]

Overall, given that most of the battery production capacity required to supply the batteries U.S. EPA assumes will be available has yet to be built and that automaker demand for those batteries will be high given the constraints of the Proposed Rule, U.S. EPA's assumptions regarding battery costs are difficult to accept and the much slower decline U.S. EPA assumes post MY 2032 may be much more reasonable to apply over the entire time period and would certainly represent a conservative approach compared to U.S. EPA's highly optimistic approach. [EPA-HQ-OAR-2022-0829-0609, pp. 57-58]

[See original attachment for Figure 2-25. Reference trajectory of future battery pack manufacturing costs for a 75 kWh BEV pack] [EPA-HQ-OAR-2022-0829-0609, pp. 57-58]

Another issue with U.S. EPA's battery cost assessment is that it appears to completely ignore the impact of the cost of the proposed battery durability and warranty provisions of the Proposed Rule. These new regulatory requirements will clearly impose costs on battery manufacturers and automakers which will ultimately be passed on to consumers and should be included in U.S. EPA's analyses. [EPA-HQ-OAR-2022-0829-0609, p. 58]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

The PHEV battery costs should be based on using BEV batteries as explained in Appendix D in this letter. [EPA-HQ-OAR-2022-0829-0646, p. 8]

PHEV and BEV Costs

Some parties claim that Strong PHEVs cost too much. Our coalition's research community believes there are several methods not yet adopted by many automakers that can reduce the cost of Strong PHEVs. For light-duty PHEVs, our coalition has found that many researchers incorrectly find that PHEVs are high cost compared to BEVs. However, researchers anticipate convergence of the purchase prices of ICEVs and PHEVs in the 2030-2035 timeframe.17 These studies suggest that declining battery costs, along with close integration of electrification subsystems, will play an important role in reducing PHEV costs as adoption increases, and that PHEVs will consequently be manufactured and operated with lower costs than comparable long-range BEVs. Further Argonne National Lab's recent report 18 shows that light-duty PHEVs are less expensive than BEVs for cars, and our experts at Strong PHEV coalition assert that several additional technical modifications can lower the cost of PHEVs that most analyses do not consider. A common mistake we find in reports is not understanding the difference between a strong PHEV and other PHEVs because a strong PHEV can use the same batteries as a BEV which results in significant cost savings. The two charts below show how a light-duty PHEV should use the same batteries as a BEV and not have to use a special low- volume production battery with a different (higher) power to energy ratio. We believe most mid- range and long-range PHEV cars and trucks will need BEV batteries. Also see our critique of the Advanced Clean Car II analysis of PHEV cost.19 Finally, we agree with EPA that BEVs with large battery backs will need stronger chassis which adds costs but note that PHEVs do not need this to the same degree. Thus, EPA's cost analysis for PHEVs should reflect this. [EPA-HQ-OAR-2022-0829-0646, pp. 21-22]

17 Three studies. 1) Hamza, K., Laberteaux, K.P., and Chu, K.-C. (2021). On modeling the cost of ownership of plug- in vehicles. World Electric Vehicle Journal 12, 39, https://doi.org/10.3390/wevj12010039. 2) California Air Resources Board (CARB) (2022). Final statement of reasons for rulemaking, including summary of comments and agency response, Appendix F: Updated costs and benefits analysis (August 25), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/fsorappf.pdf and 3) Islam, E.S., Moawad, A., Kim, N., and Rousseau, A. (2021). Future cost benefits analysis for electrified vehicles from advances due to U.S. Department of Energy targets. World Electric Vehicle Journal 12, 84, https://doi.org/10.3390/wevj12020084.

18 https://www.anl.gov/argonne-scientific-publications/pub/167396

19 Strong PHEV Coalition - Cost Model Inputs 5.2.22.mp4 (sharepoint.com)

Organization: Tesla, Inc.

Consistent with vehicle price reduction, BEV battery prices continue to decline in rapid fashion. As DOE has recently documented, the energy density of lithium-ion batteries Increased by more than eight times between 2008 and 2020, allowing for BEVs to travel the same distance with a smaller battery pack, thus saving space, weight, and manufacturing costs.95 Similarly, DOE has found that BEV battery pack cost dropped 90% since 2008.96 [EPA-HQ-OAR-2022-0829-0792, pp. 14-15]

95 DOE VTO, FOTW #1234, April 18, 2022: Volumetric Energy Density of Lithium-ion Batteries Increased by More than Eight Times Between 2008 and 2020 (Apr. 18, 2022). available at h ttps://www.energy.gov/eere/vehicles/articles/fotw-1234-a pril-18-2022-volumetric-energy-density-lithium-ion-batteries

96 DOE, FOTW #1272, January 9, 2023: Electric Vehicle Battery Pack Costs in 2022 Are Nearly 90% Lower than in 2008, according to DOE Estimates (Jan. 9, 2023) available at h ttps://www.energy.gov/eere/vehicles/articles/fotw-1272-january-9- 2 023-electric-vehicle-battery-pack-costs-2022-are-nearly

Moreover, almost all analysts project profound reductions in battery costs by 2030. For example, UBS reports that leading manufacturers are estimated to reach battery pack costs as low as $67/kWh between 2022 and 2024.97 Recently, others have also projected costs significantly lower than EPA's past projections. BNEF's has estimated that pack prices go below $100/kWh on a volume-weighted average basis by 2024, hit $58/kWh in 2030,98 and could achieve a volume-weighted average price of $45/kWh in 2035.99 The National Academies of Sciences found high-volume battery pack production would be at costs of $65-80/kWh by 2030100 and DNV-GL has predicted costs declining to $80/kWh in 2025.101 The IPCC recently concluded similarly.102 These cost estimates all were projected before the Inflation Reduction Act (IRA) passed Congress. The IRA adds a significant new element to battery cost reduction as Section 45X provides domestically manufactured cells and finished batteries a production tax credit of $45/kWh.103 This new policy has accelerated significant new domestic battery production capacity that will generate further cost reductions.104 Indeed, the 45X production tax credit is predicted to cut one-third to one-half off the total cost of any BEV battery with both cells and pack built in the U.S.105 [EPA-HQ-OAR-2022-0829-0792, pp. 14-15]

97 UBS, EVs Shifting into Overdrive: VW ID.3 teardown – How will electric cars re-shape the auto industry? (March 2, 2021) at 60 available at h ttps://www.ubs.com/global/en/investment-bank/in-focus/2021/electric-vehicle-revolution.html

98 BNEF, Electric Vehicle Outlook 2021 (June 9, 2021) available at h ttps://bnef.turtl.co/story/evo-2021/

99 BNEF, Hitting the Inflection Point: Electric Vehicle Price Parity and Phasing Out Combustion Vehicle Sales in Europe (May 5, 2021) available at h ttps://www.transportenvironment.org/sites/te/files/publications/2021_05_05_Electric_vehicle_price_parity_and_adoptio n _in_Europe_Final.pdf

100 NAS, Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy – 2025-2035 (March 31, 2021) available at h ttps://www.nap.edu/resource/26092/Briefing Slides Public Release Final 20210331.pdf

101 DNV-GL, Tesla's Battery Day and the Energy Transition (Oct. 26, 2020) available at h ttps://www.dnvgl.com/feature/tesla-battery-day-energy- t ransition.html?utm_campaign=GR_GLOB_20Q4_PROM_ETO_2020_Tesla_Battery_Article&utm_medium=email&utm_sour c e=Eloqua

102 IPCC, AR 6, Working Group III, Climate Change 2022: Mitigation of Climate Change (April 4, 2022) at 10-32 available at h ttps://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf (For example, according to IEA, battery pack costs could be as low as 80 USD per kWh by 2030 (IEA 2019a). In addition, there are clear trends that now vehicle manufacturers are offering vehicles with bigger batteries, greater driving ranges, higher top speeds, faster acceleration, and all size categories (Nykvist et al. 2019). In 2020 there were over 600,000 battery-electric buses and over 31,000 battery- electric trucks operating globally (IEA 2021a).)

103 Inflation Reduction Act, P.L. 117-169 (Aug. 16, 2022) at Section 13502.

104 DOE, FOTW #1271, January 2, 2023: Electric Vehicle Battery Manufacturing Capacity in North America in 2030 is Projected to be Nearly 20 Times Greater than in 2021 (Jan. 2, 2023) available at h ttps://www.energy.gov/eere/vehicles/articles/fotw-1271-january-2-2023-electric-vehicle-battery-manufacturing-capacity; Argonne National Lab, Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010 – 2021 (Nov. 2022) available at https://publications.anl.gov/anlpubs/2022/11/178584.pdf

105 Car and Driver, U.S.-Made EVs Could Get Massively Cheaper, Thanks to Battery Provisions in New Law (Feb. 3, 2023) available at h ttps://www.caranddriver.com/news/a42749754/us-electric-cars-could-get-cheaper-inflation-reduction-act- s ection-45x/

In general, Tesla believes the agency's cost assumptions are far too high and are not supported by the record in that they do not fully consider the documented and projected rapid decline in battery cell and pack costs, as well the significant BEV range increases achieved through other efficiencies. From 2017 -2022, the Model 3 powertrain evolved with a 20% lighter drive unit, 25% less rare earth minerals, a 75% smaller powertrain factory, and a 65% cheaper powertrain factory.106 While the agency's proposal suggests that vehicle battery size will grow, Tesla requests the EPA take into account that it has consistently increased range without increasing battery size.107 For example, the Model Y All-Wheel Drive (AWD) achieves 4.0 EPA miles/kWh, which makes it the most efficient electric SUV ever made.108 More profoundly, Tesla is hard at work on battery cell innovations. Tesla has announced and documented a path toward battery cell production that it expects will lower kWh battery costs by over 50%.109 [EPA-HQ-OAR-2022-0829-0792, p. 15]

106 Tesla, 2023 Investor Day Presentation (March 1, 2023) at 51.

107 See, Tesla, Model S Long Range Plus: Building the First 400-Mile Electric Vehicle (June 15, 2020) (discussing Model S Long Range Plus vehicles having an official EPA-rated range of 402 miles, representing a nearly 20% increase in range when compared to a 2019 Model S 100D with the same battery pack design) available at h ttps://www.tesla.com/blog/model-s-l ong-range-plus-building-first-400-mile-electric-vehicle; Tesla, The Longest-Range Electric Vehicle Now Goes Even Farther (April 23, 2019) available at https://www.tesla.com/blog/longest-range-electric-vehicle-now-goes-even-farther

108 Tesla 2023 Investor Day Presentation at 50; Tesla Impact Report 2022 at 36-37.

109 Tesla, Battery Day Presentation (Sept. 22, 2020) available at h ttps://tesla-share.thron.com/content/?id=96ea71cf-8fda- 4 648-a62c-753af436c3b6&pkey=S1dbei4

the agency's assessment should further recognize the technology forcing created by finalization of the proposed regulations by factoring in battery cost reductions that will likely be seen during the MY 2027-32 period as well, including LFP applications110 and sodium ion batteries.111 In some forecasts, LFP is viewed at rapidly growing to capture up to 47% of the EV market by 2026 resulting in dramatically lower battery pack prices.112 Indeed, battery technologies entering the commercialization phase such as silicon anodes, solid state batteries, and sodium-ion batteries are predicted to improve performance and costs and alter current material supply chains.113 The current regulatory impact statement only makes glancing reference to these technologies and the record is deficient in this respect.114 [EPA-HQ-OAR-2022-0829-0792, p. 15]

110 See, EPA, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Draft Regulatory Impact Analysis (Draft RIA) at 28; See also, CleanTechnica, Designwerk Offers LFP Battery Cells for The HIGH CAB Semi Lowliner (April 25, 2023) available at https://cleantechnica.com/2023/04/25/designwerk-offers-lfp-battery-cells-for-the-high-cab-semi-lowliner/

111 See, Draft RIA at 35; See also, Bloomberg, Silicon Valley Startup Charts a Path to Cheaper Batteries (Feb. 22, 2023) available at h ttps://www.bloomberg.com/news/articles/2023-02-22/silicon-valley-startup-charts-a-path-to-cheaper-ev-b atteries?cmpid=BBD022223_hyperdrive&utm_medium=email&utm_source=newsletter&utm_term=230222&utm_campai g n=hyperdrive

112 Ark Invest, Lithium Iron Phosphate Could Take 47% of the Battery Market By 2026 (July 29, 2022) available at h ttps://ark-invest.com/articles/analyst-research/lithium-iron-phosphate-batteries/

113 BloombergNEF, Electric Vehicle Outlook 2023, Executive Summary (June 8, 2023) at 9 available at h ttps://about.bnef.com/electric-vehicle-outlook/https://about.bnef.com/electric-vehicle-outlook/

114 See generally, IEA, Trends in batteries (2023) (analyzing other battery chemistries) available at h ttps://www.iea.org/reports/global-ev-outlook-2023/trends-in-batteries

Organization: Toyota Motor North America, Inc.

4. Battery Costs Projections

EPA's assessment of future battery costs is highly optimistic and inconsistent with available sources. The assessment starts with an inaccurate baseline cost for 2022 and then uses an incomplete set of forecasts to develop two trajectories which rely on assumed mid-decade price stabilization of lithium. The assessment appears to ignore the risk for price spikes arising in a tight and geopolitically sensitive market for critical minerals. Please see Appendix A on mineral supply and potential price implications. Lastly, EPA applies tax credits from the IRA 45X provision in a confusing way that could go beyond the intent of the legislation. [EPA-HQ-OAR-2022-0829-0620, p. 18]

4.1. Baseline Assumptions

To arrive at the 2022 baseline for direct manufacturing costs, EPA used ANL's BatPaC 5.0 to develop a sweep of expected costs ($/kWh) for varying battery sizes (gross kWh), at four different production rates as shown in Figure 3. EPA selected a 75kWh battery at 250,000 packs/year to arrive at $120/kWh to represent the baseline. EPA attempts to justify the baseline by comparing it to a Tesla 30-40 GWh capacity “gigafactory”. The assumed production rates are overly optimistic and contrary to our comments above on the lead time and scale up of new battery production facilities. EPA must recognize battery plant sizes and capacities will vary greatly based on a host of factors ranging from site size to workforce availability, to logistical optimization in the vehicle production footprint, to battery mineral/cell/pack supply chains and sources, to capital availability, and so forth. EPA appears to have selected a large capacity facility to represent what it expects will be “typical”. If EPA had data suggesting a 250,000 unit per year battery facility would be “average” then this approach might make sense. As it stands, such a large facility is more likely to be the exception and not the rule, and EPA should expect most battery production to align with the lower capacity curves in Figure 3. Painting the entire industry's manufacturing approaches with a single broad brush likely underestimates costs. [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

[See original for graph, Figure 3 Proposed Rule Cost Estimates by Battery Size and Production Rates]12 [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

12 Figure 1 - EPA DRIA Figure 2-20 Plot of Base Year 2022 DMC estimates for different sized BEV battery packs at 4 different production rates.

EPA also seeks to justify the baseline battery cost with a qualitative comparison to the summary of cost projections from EDF/ERM as seen in Figure 17.13 [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

13 Environmental Defense Fund, Electric Vehicle Market Update (Sep. 2022) at pg. 27. Available at htps://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2022/09/ERM-EDF-Electric-Vehicle-Market-Report_September2022.pdf.

Toyota's assessment of available sources finds baseline battery costs significantly higher than $120/kWh. We considered three studies by e-Source, Mauler et. al., and BNEF and added them to EPA's DRIA Figure 2-24 (shown in Figure 4). For EPA's battery cost future projections, we added insights from two studies, Mauler et.al. again, and an MITEI study. [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

[See original for graph, Figure 4 EDF/ERM Batter Cost Survey form Proposal with Added Data] [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

A 2023 study from e-Source, which specializes in downstream battery supply chain analysis and manufacturing modeling,14 concludes a cost of $158/kWh in 2022 for a 75-kWh NMC811 battery pack produced at US 100-GWh plant at 250,000 packs/year. This is significantly higher than the proposal's stated $120/kWh for 2022 – even at the high production capacity of 250,000 units. [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

The December 2022 updated annual battery price survey from BNEF observes average lithium- ion battery pack prices of $141 per kilowatt hour in 2021 increasing to $151 in 2022, representing the first increase since 2013 (Figure 5). This agrees with the e-Source study and is consistent with the price volatility in 2022 stemming from skyrocketing raw material prices, record-setting inflation, and geopolitical tensions with Russia. EPA appears to have used the 2022 BNEF data, however the 2022 data point is not included in Figure 4. [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

14 Proprietary study by e-Source for USA cost per pack of NMC811, 75 kWh packs at 250,000 packs per year assumed

[See original for bar chart, Figure 5 BNEF Battery Pack and Cell Cost Projections] [EPA-HQ-OAR-2022-0829-0620, pp. 18-21]

4.2. Forecasts

The EDF/ERM report referenced in Figure 4 is used to establish a cost trajectory that is anchored by the following data points: $120/kWh baseline for 2022, $110/kWh for 2026 and $90/kWh for 2030. [EPA-HQ-OAR-2022-0829-0620, pp. 21-23]

In Figure 6, direct manufacturer costs for a 75-kWh battery (black line) that decline over time are developed by applying assumed rates of learning to the "reference trajectory". The trajectory for a 100-kWh battery (blue line) was then generated in the OMEGA model. [EPA-HQ-OAR-2022-0829-0620, pp. 21-23]

The steepest reductions occur from 2025 to 2029 due to assumed stabilized lithium prices by the mid-2020s. The price for the 75-kWh battery falls to about $90/kWh in 2030 which implies 25% reduction in cost from 2022 baseline. The 100 kWh battery cost declines from the $115/kWh baseline to about $78/kWh in 2030 resulting in an 32% reduction, and to $61/kWh in 2035, a 21% cost reduction. The resulting costs seem implausible and would be considerably higher if upward pressure on prices cause by tight supply of were appropriately considered. [EPA-HQ-OAR-2022-0829-0620, pp. 21-23]

[See original for graph, Figure 6 OMEGA Battery Pack Costs] [EPA-HQ-OAR-2022-0829-0620, pp. 21-23]

Toyota's referenced sources indicate the cost of batteries is expected to decline in the future, but this decline could be slowed or even reversed if battery raw material prices rise. Technological innovation is expected to lead to significant cost reductions, but there is a significant risk that it may not be able to offset the rising cost of critical minerals. The Mauler et.al. study analyzed several battery forecast studies and found "the methods of technological learning, literature-based projection, bottom-up modeling, and expert elicitation…(and) technological advances... and economies of scale" 15 tend to neglect raw material price volatility. When rising material cost is added to the analysis as a main variable, even the slightest increase threatens to offset those production savings for battery costs. The study found the 2030 battery pack cost for low price case to be $96/kWh, and $130/kWh for the high price case, with a midpoint of $113/kWh. This is in stark contrast to EPA's 2030 battery pack cost projection of $78/kWh in 2030. [EPA-HQ-OAR-2022-0829-0620, pp. 21-23]

15 Id.

Finally, a 2019 study by MIT Energy Initiative (MITEI) finds that "Though battery costs have declined substantially, predictions about future price declines must be approached with caution as they often fail to account for the cost of the raw materials used to make batteries."16 MITEI projects the 2030 price of a Li Ion battery pack will be $124/kWh, despite a decline in costs. This aligns the fluctuating price of Li, Ni, Mn, Co and C found in the Mauler et. al. study, which was done independently and in 2022. [EPA-HQ-OAR-2022-0829-0620, pp. 21-23]

16 MIT Energy Initiative. Insights into Future Mobility. Cambridge, MA. (2019), 77-79. https://energy.mit.edu/wp- content/uploads/2019/11/Insights-into-Future-Mobility.pdf

4.4. Conclusions

The battery cost projections in the proposal are not realistic because they do not sufficiently consider the dynamic external variables creating tight supply which increase the risk of supply chain disruptions and volatile raw material prices. Nor does EPA's assessment account for the time it takes to establish and ramp up battery production. The Final Rule must take a broader view of available expert sources and reconsider the applicability cost reductions through IRA. The result should be revised the battery cost projections. [EPA-HQ-OAR-2022-0829-0620, pp. 24-25]

Organization: Valero Energy Corporation

EPA's cost estimates for future battery packs also ignore the customer-readable battery state-of-health monitor proposed by EPA as a new requirement under this rulemaking.209 [EPA-HQ-OAR-2022-0829-0707, pp. 38-40]

209 EPA's Proposed Rule at 29284.

Organization: Zero Emission Transportation Association (ZETA)

The EV battery is one of the most significant factors in the cost of an EV, comprising 20-50% of the total vehicle cost, though this percentage has decreased significantly over time. This decrease is driven by lithium prices, which have significantly dropped over the last year, from $85,000 to $30,000 per tonne from November 2022 to April 2023.51 This trend is driven by a boom in lithium supply from China, Australia, and Chile. The reduction in critical mineral inputs means we will "see more and more electric vehicles selling for $25,000 to $40,000" according to Cox Automotive.52 Overall, the cost of lithium-ion batteries has declined substantially since 2008, down to $153 per kWh, as shown in Figure 2.53 [EPA-HQ-OAR-2022-0829-0638, pp. 12-13]

51 "Major drop in lithium prices could mean cheaper electric vehicles," CBC News, (April 17, 2023) https://www.cbc.ca/news/canada/sudbury/lithium-price-drop-electric-vehicles-1.6811105

52 Id. at footnote 51

53 "FOTW #1272, January 9, 2023: Electric Vehicle Battery Pack Costs in 2022 Are Nearly 90% Lower than in 2008, according to DOE Estimates," U.S. Department of Energy, (January 9, 2023) https://www.energy.gov/eere/vehicles/articles/fotw-1272-january-9-2023-electric-vehicle-battery-pack-costs-2022-ar e-nearly

[See original comment for Figure 2: Estimated historical lithium-ion battery pack costs from 2008-2022] [EPA-HQ-OAR-2022-0829-0638, pp. 12-13]

54 Id. at footnote 53

EPA Summary and Response

Summary:

Several commenters stated the position that EPA's base year battery pack cost per kWh for 2022 was too low. These commenters cited various sources, most prominently the Bloomberg New Energy Finance (BNEF) battery price survey that was published in December 2022, and also Benchmark Minerals and ANL. The Alliance specifically noted that these sources indicated even higher costs for NMC chemistry, which EPA had stated as the chemistry it had assumed. In general, these commenters requested EPA to reconsider its base year battery cost and revise it to be more consistent with these sources. These commenters also frequently indicated that part of the reason that EPA's battery costs were too low, in their view, might be that we assumed average production rates that were too high. For example, the Alliance and Toyota contended that our production rate of 250,000 packs per year was too high for the base year cost case, and recommended that we consider a smaller volume more inclusive of manufacturers who have smaller production rates. Specifically, the Alliance stated that smaller automotive manufacturers may only utilize a portion of a larger plant's total capacity for cells and packs built to their individual specifications. The Alliance also questioned whether "30-40 GWh battery manufacturing plant capacity is common among the largest manufacturers" and stated that this assumption "fails to contemplate the production efficiencies of new battery plants versus those that have been fully operational for years, including variations in battery chemistry." Similarly, Toyota asserted that "such a large facility is more likely to be the exception and not the rule."

In contrast, other commenters indicated that they felt that our base year battery costs were appropriate or too high. Tesla commented that it felt that the agency's cost assumptions "are far too high and are not supported by the record in that they do not fully consider the documented and projected rapid decline in battery cell and pack costs, as well the significant BEV range increases achieved through other efficiencies." Tesla also pointed out that EPA's battery sizes increase over time, and that EPA should consider that Tesla "has consistently increased range without increasing battery size." Similar positions were expressed by ICCT and EDF.

Response:

EPA appreciates the supportive comments from Tesla, ICCT, the Environmental and Public Health Organizations coalition, and EDF, and continues to believe that the battery costs used in the proposal analysis represent one possible outcome for future battery costs. However, in considering the totality of information and data at the present time, including the battery cost analysis conducted by ANL (described in Chapter 2 of the RIA and Section IV.C.2 of the preamble), EPA believes it is appropriate to increase the battery costs in its central case in order to reflect the results of this analysis and better address the uncertainty that continues to exist in the market regarding future mineral prices and other drivers of battery cost.

In the proposal, EPA acknowledged the BNEF survey, which became public very late in our analysis process. We noted that although the nominal cost reported by BNEF for BEV batteries at $138 per kWh was lower than the base year cost in the proposal, there was considerable uncertainty in comparing the battery designs in the proposal to the battery designs represented in the survey, which were not described in detail. We also cited the BNEF report as an example of the fluidity of battery cost projections, and indicated that we would consider this and any new information to update our battery costs for the final rule. We also stated that we would conduct additional analysis of battery costs with Argonne National Laboratory by using a version of BatPaC with specific assumptions for technology improvements over time, and current and forecasted mineral costs. Through this work, and as described in preamble Section IV.C.2 and Chapter 2 of the RIA, our baseline battery costs have increased, and are now in good agreement with the 2022 BNEF price survey. In response to comments relating to ANL and BMI forecasts, we now use battery costs developed by ANL using BMI mineral cost forecasts. Relating to comments that we should be using the higher NMC costs from these sources, in OMEGA we do not specify whether specific vehicles are using NMC or another chemistry, and thus for the purpose of the analysis it is an average cost across all chemistries that may be present in the fleet that is most relevant. Although our battery costs in the proposal were developed using NMC811-G, we now use a weighted average of NMC (varying from 522 to 955) and LFP.

We also note that in light of the most recent 2023 BNEF battery price survey, our new costs are conservative, as the 2023 survey indicates that prices have resumed a downward trend, dropping by 14 percent from 2022 to 2023.

In addition, as described in the proposal, our assumption of 250,000 packs per year was in part due to limitations in how BatPaC has historically modeled pack production volume, in order to capture economies of scale for cell production in cases where a plant manufactures standardized cells at a volume sufficient to supply the annual production volume of more than one pack design. Our updated costs are now based on significantly smaller pack production volumes in the earlier years of the analysis, as described in Table 1 of the ANL study.[435]

Regarding plant size, we continue to assess that many of the operating battery plants and most new plant announcements are in the 30 to 40 GWh range or higher. For example, ANL surveyed U.S. battery manufacturing plants currently in operation and announced for the future and determined that “the majority of the production volume (860 GWh/year) comes from 22 plants with a nameplate capacity between 30-50 GWh/year.”[436] Even if, as the commenter suggests, at the current time smaller plants are also common and that production costs are higher in these plants, the sheer volume represented by the large size of announced plants that will enter production during the time frame of the rule is likely to dominate any calculation of average cost across the industry. If as the commenter suggests, the cost of production is much higher in these plants (that is, enough higher to be significant to the findings of the analysis), this assertion is inconsistent with manufacturers’ decision to construct plants of this size, knowing that they would therefore not be competitive with the majority of future production volume. Given the significance of battery cost to the cost of PEV production, we continue to assess that manufacturers will be motivated to achieve the lowest costs by either constructing large plants or purchasing from suppliers that operate large plants (or alternatively, rationally constructing smaller plants when they anticipate that the size of the plant will not make the production cost

[435] Argonne National Laboratory, “Cost Analysis and Projections for U.S.-Manufactured Automotive Lithium-ion Batteries,” ANL/CSE-24/1, January 2024.
[436] Argonne National Laboratory, “Quantification of Commercially Planned Battery Component Supply in North America through 2035,” ANL-24/14, March 2024.

uncompetitive). Toyota and the Alliance stated the position that EPA's assessment did not account for the time it takes to establish and ramp up battery production, referring specifically to OMEGA and its use of costs derived for a 250,000 pack per year production volume in each year of the analysis. However, the updated analysis for the final rule uses cost correlations developed by the ANL study which determines costs specifically for each year of the analysis with reference to a gradually increasing cell yield and plant production volume that ramp in over time. EPA considers this update also responsive to the Alliance comment that EPA should have accounted for "the production efficiencies of new battery plants versus those that have been fully operational for years, including variations in battery chemistry." With regard to this latter comment, EPA also notes that the commenters did not provide data or evidence as to why or to what degree they believe that production cost is higher in newer plants, or the effect of a plant's prior operating time on production efficiencies. EPA believes that cell yield and production volume are sufficiently representative of any purported such effect that may exist.

Summary:

Several commenters (Alliance, [etc]) stated the position that the learning rates that EPA applied to battery costs after the base year (2023 and beyond) were too high, and resulted in projected battery costs that they felt were unrealistic, or were not in agreement with specific studies that they cited in support of this position. A common theme in these comments was the position that EPA did not appropriately consider factors that might cause battery costs to decline at a much slower than historical rate, or not decline at all. These factors included: increased demand and scarcity of critical minerals, price volatility and geopolitical uncertainty in a time of dynamic global market growth, and factors beyond material costs such as engineering and performance improvements. Also exemplary of some of these comments was JLR's comment that EPA should "acknowledge the risk of further market volatility for critical mineral pricing and take a more conservative approach when modeling battery prices."

Another theme was that EPA should adopt a two-stage learning model in which material cost reductions are assessed separately from technology/process cost reductions. Specifically, the Alliance noted that an MIT report which used such a model concluded that it is unlikely that battery prices will fall below $100 kWh by 2030. The Alliance also stated that EPA should implement a model of the materials synthesis stage to better capture the dynamics of mineral demand and its effect on future prices; similarly, John Graham stated that EPA should "build a global model of raw material prices, including global demand as well as supply."

Some commenters, in particular API, also criticized our use of cumulative GWh of battery production as an input to the battery cost learning equation. The Alliance recommended "that EPA revisit its battery cost analysis and align its 2027-and-later projections with Mauler analysis." The Alliance also expressed the view that "EPA needs to update its modeling to align with current battery costs and future critical mineral costs in its analysis for the final rule."

The Alliance and some other commenters also expressed skepticism that costs would decrease in the future, the Alliance stating that it is "not confident that a net decrease in battery prices will occur; an increase in battery prices is a distinct possibility due to global demand for limited resources." These commenters often pointed out that battery costs had begun to rise in recent years, again citing the BNEF survey and other sources. For example, AFPM stated that "battery costs rose 7 percent in 2022," and that the cost of lithium increased by 738 percent between January 2021 and March 2022. Clean Fuels Development Coalition et al. noted a study by E-

Source that predicted flat battery pack prices through 2032, and a press article that cited projections by BMI that commenter asserts shows "massive lithium shortages" beginning in 2029.

In contrast, Energy Innovation supported the learning rates used in the proposal, and cited a paper to support their position that "historic forecasts of battery prices have largely underestimated the impact of future learning curve effects," and "even the most optimistic projections for prior forecasts underestimated future learning curves."

Response:

As described below, EPA has updated its battery cost modeling to include a year-by-year assessment of future mineral prices, manufacturing volumes, and technology improvements, and the updated costs align well with current battery costs. EPA appreciates the recommendation of the Mauler analysis, which we have considered carefully. We also appreciate the Alliance's specific recommendations for where to set base year and future battery costs based directly on the Mauler paper. However, we disagree that our battery cost analysis should be based on the findings of a single research paper. We also note that our new costs, like the Mauler paper, begin with a year-over-year technology roadmap based on expert expectations, and incorporate analyst forecasts of mineral prices. For the years 2023 through 2035, our new battery costs are based on the aforementioned ANL battery cost study, which predicts battery costs in specific future years resulting from specific technology development pathways, and also incorporates mineral price forecasts published by Benchmark Minerals. Therefore (a) our updated costs now consider the effect of potential mineral scarcity and demand, through the use of forecast mineral prices by a leading analyst firm, and (b) our derivation of the new costs from a specific set of technology improvements means that we no longer rely on a learning rate equation to estimate future costs to 2035. After 2035, because the ANL work did not cover this period, we continue to use a simplified and modest cost reduction rate of 1.5 percent per year. This rate is reasonable in that it results in a battery cost projection for 2055 (the endpoint of our long term analysis) of about $60 per kWh, a figure which is often seen in long-range forecasts in the literature, and often attributed to earlier years than 2055. The figure is also consistent with an analysis performed by Mauler et al. that examined a large number of published battery cost forecasts and established a mean regression out to 2050, which if extended to 2055 would suggest a cost of $63 per kWh.[437] We consider this to be a reasonable if not conservative endpoint, and we also note Energy Innovation's perspective that learning rates have historically been conservative with respect to reality.

The use of mineral price forecasts in the ANL work also obviates the suggestion to adopt a two-stage learning model, since the costs to 2035 are based on specific mineral price forecasts and technology improvements rather than a learning equation. Further, our new central case costs are not in conflict with the MIT report cited by the Alliance in that they do not fall below $100 kWh in 2030.

Regarding the position that EPA should implement a model of the materials synthesis stage including manufacturing, or a global model of raw material prices, we consider our use of mineral price forecasts from a leading analyst firm combined with a technology roadmap over

[437] Mauler et al., "Battery cost forecasting: a review of methods and results with an outlook to 2050," Energy Environ. Sci, v.14, pp. 4712-4739 (2021).

the time frame of the rule to be an effective way of representing the influence of material choice, costs, and global demand over the time frame of the rule.

Regarding comments that battery prices had begun to rise and might not decline in the future, EPA acknowledges that the BNEF 2022 price survey supports that prices had increased between 2021 and 2022. However, it is not clear that battery prices will continue to increase in this manner or fail to continue to decline. The 2022 BNEF survey itself noted that the cause of the reported increase may be due to temporary factors, and that cost reductions are expected to continue in the future. In fact, the 2023 BNEF survey fulfilled this prediction, as it showed that battery prices had dropped by 14 percent since the 2022 survey. EPA also notes that since these comments were submitted, analyst firms indicate that many mineral prices have continued a downward trend and are forecast to continue this trend in the future. For example, ZETA commented that lithium prices have significantly dropped "from $85,000 to $30,000 per tonne from November 2022 to April 2023." Further, the most recent short-range forecast by Wood Mackenzie indicates that mineral prices will moderate and decline over the next several years.[438] While forecasts cannot perfectly predict the future, these developments show that drawing a conclusion regarding future battery costs or mineral prices is subject to uncertainties. EPA's findings on battery and mineral prices recognize these uncertainties, consider the key factors that affect battery and critical mineral prices, and are based upon a thorough evaluation of the technical literature and leading analyst forecasts. Specifically, these most recent forecasts do not support commenters' suggestion that battery prices will continue to rise or fail to decline. With regard to comments that EPA should take a more conservative approach that addresses the risk and uncertainty about mineral prices, EPA considers the updated central case costs to be responsive. With regard to the possibility of higher battery costs than in our updated central analysis, EPA considers the high sensitivity case of 25 percent higher costs to adequately represent these possibilities, especially considering the overall higher costs of the updated central case.

EPA also appreciates comments related to our use of cumulative GWh of battery production in the learning equation for future battery costs. As described in preamble Section IV.C.2, the ANL-derived cost equations for 2023 through 2035 obviate the need for application of a learning factor, and we no longer use cumulative GWh learning to reflect learning by doing.

While we appreciate the Alliance's perspective questioning that a net decrease in battery prices will occur at all over the time frame of the rule, we also note that the most recent analyst outlooks and battery price forecasts continue to anticipate battery and critical mineral cost reductions to varying degrees, even in the knowledge of the possibility of increased mineral demand and price volatility. While the highest cost scenario of the Mauler paper assumes battery costs to stay at a more or less constant level to 2030, that case is arbitrarily based on the most pessimistic of analyst expectations. EPA sees no consensus that costs will behave in this manner. Many other commenters do not see such a likelihood either; for example, Tesla stated that "almost all analysts project profound reductions in battery costs by 2030." Mauler's high cost scenario of perpetually flat or increasing battery cost is clearly inconsistent with prevailing analyst outlooks on mineral or battery prices, and based on the date of the Mauler paper (received November 2021 and published March 2022), appears to be based on earlier outlooks

[438] Wood Mackenzie, "Electric Vehicle & Battery Supply Chain Short-term outlook November 2023", December 1, 2023 (filename: evbsc-short-term-outlook-november-2023_final.pdf). Available to subscribers.

that reflected analyst sentiment that is now out of date and would be considered outlier sentiment today. Similarly, the comment from Clean Fuels Development Coalition et al. that cites a study by E Source projecting "battery cell prices will surge 22% from 2023 through 2026" dates from 2022, and the outlook it describes is not supported by more recent forecasts of mineral prices nor by projections of battery prices such as the 2023 BNEF battery price survey which indicated a 14 percent reduction in battery prices since the time of the E Source study. Further, the commenter's assertion that "massive lithium shortages" will occur after 2029 is based on a chart in a press article that actually projects a market balance and not specifically a "shortage." As EPA explains in Section IV.C.7.i of the preamble, the mere identification of a gap between projected supply and projected demand, particularly in far future years, is not the same as a shortage in which manufacturers would not be able to obtain material; the identification of such a gap is in fact often essential to motivate development of new supply. EPA considers ANL's use of BMI mineral cost forecasts in developing the battery cost correlations that we use in the updated analysis through 2035 to be responsive to these comments.

Summary:

In a related vein, the Alliance stated that EPA omitted consideration of several factors other than materials prices that they contend "are working to keep battery prices high." These included: motivation to increase energy density for greater range; safety, such as minimizing the risk of battery fires; frequent use of DC fast chargers; improved thermal management systems; and adherence to responsible sourcing guidelines, including avoidance of sourcing from lower cost suppliers that are not free trade agreement partners.

Response:

EPA agrees that there are other factors beyond material costs that affect battery manufacturing costs, and that manufacturers regularly pursue improved designs. The costs derived by the ANL study include a capability to fast charge from 15 percent to 95 percent SOC in 26 minutes, and at this time it is not clear that a faster charge rate will necessarily be prevalent in the future. Improving energy density is not the only means to improve range; it can also be achieved by improving energy efficiency of the vehicle, as comments by Lucid and Tesla attest. Safety and improved thermal management are also important, as are responsible sourcing. However, these effects are not readily quantifiable, and the commenter did not provide data or evidence as to how these effects might be quantified. Nor did the commenter persuasively explain or adduce empirical evidence that these technological developments would increase prices, nor by how much, nor that it would reasonably be expected to fully or even significantly offset the cost reductions modeled by EPA. Responsible sourcing is addressed in RTC Section 15 where we discuss topics related to critical minerals.

Summary:

In the context of either base year battery costs or our learning rates, or both, some commenters addressed EPA's consideration of mineral costs. Some commenters supported EPA's assumption that mineral costs would stabilize over the time frame of the rule, while others did not.

Response:

As also noted above, our updated battery cost assessment for 2023-2035 is based on the ANL study that incorporates mineral cost forecasts from BMI, a leading analyst firm, and does not rely on any blanket assumption regarding mineral cost trends over time. We also note that since these comments were submitted, analyst firms indicate that many mineral prices have continued a downward trend, and the most recent mid-range forecast by Wood Mackenzie suggests that mineral prices will moderate or decline over the next several years and through the duration of their forecast (to 2029).[439] While some commenters have cited an outlook for a shortage of lithium beginning to form beyond that time frame, forecasting that far into the future is subject to additional uncertainties, especially in light of the high level of activity in developing new mineral and processing capability at the current time and anticipated high demand continuing into the future, all of which provides a strong environment for investment in these resources. As EPA has pointed out elsewhere, the mere identification of a gap between a future projected supply and a future projected demand does not equate to identification of a future shortage and is in fact one of the signals that spurs development of additional supply. While forecasts cannot perfectly predict the future, these developments do support our outlook that mineral costs will tend to stabilize over time. EPA's evaluation of the evidence, supported by recent analyses from ANL and BMI, is that manufacturers choosing to produce PEVs will not be constrained by the availability of lithium or other critical minerals, including through 2035. See preamble Section IV.C.7 and RTC Chapter 15 for further discussion of the availability of critical minerals.

Summary:

The Alliance stated that the version of BatPaC utilized in the proposal assumes an electrolyte cost that differs from that presented by Argonne National Laboratory in October 2022 and included on the anl.gov website.

Response:

The updated cost analysis was performed by ANL using the latest version of their BatPaC model and cost inputs that they considered appropriate for the purpose of the study.

Summary:

Some commenters including the Alliance questioned the "default labor values currently hard coded into the BatPaC model" as needing reconsideration, given that EPA's assumptions regarding the 45X production tax credit implied that most batteries would be produced in the U.S.

Response:

As described in Preamble Section IV.C.2, our battery costs are now based on twice the default labor cost in BatPaC, which we assess to be similar to prevailing hourly rates and overhead for organized labor in U.S. automotive plants.

Summary:

AFPM commented that "EPA points to the IRA as a mechanism to reduce battery prices, yet this law simply extended the existing battery subsidy and even limited its applicability through domestic sourcing and income requirements. Thus, EPA is relying on an existing program for the proposition that it will lower battery prices in the future." AFPM also stated that "EPA is simultaneously ignoring that the increase in demand for batteries will raise their price."

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[439] Wood Mackenzie, "Electric Vehicle & Battery Supply Chain Short-term outlook November 2023", December 1, 2023 (filename: evbsc-short-term-outlook-november-2023_final.pdf). Available to subscribers.

Response:

EPA disagrees. While the IRC 30D provisions can be understood as a form of the previous purchase incentive under 30D and is more limited in some ways, we do not apply the 30D incentive as a reduction in battery manufacturing cost. Moreover, the IRA included entirely new credits such as for example the 45X production tax credit which previously was not available to battery manufacturers. With regard to the effect of demand on battery prices, mineral costs are a major part of battery cost and we have included analyst mineral price forecasts, which would include the effect of anticipated demand, in our updated battery costs.

Summary:

Some commenters referred to: the status of battery raw materials as specialty chemicals (AFPM), the potential need for battery replacement (several commenters), and our application of IRA tax credits in OMEGA (several commenters), including comments that it implied negative battery costs.

Response:

EPA appreciates AFPM's observations regarding battery raw materials being considered in the market as specialty chemicals. In referencing the forecasts of respected analyst firms whose forecasts often are widely used by industry actors, for example to negotiate contracts and assess market conditions and outlook, we expect that the commenter's observations on specialty chemical status and volatility of pricing are duly reflected in these forecast products. EPA also appreciates that several commenters on battery cost mentioned the potential need for battery replacement, and/or our application of IRA credits to battery and PEV costs, including the amount of the credits and their accounting in OMEGA as passing to the manufacturer or consumer. We address comments on battery replacement in RTC Section 12.2.5 and on our application of IRA credits in RTC Section 12.4.

Summary:

The Alliance stated that they were unable to examine cell-level costs from our analysis, and recommended that "EPA clearly present its EV sales-weighted $/kWh values in pack-level and cell-level estimates for all model years 2022-2032 to transparently allow comparisons between EPA's projections and the applicable research literature and industry estimates."

Response:

The BatPaC spreadsheets that EPA used to develop cell cost equations for the proposal analysis were included in the public docket and an examination of these files would reveal all of the calculations made by the BatPaC model, including cell costs for the battery configurations that were generated in deriving the equations. That said, EPA disagrees that disclosure of cell costs in addition to pack costs is necessary in order to compare sources. For a given study, the choice of whether to study costs in terms of pack cost or cell cost depends on the context and aims of the study, and as a result, many studies choose only one or the other. The EPA analysis requires cost to be expressed in pack cost, because the unit of interest for costing electrified vehicles is packs, not cells. For this reason, the ANL battery cost equations are expressed in terms of pack cost. Also, the relationship between pack cost and cell cost would vary depending on the size of the battery, making it impractical to maintain a distinction between cell cost and pack cost throughout the analysis.

Summary:

Some commenters stated that the default costs provided in BatPaC for electrode powders and other constituents were not transparent or documented.

Response:

BatPaC is developed by Argonne National Laboratory which develops the default costs based on pricing research and expert views on the costs typically paid for these materials at the present time. These costs are part of the BatPaC product and are clearly visible for inspection and are editable in the model. Our updated battery costs are derived from work by ANL that similarly used BatPaC but provided BatPaC with costs for electrode powders based on mineral price forecasts from Benchmark Minerals Intelligence for each year from 2023 through 2035. As the values used are in fact visible in the model, they are self-evident and can be readily compared with values that the user considers appropriate. The ANL report includes a full accounting of the prices used for precursors, anode active material and cathode active material in the battery cost study.[440]

Summary:

API notes that raw material costs represent 63 percent of battery costs, and recommends following "the economics of raw materials rather than capital depreciation and learning models for purposes of accuracy," further suggesting that "perhaps following the economics of oil production would be more representative of modeling the costs […]", also noting that "over the last 40 years the global supply of oil has increased by ~50% [while] the price increased by ~200%."

Response:

EPA disagrees that the economics of oil production is a proper analogy to the economics of battery minerals. The bulk of oil production is used as fuel and is consumed entirely by its users in proportion to distance traveled over time, while use of battery minerals is fixed for the lifetime of a given vehicle and to a large degree can be recovered for recycling, reducing the amount of new material that must be produced. Although EPA agrees with commenter that mining activities in general seek to first use "the lowest cost-to-produce sources," EPA notes that many factors such as this are well understood in the mining industry, and in the updated analysis our estimates of future battery costs incorporate mineral price forecasts from a leading analyst firm. Such forecasts are based on expert knowledge of the mining industry and consider a wide range of factors that are commonly expected to drive mineral prices in the future. Further, over time, spent batteries will comprise an additional source of minerals through recycling. For more discussion of the difference between energy security and mineral security, see RTC Section 21 (Energy Security) and RTC Section 15 (which includes responses related to mineral security). For more discussion of battery recycling, see RTC Section 15.2.

Summary:

JLR stated that their forecast for battery cost reduction is considerably lower than EPA's forecast for the industry.

[440] Argonne National Laboratory, "Cost Analysis and Projections for U.S.-Manufactured Automotive Lithium-Ion Batteries," Report ANL/CSE-24/1, January 2024 (Appendix A7).

Response:

EPA anticipates that specific automakers may experience differing battery costs over the time frame of the rule, due to differences in factors such as level of previous or planned investment, size of the business operation, or the terms of negotiated supplier agreements and partnerships, among many others. Battery cost inputs to OMEGA are intended to represent an average cost across the industry and are not differentiated by specific manufacturer.

Summary:

With regard to HEV batteries, John Graham stated that HEV battery costs should be given more attention, should be estimated separately from PEV batteries, and that the learning factors EPA used for HEV batteries were too small.

Response:

EPA agrees that HEV battery costs should be estimated separately from PEV battery costs, and did so in the proposal analysis. Our updated battery costs include updated cost equations developed by ANL specifically for HEV batteries and continue to be separate from those used for PEV battery costs. The learning factors implied by the HEV cost equation in the updated analysis result from ANL experts' expectations regarding chemistry, manufacturing and design improvements for these batteries.

Summary:

Mitsubishi Motors recommended that EPA determine a "realistic maximum volume of EVs the market can support for each of the model years covered by the rule," by considering a thorough and realistic year-by-year assessment of projected battery costs and projected supply of battery critical minerals.

Response:

In the proposal and in the current analysis, EPA imposed a constraint on GWh of battery production available to the U.S. automotive market each year for modeling purposes. See also the response to comments on critical minerals and supply chain issues in RTC Section 15.

Summary:

Some commenters stated that the battery durability and warranty requirements would increase battery cost and this should be accounted for.

Response:

See RTC Section 16 where we respond to comments on battery durability and warranty.

Summary:

POET LLC commented that the battery production capacity that would support the cost reductions EPA attributed to the 45X production tax credit has yet to be built.

Response:

For general discussion of supply chain and battery manufacturing capacity, see RTC Section 15. For discussion of our application of the 45X tax credits, see RTC Section 12.4, Modeling of IRA.

Summary:

The Alliance commented that the cost of electricity to manufacture batteries did not account for the potential for electricity rates to become more expensive as renewable generation is added, and cited rates in Germany and California as evidence.

Response:

To the extent that electricity is part of the cost of manufacturing batteries, the BatPaC model accounts for plant utility cost as part of variable overhead. Regarding the idea that renewable generation will increase this cost, EPA disagrees with this assertion. Electricity rates are a result of many factors including national, regional, and state policies and conditions, regional costs of feedstocks, and many other economic and policy factors, all of which must be taken into account when considering the basis for observed electricity rates. The cost of renewable energy capacity is declining faster than other sources and its levelized cost is already highly competitive with or significantly less costly than other sources of new generating capacity,[441] and despite recent increases in commodity costs, renewable energy capacity continues to grow faster than other sources.[442] While integration of renewables with the grid is a consideration that could affect electricity costs at high levels of renewables, EPA does not expect that this rule will specifically drive higher levels of renewables on the grid than utilities are already planning to implement to serve general electricity demand, and as noted previously, the grid is generally expected to be capable of serving near term electricity needs for an increase in PEVs.[443,444]. EPA disagrees that modeling today's rates observed in just one foreign country (Germany) and just one state (California) would be a valid way of identifying the potential future change in electricity costs due to large increases in renewable energy, or to support or quantify such a relationship. In the updated analysis, EPA has carefully analyzed the impact of higher penetrations of PEVs on the electricity grid including the impact on generation and electricity prices. See preamble Section IV.C.2 and RIA Chapter 5. We further respond to comments about the grid in RTC Section 18.

Summary:

The Alliance commented that EPA should "consider costs and specifications that are reasonable for the industry as a whole to inform policy analysis, and not to assume that intellectual property and proprietary production processes that have been the result of billions of dollars of research and development paid by one manufacturer will be readily available to all manufacturers."

Response:

EPA cost inputs to OMEGA are intended to represent reasonable costs for the industry as a whole and are applied in aggregate across the fleet as a whole and not to any specific individual manufacturer. EPA recognizes that different manufacturers may experience different costs resulting from differences in their past research and investments and differences in their

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[441] International Energy Agency, Levelized Costs of New Generation Resources in the Annual Energy Outlook 2021, February 2021.
[442] International Energy Agency, Renewables 2021: Analysis and forecast to 2026, December 2021.
[443] Department of Energy, US DRIVE, Grid Integration Tech Team and Integrated Systems Analysis Tech Team, Summary Report on EVs at Scale and the U.S. Electric Power System, November 2019.
[444] CNBC, "'We could handle it right now' - AEP chief says U.S. power grid can sustain influx of EVs," November 12, 2021. Accessed on December 2, 2021 at https://www.cnbc.com/2021/11/12/we-could-handle-it-right-now-aep-chief-says-us-power-grid-can-sustain-influx-of-evs.html

approach to sourcing components, among other differences. Manufacturers have largely approached the sourcing of batteries through joint ventures or contractual relationships with established cell manufacturers rather than true vertical integration.[445] For example, while Tesla has developed intellectual property relating to pack and cell design and production, their production occurs via a joint venture with Panasonic, and also includes sourcing from other suppliers that are not part of this venture. Other manufacturers are increasingly adopting a similar approach in which new manufacturing plants are constructed as part of a joint venture, by which the OEM may secure a supply of batteries for its products.[446,447,448,449,450] EPA's experience with other technologies has shown that the existence of intellectual property belonging to one manufacturer seldom prevents other manufacturers from developing and benefiting from similarly effective technologies. The battery costs that EPA has used in the compliance analysis are not taken solely from the example of any specific manufacturer but are developed based on an assessment of the industry as a whole. EPA notes that the battery costs used in the updated compliance analysis are in fact higher than projections by BNEF, a widely referenced source on projected battery costs, and are also higher than the costs commonly reported by Tesla, the OEM that currently has the highest rate of battery production.

Summary:

"Environmental and Public Health Organizations" recommended that we consider the cost of lithium iron phosphate batteries as being lower than NMC.

Response:

We have included LFP cost based on a percentage penetration of LFP. See Section IV.C.2 of the Preamble and Chapter 2 of the RIA.

Summary:

Several commenters cite the possibility of new battery chemistries including solid state and sodium ion chemistries in advocating for lower battery cost assumptions. Some of the same commenters also advocate for improved specific energy figures to be used in an updated analysis, higher than the 180 Wh/kg that was used previously.

Response:

In developing battery cost projections for 2023 through 2035, ANL also developed year-by-year pack-level specific energy projections generated by the same BatPaC model that was used

[445] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024. (see Figure 14 therein, titled "Modeled lithium-ion cell production capacity in North America from 2018 to 2035 by plant ownership").
[446] Voelcker, J., "Good News: Ford and GM Are Competing on EV Investments," Car and Driver, October 18, 2021. Accessed on December 9, 2021 at https://www.caranddriver.com/features/a37930458/ford-gm-ev-investments/
[447] Stellantis, "Stellantis and LG Energy Solution to Form Joint Venture for Lithium-Ion Battery Production in North America," Press Release, October 18, 2021.
[448] Toyota Motor Corporation, "Toyota Charges into Electrified Future in the U.S. with 10-year, $3.4 billion Investment," Press Release, October 18, 2021.
[449] Ford Motor Company, "Ford to Lead America's Shift To Electric Vehicles With New Mega Campus in Tennessee and Twin Battery Plants in Kentucky; $11.4B Investment to Create 11,000 Jobs and Power New Lineup of Advanced EVs," Press Release, September 27, 2021.
[450] General Motors Corporation, "GM and LG Energy Solution Investing $2.3 Billion in 2nd Ultium Cells Manufacturing Plant in U.S.," Press Release, April 16, 2021.

to develop the costs, and we are using these values in the analysis. EPA notes that many of the higher specific energy values cited by the commenters are likely to represent cell-level specific energy and not pack-level. Regarding new battery chemistries, EPA agrees that there is potential for these new chemistries to result in even lower battery prices in the future than we project, but due to the nascent stage of development and the lack of high-production examples we are unable to quantitatively assign costs to these technologies. We do agree however that the possibilities offered by these chemistries are widely acknowledged in the industry as a potential route to lower battery costs and we agree that they at least qualitatively support the possibility of battery costs being lower in the long term than currently represented in the analysis. They also represent another factor in considering the possibility that our battery costs estimates are conservative, that is, more likely to overestimate future costs than underestimate them.

Summary:

ICCT cites their own study of BEV vehicle costs and numerous assumptions for specific cost elements that result in these lower vehicle costs. ICCT also states that EPA's battery costs in the proposal are significantly higher than those seen in third party analyses.

Response:

EPA appreciates the ICCT analysis, and also notes that we have made many adjustments to cost inputs that would affect BEV vehicle costs relative to ICE vehicle costs, and updates are reflected in the results of the updated analysis. Despite the alternative costs suggested by ICCT, EPA considers the sources we are using in the updated analysis to be the best possible information, being based on the FEV teardowns as well as recent FEV work estimating costs and cost relationships for the wide variety of component and vehicle types that we must consider in the analysis, and being in a format that is compatible and consistent with the needs of the OMEGA model and transparency of inputs to the public. Regarding the statement that EPA's battery costs in the proposal were much higher than the third party projections cited by ICCT, EPA notes we interpret the third party projections as representing a direct manufacturing cost that is not marked up by an RPE factor of 1.5, while the EPA costs that ICCT cites include this RPE factor. Despite the fact that the BatPaC model does in fact include some cost terms that appear to represent overhead cost, these are assessed in the context of the supplier that produces the battery, and not in the context of the OEM that purchases the battery. In analyses of this type it is customary to develop total costs to the OEM by beginning with a direct manufacturing cost, or a price that an OEM pays a supplier for a part, and marking it up by an RPE factor (in our case, 1.5) that represents specifically the OEM's overhead in specifying the part, integrating it into the design, and managing its role in the product afterward (part inventorying, modifications, etc). Any part, including a simple part like a nut or bolt, or a large part like a battery, incurs this added cost in our analysis, and is customary accounting practice to account for the myriad overhead costs that a large OEM incurs, ranging from ongoing research and development to customer support, advertising, upkeep, recalls, and so on.

Summary:

The Strong PHEV Coalition recommended that we model longer-range PHEVs with BEV batteries.

Response:

The ANL battery cost equations were developed with consideration of higher power-to-energy ratios at the lower end of their kWh capacity range, making those battery sizes applicable to either BEVs or PHEVs. In the updated analysis, only longer-range PHEVs[451] are placed into the fleet, and their battery costs are derived from the same equations as BEVs.

In response to comments relating to IRA incentives being passed on to the consumer, or views relating to a hypothetical withdrawal of IRA incentives, see RTC Section 12.4 where we respond to comments on IRA incentives.

Summary:

Various commenters alluded to the outlook for price parity or cost parity between BEVs and ICE vehicles.

Response:

See our response to cost/price parity issues in RTC Section 12.2.7.

12.2.2 - Battery cost sensitivities

Comments by Organizations

Organization: Alliance for Automotive Innovation

Based on this analysis into the underlying research literature, for the final rule's central analysis, we recommend that EPA increase its reference direct manufacturing battery pack cost per kilowat-hour for 2022 and 2023 to be approximately $153 per kilowat-hour. Further, we recommend that EPA adjust its central case battery projection through 2032 to match the midpoint of the Mauler et al (2022) analysis (i.e., $90/kWh cell-level, approximately equal to $113/kWh at a pack-level in 2030). To better reflect these key inputs, we also recommend that the final rule's low battery case sensitivity analysis go no lower than the "Lowest" value in Mauler et al 2022 (i.e., $77/kWh cell-level, approximately equal to $96/kWh at a pack-level in 2030). This adjustment better matches the U.S.-specific battery characteristics as seen by U.S. automakers and tailored for the U.S. market, better reflects the actual underlying data that EPA references for battery costs, and incorporates research that was not cited in EPA's NPRM and DRIA. [EPA-HQ-OAR-2022-0829-0701, pp. 52-53]

4. Insufficient Sensitivity Analysis of Battery Prices

Auto Innovators appreciates the agency's decision to include a sensitivity analysis of battery prices in the Drati RIA. In addition to the base-case analysis, the agency includes two sensitivity analyses: one where battery prices fall 15% relative to the base case, and the other where battery prices increase 25% relative to the base case. The downward sensitivity case is not very informative because the agency is already showing, under the base-case scenario, that massive

[451] EPA assumed that manufacturers would design PHEVs that would provide enough range to qualify as ZEVs under the ACC II and ACT programs being administered by California and participating Section 177 states. In OMEGA, EPA assumed that light-duty vehicle PHEV batteries would be sized for 40 miles of all-electric range over the US06 cycle, while medium-duty PHEVs would be sized to drive 75 miles over the UDDS while tested at ALVW.

deployment of BEVs has benefits that justify the costs. The more interesting question is how the findings of the DRIA might change if the agency's optimism about future battery prices proves to be incorrect. The Alliance and its members certainly hope that the agency's optimism proves to be warranted, but an objective regulatory impact analysis should seriously consider a pessimistic scenario on battery prices. [EPA-HQ-OAR-2022-0829-0701, pp. 61-62]

What is the basis for the agency's use of a 25% increase in battery prices for a less optimistic position on the future course of battery prices? Little rationale is given except the preamble states that it "bound(s) what EPA considered to be a reasonable envelope for future nominal battery pack cost per kWh, as informed by the full range of forecasts in the literature (see the discussion of battery cost forecasts we considered in Preamble Section IV.C.2 and DRIA Chapter 2.5.2.1.3."112 We have examined with care preamble section IV.C.2; we found no justification for using +25% as the upper sensitivity case on battery prices. We also examined DRIA Chapter 2.5.2.1.3; again, we found no rationale for using +25% as the upper sensitivity case. [EPA-HQ-OAR-2022-0829-0701, pp. 61-62]

112 NPRM at 29335.

Auto Innovators is concerned that the +25% sensitivity case may not be large enough to reveal whether there are sensitivities in the agency's results to a plausible change in a key forecasting assumption. We are concerned for two different reasons. [EPA-HQ-OAR-2022-0829-0701, pp. 62-63]

First, the +25% is applied to an annual series of cost figures that begins in 2022 and extends to 2050. No cost reductions are assumed through 2025 but a 25% decline in battery prices is assumed through 2029. Even if one assumes that EPA starts the series correctly, the +25% upper sensitivity case simply removes the 25% cost reduction that EPA assumed from 2026 to 2029. The same point applies qualitatively to the cost reductions from 2029 to 2050 – they accumulate to such a large magnitude that the +25% sensitivity case does not amount to much of a net change in battery prices. The +25% battery-price sensitivity scenario simply slows the pace of a decline in battery prices from 2022 to 2050 rather than halt the decline or presume an unexpected increase in battery prices over the time horizon of the rulemaking. Auto Innovators is particularly concerned about the years of the applicable CO2 standards (2027-2032) because that happens to be the period when global raw materials are expected to be most out of balance. [EPA-HQ-OAR-2022-0829-0701, pp. 62-63]

Second, it appears that the agency expresses the future battery prices in nominal dollars when they should be expressed in real dollars. When they are expressed in nominal dollars, the purchasing power adjustments for future years diminish their impacts in the sensitivity analysis. [EPA-HQ-OAR-2022-0829-0701, pp. 62-63]

Auto Innovators suggests that the upper sensitivity case on battery prices should represent a more severe, unexpected series: one where the series starts higher than the agency thinks is appropriate and increases slowly yet steadily throughout the time horizon of the rulemaking, at least through 2032. The price growth would represent the reality that China, Europe, and the U.S. will be bidding up the prices of key raw materials over the next decade, before a substantial impact from recycling can occur. Auto manufacturers will also be under increasing pressure to choose higher-cost battery suppliers with excellent ESG profiles and facility locations in North America. It is quite possible that those factors will overwhelm the future economies in battery production and innovations in battery design that appear to be dominating EPA's thinking on this issue. [EPA-HQ-OAR-2022-0829-0701, pp. 62-63]

…

Relatedly, we also recommend that the EPA show a full cost-benefit analysis for each of its sensitivity cases, including for high and low battery cost cases, and also for varying assumptions on IRA tax credit eligibility, phase-out, or elimination. [EPA-HQ-OAR-2022-0829-0701, p. 67]

Organization: American Fuel & Petrochemical Manufacturers

Moreover, although the incremental vehicle manufacturing cost in EPA's High Battery Cost sensitivity is higher (Table 13-140 of the DRIA provides an average increase of $1,547 by 2032 for medium duty vehicles) than the Proposed Rule, EPA does not quantify how much of the increase in incremental cost is due to battery raw material prices. Finally, as part of its ZEV cost assessment EPA relies on data as old as 2017 but does not appear to account for the inflation of cost components in recent years. EPA should make it clear how it is accounting for not just typical inflation to normalize dollars in a similar year, but also the significant changes in supply chains in recent years that have led to significantly higher costs for ZEV parts and materials compared to older data points that EPA references. [EPA-HQ-OAR-2022-0829-0733, pp. 52-53]

Organization: John Graham

The sensitivity analysis of higher battery prices needs to consider scenarios worse than +25% relative to the agency's central cost path, since the central cost path assumes future learning factors that are far larger (cumulatively) than 25%. The sensitivity analysis on battery prices needs to take a more pessimistic view than +25% above the agency's optimistic view.

In a sensitivity analysis, EPA looks at how the results of its modeling might change if battery prices are +25% (or -15%) compared to base case assumptions. However, the +25% is so small compared to the learning factors and the importance of material supply issues that it is too small to reveal any sensitivities that might be there. We suggest that EPA also examine a sensitivity case where battery prices remain at $120/kWh -- or even increase steadily -- until 2035 before falling gradually until 2050. [EPA-HQ-OAR-2022-0829-0585, pp. 17-18]

Organization: POET, LLC

While federal tax credits may lower the ultimate cost of battery production, there is no reason to assume that battery manufacturers will pass these cost savings through by lower battery prices, particularly given the projected worldwide demand for batteries. It is unclear that these credits will continue to be in place over the period from 2027 through 2032 as they could easily be eliminated or modified by future legislation. Therefore, U.S. EPA should perform a sensitivity analysis that shows how dependent the high levels of BEV penetration forecast would be impacted by the elimination of these tax credits. [EPA-HQ-OAR-2022-0829-0609, pp. 57-58]

It should be noted that U.S. EPA purports to perform a "sensitivity analysis" of BEV penetration rates under the Proposed Rule to battery costs, the results of which are presented in Chapter 13 of the DRIA. The results relevant to the proposed standards for the combined light-duty fleet (passenger cars and trucks) are shown in DRIA Tables 13-49, 13-73, 13-102, 13,-103, 13-106, and 13-107. There are two cases considered one labeled “low battery costs” and the other “high battery costs”. Under the low cost case, MY 2032 incremental vehicle costs drop from $1,164 to $490 and BEV penetration increases from 67 to 68%. Under the high cost case, MY” 2032 incremental costs increase from $1,164 to $1,632, and BEV penetration drops from 67% to 65%. Given these results, the apparent conclusion is that differences battery cost relative to those assumed by U.S. EPA for the proposed standards will have virtually no impact on BEV penetration or automakers ability to comply. [EPA-HQ-OAR-2022-0829-0609, p. 58]

However, as discussed above, U.S. EPA’s battery cost estimates range from the current $120 per kWh to as low $40 per kWh following the application of learning effects and federal tax credits. Assuming as U.S. EPA does, that a 100 kWh battery pack size will be common, it follows that the range of battery costs would be on the order of $12,000 to $4,000 with the difference from high to low being $8,000 rather than the $1,142 used by U.S. EPA in the battery cost sensitivity analysis. Clearly, use of a much larger cost differential in the sensitivity analysis will lead to much greater impacts on estimated BEV penetration rates and the potential ability of automakers to comply with the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, p. 58]

EPA Summary and Response

Summary:

We received several comments regarding the sensitivity bounds for battery costs. General themes were that the selection of 25 percent for the upper bound lacked apparent rationale and/or was insufficiently high. With regard to the upper bound, the Alliance and John Graham suggested that we should consider holding prices steady or increase them, to (in the words of the Alliance) “represent the reality that China, Europe, and the U.S. will be bidding up the prices of key raw materials over the next decade, before a substantial impact from recycling can occur.” The Alliance also commented that the lower bound of 15% was not informative, and recommended that “the final rule’s low battery case sensitivity analysis go no lower than the lowest value in Mauler et al 2022 (i.e., $77/kWh cell-level, approximately equal to $96/kWh at a pack-level in 2030.” Some commenters expressed the position that a fixed percentage sensitivity simply slows the pace of battery price decline and implied that instead it should halt the decline or even increase battery prices. Another commenter stated that EPA “needs to consider scenarios worse than +25% […] since the central cost path assumes future learning factors that are far larger (cumulatively) than 25%.”

Response:

EPA continues to assess that a fixed percentage above and below the central case can be an appropriate way to establish upper and lower bounds for a sensitivity, if the resulting band can be shown to adequately cover a range of reasonably plausible outcomes for future battery costs. For the updated analysis, we examined the appropriateness of this range, particularly in light of the updated, higher central case battery costs. We also examined the Mauler et al. paper and compared the range of scenarios expressed there to the new band of costs that would be defined by 25 percent above and 15 percent below the new central case costs. Please refer to Preamble IV.C.2 for a description of how we justified our sensitivity bands in the updated analysis. It shows that retaining the 25 and 15 percent sensitivities around the new central case costs establishes a band that largely includes the Mauler scenarios, including the highest Mauler scenario, in which costs do not decline at all, out to 2029-2030. Past 2030, we exclude the highest Mauler scenario, as such a scenario of perpetually elevated cost is not consistent with current outlooks for mineral cost or battery cost as EPA previously noted under our responses in Section 12.2.1. Therefore we have generally retained the 25 percent higher and 15 percent lower sensitivities in the updated analysis as it is now largely inclusive of commenters' concerns.

Regarding statements that the high sensitivity should assume constant or rising costs, EPA notes that there is little support for such a scenario among analyst firms. In addition, and as noted in our response to similar comments in section 12.2.1, in the time since these comments were submitted mineral prices have largely continued a downward trend, and the most recent analyst forecasts of mineral prices out to at least 2029 do not support the prospect of battery prices that never decline or actually increase. Regarding the statement that global demand will lead to bidding up of prices, this is to be expected in any market that experiences increased demand, and this outcome also leads to development of new production to serve that demand, and therefore does not necessarily lead to commenter's conclusion that it will prevent prices from falling or cause them to increase.

Regarding John Graham's suggestion that EPA "needs to consider scenarios worse than +25% […] since the central cost path assumes future learning factors that are far larger (cumulatively) than 25%," EPA sees no reason to assume that a percentage of cumulative learning should dictate the bounds of a sensitivity band. Rather, as stated above, the more relevant factor is the ability of the band to capture a range of reasonably plausible outcomes.

<u>Summary:</u>

The Alliance commented that "it appears that the agency expresses the future battery prices in nominal dollars when they should be expressed in real dollars. When they are expressed in nominal dollars, the purchasing power adjustments for future years diminish their impacts in the sensitivity analysis."

<u>Response:</u>

The final analysis is done entirely in 2022 dollars so that costs and benefits can be presented on an equal and consistent basis and in present valuations.

<u>Summary:</u>

The Alliance recommended that we should show a full cost-benefit analysis for each of our sensitivity cases.

<u>Response:</u>

Comments related to sensitivities and their role in the analysis are discussed in section 12.5.4.

EPA notes that, consistent with CAA section 202, in evaluating potential standards we carefully weighed the statutory factors, including the emissions impacts of the standards, and the feasibility of the standards (including cost of compliance in light of available lead time). We monetize benefits of the standards and evaluate other costs in part to enable a comparison of costs and benefits pursuant to E.O. 12866, but we recognize there are benefits that we are currently unable to fully quantify. EPA's practice has been to set standards to achieve improved air quality consistent with CAA section 202, and not to rely on cost-benefit calculations, with their uncertainties and limitations, as identifying the appropriate standards. Nonetheless, our conclusion that the estimated benefits exceed the estimated costs of the final program reinforces our view that the standards are appropriate under section 202(a). More specifically, for this rule our assessment that the rule has positive net monetized benefits, regardless of the magnitude of those positive net benefits, supports our view that the final standards represent an appropriate weighing of the statutory factors and other relevant considerations. Given the very limited role that the benefit-cost analysis for this rule played in decision-making for the standards, EPA deemed a benefit-cost analysis of every sensitivity unnecessary. See RTC 8 for further discussion.

Summary:

POET LLC recommended that we perform a sensitivity analysis that includes elimination of the IRA tax credits, going on to say that "the range of battery costs would be on the order of $12,000 to $4,000 with the difference from high to low being $8,000 rather than the $1,142 used by U.S. EPA in the battery cost sensitivity analysis."

Response:

While we agree with POET's statement that "use of a much larger cost differential in the sensitivity analysis will lead to much greater impacts on estimated BEV penetration rates," we do not agree that this necessarily implies that every such scenario must be analyzed regardless of its reality, relevance, or likelihood. In the case of the suggested scenario, in conducting technical analyses EPA has continued its past practice of considering the effect of laws and regulatory programs that are a matter of law at the time of the rulemaking, rather than presuming finalization of pending rules or laws, or conversely, speculating on potential changes to rules or laws that are in force at the time. At the time of this rulemaking, the assumptions in our analysis are based on the Inflation Reduction Act provisions which are currently in effect and EPA does not see a basis for speculating on potential future changes to the IRA.

12.2.3 – Non-battery costs

Comments by Organizations

Organization: Alliance for Automotive Innovation

H. Electric Motor Cost

EPA assumes a steady decline in the cost of producing electric motors ("non-battery" costs) from now until 2032. This assumption is not consistent with current trends in the industry, as the average price of electric motors for BEVs rose significantly in both 2021 and 2022. The factors that are driving the costs of electric motors are different from the factors that are driving the costs of lithium-ion batteries. [EPA-HQ-OAR-2022-0829-0701, pp. 69-70]

One of the complicated factors that the agency needs to analyze is the current and projected global shortage (2027-2030) of electrical steel. This type of steel is comprised of ultra-thin sheets that transfer electricity into mechanical power. For use in an EV's electric motor, a higher-grade electrical steel is required that entails stamping and stacking steel into precise shapes that may be less than a millimeter thick. The U.S. has very limited production capability for electrical steel and has imposed tariffis on the supplies from South Korea, Japan and China. The cost-reduction factors that the agency is using for electric motors need to be modified, as they ignore the current and likely costs of electric motors. [EPA-HQ-OAR-2022-0829-0701, pp. 69-70]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 69-70]

1. James Irwin. Price Parity Points: As EV Component Costs Rise, Stalling Push for Parity. Automotive News. November 7, 2022, 10-11.

2. Daniel Sims. Electrical Steel Supply and Demand Could Impact EV Prices Later This Decade. Techspot.com. March 28, 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 69-70]

Moreover, the industry has generally moved away from induction motors to permanent magnet synchronous motors, even though they are more costly (50-75%). While the induction motors have no need for rare earth magnets, they are harder to cool at sustained high loads and are inherently less efficient at low speeds. Thus, permanent magnet synchronous motors, due to their efficiency gain, are important for reducing the overall costs of the powertrain. [EPA-HQ-OAR-2022-0829-0701, pp. 70-71]

R&D efforts are looking into new alternatives that can reduce or eliminate the use of rare earths while maintaining the effciency advantages of permanent magnet synchronous motors. Some alternatives require expanded use of liners that depend on the ultra-thin electrical steel, but the cost premium for electrical steel is signiffcant and global shortages are projected in the 2027-2030 timeframe. It is possible that some innovations in motor design will penetrate luxury/premium models prior to 2032, but most of the 2032 light-duty fleet is likely to retain use of rare earth magnets. [EPA-HQ-OAR-2022-0829-0701, pp. 70-71]

Suppliers are also under pressure to design more efficient electric motors. Gallium nitride semiconductors can enable more efficiency. How would larger amounts of gallium be obtained? It is not found by itself in nature but is present in small amounts in bauxite. Thus, it is presently obtained primarily from mining and mineral processing of bauxite ore (as part of aluminum production). For scaling up to the auto-sector quantities, improved methods would be needed to extract and separate the gallium from oxide ore, as only a small percentage of the gallium in ore is now economically recoverable. The amounts of energy and other inputs used in producing gallium nitride also need to be assessed in lifecycle analysis. The United States currently has no capacity to produce gallium nitride. Most is produced in China for use by Asian firms. [EPA-HQ-OAR-2022-0829-0701, pp. 70-71]

The gallium nitride example illustrates that it is too simplistic to assume that the price of electric motors will plummet over the next 20 years. Electric motors are likely to become more expensive to meet the unique needs of EV consumers before they become less expensive in the long run. [EPA-HQ-OAR-2022-0829-0701, pp. 70-71]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 70-71]

1. John Irwin. Price Points: As EV Component Costs Rise, Stalling Push for Parity. Automotive News. November 7, 2022, 10-11.

2. National Research Council. Assessment of Technologies for Improving Light-Duty Vehicle Fleet Fuel Economy 2025-2035. National Academy Press. Washington, DC. 2021, 83.

3. Dan Edmunds. EV Motors Explained. Caranddriver.com. April 5, 2022.

4. USGS. Gallium – A Smart Metal. https://pubs.usgs.gov/fs/2013/3006/pdf/fs2013-3006.pdf#:~:text=Currently%2C%20gallium%20is%20obtained%20mainly%20from%20mining%20and,in%20the%20manufacture%20of%20GaAs-%20and%20GaN- based%20devices. [EPA-HQ-OAR-2022-0829-0701, pp. 70-71]

Organization: Environmental. and Public Health Organizations

D. EPA should revise its non-battery BEV powertrain costs.

EPA should use the most recent data available to estimate non-battery BEV powertrain costs. The choice of electric motor cost equation used in the OMEGA modeling does not reflect the most recent data and will overestimate the cost of the BEV powertrain, especially in vehicles with higher-power electric motors. In the 2023 draft report "Cost Modeling for BEV Powertrain" by FEV Consulting, Inc., the cost for both induction and permanent magnet electric motors is estimated to have both a fixed cost and a power-dependent variable cost.134 In contrast, the cost assumptions used in OMEGA for motors have no fixed costs and only have a power-dependent variable cost.135 The effect of this choice is that OMEGA will overestimate the motor (and powertrain) costs relative to the most recent FEV Consulting analysis for BEVs as the power of the motors increases. This overestimation of costs will likely create the largest penalty for electric-drive pickups and SUVs, which will require higher-power electric motors in the modeling. Additionally, the FEV Consulting analysis differentiates the cost of gearboxes, wiring harnesses, and coolant circuits for sedans, SUVs, and pickups, which is not reflected in the OMEGA modeling. EPA should revise these costs in its modeling for the final rule, which would more accurately show the feasibility of strong standards. [EPA-HQ-OAR-2022-0829-0759, p. 52]

134 FEV Consulting, Cost Modeling for BEV Powertrain (prepared for U.S. EPA) (Apr. 10, 2023), available at https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0384 (as Attachment 1).

135 DRIA at 2-74, Tbl. 2-39.

E. EPA should revisit the teardown study it relied on for the proposed rule.

EPA must also ensure that teardown studies it relies on for its final rulemaking are accurate and defensible. While the use of teardown studies is appropriate to generate combustion vehicle and BEV manufacturing cost estimates, it is important that the comparison vehicles chosen are similar and that any performance differences are quantified. The report "Cost and Technology Evaluation, Conventional & Electrical Powertrain Vehicles, Same Vehicle Class and OEM" by FEV Consulting, Inc. prepared for EPA, presents a detailed comparison between combustion and battery-electric vehicles of similar size made by the same manufacturer.136 While these vehicles have many similarities, there are major performance differences that were not quantified or assigned a cost. The largest variance in performance is in the power, torque, and resulting acceleration performance. The combustion model (VW Tiguan) has a 0-60 mph time of 9.7 seconds, while the more powerful BEV model (VW ID.4) accelerates to 60 mph in 5.4 seconds. If the BEV was designed to have similar performance as the combustion model, there would be downscaling of motor and power electronics, resulting in lower BEV powertrain costs. The teardown analysis should be revised to estimate the cost reductions associated with components that have similar performance as the combustion vehicle model. Similarly, the BEV model chosen has higher towing capacity than the combustion vehicle model, which results in higher costs (e.g., from heavier bumpers). EPA should consider the value of the increased towing performance or adjust the costs of the BEV model to estimate the cost to build a vehicle with the same performance as the combustion vehicle model chosen. [EPA-HQ-OAR-2022-0829-0759, pp. 52-53]

136 FEV Consulting, Cost and Technology Evaluation, Conventional & Electrical Powertrain Vehicles, Same Vehicle Class and OEM (prepared for U.S. EPA) (Feb. 24, 2023), available at https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0402 (as Attachment 3).

Organization: International Council on Clean Transportation (ICCT)

EPA’s OMEGA model also includes an analysis of light-duty electric vehicle costs. ICCT examined the BEV cost data from EPA’s OMEGA output files and compared the overall costs and the costs of various battery and vehicle components and technical specifications with those applied in the 2022 ICCT U.S. EV cost study for industry-average 300-mile range BEVs. Specifically, we compared the component-level costs and specifications broadly categorized into powertrain direct, non-powertrain direct, and indirect costs; doing so allowed for the most appropriate and direct comparisons with the findings in the ICCT study. The Figure 8 flowchart below illustrates the BEV cost comparison approach based on EPA data from the OMEGA output file and the ICCT data. [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

SEE ORIGINAL COMMENT FOR Figure 8. Illustration of methodology for EPA vs. ICCT BEV-300 cost comparison [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

To calculate EPA's modeled total manufacturing cost – including all indirect costs using the 1.5 retail price equivalent (RPE) factor – the total costs of individual vehicle elements were summed. These individual vehicle elements are electrified driveline, e-machine, battery, driveline (conventional vehicle), engine, glider (non-structure), structure (i.e., chassis/frame). The first five cost elements are powertrain-specific. The last two are non-powertrain. Some vehicles, such as hybrids, have all five powertrain cost elements. All vehicles have both non-powertrain cost elements. [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

To determine the industry average total costs for each cost component, the individual vehicle model costs were averaged, weighted by model sales. Critically, BEV and ICE platforms are kept separate by only considering costs associated with designated ICE or BEV vehicles, as appropriate. For instance, in calculating the average ICE vehicle battery cost, only ICE vehicle models were considered in the average calculation. Once the average total costs by component are obtained, they are summed into powertrain and non-powertrain (described above), and then summed into full vehicle total costs. Lastly, the direct costs for each cost component and for the full vehicle can be calculated by dividing total costs by 1.5. [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

While the OMEGA model uses “total manufacturing costs” described above as an input to calculate final vehicle price, for the purpose of comparison with the ICCT 2022 EV cost analysis, these total costs represent the equivalent of “price” as defined and analyzed by ICCT (see the flowchart above). [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

Figure 9 illustrates the key findings from our comparison of the EPA and ICCT BEV cost analyses. The figure shows the upfront incremental BEV costs for cars, crossovers, SUVs, and pickup trucks relative to their combustion counterparts for a 300-mile range BEV. The top figure shows the incremental BEV costs in 2027 and the bottom figure shows the incremental BEV costs in 2032. The blue bars represent EPA's findings of BEV incremental costs and the orange bars represent the ICCT findings of incremental costs. As shown, ICCT finds that incremental BEV costs are much lower than estimates by EPA by about $2,300 (pickups) to about $5,300 (crossovers) in 2027. As battery and electric vehicle costs fall and technology improves, the incremental costs are reduced. For 2032, the EPA finds that BEVs have incremental costs of about $3,000 to $5,000; during this same timeframe, the ICCT study finds that BEVs will be cheaper to purchase than comparable gasoline vehicles, which is indicated by the negative incremental costs shown in the bottom figure. [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

SEE ORIGINAL COMMENT FOR Figure 9. Comparison of EPA and ICCT (2022) findings of incremental BEV costs compared to ICEV costs, for 2027 (top) and 2032 (bottom) [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

The differences in overall incremental cost findings can be explained by comparing the assessments of combustion and electric vehicle costs. For combustion vehicles, on average, the costs in the ICCT analysis are about $500 less than EPA for 2027, and about $1,500 more than EPA for 2032. This shift is for two reasons: 1) the ICCT study applies cost-effective fuel savings technology to combustion vehicle models that improve the new vehicle fleet by about 3.5% per year and increase powertrain direct costs by about 1% per year, and 2) the average combustion vehicle prices in the EPA analysis decline by about $1,400 from 2027 to 2032, along with their reduced efficiency and increase in per-mile emissions. For battery electric vehicles, the average BEV costs in the ICCT analysis are about $5,000 less than EPA for 2027 and about $7,000 than EPA for 2032. The ICCT analysis finds that BEV costs can be reduced faster than the EPA projections. We further assessed BEV costs by powertrain direct, non- powertrain direct, and indirect cost elements (Figure 8). [EPA-HQ-OAR-2022-0829-0569, pp. 22-26]

In addition to the powertrain battery costs, we found that the non-battery powertrain costs in the ICCT analysis are about $600 to $900 less than the EPA modeling in 2027, and that gap declines to about $400 to $600 less than EPA in 2032. In the ICCT analysis, non-battery costs scale with power and are based on several sources. Non-battery powertrain costs are assessed primarily based on a teardown analysis by UBS (2017) and the National Academies of Sciences Engineering and Medicine fuel economy technology assessment (NASEM, 2021).74 Virtually all electric vehicles equipped with AWD do so with additional motors, rather than electronic AWD or another AWD system used on combustion vehicles. By matching electric and combustion vehicle power, combined motor power for electric vehicles with multiple motors is the same as the power for single motor vehicles. With additional motors, costs for high voltage cables and motor cooling increase. It is unclear from literature whether motor costs include driveshaft, which would also increase with the number of motors. According to NASEM, future permanent magnet motor costs are expected to decline due to reduced magnetic material requirements. These future costs scale proportionally with motor power, suggesting that certain cost elements that increase with motor number are not included. Further investigation into the true costs of BEV AWD is beyond the scope of this paper. However, manufacturers may opt for induction motors as a second motor in AWD configurations. Absent permanent magnets, induction motors have the potential to decrease AWD costs further, even below the future permanent magnet motor costs shown in NASEM. [EPA-HQ-OAR-2022-0829-0569, pp. 29-31]

74 UBS. (2017). UBS evidence lab electric car teardown: Disruption ahead? [Q-Series newsletter]. Retrieved from https://neo.ubs.com/shared/d1ZTxnvF2k/ and National Academies of Sciences, Engineering, and Medicine. (2021). Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035. Washington, DC: The National Academies Press. https://doi.org/10.17226/26092

Table 4 summarizes the findings of the underlying technical specifications for motor power in kilowatts for 300-mile range BEVs and combustion vehicles in 2027, 2030, and 2032 in the EPA and ICCT analyses. As shown, the BEV motor power assumed in the ICCT analysis is significantly less than what is applied by EPA. In the ICCT study, matching electric and combustion vehicle power means that the combined motor power for electric vehicles with multiple motors is the same as the power for single motor vehicles. From the table below, EPA applies BEV motor power that is much greater than comparable combustion vehicles. We compared EPA's assumed motor power on a model-by-model basis for BEVs and their combustion counterparts and found that on average BEV motor power is at least 38% (cars) to 45% (pickups) greater than the assumed motor power of the ICE variants. Because the non-battery powertrain costs in EPA's analysis directly scale with motor power, reducing the assumed BEV motor power (kW) in EPA's analysis to be similar to the motor power applied for combustion vehicles – based on evidence from the ICCT analysis – would reduce the BEV non-battery powertrain costs in EPA's analysis. [EPA-HQ-OAR-2022-0829-0569, pp. 29-31]

SEE ORIGINAL COMMENT FOR Table 4. Summary of fleet average motor power (kW) applied in EPA and ICCT (2022) [EPA-HQ-OAR-2022-0829-0569, pp. 29-31]

Organization: John Graham

Strong Hybrid Cost, Efficiency, and Market Share

Cost

There are two ways in which the hybrid costs in Table 2-36 and Figure 2-21 of the DRIA overstate hybrid costs. First, the proposed rule assumed the use of a 3.5 kW DC-DC converter, while 2021 NAS study assumed just a 1.1 kW converter is needed. Second, and more important, the HEV battery cost is too high. The 2021 NAS study estimated a 1.0 kWh battery plus BMU would cost $880, while the proposed rule cost is calculated to be $934 (without BMU? – unclear from discussion in DRIA). Further, FEV teardown cost analyses indicate that the DRIA cost estimates for HEV batteries are extremely outdated. FEV's teardown studies in 2012/2013 on a 2010 hybrid found HEV battery cost to be 982 Euros for a 1.0 kWh battery pack, similar to the DRIA estimates. However, FEV's teardown study in 2015 on a 2015 hybrid found a much lower cost of 610 Euros for a 1.1 kWh battery.4,5 [EPA-HQ-OAR-2022-0829-0585, p. 10]

4 FEV studies summarized in ICCT's comments to the NHTSA 2024-26 NPRM, Appendix A.2 pages 5-9. FEV, Inc., "2025 Passenger Car and Light Commercial Vehicle Powertrain Technology Analysis," Final Report, Project Number P33597, September 2015. https://theicct.org/sites/default/files/publications/PV-LCV-Powertrain- Tech-Analysis_FEV-ICCT_2015.pdf.

5 Page 2-48 of the DRIA states, "The BatPaC spreadsheet models used to develop the costs for BEVs, HEVs, and PHEVs are available in the Docket (US EPA 2023) and fully describe the BatPaC inputs that were used to generate the cloud of battery pack cost points that are visible in the plots." This is another example of the DRIA burying information in extreme detail and thereby making it inaccessible, thus we were not able to compare the PatPaC model inputs and results for hybrid batteries with the 2015 FEV teardown study.

Getting the HEV cost estimates right is important because they are an input to the OMEGA modeling, which is the source of the projection that HEVs will no longer be cost effective. [EPA-HQ-OAR-2022-0829-0585, p. 10]

Hybrid efficiency estimates in OMEGA are based upon outdated data. Worse, the agency's outdated estimates are assumed to continue through 2032 with no improvements. The bias here is obvious: innovation is assumed to improve BEVs from today through 2032; innovation is virtually ignored for hybrids, even though Toyota has already introduced revised, more powerful and more efficient, hybrid systems for 2023 and there are two more potential redesign cycles by 2032. [EPA-HQ-OAR-2022-0829-0585, p. 11]

Table 2-2 in the DRIA, page 2-18, states that the engine map for dedicated hybrid systems was calculated from a Toyota 2.5L TNGA prototype engine from the 2017 Vienna paper. This dedicated hybrid engine was first introduced in the 2015 Toyota Prius, although in a 1.8L engine. The use of the TNGA prototype engine is an improvement over the hybrid engine map used by NHTSA for the 2024-26 light-duty CAFÉ rule, which was based upon the 2010 Toyota Prius, but it still ignores that there will be three generations of hybrid improvements by 2032 (given the industry's typical schedule for redesigns). [EPA-HQ-OAR-2022-0829-0585, p. 11]

Efficiency improvements averaged about 10% for each previous generation of the Toyota Prius before 2015, in addition to large increases in engine and motor power for each generation.6 Toyota made even larger improvements to the 2015-2022 5th hybrid generation modeled by EPA, with CO2 emissions reduced by 19% on the Camry Hybrid LE relative to the previous generation, by 11% on the Camry Hybrid XLE/SE, and by 19% on the RAV4 Hybrid.7 [EPA-HQ-OAR-2022-0829-0585, p. 11]

6 German, J., Hybrid Vehicles Technology Development and Cost Reduction, ICCT Technical Brief No. 1, July 2015. https://theicct.org/sites/default/files/publications/ICCT_TechBriefNo1_Hybrids_July2015.pdf. Table 2 shows 36 mpg for 1st gen Prius (98-00), 41 mpg for 2nd gen (01-03), 46 for 3rd gen (04-10), and 50 for 4th gen (11-14), along with large increases in engine and motor power for each generation.

7 Summarized in ICCT's comments to NHTSA on the 2024-26 LD CAFÉ proposed rule. For additional information see Joint NGO 2020 Reconsideration Petition, pages 64-68.

Toyota has already brought out the first updated generation of hybrids beyond what was modelled for the proposed rule, starting with the 2023 Prius. The new Prius increased engine size from 1.8L to 2.0L, increased motor power from 71 to 111 hp, and increased combined power from 121 hp to 194 hp – a 60% increase. Acceleration from 0 to 60 as measured by Car and Driver dropped from 10.4 seconds to 7.1 seconds.8 Yet despite the bigger engine and huge performance gains, Toyota also managed to improve efficiency from 54/50/52 (city/highway/combined) for 2022 fwd Prius to 57/56/57 in 2023, or a 10% improvement.9 Part of this is due to improved aerodynamics, but even the city rating improved by 6%. This generational improvement in Prius efficiency is in line with previous efficiency improvements for each generation of the Prius but such innovation is not included in the agency's modeling. [EPA-HQ-OAR-2022-0829-0585, p. 11]

8 https://www.caranddriver.com/reviews/a42221299/2023-toyota-prius-by-the-numbers/.

9 Comparison from fueleconomy.gov calculation, retrieved at: https://www.fueleconomy.gov/feg/Find.do?action=sbs&id=44079&id=46359.

Despite this clear track record of steady HEV efficiency improvements, the proposed rule assumes no hybrid efficiency improvements from 2015 through 2032. From the baseline hybrid engine map for the 2015 Prius there has already been one complete redesign and there is time for two additional hybrid redesigns. The first redesign has already demonstrated major efficiency improvements that are not in the OMEGA model and historical trends show there is every reason to believe that large efficiency improvements will also be achieved in two more redesigns by 2032. The failure of OMEGA to update hybrid efficiency maps after the 2015 Prius means that hybrid efficiency projections in OMEGA will be massively outdated by 2032. [EPA-HQ-OAR-2022-0829-0585, pp. 11-12]

Getting the HEV's efficiency estimates right is important because fuel efficiency is the effectiveness metric in the OMEGA modeling. Incorrect inputs about HEV efficiency help explain why the OMEGA modeling shows BEVs to be more cost effective than HEVs. [EPA-HQ-OAR-2022-0829-0585, pp. 11-12]

Since batteries account for a larger share of BEV costs than non-battery costs, batteries are usually given the most attention by cost analysts. The non-battery components include electric motors, e-axles, inverters, and battery management systems. EPA makes non-battery components even less important by assuming their costs will decline (cumulatively) by 29% in 2030, 45% in 2035, and 54% in 2050. [EPA-HQ-OAR-2022-0829-0585, p. 18]

This assumption is not consistent with recent market trends. The average price of an electric motor for BEVs rose 26% in 2021 and rose slightly again in 2022. The prices of e-axles, inverters, and battery management systems have also been increasing significantly.22 [EPA-HQ-OAR-2022-0829-0585, p. 18]

22 John Irwin. Price Points: As EV Component Costs Rise, Stalling Push for Parity. Automotive News. November 7, 2022, 10-11.

One of the factors boosting the prices of electric motors is the need for a higher grade of thin electrical steel, which has a significant price premium. The ultra-thin sheets of steel transfer electricity into mechanical power. A temporary global shortage of electrical steel exists now but a more severe shortage is forecasted for 2027 to 2030, as most of the production capacity is in Asia, the US has little production capacity, and investments in new capacity are not keeping pace with demand growth.23 [EPA-HQ-OAR-2022-0829-0585, p. 18]

23 Daniel Sims. Electrical Steel Supply and Demand Could Impact EV Prices Later this Decade. Techspot.com. March 28, 2023.

For many years it was also thought that the expensive rare earths (neodymium and dysprosium) used in magnets for electric motors could be avoided through new designs of the electric motor. Those two rare earths account for up to 50-55% of the raw material costs in electric motors. However, induction motors, which have no need for rare earth magnets, are harder to cool at sustained high temperatures and are inherently less efficient at low speeds than permanent magnet synchronous motors. Tesla and BMW recently moved away from induction motors to permanent magnet synchronous motors. Given current trends in the industry, it seems unlikely that major savings in the material costs of electric motors will occur prior to 2035.24 [EPA-HQ-OAR-2022-0829-0585, pp. 18-19]

24 National Research Council. Assessment of Technologies for Improving Light-Duty Vehicle Fleet Fuel Economy, 2025-2035. National Academy Press. Washington, DC. 2021, 83. James Bonnett. The Quest to

Cut the Cost of Electric-Vehicle Motors by Adopting New Material Solutions. Victrix.com. August 28, 2018.

For the final rule, we recommend that, in the base case, EPA moderate the learning factors for non-battery components. In the high BEV cost sensitivity case, we recommend that the non-battery costs be held constant at their 2022 levels through 2032. [EPA-HQ-OAR-2022-0829-0585, pp. 18-19]

In summary, the application of learning factors in the NPRM's cost assessment is biased in favor of BEVs and against hybrids. For the cost comparison of BEVs with hybrid technologies, it is crucial that the agency make sure that the learning factors that apply to batteries and electric motors also apply to those components in hybrids. Any differences in the learning factors between BEVs and hybrids should be itemized and defended explicitly. EPA's current approach to learning factors for hybrids (lumping them with ICEs) is obviously not defensible. [EPA-HQ-OAR-2022-0829-0585, pp. 18-19]

FEV conducted a tear down comparison of ICE and BEV cost for EPA. FEV's draft report in the docket suggests that the heavier weight of the BEV incurs substantial additional costs.25 Suspension costs, including wheels and tires, were $320 higher on the BEV, brake costs $242 higher, steering costs $22 higher, and frame and mounting costs $320 higher, for a total of $895. FEV comments on slides 35-36 suggest that most of these cost increases is due to the higher weight of the BEV. Other parts of the report may also include component costs affected by the higher BEV weight (e.g. instrument panel cross beam on slide 47; possibly body structure and closures on slide 59). [EPA-HQ-OAR-2022-0829-0585, p. 19]

25 Cost and Technology Evaluation, Conventional Powertrain Vehicle Compared to an Electrified Powertrain Vehicle, Same Vehicle Class and OEM. EPA-HQ-OAR-2022-0829-0422, posted to the docket on April 20, 2023. https://www.regulations.gov/search?filter=EPA-HQ-OAR-2022-0829-0422.

Costs associated with the heavier weight of the BEV (due to the battery weight) have previously been ignored. This should be corrected for the final rule. [EPA-HQ-OAR-2022-0829-0585, p. 19]

Organization: POET, LLC

EPA also makes unfounded assumptions regarding the costs of non-battery BEV components.93 EPA assumes that the cost of non-battery components will drop by 42% from 2022 to 2032 and by another 12% between 2032 and 2055. EPA does little to explain those cost reductions, particularly, when BEVs are currently being produced and substantial work has already been performed in optimizing non-battery components.94 [EPA-HQ-OAR-2022-0829-0609, pp. 22-23]

93 Id. at 6-7.

94 See id. at 7.

Although the cost of batteries is the most significant element leading to differences in the cost of BEVs, there are sources of cost some of which U.S. EPA accounts for in the agency's assessment. However, just as with the cost of batteries, U.S. EPA again makes extremely optimistic assumptions regarding how the cost of non-battery BEV components will change over time. These assumptions are presented in Table 2-26 of the DRIA. As shown, U.S. EPA assumes that the cost of non-battery BEV components will drop by 42% from 2022 to 2032 but only by another 12% over the remaining period from 2032 through 2055. These cost reductions are claimed despite the that fact that substantial learning related to the production of BEV componentry has already occurred in the light-duty vehicle sector as evidenced by the current mass production of BEVs and further learning curve benefits would therefore be expected to be much smaller than those assumed by U.S. EPA. It should also be noted that in addition to failing to properly account for the time required for BEV development and component integration for platforms that are replacing existing conventional platforms, U.S. EPA also fails to account for the associated costs. [EPA-HQ-OAR-2022-0829-0609, pp. 58-59]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

We applaud EPA for commissioning a tear down analysis of BEV costs and request that a similar tear-down analysis be done for a Strong PHEV. Most importantly, In any cost analysis, scenario or tear-down study for PHEVs, special PHEV batteries should not be used, but rather medium and long-range PHEVs should use less expensive BEV batteries and the benefits of PHEVs not needing as strong of chassis as BEVs should be included in the cost. These are the two largest cost savings with mid- to long-range PHEVs compared to BEVs. [EPA-HQ-OAR-2022-0829-0646, p. 8]

Finally, we agree with EPA that BEVs with large battery backs will need stronger chassis which adds costs but note that PHEVs do not need this to the same degree. Thus, EPA's cost analysis for PHEVs should reflect this. [EPA-HQ-OAR-2022-0829-0646, pp. 21-22]

EPA Summary and Response

EPA acknowledges and appreciates all of the comments relating to modeling of non-battery costs in the compliance analysis. Comments in this area related to a number of topics, including: the costs assumed for HEVs and other technologies, the learning rate applied to those costs, and the importance of using teardown data and the latest available data.

In response to comments that EPA should use the most recent data available to estimate non-battery powertrain costs, EPA agrees, and notes that our updated analysis uses updated powertrain costs derived from work performed by FEV that we described in the proposal. Specifically, regarding our use of the updated FEV non-battery costs, which we noted in the proposal, some commenters agreed with using these costs ("Environmental and Public Health Organizations"), while others (AZ State Legislature) objected to our use of these costs, not based on disagreement with the costs themselves but on the grounds that the report was not final at the time of the proposal. EPA disagrees with the latter view, as the proposal clearly described the nature of the FEV work, and our use of the further developed and updated costs is consistent with our longstanding practice of considering relevant data to inform the final rule. Further, a draft of the FEV work was provided in the docket at the time of the proposal and provides a strong indication of the scope of the work and the costs that were emerging from the work at the time, which are similar in scope and magnitude to the costs that were ultimately delivered.

In response to comments that our HEV cost inputs to OMEGA were not accurate and specifically that they were higher than they should be, EPA notes that the HEV costs and non-battery costs used in the updated analysis are based on evidence provided by the FEV work and

EPA believes that they represent the best available data. Even if EPA's estimated costs are too high as commenter suggests, it would not preclude HEVs from entering the market but only affect the analysis' projection of HEVs in the future fleet. Indeed, such an occurrence would lend further support to the feasibility of the standards and the availability of a range of technological pathways for manufacturers to choose for compliance. The presence or absence of relative penetration of any technology as projected in the compliance analysis is in no way binding on the industry and does not dictate what automakers will ultimately choose to use to comply with the standards, as automakers will make these decisions using their own assessment of the relative costs and effectiveness of these technologies according, in part, to the market circumstances they observe at the time. If in future years the commenter happens to be correct that HEV costs will be lower than represented in the compliance analysis, the result would likely be higher penetration of HEVs and likely lower demand for critical minerals and lower compliance costs, compared to EPA's projections, implying that our current analysis is conservative. Commenter has not suggested that this set of events would result in an inability to comply with the standards, but only that a different collection of technologies would be employed to do so. The possibility that manufacturers may ultimately choose to comply with a different set of technologies than were suggested by the compliance analysis at the time of initial rulemaking is well within the scope of expectations regarding any such analysis; in fact, in complying with past rules, manufacturers have often chosen a different set of technologies than we projected in the corresponding compliance analysis. For example, compliance with the 2012 rule was achieved with less penetration of 48-volt mild hybrid systems and dual-clutch transmissions than we had projected.

Regarding comments that a cost term should be included to represent higher chassis cost of BEVs due to higher vehicle weight, EPA did not itemize this cost due to the lack of sufficient data points that would support its characterization as a function of battery mass, and commenter did not provide such data. The FEV teardown provided data for only one BEV, and was unable to characterize how the added cost might be different for vehicles of different configurations or different size battery. We note also that this data informed our decision not to apply an overall cost reduction to a BEV chassis to represent a commonly cited expectation among analysts that a fully optimized, purpose-built BEV platform can realize significant reductions in material cost and assembly cost due to a simpler design with fewer parts.[452,453] Given the possibility of battery weight increasing chassis cost or other factors reducing it, as well as the lack of available data to characterize these effects, EPA found it reasonable to not quantitatively model them. We also note that other aspects of the analysis, in particular our updated battery costs, are likely to be conservative, particularly in light of recent lower forecasts for future mineral costs than were used in deriving the updated battery costs. EPA also considered sensitivities for battery costs. As such, even were battery weight to somewhat increase chassis cost, EPA finds that our analysis would be reasonable. Commenter suggests that not including the added cost places other technologies, such as HEVs, at a disadvantage to being selected as part of the cost minimizing central case compliance path projection. EPA notes, however, that the presence of HEVs or any other technology in the compliance path only represents a projection of what might occur and does not preclude these technologies from having an accordingly higher representation in real

[452] McKinsey & Company, "Making electric vehicles profitable," March 8, 2019. Accessed on March 3, 2024 at https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/making-electric-vehicles-profitable
[453] UBS, "UBS Evidence Lab Electric Car Teardown – Disruption Ahead?," Q-Series report, May 18, 2017.

life if the future costs and other factors vary from the projections in the analysis and make these technologies more attractive to manufacturers as part of their chosen technology mix and compliance strategy.

Regarding comments that EPA assumed cost reduction rates that are too high, EPA notes that applying a learning cost reduction factor to estimate future costs of components is standard practice in the industry and that these learning rates typically flatten out in future years compared to earlier years,[454] as is true of the curve that was used in the analysis. Commenter simultaneously suggests that EPA is "failing to properly account for the time required for BEV development," which suggests that significant development effort is occurring and remains to occur in BEV development, which tends to contradict commenter's earlier statement in support of flattening the learning rates, i.e. that "substantial learning related to the production of BEV componentry has already occurred." Commenter has not provided evidence that would refute the learning rates that EPA used nor has provided alternative rates that are supported by specific evidence relating to the degree of progress that has already occurred or remains to occur.

Regarding comments on performing a teardown of a strong PHEV, EPA notes that this was not within the scope of the FEV teardown study. Further, EPA is unaware of any pair of candidate vehicles that would have been available at the time of the study in both an ICE vehicle and a PHEV version and which also could support the goals of the study. EPA has assessed PHEV non-battery costs using a scaling of the costs provided by FEV in its work supporting the analysis and has no reason to believe that a specific teardown of a PHEV as opposed to the vehicles in the FEV studies would lead to significantly different results.

Regarding comments concerning a potential for increased cost of electrical steel to prevent learning cost reductions in electric machines, EPA notes that the Techspot article[455] cited by commenter is based on a Wall Street Journal article[456] which provides a broader view, emphasizing U.S. investment to increase capacity, choosing as lede for the article the statement that "large U.S. steelmakers are ramping up production […] to capture a fast-growing market." The article also does not describe anticipated supply deficit as a "shortage," only as a gap between projected demand and projected supply, which EPA has already described in other responses as not being proof that an actual shortage will occur, and acting as a signal that motivates investment in new supply. When discussing the global gap, the article also qualifies it with the statement "unless more production capacity for high-grade electrical steel is added," without further suggesting specific barriers that would prevent one from reasonably expecting this increased global capacity to be built. In fact, the article places emphasis on examples of U.S. manufacturers that are making large investments to capture a share of this market. Where the article mentions creating more capacity "will likely take years," this observation is in the context of domestic capacity only (where the steel industry as a whole is relatively inexperienced in its

[454] Environmental Protection Agency, "Cost Reduction through Learning in Manufacturing Industries and in the Manufacture of Mobile Sources," Final Report and Peer Review Report, EPA-420-R-16-018, November 2016.
[455] Sims, D., "Electrical steel supply and demand could impact EV prices later this decade," Techspot.com, March 28, 2023. Accessed on March 3, 2024 at https://www.techspot.com/news/98117-electrical-steel-supply-demand-could-impact-ev-prices.html
[456] Tita, B., "The Paper-Thin Steel Needed to Power Electric Cars Is in Short Supply," Wall Street Journal, March 27, 2023. Accessed on March 3, 2024 at https://www.wsj.com/articles/the-paper-thin-steel-needed-to-power-electric-cars-is-in-short-supply-dbd2a78e

production), and does not go on to suggest that capacity at established global manufacturers would require a similarly long lead time.

EPA also notes an article by S&P Global that provides more context.[457] According to that article, in ICE vehicles "35 to 45 low-power motors are fitted on average per car, with about 20 in the B segment and 80 in the E segment (with some extremes like the Mercedes S-class that has more than 100 motors)." While the article does not quantify the amount of electrical steel these motors need, it does suggest that exposure to increased cost of electrical steel is not unique to PEVs but only resides in a relative increase of the amount needed. S&P also describes the gap more precisely as a "structural imbalance between capacity and […] demand" that "will require significant capital investment in the coming years." Nor does S&P conclude that the gap indicates a shortage will take place, discussing the concept of a shortage with the qualification "without further major investments," and discussing the potential for an impact on OEM electrification plans with the qualification, "if this is not addressed by adding more capacity and investment in new capacity." Nor does S&P indicate any reason to believe that such investments will not occur. According to the Wall Street Journal article, such investment is already occuring in the U.S.; neither article provides reason to believe that similar activity is not or will not be taking place elsewhere in the world to capture the same market gap. In any case, commenters have only alluded to the potential for increased steel cost to impact overall PEV cost and have not described what they think the effect will be. EPA notes that compared to battery cost, electric machine cost is a relatively small portion of PEV manufacturing cost, and the cost of electrical steel only a portion of that, and would likely lie well within the range of the high battery cost sensitivity. No reasonable estimate of a sustained elevation in electrical steel cost would affect PEV cost so dramatically that it would change our conclusion regarding ability to comply with the standards. EPA also notes that our responses under RTC Section 15 relating to investment in critical minerals production and development of the supply chain would also apply to comments relating to the need for increased production capacity for other inputs to PEV production, including electrical steel production.

Regarding one commenter's assertion that the "average price of an electric motor for BEVs rose 26 percent in 2021 and rose slightly again in 2022," the timing and scale of these increases suggests that COVID-19 pandemic supply chain disruptions are likely to have had an influence. Commenter suggests but does not show that this increase indicates similar increases in the future. In fact, the cited Automotive News article[458] indicates that it was "the COVID-19 pandemic, inflation and the war in Ukraine" that led to this increase, and does not suggest that it is evidence of a long term trend. The Automotive News article attributes the 26 percent statistic to Interact Analysis,[459] which in that reference (dated 2022) forecasts an even higher increase of 67 percent in 2022, which incidentally was not borne out by the "slight" 2022 increase indicated by commenter. Interact Analysis also states, "the much higher numbers are mainly because the average power of each motor has been increasing due to the production of more powerful

[457] S&P Global Mobility, "Electrical steel – Another temporary supply chain shortage or a threat to OEMs' electrification plans?," December 14, 2021. Accessed on March 3, 2024 at https://www.spglobal.com/mobility/en/research-analysis/electrical-steel-another-temporary-supply-chain-shortage.html

[458] Irwin, J., "EV Component Costs Rise, Stalling Push for Parity," Automotive News, November 4, 2022.

[459] Fox, J., "Which EV Component Increased Price the Most in 2022?," Interact Analysis, October 2022. Accessed on March 3, 2024 at https://interactanalysis.com/insight/which-ev-component-increased-price-the-most-in-2022/

vehicles and because in 2022 more larger vehicles are electrifying whereas it was mostly smaller commercial vehicles in 2020." In fact, the cited Automotive News article points out that "many of today's EV models have been 'over-engineered' by established automakers." This suggests that increases in cost of motors over time, if they occur, could be addressed by OEMs with design optimization, for example, adjusting vehicle power specifications or reducing the number of motors in models that have multiple motors.

Regarding comments on the use of BEV batteries for PHEVs, see RTC 12.2.1, Battery costs.

12.2.4 - Inclusion of PHEVs

Comments by Organizations

Organization: Alliance for Automotive Innovation

Its assessment is also limited to only battery electric vehicles, ignoring PHEVs as both a technology option and their impact on EV supply chains. [EPA-HQ-OAR-2022-0829-0701, p. 33]

7. Modeling of Plug-In Hybrid Electric Vehicles

In the Proposed Rule, EPA acknowledges that plug-in hybrid electric vehicles "can provide significant reductions in GHG emissions and that some vehicle manufacturers may choose to utilize this technology as part of their technology offering portfolio" and, in particular, that a "PHEV pickup architecture would provide several benefits."210 This is consistent with EPA's analysis in the MY 2023-2026 GHG emissions standards rulemaking, in which the Agency noted that "our updated analysis projects that about 17% of vehicles meeting the MY 2026 final standards will be BEVs or PHEVs," and projected that "BEVs and PHEVs can play a significant role in complying with the final standards."211 [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

210 NPRM at 29298; see also Drati Regulatory Impact Analysis at 2-75 (same).

211 Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74493-94 (Dec. 30, 2021) (emphasis added).

Despite recognizing the importance of PHEVs in meeting GHG emissions standards, EPA has not attempted to model any PHEVs as part of manufacturers' compliance pathways to meet the proposed standards or alternatives under consideration. Auto Innovators believes that this omission of technology that will indisputably be an important part of the transition to a net-zero carbon transportation future is a significant oversight that should be rectified in the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

A number of manufacturers are already building PHEVs or have announced plans to do so. S&P Global Mobility estimates a 5% U.S. market share for PHEVs in 2030.212 Auto Innovators' commitment to reaching 40-50% EV sales by 2030 was inclusive of PHEVs. Likewise, President Biden's Executive Order 14037 Specifically set "a goal that 50% of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles." (Emphasis added.)213 [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

212 S&P Global Mobility, U.S. light vehicle sales forecast by propulsion system design, January 2023.

213 E.O. 14037 of Aug 5, 2021.

EPA asks for comments on whether PHEVs should be modeled and what type of PHEV technology should be incorporated. Auto Innovators believes EPA should include PHEVs in their modeling and it would be appropriate to model both the typical strong PHEVs (accounting for stronger electrification needed to meet US06 high power cold starts), as well as the range-extending type that EPA is modelling at SwRI. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Moreover, assuming EPA includes PHEVs in the final rule, it should not use PHEV technology as a justification to further increase greenhouse gas stringency. Rather, EPA should treat PHEVs in the context that manufacturers consider them – as a component of EV technology, not as a means to further improve ICE vehicle emissions in addition to rapidly increasing BEV model availability and production. PHEVs offer unique utility, and because some consumers are not ready for a BEV, we do not believe the inclusion of PHEVs should increase the combined ZEV share that EPA has modeled as BEVs in the Proposed Rule. Rather, a PHEV is a preferred EV to a BEV for some vehicle buyers and should be considered as a substitute for a BEV. Additionally, the California ZEV mandate allows for PHEVs, meeting certain criteria, to meet requirements, and treats them as it treats BEVs. At a minimum, EPA could borrow CARB's assumptions regarding PHEV sales and characteristics and apply them for states that follow California's rules only. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

PHEVs are well suited to some applications, especially for more capable SUVs and pickup trucks. Specifically, EPA has modeled 60% BEV light-duty pickup trucks in the Proposed Rule, see Figure 34 below. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Figure 34: EPA Omega model output – Pickup BEV share percentage214 [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

214 OMEGA output abs_share_frac_pickup_BEV divided by abs_share_frac_pickup significant effort to model battery capacity constraints, but it is only a model, which carries uncertainty.

In addition to consumer demand (for utility or as a bridge to full electrification), another reason that EPA should include PHEVs in their modeling is the potential for PHEVs to provide clean electric miles while reducing the amount of battery material needed. EPA has devoted significant effort to model battery capacity constraints, but it is only a model, which carries uncertainty.. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Further, PHEVs can be very useful to sustain the transition to electrification in the case of unforeseen disruptions in the development of battery manufacturing capacity due to constraints in mineral availability, processing, or other supply chain challenges. Using MY 2023 EPA Fuel Economy Guide data, a 300-mile BEV requires a battery of approximately 109kW-hr on average. Accounting for energy efficiency differences, the same battery material could be used to make between four and six PHEVs with 50 miles of all-electric range. Fifty miles exceeds what most Americans drive on most days, enabling significant all-electric driving. Due to battery supply chain concerns, EPA should include PHEVs in their modeling as a substitute for some BEVs so that PHEVs comprise at least 20% of the combined BEV plus PHEV share consistent with California and other ZEV states. [EPA-HQ-OAR-2022-0829-0701, pp. 115-117]

Organization: Betsy Cooper

Together, we write to propose that the EPA reconsider its approach to PHEVs in its recent draft regulations, particularly to incentivize car manufacturers to develop longer range PHEVs. In particular, we recommend you give full off-cycle credits to manufacturers who develop PHEVs with a range of 50 or more miles. EPA's current plan will disincentivize all PHEVs, ignoring the real market benefits to keeping long-range versions of these cars in the market. Intentional or not, the effects of the EPA's current policy will be to push vehicle manufacturers further towards full EVs—before the charging infrastructure is ready to support them. In the meantime, consumers not ready to adopt full EVs – including for the same reasons we are not yet able to do so – will continue to buy gas cars instead. [EPA-HQ-OAR-2022-0829-0654, pp. 1-4]

With more long-range PHEVs on the market, more Americans will be able to drive their full commute on electricity and charge overnight at home (with reduced demand on the grid relatively to fast-charging of full EVs). Moreover, as longer range PHEV cars grow more popular, there will be greater incentives for individuals and communities to invest in improving charging infrastructure, thus reducing the friction facing current consumers. [EPA-HQ-OAR-2022-0829-0654, pp. 1-4]

PHEVs Fill An Important Market Need That Would Otherwise Be Filled By Gas Vehicles

PHEVs remain an important player in the electric vehicle market. PHEVs are excellent introductory electric cars, allowing cautious consumers to try electric driving without fully committing to weaning from gas. Many consumers are not yet ready to fully invest in electric vehicles for valid reasons including range anxiety and a lack of charging capacity in many communities. After driving a PHEV, many will purchase a fully electric car for their next car [Link: https://www.washingtonpost.com/climate-solutions/2023/05/04/plug-in-hybrids-gateway-evs/]—we count ourselves in that category. Without a PHEV option available to them, these consumers will instead purchase all-gas cars—putting more polluting vehicles on the road, not fewer. [EPA-HQ-OAR-2022-0829-0654, p. 2]

PHEVs fill an important gap, providing a transition vehicle that allow consumers to experience the benefits of all-electric driving without some of the risks: [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- First, a gas backup can reduce range anxiety, especially in uncertain terrain or cold temperatures. While our family also owns a pure EV, we are not yet ready to commit to being a fully electric household. Not least, our PHEV is our vehicle of choice for any road trip in the snow or mountains, as we do not want to test our full range in a precarious, unpredictable location. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Second, PHEVs are more family friendly than EVs; as parents (like us) of small children will tell you, charging on a road trip is one thing. Charging on the road with an unhappy toddler – or heaven forbid, one who only sleeps when the car is moving – is quite another. Having the option to keep driving on gas once the electric range runs out is a blessing. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Third, and relatedly, this is particularly true because charging infrastructure has not yet caught up with EV demand. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Rural and disadvantaged communities disproportionately lack access to public charging infrastructure [Link: https://www.marketplace.org/shows/marketplace-tech/rural-communities-are-slow-to-adopt-evs-but-a-national-charging-network-depends-on-them/]. So long as charging infrastructure is not as ubiquitous as gas stations are, gas backups remain an important option for long haul driving. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

- Moreover, even in areas with well-developed charging infrastructure, such as in California where we live, it can be very difficult to find an available and working charger in a convenient location. Betsy’s current commute has only two chargers within a mile, and both are broken. Aaron’s work sponsors chargers, but even then demand is so high that employees require a complex interoffice notification system to ensure everyone gets a charge by the end of the day. [EPA-HQ-OAR-2022-0829-0654, pp. 2-3]

Short-Range PHEVs Do Not Achieve EPA’s Greenhouse Gas Emissions Goals

While PHEVs fill an important market need, manufacturers’ move to short range PHEVs (those with less than 40 miles of range) has reduced these benefits significantly. Small electric batteries do less to reduce range anxiety. Shorter ranges require more frequent charging, and make it more likely that drivers will need to charge in inconvenient locations away from home. And these annoyances may make it more likely that new PHEVs will rely on gas. [EPA-HQ-OAR-2022-0829-0654, p. 3]

EPA may rightfully wish to disincentivize the use of gas cars for any reason. But doing so by disincentivizing all PHEVs, as the current regulation proposes, is a mistake. The fundamental problem here is not with PHEVs; it is with the small electric range on offer in those vehicles. Longer range PHEVs with smaller gas tanks will reduce reliance on gas, helping to get the first-time electric vehicle consumer more comfortable relying on electric power for their daily needs. [EPA-HQ-OAR-2022-0829-0654, p. 3]

Moreover, by encouraging long-range PHEVs, the EPA may even be able to reduce greenhouse gas emissions more than by supporting traditional EVs alone, at least in our current environment where EV battery materials and manufacturing capacity remain constrained. [Link: https://finance.yahoo.com/news/ford-ceo-on-ev-transition-batteries-are-the-constraint-190948815.html] [EPA-HQ-OAR-2022-0829-0654, p. 3]

- To overcome range anxiety in a pure EV, manufacturers have been adding larger and larger batteries (>##95 kilowatt-hours in some cases [Link: https://ev-database.org/cheatsheet/useable-battery-capacity-electric-car]). Yet given that consumers drive on average 37 miles a day, such a large battery will never be used most of the time. With current battery supply and manufacturing constraints, this is an inefficient use of resources. [EPA-HQ-OAR-2022-0829-0654, p. 3]

- This same 95 kilowatt-hour of batteries could make 5 separate PHEVs with a battery the size of our 53-mile range Chevy Volt. Five vehicles would have electric power and replace gas cars instead of one. [EPA-HQ-OAR-2022-0829-0654, p. 3]

- Moreover, given less embodied emissions in each car from the creation of the battery, these cars each could have lower lifecycle emissions as well (provided sufficient availability of charging). [EPA-HQ-OAR-2022-0829-0654, p. 3]

EPA Should Use Its Regulatory Authority To Incentivize Long-Range PHEVs

The EPA thus should use its regulatory process to encourage PHEV manufacturers to return long-train PHEVs to the market: by providing full off-cycle credits to those who give 50 or more miles of electric range. EPA's current plan will disincentivize all PHEVs, ignoring the real market benefits to keeping long-range versions of these cars in the market. Intentional or not, the effects of the EPA's current policy will be to push vehicle manufacturers further towards full EVs—before the charging infrastructure is ready to support them. In the meantime, consumers not ready to adopt full EVs – including for the same reasons we are not yet able to do so – will continue to buy gas cars instead. [EPA-HQ-OAR-2022-0829-0654, pp. 3-4]

With more long-range PHEVs on the market, more Americans will be able to drive their full commute on electricity and charge overnight at home (with reduced demand on the grid relatively to fast-charging of full EVs). Moreover, as longer range PHEV cars grow more popular, there will be greater incentives for individuals and communities to invest in improving charging infrastructure, thus reducing the friction facing current consumers. [EPA-HQ-OAR-2022-0829-0654, pp. 3-4]

By encouraging both EVs and long-range PHEVs, the EPA will encourage manufacturers to offer more long-range PHEV models, and to make more of them. As demand for the 42-mile RAV4 PHEV shows, consumers crave these long-range PHEV options. There just aren't currently any affordable and available ones to choose from. [EPA-HQ-OAR-2022-0829-0654, pp. 3-4]

We propose a 50+ mile PHEV range requirement for full off-cycle credit. There is already momentum in favor of this standard; California is planning to require 50+ mile range PHEVs by 2035 [Link: https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035]. Moreover, even with battery degradation, a PHEV rated for 50+ miles at the point of sale will still cover the average American commute many years later. [EPA-HQ-OAR-2022-0829-0654, p. 4]

The EPA may respond that its scaled utility factor already takes into account miles of range in its calculation. Even if true, by penalizing all PHEVs across the board, the EPA is incentivizing manufacturers to make fewer plug-in hybrid vehicles, period. Especially until charging infrastructure resembles the gas station infrastructure of today, long-range PHEV cars remain an important consumer option. By rewarding manufacturers for making PHEVs with a 50+ mile range, EPA will help bring an important class of climate-friendly vehicles back to market. [EPA-HQ-OAR-2022-0829-0654, p. 4]@

Organization: Environmental. and Public Health Organizations

B. EPA should include PHEVs in its modeling.

While EPA did not include any PHEVs in its modeling for the Proposal, we urge it to do so for the final rule. Modeling PHEVs will both account for manufacturers' plans and help demonstrate the technical and economic feasibility of strong final standards. Although BEVs are likely to continue to be the most common electric vehicle, PHEVs are part of some automakers' stated plans for achieving emissions reductions. PHEVs are currently more commonly used as a powertrain option for larger and less efficient vehicle models, and that trend is likely to continue with future models. Therefore, EPA should include PHEVs as a powertrain option in the final rule, but should focus on pickup trucks and SUVs as the most likely candidates to offer a PHEV variant. [EPA-HQ-OAR-2022-0829-0759, p. 48]

When modeling PHEVs, EPA should examine vehicle parameters that span a range of battery capacities. In particular, EPA should examine vehicles with battery capacity that meets the minimum capacity (7 kWh) requirements for the IRA § 30D credit. PHEVs that are eligible for the full amount of that credit ($7,500) and have the required minimum capacity battery pack are likely to have a lower net cost than conventional vehicles with similar compliance CO2 value. [EPA-HQ-OAR-2022-0829-0759, p. 48]

When considering costs for PHEVs, EPA should assume L1 charging infrastructure for these vehicles with 50-mile or lower electric-only range. The traction battery capacity for these vehicles will likely be in the range of 7-25 kWh, and therefore they can be fully recharged in 4-13 hours using a L1 EVSE connected to a 20-amp, 120V circuit. [EPA-HQ-OAR-2022-0829-0759, p. 49]

Organization: International Council on Clean Transportation (ICCT)

Incorporating PHEVs in the proposal analysis

EPA did not include PHEVs in its OMEGA modeling for this proposal; ICCT recommends EPA include PHEVs in its updated modeling for the final rule, if possible. Since PHEVs are eligible to be used for compliance with the standards, incorporating them into the modeling would more accurately project compliance pathways. If PHEVs are cost effective in some years and segments, including them as an option in the modeling would more accurately reflect the lower compliance costs that could be achieved by PHEVs in those uses compared to modeling that excludes them. [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

For reference, ICCT previously analyzed the costs of light-duty150 and medium-duty PHEVs.151 For light-duty vehicles, ICCT projected PHEVs to have higher prices and 6-year ownership costs than 300-mile BEVs of all body styles before MY2027. Light-duty PHEVs are also expected to remain costlier than non-plugin vehicles for the foreseeable future. [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

150 Slowik. P., Isenstadt, A., Pierce, L, Searle, S. (2022). Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame. International Council on Clean Transportation. https://theicct.org/publication/ev-cost-benefits-2035-oct22/

151 Mulholland, E. (2022). Cost of electric commercial vans and pickup trucks in the United States through 2040. ICCT. International Council on Clean Transportation. https://theicct.org/publication/cost-ev-vans-pickups-us-2040- jan22/

For medium-duty pickups, ICCT projected gasoline PHEVs to reach purchase price parity with 300-mile range BEV pickups around MY2027, but likely to remain costlier than both diesel and gasoline non-plugin pickups. Diesel PHEVs are not expected to reach price parity with either BEVs or non-plugin pickups. For medium-duty vans, gasoline PHEVs are expected to reach price parity with diesel non-plugin vehicles by MY2032, but 300-mi and 150-mile range BEVs are expected to cost less than PHEV vans throughout MY2027-2032. When it comes to 5-year total cost of ownership, medium-duty gasoline PHEV pickups and vans are expected to cost less than diesel non-plugin vehicles before MY2027 (diesel PHEVs are still expected to cost more throughout the timeframe of the proposed rule). [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

As discussed in the combustion vehicle technology section previously, developments in dedicated hybrid engines suitable for (primarily gasoline) serial/range-extended PHEV applications may simultaneously improve the efficiency of the engine while also reducing its cost. Thus, EPA may consider modeling PHEVs in the largest light-duty segments, as well as both medium-duty pickups and vans. Doing so could lead to reduced overall compliance costs as compared to those currently modeled in the proposal. [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

ALPHA validations of P2 and PS hybrids were based on PHEVs (DRIA Table 2-6). With PHEV- specific data, response surface equations (RSEs) for PHEVs could be developed and incorporated into OMEGA. Absent full simulation and RSEs for PHEVs, EPA can approximate PHEVs by combining BEV RSE with P2 or PS RSEs (utilizing UF for electric/ICE split). Such a combination would need to be validated against the existing PHEV test data. [EPA-HQ-OAR-2022-0829-0569, pp. 58-60]

Organization: Mazda North American Operations

Mazda strongly requests that EPA take these considerations into account and make necessary adjustments to the proposed rule as it works towards a Final Rule. We feel the Final Rule should have more realistic targets and associated ramp ups, include PHEVs, and adopt CARB's current LEV IV for criteria emissions. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Organization: Minnesota Corn Growers Association (MCGA)

Toyota6 and others7 have argued for a balanced approach to emissions reductions using BEVs and other technologies, saying “perfect should not be the enemy of the good”. The battery size8 for a BEV is about 6 times larger than a PHEV (~75-145kWh vs. ~12-18kWh), and about 60 times larger than a HEV (~1.3-1.9kWh). Given the limited supply of battery materials, a large number of HEVs and PHEVs can clearly achieve substantially better GHG reductions than a small number of BEVs. [EPA-HQ-OAR-2022-0829-0612, pp. 5-6]

6 Gill Pratt, Toyota Motor Corporation’s Chief Scientist, open letter posted on Medium, August 2021; https://medium.com/toyotaresearch/more-straight- talk-about-toyotas-electric-vehicle-strategy-f0aba4be40.

7 Foster, Koszewnik, Wade, and Winer, "Pathways to More Rapidly Reduce Transportation's Climate Change Impact." Issues in Science and Technology, November 17, 2022; https://issues.org/reduce-vehicle-transportation-emissions-foster-koszewnik-wade-winer/.

8 https://insideevs.com/reviews/344001/compare-evs/.

The proposed rulemaking assumes that BEVs will be the dominant technology for future emissions reductions. But relying on a single technology is a risky strategy; many factors could interfere including the supply and/or cost of critical minerals, lack of BEV recharging infrastructure, slow ramp-up of wind and solar power, poor customer acceptance of BEVs in some market segments, etc. EPA estimates that 67% of U.S. vehicles sales will be BEVs in 2032, but most major automakers predict much lower BEV sales, and the world’s largest automaker predicts only 20% in 2030. For comparison, MIT predicts9 that China will achieve only 40% in 2030 despite a head start and extremely strong government interventions. EPA should not base mandatory emissions standards on unrealistic predictions of BEV sales. [EPA-HQ-OAR-2022-0829-0612, pp. 5-6]

9 https://news.mit.edu/2021/chinas-transition-electric-vehicles-0429.

Organization: Mitsubishi Motors North America, Inc. (MMNA)

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators:

2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping- stone to full BEV acceptance. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Treatment of Plug-in Hybrid Electric Vehicles (PHEVs)

PHEVs offer many benefits and should be an integral part in implementing the proposed Multi-Pollutant Emissions Rule. PHEVs provide environmental benefits and are a viable alternative for vehicle buyers not yet ready or able to own or lease a BEV. PHEVs are a steppingstone to BEV acceptance, teaching consumers the benefits of BEV ownership without the drawbacks – range anxiety, charge anxiety, etc. PHEVs directly address better overall fuel economy, and reduced GHG emissions compared to comparable gasoline-only models, while offering similar utility, comfort, and convenience. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

Additionally, PHEVs aid the transition from pure internal-combustion engines to full vehicle electrification, especially during any period when limited battery critical minerals production capacity would not be sufficient to meet the volumes necessary to supply the number of BEVs assumed in EPA's proposal. PHEVs have smaller battery packs that enable clean, electric-only – and, in our case, significant –driving, thereby using less critical minerals than comparable BEVs with bigger battery packs. The All-Electric Range (AER) of today's PHEVs already exceed the average daily commute mileage of most American drivers, and this will only increase in the future. Consumers would also benefit by having less expensive, easier to install, lower amp, home chargers installed to charge their PHEVs, rather than the more expensive, higher amp ones needed to charge larger BEV battery packs. More electrified powertrain options, including PHEVs, support the shift to electrification, reduce the demand for limited critical mineral supply, and enable greater EV access to more consumers. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

Mitsubishi supports Auto Innovators' recommendation that EPA include PHEVs in its modeling, as a substitute for some BEVs, so that PHEVs comprise at least 20% of the combined BEV+PHEV share, based on the availability and benefits of PHEVs and concerns with battery critical minerals supply constraints. [EPA-HQ-OAR-2022-0829-0682, pp. 3-4]

Organization: Nissan North America, Inc.

[…] Nissan requests that EPA adjust the proposed GHG standards and targets to account for a blended PEV percentage, taking into consideration emissions reductions from PHEVs and BEVs collectively. EPA has historically considered the emissions benefits of both groups of advanced technology vehicles, acknowledging the importance and need of PHEVs in the consumer shift towards clean vehicles. […][EPA-HQ-OAR-2022-0829-0594, p. 5]

Organization: POET, LLC.

In a violation of the Administrative Procedure Act, the Proposed Rule fails to meaningfully assess PHEV technology, even though it is widely used in vehicles, and has been a key decarbonization strategy by automakers. The Proposed Rule concedes, "EPA's current analysis does not include PHEVs, though we recognize that many manufacturers' product plans include PHEVs" but "EPA plans to incorporate PHEVs into our analysis for the final rule."70 Not only is this failure to assess PHEVs arbitrary and capricious, but EPA seems to misstate the requirements of the Administrative Procedure Act here – analysis like this should be presented in a proposed rule, so that stakeholders can provide comment, not in the "final rule" analysis where the time period for comment has been extinguished. EPA's failure to meaningfully assess PHEV technology deprives stakeholders of the ability to meaningfully comment on this Proposed Rule. It is essential that the final rule provide incentives for PHEV FFVs, and otherwise recognize the contribution of higher-level bioethanol blends like MLEBs and E85 that are used in PHEV FFVs. [EPA-HQ-OAR-2022-0829-0609, pp. 20-21]

70 88 Fed. Reg. at 29329.

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

In order to show additional ways that costs can be reduced and that hard-to-reach markets are served, we respectfully request that EPA develop a scenario in the final rulemaking that reduces the total costs. Specifically, this new scenario should include a modest number of PHEV cars and trucks as that will impact the cost analysis by reducing the cost of charging infrastructure, the amount of critical minerals and by using BEV batteries in strong PHEVs. This scenario could reduce the number of BEVs and FCEVs by a small amount (say 20% collectively) and be instead served by a mix of Strong PHEV cars and trucks and other PHEV cars and trucks. The PHEV battery costs should be based on using BEV batteries as explained in Appendix D in this letter. The use of away-from-home DC fast chargers should be modestly reduced, and the cost of the PHEV including total cost of ownership should be based on work by Argonne national lab for light-duty PHEVs.7 Finally, bidirectional charging using DC off-board chargers should be assumed in our recommended alternative cost analysis for a reasonable percentage of BEVs and PHEVs in order to further reduce the total cost of ownership. [[EPA-HQ-OAR-2022-0829-0646, p. 8]

7 Ibid

Another perspective is dollars spent to achieve GHG reductions. Models such as the new Toyota tool show that PHEVs can be very good at dollars per GHG reduced.20 Finally, total cost of ownership is another perspective. We believe the above Argonne National Laboratory analysis correctly finds that PHEVs are lower cost than BEVs, but, as we point out above and, in the charts below, PHEV costs can be lowered further. In addition, the lower cost for home charging stations compared to BEVs21 and savings compared to using gasoline or diesel further lower the total cost of ownership and make Strong PHEVs very attractive in the near-term and the long-term. [EPA-HQ-OAR-2022-0829-0646, pp. 22-23]

20 GitHub - khamza075/PVC: A software for assessing the efficacy of various vehicle powertrains at mitigation of greenhouse gas emissions . Also see https://app.carghg.org/

21 Many PHEVs use a level 1 portable cord set. Some BEVs use up to 19 kW for home charging (level 2) but PHEVs do not need this extra cost and, if they use level 2 charging, use 6.6 kW home EVSE.

[See original for graphic titled “Graph of PHEVs vs. ICEVs”]

[See original for graphic titled “Cost of PHEVs, BEVs, & ICEVs”] [EPA-HQ-OAR-2022-0829-0646, pp. 22-23]

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[See original for graphic titled “Graph of PHEVs vs. ICEVs”] [EPA-HQ-OAR-2022-0829-0646, pp. 22-23]

[See original for graphic titled “Cost of PHEVs, BEVs, & ICEVs”] [EPA-HQ-OAR-2022-0829-0646, pp. 22-23]

Allowing PHEV cars and trucks to be in the proposed regulation helps low-income drivers

- The flexible nature of Strong PHEV trucks and cars makes them an important solution for low-and moderate-income drivers of used and new PHEV trucks and cars. Many drivers need flexibility in their choice of vehicle because they either change residences often, change jobs often, work two or more jobs or live in areas where charging at night is difficult. This applies to some vocational vehicles that park at home, or commercial businesses that don’t have easy access to charging or that move relatively often. In addition, we understand that low-income drivers in the California Clean Cars for All program preferred light duty PHEVs (e.g., Chevy Volt and BMW i3 REX) over light duty BEVs.22 Some new PHEVs are less expensive than their BEV counterparts.23 Also used PHEV cars and trucks are entering the market more and more and they are attractive to low-and moderate-income owners and renters of cars and trucks. Low-and moderate-income drivers and small businesses often rent their homes or business location or move their residence or business. A PHEV car or truck provides needed flexibility for this hard-to-reach market segment. [EPA-HQ-OAR-2022-0829-0646, pp. 24-25]

22 In the Advanced Clean Cars II final statement of reasons.

23 Ford Escape PHEV and Ford Mach-E are both 5 seat, full-function vehicles, built on the same C2 platform, but Ford’s PHEV has MSRP $8400 less than the BEV for MY 23.

Lower-income drivers have less economic and social capital, and therefore have less margin to be able to bear BEV’s costs associated with inadequate access to charging facilities in many areas, to accommodate unplanned or emergency situations and to pay for and access rented or owned second vehicles for travel to remote areas.24 [EPA-HQ-OAR-2022-0829-0646, pp. 24-25]

24 Two Studies and a survey: 1) Dixon, J., Andersen, P.B., Bell, K., and Træholt, C. (2020). On the ease of being green: An investigation of the inconvenience of electric vehicle charging. Applied Energy 258, 114090, https://doi.org/10.1016/j.apenergy.2019.114090.2) [1] Greene, D.L., Kontou, E., Borlaug, B., Brooker, A., Muratori, M. (2020). Public charging infrastructure for plug-in electric vehicles: What is it worth? Transportation Research Part D: Transport and Environment 78:102182, https://doi.org/10.1016/j.trd.2019.11.011 and 3) DiCamillo, M. (2022). Majority support for the state's all-electric car mandate. Berkeley Institute of Governmental Studies Poll, Release #2022-19 (Oct, 7),https://escholarship.org/content/qt6fm432sb/qt6fm432sb.pdf.

[See original for graphic titled "Low-Income (LMI) Customers/Consumer Interest"] [EPA-HQ-OAR-2022-0829-0646, pp. 24-25]

Because of the urgency of the climate and air pollution crises worldwide and the challenges of predicting consumer acceptance, it is important to take an all-hands-on-deck approach and have multiple types of zero-emission car and truck technologies in the final regulation including Strong PHEVs. [EPA-HQ-OAR-2022-0829-0646, p. 25]

• Strong PHEVs offer more options for consumers which means a faster path to zero CO2 worldwide when combined with BEV and FCEV options especially given supply chain, utility grid and charging infrastructure challenges we face today. [EPA-HQ-OAR-2022-0829-0646, p. 25]

• Many areas of the world are relying on EPA's leadership to commercialize new zero carbon solutions to transportation such as Strong PHEVs. [EPA-HQ-OAR-2022-0829-0646, p. 25]

• The longer-term goal should be PHEVs with 100% zero carbon electricity generation for almost all of their electric miles, and advanced biofuels or other ultra-low carbon fuel for the remaining miles. [EPA-HQ-OAR-2022-0829-0646, p. 25]

In addition, we believe that at least some car and truck manufacturers will find a better business case to reach scale and get higher levels of vehicle adoption by producing both PHEVs and BEVs than only producing battery electric vehicles. Such a result is good for truck and car maker competition, for consumers and the planet. [EPA-HQ-OAR-2022-0829-0646, pp. 26-27]

• EPA's actions in this final rule will be heard in many parts of the world. EPA's leadership matters and should be a factor when finalizing how the rule impacts the commercialization of Strong PHEVs. Strong PHEV cars and trucks are an excellent solution for the unique needs of rural areas, mountainous areas and cold weather areas. [EPA-HQ-OAR-2022-0829-0646, pp. 26-27]

• Strong PHEV cars and trucks are potentially a better option for the portion of the US and other countries that cover small and mid-size towns where trip distances (when needed) exceed urban megacity regions. [EPA-HQ-OAR-2022-0829-0646, pp. 26-27]

• Strong PHEVs do well compared to other ZEVs in mountainous areas, cold weather regions and other extreme use cases around the world because they are dual fuel vehicles and technology exists to make the second fuel ultra-low carbon.27 [EPA-HQ-OAR-2022-0829-0646, pp. 26-27]

27 Kambly, K. and Bradley, T.H (2015). Geographical and temporal differences in electric vehicle range due to cabin conditioning energy consumption, Journal of Power Sources 275, 468-475, and Neubauer, J., Wood, E. (2014). Thru-life impacts of driver aggression, climate, cabin thermal management, and battery thermal management on battery electric vehicle utility, Journal of Power Sources 259, 262-275.

- While many trips in these regions are local, both personal and fleet vehicles do take long distance trips, including to remote areas, where charging is lacking or inadequate. Mountainous terrain and very cold weather both significantly reduce the range of battery EVs and/or make charging difficult if not impossible, but PHEVs are not impacted. Even California's recently adopted Advanced Clean Fleet regulation defers compliance for government fleets in 25 of the State's 58 counties that are heavily rural. This is an acknowledgement that the State's rural counties will not have the infrastructure to support zero emission vehicles in the near future. Strong PHEVs are needed in this regulation for cars and trucks that tow or haul for work or recreation. [EPA-HQ-OAR-2022-0829-0646, pp. 26-27]

Due to the large energy requirements of towing, Strong PHEVs are better than other ZEVs. In addition, Strong PHEVs as dual fuel vehicles offer advantages when towing over mountains and rural areas where charging or hydrogen refueling is not common or not feasible from a business case perspective. (Many class 2b and 3 vehicles serve as both work and personal transportation, and this is a relatively large class of vehicles.) Mountain grades are particularly known for reducing the all-electric range of battery EVs, but PHEVs are dramatically less impacted and/or have better access to refueling. [EPA-HQ-OAR-2022-0829-0646, p. 27]

Allowing Strong PHEV cars and trucks to be eligible should result in less need and cost for away-from-home charging stations for individual drivers and commercial fleets. [EPA-HQ-OAR-2022-0829-0646, p. 27]

Allowing Strong PHEV cars and trucks to be eligible will help reach skeptical consumers and other late adopters. [EPA-HQ-OAR-2022-0829-0646, pp. 27-28]

EPA should adopt a provision to discourage low-range PHEVs by requiring them to count as an HEV with no zero emission miles. We suggest a cut-off of 50 km (31 miles). Further we are not suggesting a ban on low-range PHEVs but rather a disincentive to produce them. Low-range PHEVs according to the UC Davis data logger project and the EV Project have greater likelihood of not plugging in and this could increase as PHEVs get older. PHEVs with a long all-electric range offer much greater benefits to consumers and show much higher levels of plugging in. [EPA-HQ-OAR-2022-0829-0646, p. 7]

In a future rule, EPA should require automakers to only produce in the early 2030s PHEVs with 50 miles or greater all-electric range, along with BEVs and fuel cell EVs. Due to the climate catastrophe, even more electrification will be required. However, for all the reasons provided in this letter, we do not believe the approach taken by the European Union to ban PHEVs is appropriate. Further, this current rulemaking by adopting our recommendations above will help lead to a transition in the 2030s to requirements for Strong PHEVs, BEVs and FCEVs. [EPA-HQ-OAR-2022-0829-0646, p. 10]

Allowing PHEV cars and trucks in the regulation provides a better solution especially for commercial vehicles that provide services during major catastrophes and daily emergencies.

- Because Strong PHEV cars and trucks are dual fuel that means they are particularly suited to provide services for society to recover from wildfires, earthquakes, hurricanes, floods, riots, and other catastrophes, as well as provide needed services in more typical daily emergencies (e.g., police, ambulance, fire, power outage recovery). PHEVs for some of their fleet provide the flexibility they need to deal with catastrophes and emergencies as public servants. CARB's Advanced Clean Truck program recognized this by providing exemptions for emergency vehicles, and this emphasizes the need for dual fuel vehicles that can provide the flexibility that some fleets need. [EPA-HQ-OAR-2022-0829-0646, p. 26]

- Because PHEVs and Strong PHEVs are dual fuel vehicles, they provide car and truck owners who also sometimes use their car or truck for personal use or who park their work truck at home with a second fuel to travel in case of emergencies. Further, many PHEVs will come with vehicle-to-load and vehicle-to-building technology that will allow emergency power for their home or a few appliances in their home or small business. [EPA-HQ-OAR-2022-0829-0646, p. 26]

Strong PHEV cars and trucks are an excellent solution for many parts of the world and a long commercialization period is needed to scale up this technology. [EPA-HQ-OAR-2022-0829-0646, p. 26]

Due to the large energy requirements of towing, Strong PHEVs are better than other ZEVs. In addition, Strong PHEVs as dual fuel vehicles offer advantages when towing over mountains and rural areas where charging or hydrogen refueling is not common or not feasible from a business case perspective. (Many class 2b and 3 vehicles serve as both work and personal transportation, and this is a relatively large class of vehicles.) Mountain grades are particularly known for reducing the all-electric range of battery EVs, but PHEVs are dramatically less impacted and/or have better access to refueling. [EPA-HQ-OAR-2022-0829-0646, p. 27]

Organization: Stellantis

Stellantis recommends that EPA should:

GHG Standards

-Include PHEV technology as a critical transition technology to a fully electrified future – without incorrect discounting – particularly in highly capable vehicle segments [EPA-HQ-OAR-2022-0829-0678, p. 24]

-Treat trucks and SUVs fairly by including PHEV technology as an important bridge to a BEV future, and ensure year-over-year required improvements are the same as cars [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Toyota Motor North America, Inc.

6. Role of PHEVs and HEVs

Diversity is the antidote for uncertainty. The Final Rule must be more inclusive of PHEVs and HEVs to hedge compliance and environmental risks in the event the BEV market is slower to develop because of the previously mentioned market uncertainties. Unfortunately, PHEVs are excluded from the compliance modeling used to demonstrate feasibility of the standards; and

HEVs are relegated to a subset of ICEs never exceeding 3 percent combined-fleet penetration when the technology is in 7 percent of all vehicles sold today.19 [EPA-HQ-OAR-2022-0829-0620, pp. 29-30]

19 S&P Global Catalyst for Insight – Data As of April 30, 2023.

The proposal acknowledges “PHEVs can provide significant reductions in GHG emissions and a bridge for consumers that may not be ready to adopt a fully electric vehicle.”20 Toyota is seeking carbon reductions as quickly as possible by providing our customers with a range of low carbon solutions that best fit their incomes, needs, and lifestyles. From that perspective, BEVs, PHVs, and HEVs have a role to play in displacing conventional petroleum vehicles from the road. During the transition to electrification, PHEVs and HEVs offer a broader spectrum of more accessible low carbon options to consumers. [EPA-HQ-OAR-2022-0829-0620, pp. 29-30]

20 88 Fed. Reg. at 29298.

6.1. PHEV Architectures and Applications

This modeling deficiency seems temporary in the case of PHEVs as EPA seeks comment and recommendations on the types of PHEV architectures that should be considered for the analysis supporting the Final Rule. Toyota recommends that modeling for Final Rule include the more capable strong-PHEV designs being introduced to meet US06 high power cold starts as well as the range-extending architecture EPA mentions being studied at Southwest Research Institute. We agree PHEV architectures can provide pickup trucks expanded utility and power in addition to all- electric miles, but believe the technology is viable for the entire spectrum of vehicle classes including sedans, CUVs, SUVs, minivans, and pickup trucks as evidenced by the Prius Prime and RAV 4 Prime. Compliance modeling to support the Final Rule should incorporate the technology into all light-duty vehicle classes. [EPA-HQ-OAR-2022-0829-0620, pp. 29-30]

6.2. Technology Assessments Should Incorporate Critical Mineral Supply and Lifecycle Emissions

The modeling should also include a sensitivity analysis of BEV/PHEV mix on critical mineral usage for any assumed overall PEV penetration. PHEVs can make the most efficient use of the limited battery supply and constrained infrastructure network forecast through the period of the rulemaking. The below example compares different vehicle powertrain emissions for a mid-size SUV using peer-reviewed data from carghg.com. The same amount of lithium in the battery of one 300-mile plus BEV can be used for up to six PHEVs –or more than eighty conventional hybrids. See Figure 10 for the CO2 saved from replacing a mid-sized SUV powered by a conventional gasoline engine with electrified alternatives under a constrained lithium supply. This analysis assumes average US electric grid emissions for BEVs and the electric operation of PHEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

[See original for attachment for Figure 10 CO2 Saving from Replacing ICEs Under Constrained Mineral Supply] [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

PHEVs can rival the emissions performance of BEVs under many real-world operating conditions. PHEVs are not always the best-performing option but can have as good or better lifecycle performance because of lower manufacturing emissions for smaller batteries and lower well-to-tank emissions while still covering a significant fraction of daily trips in electric drive.

Given most average daily trips are under 50 miles, this results in a significant portion of all-electric miles like a BEV. [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

EPA requests any relevant performance or utility data that may help inform their analyses for the Final Rule. We appreciate the opportunity to share data which will help elevate the role PHEVs in the Final Rule to be an important part of a sustainable transition to electrification. We plan to share such PHEV data outside of the comment period, possibly, including confidential information. For now, we request EPA consider the data we have provided that suggests PHEVs should be considered be an important contributor in whatever assumed PEV sales mix. [EPA-HQ-OAR-2022-0829-0620, p. 32]

The proposal notes "that the inclusion of PHEVs could potentially increase the combined ZEV share projection beyond the BEV penetration levels shown."21 For all the reasons covered to this point in our comments, Toyota strongly believes that PHEVs must be considered a PEV-alternative to BEVs, consistent with President Biden's Executive Order 14037. PHEV buyers seek price, utility, and total driving range that a BEV may not offer. PHEVs must be considered a substitute for BEVs and not ICEs or a way to increase total PEV share beyond 60% in 2030 and 67 percent in 2032. [EPA-HQ-OAR-2022-0829-0620, p. 32]

21 88 Fed. Reg. at 29329.

Organization: Valero Energy Corporation

3. EPA arbitrarily excludes viable LMDV technologies from its compliance modeling.

EPA acknowledges in the Preamble that it "has not specifically modeled the adoption of plug-in hybrid electric vehicle (PHEV) architectures in the analysis for this proposal"16 and asks for comments on whether or how it should model PHEV architectures in the final rule.17 EPA repeats the statement that it "has not specifically modeled the adoption of plug-in hybrid electric vehicle (PHEV) architectures in the analysis for this proposal" five times in the DRIA, without any real explanation for the omission.18 [EPA-HQ-OAR-2022-0829-0707, pp. 3-4]

16 EPA's Multi-Pollutant LMDV Proposal at 29298.

17 EPA's Multi-Pollutant LMDV Proposal at 29298.

18 DRIA at 2-48, 2-74 (twice), 2-75 and 3-19.

This critical omission is wholly at odds with EPA's obligation to consider reasonable alternatives, especially considering the significant role that PHEVs play in light-duty transportation. Between 2011 and 2021, PHEVs accounted for 32% of all new LD ZEV sales in the U.S.19 Looking ahead, IHS Markit projects that PHEVs will comprise 19% of new U.S. ZEV sales over 2022 to 2032.20 [EPA-HQ-OAR-2022-0829-0707, pp. 3-4]

19 IHS Markit "Mobility and Energy Future 2022 light vehicle long-term outlook," September 2022. ZEVs include BEVs, FCEVs, and PHEVs.

20 IHS Markit "Mobility and Energy Future 2022 light vehicle long-term outlook," September 2022.

Moreover, EPA's treatment of PHEVs in its OMEGA modeling is an intentional misrepresentation in EPA's analysis fleets. Starting with the MY 2022 analysis fleet, EPA forces all PHEVs into ICEV fueling and technology classes, ignoring the attributes of the electrical powertrain and arbitrarily excluding the PHEV technology from the modeled compliance scenario.21 For example, OMEGA vehicle ID 18497 (MY 2027 Toyota PHEV, “Midsize:sedan:PHEV:1.0:{'gasoline':1.0}:car:2.0:0.0:2021:2017.0:5.0:PHEV:steel:Toyota:Toyota”), understood to represent the current-day Toyota Prius Prime, is modeled by EPA as having a zero kWh battery, tailpipe GHG emissions of 185 gCO2e/mile, and a vehicle price of $17,079.22 In reality, the 2023 Toyota Prius Prime has a 13.47 kWh battery, 23 tailpipe emissions of 78 gCO2e/mile, 24 and an MSRP of $32,350. 25 [EPA-HQ-OAR-2022-0829-0707, pp. 3-4]

21 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, “2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicle.csv.”

22 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, “2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicle.csv.”

23 See https://pressroom.toyota.com/prime-time-for-more-ev-miles-with-the-all-new-2023-prius-prime/, accessed May 2, 2023.

24 See https://www.fueleconomy.gov/feg/Find.do?action=sbs&id=44362, accessed May 2, 2023.

25 See https://pressroom.toyota.com/prime-time-for-more-ev-miles-with-the-all-new-2023-prius-prime/, accessed May 2, 2023.

Given that PHEVs accounted for almost one-third of all LD ZEV sales from 2011 to 2021, failure to account for PHEVs seriously compromises the usefulness of EPA’s modeling exercise. It is unacceptable for EPA to neglect consideration of PHEV in the OMEGA compliance modeling for the proposed rule, and unacceptable that EPA is proposing to model the PHEV architectures in the final rule without adequate opportunity for public review and comment. [EPA-HQ-OAR-2022-0829-0707, pp. 3-4]

Organization: United Steelworkers (USW)

While the proposed rule is “technology neutral”, there is an underlying assumption in it that the shift will be to ZEVs, more specifically BEVs, rather than low- emission vehicles. EPA’s proposal completely writes off plug-in hybrid electric vehicles (PHEVs) and other low-emission technologies through the requirement that BEVs take up over half of the U.S. auto market by 2030. EPA’s proposed rule calls for 37 percent of new light-duty cars and trucks to be BEVs by 2027 and more than 60 percent by 2030. It is important to note that BEV sales were just under 6 percent in 2022.6 Additionally, the proposed rule goes above the Biden Administration’s Executive Order 14037, Strengthening American Leadership in Clean Cars and Trucks, which called for BEVs, PHEVs, and fuel cell electric vehicles to take up 50 percent of U.S. auto market by 2030.7 [EPA-HQ-OAR-2022-0829-0587, pp. 4-5]

Organization: Wisconsin Department of Natural Resources

5. Modeling plug-in hybrid electric vehicles (PHEVs). EPA is requesting comment on if it should model PHEVs in the final rule. Since the emissions from PHEVs can vary substantially (based on how they are operated), to fully assess their impacts in this rulemaking, EPA should update modeling for its final rule to include PHEVs. [EPA-HQ-OAR-2022-0829-0507, p. 3]

EPA Summary and Response

EPA acknowledges and appreciates all of the comments relating to modeling PHEVs in the compliance analysis.

Comments in this area related primarily to the significance of modeling PHEVs in the compliance analysis, and predominantly advocated for their inclusion. Many comments referred to the view that PHEVs have a role to play in compliance with the standards and therefore should be included. Some comments also dealt with the configuration of PHEVs that we should model, with Toyota advocating for "the more capable strong-PHEV designs being introduced to meet US06 high power cold starts as well as the range-extending architecture."

In response, EPA first notes that the exclusion of PHEVs (or any vehicle technology type) in a compliance analysis in no way prevents manufacturers from utilizing the technology in their fleet as an emission reducing technology. EPA's compliance analysis is not prescriptive as to the types of technologies that may be used, but only descriptive of the types of technology that we anticipate manufacturers are most likely to choose to comply with the standards, based on our assessment of the relative cost and effectiveness of various technologies in contributing to compliance with the fleet average standards. Even if PHEVs were left entirely out of the analysis, a manufacturer would remain free to manufacture PHEVs and these vehicles would contribute to the manufacturer's compliance according to the emissions performance that they achieve. If PHEVs were included but the costs assumed for the technology were higher or lower for a specific manufacturer, that manufacturer may see a different value proposition for including that technology than that which was represented in the analysis. In neither case would manufacturers in any way be prevented from using the technology as part of its mix of technologies that contribute toward compliance with the standards.

In response to the totality of comments advocating for inclusion of PHEVs, we have included PHEVs in the updated compliance analysis, and our projections of PEV penetration in the various cases of the analysis now distinguish between BEVs and PHEVs. These PHEVs are modeled as having an extended US06-capable driving range.

In response to comments that modeling PHEVs in the final rule does not provide "adequate opportunity for public review and comment," EPA disagrees. EPA provided notice that we expected to add PHEVs to the final rule analysis, and also provided public notice of the cost estimates that we were likely to use in the case that we did so. The public was therefore given notice to expect PHEVs as a possible addition to the final analysis, and was given notice as to what the primary additional cost inputs to the analysis would likely be. We received very few comments on these costs, and received a large amount of positive comments recommending that we add PHEVs to the analysis.

In response to comments that the exclusion of PHEVs represents "an intentional misrepresentation in EPA's analysis fleets," EPA disagrees. At the time of the proposal, EPA assessed that PHEVs are generally significantly less cost effective than BEVs and would play a very limited role in the cost minimizing compliance pathway that EPA routinely identifies as part of the compliance analysis. In the compliance analysis for the final rule, the cost-minimizing central case bears out this expectation. As we expected, the inclusion of PHEVs in the updated analysis has not materially changed the projection of feasibility of industry's compliance with the standards, but has only provided greater resolution of the specific types and configurations of vehicles that are likely to form what we project to be the cost-minimizing compliance pathway. We note that in addition to the cost-minimizing central case pathway, we also assessed several additional example pathways, which projected various levels of PHEVs as part of the technology mix used to meet the standards. See section IV.E of the preamble for this rule.

In response to comments regarding the configurations of PHEVs we should model, we agree that the longer-range US06 capable configurations are the most relevant to this analysis. Given that blended-architecture PHEVs often have relatively small driving range that results in a relatively low GHG effectiveness due to the nature of the PHEV utility factor relationship, we expect that these vehicles will be less effective at delivering GHG reductions relative to their cost, and also are likely to be somewhat discouraged from entering the market due to their inability to generate ZEV credits in states following the California ACC II program.[460]

In response to the request by Strong PHEV Coalition that we should include scenarios with higher amounts of PHEVs, we note that our sensitivity cases include two scenarios in which BEV penetration is lower than in the central case, both of which indicate a higher level of PHEV penetration.

In response to comments advocating for longer-range PHEVs or that we should incentivize longer-range PHEVs, EPA notes that the PHEVs in our compliance analysis are longer-range PHEVs that have US06 capable electric range. As discussed above, the inclusion of a specific type of technology in the compliance analysis in no way prevents manufacturers from producing different types. Similarly, a specific type of PHEV being represented in the analysis does not incentivize production of that type of PHEV. Longer-range PHEVs are already incentivized to some degree by their treatment under the ZEV program followed by California and the Section 177 states,[461] as well as their more beneficial grams per mile compliance contribution based on the PHEV utility factor.

In response to comments that EPA should apply PHEV technology primarily to pickup trucks and SUVs, EPA agrees that these vehicles are good candidates for the specific attributes of PHEVs, but as these are performance-based standards, the OMEGA model reasonably determines the specific vehicle classes to which each technology is applied based on the relative cost and effectiveness in each potential vehicle application.

In response to comments that EPA should model PHEVs with 7 kWh batteries that meet the minimum requirement for IRA eligibility, we agree that PHEVs with a small battery may have a low battery cost relative the value of the IRC 30D credit. However, these vehicles also have relatively high GHG grams per mile due to the PHEV utility factor assigning a higher value for shorter range PHEVs. EPA has also not seen evidence of a clear trend of manufacturers planning shorter-range PHEVs in order to capture this possible advantage. While it is possible that 7 kWh PHEVs would have a lower net price due to the IRA incentives, it would still depend on the battery qualifying for the FEOC and mineral/component content requirements, and with the battery being much smaller, the 45X production tax credit would have much less of an impact. EPA instead chose to model longer-range PHEVs with US06 capability, in the expectation that

[460] As explained in preamble IV.C, EPA has not at this time approved the waiver that would allow California to follow the ACC II program.
[461] EPA has not at this time approved the waiver that would allow California to follow the ACC II program.

these will be more commonly produced due to their lower GHG grams per mile and their eligibility for ZEV credits in California and Section 177 states.

In response to comments that EPA should assume level 1 charging infrastructure for PHEVs with 50-mile or lower electric-only range, we note that this was not appropriate because as stated above, the PHEVs in the compliance analysis have longer range. For responses to comments on charging infrastructure, see section 17 of the response to comments document. In response to comments regarding the ability of longer-range PHEVs to use BEV batteries, the ANL battery cost equations were developed with consideration of higher power-to-energy ratios at the lower end of their kWh capacity range, making those battery sizes applicable to either BEVs or PHEVs. In the updated analysis, only longer-range PHEVs[462] are placed into the fleet, and their battery costs are derived from the same equations as BEVs.

For response to comments that PHEVs and HEVs are a more efficient use of critical minerals than BEVs, see the responses in section 15 of the response to comments document, Critical minerals and supply chain.

12.2.5 – Battery replacement

Comments by Organizations

Organization: Alliance for Consumers (AFC)

Most notably, while "EPA projects lower maintenance and repair costs for several advanced technologies (e.g., battery electric vehicles)," EPA has failed to properly consider the likelihood, frequency, or expense of repairing or replacing a light-duty or medium-duty vehicle's battery due to wear, accident, or malfunction; a repair or replacement of a battery for an electric vehicle could potentially undo any cost savings projected by EPA in terms of "lower maintenance and repair costs" for "battery electric vehicles." Indeed, as some sources have pointed out: "[t]here will be scenarios in which a new EV battery will cost more than the vehicle's value." Ronald Montoya, Electric Car Battery Replacement Costs, Edmunds.com, May 2, 2023; see also id. ("On one hand, [battery replacement] costs might be cheaper than buying a new EV, but spending $15,000 on a new pack for a car that might be worth $10,000 is a tough sell.").2 EPA has failed to properly consider this aspect of the problem. [EPA-HQ-OAR-2022-0829-0534, p. 4]

2 Available at https://www.edmunds.com/electric-car/articles/electric-car-battery- replacement-costs.html.

[462] EPA assumed that manufacturers would design PHEVs that would provide enough range to qualify as ZEVs under the ACC II and ACT programs being administered by California and participating Section 177 states. In OMEGA, EPA assumed that light-duty vehicle PHEV batteries would be sized for 40 miles of all-electric range over the US06 cycle, while medium-duty PHEVs would be sized to drive 75 miles over the UDDS while tested at ALVW. This assumption is supported by EPA's engagement with manufacturers and our understanding of their product plans. Nonetheless, EPA has not at this time approved the waiver that would allow California to follow the ACC II program, and we are not prejudging the outcome of that separate administrative proceeding.

Organization: American Fuel & Petrochemical Manufacturers

EPA's cost benefit analysis is implicitly built around much longer battery life than is currently achieved, as EPA does not factor in battery replacement costs or the environmental implications of additional battery production, recycling, and disposal. EPA cannot have it both ways – either the batteries are remarkably durable, or the costs of this Proposed Rule are dramatically understated.

Organization: Anonymous

Perhaps the largest omission in EPA's analysis is considering what happens if BEV needs a battery replaced. Battery replacements can cost well into the tens of thousands (https://www.jdpower.com/cars/shopping-guides/how-often-do-tesla-batteries-need-to-be-replaced), and there's some evidence that some BEVs are 'totaled' even with minor damage because it doesn't make sense to repair and replace the battery pack (for example, https://www.caranddriver.com/news/a42709679/tesla-insurance-fixes-expense/). however, this consideration is not included in EPA's analysis of repair and maintenance nor elsewhere in the rule. This unaccounted for cost obscures the true cost of ownership, and if included, could flip the estimated cost per mile of repair and maintenance costs from BEVs being net positive compared to ICE vehicles to net negative. [EPA-HQ-OAR-2022-0829-0565, pp. 1-3]

Organization: Arizona State Legislature

EPA also does not calculate the frequency or likelihood that a light-duty or medium-duty vehicle will need to replace its battery due to wear or accident. Nor does EPA calculate the cost of battery replacement. Battery replacement for a passenger vehicle can cost between $5,000 and $15,000.29 One battery replacement could obviate any cost savings estimated by EPA for that vehicle. [EPA-HQ-OAR-2022-0829-0537, p. 24]

29 Devin Pratt, What Happens to the Old Batteries in Electric Cars, CONSUMER REPORTS, Feb. 23, 2022, available at https://www.consumerreports.org/cars/hybrids-evs/what-happens-to-the-old-batteries-in-electric-cars-a1091429417/.

Organization: Clean Fuels Development Coalition et al.

- Vehicle maintenance and repair costs. EPA underestimates maintenance costs in several ways, not the least of which is by ignoring the massive expense of replacing an electric vehicles battery. For example, a Tesla battery typically costs between $12,000 and $20,000 to replace and is out of warranty after only 8 years. [EPA-HQ-OAR-2022-0829-0712, pp. 5-6]

Organization: Environmental. and Public Health Organizations

3. Design for disassembly holds promise for battery recycling.

The battery design parameters listed in the Proposal, which EPA used to develop battery cost estimates, see 88 Fed. Reg. at 29299, do not include design for disassembly (Dfd), also referred to as design for recycling or design for reuse. Dfd involves factoring end-of-life into the design of the vehicle, meaning that the battery is designed to be taken apart so that cells and modules can be refurbished, reused, or replaced, or so that the battery can be more efficiently and safely disassembled for recycling. This disassembly is typically a difficult, lengthy, and therefore expensive process because Dfd is not included in the design phase.409 [EPA-HQ-OAR-2022-0829-0759, p. 151]

409 CalEPA, Lithium-ion car battery recycling advisory group report (2022), https://calepa.ca.gov/lithium-ion-car-battery-recycling-advisory-group/ (last accessed June 29, 2023).

As reuse and recycling becomes more prevalent and policies begin to require it, we expect that Dfd will also be more common. If Dfd occurs, more reuse, refurbishment and replacement will occur and batteries will have a longer lifespan, therefore reducing the amount of new batteries necessary for electrification.410 The disassembly of a battery from a vehicle and down to the cell level currently represents approximately a third of light-duty vehicle recycling costs in the United States.411 If Dfd occurs, this recycling cost will also decline, therefore leading to more prevalent recycling and greater availability of recycled supply. [EPA-HQ-OAR-2022-0829-0759, p. 151]

410 Michael S. Koroma, et al., Life cycle assessment of battery electric vehicles: Implications of future electricity mix and different battery end-of-life management, Sci Total Env. 20;831:154859 (2022), available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9171403/ (last accessed June 29, 2023).

411 See Jessica Dunn, et al., Electric vehicle lithium-ion battery recycled content standards for the US – targets, costs, and environmental impacts, Resources, Conservation and Recycling, 185, 106488, 0921-3449 (2022), at 6, Fig. 3, available at https://doi.org/10.1016/j.resconrec.2022.106488

Organization: Fred Reitman

Electric vehicles are unaffordable. New electric vehicles cost about $20,000 more than gasoline-powered vehicles. More than half of Americans are living paycheck to paycheck and cannot afford the higher cost of an electric vehicle (EV). Further, batteries will need to be replaced and the cost of new electric batteries range from $10,000 - $ 15,000. [EPA-HQ-OAR-2022-0829-0432, p. 1]

Organization: John Graham

The BEV model with the longest run of real-world experience, the Nissan Leaf, has experienced troublesome rates of battery degradation within the first half of the Leaf's expected life (Graham, 2021). It is instructive that most battery warranties for BEVs do not extend beyond 8 years or 100,000 miles of vehicle life.26 The NPRM refers to a claim that BEV batteries will last longer than the life of the vehicle but, as noted by NAS in 2021, that claim is based on laboratory tests. Real-world driving conditions are much more diverse (e.g., extreme temperature conditions, extreme uses of batteries and so forth) and may contribute to battery degradation in ways that lab tests do not cover.27 One specific concern with laboratory tests is that they can only simulate cycle life, not battery life, and real-world experience with battery life beyond about 10 years is completely lacking. Since battery replacement costs are so large, they must be addressed in the Final Rule. [EPA-HQ-OAR-2022-0829-0585, p. 20]

26 For data on the Leaf's rate of battery degradation and battery warranty policies, see John D. Graham. The Global Rise of the Modern Plug-In Electric Vehicle: Public Policy, Innovation, and Strategy. Elgar House Publishing, UK, 2021, 44-46.

27 National Academy of Sciences. Improving Light-Duty Vehicle Fuel Economy: 2025 to 2035. National Academies Press. Washington, DC., 2021, 115.

It is worth noting here that the smaller batteries in HEVs do tend to last at least as long as the life of the vehicle. However, that is due to the HEV's battery management system, which restricts the range of the battery charge level, usually between 30% and 70% of a full charge. BEVs require deeper charging cycles to accomplish the driving ranges that customers demand. It is well known that deeper charging cycles contribute to the rate of battery degradation. Unlike HEVs,28 BEVs also need to be designed to recharge as fast as possible, which also increases the rate of battery degradation. [EPA-HQ-OAR-2022-0829-0585, p. 20]

28 John D. Graham. 2021, 154 (see footnote 26 above for full reference).

Organization: Kentucky Office of the Attorney General et al.

But used EVs offer little savings if the buyer has to replace the battery. According to the Department of Energy's National Renewable Energy Laboratory, advanced batteries "wear out eventually," and today's batteries last only 8 to 15 years. Electric Vehicle Benefits and Considerations, U.S. Department of Energy Alternate Fuels Data Center, https://bit.ly/3PcOn9i. Replacing an EV battery costs anywhere from $5,000 to more than $15,000. Electric Car Battery Replacement Costs, Edmunds (May 2, 2023) https://bit.ly/3NutoNS. Such substantial expenses hardly qualify as "reduced repair and maintenance costs." 88 Fed. Reg. at 29,364. [EPA-HQ-OAR-2022-0829-0649, pp. 17-18]

Organization: Paul Bonifas and Tim Considine

Furthermore, batteries are the most expensive part of an EV, representing up to 50% of an EV's price tag40. Though most EV batteries come with a 5- to 10-year warranty, they only kick in if a battery's capacity falls below 70-75%. This means that an ICE vehicle could lose 30% of its mileage range, and still be considered by the warranty as in "good working condition." Any replacement that occurs outside of the warranty is the financial responsibility of the owner. The battery technology in EVs is very similar to that found in everyday smartphones. Anyone who has owned a new smartphone knows that the battery degrades over time, and regardless of how well it is maintained, the battery life will inevitably worsen and eventually die. The same is true for EV batteries. While some studies show that most EVs lose between 5-10% of their battery life in the first five years41, there are many reputable reports of brand- new EVs not living up to their supposed battery life, right off the lot. As an example, MotorTrend tested the F-150 Lighting Platinum EV that has an EPA-rated range of 300-miles on a new battery. When the test was run at an average highway speed of 70 mph – this resulted in a range of 255 miles, 15% less than the EPA rating. MotorTrend warns drivers to "expect driving range to fall with extreme [hot or cold] temperatures, higher speeds, or significant elevation changes. Alternatively, you can extend that range by driving slower, limiting air-conditioning and other accessory usage, and minimizing hard braking"42. [EPA-HQ-OAR-2022-0829-0551, pp. 10-11]

40 https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk- whole-car-2023-03-20

41 https://www.kbb.com/car-advice/hybrid-ev-battery-warranty

42 https://www.motortrend.com/reviews/2022-ford-f-150-lightning-platinum-range-max-charging-test-review/

Organization: POET, LLC

EPA estimates the U.S. will have more than 800 GWh of cell or battery manufacturing capacity by 2025, and 1,000 GWh by 2030, enough to supply from 10 to 13 million BEVs per year.4 This production would roughly be sufficient to meet EPA's compliance requirements. However, EPA did not explicitly consider the battery cost replacement for the current 2 million electric vehicles in the EV sales projections by 2032. Furthermore, the battery lifetime will largely depend on the consumer behavior and how often they charge the battery. Public fast chargers tend to degrade lithium-ion batteries at a quicker rate than slower home charging options. With shorter battery life, a higher battery production rate and critical material supply would be required than otherwise projected over the next 8 to 10 years. [EPA-HQ-OAR-2022-0829-0609, p. 36]

4 DRIA pg. 3-24.

U.S. EPA does not even consider the costs associated with battery replacement outside of warranty later in the life of a BEV or the fact that the overall lifetime of BEVs may be shorter than that of a conventional vehicle which would also impact a cost comparison based on vehicle lifetime that would negatively affect BEVs. U.S. EPA should account for these factors in its analysis of BEV penetration and at a minimum perform sensitivity analyses to determine how they could affect demand for BEVs and automakers ability to comply with the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, p. 59]

Organization: Steven G. Bradbury

For one thing, EPA ignores the cost of battery replacements for EV owners.34 EV batteries degrade over time with each charge and discharge, and this degradation will be accelerated if the EV gets heavy use, if it is driven through cold winters, or if the owner uses rapid recharging.35 Battery degradation reduces significantly the power and range of the EV and will eventually lead to an unacceptable risk of thermal runaway and fire.36 At a certain point in the life of the EV, depending on the nature of its use, the type of recharging, and the environment where the vehicle is driven, the owner will need to replace the battery (if replacement is even feasible)—just to maintain or restore the utility of the vehicle or for safety reasons. Further, independent of use, if the battery is scratched or suffers other forms of damage in a relatively minor traffic accident, the battery may need to be replaced prematurely (or the vehicle may be considered a total loss).37 [EPA-HQ-OAR-2022-0829-0647, pp. 13-14]

34 Section 3.1 of the EPA's draft regulatory impact analysis (DRIA) for the proposed light- and medium-duty rule, for example, does not include any estimate for the cost of battery replacement.

35 See Jacqueline S. Edge, et al., "Lithium ion battery degradation: what you need to know," Royal Society of Chemistry, March 22, 2021, https://pubs.rsc.org/en/content/articlehtml/2021/cp/d1cp00359c (identifying 5 principal and 13 secondary mechanisms causing degradation of lithium-ion batteries in EVs, and explaining that degradation will be exacerbated by, among other things, usage profile, outside temperature, and the use of fast charging); Niall Kirkaldy, et al., "Lithium-Ion Battery Degradation: Measuring Rapid Loss of Active Silicon in Silicon-Graphite Composite Electrodes," American Chemical Society Applied Energy Materials, November 3, 2022, https://pubs.acs.org/doi/10.1021/acsaem.2c02047 (similar).

36 Significant loss in battery capacity and range over the life of the EV is expected and allowed for even within the parameters of the UN's GTR No. 22 standard for EV battery durability cited by the EPA.

37 See https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk-whole-car-2023-03-20/ (full citation in footnote 17 above).

Battery replacement, when available, will undoubtedly be very expensive. For an EV battery pack with a capacity of 100 kWh (the capacity level assumed by the EPA in its models), the replacement battery alone (not including labor, any fee for disposing of the old battery, and any other associated expenses) would cost at least $15,300. That figure is based on the Energy Department's 2022 estimated cost of manufacturing the battery—$153 per kWh of capacity. [EPA-HQ-OAR-2022-0829-0647, p. 14]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

The last detrimental aspect of this arbitrary benchmark is that part of the cost analysis done by EPA included refueling time. With larger batteries come longer recharge times, which again add to the cost. While EPA might argue that the high-speed chargers will make up for that, EPA does not want to address the fact that rapid charge or discharge of a battery accelerates its lifecycle. Every time a consumer inputs or draws large amounts of power from a battery, it damages it more than a slower input or draw, thereby decreasing the timeline for the battery's replacement and moving that expense up sooner in the timeline of EV ownership. [EPA-HQ-OAR-2022-0829-0674, p. 9]

EPA's cost estimate does not include battery replacement.37 With the proposed standards taking effect in 2027, and some of the cost and savings estimates being extrapolated out through 2055, even if Tesla can be the first EV manufacturer to achieve a battery that lasts 20 years, a replacement will be a requirement. Based on the EPA's chosen 100 kWh capacity and the Department of Energy's 2022 estimated cost of manufacturing of $153/kWh, a new battery without labor, disposal fees, and other associated expenses would cost the consumer $15,300. [EPA-HQ-OAR-2022-0829-0674, p. 10]

37 "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." EPA, Apr. 2023, www.epa.gov/system/files/documents/2022-12/420d22003.pdf (accessed 5 July 2023).

Table 4-5, which outlines the studies used to justify the proposal, shows that all but one study either came from California or New York. The claimed national study only contained 862 vehicles and therefore poses insignificant statistical relevance. It also shows that the entirety of the country is not represented. While the Census Bureau splits the United States at 80% urban and 20% rural living, New York and California cannot be considered as viable representations of the county's entire population. Due to differences in infrastructure, state-imposed regulations and laws, population density, and other factors, it is likely that differences could be found even between major cities throughout the country. [EPA-HQ-OAR-2022-0829-0674, p. 10]

On page 4-34, when referring to maintenance costs over the 225,000-mile life of a vehicle, EPA does not mention the need for battery replacement.

While EPA does not address this issue directly in any of its cost analysis, they do open the door to scrutiny and show their hypocrisy a bit by mentioning the battery durability standards in 1-4, 1-5, and 1-6. Based on the UN standards, a battery capable of supplying its platform with a range of 300 miles when new would be considered within the standard so long as it could provide 240 miles of range after 5 years or 62,000 miles. Additionally, it would remain within that standard if it could provide 210 miles of range to its associated platform after 8 years or approximately 100,000 miles. It only continues to degrade from there. [EPA-HQ-OAR-2022-0829-0674, p. 10]

In the table below, the initial data is from the UN standard and the rest is calculated from there based on linear degradation of the battery throughout its lifecycle. The reality is that the degradation would be faster than this and fast charging used to compete with ICE vehicle refuel times will only exacerbate the degradation. I have also placed a couple helpful links below that support this claim. [EPA-HQ-OAR-2022-0829-0674, p. 10]

EPA's cost estimate does not include battery replacement.37 With the proposed standards taking effect in 2027, and some of the cost and savings estimates being extrapolated out through 2055, even if Tesla can be the first EV manufacturer to achieve a battery that lasts 20 years, a replacement will be a requirement. Based on the EPA's chosen 100 kWh capacity and the Department of Energy's 2022 estimated cost of manufacturing of $153/kWh, a new battery without labor, disposal fees, and other associated expenses would cost the consumer $15,300. [EPA-HQ-OAR-2022-0829-0674, p. 10]

37 "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." EPA, Apr. 2023, www.epa.gov/system/files/documents/2022-12/420d22003.pdf (accessed 5 July 2023).

Organization: Valero Energy Corporation

EPA has not quantified the following program costs:

• Full impacts to drivers, including: Costs associated with battery replacements; [EPA-HQ-OAR-2022-0829-0707, pp. 31-33]

c) EPA omits costs of premature battery degradation

Temperature control is important for protecting the functionality of a lithium ion battery. One of the ways battery suppliers and automakers reduce the costs of batteries is to save money on their battery cooling systems. The Nissan Leaf, for example, was designed with a passive air-cooling system, in contrast to Tesla's dual-circuit liquid cooling system.196,197 The cost savings in production were accomplished, but the Leaf battery packs experienced unexpectedly high rates of battery degradation during normal use, especially in the first-generation Nissan Leaf. Even after the 2015 redesign of the Leaf, which improved the air-cooling system, the degradation rate (defined as percent loss of battery capacity in a year) was 18% by the fifth year of use (compared to 24% for the 2014 version of the Leaf). 198 The most recent versions of the Leaf have only 1-3% degradation rates in the first year of use,199 but it is too early to tell how well the improved Leaf batteries will hold up in the middle and later parts of the vehicle's 15-30 year lifespan. [EPA-HQ-OAR-2022-0829-0707, pp. 38-40]

196 Gustavo Henrique Ruffo, This Nissan Leaf Repair Shows Why Liquid-Cooling Is What EVs Need, INSIDEEVS, Jan. 26, 2021, https://insideevs.com/news/482245/nissan-leaf-repair-liquid-cooling-benefits/.

197 Ling, Chen. (2020), "A Review of Lithium-Ion Battery Thermal Management System Strategies and the Evaluate Criteria." International journal of electrochemical science. 14. 6077-6107.

198 CarParts, Nissan LEAF: Battery Degradation and Other Common Problem, CARPARTS.COM, last accessed June 30, 2023, https://www.carparts.com/blog/nissan-leaf-battery-degradation-and-other-common-problems/.

199 Id.

The history of Nissan's warranty policy implicitly acknowledges the battery degradation issue. The original warranty for battery defects in the base Leaf was only 5 years and 60,000 miles.200 The higher-trim version was backed for 8 years and 100,000 miles.201 Consumer complaints about the Leaf's high rate of battery degradation in hot climates compelled Nissan to upgrade the warranty: a replacement battery with superior battery chemistry was pledged if the original battery's capacity fell below 75% within the first five years or 60,000 miles.202 More recently, the 8-year/100,000-mile warranty has been extended to the base version but, again, only if the battery capacity is compromised by more than 25%.203 That means a loss of driving range from 150 miles to 112.5 miles might not be covered under the warranty. [EPA-HQ-OAR-2022-0829-0707, pp. 38-40]

200 JOHN D. GRAHAM, THE GLOBAL RISE OF THE MODERN PLUG-IN ELECTRIC VEHICLE, PUBLIC POLICY, INNOVATION AND STRATEGY, 45 (Elgar Publishing).

201 Id.

202 Id.

203 Tina Pavlik, Nissan Will Replace Your Leaf's Battery With a Warranty Under a Certain Percentage, MOTORBISCUIT, Jun. 10, 2022, https://www.motorbiscuit.com/nissan-replace-leaf-battery-warranty-certain- percentage/.

The warranty policy for the Chevrolet Bolt also acknowledges battery degradation issues. Chevrolet states that the Bolt's battery pack should last longer than 15 years.204 However, the Bolt owner's manual cautions that battery degradation could be as large as 40% during the warranty period of 8 years or 100,000 miles.205 A 40% degradation corresponds to a loss of 95 miles out of the Bolt's 238 miles of range.206 The cost of replacing a Bolt battery pack is $16,250 plus $850 for labor.207 That is for the 66 kWh battery back that delivers 250 miles of driving range.208 [EPA-HQ-OAR-2022-0829-0707, pp. 38-40]

204 JOHN D. GRAHAM, THE GLOBAL RISE OF THE MODERN PLUG-IN ELECTRIC VEHICLE, PUBLIC POLICY, INNOVATION AND STRATEGY, 45 (Elgar Publishing).

205 Id.

206 Id.

207 See https://chevyguide.com/chevy-bolt-battery-replacement-cost/.

208 Id.

EPA's cost analysis ignores the Leaf experience and assumes that all future lithium ion batteries will last longer than the vehicle's lifetime. Thus there are no replacement costs. However, EPA must acknowledge that the Tesla batteries, which form the foundation for EPA's optimistic position on battery degradation, were not designed for an affordable EV. Moreover, the Tesla prediction is based on laboratory predictions where Tesla models were tested. Real-world rates of battery degradation are less well understood because even the first-generation EVs (the Nissan Leaf and early Tesla models) are only beginning to enter their second decade of vehicle life. It is difficult to predict real-world rates of battery degradation based on laboratory testing because of the complexity of real-world operating conditions (mixed operating conditions, various ambient temperatures, different depths of charges, and different voltages). [EPA-HQ-OAR-2022-0829-0707, pp. 38-40]

EPA Summary and Response

In response to comments that we did not consider the cost of replacement of the high-voltage battery in PEVs, EPA disagrees that high-voltage batteries will routinely need to be replaced during the useful life of the vehicle. Based on current experience with vehicles in use in the field, and consultations on this topic that EPA has conducted with experts, stakeholders, and manufacturers, EPA finds no evidence that battery replacements out of warranty will typically be necessary for PEVs during their useful life, and therefore we have no basis for including the cost of battery replacement in the cost of PEV maintenance and repair. Additionally, commenters provided no supporting data to validate their expectation that any specific percentage of PEVs will routinely need a battery replacement during their useful life or that manufacturers widely expect such replacements to be necessary. EPA is not aware of any manufacturer that has publicly indicated that their battery is not designed to last for the useful life of the vehicle.

Commenters put forth several observations that they claim support their view that PEV batteries will need to be replaced and/or that EPA should consider their replacement cost in the analysis, but EPA finds these arguments to lack merit. EPA does not agree with comments that the batteries used in vehicles are similar to those used in smartphones to the degree that one commenter suggests; in contrast, PEV batteries typically employ a robust thermal management system and a battery management system, have a much larger thermal mass that better resists temperature variations, and have a multi-cell design in which individual cells are electrically balanced to maintain working order. Further, EPA does not find the example of the first-generation Nissan Leaf (in production from 2010 to 2017) to be a relevant indicator of the degradation rate of more recent battery designs in other vehicles, which have not shown the same behavior. Moreover, the Leaf had a relatively short driving range on the order of 100 miles, provided by a relatively small battery of about 24 kWh. BEVs modeled in our compliance analysis have batteries averaging about 100 kWh meaning that a given distance driven daily over the life of the vehicle would amount to about one-fourth as many equivalent full discharge cycles as for the Leaf, assuming energy consumption per mile were the same. Even if the energy consumption were higher, the 100 kWh battery would experience far fewer equivalent discharge cycles than the Leaf, leading to less potential for degradation. EPA also notes that ICE vehicles sometimes experience the need for major engine repair, engine replacement, and/or transmission replacement before their useful life is over, and EPA has not attempted to predict these relatively unpredictable events nor has traditionally attempted to quantify their costs in its analyses. We also disagree with the cited example in which an F-150 is said to have battery degradation “right off the lot,” as the cited example does not describe battery degradation but only demonstrates the expected variation in driving range that is understood to result from driving at different speeds or temperatures or similar deviations from the certification test cycles. EPA also disagrees with the contention that the fact we run our analysis out to the year 2055 implies that PEVs in the fleet will have to last to 2055, because our analysis assumes that vehicles that exist in the early years of the analysis fleet gradually leave the fleet as they age. We also disagree with the contention that Tesla batteries are not relevant to establishing the longevity of PEV batteries because they “were not designed for an affordable EV.” Commenter does not provide evidence that the design of the Tesla pack, which commenter suggests has good battery life, is somehow more costly or significantly different than a pack that the same manufacturer would design for a lower priced vehicle; while Tesla has stated an intention to use lower cost lithium-iron-phosphate packs in its lower cost vehicles, this chemistry is not generally regarded as having a shorter life than the nickel-based packs used in its other vehicles.

EPA also disagrees that the example of the Chevy Bolt warranty has evidentiary value in supporting the belief that PEV batteries will need replacement or will regularly decline to less than the 60 percent value cited in the warranty manual; in fact, commenter also notes that “Chevrolet states that the Bolt’s battery pack should last longer than 15 years,” and does not provide evidence or data to show that batteries in this vehicle are showing evidence of having a shorter life or degrading to near 60 percent. We also note that the battery durability and warranty standards established in this rule provide greater assurance and transparency regarding battery performance and the conditions under which a warranty repair or replacement must be honored, which will likely serve to motivate manufacturers to uphold battery longevity in future model years. See Section III.G.2 of the preamble and Section 16 of the response to comments document for expanded discussion of battery durability and warranty.

In response to comments from the Heritage Foundation (Bradbury) that assert a perpetual linear degradation of batteries to as low as 34 percent as suggested by the table commenter provides, EPA disagrees and notes in particular that citations provided by the commenter do not support the calculated figures commenter shows in the table and in fact indicate that battery degradation does not proceed in a perfectly linear manner but commonly assumes different rates at various stages, for example, see Figure 17 of the cited J.S. Edge et al.[463] in which degradation is flat for a long period during middle of life. EPA also notes that generalizations drawn from research papers that concern lithium-ion technology in general or at a cell level often do not apply perfectly to batteries that have been designed for specific applications, including PEV applications. Regarding commenter’s statements on the comparative stringency of the CARB and EPA standards, comparative stringency is difficult to quantify precisely due to the complexity of battery durability, but EPA considers the two standards to be similar in stringency, as the nominal performance criteria are reasonably similar, and where they are not the same, as the commenter has indicated, this is compensated by differences in other specific aspects (see EPA’s response in RTC Section 16, Battery durability and warranty, to comments that EPA should adopt certain specific provisions of the CARB program).

In response to comments that even minor accidents can cause a PEV to be “totaled,” and that EPA should therefore account for this possible cost in its analysis, EPA disagrees. EPA acknowledges that some press reports have suggested that some insurers have chosen not to repair vehicles with relatively minor damage or potential battery damage, but these observations are largely anecdotal and EPA is not aware of any well-documented study that shows that this practice is fundamental to addressing damage to PEVs, nor have commenters provided such data or evidence. EPA also is not aware of data, nor have commenters provided such data, that would quantify the frequency of these practices or the increase in repair costs due to these practices in

[463] Edge, J. S. et al., “Lithium ion battery degradation: what you need to know,” Phys. Chem. Chem. Phys., 2021, 23, 8200.

the current fleet, nor have commenters provided evidence that the practice is likely to continue in a future fleet as familiarity with PEVs increases.

12.2.6 – Other battery/electrification technology

Comments by Organizations

Organization: Doug Peterson

Anybody who is truly interested in accelerating BEV adoption should be advocating for the highest electric fuel economy we can muster. A bloated fleet of overpowered BEVs with jumbo battery packs will be made up of individual BEVs that take longer to charge [EPA-HQ-OAR-2022-0829-0500, p. 12]

Organization: Energy Innovation

III. The EPA's final standards should account for additional factors that may accelerate the adoption of zero- emission technologies and impact learning curves for BEV economics. [EPA-HQ-OAR-2022-0829-0561, p. 2]

Organization: Lisa Allee

[*From Hearing Testimony, May 9, 2023*] My first and biggest suggestion is bigger and faster please. Also please include hydrogen fuel cell vehicles in this regulations but importantly that the hydrogen has to be made from water and with electrolyzers that are run on electricity from solar and wind. This will mean that the hydrogen fuel cell cars are actually clean, and in decentralizing the hydrogen fueling would be great, create their own hydrogen encouraging not just allowing and local businesses. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 1]

Organization: South Dakota Department of Agriculture and Natural Resources (DANR)

Electric Vehicle Battery and Range Limitations

South Dakota is a large state with significant driving distance between many of our communities. Although several new electrical vehicles indicate they have a 200 mile or greater range (note -it is 224 miles one way from Pierre to Sioux Falls), a recent study shows electric vehicles (EVs) do not consistently achieve EPA's range estimates. In addition, all batteries degrade over time. Reports indicate EV vehicle batteries will degrade between 10 and 40 percent over a 10-year life span. To maintain the battery's life, manufactures recommend batteries are not frequently depleted below 10 percent capacity or charged above 90 percent capacity. This means that an electrical vehicle should be limited to 80 percent of its capacity range to maintain the battery's life. In addition, cold, hot, and windy weather conditions may reduce an EV vehicle's range between 20 to 40 percent and may further impact the reliability of EV. South Dakota is known to have cold and windy winters and hot and windy summers, which, with current EV ranges, batteries conditions, and availability of charging stations, makes widespread use of EVs impractical in South Dakota. [EPA-HQ-OAR-2022-0829-0523, p. 2]

Organization: Valero Energy Corporation

EPA applies a similar approach to FCEVs. For the MY 2021 analysis fleet, EPA correctly identifies base-year vehicles IDs 168, 436, and 438 as FCEV."26 Starting with the MY 2022 analysis fleet, EPA forces all FCEVs into BEV fueling and technology classes, ignoring the attributes of the electrical powertrain and arbitrarily excluding the PHEV technology from the modeled compliance scenario.27 The FCEV technology and costs are distinct from BEVs, and it is not appropriate for EPA to combine FCEV into the BEV cost curve class or assign BEV properties that do not logically apply to FCEV. [EPA-HQ-OAR-2022-0829-0707, p. 5]

26 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicle.csv."

27 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicle.csv."

d) EPA omits costs of fixing defects in BEV powertrains

A correlation exists between the rapid influx of BEVs to the U.S. market and elevated rates of safety-related recalls due to manufacturing defects in EV powertrains: General Motors210, Ford211, Tesla212, Hyundai213, and BMW214 have all issued recalls of BEVs due to battery-related problems. [EPA-HQ-OAR-2022-0829-0707, pp. 40-41]

210 General Motors, Bolt EV and Bolt EUV Recall Information, https://experience.gm.com/recalls/bolt-ev

211 Christopher Smith, Ford F-150 Lightning Recalled for Battery Issue That Halted Production, MOTOR1, Mar. 10, 2023, https://www.motor1.com/news/656717/ford-f150-lightning-recalled-battery-issue-halted-production/

212 Steven Loveday, Tesla Identified As Most Recalled Car Brand, Mercedes & Toyota Least, INSIDEEVS, Apr. 18, 2023, https://insideevs.com/news/662943/tesla-most-recalled-car-brand-mercedes-toyota-least/

213 Chris Isidore and Peter Valdes-Dapena, Hyundai's recall of 82,000 electric cars is one of the most expensive in history, CNN BUSINESS, Feb. 25, 2021, https://www.cnn.com/2021/02/25/tech/hyundai-ev-recall/index.html

214 Iulian Dnistran, BMW i4, i7, And iX Get Recalled Because Power Might Cut Out During Driving, INSIDEEVS, Jan. 11, 2023, https://insideevs.com/news/630693/bmw-i4-i7-ix-recall-power-cut/

Ernst and Young estimates that recalls are costing the auto industry $40-$50 billion per year, primarily due to defects related to the software used in powertrains.215 "As vehicles become more software-driven and connected, and suppliers are asked to speed things up, glitches are sure to pile up higher."216 [EPA-HQ-OAR-2022-0829-0707, pp. 40-41]

215 John Irwin, "Automaker Haste Increases Risk of Recalls," Automotive News, May 8, 2023, https://www.autonews.com/suppliers/ev-development-speeds-raising-odds-recalls.

216 Id.

The cost of EV-related recalls to automakers and their suppliers has already been significant. In 2021, General Motors acknowledged $1.9 billion of total costs associated with the Bolt recalls.217 It reached a deal with its supplier, South Korea's LG Chem, to reimburse $1.2 billion of the recall costs.218 [EPA-HQ-OAR-2022-0829-0707, pp. 40-41]

217 Heekyong Yang, GM settles $2 bln Bolt EV recall cost deal with S.Korea's LG, REUTERS, Oct. 12, 2021, https://www.reuters.com/business/lg-units-say-results-accounted-918-mln-costs-gms-bolt-recall-2021-10-12/

218 Id.

Despite the clear history and trends related to BEV recalls, EPA fails to consider the costs of recalls in the cost analysis for the proposed standards. [EPA-HQ-OAR-2022-0829-0707, pp. 40-41]

EPA Summary and Response

EPA acknowledges and appreciates the comment received on other battery or electrification technologies. The comments in this category relate primarily to electrification technologies or costs that were not covered in other sections.

In response to comments advocating for hydrogen fuel cell vehicles, EPA notes that although these vehicles were not explicitly represented in the compliance analysis, they are considered zero-emission vehicles under the program and their inclusion or exclusion from the compliance analysis does not preclude manufacturers from producing this technology as part of their compliance plan. EPA expects that these vehicles will be produced in relatively small volumes during the time frame of the rule due in part to factors such as a relatively high production cost and the availability of other technologies for compliance. EPA's application of BEVs as a replacement technology for redesigned FCEVs in the base year fleet is considered the most similar surrogate technology available in OMEGA, with an equivalent compliance value to FCEVs (0 g/mi). While the costs for FCEVs and BEVs may differ, the small volumes of FCEVs modeled as BEVs should be of minimal impact to the fleet technology costs. Regarding regulating the source of the hydrogen fuel for these vehicles, EPA agrees that hydrogen sources vary in their upstream CO_2 impact but due to the limited expected production of these vehicles during the time frame of the rule we believe that any impacts from hydrogen fueling would have a very small effect on our estimated CO_2 emissions impacts.

In response to comments that we should consider the cost of manufacturers recalling vehicles to repair defects in BEV powertrains, EPA notes that recall and repair costs are commonly encountered with vehicles of all technology types and are typically considered to be part of the cost of research and development, and research and development costs are commonly higher for newer technologies. The use of a multiplication factor applied to direct manufacturing cost of components is the typical way in which such costs are represented in analyses of technology cost, and EPA considers our use of a 1.5 multiplier (RPE factor) to be inclusive of these costs. Commenter has not provided specific data or evidence to support their view that average per vehicle recall costs over time for BEVs should be expected to be fundamentally higher than for ICE vehicles or other technologies, nor that EPA's analysis does not adequately account for these costs by means of the RPE factor.

In response to comments regarding electric vehicles in South Dakota, it is well known that the range of an electric vehicle is affected by cold weather, that range may vary, and that some long trips exceed the range of some electric vehicles. ICE vehicles also do not have unlimited range and the relative importance of range with electric vehicles depends in part on battery size and the availability and speed of charging away from home, which at the current time varies from location to location but is improving. See RTC section 17 for further discussion of charging infrastructure. EPA notes that the standards can be met with a variety of technologies and that the standards do not mandate electric vehicles in South Dakota or any other state. Manufacturers are free to produce vehicles that meet the needs of their customers who are free to choose them. We expect that customers in any state will include those whose needs are best met by an electric vehicle and for those whose needs are best met by another technology such as PHEVs, HEVs, or ICE vehicles, and the standards do not prevent those vehicles from being available.

12.2.7 - PEV vehicle costs and cost/price parity

Comments by Organizations

Organization: Environmental Defense Fund (EDF) (1of 2)

The IRA credits also reduce the time to achieve total cost of ownership (TCO) parity for all classes and segments of light-duty vehicles – or the time it will take consumers to realize net cost savings. In MY 2025, TCO parity is achieved immediately for compact cars, midsize cars, small SUVs, and midsize SUVs, while TCO parity is achieved in 4 years and 2 years for base-segment large SUVs and pickup trucks, respectively. In MY 2030, TCO parity is achieved immediately for all segments and classes. [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

The net cumulative savings for a BEV with IRA credits compared to a gasoline vehicle is substantial across almost all subclasses and segments in the 2025 timeframe, growing even more significant by 2030 purchase timeframes (see Figure 3). In 2025, the BEV savings over an equivalent gasoline vehicle are sizeable, ranging from more than $11,000 to over $19,000 for compact cars, midsize cars, small SUVs and midsize SUVs, across both base and premium segments. Large SUVs and pickups see fewer savings in 2025, with the premium large SUV still costing more than a comparable gasoline vehicle. However, in the 2030 timeframe, the savings range from more than $14,000 to over $27,000 across all vehicle subclasses and segments, including large SUVs and pickup trucks, with base model pickups seeing the greatest savings. [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

[See original comment for Figure 3: Cumulative lifetime savings of BEVs over equivalent gasoline vehicles] [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

Source: Roush, Impact of the Inflation Reduction Act of 2022 on Light-Duty Vehicle Electrification Costs for MYs 2025 and 2030 [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

Note: The net savings are computed and indicated in the text above the columns [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

Even without the significant impact of the IRA, BEVs still provide cost savings over the timeframe of EPA's proposal. An earlier Roush report for EDF (which only looked at 2030 purchase timeframe) found that for all BEVs up to a 300-mile range, purchase price parity with a comparable gasoline vehicle is reached by 2030, across all vehicle classes and segments.47 And by 2030, the total cost of ownership for all BEVs up to a 400-mile range were found to be equal to or lower than their gasoline counterparts across all classes and segments. The study found that even without the IRA tax credits, BEVs purchased in 2030 could see an average cumulative net savings of about $15,000 over the lifetime of the vehicle, across all classes and segments. Moreover, as noted in Section 1, above, a new EDF study with WSP demonstrates that consumers are experiencing these savings right now when purchasing BEVs. Over 10 years of owning and operating select, current EVs to comparable gasoline vehicles, the analysis finds that current, higher upfront purchase price and insurance costs for EVs are outweighed by the lower maintenance and fuel costs, with total lifetime savings of up to $18,440.48 [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

47 Himanshu Saxena, Vishnu Nair, Sajit Pillai, "Electrification Cost Evaluation of Light-Duty Vehicles for MY 2030,"(2023) Roush for EDF, https://www.edf.org/sites/default/files/2023-05/Electrification_Cost_Evaluation_of_LDVs_for_MY2030_Roush.pdf.

48 Electric Vehicle Total Cost of Ownership Analysis, Summary Report, WSP for EDF (July 2023), https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/WSP-Total-Cost-of-Ownership-Analysis-July-2023.pdf (Attachment G).

The Roush studies support EPA's proposed standards by showing that BEV costs are expected to continue to decline, achieving cost parity with gasoline vehicles over the timeframe of the rulemaking. These findings closely align with EPA's determination that BEVs represent the most cost-effective option for compliance and, in fact, demonstrate that EPA's BEV cost projections are likely conservative. [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

2. Roush's analyses are consistent with other recent analyses projecting substantial cost declines.

Recent expert analyses corroborate Roush's findings that BEV vehicle costs are declining rapidly and will soon be on par with comparable gasoline vehicle costs. A 2022 paper by ICCT analyzed bottom-up vehicle component-level costs to assess battery electric, plug-in hybrid electric, and conventional vehicle prices across the major classes of the U.S. light-duty vehicle market through 2035.49 Their analysis did not consider the impact of the IRA or other federal or state tax incentives. Even without those benefits, ICCT found declining battery and assembly costs, resulting in shorter-range BEV150s and BEV200s estimated to reach price parity by 2024-2026, with mid-range BEVs seeing parity around 2026-2029 and longer-range BEVs achieving parity around 2029-2032. These findings apply to electric cars, crossovers, sport utility vehicles, and pickup trucks, which cover all light-duty vehicle sales in the United States. Table 3 summarizes the year by which BEVs reach price parity with ICEVs. ICCT's analysis is also consistent with Roush in finding that BEVs provide significant cost savings to consumers before purchase price parity is achieved. ICCT estimates that typical six-year fuel and maintenance cost savings range from $6,600 to $11,000 per vehicle purchased in 2025, with the greatest absolute savings for the pickup and SUV class. [EPA-HQ-OAR-2022-0829-0786, pp. 20-21]

49 Peter Slowik, Aaron Isenstadt, Logan Pierce, Stephanie Searle. 2022. Assessment of Light-duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Timeframe, ICCT. https://theicct.org/publication/ev-cost-benefits-2035-oct22/

[See original attachment for Table 3: Summary of year by which BEV price parity is reached] [EPA-HQ-OAR-2022-0829-0786, pp. 20-21]

Source: ICCT, Assessment of Light-duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Timeframe [EPA-HQ-OAR-2022-0829-0786, pp. 20-21]

Following their 2022 cost analysis, ICCT conducted a study assessing the future impact of the IRA on electrification rates for light-, medium-, and heavy-duty sales in the U.S. through 2035.50 They estimate, on average over the period 2023-2032, the IRA tax credits will reduce light-duty EV purchase costs by $3,400 to $9,050. ICCT concludes that the IRA will accelerate electrification of both light-duty and heavy-duty sectors. By 2030, the study estimates a range of 48-61% EV share of light-duty vehicles in the U.S., increasing to 56-67% by 2032, which is the last year of the IRA credits. [EPA-HQ-OAR-2022-0829-0786, pp. 20-21]

50 Peter Slowik, Stephanie Searle, Hussein Basma, Josh Miller, Yuanrong Zhou, Felipe Rodríguez, Claire Buysse, Sara Kelly, Ray Minjares, Logan Pierce, Robbie Orvis and Sara Baldwin. 2023. Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States, ICCT and Energy Innovation Policy & Technology LLC. https://theicct.org/publication/ira-impact-evs-us-jan23/ (Attachment P)

Organization: Hyundai Motor America

Further, the Agency should reevaluate the assumption that price parity will be achieved by the mid- 2020s. Price parity with ICE is key to the high rates of BEV adoption required under the Proposed Alternative; it is also highly dependent on reducing material costs and costs of battery technology improvements. The recent increase in raw material prices and the unstable nature of battery system material costs in the market are just two examples of the headwinds to price parity. It is exacerbated by the cost impacts resulting from IRA’s battery component, critical minerals, and final assembly requirements even accounting for the benefits of the IRA’s 45X tax credits. This also underscores the need for the EPA to study the true costs of the IRA as described above and its impacts to ICE-BEV price parity attainment. [EPA-HQ-OAR-2022-0829-0599, pp. 6-7]

Organization: International Council on Clean Transportation (ICCT)

ICCT also believes that EPA has overestimated battery electric vehicle (BEV) costs. In in-depth study, we find that incremental BEV costs relative to their combustion vehicle counterparts are much lower than the estimates by EPA by about $2,300 (pickups) to about $5,300 (crossovers) in 2027. For 2032, EPA finds that BEVs have incremental costs of about $3,000 to $5,000; during this same timeframe, the ICCT study finds that BEVs will be cheaper to purchase than comparable gasoline vehicles. This difference is the result of several factors. We find that on average, battery pack costs in the ICCT analysis are about $3,700 less than in EPA’s analysis in 2027 and about $5,200 less than in EPA’s analysis in 2032. We believe EPA has overestimated pack size, BEV energy consumption, and pack-level costs ($/kWh). If EPA were to update their analysis with the data and evidence regarding BEV cost and technical specifications based on the ICCT cost study, BEV costs would be lower, the costs of compliance would be lower, and the net benefits would be greater. [EPA-HQ-OAR-2022-0829-0569, p. 4]

An ICCT and Energy Innovation study assesses the future impact of the IRA on electrification rates for LDV sales in the United States through 2035.4 We analyze the value of the personal and commercial EV tax credits, factoring in the various supply chain, income, and price caps on new EVs, and combine this with new estimates of future light-duty EV cost declines. We find that, on average over the period 2023–2032, the IRA tax credits will reduce EV purchase costs by $3,400 to $9,050 and accelerate the timing for price parity with combustion vehicles. Using methodologies from the Energy Policy Simulator, we project how these changing costs and incentives over time will affect the LDV markets in the United States. [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

4 Slowik, P., Searle, S., Basma, H., Miller, J. Zhou, Y., Rodriguez, F., Buysse, C., Kelly, S., Minjares, R., Pierce, L. (ICCT) Orvis, R., and Baldwin, S. (Energy Innovation). (2023). Analyzing the impact of the inflation reduction act on electric vehicle uptake in the United States. https://theicct.org/publication/ira-impact-evs-us-jan23/

Figure 1 summarizes the results from the ICCT and Energy Innovation IRA study. It shows the findings of estimated new electric vehicle sales shares for different IRA scenarios depending on how certain provisions are implemented and how the value of incentives is passed on to consumers. The figure shows our modeled projection of how the IRA will accelerate electrification. By providing thousands of dollars in financial incentives, the IRA unlocks widespread consumer benefits. We find rapid projected EV uptake when considering both expected manufacturing cost reductions and the IRA incentives, as well as state policies. By 2030, we find a range of a 48%–61% projected EV sales share, increasing to 56%–67% by 2032, the final year of the IRA tax credits. [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

SEE ORIGINAL COMMENT for Figure 1. Baseline, Low, Moderate, and High projections of EV sales share for light-duty vehicles, considering ACC II adoption in only California versus increased states [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

5 ICCT and Energy Innovation. (2023). Analyzing the impact of the inflation reduction act on electric vehicle uptake in the United States. https://theicct.org/publication/ira-impact-evs-us-jan23/

EPA Summary and Response

Summary:

EDF commented that, even without the IRA tax credits, BEVs purchased in 2030 could see an average cumulative net savings of about $15,000 over the lifetime of the vehicle, across all classes and segments. EDF also commented on the issue of price parity between BEVs and ICE vehicles. Hyundai Motor America commented that EPA should reevaluate the assumption that price parity will be achieve by the mid-2020s, noting that it is key to the high rates of BEV adoption required under the proposal. ICCT also provided an analysis based on a variety of assumptions that pointed to lower costs for PEVs than in the proposal, and cited outlooks for cost parity or price parity.

Response:

EPA appreciates the comments from EDF and ICCT. EPA agrees that BEVs can provide significant savings to consumers relative to ICE vehicles over the lifetimes of those vehicles. Regarding projections of BEV or PHEV prices lower than those forecast by EPA, we appreciate this input but continue to rely on full vehicle costs that are generated by the cost inputs and other assumptions to OMEGA which we have described in other sections and which EPA believes represent the best available data.

Regarding the issue of cost parity or price parity, including general comments as well as Hyundai's suggestion that EPA reevaluate the issue of cost/price parity between BEVs and ICE vehicles, we have reevaluated most of our technology cost estimates used in our OMEGA modeling. Note that while we do not analyze price parity explicitly as part of our OMEGA modeling analysis, we do discuss the literature on the topic in the preamble for both the proposed and final rules (see Section IV.C.1 of the preamble), and note certain projections that price parity, particularly on a total cost of ownership basis, would begin to occur by the mid- to late-2020s. We discussed these projections as part of our general assessment that interest in, and sales of, BEVs are rapidly increasing in the automotive market. This assessment supports our general view that it is reasonable to account for BEV technologies in assessing the stringency of the standards. Specifically, when doing our technical analysis, we do not believe it is necessary to project or achieve parity between BEV and ICE vehicles, but instead we estimate technology costs and weigh the relative costs and emission reduction potential in assessing the combination of technologies that manufacturers could use to meet the standards.

12.3 - ICE vehicle technologies

Comments by Organizations

Organization: Alliance for Automotive Innovation

6. Modeling of Internal Combustion Engine Vehicles

Some commenters may advocate that EPA maximize CO2 reductions in internal combustion engine vehicles while also driving large increases in EV market share through the adoption of yet more stringent standards than those proposed by EPA. Such comments do not adequately consider the massive human and capital resource requirements of the transition to EVs, and the limited nature of such resources. They also fail to recognize that revenue from relatively more profitable ICEVs is generally being used by legacy automakers to fund investments in EVs. [EPA-HQ-OAR-2022-0829-0701, pp. 111-112]

Other commenters or EPA may downplay concerns associated with the level of EV market share estimated by EPA to meet its proposed standards or the alternatives under consideration, noting that improvements in ICE vehicles could reduce the overall EV market share requirements. Such views again ignore capital and human resource availability, and furthermore fail to consider that such improvements would only have a minimal effect on EV market share given the level of standards under consideration. [EPA-HQ-OAR-2022-0829-0701, pp. 111-112]

We provide the following comments to EPA in support of our position that EPA should assume de minimis improvements in the overall efficiency of the average internal combustion engine vehicle, allowing manufacturers the flexibility to focus investments on the design and production of EVs, and improving ICEVs only where it makes sense to do so. [EPA-HQ-OAR-2022-0829-0701, pp. 111-112]

a) EV vs. ICE Investments

Automakers are focusing investments on electric vehicles. According to the Center for Automotive Research, recent North American investment announcements are overwhelmingly on electric vehicles and batteries (Figure 32).203 [EPA-HQ-OAR-2022-0829-0701, pp. 111-112]

203 Data presented in this figure includes non-plug-in hybrid electric vehicle investments. However, we believe that it is reasonable to assume that almost all of the electric vehicle / battery related investments shown are for plug-in electric vehicles.

Figure 32: Announced Automaker EV/Battery Related Investments, North America, 2009-2023 YTD.204 [EPA-HQ-OAR-2022-0829-0701, pp. 111-112]

204 Center for Automotive Research (Apr. 2023), Book of Deals: Automaker Announced Investment.

b) ICEV Improvement as a Substitute for BEVs

EPA asserts that the standards are performance-based, and therefore improving ICEVs can reduce the overall level of electrification required to meet GHG standards.205 While technically accurate, such actions would only have a small effect on the degree of electrification required by the proposed standards. [EPA-HQ-OAR-2022-0829-0701, pp. 112-114]

205 NPRM at 29342. ("At the same time, we note that the proposed standards are performance-based and do not mandate any specific technology for any manufacturer or any vehicle. Moreover, the overall industry does not necessarily need to reach this level of BEVs in order to comply—the projection in our analysis is one of many possible compliance pathways that manufacturers could choose to take under the performance-based standards. . .")

Although the standards are, in theory, technology-neutral, the level of standard proposed is far beyond the capabilities of non-electrified vehicles. For example, the best-performing (relative to target) MY 2022 or MY 2023 vehicle, a strong hybrid, still exceeds its target by MY 2029 and is almost 40 g/mile worse than its MY 2032 target.206 In Figure 33, we show MY 2022 and MY 2023 207 vehicles relative to their proposed MY 2032 target. The MY 2032 target is shown as neutral (zero). Models with 2-cycle CO2 emissions that exceed the standard are shown as negative (i.e., worse than target) and models with 2-cycle CO2 emissions lower than target are shown as positive (i.e., better than target). Only ZEVs are consistently better than the proposed MY 2032 target. Current PHEVs are both better and worse than the MY 2032 target, depending on the specific model. Strong hybrid electric models are currently about 40 g/mile or more worse than their targets. The best mild- and non-hybrid ICEVs are generally over 100 g/mile worse than the proposed MY 2032 target. [EPA-HQ-OAR-2022-0829-0701, pp. 112-114]

206 Calculation by Auto Innovators based on the NPRM and data from S&P Global Vehicle Technical Intelligence Platform (VTIP). Includes calculations based on content supplied by S&P Global Mobility VTIP – Vehicle Technical Intelligence Platform (June 2023). The S&P Global Mobility reports, data and information referenced herein (the "S&P Global Mobility Materials") are the copyrighted property of S&P Global Mobility and its subsidiaries and represent data and research published by S&P Global Mobility and are not representations of fact. The S&P Global Mobility Materials speak as of the original publication date thereof and not as of the date of this document. The information provided in the S&P Global Mobility Materials is subject to change without notice and S&P Global Mobility has no duty or responsibility to update the S&P Global Mobility Materials. Moreover, while the S&P Global Mobility Materials reproduced herein are from sources considered reliable, the accuracy and completeness thereof are not warranted, nor are the opinions and analyses which are based upon it. Opinions, statements, estimates and projections in this message or other media are solely those of the individual author(s). They do not reffect the opinions of S&P Global Mobility or any of its affiliates. S&P Global Mobility has no obligation to update, modify or amend this message or other media, or to otherwise notify a recipient thereof, in the event that any mater stated herein, or any opinion, projection, forecast or estimate set forth herein, changes or subsequently becomes inaccurate. Any content, information and any materials provided in this message or other media is on an "as is" basis. S&P Global Mobility makes no warranty, expressed or implied, as to its accuracy, completeness or timeliness, or as to the results to be obtained by recipients and shall not in any way be liable to any recipient for any inaccuracies, errors or omissions herein. Without limiting the foregoing, S&P Global Mobility shall have no liability whatsoever to a recipient of any message or media, whether in contract, in tort (including negligence), under a warranty, under statute or otherwise, in respect of any loss or damage suffered by such recipient as a result of or in connection with any actions, opinions,

recommendations, forecasts, judgments, or any other conclusions, or any course of action determined, by it or any third party, whether or not based on the content, information or materials contained herein.

207 Both MY 2022 and 2023 vehicles are used to ensure that the changing availability of some MY 2023 hybrids does not result in missing certain better-performing (relative to GHG standards) models. We acknowledge that there may improvement in certain models between MYs 2022 and 2023, but in general, most models see little or no change between model years, so overall conclusions drawn from such a view are likely still accurate.

Figure 33: MY 2022/2023 Light-Duty Models 2-Cycle CO2 Performance Relative to Proposed MY 2032 Target208 [EPA-HQ-OAR-2022-0829-0701, pp. 112-114]

208 Calculations by Auto Innovators. Data sourced from S&P Global Vehicle Technical Intelligence Platform.

While some ICEVs might be improved, thereby reducing BEV market share requirements to reach the fleet average target, such approaches are unlikely to significantly reduce the BEV market share projected by EPA as necessary to meet the proposed targets. Wells Fargo estimates that BEV market share will need to be 62% to meet the proposed standards, even if automakers "maximize hybrid mix."209 [EPA-HQ-OAR-2022-0829-0701, pp. 112-114]

209 Wells Fargo Equity Research (Jun. 9, 2023), Will Automakers Get Regulated to Unprofitability?

c) ICE Emissions During the Transition to Electric Vehicles

During the transition to electric vehicles, ICE CO2 emissions may not remain completely stable or improve significantly. [EPA-HQ-OAR-2022-0829-0701, pp. 114-115]

Manufacturers are unlikely to remove technologies that they have already sunken investments into. However, an EV model may replace an ICE model that has relatively lower emissions than other ICE models. The overall emissions of the fleet would improve, but the emissions from the remaining ICE portion of the fleet would be higher on average. This is not and should not be considered backsliding. [EPA-HQ-OAR-2022-0829-0701, pp. 114-115]

A similar effect might be observed with industry-average emissions in the remaining portion of the ICE fleet. While all manufacturers are moving toward electric vehicles, they are unlikely to do so at exactly the same rate. If a manufacturer with relatively lower CO2 emission vehicles increases EV market share more quickly than industry on average, the remaining ICE vehicles in the fleet would have higher average emissions. Again, the higher average emissions of the ICE fleet would not be related to removal of technology from the existing ICE vehicles, and should not be considered backsliding. [EPA-HQ-OAR-2022-0829-0701, pp. 114-115]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

Continued improvement in internal combustion engine vehicles is needed

Even under Alternative 1, there would still be over 40 million new ICEVs sold over the life of these standards. These vehicles could be on the road for two decades, contributing significantly to local air pollution, climate change, and costing drivers considerably at the pump. It is critical that the new standards continue improvements on ICEV efficiency while also pushing the market to electrify. Our modelling shows that under EPA's achieved emissions rates, ICEV emission rates would needlessly rise and would be as high as MY 2023 levels. Under the proposed standard, ACEEE estimates that average ICEV emissions could increase by up to 2.9% per year, contributing an extra 805 million metric tons of lifetime CO2 compared to a future where ICEV performance flatlines at model year 2026 levels. This is equivalent to an approximately 11% increase in emissions from the projected savings in the rule of 7,300 million metric tons of CO2 (FR 29198, Table 3). [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

This calculation assumes BEV penetration reaches what EPA projects under its proposal and includes upstream emissions accounting for all vehicles. However, it also factors in the reduction of credits, which limits the increase in ICEV emissions compared to model year 2026 (when there are significantly more credits available). Removing the effects of the proposed off-cycle and A/C credit changes in both model year 2026 and under the proposed standards means that ICEVs emissions reductions backslide even further, reaching almost 5% annually. [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

EPA also projects that strong hybrids are completely phased out by MY 2031 in the baseline scenario despite their wide and growing usage today (FR 29329, Table 83). In 2021, hybrids accounted for more than 15% of the fleets of five automakers (collectively responsible for producing 5.5 million vehicles for the US market.) Hybrid vehicles made up 20% of the lineup for 4 out of 5 of those automakers. .9 Hybrid technology is a proven way to considerably reduce the emissions from ICEVs and is a pathway for automakers to meet stronger standards. This is evident in the fact that EPA projects fleetwide strong hybrid penetration to be upwards of 9% in MY 2029 under Alternative 1 compared to only 2% under the proposed standards. Different automakers will choose different compliance pathways and those that already produce a significant number of hybrids could continue to do so, leveraging the investments they've made thus far, to meet the emissions levels in Alternative 1. [EPA-HQ-OAR-2022-0829-0642, pp. 2-3]

9 https://www.epa.gov/automotive-trends

Under EPA's proposed standards, rapid electrification can allow automakers to meet their targets even while letting ICEVs worsen, squandering some of the emissions benefit of electrification and missing an important opportunity for further emissions reductions. This is unacceptable given that mature emissions-reducing technologies, such as hybridization, already exist on the market today and often go underutilized by manufacturers. Our modeled findings are consistent with EPA's own analysis, which projects that ICEV emissions rates will increase over the life of the standard. In fact, EPA compliance modeling indicates that manufacturers will go so far as to remove emissions-reducing technologies from many ICEV models, a completely counterproductive behavior.10 On the other hand, if manufacturers do not move backwards on ICEV efficiency, they will be able to meet the standards with fewer BEVs than EPA projects, also an undesirable outcome. In either case, the conclusion is that the standards should be strengthened to incentivize ICEV improvements more strongly. [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

10 Based on analysis of EPA's OMEGA model outputs, 2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv

Just a 3% annual reduction in the average emissions for ICEVs — compared, for example, to the 4.6% per-year reduction called for under the 2012 standards for MY 2017-202511 — could lead to a further reduction of almost 800 million metric tons of CO2 and ICEVs that are about 30% cleaner compared to EPA's proposal. Much of this reduction could come from the continued adoption of hybrid vehicles in the US market. EPA expects little contribution from strong hybrids in meeting the proposed standard even though hybridization is a proven technology with decades of usage, as discussed above. EPA projects that strong hybrids will be completely phased out under the proposed standards by 2032 (FR 29329, Table 83), despite hybrids accounting for a record 10% of new vehicles offerings in model year 2022.12 We should not be moving backwards on ICEV performance and the penetration of proven efficiency technologies like hybridization over the life of these standards. [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

11 https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EZ7C.PDF?Dockey=P100EZ7C.PDF

12 https://www.epa.gov/automotive-trends

The standards should take full advantage of the potential for medium-duty ICEV efficiency gains

The expected GHG emissions trajectory of medium-duty ICEVs under the proposal is essentially flat. Backing out ICEV emissions rates from the projected achieved values for all vehicles (FR 29328, Table 26) together with projected BEV adoption rates (FR 29331), one finds that ICE pickup emissions would decline by about 2% per year and ICE vans' emissions would increase by 2% per year under the proposal. ICE MDVs overall would improve at 1% per year. As in the case of light-duty ICEVs, the backsliding of medium-duty ICE van emissions would be unnecessary and counterproductive. These projections may indicate unrealistic assumptions in EPA's compliance modeling; otherwise, the standard should be tightened to prevent this outcome. [EPA-HQ-OAR-2022-0829-0642, p. 10]

ICE pickup emissions rates would decline under the proposed standards at a rate close to the required reduction rate in the Phase 2 heavy-duty rule (2.5% per year for heavy-duty pickups and vans).22 However, if MDV pickups are to reach only 19% EV share in 2032 as EPA projects, much more needs to be done to promote ICE pickup efficiency gains as plans take shape to zero out transportation GHG emissions entirely over the next two decades. EPA acknowledges that hybrids (as well as PHEVs) have high potential for these vehicles (DRIA p.1-20) yet provides no explanation of why substantial adoption is not feasible or desirable. The stringency of the standards should be set to promote adoption of the most efficient ICE technology until any obstacles to electrification can be overcome. [EPA-HQ-OAR-2022-0829-0642, p. 10]

22 Federal Register, Vol. 81, No. 206. October 25, 2016. Table VI-7.

EPA's assessment of the potential for medium-duty ICEV improvements in the proposal is perfunctory at best. The proposal states: "The feasibility of the 2027-2032 GHG standards is based primarily upon an assessment of the potential for a steady increase in MDV electrification, primarily within the van segment" (DRIA p.1-21). For medium-duty ICEV pickup emissions reduction opportunities, the reader is referred to the discussion of efficiency technologies in the 2016 heavy-duty Phase 2 rulemaking (DRIA p.3-12). While stating that "[t]he agency still expects to see additional penetration of many of these technologies" (DRIA p.1-20), EPA provides no account of the extent to which they could cost-effectively reduce medium-duty pickup emissions rates and how this relates to the projected 2% per year improvement project for these vehicles. [EPA-HQ-OAR-2022-0829-0642, p. 10]

Organization: The Aluminum Association

The value of vehicle lightweighting in supporting GHG emissions reductions for internal combustion engine powered vehicles has been well documented by EPA, NHTSA, and others across prior rulemakings6,7,8. As internal combustion engine vehicles will continue to comprise a significant percentage of vehicle sales during the scope of this rulemaking, the Association encourages EPA to continue recognition of this value as applied to ICE vehicles as it considers revisions to the proposed rule toward its finalization. [EPA-HQ-OAR-2022-0829-0704, pp. 6-7]

6 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, https://www.federalregister.gov/documents/2010/05/07/2010-8159/light-duty-vehicle-greenhouse-gas-emission-standards-and-corporate-average-fuel-economy-standards (Accessed June 23, 2023)

7 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, https://www.govinfo.gov/content/pkg/FR-2012-10-15/pdf/2012-21972.pdf (Accessed June 23, 2023)

8 Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model- year-light-duty-vehicle-greenhouse-gas-emissions-standards (Accessed June 23, 2023)

Lightweighting also plays an important role in BEV design considerations as well. In 2022, the Association released groundbreaking research9 wherein it specified three BEV's, analyzed material substitution potentials, assessed the weight, cost, and efficiency impacts of those material substitutions, calculated their effects on vehicle fuel economy and GHG emissions, and developed concluding recommendations. [EPA-HQ-OAR-2022-0829-0704, pp. 6-7]

9 Aluminum Value In Battery Electric Vehicles, https://drivealuminum.org/wp-content/uploads/2022/05/2022-ATG-BEV-Lightweighting-Study_Exec-Summary.pdf (Accessed June 23, 2023)

In particular, this research demonstrates that, despite expected improvements in battery cost and storage density, aluminum lightweighting solutions are expected to remain economically attractive for at least the next decade, and that lightweighting battery electric vehicles with aluminum provides additional economic benefits when the entire sales fleet is considered, creating additional economic benefit and further increasing the economic viability of aluminum lightweighting. [EPA-HQ-OAR-2022-0829-0704, pp. 6-7]

Organization: American Fuel & Petrochemical Manufacturers

Internal combustion engines (ICEs) will continue to play a significant role in the new vehicle fleet in MY 2025–2035 in ICE-only vehicles, as well as in hybrid electric vehicles (HEVs) from mild hybrids to plug-in hybrids but will decrease in number with increasing battery electric vehicle (BEV) and fuel cell electric vehicle penetration. In this period, manufacturers will continue to develop and deploy technologies to further improve the efficiency of conventional powertrains, for ICE-only vehicles and as implemented in HEVs. Developments in the ICE for hybrids will advance toward engines optimized for a limited range of engine operating conditions, with associated efficiency benefits. Major automakers are on differing paths, with some focusing their research and development and advanced technology deployment more squarely on BEVs, and others more focused on advanced HEVs to maximize ICE efficiency.6 [EPA-HQ-OAR-2022-0829-0733, pp. 3-4]

6 Note that the term “zero emissions vehicle” (“ZEVs”), and even near-ZEVs as used by EPA, is a misnomer. ZEVs are not actually zero emission when accounting for the vehicle lifecycle, including GHG and criteria pollutant emissions associated with electricity generation required for charging certain ZEVs and production of the ZEV vehicle and battery. We recognize that in the Proposed Rule, EPA uses “ZEV” to refer only to those vehicles with a specific meaning under California’s EV program, but for ease of review, “ZEVs” is used throughout these comments and encompasses all of the EV technologies, including plug in electric vehicles (“PEVs”) such as plug-in hybrid electric vehicles (“PHEVs”) and battery electric vehicles (“BEVs”).

Organization: American Petroleum Institute (API)

Vehicles powered by internal combustion engines (ICE) offer “outstanding “drivability and reliability” according to the Department of Energy62 and “increasing the effciency of internal combustion engines (ICEs) is one of the most promising and cost-effective approaches to dramatically improving the fuel economy of the on-road vehicle fleet in the near-to mid-term.” Increasing sales of EVs does not necessarily mean they are more reliable. According to this survey data63 “[e]lectric cars are less reliable” than cars powered by petroleum, where software related problems cause reliability issues for consumers. In a Consumer Reports survey,64 data reported by EV owners indicate that EVs, as a category, have “more frequent problems” compared to conventional vehicles. EPA should take into account these factors in their analysis. [EPA-HQ-OAR-2022-0829-0641, p. 19]

62 U.S. Energy Information Administration. “Transportation Demand Module Assumptions.” March 2023. https://www.energy.gov/sites/default/files/2015/11/f27/QTR2015-8C-Internal-Combustion-Engines.pdf.

63 Hull, R. “Electric cars are LESS reliable than petrols and diesels with nearly a third reporting faults taking longer to fix -and Tesla is rated worst overall, says Which?” March 2022. Daily Mail. https://www.dailymail.co.uk/money/cars/article-10569557/Electric-cars-reliable-petrol-diesel-says-Which.html.

64 Tucker, S. December 2022. “Consumer Reports: EVs Less Reliable Than Gas-Powered Cars.” Kelley Blue Book. https://www.kbb.com/car-news/consumer-reports-evs-less-reliable-than-gas-powered-cars/.

Organization: Arizona Department of Environmental Quality (ADEQ)

While ADEQ is supportive, we are curious as to why this proposed rule is less stringent than similar rules proposed by multiple states. ADEQ recognizes that EPA has adopted some state-implemented electric vehicle program elements; however, ADEQ encourages EPA to consider further strengthening its proposal by continuing to improve upon and incentivize advancements in internal combustion engine technology. By moving the nation towards zero emission vehicle (ZEV) technology and improving upon the existing traditional combustion engine technology, EPA will further reduce criteria pollutants and greenhouse gas emissions from the transportation sector. [EPA-HQ-OAR-2022-0829-0533, pp. 1-2]

Organization: BorgWarner Inc.

Hydrogen combustion engines (H2ICE) are a cost-effective advanced technology that can make a significant positive impact to the environment, and we urge EPA to recognize H2ICE as a technology solution in the Proposal, especially for heavier MD applications. As the IRA and IIJA are providing billions of dollars for the development of a hydrogen economy, EPA should support these efforts with program incentives. [EPA-HQ-OAR-2022-0829-0640, pp. 4-5]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Given the urgency of the climate crisis, as well as the opportunity to provide real-world cost savings to consumers, CARB recommends that U.S. EPA adopt additional regulatory mechanisms to ensure that all cost-effective technologies that get integrated into conventional vehicle designs will continue to be installed throughout vehicle line-ups and throughout the program lifetime to maintain emission reductions from conventional vehicles and save consumers money. Such a mechanism is especially important in the federal context where there is no ZEV sales requirement and thus a significant fraction of internal combustion engine vehicles are expected to persist in the new vehicle fleet longer than they might in California; those vehicles should not emit more than their counterparts from just a few years prior. In the absence of policies specifically focused on addressing this issue, CARB notes that a tighter fleet average standard could mitigate some of this risk and that manufacturers would have a technically feasible pathway to comply with tighter standards by simply retaining these proven, already deployed cost-effective technologies. [EPA-HQ-OAR-2022-0829-0780, pp. 15-16]

Organization: California Attorney General's Office, et al.

Our States and Cities add three observations to EPA's analysis of costs and lead time. First, EPA's projected costs likely overstate the actual costs attributable to reaching the standards in the allotted lead time, due to conservative assumptions in EPA's no-action case that omit the myriad state and local actions to promote electric vehicle adoption. See supra 18-21; CARB Comment at 16. Second, state and local agencies are implementing ambitious programs to ready power grids and charging infrastructure for the increased adoption of electric vehicles and the associated increase in electricity demand, which further supports EPA's feasibility analysis. Third, although internal-combustion-engine vehicles will make up a smaller portion of the national fleet, it is imperative that EPA's standards continue to encourage the application of feasible, cost-effective emission-reduction technologies to these vehicles, as they still represent a significant source of GHG, criteria, and toxic pollutant emissions. [EPA-HQ-OAR-2022-0829-0746, p. 33]

3. EPA Should Ensure that Internal Combustion Engine Vehicles Continue to Apply Emission-Reduction Technologies

EPA projects that, aside from electric vehicle adoption, auto manufacturers are likely to apply advanced technologies to reduce the GHG and criteria emissions of their internal-combustion-engine vehicles, albeit in lower numbers than is otherwise feasible. 88 Fed. Reg. at 29,330. This highlights an important aspect of the proposed standards: that even as the industry transitions to zero-emission vehicles, internal-combustion-engine vehicles will continue to make up a sizeable portion of new vehicle sales. These new internal-combustion-engine vehicles will continue to drive on the roads and emit GHGs, criteria pollutants, and air toxics for potentially decades, so it is crucial that EPA's standards continue to require improvements from these vehicles' emissions performances. Because of the standards' fleet average structure, a manufacturer's production of zero-emission vehicles may enable it to forego improving or even backslide on internal-combustion-engine vehicles' emissions performance. Indeed, as the California Air Resources Board's comment discusses, the compliance pathway EPA projects for its proposed standards show automakers removing emission-reduction technologies from internal-combustion-engine vehicles while still complying with the proposed standards. CARB Comment at 18-22.

Therefore, even if EPA were to forego encouraging the application of zero-emission technologies, it would still be obligated to tighten these emission standards beyond the proposed standards simply to keep pace with that trend and ensure the continued integrity of its emissions program as to new internal-combustion-engine vehicles. [EPA-HQ-OAR-2022-0829-0746, pp. 35-36]

This dynamic underscores the need for EPA to adopt standards more stringent than those proposed, and to eliminate outdated or redundant compliance flexibilities as proposed and as discussed below. We urge EPA to continue to monitor the industry's ongoing transition to zero-emission vehicles and ensure all of its standards continue to spur necessary and feasible reductions in vehicle pollution of all kinds. [EPA-HQ-OAR-2022-0829-0746, pp. 35-36]

Organization: Center for American Progress (CAP)

c. Improvements for ICE Vehicles–EPA must ensure actual multi-pollutant emissions reductions for ICE vehicles. Under the current proposal and Alternative 1 there is no guarantee that ICE vehicles lower their emissions despite the fact that there is proven technology available to accomplish that goal. Part 3.1.1.1 of EPA's DRIA notes adoption rates of key advanced ICE technology. The technology with the highest rate of adoption across all manufacturers is 7 or more gears, with an adoption rate of 57 percent. This shows that opportunities exist for further emissions reductions from ICE vehicles.25 EPA's final rule should ensure that MY2027 through MY2032 ICE vehicles make increased use of technology that decreases both GHG and criteria pollutant emissions. [EPA-HQ-OAR-2022-0829-0658, pp. 5-6]

25 U.S. Environmental Protection Agency, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis," April 2023, available online: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Organization: Center for Biological Diversity et al.

EPA's own data shows that multiple technologies exist to make the millions of gas-powered vehicles sold in the next decade much more efficient, from gasoline direct injection and continuously variable transmission to hybrid technologies. The fact that some automakers use some of these technologies some of the time shows EPA that it is possible for automakers to implement more of them consistently. In its final rule, EPA should model widespread adoption of these well-established technologies, and issue even more ambitious standards that hold automakers to the higher standards. At a minimum, this means strengthening the rule to account for annual improvements to the gas-powered light-duty fleet of at least 3.5%, as the International Council on Clean Transportation recommends.6 [EPA-HQ-OAR-2022-0829-0671, p. 2]

6 Slowik, Peter & Miller, Josh, Aligning the U.S. Greenhouse Gas Standard for Cars and Light Trucks With the Paris Climate Agreement, International Council on Clean Transportation (Dec. 19, 2022), https://theicct.org/us-ghg- standard-paris-agreement-dec22/.

These changes would have immediate consequences on the criteria and carbon pollution that continues to poison vulnerable communities and populations. With the climate emergency worsening each day, and public health concerns adding cumulative stress to the lives of vulnerable Americans, there is no time for delay. The rise of EVs is promising but by itself will not guarantee a clean air future at the speed that science and justice require. We urge you to curb pollution from the gas-powered fleet in this critical rulemaking to help ensure a clean and just transportation future for all. [EPA-HQ-OAR-2022-0829-0671, p. 2]

EPA claims that technologies to improve gas-powered cars, pickups, and SUVs have already been widely implemented, and that electrification is therefore the most effective pathway to further emissions reductions.2 The reality is more complicated. Many emissions control technologies are proven and cost-effective, yet manufacturers have dallied to implement them across their fleets. For example, turbocharged engines, which allow for more efficient engine design and operation, have been adopted in 80% of Ford's vehicles, but only in 37% of GM's fleet, 13% of Stellantis', and 3% of Toyota's.3 Cylinder deactivation, which allows for use of only a portion of the engine when less power is needed, has also been adopted unevenly: it exists in 54% of GM's vehicles, but only 22% of Stellantis', 21% of Ford's, and 3% of Volkswagen's.4 Some automakers continue to shrug their shoulders at proven emissions-reducing technologies. [EPA-HQ-OAR-2022-0829-0671, pp. 1-2]

2 Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium- Duty Vehicles, 88 Fed. Reg. 29,297 (May 5, 2023).

3 EPA Automotive Trends Report 2022, ES-8, https://www.epa.gov/system/files/documents/2022-12/420s22001.pdf.

4 Id.

EPA's actions make a huge difference in whether these powerful technologies are adopted across-the-board or whether some automakers will remain laggards. As EPA acknowledged for fuel injection technology, "one important driver for adoption was increasingly stringent emissions standards."5 EPA's past rulemakings caused significant overall improvements in the gas-powered fleet. Yet with the proposed rule, if automakers manage to achieve the EV targets, emissions reductions from their gas-powered cars and trucks are allowed to stall. Even worse, there is a risk that automakers will backslide on improvements to their gas-powered fleets, arguing that they need to profit from selling more gas-guzzling trucks and SUVs, while also claiming that the added emissions would be canceled out with increased EVs. That equation is unacceptable, and EPA must foresee and prevent it. [EPA-HQ-OAR-2022-0829-0671, pp. 1-2]

5 EPA Automotive Trends Report 2022, p. 72, https://www.epa.gov/system/files/documents/2022-12/420r22029.pdf.

Organization: Consumer Reports (CR)

6. Specific Technical Comments On EPA's Proposal and Modeling

6.1. Internal Combustion Engine Vehicle Backsliding

EPA's modeling accurately considers the high effectiveness of battery EVs at delivering both significant emissions reductions and consumer savings. EPA's modeling finds that EVs are so cost-effective that emissions from the remaining ICE fleet actually increase over the period of the rule by an average of around 4%. This is because EPA's model finds that it would be cost-effective for automakers to remove already developed technology from their ICE vehicles to save money while building more EVs. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

However, this modeling result does not seem likely in the real world. Consumer demand for EVs is rapidly increasing, and technology improvements will mean that the remaining gasoline powered vehicles will have to compete with better and better EV offerings.36 In order to continue to find buyers for their remaining gasoline powered vehicles, automakers will need to make them better, not worse. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

36 Excess Demand, The Looming EV Shortage, Consumer Reports, March 2023, https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf.

Furthermore, this result ignores consumer demand for cleaner, more efficient gasoline vehicles. Consumer Reports' 2022 fuel economy survey found continued strong consumer demand for more efficient vehicles.37 [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

37 Fuel Economy: A Nationally Representative Multi Mode Survey, Consumer Reports, November 2022, https://article.images.consumerreports.org/image/upload/v1670867143/prod/content/dam/surveys/Consumer_Reports_Fuel_Economy_National_September_October_2022.pdf.

- 95% of American drivers said fuel economy is at least somewhat important to them when considering what vehicle to purchase or lease, and seven in 10 (70%) say it is very important or extremely important. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

- 85% of Americans agreed that automakers should continue to improve fuel economy for all vehicle types. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

- 78% of American drivers agreed that they expect each new generation of vehicles available on the market to be more fuel-efficient than the last. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

EPA specifically estimates that hybrid vehicles will drop from 4% of the vehicle fleet in 2027 to 0% of the fleet in 2031 and 2032.38 Research from CR has shown that many hybrids on the market today are extremely cost-effective for consumers, delivering a payback on their cost in 3 years or less, with some delivering savings instantly.39 CR's 2022 nationally representative car buying survey of 6,960 US adults found that 32% of consumers planning to purchase or lease a vehicle within a year were considering a hybrid car or truck.40 While consumer demand for EVs is likely to continue to grow rapidly, EVs do not yet work for all consumer lifestyles, and hybrids offer a viable and cost-effective alternative for these consumers to both reduce their emissions and their fuel spending. EPA's modeling that shows that this popular and cost-effective technology will be completely abandoned by the entire market by the end of the decade is at odds with the data on consumer preferences for these vehicles. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

38 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Draft Regulatory Impact Analysis, EPA-420-D-23-003, Table 13-68

39 Regardless of Gas Prices, Some Hybrids Pay for Themselves Immediately, Consumer Reports, March 2, 2023, https://www.consumerreports.org/cars/hybrids-evs/hybrids-vehicles-pay-for-themselves-a1092610835/.

40 Fuel Economy: A Nationally Representative Multi Mode Survey, Consumer Reports, November 2022, https://article.images.consumerreports.org/image/upload/v1670867143/prod/content/dam/surveys/Consumer_Reports_Fuel_Economy_National_September_October_2022.pdf.

Finally, over the duration of this proposed rule, EVs will be gaining significant market share. As they do so, ICE vehicles will by necessity be losing market share. Automakers will need to make decisions about which ICE vehicles and powertrains to keep producing and which ones to discontinue. The most logical approach to meeting these standards would be to phase out their oldest and least efficient vehicles and powertrains, while keeping their newest, most advanced, and most efficient powertrains. This process has the potential to result in significant improvements in average vehicle emissions without automakers having to deploy any additional technology. For example, in the 2023 model year, the best selling Ford F150 offers ICE variants that range in emissions from 352 g/mi to 741 g/mi.41 This large range in emissions leaves a lot of room for improving fleet performance by focusing future production on the lowest emitting variants and eliminating the highest emitting variants. A more detailed analysis from the Natural Resource Defense Council found that shifting to the lowest emitting powertrains could result in emissions reductions of between 19 and 65 grams per mile, compared to the current sales weighted average, for the 12 best selling vehicles.42 [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

41 Fuel Economy of 2023 Ford F150, U.S. Department of Energy, 2023, https://www.fueleconomy.gov/feg/PowerSearch.do?action=noform&path=1&year1=2023&year2=2023&make=Ford&baseModel=F150&srchtyp=ymm&pageno=1&rowLimit=50.

42 Shifting to Cleaner Gas Engines Can Help Reduce Emissions, Natural Resource Defense Council, July 5, 2023, https://www.nrdc.org/bio/kathy-harris/shifting-cleaner-gas-engines-can-help-reduce-emissions

Given the above, CR makes the following general recommendations to improve EPA's modeling:

- EPA's model should not remove technology that automakers have already invested in adding to their existing ICE vehicles. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

Organization: David Hallberg

I recognize that the primary thrust of the proposed rule is to propel the electrification of the U.S. light-duty vehicle (LDV) fleet. However, we all know that the "ICE (internal combustion engine) Age" is far from over. EPA itself admits that 100 million or more ICE-powered LDVs will be sold over the coming decade, and the average vehicle's life span is more than 12 years. In the years to come literally trillions of miles will be driven on billions of gallons of gasoline, the typical gallon of which contains on average 20% benzene-based octane enhancing compounds (BTEX), in violation of Congressional mandates. [EPA-HQ-OAR-2022-0829-0548, pp. 1-2]

"Since the U.S. regulation was introduced in 2014, direct injection fuel technology, which improves fuel efficiency, has increased the amount of particulate matter gasoline cars emit, industry experts say. Ultrafine particles are harmful because their microscopic size means they can be drawn deep into human lungs. Even under the most aggressive U.S. scenarios for phasing out ICEs, they will likely be sold into the 2030s."There is a strong argument we should do what we can to make ICE vehicles as clean as possible, whatever the speed of electrification," Molden said." [EPA-HQ-OAR-2022-0829-0548, p. 3]

Organization: District of Columbia Department of Energy and Environment (DOEE)

"Backsliding"

DOEE is concerned that EPA's proposal will allow for increased emission rates from non-zero emission vehicles and internal combustion engine (ICE) vehicles as the share of zero emission vehicles (ZEV) increases. EPA's proposed methodology for determining compliance could allow manufacturers to meet the proposed emission standards while potentially allowing emission rates from ICE vehicles to increase because the increased emissions can be offset by greater shares of ZEVs. The bottom line is that as vehicle emissions become cleaner, no vehicle should have the ability to become more polluting. [EPA-HQ-OAR-2022-0829-0550, p. 5]

Newer ICE vehicle models should be federally mandated to be cleaner than earlier models of that vehicle to prevent any theoretical "backsliding." "Backsliding" is inconsistent with air quality and climate goals necessitating feasible, cost-effective criteria pollutant and GHG reductions. The EPA must include regulatory mechanisms to prevent "backsliding" on non-ZEVs by requiring new models to always be as or more efficient than its predecessor. [EPA-HQ-OAR-2022-0829-0550, p. 5]

Organization: Environmental. and Public Health Organizations

EPA has both an opportunity and an obligation to dramatically reduce emissions of greenhouse gases (GHGs) and other pollutants from light-duty vehicles (LDVs) and medium-duty vehicles (MDVs). The Agency's mandate to protect public health and welfare is made urgent by the ever more dire impacts of climate change, as well as the continuing harms to public health from vehicle criteria pollution. And the opportunity to significantly reduce these impacts is clear. Zero-emission vehicles (ZEVs) are not only feasible and cost-reasonable—they are rapidly penetrating the fleet, with more than 250,000 fully battery electric vehicles sold in the first quarter of 2023 alone, a 44.9% increase over the same period last year.1 In addition, numerous emission control technologies for combustion vehicles are also feasible, cost-reasonable, and already extensively deployed on the fleet, yet still have potential for greater application within the fleet of new combustion vehicles that will continue to be produced. [EPA-HQ-OAR-2022-0829-0759, p. 8]

1 Cox Automotive, Another Record Broken: Q1 Electric Vehicle Sales Surpass 250,000, as EV Market Share in the U.S. Jumps to 7.2% of Total Sales (Apr. 12, 2023), https://www.coxautoinc.com/market-insights/q1-2023-ev-sales/.

- As EV market share increases over the course of the rule, EPA should model a reduction in the number of ICE powertrains that automakers continue to build in such a way that the newest and most advanced options are kept, and the oldest and least advanced are phased out over time. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

A. EPA's modeling should more fully incorporate combustion vehicle technologies that reduce greenhouse gas emissions, which would further demonstrate technological feasibility and available compliance pathways.

1. EPA's modeling does not account for the full range of combustion vehicle technology availability and effectiveness.

The technologies EPA assesses to curb GHG emissions from light-duty vehicles are significantly reduced in number and effectiveness compared to the technology assessment supporting the MY 2023-2026 Rule, for which EPA used CCEMS as its modeling tool. In particular, OMEGA2, the modeling tool EPA now employs, omits the following technologies when modeling compliance: advanced 10-speed transmissions, turbocharging with cooled exhaust gas regulation, variable compression ratio engines, and others.120 Moreover, the Agency has adopted many fewer technology packages: in contrast to the 6,500 packages available in the CCEMS modeling for each of the 10 vehicle types, the OMEGA2 modeling is limited to 108 packages for cars and 60 packages for trucks.121 [EPA-HQ-OAR-2022-0829-0759, p. 37]

120 Compare DRIA Table 2-21 with the "Technologies" tab in technologies_NoHCR_LowBEV200_BatteryAdj2023_YearShift.xlsx, a file accompanying the Agency's final modeling supporting the FRIA, as well as Figures 2, 3, and 4 in NHTSA's 2020 CAFE Model Documentation, the documentation included with the agency's CAFE Compliance and Effects Modeling System (CCEMS). NHTSA, CAFE Model Documentation, DOT HS 812 934, EPA-HQ-OAR-2021-0208-0138 (Mar. 2020), at 24-28, Figs 2-4.

121 Here we refer solely to changes in the powertrain. Throughout this section, we do not consider differences in how the road load reduction was modeled, since while that effect was considered discretely in the CCEMS modeling, it was modeled separately and continuously in the OMEGA2 model.

In and of themselves, these changes might not have a significant impact on the modeling if the technologies contained within the packages were sufficiently representative of the relative technical potential for reducing emissions from combustion vehicles. However, there are significant differences between the effectiveness of the packages analyzed by the OMEGA2 and CCEMS models, as well as the maximum improvement they can deliver (Figure VI.A-1).122 Because the OMEGA2 model calculates absolute emissions, effectiveness of the packages is considered relative to the base gasoline package modeled in OMEGA2 for each body type, a direct-injection engine with continuously variable valve timing and five-speed automatic transmission. [EPA-HQ-OAR-2022-0829-0759, p. 37]

122 Owing to differences in the model's architecture, we use representative vehicles from each of the CCEMS classes to obtain the OMEGA2 results using the response surface equations provided. The relevant parameters include the road load coefficients, test weight, and maximum horsepower. Representative vehicles were selected by sales volume, using the classification from the CCEMS model. The identified representative vehicles are: Toyota Corolla, Small Car; Hyundai Elantra, Small Car Perf; Ford Fusion, Med Car; Mercedes C 300, Med Car Perf; Honda CR-V, Small SUV; Ford Escape Titanium, Small SUV Perf; Mercedes GLC 300 4 MATIC, Med SUV; Jeep Grand Cherokee, Med SUV Perf; Toyota Tacoma, Pickup; and Ford F-150 4WD 3.5L EcoBoost, Pickup HT. For the car categories, only unibody packages were defined. For the pickups, only the truck packages were calculated. For SUVs, which can fall into either category, both the car and truck packages were included in the comparison, even if the representative vehicle itself may have been classified as only a light truck.

SEE ORIGINAL COMMENT FOR Figure VI.A-1: Comparison of the effectiveness of packages modeled by EPA to reduce emissions in the Proposal and the MY 2023-2026 Rule [EPA-HQ-OAR-2022-0829-0759, p. 38]

The technology packages modeled in the Proposal using OMEGA2 show a markedly reduced effectiveness compared to the same packages modeled using the CCEMS supporting the MY 2023-2026 rulemaking, as indicated by the increased share of data falling below the X=Y line (black). 74% of the packages modeled in OMEGA2 show a reduced effectiveness. On average, a given OMEGA2 package shows a 3.9 ± 0.3% increase in emissions compared to the prior CCEMS modeling. The most efficient packages show an even greater disparity, with the maximum effectiveness for OMEGA2 showing just a 36% improvement compared to a 53% improvement in CCEMS. [EPA-HQ-OAR-2022-0829-0759, p. 38]

Looking at the relative effectiveness of the modeled packages, it is clear that the CCEMS modeling generally finds a greater level of improvement than the more recent OMEGA2 modeling. Because the benchmark data for the ALPHA modeling supporting OMEGA2 is almost identical to that used to support the previous rulemaking (excepting the Volvo Miller cycle engine, which corresponds most accurately to the prior variable-geometry turbo technology package), and because the changes to the ALPHA model (vis-à-vis the response surface equations) are generally reasonable, as supported by the peer review process, the reason for the disparity in EPA's analysis is unclear. There are some general trends that may be illustrative in assessing the flaws in EPA's more recent modeling. Across all categories of vehicle, the 5-speed automatic transmission package (TRX10) was found to be more efficient than the basic 6-speed automatic (TRX11), which seems implausible and may speak to problems with how the scaling algorithm matches a modeled vehicle's transmission to different engine maps—all the more perplexing since the Agency claims to use the same model as before.123 Similarly, there appears to be little difference in the effectiveness of any of the three hybrid packages, despite significant differences in the underlying engines.124 This is particularly perplexing given that strong hybrids have continued to evolve with each successive generation, and yet, according to EPA's modeling, they appear to be stuck at the efficiency levels of the MY 2019 power-split fleet.125 [EPA-HQ-OAR-2022-0829-0759, pp. 38-39]

123 DRIA at 2-29.

124 Id. at Table 2-2.

125 Id. at Section 2.4.8.6.

In addition to the packages' lack of effectiveness, we question whether these packages cover a sufficiently robust opportunity for reductions from the internal combustion engine. Unfortunately, the answer appears to be that they are also now covering a narrower range than previous modeling (Figure VI.A-2, infra). As expected based on the results discussed above, the shift in the distribution of effectiveness for the current modeling is below that of the CCEMS, but the packages are also overweighted towards less effective packages, in contrast to the symmetric/Gaussian distribution of the CCEMS data. Also of note is the lack of a long tail out to higher effectiveness; as noted previously, while the few hybrid packages available in the CCEMS model can reduce emissions by over 50%, the OMEGA2 packages max out at 36%. This means that about one-third of the assessed maximum potential improvement previously modeled to be available to manufacturers for their combustion vehicle fleets has been eliminated due to unknown factors. [EPA-HQ-OAR-2022-0829-0759, p. 39]

We believe that once these issues have been addressed, it will become apparent that the standards are considerably more feasible than EPA states; that combustion vehicle emissions can be reduced to a much larger degree than EPA assumes; and that even more technologically diverse compliance pathways are available to manufacturers, enabling them to meet the standards at PEV penetration levels lower than EPA projects. [EPA-HQ-OAR-2022-0829-0759, p. 39]

SEE ORIGINAL COMMENT FOR Figure VI.A-2: Available technology packages at different levels of effectiveness [EPA-HQ-OAR-2022-0829-0759, p. 40]

A histogram comparing the share of packages in the current (OMEGA2) and previous (CCEMS) compliance modeling efforts from EPA, grouped by total package effectiveness relative to a GDI engine paired with a 5-speed transmission. It is clear that not only do manufacturers have significantly more package options at, on average, higher effectiveness, but the total absolute range has been condensed as well for the current modeling effort, limiting compliance flexibility for manufacturers in the model that does not reflect the broader range of options available. [EPA-HQ-OAR-2022-0829-0759, p. 40]

VIII. Stronger GHG and Criteria Pollutant Standards for Medium-Duty Vehicles Are Feasible.

We now turn to EPA's proposed emission standards for medium-duty vehicles. Below, we examine the combustion vehicle and zero-emission technologies that can further reduce GHG emissions from the medium-duty fleet, comment on EPA's modeling, address economic considerations, and make suggestions on certain aspects of EPA's regulatory program. We also offer recommendations for the Tier 4 NMOG+NOx standards and PM requirements. As detailed below, strong GHG and criteria pollutant emission standards for MDVs are feasible and cost-reasonable. [EPA-HQ-OAR-2022-0829-0759, p. 64]

A. EPA must strengthen its GHG standards for MDVs.

EPA's proposed GHG standards for MDVs significantly underestimate the potential for feasible emissions reductions from the Class 2b-3 fleet, particularly pickup trucks. EPA has primarily focused on the electrification of MDVs in setting its standards.169 However, not only has it underestimated the share of MDVs that could be electrified, it has underestimated the technologies available to reduce GHG emissions from gasoline- and diesel-fueled vehicles. EPA should adopt more stringent final standards for MDVs that reflect greater application of both the zero-emission powertrain and conventional emission control technologies that are feasible and widely available. [EPA-HQ-OAR-2022-0829-0759, p. 64]

169 DRIA at 1-21: "The feasibility of the 2027-2032 GHG standards is based primarily upon an assessment of the potential for a steady increase in MDV electrification, primarily within the van segment."

1. The combustion vehicle technology pathways show the feasibility of stronger standards.

EPA proposes as its 2027 standard the current (Phase 2) standards for diesel pickups and vans, and then adjusts those standards in the future based on assumptions about the level of electrification within the fleet. In fact, in EPA's modeling, combustion MDVs actually increase average direct tailpipe emissions by 1.5% between 2022 and 2032, with the increase being even larger for the Phase 2 baseline. The modeling thus indicates that no technological improvements to combustion MDVs are needed to comply with even the existing Phase 2 standards through 2027.170 [EPA-HQ-OAR-2022-0829-0759, p. 64]

170 This remains true for the "No IRA" sensitivity, though there is virtually no difference in the assumed production of electric MDVs between the default modeling run and this sensitivity case, indicating the degree to which electrification is expected to take off in the commercial van space due to improved TCO.

Subsequent to finalization of the Phase 2 standards in 2016, a number of technologies have been developed that EPA did not originally consider in establishing those standards; nor were the Phase 2 standards predicated on the full adoption of even those technologies that were identified at the time. As EPA noted in its Phase 3 heavy-duty vehicle proposal: "In developing the Phase 2 CO2 emission standards, we developed technology packages that were premised on technology adoption rates of less than 100%. There may be an opportunity for further improvements and increased adoption through MY 2032 for many of these technologies included in the heavy-duty (HD) GHG Phase 2 technology package used to set the existing MY 2027 standards."171 [EPA-HQ-OAR-2022-0829-0759, p. 65]

171 88 Fed. Reg. at 25960.

By ignoring technologies for Class 2b-3 combustion vehicles that could achieve emissions reductions beyond the Phase 2 standards, EPA is setting its MDV standards below a level of readily achievable technology adoption (and, indeed, many of these technologies are already being deployed). Below, we walk through a number of the technologies that EPA should assume will be deployed by MDV manufacturers in the timeframe of the MDV Proposal. [EPA-HQ-OAR-2022-0829-0759, p. 65]

a. EPA should consider additional compression-ignition (diesel) engine technologies. [EPA-HQ-OAR-2022-0829-0759, p. 65]

Manufacturers of diesel engines for Class 2b-3 pickups and vans will deploy new engines in order to meet the 2027 NOX standards that EPA finalized last year.172 However, the Agency's modeling assumes that diesel vehicles will reduce GHG emissions by less than 1% from 2022 to 2032. This leaves a tremendous amount of technology on the table, not just from what the Agency identified in the Phase 2 rulemaking and assumed would be needed to meet the standards already on the books, but also from additional improvements that have been developed since then. [EPA-HQ-OAR-2022-0829-0759, p. 65]

172 See 88 Fed. Reg. 4296.

Diesel engine efficiency continues to increase, with HHD (Class 8) diesel engines demonstrating up to 55% brake-thermal efficiency (BTE) in response to the second phase of the SuperTruck program. The Navistar and Cummins/Peterbilt teams demonstrated 55% BTE, compared to the 50% target for the first phase, while Daimler, Volvo, and PACCAR all demonstrated over 50% BTE, with a clear pathway towards the 55% target. The PACCAR team's progress is particularly illuminating, as they undertook an additional challenge to meet "ultra low NOX" targets consistent with EPA's recent regulation as part of their overall efficiency effort, indicating that these levels of thermal efficiency are not incompatible with achieving the 2027 NOX standards.173 [EPA-HQ-OAR-2022-0829-0759, pp. 65-66]

173 See Zukouski, Russ, Navistar SuperTruck II: Development and demonstration of a fuel-efficient class 8 tractor & trailer, DOE Annual Merit Review, (Jun. 21-23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace103_%20Zukouski_2022_o_4-29_1232p m_ML.pdf; Mielke, David, 2022 Annual Merit Review: Cummins/Peterbilt SuperTruck II, DOE Annual Merit Review, (Jun. 21-23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace102_dickson_2022_o_rev2%20-%20Trai lLife-GCCC%20IN0110%20REVISED.pdf; Bashir, Murad, et al., Daimler: Improving transportation efficiency through integrated vehicle, engine, and powertrain research - SuperTruck 2, DOE Annual Merit Review, (Jun. 21-23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace100_Villeneuve_2022_o_4-30_1116am_ ML.pdf; Bond, Eric, et al, Volvo SuperTruck 2: Pathway to cost-effective commercialized freight efficiency, DOE Annual Merit Review, (Jun. 23, 2022) https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace101_bond_2022_o_5-1_129pm_ML.pdf; Meijer, Maarten, Development and demonstration of advanced engine and vehicle technologies for class 8 heavy-duty vehicle ([PACCAR] SuperTruck II), DOE Annual Merit Review (Jun. 21-23, 2022),

https://www1.eere.energy.gov/vehiclesandfuels/downloads/2022_AMR/ace124_Meijer_2022_o_4-29_1056pm_KF. pdf.

Significant improvements in efficiency are not limited to the largest engines and can also be feasibly deployed on Class 2b-3 vehicles. Ford's latest iteration of its 6.7L Power Stroke diesel engine cut GHG emissions by 3.5% over the previous generation when it was introduced in 2020, and 2023 saw an additional 3% improvement due to a revised injection system.174 General Motors released its new 6.6L Duramax diesel engine in 2023 with improved cylinder heads, fuel injection, and other features in a design that is meant to increase both power and efficiency, particularly at higher output.175 These engine improvements are already being deployed today but are not captured in the Agency's OMEGA2 modeling. [EPA-HQ-OAR-2022-0829-0759, p. 66]

174 To assess these improvements, we refer to the combined transient cycle certification results for the MHD Power Stroke family of diesel engines available in the chassis cab/F-650 and F-750 configurations. The engines available in the heavy-duty pickups are not required to certify to isolated engine tests, but are likely to see similar levels of improvement, even with the higher power output, since they also have the same underlying technology.

175 GMC Pressroom, The Ultimate Heavy Duty: GMC Introduces its Most Luxurious, Advanced and Capable Sierra HD Ever (Oct. 6, 2022), https://media.gmc.com/media/us/en/gmc/home.detail.html/content/Pages/news/us/en/2022/oct/1006-sierra.html. It is difficult to compare apples-to-apples between the new and old Duramax engines due to limited certification data and because some of that efficiency improvement was used to reduce tailpipe NOx, since the new diesel-equipped Silverado/Sierra HD 2500 have a reduced NMOG+NOx bin of 200 vs. 250 mg/mile. Additionally, because the standards are set by "work factor," the increase in power used to raise towing capacity by 4000 pounds increases the allowable emissions for the engine, which means that despite an apparent increase in certified CO2 emissions of 2.4%, there could be a net improvement in compliance of up to nearly 5% as the result of up to a 7% increase in the model year 2023 emissions target.

Mild electrification also offers increased emissions reduction capabilities. Eaton demonstrated that it is possible to outperform simultaneously the 2027 NOx standards and the Phase 2 CO2 standards through a number of different aftertreatment and powertrain combinations,176 including those applicable to Class 2b-3 vehicles. A recent research paper by Eaton demonstrates various combinations of control technologies manufacturers can target CO2 and NOx emissions levels over different regulatory cycles to develop a technology package that is suitable for compliance, including packages that can achieve CO2 reductions beyond Phase 2 while meeting EPA's future 2027 NOx standards.177[EPA-HQ-OAR-2022-0829-0759, pp. 66-67]

176 Se-e generally Dorobantu, Mihai, Eaton considerations on MD/HD GHG Phase 3, OIRA-Eaton meeting, (Mar. 23, 2023), https://www.reginfo.gov/public/do/eoDownloadDocument?pubId=&eodoc=true&documentID=215442

177 McCarthy, J., et al. 2023. "Technology levers for meeting 2027 NOX and CO2 regulations." SAE Technical Paper 2023-01-0354. https://doi.org/10.4271/2023-01-0354.

One of the strategies deployed by Eaton is a 48V electric heater, which could be deployed easily with a 48V mild hybrid powertrain, again illustrating the complementary technology packages available to manufacturers to simultaneously meet GHG and NOx standards. The 48V mild hybrid powertrain can power accessories, including those related to emissions control, and can also help reduce engine-out NOx. This was also demonstrated through testing by FEV as a strategy particularly relevant to medium-heavy-duty vehicles that share chassis and power requirements with the Class 2b-3 pickups and vans covered by this proposal.178 Such developments should be incorporated into the Agency's analysis of the level of emissions reductions achievable from diesel-powered Class 2b-3 vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 67]

178 Fnu, D., et al. 2023. "Application of 48V mild-hybrid technology for meeting GHG and low NOX regulation for MHD vehicles." SAE Technical Paper 2023-01-0484. https://doi.org/10.4271/2023-01-0484.

In the Phase 2 rulemaking, EPA excluded cylinder deactivation from medium-duty diesel engines,179 but its own analysis now shows that manufacturers are likely to deploy that technology to meet the heavy-duty NOx standards.180 Similarly, a recent report by Roush identified cylinder deactivation as a likely engine configuration for many Class 2b-3 vehicles.181 The Agency should consider this technology in its OMEGA2 modeling, further increasing the available emissions reductions technologies for diesel-powered vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 67]

179 81 Fed. Reg. at 73754, Table VI-4. Note, however, that the agencies did consider a "right-sizing" of diesel engines, based on a 4-cylinder vs. 6-cylinder engine, and cylinder deactivation could be seen as a control-based attempt to yield the equivalent improvement without altering the maximum output. See NHTSA, Commercial medium- and heavy-duty truck fuel efficiency technology study – Report #2, U.S. Dep. of Transportation, 52–53 (Feb. 2016), https://www.nhtsa.gov/sites/nhtsa.gov/files/812194_commercialmdhdtruckfuelefficiency.pdf.

180 EPA, Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards, Regulatory Impact Analysis, at 108–131 (Dec. 2022), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1016A9N.pdf.

181 Himanshu Saxena et al., Electrification Cost Evaluation of Class 2b and Class 3 Vehicles in 2027–2030, Roush, at 24-25, 28-30 (May 2023), https://cdn.mediavalet.com/usva/roush/r0YBSBBv00edOiBP759yoA/3Hcv7F_W-0G9ek0ODPgNMg/Original/Elect rification%20Cost%20Evaluation%20of%20Class%202b-3%20Vehicles%20in%202027-2030_ROUSH.pdf. [hereinafter Saxena et al., Electrification Cost Evaluation].

b. EPA should consider additional spark-ignition (gasoline) engine technologies.

Another significant opportunity for increased improvement to combustion vehicles lies in spark-ignition (SI) engines, for which Phase 2 required no engine improvements beyond the 2016 SI engine standard. While this is somewhat rectified in EPA's move to a fuel-neutral standard for Class 2b-3 pickups and vans—which effectively results in a 5-6% increase in stringency for MDVs—this still does not fully recognize the potential improvement available from gasoline engines. And in fact, in the Agency's modeling, gasoline vehicles see, on average, 5% higher emissions in 2032, compared to 2022.182[EPA-HQ-OAR-2022-0829-0759, p. 67]

182 Because the model preferentially selects vans for electrification, some of this decrease is related to a shift in the vehicles included in the remaining gasoline fleet. However, even when limited to gasoline pickups there is an apparent backsliding in emissions, with an increase of 3%. This is similar to the backsliding that appears in the modeling of light-duty vehicles (see Section VI.A.2).

The weakness in EPA's Phase 2 targets for SI engines and vehicles is apparent in looking at manufacturers' growing bank of compliance credits to-date, particularly for Ford Motor Company, the largest SI engine supplier. Ford has run a credit surplus in every year of the vocational engine program, but this surplus exploded in MY 2020 with the release of its latest 7.3L V8 engine, codenamed "Godzilla."183 Even though the engine platform is relatively low-tech (naturally aspirated, pushrod V8), by utilizing variable cam timing and a variable-displacement oil pump, Ford's engine achieved a significant improvement in efficiency. The engine was also designed with fuel economy at load in mind for applications like towing. A smaller engine built on the same platform replaced the older base engine in 2023, no doubt increasing Ford's overcompliance and increasing the efficiency of even more of the MDV fleet. [EPA-HQ-OAR-2022-0829-0759, p. 68]

183 EPA, Final Phase 1 EPA Heavy-Duty Vehicle and Engine Greenhouse Gas Emissions Compliance Report (Model Years 2014-2020), Appendix B, at 40-42 (Nov. 2022) https://nepis.epa.gov/Exe/ZyPDF.cgi/P1016962.PDF?Dockey=P1016962.pdf.

General Motors is not standing still, either—its fifth-generation small-block V8 platform is getting a next generation update to a 5% improvement over the current generation,184 and the current generation is already a credit generator for GM's heavy-duty vehicles under the Phase 2 program.185 No further details are available about the heir to the current iron-block direct-injection L8T variant found in GM's heavy-duty offerings. [EPA-HQ-OAR-2022-0829-0759, p. 68]

184 Wren, Wesley, This is why GM is launching a new small block V8, Autoweek, (Feb. 3, 2023) https://www.autoweek.com/news/industry-news/a42746723/why-gm-is-launching-a-new-small-block-v8/.

185 EPA, Final Phase 1 EPA Heavy-Duty Vehicle and Engine Greenhouse Gas Emissions Compliance Report (Model Years 2014-2020), Appendix B, at 43.

Note that neither of these new improvements reflect technology adoption that was further anticipated for gasoline engines when the Phase 2 regulations were finalized. EPA assumed that cylinder deactivation (discrete or continuous), downsizing, and mild and strong hybridization would be used to meet those standards,186 yet none have yet been deployed in Class 2b-3 pickups and vans. This further underscores the significant amount of emissions reductions that are still readily achievable for Class 2b-3 vehicles. [EPA-HQ-OAR-2022-0829-0759, p. 68]

186 81 Fed Reg. at 73776, Table VI-13.

Organization: Environmental Defense Fund (EDF) (1of 2)

D. EPA must put in place guardrails that prevent ICEVs from removing greenhouse gas reducing technologies.

EDF reviewed the output from EPA's modeling of manufacturers' compliance with the Proposal using the OMEGA 2 model and found instances where the model removed technology that was either on vehicles in the 2021 baseline fleet or that had been added in subsequent model years. The California Air Resources Board and others have described this technology removal in considerable detail within their comments. We recognize the light-duty GHG program, since its inception, has been performance-based and provided manufacturers flexibility in applying technology to some vehicles and not others. At the same time, the increasing availability of battery electric vehicles provides manufacturers an even greater ability to trade off emissions between vehicles (and potentially significantly increase emissions from some of the remaining combustion engine vehicles in their fleets). While we do not expect manufacturers to take this approach, we are concerned that the compliance model shows technology removal and an outcome along these lines is permitted under the current standards. [EPA-HQ-OAR-2022-0829-0786, pp. 66-67]

Accordingly, we encourage EPA to put in place guardrails to ensure, at the very least, technologies that manufacturers have previously deployed on combustion vehicles are not removed as larger numbers of ZEVs are introduced into the fleet. Notably, EPA's approach to its NMOG + NOx standards is likewise performance based with guardrails. Though those standards are designed somewhat differently around a bin structure, EPA has here proposed to eliminate higher emitting bins in a manner that would ensure, as vehicles become cleaner, manufacturers can no longer offset those gains by certifying vehicles to higher-polluting levels. EPA should consider how it can apply the same concept to its greenhouse gas standards, perhaps through an emissions cap as a function of footprint curve that would retain the flexibility that has been a hallmark of the program but prevent any abuse that might come with increasing deployment of ZEVs. [EPA-HQ-OAR-2022-0829-0786, pp. 66-67]

Organization: Ford Motor Company

Next, each full-line automaker needs to allocate finite resources between EV programs and efforts toward incremental reductions in emissions from ICE vehicles. Insofar as automakers are required to lower emissions from ICE vehicles, the resources invested toward that end will not be available to invest toward EVs. [EPA-HQ-OAR-2022-0829-0605, p. 7]

Organization: International Council on Clean Transportation (ICCT)

There is potential for significant additional GHG savings from ICE vehicles beyond what EPA has modeled for its proposal. Many existing and recently announced ICEV technology improvements have ample room for increased application throughout the ICEV fleet. ICCT has identified several technologies, including advanced mild hybrids and plug-in hybrid EVs (PHEVs) that are commercially available and could significantly and cost-effectively improve ICE vehicle efficiency that EPA has not included in its modeling. We have also identified other technologies for which EPA has overestimated the costs in its modeling, such as Miller cycle engines and mild hybrid technology. If EPA made these changes to its model, we believe the agency would project lower overall compliance costs and lower BEV shares to achieve the same level of GHG reductions compared to its proposal. [EPA-HQ-OAR-2022-0829-0569, p. 4]

ICCT believes there is even greater opportunity to capture technology potential and cost reductions for medium-duty vehicles (MDVs) in EPA's modeling. While ICCT believes EPA underestimated the potential for ICE vehicle improvements for LDVs in its modeling, EPA did not model any ICE vehicle improvement technologies for MDVs. All of the above findings and recommendations about combustion and EV technology potential and cost for LDVs apply to MDVs. In addition, EPA has not included any kind of hybrid technology options in its modeling for MDVs and has omitted other ICE technology options it included for LDVs. All of the LDV technology options we review in these comments can be applied to MDVs and can deliver cost savings in meeting the proposed GHG standards. We strongly recommend EPA add ICE and PHEV technology options and incorporate the latest evidence on declining ICE and BEV technology costs into its modeling for MDVs. We also recommend EPA consider increasing the stringency of the MDV GHG standards since this could be achieved at lower costs when considering the evidence presented here on technology options. [EPA-HQ-OAR-2022-0829-0569, pp. 4-5]

Cylinder deactivation (DEAC)

Application in OMEGA

Based on the response surface equations (RSE) input file (simulated_vehicles_rse_ice_20221021_debug_noP2.csv), there are no technology packages/cost curve classes with DEAC on a turbocharged engine in EPA's OMEGA modeling. While adding DEAC to a turbocharged engine has smaller pumping loss reductions than for naturally aspirated engines, DEAC still has significant pumping loss reductions and has the additional benefit of enabling the engine to operate in a more thermal efficient region of the engine fuel map. As described in the National Academies of Sciences' 2021 report on light-duty vehicle fuel economy (NAS 2021)91, turbocharged engines with DEAC are already in production (NAS 2021, section 4.1.3). EPA could consider adding DEAC option to turbocharged cost curve classes. [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

91 National Academies of Sciences, Engineering, and Medicine. (2021). Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035. The National Academies Press. https://doi.org/10.17226/26092

Cooled Exhaust Gas Recirculation (CEGR)

Application in OMEGA

Similar to the application of DEAC, based on the RSE input file, there are no cost curve classes with CEGR on a base turbo engine in EPA's OMEGA modeling (i.e. "TDS" within the input file). As reported in NAS 2021 (section 4.1.3) turbocharged engines with CEGR are already in production. NAS 2021 also provides estimates for the efficiency benefit of including CEGR on a base turbo engine. EPA could consider adding CEGR option to turbocharged cost curve classes. [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

Atkinson cycle engine (ATK)

Application in OMEGA

EPA appears to have excluded the modeling and application of ATK from pickups and other body-on-frame vehicles (DRIA page 1-10 and RSE input file). However, as detailed in ICCT 2021 comments (pages 14-16), this exclusion could be lifted, allowing all vehicle classes to adopt ATK in the OMEGA model. [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

To briefly summarize those ICCT 2021 comments, engines in pickup trucks and high-performance vehicles are sized and powered to handle higher peak loads. This means larger engines that operate at lower loads relative to their maximum capacity on the 2-cycle test – and during most real-world driving. This, in turn, means that pickup trucks and high-performance vehicles will spend more time in Atkinson Cycle operation than lower performance vehicles on both the test cycles and in the real world. This includes time spent towing, which represents a very small fraction of light-duty pickup usage.92,93 Altogether, the large majority of pickup trucks spend the vast majority of driving at low loads relative to the engine's capability, where Atkinson Cycle engines are very effective. In other words, ATK is likely a highly cost-effective technology for pickup trucks, which may be the most challenging to electrify, as evidenced by the low BEV share of pickups in the 2027-2031 time frame compared to other body styles in EPA's modeling (Preamble Table 80). Furthermore, the claim that an Atkinson Cycle engine that switches to Otto cycle on demand cannot provide the additional torque reserve is not accurate (a claim previously used to justify blocking ATK on pickups in prior rulemakings, see ICCT 2021 comments). [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

92 Berk, B. (2019, March 13). You Don't Need a Full-Size Pickup Truck, You Need a Cowboy Costume. Thedrive.com. https://www.thedrive.com/news/26907/you-dont-need-a-full-size-pickup-truck-you-need-a-cowboy-costume

93 Chase, W., Whalen, J., Muller, J. (2023, January 23). Pickup Trucks: from workhorse to joyride. Axios. https://www.axios.com/ford-pickup-trucks-history

Moreover, Atkinson Cycle engines have been used on the Toyota Tacoma pickup V6 engine since 2017, illustrating that Atkinson Cycle engines are cost-effective for use on pickups. [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

For additional information see:

- ICCT 2021 comments pages 14-16

- ICCT 2018 comments pages I-2–I-12

- ICCT 2018 Camry study

[EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

Effectiveness

Outlined in the table above, MHEV architectures beyond P0 can have substantial CO2-reduction benefits. However, the benefits of more advanced MHEV architectures are expected to exceed those illustrated in the table, through the implementation of higher power systems (20kW- 30kW). Roush 2021 LDV96 describes the additional benefits offered by higher power MHEV systems, including advancements in electric boosting, high energy ignition systems (see section below), accessory electrification, and electrically heated catalysts. Enabling electrically heated catalysts in particular permits further fuel economy optimization through, for example, aggressive stop-start strategies. [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

96 Roush report on Gasoline Engine Technologies for Improved Efficiency (Roush 2021 LDV) https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0208-0210

For additional information, see:

- Roush 2021 LDV page 11 and pages 38-40 [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

- Roush 2021 48V97 pages 11-23 [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

- AVL 2020 slide 6298 [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

97 Roush report on 48V and BEV costs (Roush 2021 48V) https://www.regulations.gov/comment/EPA-HQ-OAR-2021- 0208-0210

98 AVL Webinar on Passenger Car powertrain 4.x – Fuel Consumption, Emissions, and Cost. (2020, June 2). https://www.avl.com/-/passenger-car-powertrain-4.x-fuel-consumption-emissions-and-cost (Slides available at https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0208-0522) (AVL 2020)

Roush 2021 LDV provides specific example applications of high power MHEV systems and the associated fuel efficiency improvements on pickups and SUVs. These examples, which have not previously been considered by either EPA or ICCT, are excerpted below:

Pickup/full-size SUV GHG reduction: As ICCT previously commented, Roush 2021 states "Two powertrain configurations are recommended for study and could support future rulemaking. The first option synergistically combines available technologies (without a major redesign of the underlying engine architecture) to give maximum fuel economy benefit for a relatively low cost, hence high effectiveness. It combines a naturally aspirated DI engine with advanced cylinder deactivation and a 30kW 48V P2 mild hybrid system. The 48V hybrid system is used to actively smooth out crankshaft torque pulsations to enable aggressive cylinder deactivation strategies (advanced deac – like the Tula Skipfire System). Such a system will also enable start-stop, electric creep, regen braking, slow-speed electric driving, and a heated catalyst. Depending on system integration factors Roush estimates a reduction in GHG emissions of 20% or more, compared to a baseline naturally aspirated direct-injection V8." (Roush 2021 LDV page 13).

Additional information can be found at:

- Roush 2021 LDV Section 13.1 page 65 [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

Compact SUV GHG Reduction: Relatedly, as ICCT previously commented, Roush 2021 states, "A 30kW 48-volt P2 system mated to a low bore-to-stroke ratio Miller cycle engine with electrified boosting, advanced cylinder deactivation, cooled EGR and a heated catalyst can provide a fuel economy benefit close to a full high voltage hybrid powertrain at a much lower cost. The 48V electric motor can supplement the engine torque under low- speed high load conditions, thereby avoiding this knock-prone area of the engine map. Also, the use of an advanced boosting system, combining a turbocharger and a 48V electric supercharger, will reduce engine backpressure (larger turbine) and improve scavenging, reduce combustion residuals, and reduce the propensity for knock. This combination enables the use of a higher compression ratio, thereby increasing engine efficiency. A combination of a high-energy ignition system (high energy spark plug/plasma ignition) and fuel reforming by pilot fuel injection during NVO can be used to increase cEGR tolerance at low loads. The initial part of such a project would include engine and combustion modeling, followed by prototype engine testing. The overall GHG reduction potential will require modeling and optimization of engine design, calibration parameters, and boosting system sizing and control. Roush estimates a reduction in GHG emissions exceeding 30% is possible compared to a level 1 (NHTSA) turbocharged engine." (Roush 2021 LDV page 14). [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

Additional information can be found at:

- Roush 2021 LDV Section 2.3 pages 23-25 on higher compression ratios and higher Miller/Atkinson ratios. [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

- Roush 2021 LDV Sections 2.4 and 2.5 pages 26-28 on low bore-to-stroke ratio benefits [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

- Roush 2021 LDV Section 13.2 page 66 [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

Strong hybrid (HEV)

Effectiveness

ICCT commends EPA's incorporation of advanced Atkinson and Miller cycle engines. However, the notion of a dedicated hybrid engine (DHE) extends beyond the engine maps used during ALPHA HEV simulation. ICCT recommends EPA consider even further optimized/efficient dedicated hybrid engines, both for HEV applications and for PHEVs. As described in ICCT's 2021 comments and in SAE (2021),101 "EPA should focus on the expanded application of energy management capabilities in full hybrid powertrains to also minimize operation under the low-speed high torque areas of the engine which are prone to knocking by torque augmentation with the electric motor. The instantaneous torque capability of the electric motor can effectively support transient torque demand. This will allow both naturally aspirated and turbocharged engines that are part of a hybrid powertrain to be optimized for a narrow operating range incorporating higher compression ratios and increased EGR dilution (maintaining stoichiometric operation), thereby prioritizing efficiency over peak torque at low engine speeds and transient response." (Roush 2021 LDV page 12) [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

101 Ibid.

For additional information, see:

- Roush 2021 LDV Section 7.0 pages 41-44

- AVL 2020 slide 24: BSFC for Lambda=1

- AVL 2020 slides 25-26: Dedicated Hybrid Engine Efficiency Roadmaps (45% Lambda=1, 51% ideal)

- AVL 2020 slides 35-42: WLTP CO2 reduction potential of various hybrid configurations

- AVL 2020 slide 43: Relative comparison of attributes for three powertrain architectures

-AVL 2020 slide 62: WLTP % CO2 reduction and slide 63: cost per % FC reduction

[EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

Such dedicated hybrid engines can achieve 45% brake thermal efficiency (BTE) at stoichiometric air-fuel ratio using known technologies,102 or 50% BTE in a serial/range-extender with pre-chamber ignition, ultra-high pressure injection, and reduced intake air temperatures (SAE 2021). [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

102 Visnic, B. (2022, April). Keeping combustion in the conversation. SAE Automotive Engineering. Page 18. https://www.nxtbook.com/smg/sae/22AE04/index.php#/p/18

Negative valve overlap in-cylinder fuel reforming (NVO)

Effectiveness

As ICCT previously commented, Roush states, "In-cylinder fuel reforming by using pilot fuel injection during NVO has shown to significantly improve cooled EGR (cEGR) tolerance, combustion stability, and engine efficiency. Such a system can have wide application in turbocharged and NA engines across different vehicle segments with minimal hardware requirements. Depending on the base engine, Roush estimates an efficiency improvement, and the corresponding reduction in GHG emissions, in the range of 5 to 10% is possible and low cost, therefore correspondingly high effectiveness." (Roush 2021 LDV page 14). [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

Additional information can be found at:

- Roush 2021 LDV Section 10.0 pages 50-52

- Roush 2021 LDV Section 13.3 page 66

[EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

Passive prechamber combustion (PPC)

Effectiveness

As ICCT previously commented, Roush states, “Prechamber combustion systems are one of the most promising technologies for improving the dilution limit of engines, thereby improving system efficiency. It can also enable extremely fast burn rates increasing the knock tolerance of turbocharged engines, allowing higher compression ratios and the associated efficiency improvements. The Maserati Nettuno engine in the 2021 Maserati MC20 will be the first application of a passive prechamber engine in production. However, the primary objective in the MC20 is high performance. It would be very valuable to study the effect of the system on knock tolerance, burn rates, dilution tolerance (EGR and air), and emissions. The effort should focus on quantifying possible efficiency gains in a non-performance application.” (Roush 2021 LDV pages 14-15). In a dedicated hybrid engine developed by Mahle, pre-chamber combustion enabled a CO2 emissions reduction of over 5%.103 [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

Additional information can be found at:

- Roush 2021 LDV Section 13.4 page 67

- AVL 2020 slides 28, 31, and 33 [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

103 Birch, S. (2019, November). Mahle reveals modular, scalable integrated hybrid powertrain. SAE Automotive Engineering. Page 14. https://www.nxtbook.com/nxtbooks/sae/19AUTP11/index.php#/p/14

High energy ignition (HEI)

Effectiveness

As ICCT previously commented, Roush states, “High energy volume ignition systems can enable combustion of dilute (cEGR or air diluted) in-cylinder mixtures resulting in a step-change in engine efficiency compared to conventional spark plugs. Such systems can be a drop-in replacement for a spark plug, thereby representing a cost-effective GHG improvement option. Such systems should be evaluated for maximum efficiency potential, in conventional, 48V mild hybrid, and full HV hybrid applications. Roush estimates that systems such as plasma ignition can support good combustion stability with high amounts of cooled EGR, thereby achieving engine efficiency improvements in the range of 5-10% over a baseline turbocharged DI, dual VVT engine. Microwave ignition systems, on the other hand, have the potential to achieve levels consistent with prechamber ignition systems. This would enable lean-burn engines with low engine-out NOx emissions which can achieve brake thermal efficiency which exceeds 45% in light-duty vehicle applications, compared to a level of 36-38% for a baseline turbocharged DI, dual VVT engine.” (Roush 2021 LDV page 15). Additional information can be found at:

- Roush 2021 LDV Section 11.0 pages 53-62

-Roush 2021 LDV Section 13.5 page 67

[EPA-HQ-OAR-2022-0829-0569, pp. 37-40]Transmissions

Application in OMEGA

In this proposal, EPA did not consider the application of automatic transmissions with 9 or more gear ratios. This is unrealistic, as nearly 40% of pickups were equipped with such transmissions in 2021, and EPA expects more than a quarter of all vehicles to have such transmissions in MY2022.104 Without including the costs and benefits of transmissions with additional gears, EPA is missing important fuel-savings technology. Consequently, ICCT recommends EPA incorporate in its analysis transmissions with 9 or more gears. [EPA-HQ-OAR-2022-0829-0569, pp. 40-43]

104 EPA. (2022). Automotive Trends Report [detailed automotive trends data]. https://www.epa.gov/automotive- trends/explore-automotive-trends-data

Organization: Kia Corporation

- Kia urges EPA to take further action to improve fuel standards that will lower vehicle fuel consumption and criteria pollutant emissions from legacy and new Internal Combustion Engine (ICE) vehicles. As Kia is significantly increasing resources for developing and transitioning to electrified powertrains, Kia will have fewer resources available to improve ICE. [EPA-HQ-OAR-2022-0829-0555, p. 4]

Organization: Mazda North American Operations

On top of this, the additional criteria emissions requirements placed on internal combustion engine vehicles will also divert limited resources with questionable efficacy. [EPA-HQ-OAR-2022-0829-0595, p. 2]

Organization: MEMA, The Vehicle Suppliers Associated

Technology Neutrality Pairs with Regulatory Certainty

The proposed rule disproportionally favors battery electric propulsion, which in turn discourages any further advancements for internal combustion technology, including carbon-neutral renewable fuels. Emerging innovations and recent technologies offer significant reduction in emissions from ICE vehicles, in both future and current fleets. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

Technology-forcing regulations that foster innovation aligned with policy, rather than regulations that mandate a narrowly defined technology path, will lead to a more positive national outcome. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

MEMA recognizes that the proposal attempts a performance-based standard, and the agency makes forecasts that estimate a variety of technology combinations in future fleets. By accepting the potential for technologies other than battery electric and hydrogen fuel cell, EPA can make a more immediate, widespread, positive impact on nationwide emissions reductions. Therefore, EPA must incent the development and deployment of advanced technology options to include advanced internal combustion (ICE) technologies, renewable fuels, and post-combustion CO2 capture (known as mobile carbon capture). These incentives will assist in accelerating the necessary infrastructure improvements needed to support advanced technology vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

One of the pathways which deserves to be highlighted is the Hydrogen Internal Combustion Engine (H2ICE). This technology is a promising pathway which for certain applications is preferable to other alternate advanced technologies in the proposed rule. For example, a vehicle towing a trailer requires sustained torque output to tow a heavy load. H2ICE would offer the best solution for this vehicle to achieve the emission targets while fulfilling the customer needs for range and load. BEVs and fuel cell electric vehicles (FCEV) have weight and load limitations that might not allow this vehicle to meet its operational requirements. Indeed, the agency has recognized the benefit of H2ICE in the separate rulemaking for "Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles -Phase 3 [1]. We refer to section II. Proposed CO2 Emission Standards, D. Vehicle Technologies, 1. Technologies to Reduce GHG Emissions from HD Vehicles with ICES, paragraph 5 [2] which states: [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

1 https://www.regulations.gov/document/EPA-HQ-OAR-2022-0985-1423121

2 11. Proposed CO? Emission Standards, D. Vehicle Technologies, 1. Technologies to Reduce GHG Emissions from HD Vehicles with ICES, paragraph 5

Manufacturers may develop new ICE vehicle technologies through the MY 2032 timeframe. An example of a new technology under development that would reduce GHG emissions from HD vehicles with ICES is hydrogen-fueled internal combustion engines (H2ICE). These engines are currently in the prototype stage of innovation for HD vehicles but have also been demonstrated as technically feasible in the past in the LD fleet. H2ICE is a technology that produces zero hydrocarbon (HC), carbon monoxide (CO), and CO2 engine-out emissions. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

Furthermore, a large portion of manufacturing technology and workforce skills needed to manufacture H2ICE equipment may be adapted from currently available gasoline or diesel manufacturing footprints. H2ICE also builds hydrogen demand, which is a nascent market in the U.S. Building that market will help supply the needs of hydrogen fuel cell electric vehicles in due course. The two are complementary to each other's growth and commercialization. MEMA therefore strongly suggests that EPA adopt a consistent pathway for H2ICE for light-duty and medium-duty vehicles just as proposed for heavy-duty vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

MEMA urges:

- EPA to move beyond tailpipe emissions and include emissions from electricity generation in BEV calculations. [EPA-HQ-OAR-2022-0829-0644, p. 7]

- EPA to act decisively to further encourage and incentivize the development and deployment of advanced clean ICE technologies, including renewable fuels, and mobile carbon capture. [EPA-HQ-OAR-2022-0829-0644, p. 7]

- EPA to develop an efficiency metric to comparatively analyze ZEV energy needs and if not incorporated into this rule - report that metric to the public as an initial step. [EPA-HQ-OAR-2022-0829-0644, p. 7]

Organization: Our Children's Trust (OCT)

In short, continuing to promulgate rules that contemplate, facilitate, and allow for continued sales of internal combustion engine ("ICE") vehicles is reckless and nonsensical. Instead, EPA should set the national standard to align with zero ICE vehicle sales by 2030. [EPA-HQ-OAR-2022-0829-0542, p. 1]

Specifically, there is a clear consensus that decarbonizing transportation requires a rapid shift away from fossil fuel vehicles toward Zero Emissions Vehicles ("ZEVs"), including battery-electric vehicles ("BEVs"), plug-in hybrid vehicles running primarily on electricity ("PHEVs"), and hydrogen fuel cell electric vehicles ("FCEVs"). 1 Transitioning from conventional internal combustion engine vehicles to electric vehicles is believed to be one of the most promising pathways for decreasing greenhouse gas ("GHG") emissions from the road transportation sectors and thus should be pursued aggressively. 2 While improving fuel efficiency can help to reduce emissions in the short-term, it cannot achieve the emissions reductions needed to achieve the Administration's net zero emissions target, it contributes to ongoing dangerous levels of GHG emissions, and experts have concluded that the continued use of fossil fuel vehicles is considered "a technological dead end." [EPA-HQ-OAR-2022-0829-0542, p. 1]

In short, continuing to promulgate rules that contemplate, facilitate, and allow for continued sales of internal combustion engine ("ICE") vehicles is reckless and nonsensical. Instead, EPA should set the national standard to align with zero ICE vehicle sales by 2030. There is also no justification, no compelling interest, and no rational basis for not aligning EPA's rule with California and other states that require 100% of light-duty vehicle sales to be ZEVs by 2035. [EPA-HQ-OAR-2022-0829-0542, p. 2]

1 Austin L. Brown et al., Institute of Transportation Studies, University of California, Driving California's Transportation Emissions to Zero (Apr. 2021); Zero Carbon Consortium, America's Zero Carbon Action Plan (2020).

2 Daniel Sperling et al., 5.2 Accelerating Deep Decarbonization in the U.S. Transportation Sector, in America's Zero Carbon Action Plan 188 (Zero Carbon Consortium, 2020) ("The most compelling strategy for deep GHG emissions reductions . . . is to electrify surface vehicles: to switch vehicles from fossil fuel combustion (e.g., gasoline and diesel) to electric propulsion (e.g., battery, plug-in hybrid, and fuel cell electric vehicles).").

3 Daniel Sperling et al., 5.2 Accelerating Deep Decarbonization in the U.S. Transportation Sector, in America's Zero Carbon Action Plan 198 (Zero Carbon Consortium, 2020).

Organization: Sierra Club et al.

We appreciate the EPA's proposal, which moves our vehicles in the right direction. However, the final emissions standard for light-duty vehicles should: [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Appropriately take advantage of available cost-effective improvements to new fossil-fuel vehicles; [EPA-HQ-OAR-2022-0829-0668, p. 2]

Organization: South Coast Air Quality Management District

2. Ensure manufacturers continue to reduce emissions from conventional engines and vehicle technologies. The proposed rule allows manufactures to include ZEVs and PHEVs in the calculation of fleet average standards. In contrast, ACC II phases out the inclusion of ZEVs and PHEVs in the fleet averages starting with 60% allowed in 2026 to 0% in 2029 and subsequent years. CARB adopted this approach to ensure that conventional engine vehicles would also improve over time on fuel efficiency and emissions control systems. With the increasing stringency of the emissions standards, manufacturers may opt to rely more on the ZEVs sales to comply with the standards while forgoing the allocation of resources and needed development work to lower emissions from conventional engine vehicle technologies. While it is desirable to see increasing market share of ZEVs, it is also important not to overlook the necessary improvements that manufacturers should make on conventional vehicles since these vehicles will be around us for many years to come. Therefore, we recommend U.S. EPA consider including requirements or mechanisms for manufacturers to continue to allocate necessary resources to develop cost-effective technologies for conventional engines and vehicles to maximize emissions reductions, especially in the near term. [EPA-HQ-OAR-2022-0829-0659, pp. 2-3]

Organization: Southern Environmental Law Center (SELC)

EPA must also ensure its modeling accurately captures emissions reductions that can be achieved in internal combustion engine vehicles through existing vehicle efficiency technologies. [EPA-HQ-OAR-2022-0829-0591, p. 8]

Organization: United Steelworkers (USW)

In the proposed rule, the EPA's approach to lowering emissions is termed the technology-neutral way, which envisions using more clean-running gas vehicles, hybrids, fuel cell vehicles, and other innovations to meet more stringent standards. However, in this proposed rule, EPA did not consider improvements to ICE vehicles with off-the-shelf technology. EPA's proposal will outlaw ICE vehicles without considering or encouraging manufacturers to invest in engine and fuel efficiency technologies that would lower emissions. [EPA-HQ-OAR-2022-0829-0587, p. 6]

Engine efficiency and aftertreatment systems can help achieve CO2 reductions, while protecting workers in the ICE vehicle supply chain and oil refinery workers during the transition to low-emission vehicles. Existing and new technologies ranging from engine improvements and hybridization can achieve between 5 and 50 percent GHG reductions. For example, gasoline particulate filters (GPFs) significantly reduce fine particulates black carbon.13 GPFs are required in Europe and Asia in order for vehicles to comply with regulations there. Off-the-shelf technologies that reduce tailpipe emissions from ICE vehicles – such as GPFs – could easily and affordably be applied to light- and medium- duty vehicles sold in the United States, with no additional research and development needed. Automakers should be able to employ a combination of ZEV and ICE improvement technologies to comply with the final rule. [EPA-HQ-OAR-2022-0829-0587, p. 6]

13 DieselNet, (Link: https://dieselnet.com/tech/gasoline_particulate_filters.php) "Gasoline Particulate Filters", Accessed July 5, 2023.

Technology that lowers emissions for ICE vehicles should be elevated in this proposal. EPA could do this by keeping the rule technology neutral and finalizing a more practical timeline for emissions reductions. These technologies protect jobs in the current auto supply chain and ensure that our nation is actively pursuing policy to lower vehicle emissions. Standards must be reassessed with the inclusion of these technologies because the current proposal will eliminate the ICE vehicle all together, and is not an economically or socially viable rule. [EPA-HQ-OAR-2022-0829-0587, p. 6]

EPA Summary and Response

Summary:

Commenters provided a broad number of themes with respect to ICE vehicle technologies. Several commenters noted the significant role ICE powertrains will serve in the LMDV fleet for many years to come. Commenters further noted the opportunity for further ICE-based improvements to reduce emissions while other commenters expressed concern that ICE improvements should not be required in addition to electrification. Other commenters expressed concern regarding the risk of ICE-based vehicles backsliding in emissions.

The Alliance for Automotive Innovation (AAI) noted that, based on current emissions performance, ICE-based vehicles are not able to meet the final standards and levels of electrification would be required to offset the debits generated by ICE vehicles. In contrast, Consumer Reports noted that if vehicle manufacturers replace their oldest and highest emitting ICE vehicles first and retain their newest, most efficient ICE powertrains, significant emissions reductions can be achieved sooner. Consumer Reports went on to recommend reflecting this possible type of fleet turnover in the agency's modeling.

Ford, Kia and Mazda all commented that standards that required additional improvements to ICE powertrains would divert resources away from EV development.

The Aluminum Association and American Fuel & Petrochemicals Manufacturers (AFPM) both noted that ICE powertrains would be part of the LMDV fleet for some time to come. The Aluminum Association noted the benefits of ancillary vehicle technologies, such as lightweighting, while AFPM commented on the benefits of ICE powertrains and drivability.

Commenters recommended that EPA require more improvements from ICE powertrains with the Arizona Department of Environmental Quality (ADEQ) recommending "EPA to consider further strengthening its proposal by continuing to improve upon and incentivize advancements in internal combustion engine technology." Center for Biological Diversity (CBD) noted that "EPA's own data shows that multiple technologies exist to make the millions of gas-powered vehicles sold in the next decade much more efficient, from gasoline direct injection and continuously variable transmission to hybrid technologies" and recommended that EPA adopt more stringent standards further noting that emission reductions would be significant and immediate. Environmental and Public Health Organizations and the Center for American progress echoed the CBD comments. Environmental and Public Health Organizations also commented on the Agencies use of the CCEMS model and commented that CCEMS was more likely to project greater ICE technology improvements. Sierra Club, Southern Environmental Law, United Steel Workers, ICCT and private citizen David Hallberg also recommend that EPA fully consider the potential for ICE improvements, with ICCT noting that EPA had not considered any ICE improvements for MDVs.

Our Childrens Trust (OCT) recommended that EPA "should set the national standard to align with zero ICE vehicle sales by 2030" and that EPA should not align with California's 100% ZEV mandate in 2035. OCT further commented that "continuing to promulgate rules that contemplate, facilitate, and allow for continued sales of internal combustion engine ("ICE") vehicles is reckless and nonsensical."

Consumer Reports commented with a focus on vehicle buyers and commented that "Consumer demand for EVs is rapidly increasing, and technology improvements will mean that the remaining gasoline powered vehicles will have to compete with better and better EV offerings", suggesting that the ICE backsliding, modeled by EPA, would not automatically occur. Consumer Reports also noted the strong demand from consumers for clean vehicles.

The California Air Resources Board (CARB) suggested in their comments "that U.S. EPA adopt additional regulatory mechanisms to ensure that all cost-effective technologies that get integrated into conventional vehicle designs will continue to be installed throughout vehicle line-ups and throughout the program lifetime to maintain emission reductions from conventional vehicles" to prevent backsliding. These comments were also echoed by the California Attorney General's Office which recommended that EPA adopt more stringent standards to prevent backsliding. CBD, District of Columbia Department of Energy and Environment (DOEE), and the Environmental Defense Fund (EDF) similarly commented on the need for EPA to put in place measures to prevent backsliding, with EDF requesting "guardrails" to ensure technology is not removed.

The Motor and Equipment Manufacturers Association commented on hydrogen combustion technology and noted its potential for emission reductions.

South Coast Air Quality Management District (SCAQMD) commented that EPA should "Ensure manufacturers continue to reduce emissions from conventional engines and vehicle technologies." and compared EPA's proposal to CARB's ACC II program.

Response:

EPA appreciates all the comments received regarding ICE vehicle technologies. EPA agrees that ICE technologies will most likely be used in light and medium duty vehicles for years to come and recognizes that further ICE improvements are available to manufacturers and encourages their implementation. EPA's technology projections are based the Agency's assessment of technology application to meet a future set of emission standards in a cost-effective manner. While some technologies may be more cost-effective than others, the decisions as to which technology to adopt to meet future standards are ultimately made by the manufacturers. EPA's modeling in the proposal, being cost minimizing in nature, did project that some manufacturers might remove technology from existing vehicles as their compliance situation develops and significantly more cost-effective technology is brought to market. The modeling may illuminate a possibility of backsliding, but it does not necessarily indicate vehicle manufacturer's intentions. Nevertheless, in our modeling for the final rule, we restricted the model from allowing the backsliding of ICE technology. This modeling approach reflects our expectation that manufacturers are unlikely to backslide on technology in actual practice, as the year over year stringency of the standards will warrant manufacturers to employ a full range of technologies; backsliding on ICE vehicles would only result in additional credit deficits that would need to be made up with more credit-generating vehicles under the fleetwide averaging standards.

EPA has adopted performance-based standards set at a level we have determined to be appropriate to achieve substantial air pollutant emission reduction to protect public health and welfare according to the CAA. Manufacturers are free to adopt any technology strategy, be it via advancements in ICE, hybrids, PHEVs or BEVs, that enables them to comply with the final standards. In this rulemaking EPA is not providing additional credits for specific technologies; that is, we are not providing any advanced technology multipliers for MY 2027 and later years. However, not all technologies emit the same level of GHG emissions and there will be naturally more cost-effective technologies, and it is up to each manufacturer to decide which technologies they ultimately adopt. Performance-based standards account for all emissions reductions and technology benefits that may be implemented by manufacturers. However, given some of the comments received, such as those from Ford, Mazda, Kia and AAI, EPA has reason to believe that vehicle manufacturers are planning to place less emphasis on the design, development, and deployment of ICE-based technologies to focus on the development of electrified vehicles.

EPA has not put in place specific provisions to prevent backsliding or to control which vehicles receive specific technology, as suggested by several commentors including CBD, District of Columbia Department of Energy and Environment (DOEE), CARB, and the Environmental Defense Fund (EDF), although we have made modifications to our fleet analysis modeling to consider the effects of backsliding, as described above. The comment from Consumer Reports regarding manufacturers decisions to replace older, less efficient vehicles first and keep modern, more efficient vehicles longer and that conventional vehicles will need to compete with BEVs seem like reasonable conclusions, although EPA does not reflect these recommendations in our modeling.

EPA did not include hydrogen combustion in assessment of ICE technologies, as recommended by MEMA. Due to the high cost of aftertreatment systems and the availability of other technologies for compliance, we do not at this time anticipate manufacturers to adopt hydrogen combustion technologies at significant rates. We agree that it remains a possible technology pathway that manufacturers are free to choose.

EPA appreciates the supportive comments, such as those from Our Children's Trust, encouraging the agency to adopt more stringent standards more quickly. We respond to comments on the stringency of the standards in RTC 3.3.1.

12.3.1 – ICE costs

Comments by Organizations

Organization: International Council on Clean Transportation (ICCT)

COMBUSTION VEHICLE EFFICIENCY POTENTIAL AND COST- EFFECTIVENESS

While ICCT strongly supports the proposed rule, the cost of compliance may be overstated due to the use of outdated internal combustion engine vehicle (ICEV) technology data and information. ICEV technology has been consistently improving for decades. While automakers are investing heavily in BEV development, the substantial progress that has been—and continues to be—made in ICE technology has yet to saturate the market. That is, many existing and recently announced ICEV technology improvements have ample room for increased application throughout the ICEV fleet. As many ICE vehicles are still to be sold in the MY2027- 2032 timeframe, the proposed rule is an opportunity to maximize their efficiency and minimize their tailpipe emissions, while providing substantial consumer fuel savings. [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

ICCT commented extensively on recent ICEV technology improvements in its 2018 comments on the SAFE NPRM for 2021-26 cars and light trucks (ICCT 2018 comments)82, its study of LPM and OMEGA modeling of the 2018 Camry (ICCT 2018 Camry)83, its supplemental comments responding to Toyota comments on ICCT's study of LPM and OMEGA modeling of the 2018 Camry (ICCT 2019 comments)84, and its 2021 comments on the Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards (ICCT 2021 comments).85 Much of the content of these prior comments are reiterated or summarized in the following subsections, as appropriate and relevant for this proposed rule. Moreover, recent reports demonstrate that further technology improvements are coming that can boost ICE vehicle efficiency levels well beyond that of even the highly-efficient Atkinson cycle engine efficiency levels assumed in this proposal,86,87 as well as show the declining costs of 48-volt mild hybrid systems.88,89 [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

82 ICCT Comments on the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Truck. (2018, October 26). https://theicct.org/news/comments-safe-regulation-2021- 2026 (ICCT 2018 comments)

83 German J. (2018, February 21). How things work: OMEGA modeling case study based on the 2018 Toyota Camry. https://theicct.org/publications/how-things-work-omega-modeling-case-study-based-2018-toyota-camry (ICCT 2018 Camry)

84 Supplemental Comment from the International Council on Clean Transportation. (2019, April 28). Docket #NHTSA- 2018-0067-12387. https://www.regulations.gov/comment/NHTSA-2018-0067-12387, #NHTSA-2018-0067-12388 https://www.regulations.gov/comment/NHTSA-2018-0067-12388 (ICCT 2019 comments)

85 ICCT comments on the Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards. (2021, September 29). Docket ID EPA-HQ-OAR-2021-0208, https://www.regulations.gov/docket/EPA- HQ-OAR-2021-0208, Comment ID EPA-HQ-OAR-2021-0208-0522, https://www.regulations.gov/comment/EPA- HQ-OAR-2021-0208-0522 (ICCT 2021 comments)

86 AVL Webinar on Passenger Car powertrain 4.x – Fuel Consumption, Emissions, and Cost. (2020, June 2). https://www.avl.com/-/passenger-car-powertrain-4.x-fuel-consumption-emissions-and-cost (Slides available at https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0208-0522) (AVL 2020)

87 Roush report on Gasoline Engine Technologies for Improved Efficiency (Roush 2021 LDV) https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0208-0210

88 Roush report on 48V and BEV costs (Roush 2021 48V) https://www.regulations.gov/comment/EPA-HQ-OAR-2021- 0208-0210

89 Dornoff, J., German, J., Deo, A. (ICCT), Dimaratos, A. (DITENCO). (2022). Mild-hybrid vehicles: a near term technology trend for CO2 emissions reduction. https://theicct.org/publication/mild-hybrid-emissions-jul22/ (ICCT 2022 MHEV)

As documented in the following subsections, the efficiency potential of ICE technology has continued to improve, while costs have remained lower than previously estimated. Thus, if technology costs and benefits were updated with the latest information, it would show that the proposed standards are even more feasible and lower-cost than EPA's analysis indicates. The following subsections discuss various ICE technologies and compare the assumptions about cost and efficiency potential within EPA's OMEGA analysis with independent research by the ICCT and other experts. [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

Gasoline Direct Injection (GDI)

Cost

Based on the DRIA Table 2-30, GDI direct manufacturing costs in EPA's OMEGA modeling are between $55-$81 per cylinder. ICCT submitted direct injection cost data in our 2018 comments based on a 2016 FEV teardown cost study (FEV 2016)90, which found per-cylinder costs to be about $40 per cylinder. For additional information see:

- ICCT 2021 comments page 6 [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

- ICCT 2018 comments pages I-69–I-70 [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

- FEV 2016 [EPA-HQ-OAR-2022-0829-0569, pp. 31-34]

90 David Blanco-Rodriguez, 2025 Passenger car and light commercial vehicle powertrain technology analysis. FEV GmbH. (2016, November 21). https://www.theicct.org/publications/2025-passenger-car-and-light- commercial-vehicle-powertrain-technology-analysis (FEV 2016)

Miller cycle engine (MIL)

Cost

It is unclear from the DRIA how MIL costs were developed and how OMEGA calculates MIL costs. Nevertheless, based on analysis of output file engine costs, MIL costs appear too high, especially as compared to base turbo costs (TDS). [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

Table 5 below is an excerpt from the central analysis of the proposed standards (2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv). It highlights 9 ICE vehicles which changed from being equipped with MIL to being equipped with TDS only. Note that the change from a more advanced engine (MIL) to a less advanced engine (TDS) is an artefact of the modeling and is unlikely to occur in the real world as such a change may come at the expense of reduced performance, fuel economy, or other consumer-valued function. Comparing solely the engine costs associated with a specific vehicle model (assigned to a base year vehicle ID in the table), the cost of MIL appears to be $600-$2400 more expensive than TDS. As MIL costs very little compared to a turbocharged, downsized engine such as that used in the proposal analysis to represent TDS (2016 Honda 1.5L L15B7) (see NAS 2021), the incremental costs shown in the table suggest the MIL costs are far too high. ICCT 2021 comments, ICCT 2018 comments, and NAS 2021 explain that incremental MIL costs range from $0–$250. [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

SEE ORIGINAL COMMENT FOR Table 5. Comparison of Miller (MIL) and Turbo-downsized (TDS) engine costs [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

In prior rulemakings, EPA included the cost of ATK in the cost of MIL which led to unnecessarily high MIL costs. While it is unclear if ATK costs are included in MIL in the current proposal analysis, such an inclusion would contribute to high MIL costs. [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

For additional information see:

- ICCT 2021 comments page 7

Mild hybrid (MHEV)

Cost [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

The costs for position 0 (P0) MHEV are determined according to the equations in DRIA Table 2- In Table 6 below, by comparing these MHEV costs to those found by ICCT in 201694 and more recently in 202295, ICCT finds the EPA MHEV costs to be 2x-3x more expensive. Consequently, ICCT recommends EPA reassess and adjust its MHEV costs to better reflect the most recent data, which are summarized below. One possible source of added cost in the proposal is the identical calculation of MHEV and HEV costs (scaled by motor power). This approach may lead to an overestimate of MHEV costs because the 48V electrical systems of MHEVs do not require the same safety and electrical hardware as higher voltage HEVs. ICCT recommends adjusting MHEV cost calculations according to the table below. [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

94 Isenstadt, A., German, J. (ICCT), Dorobantu, M. (Eaton), Boggs, D. (Ricardo), Watson, T. (JCI). (2016). Downsized, boosted gasoline engines. https://theicct.org/publication/downsized-boosted-gasoline-engines-2/

95 Dornoff, J., German, J., Deo, A. (ICCT), Dimaratos, A. (DITENCO). (2022). Mild-hybrid vehicles: a near term technology trend for CO2 emissions reduction. https://theicct.org/publication/mild-hybrid-emissions-jul22/ (ICCT 2022 MHEV)

SEE ORIGINAL COMMENT FOR Table 6. Comparison of EPA and ICCT P0 mild hybrid (MHEV) direct manufacturing costs, ** Alternator removal costs represented by negative cost (cost savings), For further information, see Dornoff, J., German, J., Deo, A. (ICCT), Dimaratos, A. (DITENCO). (2022). Mild-hybrid vehicles: a near term technology trend for CO2 emissions reduction. https://theicct.org/publication/mild-hybrid-emissions-jul22/ and Isenstadt, A., German, J. (ICCT), Dorobantu, M. (Eaton), Boggs, D. (Ricardo), Watson, T. (JCI). (2016). Downsized, boosted gasoline engines. https://theicct.org/publication/downsized-boosted-gasoline-engines-2/ [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

Beyond P0 MHEV architectures, there are substantial CO2 reduction benefits achievable by implementing P1-P4 architectures, representing placement of the motor/generator in positions of increasing distance from the engine along the driveline. While such systems cost more than P0, they are more cost-effective in that they have lower cost per percent reduction in CO2. Thus, ICCT recommends EPA consider including in its modeling more advanced MHEV architectures beyond P0. Additional discussion on MHEV effectiveness is in the following section. Table 7 below replicates Table 18 in ICCT 2022 MHEV. As shown in the table, P1-P4 MHEV architectures with specifications similar to P0 MHEV can increase cost by at most 53% (P4+P0 for FWD) with P4+P0 for AWD decreasing costs vs P0. At the same time, P2-P4 architectures can more than double P0 effectiveness. Combining the “Total” cost scaling shown in the below table with the ICCT P0 cost in the table above, all architectures have lower cost than the P0 MHEV cost used in the proposal. [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

SEE ORIGINAL COMMENT FOR Table 7. Mild hybrid architecture cost in 2020 (ICCT 2022 MHEV, Table 18) [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

For further information, see Dornoff, J., German, J., Deo, A. (ICCT), Dimaratos, A. (DITENCO). (2022). Mild-hybrid vehicles: a near term technology trend for CO2 emissions reduction. https://theicct.org/publication/mild-hybrid-emissions-jul22/ [EPA-HQ-OAR-2022-0829-0569, pp. 34-37]

Cost

EPA's estimated HEV costs also appear to be overestimated. Due to the challenge of disentangling the costs and effects of both electrified and conventional powertrain component changes from one redesign to the next, ICCT examined total powertrain costs from the central analysis output file (2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv). Total powertrain costs are calculated as the sum of battery cost, electrified driveline cost, e-machine cost, driveline cost, and engine cost. For redesigns that occur between MY2023-2027, the difference in cost between the HEV powertrain and non-HEV powertrain ranges from approximately $3,400 to over $9,000. For redesigns that occur after MY2027, the HEV powertrain cost difference ranges between approximately $2,700 to over $10,000. Cost changes due to learning notwithstanding, as analyzed in ICCT's 2015 report on hybrids,99 these levels of cost premiums are not plausible. [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

99 German, J. (2015). Hybrid vehicles: Trends in technology development and cost reduction. International Council on Clean Transportation. https://www.theicct.org/hybrid-vehicles-trends-technology-development-and-cost-reduction

As with MIL costs, it is not clear precisely how HEV engine (MIL, DHE, and DHE2) costs are calculated. Regardless, as HEV engines are modeled as either Atkinson or Miller cycle engines, their costs ought to be very similar to the same types of engines on non-HEV models. As ATK and MIL are fairly inexpensive as compared to a sufficiently advanced engine (NAS 2021), modeled HEV engine costs ought not to be significantly more expensive than their non-HEV counterparts. In fact, due to the capacity of HEV motor to take up low-speed, high torque demand and transient response, HEV engines can be optimized to a narrower operating range than non-HEV engines. This can enable higher compression ratios, increase EGR dilution, and potentially decrease costs. Especially in the case of a serial hybrid or range extended PHEV, the engine is effectively decoupled from the drivetrain, permitting deep optimization, with up to 40% engine cost reduction depending on electrification.100 [EPA-HQ-OAR-2022-0829-0569, pp. 37-40]

100 SAE 2021. (2021). Optimizing hybrids for cost and efficiency. SAE Automotive Engineering. Page 18. https://www.nxtbook.com/smg/sae/21AE04/index.php#/p/18

Lightweighting

Cost

In the proposal, the only lightweighting option is the switch to an aluminum body. This is certainly a viable lightweighting option, but it is not the only one. Manufacturers have many avenues for lightweighting with various degrees of mass reduction and associated cost (NAS 2021 and ICCT 2018 comments). [EPA-HQ-OAR-2022-0829-0569, pp. 40-43]

EPA should consider adjusting its lightweighting options in its analysis to incorporate varying levels of mass reduction at vary levels of cost per unit mass saved. This methodology has been used in prior rulemakings and can fit into EPA's existing mass and cost calculations. Alternatively, EPA can add a single, discrete, intermediate lightweighting option (between the base steel body and lightweighted aluminum body) that mimics the same format as the two existing options. This intermediate option would be composed of primarily ultra-, advanced- and high strength steels (as opposed to conventional or mild steel). Such steels with optimized design can offer mass reductions on the order of 10%-15% (higher for specific parts), at costs comparable to existing steel costs.105 More recent steel developments indicate further mass reductions are possible with both steel and better design optimization, with high strength steel costs similar to mild steel costs up to half the cost of lightweighting with Aluminum.106 [EPA-HQ-OAR-2022-0829-0569, pp. 40-43]

105 Isenstadt, A. and German, J. (ICCT); Piyush Bubna and Marc Wiseman (Ricardo Strategic Consulting); Umamaheswaran Venkatakrishnan and Lenar Abbasov (SABIC); Pedro Guillen and Nick Moroz (Detroit Materials); Doug Richman (Aluminum Association), Greg Kolwich (FEV). Lightweighting technology development and trends in U.S. passenger vehicles, (2016, December 19). http://www.theicct.org/lightweighting-technology- development-and-trends-us-passenger-vehicles

106 Brooke, L. (2019, May). The economics of materials selection. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Gehm, R. (2019, September). Latest mass-reducing innovations honored by Altair. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Visnic, B., Brooke, L. (2019, September). Stuck on structural adhesives. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Weissler, P. (2019, October). Cutting weight seen as less vital for automated and shared vehicles. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Gehm, R. (2020, September). Altair honors lightweight advances. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Macek. B. (FCA), Lutz, J. (US Steel). (2020, September). Virtual and physical testing of Third-generation High Strength Steel. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Vartanov, G. (2021, June). Lightweight steel on a (cold) roll. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Gehm, R. (2021, September). Altair honors weight-saving innovations. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues; Brooke, L. (2022, September). A materials lesson in Civics. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive- engineering/past-issues; Gehm, R. (2022, September). Altair honors innovations in sustainability and lightweighting. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive- engineering/past-issues; Brooke, L. (2023, March). Battle for the box. SAE Automotive Engineering. https://www.sae.org/publications/magazines/automotive-engineering/past-issues

Organization: John Graham

4. Mild Hybrid Efficiency, Cost, and Architecture

The proposed rule did not consider any improvements to mild hybrids. Estimates of mild hybrid effectiveness remain unchanged from the P0 mild hybrid estimate in previous rulemakings. Engine efficiency maps for light-duty non-dedicated hybrid systems in DRIA Table 2-2 all date from 2016 or earlier, with the exception of a turbo Miller cycle engine from 2020, and there are no efficiency improvements for any specific engine through 2032. [EPA-HQ-OAR-2022-0829-0585, pp. 15-16]

Further, EPA implicitly assumed that there would be no improvement in mild hybrid architecture. Only the P0 architecture was considered in the proposed rule.16 However, several recent studies have found that P2, P3, and P4 mild hybrid architectures are much more cost effective than P0 systems.17 They eliminate the losses in the belt, eliminate engine friction and pumping losses during regenerative braking, and enable the use of 20-30 kW electric motors with corresponding higher regenerative braking energy and engine synergies (e.g. launch assist, low-speed electric driving, aggressive fuel cutoff, and torque assist during driver tip-in). Overall, efficiency more than doubles compared with P0 systems at a much smaller incremental cost. Even though these reports were previously submitted to EPA and NHTSA, there was no discussion of mild hybrid architecture and system improvements in the proposed rule. [EPA-HQ-OAR-2022-0829-0585, pp. 15-16]

16 Figure 2-4: Summary of components and architectures used in ALPHA's modeling for this proposal (DRIA 2-11).

17 ICCT 2022 48V hybrid: Mild-hybrid vehicles: A near term technology trend for CO2 emissions reduction; https://theicct.org/publication/mild-hybrid-emissions-jul22/Roush report on 48V and BEV costs; https://www.regulations.gov/comment/EPA-HQ-OAR-2021- 0208-0210 AVL Webinar on Passenger Car powertrain 4.x – Fuel Consumption, Emissions, and Cost on June 2, 2020 https://www.avl.com/-/passenger-car-powertrain-4.x-fuel-consumption-emissions-and-cost plus slides were attached to ICCT's comments to NHTSA on 2024-26 LD CAFÉ proposed rule.

EPA Summary and Response

Summary:

EPA appreciates the comments from the International Council on Clean Transportation (ICCT) and John Graham regarding ICE costs provided in response to our proposal. ICCT commented that EPA's estimated costs of compliance are too high due to the overestimation of ICE technology costs. ICCT provided several examples and recommendations for changes.

Response:

EPA agrees that the ICE powertrain costs needed updating for the final rulemaking. As we discuss in chapter 2.5.1 of the RIA, for this rulemaking we are now assessing costs on an absolute (rather than incremental) basis. This also has enabled us to update our analysis to include more robust costing of PHEVs which were added to our ALPHA and OMEGA compliance modeling for analysis of the final standards. As discussed in 2.5.2.3 of the RIA, we contracted with FEV to evaluate and update our powertrain costs based on information within their powertrain components and engine database to help inform EPA's scalable cost equations for the engine and electrified powertrain (i.e., mild HEV, strong HEV, PHEV and EV) architectures currently being modeled in ALPHA. As a result, our overall ICE and HEV powertrain costs have decreased which is directionally in agreement with ICCT's comments.

For comments responses related to cost of PM standards and gasoline particulate filters, please refer to section 4.2.3.

12.3.2 – Other ICE topics

Comments by Organizations

Organization: GROWMARK, Inc.

Lack of EV Capability for Farmers

Current electric vehicles do not provide the capabilities that farmers rely on to carry out their operations. According to a study recently released by the American Automobile Association (AAA), the Ford F-150 Lightning saw its range decrease by almost a quarter when loaded close to its maximum payload capacity.4 A gasoline-powered truck, however, would only lose 14 percent of its range with the same amount of weight, and of course it would be quicker and more convenient to refuel.5 [EPA-HQ-OAR-2022-0829-0560, p. 2]

4 American Automobile Association. (2023, June). Effect of payload on driving range of battery electric truck. https://urldefense.com/v3/ https:/u7061146.ct.sendgrid.net/ls/click?upn=4tNED-2FM8iDZJQyQ53jATUZvOEO3mirlEl3vtAic9l7ghAOXNRXkwKaKICrDXA3ZoT75TOvo955EZ6-2FJiQG-2FErJaPZeKHTyfflQJiv4TMR5A-3DMLSQ_wwmARy8TMTevifjaQtiXjzeH-2FSc8WPX2ToRxYAJ5XFXCYIVurVZ- 2F7aCPZDngjq-2BQuMDruqnM8cSNwQPzi5UIwwpztKldVzphs52jy6vxI2xgPnkdzJy3C9ftadJYj76WuUf2T26mkgeQA4pLiS2I3PjMzAEYZZu-2BUbgcPfolgmcVfQ7aEf7LxjMjPw-2B8WF3EQEdXTpy-2BAUfR52wN4rM91gx75Pxivc VYDED1S55BpuarlzGYrR-2Bk3PvHnJeb3rGPLd5dXXuQ8SwSjo-2BWWPLN8Jrn1ZD1e0j05qXvdpcFmg7-2FbUtbDUzAhjkGZGxVpfcOxvWD4YC810LuMOxWhv3kzMP1Xq9BQ4VUljZwYsOjU-2BI-3D;!!A1OrVxnpM0w!A Qdah29wRyKcLjIUYyHo21FIzdyG78ee-sIEhfNe4_m8Dkjdh8iAFlUoJGGzPw1xORQ0wI8g1EedoHHou9l8NRN7$

5 Tucker, S. (2023, June 6). Study: EVs lose range to hauling, more than gas trucks. Kelly Blue Book. https://www.kbb.com/car-news/study-evs-lose-range-to-hauling-more-than-gas-trucks/

Additionally, EVs will have worse results when it comes to towing than ICE vehicles. For example, while an ICE Ford F-150 can tow up to 14,000 pounds, the EV Ford F-150 Lightning has a max towing capacity of two tons less than that.6 Furthermore, testing of towing any considerable weights with the EV truck resulted in dramatic decreases in range, up to a 70 percent decrease in one test.7 [EPA-HQ-OAR-2022-0829-0560, p. 2]

6 Brandt, E. (2022, August 18). Payload and towing capacity on electric vehicles. Kelly Blue Book. https://www.kbb.com/car-news/how-far-can-an-electric-truck-tow/

7 Brandt, 2022.

These figures are simply not acceptable to farmers who rely on their vehicles to do their jobs. Farmers use their trucks to take products to market, bring supplies to their fields, and move livestock. Vehicles that have less capability than current ICE technology will lead to decreased efficiency and increased cost at the farm gate, which will lead to further farm consolidation and threaten our nation's food security. [EPA-HQ-OAR-2022-0829-0560, p. 2]

Organization: Illinois Farm Bureau (IFB)

According to the USEPA, vehicle technology has reduced emissions from common pollutants by roughly 99 percent in both light- and heavy-duty vehicles and buses,1 and CO2 emissions from light-duty internal combustion engine vehicles ("ICEV") have decreased 25 percent since model year 2004.2 All vehicle technologies can continue to reduce emissions effectively and efficiently. According to the U.S. Energy Information Administration ("EIA"), there are about

272 million ICEVs3 on the road today, and EIA projects over 140 million ICEV sales will occur between 2023 and 2032.4 Further, EIA projects there will be about 269 million ICEVs in the fleet in 2050 along with 47 million battery electric and plug-in hybrid electric vehicles. [EPA-HQ-OAR-2022-0829-0532, p. 2]

1 U.S. EPA, History of Reducing Air Pollution from Transportation in the United States," https://www.epa.gov/transportation-air-pollution-and-climate-change/history-reducing-air-pollution-transportation, accessed June 2, 2023.

2 U.S. EPA, "Highlights of the Automotive Trends Report," https://www.epa.gov/automotive-trends/highlights- automotive-trends-report, accessed June 2, 2023.

3 That is: light-, medium-, and heavy-duty ICEV including gasoline, diesel, and hybrid electrics.

4 U.S. Energy Information Administration, Annual Energy Outlook 2023, Supplemental Tables 38. LDV Sales by Technology Type, 39. LDV Stock by Tech. Type, and 49 Freight Transport Energy Use.

Organization: Mass Comment Campaign sponsoring organization unknown (2,088 signatures)

EPA's proposal to ban most new gasoline and diesel vehicles by 2032 will benefit China at the expense of Americans, our energy security and jobs like mine in U.S. fuel and petrochemical manufacturing. [EPA-HQ-OAR-2022-0829-1707]

Plus stop Ireland from killing 200000 cows. You know it's crap. Cows are not killing the planet. Plus as long as China Keri's doing what they do doesn't matter how much we do. China U.S. the problem for the world and y'all know it. Stop the madness [EPA-HQ-OAR-2022-0829-1707]

The United States is the world's top producer of liquid fuels. American crude oil—not foreign oil—is the number one feedstock for our refineries. [EPA-HQ-OAR-2022-0829-1707]

We do not have the same strength in electric vehicle (EV) batteries and minerals. China owns that market. Even with massive investments, a study from the Dallas Fed suggests the United States is likely to control just 11% of global battery production while China keeps a stranglehold on 70%. This policy would trade U.S. fuel security and influence for dependence on China. [EPA-HQ-OAR-2022-0829-1707]

Consumers will pay for EPA's proposal long before it's implemented. EVs have yet to reach cost parity and sell for about $12,000 more than traditional models according to Kelley Blue Book. Forced EV sales are also inflating the cost of new and used gasoline vehicles. Public financing for the rushed expansion of the electric grid is also going to fall on consumers' and taxpayers' shoulders. [EPA-HQ-OAR-2022-0829-1707]

EPA claims reduced emissions will make up for these costs, but its accounting ignores all but one category of vehicle emissions—just those from a vehicle tailpipe. According to this logic, a Hummer EV, with its nearly 3,000-pound battery, is responsible for ZERO emissions and has less impact on the environment than a Prius. [EPA-HQ-OAR-2022-0829-1707]

In addition to ignoring lifecycle emissions, EPA overlooks the fact that today's fleet—composed almost entirely of consumer-preferred gasoline and diesel vehicles—is the cleanest on record. These improvements can continue—with more carbon capture, clean hydrogen and U.S.

biofuels—providing EPA allows all vehicle technologies to compete. [EPA-HQ-OAR-2022-0829-1707]

Please withdraw the current proposal and replace it with policy that (1) considers the full lifecycle emissions of vehicles, (2) prioritizes consumer choice and (3) commits to upholding to American energy security. [EPA-HQ-OAR-2022-0829-1707]

Organization: Matthew DiPaulo

While OEMs are producing EV vehicles, their entire fleet isn't. The average age of the vehicle car parc is 13 years with an average of 122,000 miles. With OEMs still manufacturing ICE engines, those vehicles will last 15+ years (or more) and will require motor oil. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: Missouri Corn Growers Association (MCGA)

To this point, the rulemaking ignores the fact that the ICE engines can be engineered and further optimized to lower emissions and meet targets. In the 1970s, the U.S. faced a problem with lead tailpipe emissions. To solve the issue, gasoline was reformulated to meet lead-based emission reduction targets. The U.S. didn’t ban or restrict the use of internal combustion engines. Instead, the fuel source was reengineered, allowing auto manufacturers to adjust and optimize powertrain technologies to simultaneously meet emission targets while following and meeting consumer demands. There are low and zero-emission liquid fuel options available today that can accomplish the same thing, including low-carbon ethanol as well as biodiesel. EPA should take the opportunity to focus on solutions that keep ICE engines on the road– because they are on the road in mass today and will be for the foreseeable future. [EPA-HQ-OAR-2022-0829-0578, p. 2]

Suppose EPA is genuinely interested in finding sustainable and workable emissions reduction solutions. Focusing on new fuel technologies that work within existing vehicle powertrains and fueling infrastructure available right now is the smart way forward. To that end, MCGA urges EPA to focus its energy on modernizing the nation’s liquid fuel standards, not cherry-picking winners and losers in the vehicle technology and powertrain sector. [EPA-HQ-OAR-2022-0829-0578, p. 2]

Organization: Reginald Modlin and B. Reid Detchon

The Proposed Rule primarily targets reducing emission of Greenhouse Gas (GHG). In that context, we observe that EPA has missed a substantial opportunity to reduce GHG emissions from vehicles now on the road. In seeking to achieve early wins in the climate challenge, the goal of deploying effective, available, and affordable technology packages should consider improving the fuel used by over 250 million existing vehicles. An analysis of the potential effectiveness of an improved fuel used in Internal Combustion Engine (ICE) powered vehicles now and into the next few decades shows that adoption of an improved fuel could possibly double the CO2 reductions claimed by the Proposed Rule! (See analysis conducted by Steffen Mueller, University of Illinois at Chicago, reported by B. West, “Benefits of Ethanol Blending and Impact on Emissions and Emissions Control,” at SAE Powertrains, Fuels and Lubricants Summit, October, 2021.) This observation alone should cause EPA to give very serious consideration into how an improved fuel can be adopted and deployed. And, an improved fuel would bring along further, substantial, benefits. [EPA-HQ-OAR-2022-0829-0570, pp. 1-2]

Organization: Transfer Flow, Inc

Different technologies are appropriate for different scenarios. [EPA-HQ-OAR-2022-0829-0496, p. 5]

Liquid fuels have a strong heritage of radically improving quality of life, and this history is not going to erase itself overnight. Basing the performance of all liquid fuels on fossil fuels or even gasoline is a limiting perspective that undercuts the potential for a grassroots fuels movement where fuels are created and consumed locally by repurposing the waste created from The United States' rich agricultural resources. [EPA-HQ-OAR-2022-0829-0496, p. 5]

California Senate Bill SB-1383 requires waste management companies to sequester organic materials and keep them out of landfills. Several CalRecycle24 facilities have developed waste-to-energy facilities that convert food and yard waste to carbon-negative biofuels, which are then used to power their garbage trucks and other vehicles. These waste-to-energy projects reduce landfilling and fossil fuel consumption and provide dramatic air quality benefits. They also create good-paying local jobs, often in low-income communities. [EPA-HQ-OAR-2022-0829-0496, p. 5]

24 https://calrecycle.ca.gov/organics/slcp/

Comparing low-NOx renewable natural gas made locally to gasoline is like comparing your current high-speed internet to the old, antiquated dial-up internet. The EPA's bias against internal combustion technologies is a short-sighted assumption and serves to undermine the overall goal of reducing emissions. [EPA-HQ-OAR-2022-0829-0496, p. 5]

EPA Summary and Response

Summary:

EPA received several comments related to ICE powertrains overall, or in relation to potential changes from ICE-based powertrains to EVs. Growmark, Inc. commented that EVs do not have the same functionality as ICE vehicles and may not meet the utility needs of farmers while the Illinois Farm Bureau commented on the historical improvement of ICE-based vehicle efficiency and reductions in emissions. Matthew DiPaulo, a private citizen noted the likely long life of ICE-based vehicles in the fleet. Missouri Corn Growers, Transfer Flow, and Reginald Modlin and B. Reid recommended that EPA focus on alternative fuels that could be used in the existing fleet of vehicles in considering reductions in emissions. EPA also received a number of comments from a mass comment campaign that ranged from calling into question the impact of livestock on climate change to recommending that EPA adopt lifecycle analysis into its standard setting process.

Response:

EPA appreciates all the comments we received related to ICE technologies and fuels. The agency recognizes that no single technology will meet the needs of every consumer which is why the Agency has decided to continue our longstanding practice of adopting performance-based standards instead of a ZEV mandate. Performance-based standards allow vehicle manufacturers the option of building lower emission versions of the vehicles that their consumers and intended applications demand. Under the final standards, we expect that consumers will have more choice of vehicles; though all the technologies we project that manufacturers might use to comply with the standards are available in the market today, over the timeframe of the standards we expect that the technology options will span more vehicle segments and price points.

EPA also appreciates commenters recommendations regarding alternative fuels and the potential emission reductions that could be achieved. Fuel changes are out of scope for this rulemaking, however, the EPA will continue to monitor fuel technology developments for future consideration.

12.4 – Modeling of IRA incentives

Comments by Organizations

Organization: Alliance for Automotive Innovation

EPA underestimates battery costs; unrealistic BEV sales assumptions

The NPRM substantially underestimates the cost of batteries while overestimating the availability of consumer and manufacturing tax credits. For example, the Proposed Rule assumes that in 2029, the combination of cost reductions from installing larger batteries in BEVs and incentives from Inflation Reduction Act (IRA)5 Sections 30D, 45W, and 45X results in consumer incentives and battery production tax credits that substantially exceed the battery cost. If cost reductions and incentives eliminate the entire cost of EV batteries, it is little wonder the EPA model suggests a massive increase in sales of long-range BEVs. However, we do not believe these assumptions are realistic. Moreover, while vehicle cost and affordability are critical to success, they are just one set of factors in the transformation to electric vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 4-5]

5 H.R.5376 - 117th Congress (2021-2022): Inflation Reduction Act. (2022, August 16). Available at https://www.congress.gov/bill/117th-congress/house-bill/5376/text.

- The Inflation Reduction Act (IRA)21 committed to incentivizing the retail purchase of EVs; however, this incentive comes with criteria that exclude the vast majority of EVs currently for sale in the United States. As of June 2023, due to the North American assembly requirement and the MSRP limitations, less than 20 of the 97 EVs for sale qualify for either half or all of the $7,500 tax credit available to eligible taxpayers. Guidance regarding Foreign Entity of Concern provisions (Section 30D), which go into effect in 2024 (battery components) and 2025 (critical minerals), is still forthcoming from the Treasury Department. These provisions will potentially make qualifying for the tax credit more challenging for eligible consumers in the next 12-18 months. [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

21 H.R.5376 - 117th Congress (2021-2022): Inflation Reduction Act. (2022, August 16). Available at https://www.congress.gov/bill/117th-congress/house-bill/5376/text.

- The $7,500 retail tax credit under 30D is split in half with eligibility requirements for battery components and critical minerals. The critical minerals portion requires a qualifying percentage (currently 40%) to be extracted or processed in the United States or a country with which the U.S. has a free trade agreement, or recycled in North America. The U.S. does not currently have free trade agreements with many of our allies (e.g., the EU and UK) or mineral-rich nations (e.g., Indonesia for nickel). Similarly, the other half of the 30D tax credit is available for eligible vehicles that contain battery components (currently 50%) that are manufactured or assembled in the United States. [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

- The IRA also provides an incentive to produce the needed batteries helping to offset their cost; however, this only applies to the United States, ignoring the global supply chain needed to support a 40-50% U.S. EV market. [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

5. IRA Manufacturing Credits (45X)

a) Application of IRA 45X Credit in EPA Modeling

The Inflation Reduction Act has numerous provisions aimed at increasing domestic manufacturing of clean energy components, including EV batteries, and reducing the cost of EVs through consumer tax credits. [EPA-HQ-OAR-2022-0829-0701, pp. 63-64]

While provisions such as the Advanced Manufacturing Tax Credit (Section 45X) and Advanced Energy Project Credit (Section 48C) will assist in onshoring production of EV batteries and battery components, that will take time. As much as automakers and policymakers would like this transition to happen faster, increasing access to raw materials, expanding manufacturing capacity and broadening domestic supply chains will not happen overnight. [EPA-HQ-OAR-2022-0829-0701, pp. 63-64]

In its modeling, EPA assumes that battery costs will be reduced through the use of the Advanced Manufacturing Tax Credit (Section 45X). The 45X production tax credit provides a credit of $35/kWh for battery cell production and $10/kWh for battery module production. To qualify for the credit, manufacturing must take place in the U.S. While the 45X tax credit will assist in bolstering our nation's competitiveness and economic security, the assumptions made by EPA are overly optimistic. [EPA-HQ-OAR-2022-0829-0701, pp. 63-64]

EPA assumes that 60% of manufacturers will be able to take advantage of the $35/kWh battery cell credit and $10/kWh battery module credit in 2023, ramping up to 100% by 2027.113 The resulting credit is provided in Table 2-49 of the DRIA. [EPA-HQ-OAR-2022-0829-0701, pp. 63-64]

113 DRIA at 2-86.

In order for 100% of manufacturers to claim the credit, all EV battery cells and modules would have to be manufactured in the U.S. As shown in Figure 18, this is an unrealistic assumption. EPA's projections for GWh of battery capacity needed to support its proposal exceed estimates of total U.S. battery cell manufacturing capacity. [EPA-HQ-OAR-2022-0829-0701, pp. 63-64]

Figure 18: Projected battery demand under the EPA proposal114 vs. U.S. battery cell supply115 [EPA-HQ-OAR-2022-0829-0701, pp. 63-64]

114 Calculated by Auto Innovators based on data in OMEGA output file [. . .]vehicles.csv for the proposal central analysis.

115 Benchmark Minerals Intelligence (1Q2023), proprietary model for Auto Innovators. Reflects unweighted U.S. battery cell manufacturing capacity, not weighted for probability.

It does not appear that EPA considered any specific source to support its estimates for future U.S. cell and pack manufacturing capacity relative to its projected battery demand for the proposal. The DRIA simply says, [EPA-HQ-OAR-2022-0829-0701, pp. 64-65]

We estimated that, across the PEV industry as a whole, the capability of manufacturers to take advantage of the $35 cell credit and the $10 module credit would ramp up over time, as new U.S. battery manufacturing facilities come online, allowing manufacturing to increasingly take place in the U.S. We ramped the modeling value of the credit linearly from 60% of total cells and modules in 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 64-65]

. . to 100% utilization in 2027 . . . Although a large percentage of 2023 U.S. BEV battery and cell manufacturing is represented by the production of one OEM, we believe that the many large U.S. battery production facilities that are being actively developed by suppliers and other OEMs (as described in IV.C.6 of the Preamble) will allow benefit of the credit to be accessible to all manufacturers by 2027. We also note that the high value of the credit provides a strong motivation for manufacturers to utilize it.116 [EPA-HQ-OAR-2022-0829-0701, pp. 64-65]

116 DRIA at 2-54.

An assumption of 100% applicability of 45X credits also implies that all imported vehicles will have U.S.-manufactured battery cells and packs. Imported new light-duty vehicles generally arrive fully assembled. In order to have U.S.-manufactured battery cells and packs, those components would either have to be exported (only to later be imported as part of a complete vehicle), or imported vehicles would need to have their battery packs installed upon arrival in the U.S. Such assumptions could only be applied as an exception to the rule. To apply them to every imported vehicle is a clear error that needs correction for the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 64-65]

In addition, EPA should consider that some manufacturers do not have domestic production facilities and import all of their vehicles. EPA applies its 45X credit adjustment equally to all BEVs, but this would not be a fair or accurate assessment for vehicle importers. [EPA-HQ-OAR-2022-0829-0701, pp. 64-65]

Although U.S. battery cell and pack manufacturing are clearly on an upward trajectory, it is extremely doubtful that 100% of batteries used in vehicles produced for sale in the U.S. will meet IRA 45X requirements. It is going to take time, certainly longer than 2027, to onshore all EV battery manufacturing, and it is unclear whether manufacturers would benefit directly from the $35 kWh credit, or the $10 kWh credit depending on yet to be issued Treasury guidance. [EPA-HQ-OAR-2022-0829-0701, p. 65]

While we are supportive of the 45X production tax credit and view it as a valuable incentive to increase the pace of localizing battery manufacturing, the assumption made by EPA that all battery cell and module manufacturing will be in the U.S. is simply not accurate. This type of industrial transformation will not happen overnight. We recommend that EPA reconsider its assumptions for applicability of IRA 45X in the final rule. The reconsideration should include projected U.S. battery cell and pack manufacturing capacity, domestic versus import vehicles, and impacts on specific manufacturers. [EPA-HQ-OAR-2022-0829-0701, p. 65]

b) Disconnects Between EPA’s 45X Projections and BatPac Inputs

It appears there are likely significant disconnects between EPA's forecasted domestic battery production environment—in which battery supply is assumed to be available for all OEMs to source domestically produced batteries while fully passing along IRA-based tax benefits to their customers—and the agency's acknowledged use of "default" BatPaC values/assumptions in the model. For example, the model defaults to an assumption that all battery manufacturing will be performed "in house." Certainly, for some manufacturers, this is a fair characterization. For others, however, it is unlikely to be the case which, as demonstrated by BatPaC outputs, will result in higher overall battery costs. [EPA-HQ-OAR-2022-0829-0701, pp. 65-66]

c) Impact of 45X and 30D/45W Assumption on Implied Battery Cost

In addition to the IRA 45X credits, EPA also projects the availability of IRA 30D/45W retail and commercial EV purchase incentives. Although we recognize that the 30D/45W incentives are applied to vehicle purchases or leases, this is similar to EPA's approach to the 45X credit, which EPA applies the marked-up battery cost.117 [EPA-HQ-OAR-2022-0829-0701, pp. 65-66]

117 DRIA at 2-54.

Therefore, it is informative to assess the combined impact of EPA's projections of rapidly declining battery costs, 45X, and 30D/45W credits on net battery cost. In Figure 19, we start with EPA's sales-weighted average battery cost in 2029, apply EPA's projected 45X credits, and then apply EPA's projected 30D/45W incentives to calculate a net battery cost. EPA projects that an average 2029 BEV battery of 103 kWh118 will cost $8,190 in 2029. The EPA-projected 45X credit is $45/kWh119 or $4,628 total. EPA's projected 30D/45W credit is $5,250 in 2029.120 The battery is the largest cost driver in an EV and therefore these IRA incentives can be considered as direct offsets to battery cost. After application of 45X and 30D/45W credits the implied net cost of the battery is negative – ($1,688). The estimations that EPA relies upon also presume that Congress makes no changes to the IRA, including the 30D, 45W, or 45X tax provisions that are used to justify the extraordinarily high BEV levels between MYs 2027-2032. [EPA-HQ-OAR-2022-0829-0701, pp. 65-66]

118 OMEGA, EPA proposal central analysis, […]vehicles.csv output file. Sales-weighted average calculated by Auto Innovators.

119 DRIA at 2-87 (Table 2-49).

120 DRIA at 2-87 (Table 2-50).

Figure 19: Battery cost walk using EPA projections for average battery cost, 45X credits and 30D/45W credits

Item	Cost	Cost After Credit
2029 average BEV battery (103 kWh)	$8,190	$8,190
EPA-projected 45X credit ($45/kWh)	($4,628)	$3,562
EPA-projected 30D/45W credit	($5,250)	($1,688)

[EPA-HQ-OAR-2022-0829-0701, pp. 65-66]

d) Transparency of EPA's Methodology in Application of 45X Credits

To verify our understanding of EPA's methodology in applying estimated 45X credits, Auto Innovators attempted to recreate results shown in Figure 2-27 based on descriptions of the methodology121 and data from OMEGA input and output files. However, those efforts were unsuccessful. Given the importance of the potential impact of the IRA credits on battery costs in general, the agency's application of these credits must be accurate and fully transparent. We recommend that EPA provide more thorough documentation of the OMEGA input and output files, and descriptions of data used in the final rule. An example calculation for application of the 45X credits based on OMEGA fields could be helpful. [EPA-HQ-OAR-2022-0829-0701, pp. 66-67]

121 DRIA at 2-53 et seq.

e) Economics of 45X Benefits

The DRIA includes a simple analysis of how the tax provisions in the Inflation Reduction Act would affect the cost of producing bateries.122 However, EPA does not take into account that the burden of a tax (or benefit of a credit) does not necessarily accrue to the party that is taxed (or receives the credit).123 If the industry is reasonably competitive, then most of the gains and losses from changes in industrial tax policy may flow through to consumers. If an individual firm does not pass through the benefit (to either an automaker or ultimately a consumer), they are vulnerable to competition from another firm that does pass through the benefit of the credit. The price elasticity of demand for the product also plays a role in the pass-through analysis. Before the final rule, Auto Innovators recommends that the EPA re-evaluate the analysis of the credit provisions of the IRA. [EPA-HQ-OAR-2022-0829-0701, pp. 66-67]

122 DRIA at 2-53 et seq.

123 htps://pressbooks-dev.oer.hawaii.edu/principlesofeconomics/chapter/5-3-elasticity-and-pricing./

I. Consumer Adoption

1. IRA – Consumer Tax Credits

The Inflation Reduction Act has numerous provisions aimed at reducing the cost of EVs through consumer tax credits. It remains to be seen how consumer tax credits, such as the Clean Vehicle Credit (Section 30D) and Credit for Qualified Commercial Clean Vehicles (Section 45W), are implemented. With the passage of the Inflation Reduction Act, the clean vehicle tax credit went from a credit that was widely available to all consumers and all electric vehicles127 to one that includes critical mineral and battery component requirements and that limits eligibility based on location of vehicle assembly, customer income and vehicle manufacturer suggested retail price (MSRP). The previous tax credit provided up to $7,500 depending on battery size. The new tax credit is split in half with battery component requirements accounting for one half and critical minerals requirements the other. The 30D tax credit is now more industrial policy than a simple consumer tax credit. [EPA-HQ-OAR-2022-0829-0701, pp. 71-72]

127 Up to a per manufacturer cap of 200,000 cumulative sales.

As shown in Figure 21 below, the day a tier President Biden signed the Inflation Reduction Act, the portion of all PEV models eligible for 30D dropped from 92% to 35% due to the North American assembly requirement. That percentage further dropped on January 1, 2023, to 24%, when MSRP caps were implemented, and the number of eligible consumers dropped with the implementation of income caps. Battery component and critical mineral provisions then went into effect on April 18, 2023, which dropped the portion of eligible models to just 19%. Of that 19%, only half of the vehicles qualify for the full $7,500. [EPA-HQ-OAR-2022-0829-0701, pp. 71-72]

Figure 21: Percent of Eligible EV Models for the 30D Clean Vehicle Tax Credit

There will also be another hurdle that manufacturers must meet when Foreign Entity of Concern restrictions go into effect in 2024 for battery components and 2025 for critical minerals. We have yet to see any guidance on how these provisions will be rolled out, but it will almost certainly reduce the number of eligible vehicle models. [EPA-HQ-OAR-2022-0829-0701, pp. 71-72]

As of today, there are 97 ZEVs available to purchase in the U.S.128 Only 18 unique models qualify for the Inflation Reduction Act (IRA) 30D tax credit.129 IRS guidance with respect to Foreign Entities of Concern is still outstanding, which JD Power expects will result in more vehicles losing eligibility for the tax credit altogether. [EPA-HQ-OAR-2022-0829-0701, pp. 72-74]

128 htps://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard

129 htps://www.fueleconomy.gov/feg/tax2023.shtml. Accessed on June 29, 2023.

The Inflation Reduction Act also created a new tax credit for qualified commercial clean vehicles (Section 45W). This credit is up to $7,500 and is available for qualified vehicles with a battery capacity of at least 7 kWh and acquired for use or lease by a taxpayer and not for resale. In the instance of vehicles leased to a private retail customer, the captive finance company leasing the vehicle could be the eligible taxpayer and receive the 45W tax credit. The captive finance company may then pass along all, some, or none of the credit onto the customer. [EPA-HQ-OAR-2022-0829-0701, pp. 72-74]

As shown in Table 2-50 of the DRIA (Figure 22), EPA assumes that on average every EV sold will qualify for and receive at least $3,750 of the 30D or 45W tax credit in 2023. Currently, about one-fifth of all available EV models qualify for at least half of the 30D tax credit. EPA expects that the average amount of tax credits to rise by $250 per year, but again, with foreign entity of concern provisions going into effect in 2024 for battery components and 2025 for critical minerals, the amount of available credit is likely to go down, not up. [EPA-HQ-OAR-2022-0829-0701, pp. 72-74]

Additionally, EPA also assumes that 45W will play a significant role in reducing the overall price of EVs. This assumption is flawed for several reasons. First, the percentage of vehicles leased in the U.S. has declined steadily over the past three years. Figure 23 shows the percentage of leased vehicles has dropped from over one-third in January 2020 to less than one-fifth in July 2022.130 While lease rates may rise as a result of the 45W provision, there's no indication they will rise to a level that would result in 80% of BEVs receiving either a 30D or 45W tax credit. [EPA-HQ-OAR-2022-0829-0701, pp. 72-74]

130 https://www.coxautoinc.com/market-insights/leasing-decline-has-short-term-and-long-term-implications/

Second, in the cases where 45W is applied to a leased vehicle to a private customer, the captive finance company leasing the vehicle is the eligible taxpayer to receive the 45W credit. Under existing law, the 45W tax credit does not require that the credit be passed on to the person leasing the vehicle. The captive finance company has discretion to pass along all, some, or none of the credit to the customer. Third, 45W is based on the cost differential between battery and internal combustion engines, and if battery prices decrease as EPA has estimated, the amount available under 45W could quickly phase down. Fourth, while the 30D credit might not be widely available to eligible taxpayers, the 45W credit may or may not be a viable option depending on a host of factors that impact a new vehicle buyer (e.g., credit score, interest rates, etc.). [EPA-HQ-OAR-2022-0829-0701, pp. 72-74]

Figure 22: Assumed IRS 30D and 45W Clean Vehicle Credit in Omega (EPA NPRM Table 2-50) [EPA-HQ-OAR-2022-0829-0701, pp. 72-74]

Figure 23: Retail lease share of retail sales [EPA-HQ-OAR-2022-0829-0701, pp. 72-74]

While there are positive provisions in the Inflation Reduction Act that will help onshore battery and vehicle production, it is going to take time. The assumptions used by EPA regarding the number of vehicles that will qualify for consumer tax credits are overly optimistic and should be reevaluated. [EPA-HQ-OAR-2022-0829-0701, pp. 75-76]

Adding to this uncertainty is the potential for federal legislation that could change the Infrastructure Investment and Jobs Act (IIJA) or the availability of the IRA tax credits. For example, on June 8, 2023, Bill H.R. 3938132 was introduced to "Build it in America", which, if passed and signed into law, would end both the 25E used EV tax credit as well the 45W tax credits. The 30D credit would have the 200,000-vehicle cap per manufacturer reinstated, including previously qualifying vehicles. Additionally, no credit would be allowed under the provision for vehicles which have batteries that contain less than 80% critical minerals extracted or processed in the United States or in any country which the United States has a free trade agreement. The provision would also further restrict the definition of a "free trade agreement." No credit would be allowed under the provision for vehicles in which less than 100% of the value of the battery components contained in the battery were manufactured or assembled in North America. While H.R. 3938 was passed by the House Ways and Means Committee on June 13th by a vote of 24-18, it demonstrates the possibility of Congressional changes that could dramatically and negatively change the entire landscape for EVs - including the assumptions that EPA relied upon for this proposed rulemaking. [EPA-HQ-OAR-2022-0829-0701, pp. 75-76]

Probably the most significant concern is the impact of the 45X production tax credit on the overall estimated cost/price reduction of EVs. As mentioned in Section I.A.2, EPA assumes that every battery cell and every battery module in every EV sold starting in 2027 will be produced in the United States and will therefore receive the benefit of a $45/kWh price reduction. MDVs are larger, heavier vehicles that will likely need larger, higher power batteries. As a result of EPA's assumption, every MDV will receive a significant price reduction scaled to the size of these very large batteries. For example, a 200-kWh battery under EPA's assumed application of the 45X tax credit would receive a $9,000 price reduction. This projected, dramatic reduction in price, as discussed earlier in this comment, is overly optimistic and incorrect, and without doubt positively, increased the EV penetration rate of these vehicles in support of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0701, p. 191]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

The Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) have set aside historic amounts of funding for electric vehicles and will greatly reduce greenhouse gas (GHG) emissions from the transportation sector if that money is invested with climate impacts in mind. EPA's standards must build off of these investments. While we commend EPA for proposing strong standards that help the U.S. achieve President Biden's 2030 goal of 50% zero emission new vehicle sales, these historic investments mean we can go even further.5 Since the IRA was signed into law, $50 billion in investments in EV and battery manufacturing, and supply chain projects have been announced.6 These investments could get the U.S. to over 60% new light-duty EV sales by the early 2030s.7 But more will be needed to adequately address the climate emergency. EPA's MY 2027-2032 standards should fully account for the recent federal activity and build off them to achieve further emissions reductions. [EPA-HQ-OAR-2022-0829-0642, pp. 1-2]

5 https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/

6 https://www.charged-the-book.com/na-ev-supply-chain-map

7 https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23.pdf; https://rmi.org/insight/how-inflation-reduction-act-will-affect-ev-adoption-in-the-united-states/

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

As for IRA incentives, EPA substantially overestimates the effect that those incentives will have on the upfront purchase price of electric vehicles. See 88 Fed. Reg. at 29,195; Draft RIA at 2-86. Many of the credits EPA models come with stringent restrictions and qualifications that make the benefits una- vailable to most consumers. [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

For example, EPA relies heavily on the "Clean Vehicle Tax Credit," which offers consumers up to $7,500 for buying a new electric vehicle during the tax- able year. See 26 U.S.C. §§ 30D(a)-(b). The $7,500 is the sum of two credit amounts. Id. § 30D(a). First, purchasers receive $3,750 if certain percentages of the critical minerals in the vehicle's battery are (i) extracted or processed in the United States or a country with which the United States has a free-trade agreement,3 or (ii) derived from materials recycled in North America. Id. § 30D(b)(2). The requisite percentages of minerals that must be extracted, pro- cessed, or recycled in North America or in a nation that is a U.S. free-trade- agreement partner increase year over year, beginning with 40 percent for vehi- cles placed in service during 2023 and reaching 80 percent for vehicles placed in service during or after 2027. Id. § 30D(e)(1)(B). Second, purchasers receive an additional $3,750 if a certain percentage of the battery components are man- ufactured or assembled in North America. Id. § 30D(b)(3). Again, the percent- ages increase year over year, beginning with 50 percent for vehicles placed in service during 2023 and reaching 100 percent for vehicles placed in service dur- ing or after 2029. Id. § 30D(e)(2)(B). In addition, for either of these credit amounts to apply, the purchaser or vehicle must meet additional requirements: [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

3 The IRS identifies these countries as Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Japan, Jordan, Korea, Mexico, Mo- rocco, Nicaragua, Oman, Panama, Peru, and Singapore. See Treasury Releases Proposed Guidance on New Clean Vehicle Credit to Lower Costs for Consumers, Build U.S. Industrial Base, Strengthen Supply Chains, U.S. Dep't of Treasury (Mar. 31, 2023), https://home.treasury.gov/news/press-re- leases/jy1379.

• Final assembly of the vehicle must occur in North America. Id. § 30D(d)(1)(G). [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

• The vehicle's retail price cannot exceed certain thresholds ($80,000 for vans, SUVs, and pickups, and $55,000 for all other vehicles). Id. § 30D(f)(11). [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

• The taxpayer's income cannot exceed certain threshold amounts ($150,000 for taxpayers filing a single return; $225,000 for taxpayers fil- ing as head of household; and $300,000 for taxpayers filing jointly). Id. § 30D(f)(10). [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

• Finally, whatever percentage of the critical minerals or battery compo- nents that are not sourced from North America or a free-trade partner still cannot come from a "foreign entity of concern"—which is defined by a cross-referenced statute to include (among others) entities that are "owned by, controlled by, or subject to the jurisdiction or direction of" China and Russia. Id. § 30D(d)(7)(A); see 42 U.S.C. § 18741(a)(5)(C); 10 U.S.C. § 4872(d)(2). [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

That panoply of onerous restrictions will likely limit drastically the number of consumers who will actually benefit from the credit. The critical-minerals sourcing requirements will render many electric-vehicle models ineligible. In April 2023, the IRS concluded that only 22 electric-vehicle models qualify. See Tax Credits for Electric Vehicles: The Latest from the IRS, Bradford Tax Inst. (May 2023), https://tinyurl.com/32akaztz. And the Congressional Research Service reports that, "[o]ver time, as the battery critical minerals and components re- quirements tighten, there are claims that no vehicles would qualify." Molly F. Sherlock, Clean Vehicle Tax Credits in the Inflation Reduction Act of 2022, Cong. Research Serv., at 3 (Aug. 24, 2022) ("Clean Vehicle Tax Credits"). The retail- price threshold will likely further disqualify many purchases of electric vehicles. In September 2022, the average cost of a new electric vehicle was $65,291—far above the $55,000 limit for many passenger vehicles. Renee Valdes, Electric Car FAQ: Your Questions Answered, Kelly Blue Book (Oct. 31, 2022), https://ti- nyurl.com/4zepcvd4. And some consumers who purchase electric-vehicles might have incomes exceeding the statutory thresholds. [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

Despite these impediments to the Clean Vehicle Tax Credit's uptake, EPA predicts that electric-vehicle purchasers will experience substantial benefits. It states that, "[f]or 2023 [the agency] estimated that an average credit amount (across all PEV purchases) of $3,750 per vehicle could reasonably be expected to be realized" through a combination of this credit and the Qualified Commer- cial Clean Vehicles Credit (which applies for Class 2b or Class 3 vehicles). 88 Fed. Reg. at 29,301. "For later years," the agency assumes that "the attrac- tiveness of the credits to manufacturers and consumers would likely increase eligibility over time" and "ramped the value linearly to $6,000 by 2032." Id. EPA does not explain how it settled upon any of those estimates, offer data to support them, or reconcile them with reports that far less than half of current models qualify today and that none may qualify in the coming years. [EPA-HQ-OAR-2022-0829-0683, pp. 25-27]

In addition, although EPA presents the Clean Vehicle Tax Credit as a new incentive that will accelerate consumer acceptance, it is a successor to a tax credit that has existed for years. And as amended by the IRA, the credit is in most respects more restrictive than its predecessor. Although the prior version of the tax credit was subject to a manufacturer-level cap (that the IRA re- moved)—under which the credit was reduced and ultimately eliminated for a particular manufacturer if it sold a certain number of vehicles—the prior ver- sion was easier for individual electric-vehicle buyers to satisfy. Under the prior version, purchasers were eligible for a base amount of $2,500 with an additional $417 for every kilowatt-hour of capacity above 5 kilowatt-hours, up to $5,000. See Sherlock, Clean Vehicle Tax Credits at 2. There were no restrictions based on the critical minerals or components used in the vehicle's battery; there was no requirement that final assembly occur in North America; and there were no thresholds for income or retail price. Id. [EPA-HQ-OAR-2022-0829-0683, pp. 27-28]

If the pre-existing, easier-to-satisfy version of this tax credit did not result in the widespread adoption of electric vehicles—which, by all accounts, it did not—an amended version with more stringent qualifying requirements is un- likely to do so either. Although the IRA eliminated the manufacturer-level cap on the tax credit's availability, removing one impediment to consumers' ability to receive the tax credit for a particular manufacturer's vehicles, the other changes Congress made to the credit through the IRA could if anything disin- centivize consumers from purchasing electric vehicles by making it more difficult to obtain a tax credit for any electric vehicle. Shortly before the IRA was en- acted, the President and CEO of the Alliance for Automotive Innovation de- scribed the amended credit as a "major setback" to electrification, noting that "Americans who would otherwise receive the credit today (say, the family test driving a car this weekend and on the fence about whether to make the switch to an EV) will no longer be able to take advantage of this financial incentive to purchase an EV." John Bozzella, What if No EVs Qualify for the EV Tax Credit? It Could Happen., All. for Auto. Innovation (Aug. 5, 2022), https://ti- nyurl.com/3fhb6mcu (emphasis added). At a minimum, EPA has not ex- plained how tightening the tax credit's criteria would substantially increase electric-vehicle adoption. [EPA-HQ-OAR-2022-0829-0683, pp. 27-28]

EPA also relies on the "Advanced Manufacturing Production Credit," which (among other things) provides manufacturers with a credit of up to $35 per kilowatt-hour for producing battery cells, 26 U.S.C. § 45X(b)(1)(K), and a credit of up to $10 per kilowatt-hour for producing battery modules, id. § 45X(b)(1)(L). EPA characterizes this tax credit "as a reduction in direct man-ufacturing costs, which in turn is assumed to result in a reduction in purchase price for the consumer." Draft RIA at 2-86. But EPA significantly overstates the likely effect of this credit as well. [EPA-HQ-OAR-2022-0829-0683, pp. 28-29]

Under the Internal Revenue Code, manufacturers do not qualify for these credits unless the battery cells and modules are produced within the United States. 26 U.S.C. § 45X(d)(2). As EPA acknowledges, however, "a large percentage of 2023 U.S. BEV battery and cell manufacturing is represented by the production of one [original-equipment manufacturer]." 88 Fed. Reg. at 29,300 (emphasis added); see also Draft RIA at 2-54. As a result, many batteries do not currently qualify for the tax credit. Cf. Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 88 Fed. Reg. 25,926, 25,945 (Apr. 27, 2023) ("there are few manufacturing plants for HD vehicle batteries in the United States, which means that few batteries would qualify for the tax credit now"). [EPA-HQ-OAR-2022-0829-0683, pp. 28-29]

EPA rejoins that the amount of domestically produced battery cells and modules will increase in the coming years and projects that all manufacturers will be eligible for the credit in 2027. See Draft RIA at 2-54. But that assertion depends entirely on EPA's "expect[ation] that the many large U.S. battery pro- duction facilities that are being actively developed by suppliers and other [orig- inal-equipment manufacturers]" will come online in just a few short years and will produce enough battery cells and modules to support the Nation's expected electric-vehicle fleet by the rule's compliance period. 88 Fed. Reg. at 29,300. [EPA-HQ-OAR-2022-0829-0683, pp. 29-30]

That expectation is unwarranted. Some of the battery-manufacturing plants that EPA relies on are still only under consideration. See 88 Fed. Reg. at 29,317 (discussing four plants that companies are "considering" constructing). The plans for one of those plants were reportedly put on hold after executives reached an impasse and decided not to move forward. See Peter Johnson, GM and LG Partnership Falters; Will Another Battery Maker Save the Next US Plant?, Electrek (Jan. 20, 2023), https://tinyurl.com/mvfewj3e. Other planned facili- ties have experienced setbacks in construction and production. For example, LG Chem planned to begin construction on its facilities in the first half of 2023, but construction has been postponed until "about the end of the third quarter." LG Chem to Develop Tennessee Site as Base for Batteries in North America, Pulse (Apr. 20, 2023), https://tinyurl.com/37r49eew. Tesla and Panasonic built a factory in Nevada, but "production ramp-up ran at least a year behind sched- ule" because workers "had to be trained on manufacturing skills they had long lost" and "battery machinery had to be redesigned and adapted." Daniel Zlatev, Tesla Battery Factory Took Panasonic 6 Years to Master Since US Workers Lost Their Manufacturing Skills, Notebook Check (Feb. 27, 2023), https://ti- nyurl.com/3vu8usmd. Thus far, that "facility hasn't grown to the size that the companies originally planned." Fred Lambert, Panasonic Is Planning a Large Bat- tery Cell Factory in the US to Supply Tesla's Demand, Report Says, Electrek (Mar. 3, 2022), https://tinyurl.com/bdz6j9sy. Recent reports indicate that the factory is still only "about 30% complete," Fred Lambert, Panasonic to Add New Battery Production Line at Tesla Gigafactory Nevada, Electrek (June 6, 2023), and although there are plans for expansion, there was "no clear timeline for Tesla to start the construction project" as of October 2022, Fred Lambert, Tesla Is Finally Going to Expand Gigafactory Nevada, Electrek (Oct. 3, 2022), https://tinyurl.com/4de-ump6k. As these examples illustrate, for any number of reasons, the domestic battery-manufacturing sector may not develop at the pace or scale that EPA predicts. EPA's analysis of likely effect of the tax credits for producing batteries, which is predicated on that prediction, is therefore unsound. [EPA-HQ-OAR-2022-0829-0683, pp. 29-30]

Organization: American Fuel & Petrochemical Manufacturers

ii. EV Purchase Price

EPA assumes in MY 2032, there will be a $3500-$6100 price gap between EVs and ICEVs, with ICEVs costing less.234 EPA's purchase price incorrectly assumes that every ZEV will be eligible for the maximum federal purchase incentive.235 EPA asserts the relatively slight increase in the incremental cost of manufacturing a rule-compliant vehicle (Table 13-46 of the DRIA provides an average increase of $1,164 by 2032) is based, in part, on the assumption battery manufacturers are eligible for the IRA's ten percent Production Tax Credit for modules manufactured in the U.S. It is arbitrary and capricious for EPA to ignore the likelihood that battery raw materials will not be mined in the U.S. or available for import from credit-qualifying countries, given Section I.A.1 of these comments illustrates China's dominance in processing critical minerals needed for ZEV batteries and the manufacture of ZEV batteries. Consequently, it is unrealistic for the Agency to assume ZEV purchases will be eligible for the full incentive. [EPA-HQ-OAR-2022-0829-0733, p. 51]

234 DRIA at 4-20, Table 4-77

235 AAI Comments at ii-iv.

Organization: American Honda Motor Co., Inc.

Projecting future battery material and labor costs

The agency assumes that the IRA 45X tax credits will be fully utilized by all OEMs through MY2032 (subject to phase-down in the final years of the program) and applies those reductions to the overall cost of batteries in EPA's OMEGA modeling. This has resulted in profoundly low battery cost estimates, for example, below $40/kWh in 2029.10 The agency does not, however, appear to make any upward adjustments to the core Argonne National Laboratory BatPaC 5.0 material costs to account for exponential growth in critical minerals demand that will occur during this time frame, or to the increased labor cost associated with domestically produced packs. We believe these are significant oversights that likely result in a meaningful underestimation of true vehicle electrification costs. [EPA-HQ-OAR-2022-0829-0652, pp. 7-8]

10 EPA, 2023. Draft RIA, Figure 2-27. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Rather than address those and other concerns head-on, the proposal leans heavily on the Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL). In particular, the proposal includes generous assumptions about the role that the IRA will play in reducing both battery costs to manufacturers and vehicle prices to consumers. For example, the agency assumes:

- Seamless cascading of incentives through the supply base, retail partners and economy in general [EPA-HQ-OAR-2022-0829-0652, pp. 23-24]

- Domestic production of all batteries in all EVs produced between model years 2027 and 2032 [EPA-HQ-OAR-2022-0829-0652, pp. 23-24]

- Full IRA 45X credit eligibility for all batteries in all model year 2027-2032 vehicles, despite the fact that IRS guidance has not yet been issued and may contain certain restrictions [EPA-HQ-OAR-2022-0829-0652, pp. 23-24]

- Full utilization of domestically produced batteries, even from automakers without domestic battery manufacturing capability [EPA-HQ-OAR-2022-0829-0652, pp. 23-24]

- Consumers' utilization of 80% of IRA 30D credit eligibility ($6000 out of $7500), despite numerous restrictions such as critical minerals sourcing, MRSP caps and household income eligibility restrictions [EPA-HQ-OAR-2022-0829-0652, pp. 23-24]

To be clear, the IRA and BIL are critically important and include policies necessary to support a transition toward greater levels of vehicle electrification. It is important for the agency to understand, however, that these policies are far from set in stone, representing additional degrees of uncertainty when trying to assess the feasibility of future electrification levels. [EPA-HQ-OAR-2022-0829-0652, pp. 23-24]

Threats to the longevity of the IRA and BIL are clearly recognizable. In June 2023, for example, a House tax package proposed to repeal 45W (commercial) and 25E (used) provisions, and to restrict 30D (consumer) incentives by reverting to older manufacturing caps.42 While this specific package is unlikely to be signed into law in the near term, it is a clear sign of opposition by certain policymakers. Surprisingly, the agency does not even appear to acknowledge the possibility that these credits may not exist through 2032, or contemplate the impact that such a change would have on an automaker's ability to comply with the proposed standards. [EPA-HQ-OAR-2022-0829-0652, p. 24]

42 See, for example, H.R.3938, Build it in America Act. https://www.congress.gov/bill/118th-congress/house- bill/3938, and H.R.2811, Limit, Save, Grow Act of 2023. https://www.congress.gov/bill/118th-congress/house- bill/2811

Given the impact that IRA and BIL assumptions play in the agency's resulting standards, it is incumbent upon the agency to also consider the potential for their removal or substantial weakening. To ignore such potential renders the agency's conclusions fatally flawed. [EPA-HQ-OAR-2022-0829-0652, p. 24]

Organization: American Petroleum Institute (API)

iii. Impacts of IRA.

The NPRM cities the Inlaation Reduction Act (IRA – enacted in 2022) as key legislation that will support the domestic supply chain for battery and electric vehicle production, subsidize EV purchases, and incentivize the build-out of charging infrastructure and renewable power production. However, as outlined below, EPA overstates the potential impacts of the IRA. [EPA-HQ-OAR-2022-0829-0641, pp. 23-24]

The EPA makes misleading claims regarding the ability of the IRA's Clean Vehicle Credits to "incentivize the growth and manufacturing capacity of onshore sourcing of critical minerals."78 While critical minerals, from any origin, can be used for manufacturing battery electric vehicles, the IRA establishes restrictive domestic content requirements for tax credit eligibility. In other words, the IRA tax credits are not a subsidy or policy that directly remove "potential barriers to wider adoption of PEVs,"79 but rather potentially only provide tax credits if domestic content requirements are met.80 [EPA-HQ-OAR-2022-0829-0641, pp. 23-24]

78 88 Fed. Reg. 29195 (May 5, 2023).

79 88 Fed. Reg. 29346 (May 5, 2023).

80 Center for Strategic and International Studies. Tax credits are also subject to other requirements – "An Electric Debate: Local Content Requirements and Trade Considerations." October 2022. https://www.csis.org/analysis/electric-debate-local-content-requirements-and-trade-considerations.

According to the National Mining Association:81 demand for minerals is souring and policies in the U.S. are lagging; scaling up the U.S. supply chain requires increased extraction and processing; withdrawing federal leases covering reserves of nickel, cobalt, and copper are described as “self-sabotage”; and “permitting delays have been, and continue to be, one of the most significant risks to meeting domestic mineral production goals.” According to NMA testimony, automakers are “warning with ever greater frequency that the coming battery material shortfall could stop the EV revolution” and a shortage of batteries could arrive as early as 2024. The NMA reports new mining is needed to meet demand, but it takes, on average, 7 to 10 years to secure permits to open or expand a mine. Even as the NMA acknowledges domestically mined minerals are incentivized,82 the NMA indicates the mine permitting process is “unwieldly” and discourages83 investment in domestic mining. [EPA-HQ-OAR-2022-0829-0641, pp. 23-24]

81 “Unleashing American Energy, Lowering Energy Costs, and Strengthening Supply Chains.”, United States House of Representatives Committee on Energy & Commerce, Testimony of Katie Sweeney, Executive Vice President & General Counsel National Mining Association, February 7, 2023.

82 National Mining Association. “The Future of Mining Rests on the Actions of Today.” September 2022. https://nma.org/2022/09/22/future-of-mining/.

83 Legislative Hearing, United States House of Representatives Committee on Natural Resources, Testimony of Rich Nolan, President & CEO, National Mining Association, February 28, 2023. https://nma.org/wp- content/uploads/2023/02/National-Mining-Association-2-28-23-Nolan-Testimony.pdf.

The IRA places income and purchase price limits on tax credit eligibility, along with foreign content restrictions beginning in 2024. Overall, according to the Center for Strategic and International Studies (CSIS)84, it could be “impossible” for a battery electric vehicle to obtain the full value of the tax credit (i.e., $7,500) in the near term. [EPA-HQ-OAR-2022-0829-0641, pp. 23-24]

84 Center for Strategic and International Studies. “An Electric Debate: Local Content Requirements and Trade Considerations.” October 2022. https://www.csis.org/analysis/electric-debate-local-content-requirements-and- trade-considerations.

Organization: Anonymous

4. Assumes tax credits are boom for consumers

EPA assumes that the Commercial Clean Vehicle and Clean Vehicle tax credits will lower BEV costs up to $6,000 to consumers and the Advance Manufacturer Battery Production Credits by $45 per kWh. EPA incorrectly assumes that manufacturers will pass on the full credit values to consumers; instead, it is likely that manufacturers will only lower their vehicle prices by a fraction of these credits, and thus increase their profits. This is especially true for the battery credits as they aren’t consumer facing where consumers may not realize that manufacturer are being subsidized. [EPA-HQ-OAR-2022-0829-0565, p. 4]

EPA also incorrectly assumes that the tax credits are free. They use the tax credits to offset the costs of BEVs, but they do not consider the costs to taxpayers to fund the tax credits. This hides the costs of BEVs to the American Population by hundreds of billions. Furthermore, EPA does not address the societal inequities that will be produced by providing tax credits for BEVs. Since BEVs are typically more expensive than basic ICE vehicles and the fact that the tax credits are non-refundable (meaning that you have to carry a tax liability to get the benefits of the tax credit), all taxpayer funds will be going towards funding new BEVs for richer Americans. In this sense, EPA's reduces environmental justice by forcing BEVs. [EPA-HQ-OAR-2022-0829-0565, p. 4]

Finally, EPA's estimates of tax credits overstates their applicability. The Clean Vehicle credit has some restrictions that will limit how many vehicles qualify and how much. EPA should model these restrictions or at the very least make a good faith estimate. For the commercial clean vehicle tax credit, EPA ignores the cost-basis nature of the credit and assumes that everyone will lease a vehicle to get the EV tax credit while ignoring the lost utility of owning a vehicle. [EPA-HQ-OAR-2022-0829-0565, p. 4]

Organization: Arizona State Legislature

V. The proposed rule is arbitrary and capricious because it relies on erroneous assumptions about vehicle costs.

EPA's analysis includes a tax credit from the Inflation Reduction Act to those who purchase or lease a qualifying vehicle. 88 Fed. Reg. 29,301. In EPA's view, the tax credit "will have a strong impact on affordability of these vehicles for a wide range of customers." Id. at 29,195. Indeed, EPA believes the tax credit "effectively mak[es] some [battery electric vehicles] more affordable to buy and operate today than comparable ICE vehicles." Id. at 29,190. These are "significant incentives" in EPA's view. Id. at 29,294. EPA calculated that the average customer could use half of the tax credit and that it would not impact vehicle production costs. Id. at 29,301. [EPA-HQ-OAR-2022-0829-0537, pp. 22-23]

EPA's analysis already has proven inaccurate. Contrary to EPA's assumptions, the price for electric vehicles has not remained static with the passage of the Inflation Reduction Act. Instead, days before passage of the Inflation Reduction Act, "Ford and General Motors announced price increases at similar rates" as the Act's tax credits.17 Inflation and supply-chain issues have caused electric car prices to "surge" and mean fewer buyers can use the Inflation Reduction Act tax credits.18 [EPA-HQ-OAR-2022-0829-0537, pp. 22-23]

17 Ryan King, Inflation Reduction Act promises $7,500 electric vehicle credits after Ford and GM raised prices, WASHINGTON EXAMINER, Aug. 16, 2022, available at https://www.washingtonexaminer.com/news/democrats- extended-credits-evs-ford-gm-prices.

18 Keith Laing, Electric Cars' Surging Prices Mean Fewer Buyers Can Use Tax Credit, BLOOMBERG, Aug. 4, 2022, available at https://www.bloomberg.com/news/articles/2022-08-04/electric-cars-rising-prices-mean-fewer-buyers- eligible-for-senate-tax-credit.

Vehicles also have been eliminated from receiving the full tax credit. Ford and Chrysler parent Stellantis reported in April that "most of its electric and plug-in electric hybrid models will see tax credits halved to $3,750 on April 18 after new U.S. Treasury rules take effect."19 In fact, just 11 electric cars from four automakers qualify for the full tax credit.20 And this limited availability comes before any changes made in response to Senator Joe Manchin, the critical vote to passing the Inflation Reduction Act, who threatened to repeal the bill or sue the Treasury Department because the tax credit standards are too liberal.21 [EPA-HQ-OAR-2022-0829-0537, pp. 22-23]

19 David Shepardson and Nathan Gomes, Ford, Stellantis says new rules will cut EV tax credits for most models, REUTERS, Apr. 5, 2023, available at https://www.reuters.com/business/autos-transportation/ford-confirms-all-three- evs-plug-in-hybrids-eligible-ira-subsidies-2023-04-05/.

20 Lawrence Ulrich, Electric Vehicle Tax Credit Rules Create ‘Chaos for Consumers,” The New York Times, Apr. 20, 2023, available at https://www.nytimes.com/2023/04/20/business/electric-vehicle-tax-credits-consumers.html.

21 Ramsey Touchberry, Sen. Manchin threatens to repeal his own climate law if Biden continues to ‘liberalize’ it, WASHINGTON TIMES, Apr. 25, 2023, available at https://www.washingtontimes.com/news/2023/apr/25/sen-joe- manchin-threatens-repeal-his-own-climate-l/; David Shepardson, Manchin threatens to sue US Treasury over EV tax credit rules, REUTERS, Mar. 30, 2023, available at https://www.reuters.com/world/us/democratic-sen-manchin- threatens-legal-action-over-treasury-ev-battery-guidance-2023-03-29/.

EPA also does not grapple with the economic reality that the Inflation Reduction Act’s “net impact is likely to be negative on electric vehicle sales in the immediate future.”22 Other economic analysis concluded the strings attached to the Inflation Reduction Act tax credits “are likely to make [electric vehicles] even more expensive.”23 [EPA-HQ-OAR-2022-0829-0537, pp. 22-23]

22 Anderson Economic Group, “An estimated 3/4 of recent EV purchases would no longer qualify for tax credits under the proposed ‘Inflation Reduction Act’,” Aug. 9, 2022, available at https://www.andersoneconomicgroup.com/at- least-four-ira-provisions-will-negatively-affect-sales-of-electric-vehicles/.

23 Tori Smith, “Proposed Tax Credits Would Make Electric Vehicles More Expensive,” AMERICAN ACTION FORUM, Aug. 4, 2022, available at https://www.americanactionforum.org/insight/proposed-tax-credits-would-make-electric- vehicles-more-expensive/.

This all significantly affects EPA’s analysis. Vehicles that EPA’s analysis includes as eligible for the credit are now ineligible due to price increases or Treasury Department regulations. The resulting higher prices for electric vehicles, and reduced amount and availability of subsidies, will affect consumer demand. EPA’s conclusions that there is no cost difference between gas-powered and electric-powered vehicles, and that there will be a corresponding increase in purchaser demand, are thus erroneous. [EPA-HQ-OAR-2022-0829-0537, pp. 22-23]

EPA’s failure to include accurate estimates for vehicle costs and the resulting impact on customer demand is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0537, pp. 22-23]

Organization: BlueGreen Alliance (BGA)

At the same time, EPA must consider that the manufacturing investments from the Inflation Reduction Act and Bipartisan Infrastructure Law will take time to achieve their full production capacity. EPA should coordinate with DOE, the U.S. Department of Transportation (DOT), and the U.S. Department of Commerce (DOC) to ensure that the manufacturing investments from the Inflation Reduction Act and Bipartisan Infrastructure Law will be fully leveraged to support regulatory compliance. Programs like the Battery Manufacturing and Recycling Grants (DOE), the Battery Material Processing Grants (DOE), the Domestic Manufacturing Conversion Grants (DOE), the 48C Advanced Manufacturing Tax Credit (DOE/DOC), the Advanced Technology Vehicle Manufacturing Loan Program (DOE), the National Electric Vehicle Infrastructure (NEVI) Program (DOT), and the Charging and Fueling Infrastructure Grant Program (DOT) all provide unprecedented federal resources that manufacturers and fleet owners can leverage to support both supply and demand for low- and zero-emission light- and medium-duty vehicles. However, these programs take time to bear fruit—whether that means a complete public, affordable, and interoperable EV charging network, or a robust domestic supply chain for vehicles eligible for the battery component and critical mineral requirements of the 30D Clean Vehicle Tax Credit. [EPA-HQ-OAR-2022-0829-0667, pp. 8-9]

It is essential to workers and communities that these programs be carefully designed and implemented, with robust stakeholder engagement. This helps ensure that they adhere to Justice40 requirements and new Build America, Buy America provisions that are critical to ensuring that federal programs support domestic manufacturing investments that are fully supported by their communities. [EPA-HQ-OAR-2022-0829-0667, pp. 8-9]

With that, EPA must account for the time it takes to convert federal awards and allocations into actual domestic production capacity and critical on-the-ground infrastructure. EPA should coordinate with DOT and DOE to fully assess the availability of charging and fueling infrastructure for electric vehicles, and related grants and loans. [EPA-HQ-OAR-2022-0829-0667, pp. 8-9]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Critical Minerals

CARB appreciates the consideration U.S. EPA has given to understanding critical minerals availability, production, and costs and the impacts that the Inflation Reduction Act (IRA) will have on these factors. The IRA Production Tax Credit provides a key mechanism for helping to significantly reduce production costs of vehicle traction batteries in the near term which will help to lower prices for consumers of ZEVs. Additionally, the Production Tax Credit is one policy tool that will help accelerate domestic processing and production of critical minerals and batteries, which can support more reliable supply chains for increasing volumes of ZEVs in the years to come. [EPA-HQ-OAR-2022-0829-0780, pp. 49-50]

Despite those very important production tax credits being put in place, there is still uncertainty estimating future technology costs. CARB supports U.S. EPA's decision not to include the 10 percent tax credits for critical minerals production and active cathode materials production. That decision represents a more conservative cost position which bolsters U.S. EPA's future battery cost projections and imparts even more confidence in its future modeled ZEV volumes as the least costly means of meeting the emission standards. [EPA-HQ-OAR-2022-0829-0780, pp. 49-50]

Organization: California Attorney General's Office, et al.

Recent congressional actions demonstrate the federal commitment to substantial electrification of the transportation sector. In 2021, Congress passed the Bipartisan Infrastructure Law, which allocates $7.5 billion to building out a national network of electric vehicle chargers, $7 billion to ensure domestic manufacturers have the critical minerals and other components necessary to make electric vehicle batteries, and $10 billion for clean transit and school buses.110 In 2022, Congress passed the CHIPS and Science Act, which invests $52.7 billion in America's manufacturing capacity for the semiconductors used in electric vehicles and chargers.111 Later in 2022, Congress passed the Inflation Reduction Act, which provides $7,500 to buyers of new electric vehicles and $4,000 to purchasers of pre-owned electric vehicles.112 Additionally, the Inflation Reduction Act provides billions of dollars to support vehicle manufacturers' expansion of their domestic production of clean vehicles,113 and billions to support battery production in the United States and mining and processing of critical minerals needed for battery cells and electric motors.114 The Inflation Reduction Act also allocates billions to upgrade the nation's power grid in order to help address the new surge in grid demand from electric vehicles.115 [EPA-HQ-OAR-2022-0829-0746, pp. 18-19]

110 White House, Building a Better America: A Guidebook to the Bipartisan Infrastructure Law for State, Local, Tribal, and Territorial Governments, and Other Parties (May 2022), at 136, available at https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf.; White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action (Jan. 2023) at 46, available at, https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.

111 White House, Guidebook to the Inflation Reduction Act, supra n. 110, at 46.

112 Id.

113 Id. at 47.

114 Id. at 10, 26, 47.

115 Id. at 34.

Organization: Center for American Progress (CAP)

As recognized by EPA, the historic investments contained in the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) have significant implications for the American light and medium duty fleet, accelerating an existing market shift towards electric vehicles. While EPA's proposal takes these changes into account, CAP asserts that the baseline trend toward electrification is even stronger than EPA's assumptions and that the proposed standards can be significantly more ambitious. [EPA-HQ-OAR-2022-0829-0658, pp. 2-3]

EPA appropriately recognizes that the IRA will have substantial effects on the costs of electric vehicles and batteries, acknowledging several of the important provisions including up to $7,500 towards the purchase of new electric vehicles, $35 per kWh for the production of battery cells, and $10 per kWh for the production of battery modules. However, there are several additional incentives included in the IRA that EPA should also consider. [EPA-HQ-OAR-2022-0829-0658, pp. 2-3]

First, EPA should account for the 10 percent electrode active materials component of the 45X credit. Not accounting for this component of the credit significantly underestimates its value. Electrode active materials include cathode and anode materials. Cathode material costs range from approximately 22 to 51 percent of the total cost of a battery cell.11Anode and electrolyte costs comprise another 19 percent.12 Analysis by the Environmental Defense Fund (EDF) and Deloitte finds that this component of the 45X could amount to an additional credit of $30 per kWh.13 This is a significant increase and EPA should account for this component of the 45X credit in its final rule. [EPA-HQ-OAR-2022-0829-0658, pp. 2-3]

11 U.S.Department of Energy, "Cobalt is the Most Expensive Material Used in Lithium-Ion Battery Cathodes," March 7, 2022, available online: https://www.energy.gov/eere/vehicles/articles/fotw-1228-march-7-2022-cobalt-most-expensive-material-used-lithium-ion; Frith, James. "EV Battery Prices Risk Reversing Downward Trend as Metals Surge," Bloomberg, September 14, 2021, available online: https://www.bloomberg.com/news/newsletters/2021-09-14/ev-battery-prices-risk-reversing-downward-trend-as-meta ls-surge; IEA, "Average pack price of lithium-ion batteries and share of cathode material

cost, 2011-2021, may, 2022, available online: https://www.iea.org/data-and-statistics/charts/average-pack-price-of-lithium-ion-batteries-and-share-of-cathode-mate rial-cost-2011-2021

12 Ibid.

13 Environmental Defense Fund, “IRA Activation Guide: Advanced Manufacturing,” May 2023, available online: https://business.edf.org/wp-content/blogs.dir/90/files/EDF-IRA-Advanced-Manufacturing-Activation-Guide.pdf

Second, EPA should account for the 10 percent critical mineral production cost component of the credit. This portion of the credit will likely be claimed by firms engaged in critical mineral production and not battery manufacturers, however, the related cost savings may be passed on to manufacturers. Analysis by EDF and Deloitte finds that this component of the credit could amount to over $20 per kWh for lithium-ion batteries.14 This portion of the 45X credit is also notable because it will not phase out as the other components of the credit do between 2030 and 2032. EPA should account for the full impact of the 45X on critical mineral input costs in the final rule. [EPA-HQ-OAR-2022-0829-0658, pp. 2-3]

14 Ibid.

Third, EPA should also consider the effects of other IRA provisions, including the modified 48C Qualifying Advanced Energy Project Credit and multiple DOE loan and grant programs that have already been influential in establishing battery production capacity. Through the IRA and IIJA, the DOE may make up to $8.95 billion in grants to support EV, battery, and critical mineral production as well as battery and critical mineral recycling.15 The IRA also authorizes an additional $3 billion for DOE’s Advanced Technology Vehicle Manufacturing (ATVM) loan program and removes the program's $25 billion cap on total lending.16 While the 48C credit and these grant and loan programs are discretionary in nature, thus making outcomes for individual companies difficult to predict, EPA should consider accounting for their effects, at least in a conservative manner. [EPA-HQ-OAR-2022-0829-0658, pp. 3-4]

15 U.S. Department of Energy, Office of Manufacturing and Energy Supply Chains, “Domestic Manufacturing Conversion Grants,” available online: https://www.energy.gov/mesc/domestic-manufacturing-conversion-grants; U.S. Department of Energy, Office of Manufacturing and Energy Supply Chains, “Battery Materials Processing Grants,” available online: https://www.energy.gov/mesc/battery-materials-processing-grants#:~:text=The%20Battery%20Materials%20Process ing%20Grants,manufacturing%20and%20enhance%20processing%20capacity; U.S. Department of Energy, Office of Manufacturing and Energy Supply Chains, “Battery Manufacturing and Recycling Grants,” available online: https://www.energy.gov/mesc/battery-manufacturing-and-recycling-grants; U.S. Department of Energy, “Electric Drive Vehicle Battery Recycling and 2nd Life Apps,” available online: https://www.energy.gov/clean-energy-infrastructure/electric-drive-vehicle-battery-recycling-and-2nd-life-apps#:~:te xt=The%20Electric%20Drive%20Vehicle%20Battery,life%20applications%20for%20vehicle%20batteries; U.S. Department of Energy, Office of Manufacturing and Energy Supply Chains, “Advanced Energy Manufacturing and Recycling Grants,” available online: https://www.energy.gov/mesc/advanced-energy-manufacturing-and-recycling-grants#:~:text=The%20Advanced%20 Energy%20Manufacturing%20and,coal%20mines%20or%20coal%20power

16 U.S. Department of Energy, Loan Programs Office, “Inflation Reduction Act of 2022,” available online: https://www.energy.gov/lpo/inflation-reduction-act-2022

Accounting for the full range of incentives is critical to accurately predicting industry and technological trends. Analysis by EDF and WSP Global finds that 42 percent of all EV investment announcements in the United States, by amount invested, have occurred between the passage of the IRA and March 10, 2023.17 Following current trends and announcements, the U.S. is expected to be able to produce approximately 4.3 million EVs per year by 2026 which equates to 33 percent of all U.S. new vehicle sales in 2022.18 [EPA-HQ-OAR-2022-0829-0658, pp. 3-4]

17 Environmental Defense Fund, "U.S. Electric Vehicle Manufacturing Investments and Jobs," March 2023, available online: https://www.edf.org/media/report-finds-investments-us-electric-vehicle-manufacturing-reach-120-billion- create-143000

18 Ibid.

Organization: Clean Fuels Development Coalition et al.

D. The proposed rule overestimates the availability of Clean Vehicle Tax Credits.

The proposal also relies on the tax credits to offset the cost of new electric vehicles. The IRA modified the electric vehicle tax credit in Section 30D of the tax code, expanding that up-to-$7,500 credit to all "clean" vehicles while placing strict sourcing requirements on the materials and components within clean vehicle batteries to promote domestic manufacturing and energy security, while stabilizing supply chains for the same. To that end, the IRA established threshold "applicable percentages" of domestically sourced critical minerals and components that must be met to qualify for the credit. 136 Stat. 1956. This "applicable percentage" ramps up over time, increasing from "40 percent" when the vehicle is placed in service "after the date on which the proposed guidance … is issued … and before January 1, 2024," to "50 percent" in 2024, "60 percent" in 2025, "70 percent" in 2026, and "80 percent" after December 31, 2026. Id. Similarly, the "applicable percentage" for battery components increases from "50 percent" "before January 1, 2024," to "60 percent" in 2024 and 2025, "70 percent" in 2026, "80 percent" in 2027, "90 percent" in 2028, and "100 percent" after December 31, 2028. Id. at 1957. Finally, whatever percentage of the critical minerals or battery components that are not sourced from North America or a free-trade partner still cannot come from a "foreign entity of concern"—which is defined by a cross-referenced statute to include (among others) entities that are "owned, controlled by, or subject to the jurisdiction or direction of" China and Russia. See 136 Stat. 1957; 42 U.S.C. § 18741(a)(5)(C); 10 U.S.C. § 4872(d)(2). [EPA-HQ-OAR-2022-0829-0712, p. 23]

Despite these restrictions, EPA estimates that a steadily increasing share of vehicles will qualify for the credit. The proposal states that, "[f]or 2023, [the agency] estimated that an average credit amount (across all PEV purchases) of $3,750 per vehicle could reasonably be expected to be realized" through a combination of this credit and the Qualified Commercial Clean Vehicles Credit (which applies for Class 2b or Class 3 vehicles). 88 Fed. Reg. 29,301. "For later years," the agency assumes that "the attractiveness of the credits to manufacturers and consumers would likely increase eligibility over time" and "ramped the value linearly to $6,000 by 2032." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 23-24]

This is unreasonable. The proposal does not explain how it reached these estimates or offer any data to support them. The proposal makes no mention of the what fraction of minerals are mined domestically and glosses over the fact that China is a key supplier of some 85% of the global stock of critical minerals (including rare earths, copper, cobalt, etc.), Robert Bryce, The Electric Vehicle Push Empowers China, Wall St. J. (Dec. 23, 2021), and that almost no vehicles will be able to qualify for this credit in the near future. [EPA-HQ-OAR-2022-0829-0712, pp. 23-24]

Indeed, as of April 17, 2023, only 22 of the 68 available electric vehicle models qualify for the light duty tax credit, and some of those only qualify for half of the tax credit because they only meet the critical mineral or battery components standards.14 See Tax Credits for Electric Vehicles: The Latest from the IRS, Bradford Tax Inst. (May 2023), A more reasonable assumption is that roughly the same share of electric vehicles will qualify—and for the same fractional share of the credits—throughout the compliance period as currently qualify, as domestic manufacturing and sourcing improves in step with the increasingly stringent standards. See Figure 5. When the reduced availability of Clean Vehicle Credits is added to the manufacturing of each of the 15 million electric vehicles needed to comply with the proposed standards, an additional $55 billion in vehicle technology costs are added to EPA's projections. [EPA-HQ-OAR-2022-0829-0712, p. 24]

14 Only three battery electric vehicle models qualify for the under-$55,000-MSRP credit: the Chevrolet Bolt, Chevrolet Bolt EUV, and Tesla Model 3.

SEE ORIGINAL COMMENT FOR Figure 5: Projected availability of Clean Vehicle Credits. [EPA-HQ-OAR-2022-0829-0712, p. 24]

Organization: Electric Drive Transportation Association (EDTA)

The speed of the transition to e-mobility will also be materially impacted by the coherence of the policy landscape. For instance, consistent and rapid market growth means expanding consumer interest and confidence, which will require accessible incentives for vehicles and infrastructure. However, material elements of the IRA's incentives are awaiting final interpretation. Federal investment in innovation, as well as infrastructure deployment, also needs to be consistent and coherent to support a rapid transition to e-mobility. [EPA-HQ-OAR-2022-0829-0589, p. 2]

Organization: Energy Innovation

We agree with the EPA that the passage of the BIL and IRA represent significant "support for investment in expanding the manufacture, sale, and use of zero-emission vehicles by addressing elements critical to the advancement of clean transportation and clean electricity generation in ways that will facilitate and accelerate the development, production and adoption of zero-emission technology during the time frame of the rule."20 Our modeling supports these findings. [EPA-HQ-OAR-2022-0829-0561, p. 8]

20 U.S. EPA, 29195.

In a January 2023 study by the International Council on Clean Transportation (ICCT) and Energy Innovation, Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the U.S. (ICCT-EI Study), we examined the IRA's impact on the sale of new EVs in the LDV and HDV sectors in the U.S. through 2035. We used a customized Excel model based on Energy Innovation's U.S. EPS, using updated data on vehicle costs, battery pack estimates, efficiencies, charging behavior, future fuel prices, and state adoption of Advanced Clean Cars II (ACC II)[vi] rules and Advanced Clean Truck (ACT)21 rules. We have attached the full study with our comments.[vii] [EPA-HQ-OAR-2022-0829-0561, p. 8] vi California’s ACC II rule requires that by 2035, all new passenger cars, trucks, and SUVs sold in California must be zero-emission vehicles, from MY 2026 through MY 2035. It relies on currently available advanced vehicle technologies, including battery-electric, hydrogen fuel cell electric, and plug-in hybrid electric vehicles, to meet air quality and climate change emissions standards. See https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii for more information.

21 “Advanced Clean Trucks,” California Air Resources Board, accessed June 28, 2023, https://ww2.arb.ca.gov/ourwork/programs/advanced-clean-trucks.

vii The EPA included the ICCT-EI study on the regulations.gov website as part of the supporting and related material for the docket, but the content was marked as restricted due to copyright reasons. We believe this was an error. The study is not restricted and is publicly available at https://theicct.org/publication/ira-impact-evs-us-jan23/. The report is also included as an attachment to these comments.

We evaluated three IRA scenarios: Low, Moderate, and High, with different assumptions for each scenario to reflect how certain provisions of the IRA (the Personal Tax Credits for Clean Passenger Vehicles (30D), the Commercial Vehicle Tax Credits (45W), and the Advanced Manufacturing Production Tax Credit (45X)) are implemented and the value of incentives passed on to consumers. We compared these scenarios to a Baseline without the IRA and with just California adopting ACC II and ACT. For LDVs, we modeled different scenarios to reflect the impact of California-only adoption of ACC II and increased state adoption of ACC II. Our results do not evaluate the impact of federal GHG standards for model years 2027 and beyond. [EPA-HQ-OAR-2022-0829-0561, p. 8]

As shown in Figure 4, we found that the IRA will accelerate electrification in both the light-duty and heavy-duty sectors. For light-duty, we find a range of 48 to 61 percent EV sales[viii] share by 2030, increasing to 56 to 67 percent by 2032. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

viii: In our study, we use the term “EV” for new light-duty BEVs and plug-in hybrid vehicles. Used EVs are not included in the analysis.

[See original attachment for line graph “Light-duty vehicles”] [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

Figure 4. Baseline, Low, Moderate, and High projections of EV sales share for LDVs, considering ACC II adoption in only California versus increased states, 2023-2035. Source: Slowik, Peter, et al., Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States (ICCT-EI Study) (ICCT and Energy Innovation, January 2023), available at: https://theicct.org/wp- content/uploads/2023/01/ira-impact-evs-us-jan23.pdf. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

Given that the proposed rule applies to vehicles that will be manufactured starting in 2027, we expect more vehicles to qualify for the full 30D incentive, and we also anticipate more supply chain operations will be in place to serve increased demand for EVs that meet the new IRA incentive requirements. As of June 2023, private investment commitments for new EV and battery facilities in the U.S. have already reached nearly $150 Billion.22 These new investments will create jobs, economic development, and support a stronger domestic supply chain for BEVs for decades to come. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

22 The White House, “Investing in America,” President Joe Biden Investing in America, n.d., https://www.whitehouse.gov/invest/.

Similarly, BloombergNEF updated forecast to its account for the IRA’s positive impact on the EV market. Its September 2022 outlook shows an increase in sales shares of EVs from 43 percent of new sales pre-IRA to 52 percent of new sales in 2030 post-IRA.23 See Figure 5. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

23 Ira Boudway, “More Than Half of US Car Sales Will Be Electric by 2030,” Bloomberg.com, September 20, 2022, https://www.bloomberg.com/news/articles/2022-09-20/more-than-half-of-us-car-sales-will-be-electric-by-2030.9

[See original attachment for line graph “Smashing the Pedal”] [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

Figure 5. Share of U.S. passenger vehicle sales, pre- and post-IRA. Source: BloombergNEF via Ira Boudway, “More Than Half of US Car Sales Will Be Electric by 2030” (Bloomberg, September 2022), available at: https://www.bloomberg.com/news/articles/2022-09- 20/more-than-half-of-us-car-sales-will-be-electric-by-2030. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

As shown in Figure 6, taken from the ICCT-EI Study, we expect BEVs to make up the majority of new sales, whereas plug-in hybrid vehicles (PHEVs) constitute a small percentage of vehicles in all scenarios. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

[See original attachment for table described below] [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

Figure 6. Projected EV sales shares for LDVs nationwide, 2022-2035, according to each modeled scenario. Source: ICCT-EI Study. [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

Both the ICCT-EI study findings and BloombergNEF analysis are in line with the projections of BEV sales shares in EPA’s analysis, as shown in tables 80 and 81 below from the proposed rule.24 [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

24 U.S. EPA, “Proposed Rules,” May 5, 2023, 29329.

[See original attachment for Tables 80 and 81] [EPA-HQ-OAR-2022-0829-0561, pp. 9-11]

Organization: Environmental. and Public Health Organizations

D. Congressional support will increase ZEV deployment and cost-competitiveness.

In addition to highlighting the investments from the BIL (explored in further detail later in these comments), EPA rightly points to the historic funding from the IRA as building on and supporting EPA’s efforts to regulate tailpipe emissions from vehicles:

Congress passed the Bipartisan Infrastructure Law (BIL) in 2021, and the Inflation Reduction Act (IRA) in 2022, which together provide further support for a government-wide approach to reducing emissions by providing significant funding and support for air pollution and GHG reductions across the economy, including specifically, for the component technology and infrastructure for the manufacture, sales, and use of electric vehicles.262 [EPA-HQ-OAR-2022-0829-0759, p. 103]

262 88 Fed. Reg. at 29187.

Together, these legislative measures represent significant congressional support for accelerating the deployment of and market for ZEV technologies. First, the BIL and IRA provide an unprecedented level of investment (over $430 billion) in ZEV infrastructure, technology, and supply chains, through a variety of key tax provisions, manufacturing investments, grants, rebates, loans, and other investment mechanisms.263 BIL and IRA programs will, among other things, provide both direct grants and tax credits to lower acquisition costs of vehicles and increase the range of cost-effective applications,264 help entities conduct planning for fleet electrification,265 enable deployment of charging and hydrogen fueling infrastructure,266 and facilitate advances in technology that can lower future vehicle costs. These programs also invest in vehicle and battery manufacturing and recycling, driving cost reductions and increasing domestic supply. EPA should accordingly ensure that these important laws are reflected in its estimate of baseline LD ZEV market penetration. [EPA-HQ-OAR-2022-0829-0759, p. 104]

263 U.S. DOE Office of Policy, The IRA Drives Significant Emission Reductions and Positions America to Reach Our Climate Goals, DOE/OP-0018 (August 2022), https://www.energy.gov/sites/default/files/2022-08/8.18%20InflationReductionAct_Factsheet_Final.pdf.

264 See, e.g., 42 U.S.C. § 7432 (appropriating $1 billion to EPA to create a program that awards grants and rebates for the costs of replacing existing class 6 and 7 HDVs with ZEVs, purchasing, installing, operating, and maintaining infrastructure needed for ZEVs, associated workforce development and training, and planning and technical activities needed to support the deployment of ZEV); 26 U.S.C. § 45W (providing up to $40,000 in tax credits to assist with vehicle replacements and reduce the effective cost of commercial ZEVs).

265 See, e.g., 42 U.S.C. § 7432.

266 See, e.g., 26 U.S.C. § 30C (providing tax credits to qualified alternative fuel vehicle property); 42 U.S.C. § 16161a (providing $8 billion to DOE to fund regional hydrogen hubs across the country); 23 U.S.C. § 151 (appropriating $2.5 billion to support the build-out of clean charging and fueling infrastructure projects along designated alternative fuel corridors of the National Highway System).

These federal incentives are a key market enabler and will help drivers (and commercial L/MD fleets) adopt advanced clean transportation technologies (like ZEVs) that lower operating costs and reduce emissions. Manufacturers also stand to reap significant benefits, as several key tax credits are expected to add up to provide robust support of ZEV production. Passing those savings on to consumers could drive down the cost of new ZEVs and spur sales.267 For example, Tesla alone could qualify for $1 billion in tax credits this year, while its Giga Nevada plant could gain up to $17.5 billion in credits for its projected annual production rate of 500 gigawatt hours.268 Ford and General Motors also stated that they could reap significant benefits as a result of IRA investments. Ford expects $7 billion in tax credits over the next three years and GM could gain $300 million in 2023.269 [EPA-HQ-OAR-2022-0829-0759, p. 104]

267 Tom Taylor & Noah Gabriel, The EV Transition: Key Market and Supply Chain Enablers, Atlas Public Policy (Nov. 2022), https://atlaspolicy.com/wp-content/uploads/2022/12/2022-EV-Transition-Key-Market-and-Supply-Chain-Enablers.pdf.

268 Joann Muller, Biden’s EV Surprise, Axios (Feb. 1, 2023) https://www.axios.com/2023/02/01/electric-car-ev-tax-incentives-biden.

269 Muller, Biden’s EV Surprise.

Second, the congressional investments from the IRA and BIL further the public health goals of the Clean Air Act and of this rulemaking: the reduction of harmful pollution from light- and medium-duty vehicles. A preliminary assessment conducted by the U.S. Department of Energy (DOE) found that the IRA, in combination with other enacted policies and past actions, will help drive 2030 economy-wide GHG emissions down to 40% below 2005 levels and move the United States towards its overall 2030 target of achieving a 50 to 52% reduction in GHG emissions below 2005 levels.270 DOE also noted that the impacts of these congressional investments can be further amplified and accelerated when paired with ambitious and consistent executive branch, state, local, and private sector actions to reduce transportation sector emissions and to make large-scale investments in PEV manufacturing and battery supply chains.271 These investments are key factors driving industry developments in ZEVs and reducing manufacturing costs, in turn helping make compliance (with the stringency levels in Alternative 1) through enhanced ZEV deployment even more feasible and cost-effective for manufacturers. [EPA-HQ-OAR-2022-0829-0759, pp. 104-105]

270 U.S. DOE Office of Policy, The IRA Drives Significant Emission Reductions.

271 U.S. DOE Office of Policy, The IRA Drives Significant Emission Reductions.

Third, congressional funding will prompt and support private sector investment. An analysis by Atlas Public Policy explains that the combination of a strong regulatory environment (like EPA's vehicle standards help provide) along with congressional investments has and will continue to encourage substantial private sector investment in ZEVs, and finds that the U.S. is on track to reach $210 billion in economic commitments by automakers and battery manufacturers by 2030.272 Clear regulatory signals – like EPA's vehicle emissions regulations – can create further confidence in the private sector to accelerate and expand investments and help ensure companies follow through on their ZEV commitments. In the Proposal, EPA highlights several IRA clean vehicles provisions that will help bolster ZEV deployment, drive down costs, and facilitate compliance with strong standards. These include the clean vehicles tax credit (§ 30D), the previously owned clean vehicle tax credit (§ 25E), the commercial clean vehicle tax credit (§ 45W), and the advanced manufacturing production credit (§ 45X). The § 45X credit is anticipated to be the most lucrative program for automakers, offering a tax credit of $35 per kilowatt-hour for each domestically made battery cell, which could slice manufacturer production costs by a third. [EPA-HQ-OAR-2022-0829-0759, p. 105]

272 Gabriel, $210 Billion of Annouced Investments.

Fourth, a number of other congressional investments can be leveraged to address timelines for deploying ZEVs, human capital issues, potential supply chain constraints, consumer demand, and workforce development issues. For example, the IRA provided $500 million for the enhanced use of the Defense Production Act (DPA) – which President Biden recently invoked to support critical minerals production – on top of the funds made available for the DPA through the normal appropriations process.273 This provision will support domestic mineral supply chains for large-capacity batteries, including those used in PEVs, and is intended to help increase productivity, workforce safety, and sustainability in the various steps of the critical minerals lifecycle. [EPA-HQ-OAR-2022-0829-0759, pp. 105-106]

273 The White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action. (2023). https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf

Additionally, the CHIPS and Science Act will strengthen American manufacturing, supply chains, and national security, and will invest in research and development, science and technology, and the workforce of the future to position the U.S. as a leader in clean transportation.274 This law is further complemented by other congressional investments like the IRA's Advanced Energy Project Credit (§ 48C), which provides a $10 billion investment to expand clean manufacturing and recycling (including critical minerals refining, processing and recycling) and to address technology supply chain gaps. Manufacturers and other private parties are more likely to fully leverage these and other congressional investments if strong regulatory signals are in place, as would be the case under any policy scenarios that are at least as stringent as Alternative 1. This too helps bolster EPA's conclusion of feasibility for the standards outlined in Alternative 1 and in EPA's main Proposal. [EPA-HQ-OAR-2022-0829-0759, p. 106]

274 The White House. "CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China." press release, August 9, 2021. https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lo wer-costs-create-jobs-strengthen-supply-chains-and-counter-china/.

Lastly, EPA's Proposal references a number of studies that look at the effect congressional investments (especially the IRA) have on ZEV penetration levels. These studies include reports from ICCT, BloombergNEF,275 IHS Markit,276 and others that suggest that even before the IRA, the U.S. was on track to reach as much as 50% new ZEV sales by 2030 due to a range of preexisting policies and market forces. When adjusted for the effects of the IRA, ZEV penetration levels are expected to increase to as much as 61% of sales in 2030, increasing to as much as 67% of new sales by 2032, per ICCT's analysis.277 These studies further support the feasibility of a final rule at least as stringent as Alternative 1. [EPA-HQ-OAR-2022-0829-0759, p. 106]

275 Bloomberg New Energy Finance (BNEF), Electric Vehicle Outlook 2022: Long term outlook economic transition scenario.

276 IHS Markit, US EPA Proposed Greenhouse Gas Emissions Standards for Model Years 2023-2026; What to Expect (Aug. 9, 2021), https://www.spglobal.com/mobility/en/research-analysis/us-epa-proposed-greenhouse-gas-emissions-standards-my2 023-26.html. The table indicates 32.3% BEVs and combined 39.7% BEV, PHEV, and range-extended electric vehicle (REX) in 2030.

277 Peter Slowik et. al., Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the U.S., ICCT (Jan. 2023), https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23.pdf [

Organization: Environmental Defense Fund (EDF) (1of 2)

i. ZEV costs are rapidly declining.

The costs of batteries and ZEVs have declined significantly over the last few years. Recent analyses project that costs will continue to decline, even when IRA investments are not considered. The decline has been dramatically accelerated by the IRA. [EPA-HQ-OAR-2022-0829-0786, pp. 16-17]

The IRA provides $369 billion in investments to help achieve a 40 percent nation-wide reduction of carbon emissions by 2030.36 The IRA significantly reduces the upfront cost of ZEVs by offering consumers $7,500 in tax credits for new light-duty EVs and $4,000 for used EVs.37 In addition, the IRA provides $3 billion to the Department of Energy's Advanced Technology Vehicle Manufacturing Loan Program for loans to manufacture clean vehicles and their components in the United States, $2 billion to the Department of Energy for Domestic Manufacturing Conversion Grants, which will fund manufacturers' retooling of production lines for clean vehicles, and $40 billion in loan authority supported by $3.6 billion in credit subsidy for innovative clean energy technologies, including critical minerals processing, manufacturing, and recycling, all of which will drive down the costs of batteries and EV manufacturing.38,39 In addition, the IRA will distribute $500 million to accelerate domestic manufacturing of clean energy technologies and components,40 $2 billion for auto manufacturing facility conversion,41 and $3 billion in loans to build out the domestic clean vehicle manufacturing network,42 all of which will drive down the costs of batteries and EV manufacturing. EDF and WSP found that over $120 billion in private EV supply ecosystem investments and 143,000 new jobs have been announced in the last eight years and nearly $50 billion of that, representing 42 percent of all announced EV investments, has occurred since the passage of the IRA.43 [EPA-HQ-OAR-2022-0829-0786, pp. 16-17]

36 White House, "Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action," January 2023, Version 2. https://www.whitehouse.gov/wp- content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf U.S. Dep't of the Treasury, Treasury Annoucnes Guidance on Inflation Reduction Act's Strong Labor Protections, https://home.treasury.gov/news/press-releases/jy1128#:~:text=The%20Inflation%20Reduction%20Act%20is,build%20a%20clean%20energy%20economy.

37 Id.

38 Id.

39 EDF, U.S. Reaches Another Clean Transportation Milestone with New Treasury Department Guidelines for Electric Vehicle Tax Credits (Mar. 31, 2023), https://www.edf.org/media/us-reaches-another-clean-transportation- milestone-new-treasury-department-guidelines-electric.

40 Inflation Reduction Act of 2022, Section 30001.

41 Department of Energy, Domestic Manufacturing Conversion Grants, https://www.energy.gov/mesc/domestic- manufacturing-conversion-grants.

42 Inflation Reduction Act of 2022, Section 50142(a).

43 U.S. Electric Vehicle Manufacturing Investments and Jobs, Characterizing the Impacts of the Inflation Reduction Act after 6 Months, WSP for EDF, (March 2023), https://blogs.edf.org/climate411/files/2023/03/State-Electric- Vehicle-Policy-Landscape.pdf

1. Independent analyses commissioned by EDF show rapidly declining ZEV costs.

A May 2023 study by Roush for EDF assessed and quantified, where possible,44 the key impacts of the IRA on the cost of electrifying MY 2025 and 2030 light-duty vehicles, using costs from a previous Roush study45 as a baseline. Both studies analyzed six subclasses of light-duty vehicles—compact cars, midsize cars, small SUVs, midsize SUVs, large SUVs, and pickup trucks—under two segments: base (non-performance) and premium (performance). With the exception of large SUVs and pickups, BEV200s were assumed to be a viable alternative to base model gasoline vehicles and BEV300s a comparable substitute for premium model gasoline vehicles. For large SUVs and pickups, the analysis assumes BEV300s as an alternative to base gasoline model, and BEV400s as a comparable substitute for premium gasoline models. [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

44 Roush for EDF, Saxena, S. Pillai, “Impact of the Inflation Reduction Act of 2022 on Light-Duty Vehicle Electrification Costs for MYs 2025 and 2030” (2023) https://www.edf.org/sites/default/files/2023-05/Impact_IRA_LDV_Electrification_Costs_for_MYs_2025_and_2030_Roush.pdf (Attachment N).

45 Himanshu Saxena, Vishnu Nair, Sajit Pillai, “Electrification Cost Evaluation of Light-Duty Vehicles for MY 2030,”(2023) Roush for EDF, https://www.edf.org/sites/default/files/2023-05/Electrification_Cost_Evaluation_of_LDVs_for_MY2030_Roush.pdf (Attachment O).

Roush’s May 2023 study concluded that IRA vehicle and charger credits enable the purchase price of BEVs to be equal to or less than an equivalent gasoline vehicle in both MYs 2025 and 2030 for compact cars, midsize cars, small SUVs, and midsize SUVs, in both base and premium segments.46 As shown in Table 2, which applies IRA vehicle tax credits, purchasers of some subclasses will see savings of more than $7,000 over an equivalent gasoline vehicle in 2025. With the IRA credits, large SUVs and pickup trucks will achieve purchase price parity by MY 2030. The analysis shows that these credits will help lower the purchase prices of BEVs faced by consumers. [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

46 Roush, Saxena, S. Pillai, “Impact of the Inflation Reduction Act of 2022 on Light-Duty Vehicle Electrification Costs for MYs 2025 and 2030” (2023) https://www.edf.org/sites/default/files/2023-05/Impact_IRA_LDV_Electrification_Costs_for_MYs_2025_and_2030_Roush.pdf

[See original attachment for Table 2: Upfront savings of BEV over gasoline vehicle in 2025 and 2030 purchase timeframes] [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

Source: Roush, Impact of the Inflation Reduction Act of 2022 on Light-Duty Vehicle Electrification Costs for MYs 2025 and 2030 [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

Note: Positive numbers represent BEV upfront savings compared to combustion vehicles and negative numbers represent an upfront increase in price [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

The IRA will also result in an estimated 30 percent reduction in charger-unit costs for all consumers. The consumer will save $300 on a $1,000 Level 2, 11.5 kW charger and the affordability and savings associated with the purchase price and charger unit price improve significantly over time. [EPA-HQ-OAR-2022-0829-0786, pp. 17-20]

Organization: Greg Dotson

It is already apparent that Congress’ effort to encourage electric vehicles through incentives in the IRA has been successful. According to one analysis, the automobile industry has invested more than $120 billion in electric vehicle manufacturing in the U.S.123 Moreover, Congress has increased these incentives even while preserving and ratifying EPA’s Clean Air Act authority to require further reductions in greenhouse gas emissions from mobile sources.124 [EPA-HQ-OAR-2022-0829-0685, p. 20]

123 Environmental Defense Fund, Report Finds Investments in U.S. Electric Vehicle Manufacturing Reach $120 Billion, Create 143,000 New Jobs, Mar. 14, 2023, https://www.edf.org/media/report-finds-investments-us-electric- vehicle-manufacturing-reach-120-billion-create-143000 (finding that more than 40 percent of these investments were announced in the six months after passage of the IRA).

124 For a discussion of how Congress ratified the Clean Air Act’s regulatory structure for mobile source greenhouse gas reductions in the Inflation Reduction Act, see Dotson, Greg and Maghamfar, Dustin, The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act (January

1, 2023). Environmental Law Reporter, Vol. 53, No. 10017, 2023, Available at SSRN: https://ssrn.com/abstract=4338903.

Organization: Hyundai Motor America

The NPRM's No Action Case is Overly Optimistic.

We encourage EPA to revisit the proposed No Action case. As a baseline-setting scenario, it fundamentally impacts the alternatives under the agency's consideration for a proposed rule. In this case, the No Action case's assumptions create a rosier picture than reality. The NPRM assumes 54 percent BEV penetration in MY 2032, adjusted upward from 39 percent based on the sensitivity analysis that accounts for impact of state adoption of California's Advanced Clean Cars II Zero Emission Vehicle regulation ("ACC II ZEV Regulation"). The NPRM also lauds the Inflation Reduction Act's ("IRA") consumer tax incentive ("30D tax credit") and assumes the 30D tax credit will generate unprecedented consumer EV acceptance thereby enabling the Proposed Alternative's BEV penetration requirements. Data suggests consumers are more likely to purchase EVs with the availability of tax incentives.5 A majority of Consumer Reports 2022 survey respondents indicated that the most impactful EV tax incentive is a rebate applied at point of sale followed by 45% of respondents identifying tax credits such as the 30D tax credit. Id. [EPA-HQ-OAR-2022-0829-0599, p. 3]

5 "Battery Electric Vehicles and Low Carbon Fuel: A Nationally Representative Multi-Mode Survey," Consumer Reports, Page 7, April 2022.

Yet, predictable headwinds caused by federal and state policies are insufficiently contemplated by the No Action case. Before the enactment of the IRA, 72 BEVs and PHEVs were eligible for the predecessor 30D tax credit of $7,500 compared to five models that were ineligible.6 As of March 2023, there are 76,7 plug-in electric vehicles ("PEV") and FCEV,8 light-duty models offered for sale in the U.S. market. The IRS guidance on the IRA's battery component and critical mineral sourcing requirements effective on April 18, 2023,9 qualified just 17 of these vehicle models for the 30D tax credit's full amount of $7,500.10 It is uncertain when more vehicle models will become fully eligible, particularly as industry awaits key IRS guidance on the IRA's Foreign Entities of Concern ("FEOC") provisions. FEOC guidance has the potential to eliminate all vehicles from 30D tax credit eligibility in the short and medium term, which could chill EV sales leading up to and during the first few years of the Proposed Rule's timeframe as automakers shift their supply chains to non- FEOC controlled suppliers and shift EV manufacturing operations to North America. [EPA-HQ-OAR-2022-0829-0599, p. 3]

6 "What New Tax Credit Rules Will Mean If You're Shopping for an EV," Car And Driver, 11/13/22.

7 evadoption.com, 40 BEV and 33 PHEV Models Currently Available in the US, 3/3/23.

8 FCEV Models: Hyundai NEXO, Toyota Mirai, Honda Clarity, 3/3/23.

9 FS-2023-08, IRS Fact Sheet, March 2023.

10 "Here's every electric vehicle that currently qualifies for the US federal tax credit," Electrek, 6/7/23.

The IRA Significantly Reduces Availability of the 30D Tax Credit and May Inhibit EV Purchases during the Proposed Alternative's Term. [EPA-HQ-OAR-2022-0829-0599, pp. 5-6]

The NPRM's cost assumptions include the benefits purportedly conferred by 30D tax credit and the IRA's Credit for Qualified Commercial Clean Vehicles ("45W tax credit").15 The NPRM indicates that an estimated average 30D tax credit of $3,750 can be claimed by the purchaser in 2023.16 However, as stated above and more fully explained here, less than one quarter of current EVs are currently eligible for at least $3,750 under the 30D tax credit. The 30D tax credit is constrained by the IRA's strict requirements on final assembly in North America and battery and critical mineral sourcing requirements. For example, effective April 18, 2023,17 the battery must contain a minimum of 40 percent (doubling to 80 percent or more by 2027) critical minerals extracted or processed in the U.S. or in a country of which the U.S. has a free trade agreement ("FTA"), or from materials recycled in North America. Similar battery manufacturing requirements are also in place: at least 50 percent (doubling by 2029) of components must be manufactured or assembled in North America and must not come from a FEOC. Further complicating the matter is the fact that while sourcing from a FEOC is prohibited, industry still awaits guidance on this term. Once released, the scope of the FEOC guidance could curtail even partial access to the 30D tax credit for an unknown period of time. Although the 45W tax credit may provide a boost, the market demand for EV leases dropped significantly from 26 to 12.5 percent in CY 2022.18 Generally, leases do not account for a majority of transactions and therefore, due to the unprecedented nature of the 45W tax credit, it is difficult to forecast whether EV lease rates will jump significantly to offset the unavailability of the 30D tax credit. [EPA-HQ-OAR-2022-0829-0599, pp. 5-6]

15 26 U.S.C. §45W.

16 88 Fed. Reg. 29,184 (May 5, 2023). EPA NPRM, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Section IV(C)(2).

17 88 Fed. Reg. 23370 (April 17, 2023). IRS Critical Mineral and Battery Component Guidance.

18 Zabritski, M. Auto Finance Year-In-Review Electric Vehicles & Affordability, January 2023. Online slide presentation available at http://www.experian.com/content/dam/marketing/na/automotive/pr-folder/experian-automotive-2022-yir-evs-affordability.pdf.

We request that EPA conduct additional analysis to more accurately capture cost impacts resulting from the IRA's critical minerals requirements and the likely unavailability of full tax credits for the near term. For example, Benchmark Mineral Intelligence has determined a one (1) TWh shortfall in domestic supply by 2032.19 Assuming a 30-40 GWh battery capacity for one plant,20 25 to 30 battery plants will need to be constructed in order to supply the level of critical minerals needed to meet the estimated BEV penetration rates required by the Proposed Alternative. In addition, it takes between 5 to 15 years to build one new mining operation.21 China is the only region which will have excess manufacturing to fill the gap.22 [EPA-HQ-OAR-2022-0829-0599, p. 6]

19 Benchmark Mineral Intelligence, Report for: Alliance for Automotive Innovation U.S. Electric Vehicle Feasibility Study. page 1.

20 EPA NPRM, Draft Regulatory Impact Analysis Report, Figure 2-20, page 2-46.

21 Benchmark Mineral Intelligence, Report for: Alliance for Automotive Innovation U.S. Electric Vehicle Feasibility Study. page 45.

22 Benchmark Mineral Intelligence, Report for: Alliance for Automotive Innovation U.S. Electric Vehicle Feasibility Study. page 4.

This will leave many consumers unable to receive the full tax credit, or with little choice on what vehicles they can purchase in order to take advantage of it. In addition, high demand for critical mineral and battery components are expected to spike EV production costs, impacting affordability likely through the IRA's statutory life. Again, the uncertainty of the FEOC provision is not yet priced into the vehicle cost. The IRA's statutory language strongly suggests industry must move all battery component and critical mineral contracts away from their current primary country of origin – primarily China, which is expressly listed as a FEOC – to non-FEOC controlled suppliers without the same capabilities. It will take time to robustly develop these operations outside of FEOCs. IRA costs to both consumers and automakers, including the near and long term cost of uncertainty, are significant and we urge the EPA to better understand and assess them. Hyundai supports a confidential EPA survey through AFAI to aggregate industry data that would help accurately assess this impact. [EPA-HQ-OAR-2022-0829-0599, p. 6]

Organization: International Council on Clean Transportation (ICCT)

The Inflation Reduction Act (IRA) of 2022 will accelerate electric vehicle sales in the United States across all vehicle types. The $370 billion allocated to climate and clean energy investments dramatically expands tax credits and incentives to deploy more clean vehicles, including commercial vehicles, while supporting a domestic EV supply chain and charging infrastructure buildout. IRA transportation sector provisions will accelerate the shift to zero-emission vehicles by combining consumer and manufacturing policies. Consumer tax credits for new and used EVs and tax credits for commercial EVs, along with individual and commercial charging infrastructure tax credits, will increase sales. Domestic supply chain incentives and investments will boost EV manufacturing and battery production. Critical mineral mining and refining incentives will bolster industrial development. [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

Short of including safeguards in the proposed standards to support the domestic auto manufacturing base, the EPA expects minimal incentive for manufacturers to shift to foreign production as a result of the rule.13 However, in its analysis, we are concerned the EPA overvalues the incentives available to domestic manufacturers to produce vehicles and components domestically.14 The new 30D Clean Vehicle Credit for the purchase of light-duty EVs includes domestic assembly and domestic content requirements, however they are not stringent enough to prevent the credit from applying to vehicles produced by automakers who have shifted production to Mexico and Canada. And the 45W Commercial Clean Vehicle "lease loophole" provides up to $7,500 for light-duty BEVs and PHEVs without any domestic or regional sourcing requirements on final assembly, battery component, or critical mineral content. The industry has already seen a significant increase in BEV leasing, as automakers shift sales strategies to take advantage of the loophole.15 Thus, federal incentives may serve as a potential inducement for the further offshoring of manufacturing job or may merely dissuade original equipment manufacturers (OEMs) from onshoring more of these jobs. Since November 2022, the import of goods generally, and of automotive vehicles and parts in particular, has increased as more goods arrive from Mexico and Canada.16 For this reason, these federal investments should not prima facie be expected to support the domestic build-out of the EV supply chain. Targeted safeguards are necessary to ensure the proposed standards support the domestic production of vehicles and components, instead of encouraging a shift to foreign production. We encourage the EPA to implement standards that strengthen the domestic auto manufacturing supply chain and require the EV transition to provide the same level of investment and quality jobs as the current ICE footprint. [EPA-HQ-OAR-2022-0829-0614, pp. 6-7]

13 See id. at 29313 (”It is also our assessment that widespread automotive electrification in the U.S. will not lead to a critical long-term dependence on foreign imports of minerals or components”).

14 See id. at 29187 (”Congress passed the Bipartisan Infrastructure Law (BIL) in 2021, and the Inflation Reduction Act (IRA) in 2022, which together provide further support for a government-wide approach to reducing emissions by providing significant funding and support for air pollution and GHG reductions across the economy, including specifically, for the component technology and infrastructure for the manufacture, sales, and use of electric vehicles”).

15 CNBC. May 15, 2023. “Automakers Find a Tax Credit Loophole to Increase EV Leasing and Boost Sales”: https://www.cnbc.com/2023/05/13/electric-vehicles-inflation-reduction-act-tax-credit-loophole-boosts- leasing.html.

16 Austen Hufford and Anthony DeBarros, ”China’s Share of U.S. Goods Imports Falls to Lowest Since 2006”, (The Wall Street Journal, June 7, 2023), https://www.wsj.com/articles/u-s-imported-more-cars-phones-supplies-from- abroad-9157aca6.

Organization: Jaguar Land Rover NA, LLC (JLR)

Inflation Reduction Act (IRA) Clean Vehicle Tax Credits

Prior to the publication of the IRA last year, our vehicles qualified for the 30D Clean Vehicle Credit. The changing incentive landscape has adversely affected Jaguar Land Rover, with our manufacturing facilities located outside the US, we are now ineligible for the amended 30D credit. Due to the positioning of our vehicles and our customer demographics as a premium luxury vehicle manufacturer, the income and MSRP pre-requisites for the 30D credit also exclude us from claiming. We are fortunately eligible to claim the 45W Commercial Clean Vehicle Credit and we are pursuing this opportunity to potentially benefit our customers. [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

JLR challenges the assumption made by EPA that: “While the restrictions imposed by the IRA on the 30D credit (income, MSRP, critical mineral content, and manufacturing content) limit the vehicles which are eligible for the full $7,500 incentive under 30D, we believe that manufacturers will work to increase the number of vehicles that qualify over time due to the high marketing value of the credit.” Despite the work that manufacturers carry out, factors relating to the critical mineral and battery component requirements are largely out of their control. For example, currently 65% of battery cells and almost 80% of cathodes are manufactured in China.15 Until the US develops a robust battery manufacturing industry, it cannot be guaranteed that a high percentage of the fleet will be able to claim. [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

15 IEA (2023), Global EV Outlook 2023, IEA, Paris Trends in batteries - https://www.iea.org/reports/global-ev-outlook- 2023/trends-in-batteries License: CC BY 4.0

We suggest that EPA incorporate the following into the final rule analysis and the monitoring reports mentioned previously to ensure that the portion of BEV sales eligible for credit under 30D in OMEGA is appropriate.

- Industry fleet GWh of cell and battery capacity eligible
- Industry fleet battery minerals extraction eligible
- Number of IRS eligible vehicles [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

JLR requests that EPA amends the central case compliance model to reflect a more accurate and realistic credit utilization of the IRA credits. [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

We disagree with the assumptions made by EPA referencing the 45X Advanced Manufacturing Production Tax Credit. In the Draft Regulatory Impact Analysis (DRIA), EPA stated, "Although a large percentage of 2023 U.S. BEV battery and cell manufacturing is represented by the production of one OEM, we believe that the many large U.S. battery production facilities that are being actively developed by suppliers and other OEMs… will allow benefit of the credit to be accessible to all manufacturers by 2027." This statement is highly unlikely, in JLR's case, our vehicles and batteries are produced outside of the US therefore we are ineligible for the credit. [EPA-HQ-OAR-2022-0829-0744, pp. 10-11]

Market Comparison

Current and forecast electrification trends show that the US is behind other markets such as the EU, China and Canada. Despite great advancements recently with policies such as the Bipartisan Infrastructure Law and the Inflation Reduction Act, the effects of these policies will take time to realize. The Global EV Outlook 2023 from the IEA expects the US to reach the government target of 50% ZEV in 2030.6 Based on this forecast, it would seem that EPA's proposal is too optimistic and leaves no room for error. [EPA-HQ-OAR-2022-0829-0744, p. 5]

6 IEA (2023), Global EV Outlook 2023, IEA, Paris, Prospects for electric vehicle deployment - https://www.iea.org/reports/global- ev-outlook-2023/prospects-for-electric-vehicle-deployment License: CC BY 4.0

Organization: John Graham

A major bias introduced into the cost of future BEVs is the vehicle tax credits from the Inflation Reduction Act (IRA). Inclusion of the vehicle incentives would be appropriate if the incentives continued indefinitely, but they end after 2032. Thus, while the vehicle tax credits will certainly influence manufacturer decisions in the early stages of the standards, manufacturers will anticipate the end of the program in 2032 and will make decisions on how to comply in 2032 (and beyond) that do not include the IRA vehicle tax credits. HEVs may look like a better long-run investment. The Final Rule should reflect this consideration and address in 2032 the reality of complying without the IRA vehicle tax credits. [EPA-HQ-OAR-2022-0829-0585, p. 22]

Organization: Kia Corporation

EPA's Analysis of Supporting Government Policies is Extremely Optimistic

EPA over-estimates the utility of the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) that have started but are nowhere near complete. And we certainly cannot tell yet if these programs will be successful. Kia is also hopeful that the IIJA and IRA clean vehicle tax credit can help expedite the sales of EVs, but EPA justifies its proposal with overly optimistic forecasts about these programs. [EPA-HQ-OAR-2022-0829-0555, p. 6]

As an example, EPA forecasts that the average IRA clean vehicle credit amount (30D) will be $6000 across all EV purchases by 2032.11 Currently, there are 91 ZEVs available to purchase but only ten vehicles qualified for the tax credits in February 2023. The Internal Revenue Service (IRS) proposed rules released in March 2023 further decreased the vehicles eligible and will continue to decrease the vehicles eligible, at least in the short-term. [EPA-HQ-OAR-2022-0829-0555, p. 6]

11 88 Fed. Reg. 29,201.

There are several actions that will greatly reduce the number of eligible vehicles. Each year, larger percentages of critical minerals and battery components are required to be sourced outside China. The Foreign Entities of Concern (FEOC) definition and requirements will start in 2024, which will greatly impact the eligibility of vehicles over the lifetime of the program, yet has not been defined. The FEOC is a blind spot for how automakers need to invest and source their materials. Outside of 30D, 45W is forecast to supplement incentives to consumers for vehicles ineligible for 30D. Currently, leases do not account for a majority of vehicle transactions. [EPA-HQ-OAR-2022-0829-0555, pp. 6-7]

Therefore, it is unlikely the 45W leasing tax credit will fully offset the unavailability of the 30D tax credit, as assumed in the proposal. [EPA-HQ-OAR-2022-0829-0555, pp. 6-7]

Importantly, we do not yet know the ability or impact (cost or otherwise) of sourcing EV batteries outside of China and in North America and Free Trade Agreement (FTA) countries. Given the limited supply of critical minerals in FTA countries, the future growth of EVs will be reliant on IRA ineligible sources. This will stunt the growth of the EV market. EPA's optimistic assumptions on the IRA skews the predicted cost of EVs in the future, and, consequently, results in underestimating the future price disparity between EVs and ICEs.12 This will have significant consequences to the vehicle industry and our investments. [EPA-HQ-OAR-2022-0829-0555, pp. 6-7]

12 Benchmark Mineral Intelligence, U.S. Electric Vehicle Feasibility Study, Report for Alliance for Automotive Innovation (Quarter 1, 2023).

Organization: Lisa Allee

[*From Hearing Testimony, May 9, 2023*] And lastly money, you talk about incentives to car companies, please consider getting incentives directly to consumers so that consumers can afford to buy electrical and hydrogen fuel cell vehicles because if you give the money to the car companies, doesn't necessarily pass onto the consumers, you give the money to the consumers, they buy the cars, the car companies make money, we all win. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 1]

Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

Throughout the rulemaking process, EPA should also recognize and consider investments from the recently enacted Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0732, pp. 1-2]

Together, these two laws are expected to reduce adoption costs for ZEVs by providing at least $245 billion in federal funds—through tax credits, loans, and grants—to support ZEV charging infrastructure, manufacturing, and purchasing. Long-term regulatory certainty will push domestic manufacturers to take full advantage of these investments. [EPA-HQ-OAR-2022-0829-0732, pp. 1-2]

The final standards should:

- Ensure the LDV and HDV standards support greater zero-emission vehicle adoption by considering market growth expected from IRA and IIJA investments (which will surpass existing commitments outlined in Executive Order 14037);

Organization: Mazda North American Operations

We also can't ignore the requirements of the recently passed Inflation Reduction Act (IRA)'s EV incentives. The requirements for consumers to access the full $7500 incentive are complicated and confusing, and they are driving further changes to EV supply chains and manufacturer product plans. In the short term the changes to section 30D have reduced the number of eligible vehicles by 70% including eliminating Mazda's current EVs. While the long-term effects are not yet fully known, the IRA EV incentives will impact consumer demand in some ways, and this will impact EPA's aggressive EV goals. [EPA-HQ-OAR-2022-0829-0595, p. 2]

Organization: National Automobile Dealers Association (NADA)

4. EPA’s Modeling Values the IRA’s EV Tax Credits Inconsistently.

EPA’s approach for estimating electrification technology costs for its technical feasibility analysis does not assume that all consumers will receive the full $7,500 value of the IRA’s EV tax credits, opting instead to combine portions of the Section 30D and Section 45W tax credits in its modeling.46 The initial value of the credit used in the modeling starts at $3,750 in MY 2027 and increases annually until reaching $6,000 in MY 2032.47 But when elsewhere discussing the TCO savings and expenses for a MY 2032 vehicle, EPA assumes a maximum value of $7,500 when comparing the net purchase price of an EV with that of an ICE vehicle.48 [EPA-HQ-OAR-2022-0829-0656, p. 10]

46 88 Fed. Reg. at 29301; EPA DRIA. p. 2-87.

47 88 Fed. Reg. at 29301; DRIA. p. 2-87, Table 2-50.

48 DRIA. p. 4-20, Table 4-7.

This approach is inconsistent. If EPA’s own technical feasibility modeling assumes a credit value of only $6,000, the agency should use this same value in its TCO analysis, even if doing so would result in more favorable average purchase price for an ICE powered vehicle versus a comparable EV. For example, assuming application of a $7,500 credit, an EV CUV/SUV may have a net purchase price $400 lower than its ICE counterpart, but assuming application of a $6,000 credit, the ICE CUV/SUV would be $1,100 less expensive than its EV counterpart. [EPA-HQ-OAR-2022-0829-0656, p. 10]

EPA’s assumption that the IRA’s clean vehicle credits will have an increasing impact on vehicle affordability over time is questionable. First, to qualify for the Section 30D credit, future battery electric (BEV) and plug-in hybrid (PHEV) vehicles will need to satisfy ever more stringent critical mineral and battery component requirements. Second, vehicle MSRPs are likely to increase over time, making an increasing percentage of vehicles ineligible for Section 30D credits. Today, only a relatively few EV make/models qualify for the full $7,500 tax credit, and most OEMs are expected to be challenged through 2032 to establish supply chains for necessary battery componentry independent of China and other foreign entities of concern.49 NADA urges EPA to revisit its assumptions regarding the extent to which the IRA's tax credits will have a significant positive impact on the affordability of BEVs and PHEVs.50 [EPA-HQ-OAR-2022-0829-0656, p. 10]

49 See Get Connected EV Quarterly Report 2023 Q1.pdf (autosinnovate.org), pp. 12-15; Transforming Personal Mobility | AAI (autosinnovate.org).

50 NADA agrees with AAI's suggestions in its comments that EPA should incorporate an adjustment mechanism into its modeling assumptions to account for EV market uncertainties regarding the various federal tax incentives, battery cost improvements, and infrastructure development.

Organization: North American Subaru, Inc.

Federal and state consumer incentive programs aim to help bridge the price gap. The 2022 Inflation Reduction Act created a consumer purchase incentive program for new EVs (30D Clean Vehicle Credit Program), but the program's strict eligibility conditions disqualified most EVs on the market and many consumers are unable to use it on the vehicle of their choice. As Auto Innovators has previously noted, seventy percent of previously eligible vehicles became ineligible the day the Inflation Reduction Act was signed into law 5• As additional conditions were implemented in January 2023 and again in April 2023 fewer vehicles qualify for the consumer incentive. The Proposed Rule notes the importance of consumer incentives, but unfortunately the 2022 IRA creates a consumer incentive program where few vehicles qualify. limited access to the critical minerals that are needed for EV batteries like lithium, cobalt, and nickel, pose enormous challenges to automakers' transition to electrification. Significantly more extraction and processing capabilities are needed to support increased battery demand by automakers. Critical mineral availability and the impact on battery and vehicle costs should be considered by regulators. [EPA-HQ-OAR-2022-0829-0576, p. 3]

5 Alliance for Automotive Innovation blog "EV Tax Credit: Is This is Good as it Gets?" March 31, 2023.

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

D. Deployment of Federal Funding

The recently enacted Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) provide billions of dollars of funding to advance transportation electrification including substantial funding for state governments. Combined with state and federal financial incentives for ZEVs and charging and fueling infrastructure, and other market-enabling policies, the LDV and MDV market segments are primed for rapid and widespread electrification. [EPA-HQ-OAR-2022-0829-0584, p. 7]

The NESCAUM and OTC states are already beginning to deploy the $5 billion made available through the National Electric Vehicle Infrastructure program to accelerate installation of public charging and other alternative fueling infrastructure, and the $5 billion Clean School

Bus grant program for zero-emission school buses and technology. Additional funding will be available soon through the $7.25 billion Low or No Emission and Grants for Buses and Bus Facilities programs, the $2.5 billion Charging and Fueling Infrastructure program, the $1 billion Clean Heavy-Duty Vehicle program, and many other new and existing federal programs for which activities that support transportation electrification are eligible. All of the NESCAUM and OTC states recently submitted applications for the $5 billion Climate Pollution Reduction Grant Planning and Implementation programs, which require states to develop and implement priority and comprehensive climate action plans to reduce economy-wide GHG emissions. [EPA-HQ-OAR-2022-0829-0584, p. 7]

Organization: Paul Bonifas and Tim Considine

The EPA argues that because of the maximum federal purchase incentive tax rebate of $7,500, this would reduce the price paid by consumers. However, tax rebates are not magic wands. The money must originate from somewhere: the US economy, aka taxpayers. The tax rebate does not increase nor decrease the “net benefit” to the US economy. Moreover, there are income limits to the EV tax rebate, and the current EV owner demographic would not qualify for any tax rebate when purchasing a new EV. [EPA-HQ-OAR-2022-0829-0551, p. 6]

Organization: Plug In America

These regulations are essential to keeping our climate commitments. They are fortified by billions of dollars of federal funding authorized through the 2021 Infrastructure Investment and Jobs Act and the 2022 Inflation Reduction Act. Federal funding has catalyzed private investment in this market. Vehicle and battery manufacturers are expected to invest $210 billion in the U.S. by 2030, nearly a quarter of global financial commitments toward the EV transition and more than any other country in the world.2 [EPA-HQ-OAR-2022-0829-0625, p. 1]

2 https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-headed-for-the-u-s/.

Organization: POET, LLC

EPA then adds a significant, additional reduction—from about $80 to $90 per kWh from 2027 to 2032 to $40 to $60 per kWh—because of the IRA tax credits.88 This amounts to a total cost reduction of about 50 to 67% in “as few as two to three years” simply because of increased demand and the IRA.89 These large reductions are not justified. First, the battery production capacity that would support these cost reductions has yet to be built. Second, even assuming it is built as EPA predicts, there is no reason to assume that battery manufacturers will pass cost savings from the IRA directly onto customers on a one-to-one basis.90 [EPA-HQ-OAR-2022-0829-0609, pp. 22-23]

88 Id.

89 Id.

90 Id.

Finally, EPA assumes that the significant federal tax incentives supporting batteries and reducing the purchase price of BEVs for consumers will continue throughout the term of the

Proposed Rule, when those incentives could be eliminated or modified by future legislation.100 [EPA-HQ-OAR-2022-0829-0609, p. 24]

100 Id.at 7.

Beyond the assumptions of dramatic reductions in the cost of batteries and other BEV componentry over the period from 2022 through 2032, U.S. EPA also assumes that federal tax incentives will be available that dramatically lower the purchase price of BEVs. In some instances, U.S. EPA assumes that purchase incentives of $7,500 per BEV apply (see DRIA Table 4-7 for example) but in U.S. EPA's analysis of BEV penetration, somewhat lower values are used which range from $4,750 in MY 2027 to $6,000 in MY 2032 as shown in DRIA Table 2-50. Purchase incentives are assumed to end with MY 2033. The main concern with U.S. EPA's treatment of purchase incentives is the assumption that they will continue to be in place over the period from 2027 through 2032 as they could easily be eliminated or modified by future legislation. This assumption should clearly be subjected to a sensitivity analysis as the elimination of purchase incentives would be expected to dramatically lower BEV penetration rates during the MY 2027 to 2032 period while U.S. EPA's assumptions regarding dramatic reductions in BEV battery and component costs are occurring. [EPA-HQ-OAR-2022-0829-0609, p. 59]

Organization: Sierra Club et al.

The EPA should ensure that the final standard reflects the investments from the Infrastructure Investment and Jobs Act and Inflation Reduction Act. Together, these two laws are expected to reduce ZEV adoption costs by providing at least $245 billion in federal funds—through tax credits, loans, and grants—to support ZEV infrastructure, manufacturing, purchasing, and charging.2 Long-term regulatory certainty, through strong federal clean car standards, will encourage domestic manufacturers to take full advantage of federal investments and spur ZEV innovations that can reduce pollution and save families money. [EPA-HQ-OAR-2022-0829-0668, pp. 1-2]

2 Noah Gabriel, $210 Billion of Announced Investments in Electric Vehicle Manufacturing Headed for the U.S., EV Hub (Jan. 12, 2023), https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-headed-for-the-u-s/.

Organization: Specialty Equipment Market Association (SEMA)

The Inflation Reduction Act of 2022 further expanded these investments by offering $7,500 tax incentives to American consumers to purchase electric vehicles. While initial estimates from the CBO determined the cost of the program at $30.6 billion over the next 10 years, the University of Pennsylvania now estimates the EV tax incentive's total cost has increased by over 1,000 percent to $393 billion over 10 years.3 [EPA-HQ-OAR-2022-0829-0596, p. 3]

3 University of Pennsylvania: Budgetary Cost of Climate and energy provisions in the Inflation Reduction Act (Link: https://budgetmodel.wharton.upenn.edu/estimates/2023/4/27/update-cost-climate-and-energy-inflation-reduction-act).

Organization: Stellantis

- The Inflation Reduction Act (IRA) committed significant funds to incentivize the purchase of EVs [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

– however these incentives come with criteria that exclude many EV models today, and pending guidance from the IRS likely could exclude more in the future. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

- The IRA also provides an incentive to produce the needed batteries helping to offset their cost – however this only applies to the U.S., ignoring the global supply chain needed to support a 40- 50% U.S. EV market. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

Another example of overly optimistic assumptions is how EPA overestimated the impact of the federal incentives introduced by the IRA. EPA's modelling assumes all batteries in all EVs will be built in the U.S. getting the maximum $45/kWh credit offered by the 45X battery production tax credit for 2027- 2029MY. This results in an assumed price reduction of $4,500 for a vehicle with a 100kWh battery and scales up to ever larger price reductions with larger batteries. As shown in Figure 4 below, EPA combined the IRA 30D (retail) and 45W (lease/commercial) incentives assuming on average vehicles receive $3,750 to $6,000 of price reduction. Applying both the 45X IRA production and 30D/45W purchase incentives assumes average BEV price reductions of >##$9K starting in 2027MY, having a significant influence on EPA's forecasted market demand and affordability for EVs. EPA justifies its assumption citing most batteries are U.S. manufactured today (even though data is heavily skewed by one OEM) and that the lucrative credit will drive OEMs to invest in U.S. production. Stellantis supports Auto Innovators' comments recommending that EPA take a less optimistic approach in applying IRA incentives incorporating a more realistic price influence on future EV market projections. [EPA-HQ-OAR-2022-0829-0678, pp. 5-6]

SEE ORIGINAL COMMENT FOR Table 2-49: IRA Battery Production Tax Credits in OMEGA and Estimated BEV Price Reduction Assumed due to IRA Incentives. Figure 4 - IRA incentives assumed in the EPA NPRM [EPA-HQ-OAR-2022-0829-0678, pp. 5-6]

Organization: Steven G. Bradbury

EPA is confident that generous federal subsidies for EV purchases will help con- sumers overcome their reluctance, but that confidence is questionable at best. EPA's cal- culations assume that the current subsidies promised in the Inflation Reduction Act will apply to all EV purchases in the U.S., which they do not and never will, and that these subsidies will remain available going forward, which will not be the case if a future Con- gress changes course and repeals these costly subsidies. [EPA-HQ-OAR-2022-0829-0647, p. 12]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

The Environmental Protection Agency claims that costs of battery cell and pack manufacturing will continue to decline due to the learning curve, shared costs across larger volumes, and government subsidies. However, the introduction of government subsidies artificially reduces the cost of manufacturing and provides an unrealistic perspective of the actual costs should the government stop subsidizing battery manufacturing. [EPA-HQ-OAR-2022-0829-0674, p. 8]

Organization: Toyota Motor North America, Inc.

4.3. Application of IRA

Projected battery costs are further reduced in EPA's analysis by applying the IRA 45X cell and module tax credits. To do this, the direct manufacturing costs above are scaled up to their retail price equivalent (RPE) from which the IRA tax benefits are subtracted resulting the lower cost curve in Figure 7. [EPA-HQ-OAR-2022-0829-0620, pp. 24-25]

[See original for graph Figure 7 IRA 45X Cost Reductions] [EPA-HQ-OAR-2022-0829-0620, pp. 24-25]

It is unclear as to how the IRA tax credits are applied to arrive at the lower curve. The RPE curve seems to be missing from Figure 7making it impossible to visualize the actual cost reductions due to the IRA tax credits. Toyota recommends the Final Rule clearly describe and illustrate each step of the process and provide an accounting of the cumulative IRA tax credits applicable each year, as well as the marked-up (RPE) costs prior to the IRA tax credits being applied for comparison. Toyota believes EPA must reconsider how the IRA benefits are being applied to achieve battery cost savings for the proposed standards. The resulting battery costs seem implausible as total battery costs after the tax credit can be negative. [EPA-HQ-OAR-2022-0829-0620, pp. 24-25]

EPA assumes that starting in 27MY virtually every battery produced on the path to hitting the 67% BEV target in 32MY will be produced in the U.S. and earning the 45X credit. This is unrealistic and not supported by the U.S. Department of Energy or any other projections. EPA's own analysis of this scenario would put the cost of the 45X credit related to the proposed rule at around $160 billion between 2027 and 2032 - nearly six times the total CBO score of $30.6B. [EPA-HQ-OAR-2022-0829-0620, pp. 24-25]

Further, EPA assumes that starting in 27MY, every BEV sold in the US will receive part of the combined 30D+45W Clean Vehicle Credits, up to a maximum of $6,000 per BEV in 32MY. EPA's own analysis of this scenario would put the total cost of the 30D+45W Clean Vehicle Credits related to the proposed rule at around $270 billion between 2027 and 2032 – nearly twenty-five times the total CBO score of $11 billion ($7.5 billion for 30D and $3.5 billion for 45W). [EPA-HQ-OAR-2022-0829-0620, pp. 24-25]

6 Conclusion

A deeper analysis of global and IRA-compliant critical material supply and demand is needed to support the final rule. The proposal's high-level assessment results in overly optimistic observations that "critical battery mineral supply is likely to be adequate to meet anticipated demand, in some cases by a significant margin".19 The proposal lacks the evidence to support this finding. Demand for critical minerals today is now higher than the years referenced in the proposal due to new policy and OEM targets. Future demand growth for PEVs is unclear given the uncertain geo-political considerations and supply chain operations beyond the control manufacturers and EPA. It is highly plausible the tight supply-demand for lithium and graphite will lead to volatile prices and the proposal fails to consider how this could suppress demand and annual EV market share. The Final Rule must encompass a significantly deeper analysis based on a boarder array of sources for assessing global supply-demand by country of origin to support the use of IRA tax credits. [EPA-HQ-OAR-2022-0829-0620, pp. 65-66]

19 Id.

Organization: United Steelworkers (USW)

EPA relies heavily on the potential critical role and incentives from the manufacturing investments from the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA) for its proposed emissions standards. Programs related to the auto manufacturing sector include the Battery Manufacturing and Recycling Grants, the Battery Material Processing Grants, the Domestic Manufacturing Conversion Grants, the 48C Advanced Manufacturing Tax Credit, the Advanced Technology Vehicle Manufacturing Loan Program, the National Electric Vehicle Infrastructure Program, and the Charging and Fueling Infrastructure Grant Program. [EPA-HQ-OAR-2022-0829-0587, p. 4]

While the proposed rule is not wrong that the investments made by IRA and IIJA should spur investments in new technologies to lower emissions of vehicles, it does fail to consider the timeline and effectiveness of program implementation. Undoubtably, these manufacturing investments will take time to achieve their full production capacity. [EPA-HQ-OAR-2022-0829-0587, p. 4]

Organization: Valero Energy Corporation

6. EPA's application of price modifications is inconsistent with the Inflation Reduction Act ("IRA") and IRS's proposed implementation of 26 U.S.C. §30D and §45W. [EPA-HQ-OAR-2022-0829-0707, p. 9]

In Section 2.6.8 of the DRIA, EPA describes its methodology for incorporating IRA tax incentives into OMEGA modeling,37 and those price modifications are reflected in the OMEGA input file.38 However, EPA misapplies the §30D and §45W tax credits in the following ways: [EPA-HQ-OAR-2022-0829-0707, p. 9]

37 DRIA at 2-86 and 2-87.

38 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "vehicle_price_modifications_20230314b.csv."

• As of April 18, 2023, only 14 light-duty vehicles in the MY 2023 fleet are eligible for any credit amount under 30D.39 Nonetheless, EPA applies a price modification to every BEV in the MY 2023 to MY 2032 analysis fleets, without any consideration of: [EPA-HQ-OAR-2022-0829-0707, p. 9]

39 https://www.politico.com/news/2023/04/17/ev-treasury-department-regulation-00092123 and https://fueleconomy.gov/feg/tax2023.shtml, accessed 4/28/2023.

o Cost of the vehicle – the §30D tax credit is only available for pick-up trucks, vans and SUVs with an MSRP ≤ $80,000 and other qualified vehicles with an MSRP ≤ $55,000. The BEV to which EPA applies the price modification have OMEGA-projected prices ranging from $24,633 to $360,545;40 [EPA-HQ-OAR-2022-0829-0707, p. 9]

40 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, Column AB of "2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicles/csv."

- Location of final assembly – from August 17, 2022, the §30D tax credit is only available for vehicles whose final assembly occurs in North America; [EPA-HQ-OAR-2022-0829-0707, p. 9]
- o Battery components – Starting in 2023, an increasing percentage of battery components must be manufactured or assembled in North America; [EPA-HQ-OAR-2022-0829-0707, p. 9]
- o Battery critical minerals – Starting in 2023, an increasing percentage of battery critical minerals must be extracted, processed or recycled in eligible locations; and [EPA-HQ-OAR-2022-0829-0707, p. 9]
- o Purchaser income – the §30D tax credit is only available for taxpayers with adjusted gross income less than thresholds. [EPA-HQ-OAR-2022-0829-0707, p. 9]

• EPA does not apply a price modification to even a single PHEV in the MY 2023 to MY 2032 analysis fleets. Eligible vehicles under 26 U.S.C. 30D include plug-in electric vehicles with a battery capacity ≥ 7 kWh and capable of being recharged by external source of electricity,41 so certainly PHEVs are eligible. And in fact, of the 14 models currently eligible for 30D tax credits, six are PHEVs. [EPA-HQ-OAR-2022-0829-0707, p. 9]

41 PHEVs available in the US have a mean battery size of 14.9 kWh, https://evstatistics.com/2022/04/bev-batteries- average-83-kwh-versus-15-kwh-for-phevs/ (accessed 4/27/2023)

Organization: World Resources Institute (WRI)

Locking in cleaner vehicle standards, and potentially extending them through 2035 as requested by auto manufacturers, will create market stability and will give manufacturers, investors, and consumers greater confidence in the direction of the vehicle market. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Based on the current and growing uptake of electric vehicles, paired with public and private investments in charging, purchasing, and manufacturing from the Inflation Reduction Act and the Infrastructure Investment and Jobs Act, these standards would be achievable under the model years proposed. Public investments from recent legislation include but are not limited to: [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

• National Electric Vehicle Infrastructure Program [Link: https://www.fhwa.dot.gov/environment/nevi/]

• Electric Vehicle Tax Credit [Link: https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after]

• Commercial Clean Vehicle Credit (45W) [Link: https://www.irs.gov/credits-deductions/commercial-clean-vehicle-credit]

- Used Clean Vehicle Credit [Link: https://www.irs.gov/credits-deductions/used-clean-vehicle-credit]

- Advanced Manufacturing Production Credit (45X) [Link: https://www.irs.gov/instructions/i7207] [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Thus, we urge EPA to strengthen and finalize the strongest rule possible as

1. Complementary policies provide incentives for vehicle manufacturers and consumers in the transition; and

2. Strong private investments are rapidly expanding supply chains and manufacturing, helping to accelerate the transition to cleaner, electric vehicles. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Complementary policies provide incentives

By leveraging the billions of dollars in new federal investments in electric vehicle charging in the Infrastructure Investment and Jobs Act and the hundreds of millions of dollars of clean transportation incentives in the Inflation Reduction Act these standards have the potential to be the floor not the ceiling for transportation emissions reductions. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

These policies provide unprecedented levels of public support for electric vehicles specifically including at least $83 billion of loans, grants, and tax credits that could support the production of low or zero-emission vehicles, batteries, or chargers according to a recent analysis [Link: https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-headed-for-the-u-s/#_ftn4] by Atlas Public Policy. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Complemented by existing state policies like the Advanced Clean Trucks and Advanced Clean Fleets rules, which require manufacturers to begin selling an increasing percentage of zero- emission vehicles starting in 2024, EPA's proposed rules can help to accelerate the transition to zero-emission transportation while improving public health and reducing climate pollution. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Private investments are rapidly expanding supply chains and manufacturing

Since the passage of the Inflation Reduction Act less than one year ago, companies have announced tens of billions of dollars in renewable energy, battery, and electric vehicle projects across the country. From the announcement that Our Next Energy [Link: https://www.michiganbusiness.org/press-releases/2022/10/whitmer-announces-2000-jobs-investment-of-$1.6-billion-michigan-based-our-next-energy-builds-battery-manufacturing-campus-wayne-county/] has invested $1.6 billion in their first battery manufacturing campus in Wayne County, Michigan to the news that Hyundai Motor Group and SK On [Link: https://fortune.com/2022/12/08/hyundai-new-5-billion-electric-battery-plant-georgia-atlanta-biden-inflation-reduction-act/] are jointly investing $4-$5 billion to build electric battery plants outside of Atlanta, Georgia to BMW's [Link: https://apnews.com/article/technology-north-america-spartanburg-south-carolina-climate-and-environment-96753f092b29e0d384903591b5221f13] recent announcement of their $1.7 billion investment near Spartanburg, South Carolina in their shift to EV manufacturing there is ample evidence that recent policies are helping to drive substantial private investments. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

These investments are leading to rapidly developing supply chains, domestic battery production capacity, and increased manufacturing which will lead to further reductions in the cost and increases in the availability of zero-emission vehicles. This market growth will continue to increase with additional supportive policies and regulations, such as these proposed rules. [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

EPA Summary and Response

EPA acknowledges and appreciates all of the comments relating to IRA provisions and their modeling in the compliance analysis. Comments on this topic included a number of distinct themes that we individually identify and respond to in this section. Our responses to these themes collectively respond to all of the individual comments on these topics. Some comments touch on topics that are responded to in other sections of the RTC, and we cite these other sections at the end of this section.

In general, comments in this area were related either to the potential for IRA provisions to promote feasibility and adoption of PEV technology, or to our representation of specific IRA provisions as inputs to the compliance analysis.

Comments relating to the potential of IRA provisions frequently cited the intent of the Act to support industry development, and cited supportive information relating to recent examples of how this is occurring robustly and as expected. For example, comments from ACEEE, CARB, CAP, Energy Innovation, "Environmental and Public Health Organizations", EDF, ICCT, NESCAUM, Plugin America, and others strongly supported the position that the IRA and other governmental programs are already and would continue to have a strong and positive influence on development of the supply chain and promoting feasibility of PEV technology. Other comments related to the importance of EPA reflecting the potential impact of the IRA in its compliance analysis (both in the No Action case and the action cases), and setting the stringency of the standards accordingly. For example, this view was advanced by ACEEE, CAP, the Sierra Club, and others, including comments that the full potential of the IRA provisions should be utilized by actively taking full advantage of its provisions. Other commenters were more skeptical of the impact of the IRA provisions. For example, the Alliance and Stellantis suggested that the IRA would not be enough, and others (such as Honda, Kia, API, and NADA) generally expressed the view that the provisions were unlikely to have the impact EPA had assumed in its analysis (for example, that the 30D Clean Vehicle Credit is more restrictive than its predecessor and may be severely restricted in applicability, or that the IRA would take longer than expected to influence the domestic supply chain). Others stated their view that, because the IRA provisions could potentially be modified or repealed by a future Congress, EPA should have either not included the IRA provisions in its analysis or should conduct a sensitivity to account for this possibility. Others suggested that the limited lifetime of the IRA provisions means that EPA should have accounted for the effect of their discontinuation after 2032, and specifically that their inclusion at all biased the analysis toward PEVs and discouraged HEVs and other ICE technology from playing as significant a role in the modeled compliance fleet.

Comments relating to our representation of specific IRA provisions in the compliance analysis primarily consisted of comments about our numeric OMEGA inputs for average values of credits under 30D (Clean Vehicle Credit), 45W (Commercial Clean Vehicle Credit), and 45X (Production Tax Credit). Some commenters agreed with our numeric values and in some cases suggested that our values may be conservative. In particular, some commenters urged EPA to include the 45X provision that provides 10 percent credit for manufacturing cost of domestic electrode active materials and critical minerals. Other commenters stated the view that our assumptions for any or all of the credit programs were too optimistic, for example, that they did not account for various limitations on eligibility, or did not fully explain the basis for the values that were used, or did not address the ability of U.S. battery manufacturing facilities currently planned or under construction to ramp up quickly enough.

EPA acknowledges the comments relating to the current and potential effects of the IRA provisions, the need for actions and timely progress on the part of other parts of the government, and the effectiveness of such actions. EPA agrees with commenters who argued that the PEV-related incentives and other programs under the IRA have strong potential to advance development of the PEV supply chain and PEV feasibility, not only at the manufacturing level but also at the infrastructure level, and are already demonstrating this effect through industry's increased emphasis on building a domestic supply chain, manufacturing battery cells in the U.S., securing IRA-compliant mineral and component inputs, and stimulating private investment. EPA also acknowledges comments relating to the need for action and timely progress across the government, and/or the likely effectiveness of these efforts, such as the programs under the Bipartisan Infrastructure Law, the CHIPS Act, and various funding and assistance mechanisms administered by agencies across the government. The bulk of our responses to these topics are in RTC 15. EPA also acknowledges the views of adverse commenters who cite uncertainty or skepticism with respect to the rate at which IRA provisions and other governmental efforts will grow the domestic supply chain, the effect of specific requirements of specific tax credits or incentives, and similar concerns. EPA addresses these comments in turn in the paragraphs below.

In response to commenters who stated that our OMEGA inputs for the average composite value of 30D and 45W credits across the fleet were too optimistic, or more specifically that the domestic supply chain, including critical mineral mining and processing and electrode active material manufacturing, will not grow fast enough to allow the assumed levels of 30D credits, EPA disagrees. EPA acknowledges that eligibility for 30D specifically was reduced for many manufacturers in 2023 with the activation of critical mineral and battery component sourcing requirements, and this reduction in the number of eligible vehicle models was understood across the industry at the time of the proposal. EPA disagrees with commenters who assert that this means that 30D will be a disincentive to PEV sales, or that it means that few or no vehicles will be eligible in the future. It is clear that the supply chain is growing in response to market forces and incentives, and manufacturers are actively pursuing compliance with the IRA incentives, meaning that some percentage of vehicles will in fact qualify in the future and the primary uncertainty is to what degree. To reexamine the validity of our assumptions for 30D and 45W, we requested the Department of Energy to perform an independent assessment[464] of the likely average yearly value per vehicle of combined 30D and 45W, taking into account the various eligibility constraints, trends in leasing, and rate of growth in U.S. battery manufacturing

[464] Department of Energy, "Estimating Federal Tax Incentives for Heavy Duty Electric Vehicle Infrastructure and for Acquiring Electric Vehicles Weighing Less Than 14,000 Pounds," Memorandum, March 11, 2024.

facilities including an accounting for gradual ramp-up over time. This work resulted in a set of year-by-year fleet-average credit values for the combined effect of 30D and 45W that are described in preamble Section IV.C.2. These updates estimates from DOE represent a more complete and independent assessment of the issue and EPA believes it to be the best publicly available accounting of the potential value of the credits given their specific requirements. We note that the DOE figures are very close to the figures used in the proposal. As described in more detail in Preamble IV.C.2, in our updated compliance analysis we adopt the DOE figures for 30D/45W but reduce them to conservatively account for uncertainties. See Preamble IV.C.2 for a full discussion.

Some commenters also expressed the view that the proposal did not adequately explain the basis for the combined 30D and 45W values that were used in the proposal. In response, we refer to the DOE analysis which provides specific information on the basis of the estimates used in the updated compliance analysis.

In response to comments that the IRA's mineral and battery component sourcing requirements have already reduced the number of PEVs that qualify for one or both halves of the 30D credit, or that the IRA sourcing requirements will severely limit the percentage of PEVs that qualify for 30D in the future, EPA agrees that not all PEVs qualify for 30D today and that it is likely that some portion of PEVs will not qualify in the future. However, EPA disagrees with the implication that our values for combined 30D and 45W are therefore too optimistic. First, we note that we have modeled 30D and 45W in combination, either of which potentially provide for up to $7,500 in credit toward a vehicle transaction, albeit in different forms. The 45W credit is applicable to commercial vehicles, which includes vehicles that are purchased for the purpose of leasing, whether to businesses or to consumers, and it is not subject to the sourcing requirements of 30D. Also, the independent DOE analysis largely corroborates the figures that were used in the proposal. Some commenters cited current or past lease rates across the vehicle market or within their own operations, and used this to question whether lease rates would be sufficient in the future to combine with 30D as described. EPA disagrees that past history or recent trends in lease rates has a bearing on future rates given 45W; the data for current or past leasing rates would not reflect the influence of 45W on PEV transactions and thus has limited if any value in predicting future rates. We also note that there is evidence that vehicle leasing has or is likely to increase in response to this provision; for example, JLR indicated that it is considering leasing in response to this provision, and the DOE analysis also observes an increase in leasing rates. Although some commenters appeared to question the appropriateness of IRS guidance clarifying that the leased vehicles may qualify for 45W, The Department of Treasury and the IRS have explained that the guidance simply follows the statutory text of the IRA and longstanding tax rules regarding leasing. Regarding comments expressing the view that 45W consumer eligibility will depend in part on the cost differential from ICE vehicles, MSRP is considered in the DOE study. Regarding comments that some consumers may not qualify for a lease due to credit score or interest rates, these factors influence ability to purchase a vehicle as well and are not limited to leasing.

In response to comments that the IRA provisions will take time to have their full effect, EPA agrees that development of the supply chain will not occur overnight, but also notes that robust progress is being made. EPA also notes, as stated in comments from "Environmental and Public Health Organizations" among others, that these programs as well as the standards themselves provide clear regulatory and market signals that are likely to accelerate this progress. For more discussion of comments related to the supply chain, critical minerals, and the impact of the IRA, BIL, and other measures toward this end, see RTC 15.1.

In response to comments that our assumptions for the value of combined 30D and 45W were not documented, or that specific requirements such as for example the MSRP limitations on 30D were not quantified, please see Preamble IV.C.2 where we describe the DOE study that independently estimated yearly values for combined 30D and 45W,[465] and largely confirmed the estimates used in the proposal. The DOE analysis provides a rigorous accounting of most of the various restrictions on the credits in developing its estimates, and EPA believes that the study provides a strong estimate of 30D/45W. However, some commenters additionally noted limitations on 30D that DOE did not explicitly consider, including: that inflation could affect vehicle eligibility under the MSRP limit, or that over time buyers might increasingly fail to qualify under the income limit which also is not adjusted for inflation, or that some buyers would not have enough tax liability to claim the full credit, and various other uncertainties about the other limitations on 30D. While EPA continues to believe that the DOE estimates are reasonable and likely to be an accurate representation, in the interest of addressing these comments and as described immediately below and in more detail in Preamble IV.C.2, in our updated compliance analysis we adopt the DOE figures for 30D/45W but reduce them to conservatively account for these uncertainties. For example, DOE considered the MSRP limit, but did not project increases in vehicle prices due to inflation, and was unable to include the effect of income limits because of lack of citable data on customer incomes. See Preamble IV.C.2 for a full discussion.

EPA notes that JLR's comment that "65% of battery cells and almost 80% of cathodes are manufactured in China" is not relevant to commenter's points on 30D eligibility, as this appears to refer to global production, the majority of which is not sold into the U.S. market.

In response to comments that significant uncertainty remains regarding Treasury guidance on the application of the IRA credits (for example, the definition of foreign entities of concern (FEOC)), EPA notes that the Treasury Department has issued much of this guidance in the time since the proposal was issued, and EPA has considered this guidance, which was largely as had been expected across the industry and by EPA at the time of the proposal. The DOE analysis of 30D/45W was conducted with consideration of aspects of Treasury guidance that were under development at the time and subsequently proposed for rulemaking by Treasury.

In response to comments expressing the view that domestic battery manufacturing capacity will not grow fast enough to allow the assumed levels of 45X in our analysis, or that the value of the 45X production tax credits we assumed are not justified by projections of future U.S. manufacturing capacity, EPA disagrees. The proposal cited work by Argonne National Laboratory and other organizations on which we based our expectation that planned and announced U.S. cell manufacturing capacity would grow at a rate greater than expected domestic battery demand under the central case of the analysis. Comments received on our modeling of the 45X cell and module credit led us to further investigate our inputs for the phase-in schedule and average amount realized. Our updated analysis includes updated figures from ANL that include an allowance for ramp-up time based on ANL's assessment of typical plant construction and growth rates in the industry. Further, our updated compliance analysis projects less battery

[465] Department of Energy, "Estimating Federal Tax Incentives for Heavy Duty Electric Vehicle Infrastructure and for Acquiring Electric Vehicles Weighing Less Than 14,000 Pounds,", March 11, 2024.

demand than in the central case of the proposal, and we have included sensitivity cases and other examples of pathways that project less demand. With projected U.S. manufacturing capacity exceeding projected demand in every compliance scenario we have analyzed, PEV manufacturers and cell suppliers are well positioned to take significant advantage of the 45X credit throughout the time frame of the rule.

In response to comments that EPA did not sufficiently document our conclusion that 45X could be accommodated by projected U.S. battery manufacturing, EPA disagrees. EPA clearly based its conclusion on the ANL projection of North American battery manufacturing capacity plans presented in the proposal. In the final compliance analysis, we updated these projections with a new study by ANL that explicitly takes into account newly announced plans as well as the time necessary to build and bring the plants to capacity.

In response to comments that smaller manufacturers may never move battery manufacturing capacity to the U.S. and thus never realize 45X credits, EPA disagrees that this need be the case in all situations or that significant value of the credit cannot be realized by other means. In the case that a manufacturer has not constructed U.S. battery manufacturing capacity for its own use, we note that many vehicle manufacturers today procure cells and/or modules from suppliers that do manufacture in the U.S., making it possible for the 45X credit to be passed along in the price of the product. The ANL report also identifies production capacity associated with suppliers that have not identified offtake agreements that could be used as a U.S. manufacturing source. We expect that cell and module suppliers will compete on price by reflecting the advantage of the 45X credit in their pricing to these and other manufacturers.

In response to comments that EPA's accounting for 30D/45W and 45X together causes battery costs to be unrealistically low or negative, EPA disagrees. Specifically, EPA disagrees with the characterization by some commenters that the sum of 30D, 45W, and 45X credits imply that battery costs will be negative. The 30D/45W credit does not impact the modeled battery net manufacturing cost (only 45X does) but is realized within our modeling on the consumer side in making the overall cost of the vehicle more attractive to the buyer relative other technologies. EPA therefore has not assumed that the manufacturing cost of batteries will be negative or zero. EPA also disagrees with comments alleging that vehicle costs are inaccurate as a result of our IRA modeling or other OMEGA inputs. As described in the Preamble, RIA, and this RTC, the large set of OMEGA inputs that result in our estimates of vehicle cost are based on many data sources, studies, and analyses that EPA considers to be the best available.

In response to comments that there is no guarantee that 30D, 45W, or 45X tax credits will be passed on to the consumer, but instead could be taken as profit by the manufacturer or otherwise lost to the consumer, EPA agrees that there is no guarantee but notes that the motivation to compete in the market on pricing is likely to encourage manufacturers to pass the savings along. To the degree that manufacturers will choose to produce PEVs as part of their means to comply with the standards, they are likely to be incentivized to compete with one another on a pricing basis. If a manufacturer were to arbitrarily capture a large portion of the credit as additional profit at the expense of selling the vehicles as part of its compliant fleet, this would conflict with the manufacturer's ability to sell the vehicles, which manufacturers are motivated to do as one of the lowest cost pathways to meeting the standards. Some commenters have suggested that some manufacturers appear to have raised MSRP for PEVs in response to the availability of the 30D credit. EPA notes that the commenter's cited reason for such events is speculative, as manufacturers consider a host of factors in setting MSRP for specific vehicle types or models. The cited example occurred during a time of low vehicle inventory and higher vehicle prices across the industry, and evidence that the price change was a direct result of availability of 30D is only speculative and circumstantial, as EPA is not aware of any manufacturer having announced such a policy. In addition, DOE validated its 30D/45W estimate for 2023 against actual 2023 market transaction data from J.D. Power illustrating that OEMs are indeed passing on the value of the credits by reducing the cost of both purchases and leased BEVs and PHEVs.[466] At any rate, in a more mature and competitive PEV sales environment in which manufacturers are relying on sales of PEVs to comply with increasingly stringent standards, failure to pass on the credit is unlikely to be beneficial to the manufacturer as it would affect their ability to comply. In this final rule analysis, EPA continues to apply the full estimated average value of the 30D/45W credit toward the purchase price seen by the consumer, and to apply the full estimated average value of the 45X cell and module credit to the cost seen by the manufacturer. The 30D/45W credit amount is modeled in OMEGA as a direct reduction to the consumer purchase costs,[467] and therefore has an influence on the shares of BEVs demanded by consumers within the model. The purchase incentive is assumed to be realized entirely by the consumer and does not impact the vehicle production costs for the producer. For more discussion and the values used within OMEGA, please see RIA Chapter 2.6.8.

In response to comments from the Alliance that the BatPaC default setting for in-house production is somehow in conflict with the assumption that batteries will benefit from 45X cell and module credits, EPA disagrees. Whether a battery is made entirely in-house by an OEM from cells and modules manufactured in-house, or is purchased from a supplier, 45X cell and module credits are earned by the applicable manufacturing entity and can be transferred or passed along in the purchase price, given a competitive industry as discussed elsewhere. The ANL battery pricing study on which our updated costs are based considers the OEM to be the consumer that purchases the pack from the supplier, rather than an in-house operation.

Regarding the Alliance's assertion that the value of the 45X credit for MDVs would be unrealistically large due to the size of the battery, EPA does not see a basis for commenter's concern, as it is well understood that the amount of the 45X cell and module credit scales with the energy capacity of the battery in kWh. EPA sees no reasoning that would suggest that large batteries for large vehicles are somehow limited in the amount of credit they can realize simply because they are too large.

Regarding AmFree's comment suggesting that a statement from the proposal, "a large percentage of 2023 U.S. BEV battery and cell manufacturing is represented by the production of one [original-equipment manufacturer]," implies that the rest do not qualify for 45X, EPA disagrees. Batteries manufactured in the U.S. qualify for 45X regardless of which OEM makes them. Further, AmFree wrongly cites the Heavy Duty rule, which specifically deals with batteries manufactured for the heavy-duty market, which are in lower volumes than the light-

[466] Department of Energy, "Estimating Federal Tax Incentives for Heavy Duty Electric Vehicle Infrastructure and for Acquiring Electric Vehicles Weighing Less Than 14,000 Pounds," March 11, 2024.

[467] As described in Chapter 4.1 of the RIA, the modeling of consumer demand for ICE and BEV vehicles considers purchase and ownership costs as components of a "consumer generalized cost" for the ICE and BEV options. The purchase cost reflects the vehicle purchase price and any assumed purchase incentives under 30D or 45W.

duty market and are subject to other factors specific to HD vehicles, as support for the incorrect implication that many light-duty batteries are not eligible.

Regarding AmFree's citation of examples that in their view indicate a hesitance on the part of industry to proceed with announced battery manufacturing development plans, and that therefore EPA's assessment of future U.S. battery manufacturing capacity is "unsound," EPA disagrees. DOE has assessed future battery manufacturing plants in the U.S. and North America and based on the latest data, including ramp-up time estimates, continues to conclude that capacity is on track. EPA is aware that in the second half of 2023, some commentators began reporting on specific changes in previously announced investment plans by some automakers; see the discussion in Preamble I.A.2 and IV.C.7.i. As we explain there, EPA does not consider such recent news stories to be indicative of any general trend that would change our assessment of the outlook for investment in PEV technology, including domestic battery manufacturing capacity.

In response to comments that IRA credits could be repealed by a new Congress and therefore EPA should consider that possibility in its analysis, EPA disagrees. EPA has traditionally and consistently considered only the effect of final enacted laws and regulations in its feasibility analyses, and does not consider speculation about possible actions of Congress, the executive branch, states, or other entities in assessing the impact or outcome of its rulemakings. The range of possible future actions by any lawmaking, policymaking, or rulemaking entity would by definition encompass almost every possible outcome, including those with either positive or negative implications for the assessment, rendering the selection of any individual outcome merely speculative and potentially contradictory to the objectiveness of the assessment. EPA also notes that any regulatory action is subject to potential modification by a future Administrator subject to the public notice and comment process, just as other laws or regulations are subject to potential change. In response to the view that the limited time frame during which the IRA incentives will be available (2023 to 2032) means that they should not be considered in the analysis, EPA disagrees. The credits are available during this time frame and are very significant, and there is no reasonable basis for their arbitrary exclusion when it is clear that the credits are already being claimed and are already impacting the market as intended by Congress.

In response to comments that we should include the 10 percent provisions of 45X, EPA continues to believe that this aspect of the credit program is relatively small in comparison to others, and its exclusion makes the analysis conservative. To investigate the potential value of these credits across the new PEV fleet as a whole, we consulted with the Department of Energy and Argonne National Laboratory to characterize the potential value of the 10 percent provisions of 45X on a dollar per kWh basis. ANL determined that the maximum value of the credits would change over time, as critical minerals become a larger share of battery manufacturing cost due to efficiencies in other material and manufacturing costs. The maximum value for the electrode active materials (EAM) credit, or both the EAM credit and the critical minerals (CM) credit, would range from $5.60 to $10.70 per kWh in 2026 and decline to $3.50 to $7.60 per kWh in 2030, depending on chemistry. The decline is a result of ANL's projection that the amount (and hence manufacturing cost) of critical mineral content will decline over time. While these tax credits will be significant to manufacturers that produce EAM and CM in the U.S., their effect on average battery manufacturing cost across the fleet depends on the degree to which the average battery uses U.S.-produced EAM and CM. Because qualifying domestic production of CM and EAM is unlikely to supply all U.S. PEV battery production (as described in Preamble IV.C.7.i), the average value of the credit on a per kWh basis across the fleet will be less than the figures above. Because of the uncertainty in predicting the use of qualifying EAM and CM across the industry at this time, we have chosen to not include an estimate of the 10 percent credits in this analysis. Because some manufacturers will likely be in a position to qualify for some portion of the credit, this represents a conservative assumption, and thus is directionally consistent with addressing comments that our assumptions for other IRA credits were optimistic.

In response to comments that we should consider in our analysis the full range of IRA incentives extending beyond 45X and 30D/45W, EPA acknowledges that other parts of the IRA, for example the 30C charger credit, the 25E used vehicle credit, the 48C energy project credit and other programs, are likely to have a tangible impact. However, the impacts of these provisions vary in their ability to be estimated and quantified in the scope of our compliance analysis and so we have limited our analysis to the largest incentives that are relatively easy to model. EPA considers the exclusion of these other aspects of the IRA as making our analysis conservative.

EPA appreciates comments from Center for American Progress (CAP) advocating for inclusion of the 45X 10 percent provisions, but EPA disagrees regarding the cited size of the credit. CAP states that the EAM portion of the credit can amount to $30 per kWh and the CM portion to $20 per kWh. However, the credit is equal to 10 percent of manufacturing cost of EAM and CM; if for example 10 percent of EAM cost amounts to the cited credit of $30 per kWh, it implies that total EAM cost alone for a battery is $300 per kWh, which clearly cannot be correct for batteries whose total manufacturing cost is on the order of $100 per kWh.

In response to comments expressing the view that imported PEVs are unlikely to be able to benefit from the 45X cell and module credit in accounting for their battery cost, EPA agrees that imported vehicles are likely to continue to comprise some portion of the future PEV market, and that imported PEVs currently have limited options to utilize batteries whose cost benefits from 45X. In IV.C.2 of the preamble, we discussed some ways in which imported vehicles may be able to realize a similar benefit, including using batteries or cells exported from the U.S. or by benefiting from similarly sized subsidies in their home countries, and EPA still believes that this is likely to be the case for some foreign manufacturers. Ultimately we decided, for the purpose of this analysis at this time, to conservatively reduce the 45X credit amount for several reasons including the uncertainty surrounding imports, as described in section IV.C.2 of the preamble.

In response to the recommendation by the Alliance that we should consider 45X "impacts on specific manufacturers," the Alliance was unclear about the nature of these impacts, and EPA assumes that this is a reference to nearby text referring to domestic manufacturers that import some of their vehicles. As such, this comment is addressed above. In the case that the Alliance was referring to other reasons that it believes specific manufacturers may not be able to access the benefit of the credit, EPA also notes that other conservative aspects of our analysis would tend to offset the effect on our fleetwide 45X amounts, if in fact such an issue exists. For example, we have conservatively chosen not to account for potential savings from the 45X 10 percent credits for electrode active materials and critical minerals. Similarly, regarding comments generally suggesting that some U.S. vehicle manufacturers may nonetheless not have access to 45X, presumably due to internal business decisions to import batteries and/or the decision not to manufacture batteries in the U.S., we note that manufacturers are free to make their business decisions as they see fit and consider it reasonable to assume that such decisions are rational and lead to a lower cost for the manufacturer. We also note again, as previously noted, that manufacturers have the option to purchase cells, packs, or modules from suppliers that manufacture in the U.S. that can claim the credit.

EPA disagrees with API's assertion that the IRA tax credits cannot help to address "potential barriers to wider adoption of PEVs." Although 30D does not apply to every PEV depending on eligibility requirements, those that are eligible certainly benefit, and the IRA includes other tax credits that do not carry such restrictions.

Regarding the view expressed by UAW that the applicability of the 45W Commercial Clean Vehicle Credit to vehicles offered for lease may prevent 30D from encouraging domestic manufacture of vehicles, EPA disagrees and notes that 30D is likely to remain a powerful incentive for several reasons. This is in part because in order to benefit from 45W, customers must choose to lease rather than purchase, and a lease model may not fit all customers' preferences. Also, the amount available under 45W depends on the price difference between a PEV and a comparable ICE vehicle, which is widely expected to diminish or disappear for many vehicles over time while 30D will not, and over time manufacturers should increasingly be able meet the 30D sourcing requirements. Further, manufacturers have continued to demonstrate that 30D remains highly influential in manufacturer siting decisions; for example, as discussed in section I.A.3 of the preamble, while Hyundai has increased the leasing of vehicles to consumers it has simultaneously also continued plans to site battery and vehicle manufacturing in the U.S.[468] Regarding UAW's suggestion that 30D and/or 45W may promote moving assembly to Canada or Mexico or dissuade onshoring of jobs, EPA does not see reason to believe that 30D would specifically or additionally promote such an outcome, as the 30D incentive applies equally to vehicles assembled in the U.S. and the 45X battery manufacturing tax credits apply specifically to U.S. manufacture. To the degree that the design and interpretation of IRA tax incentives are determined by Congress and the Treasury Department, EPA does not have authority over how the IRA incentives are implemented but has accounted for their likely effect as written and based on our observation of the market.

Comments related to CBO projections of the cost of the IRA incentives compared to other estimates are out of scope, as the accuracy or inaccuracy of CBO estimates does not in any way bear on the availability of IRA incentives.

Regarding the comment advocating for a point of sale option for 30D, EPA notes that the point of sale option has become available to registered dealer entities as of 2024. EPA also notes, in response to comments that accessing 30D may be complicated or confusing, that the point of sale option makes access easier.

In response to the comment from Valero that EPA did not apply IRA incentives to "a single PHEV," EPA notes that there were no PHEVs in the proposal's compliance analysis, as was clearly noted in the proposal. The updated compliance analysis includes PHEVs and these vehicles receive the IRA credits appropriate to PHEVs.

In response to general comments citing various uncertainties with regard to future development of the supply chain, critical minerals, and similar concerns, see also our responses to comments on such uncertainties in RTC 15.1.

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[468] Korea Economic Daily, "Hyundai Motor to boost EV leasing in US for tax credits from 2023," December 30, 2022. Accessed on February 14, 2024 at https://www.kedglobal.com/electric-vehicles/newsView/ked202212300014

In response to comments that EPA should improve documentation of 45X assumptions in OMEGA, EPA believes that docketing of OMEGA files and the provided level of documentation is sufficient. Stakeholders have in the past contacted EPA staff for assistance with OMEGA files and are encouraged to do so if desired.

For our response to comments that the total cost of ownership (TCO) example in the proposal (DRIA p. 4-20 Table 4-7) assumed a different 30D credit amount from the amounts used in the OMEGA analysis, see RTC 13.5. Comments that relate the IRA to projections of vehicle cost, cost parity or price parity are discussed in RTC 12.2.7. Comments related to the interaction between IRA assumptions and estimation of battery costs, or the effect of critical mineral cost or availability on same, are addressed in RTC 12.2.1. For response to comments related to 30D being a less effective successor to the previous 30D program, see our response to AFPM on a similar topic in 12.2.1 where we discuss battery costs. Comments related to the PEV penetrations in the No Action case are discussed in RTC 12.5.6, Modeling of the No Action case. Comments related to monitoring development of the supply chain or similar developments in order to modify stringency of the standards are addressed in RTC 3.4. Comments suggesting that tax credits have a societal cost are addressed where we discuss transfers in RTC 8.1.

12.5 - Other modeling comments

12.5.1 – MOVES

<u>Comments by Organizations</u>

Organization: Alliance for Automotive Innovation

EPA's estimated per vehicle PM benefits for the exhaust PM standards are shown below. 270 [EPA-HQ-OAR-2022-0829-0701, p. 152]

270 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, Draft Regulatory Impact Analysis, April 2023, Table 8-1, page 8-9.

Figure 42: PM reductions by MOVES

Operating Modes: 0 -29

EC Reduction (%):99.9

Non EC PM Reduction (%):75

Operating Modes: 30

EC Reduction (%):98.5

Non EC PM Reduction (%):80

Operating Modes: 33 -39

EC Reduction (%):99.9

Non EC PM Reduction (%):75

Operating Modes: 40

EC Reduction (%):98.5

Non EC PM Reduction (%):80

Operating Modes: 101 -108

EC Reduction (%):99.9

Non EC PM Reduction (%):91

[EPA-HQ-OAR-2022-0829-0701, p. 152]

It is important to note that when estimating the emission reductions of gasoline particulate filter (GPFs), EPA used percent reductions obtained from testing new GPFs on test vehicles. New GPFs would be expected to have high efficiencies. For consistency with MOVES modeling of criteria pollutants, EPA should consider lifetime average filter efficiency, not just efficiency on new vehicles in estimates of related emission benefits. [EPA-HQ-OAR-2022-0829-0701, p. 152]

Organization: Clean Fuels Development Coalition (CDFC)

EPA's judgement is misdirected by OTAQ's MOVES Model. As explained further in the "Supporting Documentation and End Notes" section, OTAQ's now repudiated MOVES Model underwent a highly questionable "development process" facilitated by BP and Chevron refinery experts. OTAQ emails obtained via FOIA requests reveal a shocking degree of collaboration/collusion between OTAQ experts and Coordinating Research Council (CRC) scientists funded by the petroleum industry. Their "cooperation" went so far as OTAQ agreeing to delete fuel samples that produced emissions results that "appeared too positive" when more ethanol was added. Rather than adhering to market practices in full display at the time—e.g., splash-blending additional ethanol on top of market gasoline, thus reducing BTEX content by dilution—OTAQ/CRC experts developed an incomprehensible "match-blending" scheme that resulted in more BTEX being added to fuel samples at the same time as more ethanol. Naturally, the resulting emissions were worse, but they were attributed to ethanol rather than the BTEX. [EPA-HQ-OAR-2022-0829-0630, pp. 5-6]

EPA's testing methods (and relative outcomes) for ethanol-gasoline blends seemed to undergo a fundamental shift beginning with the Tier 3 NPRM. In 2012, during development of the Tier 3 Rule when EPA was initially requesting comment on encouraging E30 higher octane blends, OTAQ published test results that compared E10 to E0 fuel sample. In this Tier 3 Fuels Impact Study [Link: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100TLC7.pdf], E10 had a 0.3% efficiency gain over E0 gasoline and the E10 fuel had 1.3% less carbon per unit of energy due to lower aromatic content. Thus, EPA's own data shows a 1.6% CO_2 reduction mostly due to E10's lower aromatic content (22 vol. % vs. 30 vol. % in the E0 test fuel). These results are consistent with the 2015 Ford/Leone E30 chart in the endnotes, see p. 13. [EPA-HQ-OAR-2022-0829-0630, pp. 5-6]

However, seven years later, in its 2019 E15 RVP Rule (ultimately rejected by the courts), EPA's MOVES Model concluded that compared to E10, E15 blends increased NMOG by 2.2%, NOx by 2.5%, and PM by 4.1%. Recently, buried deep in OTAQ/CRC footnotes, we found one clue: It turns out that CRC admitted in the fine print of one of their subsequently released studies that ethanol's alleged propensity to increase PM and NOx emissions was observed ONLY WHEN ETHANOL WAS MIXED IN A HIGH- AROMATIC FUEL BLEND. Of course, the burning question is why would EPA encourage the blending of ethanol into fuel samples that contain elevated levels of aromatics, especially when Congress has directed it to promote technologies that REDUCE aromatics to the "greatest degree achievable"? [EPA-HQ-OAR-2022-0829-0630, pp. 5-6]

CRC clarified (after prodding) that "the two-phase vaporization is NOT seen in fuel blend with lower aromatic content". In other words, if EPA had complied with Congressional directives to REDUCE aromatics content to the greatest degree achievable there would not be a MOVES PM controversy.2" [EPA-HQ-OAR-2022-0829-0630, pp. 5-6]

2 For further explanation of CRC's rationale, see Endnotes, p. 13.

This connection between aromatics and higher PM emissions was indirectly validated by EPA in the NPRM at p. 590, "Estimated Emissions and Air Quality Impacts", where EPA begins to acknowledge that changes in fuel composition (e.g., aromatics controls) "may also impact secondary pollutants formed in the atmosphere". EPA goes on to note that "Mobile sources are an important contributor to secondary aerosols formed from…organic precursors [aromatics]", and that "Changes in aromatic content may also affect NOx emissions". (P. 592) [EPA-HQ-OAR-2022-0829-0630, pp. 5-6]

Clearly, the CRC refinery experts knew about the linkage between aromatics and increased PM emissions very well, which explains why they insisted on adding more aromatics to fuel samples whenever they added more ethanol. [EPA-HQ-OAR-2022-0829-0630, pp. 5-6]

Organization: David Hallberg

I respectfully urge that you and your experts pay careful attention to the CFDC et al. NPRM comments—[link here-- https://cleanfuelsdc.org/wp-content/uploads/2023/06/EPA-CommentsOnMulti-pollutantRule-July23.pdf.] Of particular importance is the discussion in the end notes which quotes OTAQ's 2015 UFP Workshop report's admission that its controversial MOVES Model is defective because it utterly fails to predict the highly potent UFP/SOA-bound PAHs. They also explain how OTAQ's collusion with oil experts at the Coordinating Research Council (confirmed by FOIA-secured internal correspondence) manipulated fuel samples in a way that deliberately pinned the additional PM emissions caused by higher BTEX content on ethanol. [Experts were amazed at such a counterintuitive finding: EPA's 2013 Tier 3 Rule confirmed that ethanol does not produce either SOA or PAH.] [EPA-HQ-OAR-2022-0829-0548, p. 3]

Administrator Regan, eight years ago OTAQ formally admitted that its defective MOVES Model requires replacement. It is unconscionable that EPA continue to rely on MOVES as the basis for highly consequential rulemakings as it did with the MY2023 LDV GHG Final Rule. [EPA-HQ-OAR-2022-0829-0548, p. 3]

Clearly, EPA is acting unlawfully in its use of the MOVES Model as well as its recent RFS "set" rule, because they both contravene the Congressional directive to displace maximum achievable amounts of BTEX with ethanol's "clean octane". [EPA-HQ-OAR-2022-0829-0548, p. 7]

Organization: Environmental. and Public Health Organizations

A. Policy Scenarios

ERM investigated five different policy scenarios: EPA's no action "baseline" ("EPA No Action"); EPA's preferred approach ("EPA Main Proposal"); our recommended approach, which reflects greater increases in stringency after model year 2030 ("Alternative 1+"); EPA's strongest option ("EPA Alternative 1"); and EPA's weakest option ("EPA Alternative 3"). [EPA-HQ-OAR-2022-0829-0759, p. 27]

B. Modeling Background

EPA's updated MOVES model (MOVES3.R3105) was utilized to model electric vehicle (EV) adoption rates (sales and in-use), vehicle miles traveled (VMT), and pollutant emissions by vehicle type. Cost assumptions (battery costs, incremental vehicle costs, charging equipment costs, etc.) and vehicle classification/identification information and sales shares were incorporated into both ERM's BCA framework and its modification and application of MOVES3.R3 data outputs. ERM's BCA framework was applied to compare and evaluate the impacts across several policy scenarios as compared to the EPA No Action case. [EPA-HQ-OAR-2022-0829-0759, p. 27]

105 Although MOVES3.R1 was used for L/MD rulemaking, MOVES3.R3 reflects an updated version of MOVES3.R1 but maintains relevant L/MDV data and assumptions.

SEE ORIGINAL COMMENT FOR PIE CHART - Figure V.B-1: National Light- and Medium-Duty Vehicle Fleet106 [EPA-HQ-OAR-2022-0829-0759, p. 28]

106 ERM, Impacts Report at 6.

This pie chart is based on EPA's modified version of MOVES. EPA projects that the majority of vehicles subject to the rule will be SUVs and light trucks (~160 million), followed by passenger cars (i.e., sedans), which are projected to number just over 100 million vehicles. The remainder is made up of Class 2b (chassis-certified only) and Class 3 medium-duty vehicles, projected to number around 14 million vehicles nationwide; note that "incomplete" class 2b/3 vehicles covered by the proposed Phase 3 heavy-duty rulemaking were not included in this analysis. [EPA-HQ-OAR-2022-0829-0759, p. 28]

Organization: International Council on Clean Transportation (ICCT)

In evaluating the health benefits of the proposed rule, it is critical to consider the evidence of increases in PM from recent model year vehicles. The health benefits assessment included in EPA's proposal uses emission factors from Motor Vehicle Emission Simulator (MOVES), which likely underestimates PM emissions from recent model year vehicles. Figure 15 shows a comparison between EPA MOVES emission factors and remote sensing UV smoke averages by model year, shown as a percent change from each sources respective model year 2005 averages.140 From model years 2006–2015, year-to-year changes, shown in the slopes of the lines, are relatively consistent between EPA MOVES and remote sensing data. However, from model year 2015 on, the trends diverge. For light-duty passenger trucks, the EPA MOVES PM emission factors sharply decline while the remote sensing data show an increase in UV smoke averages.141 Though less significant, a similar trend is observed for passenger cars, with the

EPA MOVES PM emission factor continuing to decline after 2015 and remote sensing UV smoke averages showing a slight increase. These findings suggest that the modeled air quality and health benefits of the proposed rule may be underestimated when considering the large benefits of replacing 2015–2020 model year vehicles with future vehicles meeting the proposed PM emission limits. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

140 EPA MOVES emission factors are converted from fuel-specific to distance-specific emission factors for this comparison. This is done using real-world fuel economy data from EPA Automotive Trends report, the same source used to convert the remote sensing emissions from fuel-specific to distance-specific.

141 Light-duty passenger truck emission trends from EPA MOVES are compared to light-duty truck (LDT) emission trends from remote sensing data. Similarly, passenger car emission trends from EPA MOVES are compared to light-duty vehicle (LDV) emission trends from remote sensing data.

SEE ORIGINAL COMMENT FOR Figure 15. Percent change in distance-specific PM emission factor from EPA MOVES and remote sensing (RS) UV smoke measurements from Colorado (CO) and Virginia (VA) sources by model year, compared to model year 2005. [EPA-HQ-OAR-2022-0829-0569, pp. 53-54]

Organization: Reginald Modlin and B. Reid Detchon

2. EPA’s modeling – Part 2

a. EPA's Motor Vehicle Emission Simulator (MOVES) is a modeling system that estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxics. Its use is required for the development of State Implementation Plans to reduce air pollution in areas that do not meet National Ambient Air Quality Standards. [EPA-HQ-OAR-2022-0829-0570, p. 29]

i. In 2014 EPA updated the MOVES model to incorporate new emissions factors for ethanol blends. These changes were based on a laboratory analysis that used “match blending” to simulate the performance of various fuel formulas. This approach was fundamentally flawed, as a published paper by industry engineers observed: [EPA-HQ-OAR-2022-0829-0570, p. 29]

1. Aromatics were added (above the 25% legal limit for reformulated gasoline) to match certain parameters of fuels that had less ethanol. The resulting degradation of emissions was primarily caused by the added aromatics but was incorrectly blamed on the ethanol. [EPA-HQ-OAR-2022-0829-0570, p. 29]

148 James E. Anderson et al., "Issues with T50 and T90 as Match Criteria for Ethanol-Gasoline Blends," SAE International Journal of Fuels and Lubricants (2014): 7(3): pp. 1027-40: https://saemobilus.sae.org/content/2014-01-9080/ (accessed Feb. 24, 2021).

2. This mistake causes the MOVES model to predict incorrectly elevated emissions factors for ethanol blends. For example, smog-forming nitrogen oxides (NOx) have been shown in the real world to decrease as the percentage of ethanol increases, but the MOVES model predicts higher NOx emissions for ethanol blends. [EPA-HQ-OAR-2022-0829-0570, p. 29]

149 Ioannis Gravalos et al., "Performance and Emission Characteristics of Spark Ignition Engine Fuelled with Ethanol and Methanol Gasoline Blended Fuels," chapter 7, Alternative Fuel, Maximino Manzanera (ed.) (2011): p. 170: https://www.researchgate.net/publication/221914443_Performance_and_Emission_Characteristics_of_Spar

k_Ignition_Engine_Fuelled_with_Ethanol_and_Methanol_Gasoline_Blended_Fuels (accessed Feb. 24, 2021).

3. In fact, EPA's Phase I testing results showed that NOx and PM "have significant decreases in emissions as ethanol levels increase from E0 to E10" – and EPA then "decided to drop the Phase 1 test fuels … from the Phase 3 fuel matrix." [EPA-HQ-OAR-2022-0829-0570, p. 30]

150 Adam R.F. Gustafson, Boyden Gray & Associates, "EPA Emails Show the Agency Relied on the Oil Industry to Design Anti-Ethanol Fuel Effects Study," memo to Urban Air Initiative, Nov. 4, 2016: pp. 15, 17: http://cleanfuelsdc.org/wp-content/uploads/2019/04/BGA-FOIA-EPA-EPact-Emails-Nov-4-2016.pdf (accessed Sept. 14, 2021)

4. At a meeting in June 2015 with the Energy Future Coalition, EPA Administrator Gina McCarthy erroneously asserted that her hands were tied on mid-level ethanol blends because they would increase NOx – a comment probably based on the flawed tests and the MOVES model. [EPA-HQ-OAR-2022-0829-0570, p. 30]

151 Reid Detchon, Energy Future Coalition, personal recollection.

ii. Emissions tests by the U.S. Department of Energy have confirmed that "even though ethanol is more catalytically reactive than other gasoline components, ethanol will likely neither help nor hinder compliance with NOx, non-methane organic gases (NMOG), and CO regulations in realistic fuel blends." [EPA-HQ-OAR-2022-0829-0570, p. 30]

152 Daniel Gaspar, Pacific Northwest National Laboratory, "Top Ten Blendstocks For Turbocharged Gasoline Engines: Bioblendstocks With Potential to Deliver the Highest Engine Efficiency." PNNL-28713 (2019): p. 34: https://www.osti.gov/servlets/purl/1567705 (accessed June 22, 2021).

iii. Despite repeated calls to fix this clear error, EPA has not done so. [EPA-HQ-OAR-2022-0829-0570, p. 30]

Organization: Wisconsin Department of Natural Resources

8. Incorporation of standards into the Motor Vehicle Emission Simulator (MOVES). EPA should ensure these standards, when finalized, are incorporated into the MOVES emissions model as soon as possible so that they can be reflected in the regulatory modeling associated with state implementation plans and transportation conformity. EPA should also consider if additional MOVES guidance is necessary to address situations in which an individual state's future on-road electric vehicle penetration ends up differing substantially from those on which these standards are based. [EPA-HQ-OAR-2022-0829-0507, p. 3]

EPA Summary and Response

Summary:

One commenter states that EPA should consider lifetime average exhaust particulate filter efficiency (not just efficiency on new vehicles) in estimates of related emission benefits.

Other commenters state that the MOVES model incorrectly predicts increases in particulates and other emissions for mid-level ethanol blends compared to E10 gasoline. They also suggest this situation has contributed to avoidance of regulatory actions that should have imposed limits on the aromatic content (referred to as BTEX) in market gasoline, which in turn could have reduced emissions of a range of toxic pollutants including compounds known to form secondary organic aerosols. Some commenters attribute these problems with MOVES to an emissions study (known as EPAct) using test fuels that didn't represent real-world gasoline formulations. A commenter asserts that this issue has been brought to EPA's attention in the past, but EPA has not made corrections to the MOVES model.

One commenter states that EPA's MOVES model underestimates exhaust particulate matter emissions from recent light duty vehicles.

Another commenter asks if EPA should consider changes to EPA guidance on using MOVES.

Response:

We thank the commenters for their review of the proposed program. With regard to the comment on lifetime particulate filter efficiency, while we do not yet have data on the effectiveness of future gasoline particulate filters over the full life of in-use vehicles, we do know that filtration efficiency increases rapidly in the first ~1,500 miles and then increases slowly after that. At the same time, gasoline engines typically produce more particulate matter as they age, and there will be some GPF removal, tampering and damage with age. Considering all these factors, the net PM is likely fairly stable after the first 1,500 miles, which implies an increasing percent filter effectiveness. The modeling done in the regulatory analysis applied a constant percent filter effectiveness to all MOVES ages, and thus may have underestimated the GPF benefits for older vehicles.

We have responded to the comments related to the EPAct study and its application in MOVES in multiple documents over the past several years. Regarding the central issue of the design and conduct of the EPAct study, it was not intended to only assess the effects of incremental increases in ethanol but changes in multiple fuel parameters separately or together so that it could be applied to a wide range of gasoline formulations found in the market. The multivariate parametric treatment design used in the EPAct fuel matrix reflects a standard practice across a wide range of scientific disciplines. Additional responses to specific comments on the EPAct study are covered at length in Section 3 of a document entitled "*Agency Response to Request for Correction of Information Petition #17001 Concerning the EPAct/V2/E-89 Fuel Effects Study and the Motor Vehicle Emissions Simulator (MOVES2014)*" available via the EPA website and in this rulemaking docket.[469]

Regarding the comments about BTEX, imposing limits on BTEX in gasoline would force refiners to reformulate their gasoline to use other high-octane components, one of which may be additional ethanol. Understanding the impact of such reformulations on overall air quality would necessarily include changes in a broad range of vehicle emissions (including refueling and evaporative processes), as well as changes in petroleum refining and increases in ethanol production and agricultural intensity. These things may reduce the overall air quality benefits significantly. We are not aware of any analyses integrating all these pieces at this time, and such work is beyond the scope of this final rule. The CAA imposes a significantly different regulatory regime for regulating fuels under 211(c), and EPA solicited comment on potential changes to fuels regulations but did not propose changes.

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[469] Available at https://www.epa.gov/sites/default/files/2018-09/documents/ethanol-related_request_for_correction_combined_aug_31_2018.pdf

We understand that new data on fuel properties and their effects on emissions are being generated continuously, and through a process of ongoing and deliberate review, we update the MOVES model when the weight of evidence warrants. As described in Section IX of the proposal, as part of a separate, potential future action, we are considering a potential limit on heavy aromatics in market gasoline, which could reduce particulate emissions and other pollutant precursors in many areas of the country.

With regards to concerns that MOVES may underestimate exhaust particulate emissions from recent light duty vehicles, the ICCT analysis seems to have been done with an earlier version of MOVES. The MOVES3.R1 version used to support the NPRM was revised from MOVES3 to better account for the phase-in of vehicles with gasoline direct injection engines. For more information see NPRM Docket Memo " Updates to MOVES for the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," FROM: Megan Beardsley, Environmental Scientist, Assessment and Standards Division, Office of Transportation and Air Quality, TO: Docket Number EPA-HQ-OAR-2022-0829, DATE: February 10, 2023, and Section 4 of Exhaust Emission Rates for Light-Duty Onroad Vehicles in MOVES4 (pdf) (8.5 MB, August 2023, EPA-420-R-23-028). Also, it is not clear how the ICCT analysis accounts for vehicle age. The cited ICCT report says that the data summarized in the figure was collected over the calendar years from 2015 to 2021, implying that the data points for older model years represent average values across a range of MOVES age bins. Presumably, the MOVES emissions shown in the figure are for a single calendar year and thus incorporate deterioration factors that increase with age (and decline with model year). That means the graph shared in the comment is not comparing like quantities. Nevertheless, if additional analysis confirms the commenter's claim that MOVES has underestimated the emissions from light-duty vehicles, this would further support the need for more stringent PM controls as finalized in this rule.

With regards to MOVES guidance, the MOVES4 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity included in the docket for this rulemaking provides guidance on how to forecast future on-road electric vehicle fractions. If needed, we will update this guidance for future MOVES versions.

12.5.2 – [Reserved]

12.5.3 – Compliance modeling pathways

Comments by Organizations

Organization: Alliance for Automotive Innovation

A de facto battery electric vehicle mandate

Our concerns cover both the GHG requirements and the criteria emission requirements. Taken together, the proposed GHG and criteria pollutant standards are so stringent as to set a de facto BEV mandate. [EPA-HQ-OAR-2022-0829-0701, p. 3]

Auto Innovators is concerned that the proposed standards leave little or no room for error to address foreseen and unforeseen challenges and overestimates the potential for the EV market to develop as rapidly as EPA assumes – effectively 10x greater BEV market share than in 2022. In the past, multiple technologies were available for manufacturers to pick from or to fall back on if a chosen technology encountered technical or market issues. For example, for a short time, some manufacturers applied dual clutch transmission technology and then moved on to advanced planetary gear automatic transmissions due to customer acceptance issues. Some engine stop-start systems also encountered challenges, slowing their anticipated roll-out. [EPA-HQ-OAR-2022-0829-0701, p. 89]

In the case of emissions standards largely premised on zero-emission vehicles, such as EPA's proposed rule, there is no such fallback. By 2032, under the proposed standards, only EVs are likely to meet their individual footprint-based targets. [EPA-HQ-OAR-2022-0829-0701, p. 89]

Organization: American Fuel & Petrochemical Manufacturers

Despite EPA's assertions that the standards are technology-neutral, the reality is the proposed tailpipe-only approach is a de facto ban on ICEVs. AFPM does not oppose electric vehicles comprising an increasing share of the transportation mix, but we oppose regulations that are framed to ultimately ban ICEVs. EPA should establish standards, based on the full lifecycle of each vehicle class, that are achievable by each powertrain technology. ICEVs will continue to have a place in a diverse transportation future. This approach was summarized well in a 2021 report from the National Academies of Science [EPA-HQ-OAR-2022-0829-0733, p. 3]

In addition, by factoring in ZEV performance into standards broadly applicable to both ZEV and non-ZEV, utilizing averaging, EPA is ignoring the technological feasibility of emissions-related systems and simply requiring the production of fewer ICEVs. This approach also ignores the fact that major automakers are on differing technological paths, as noted by the National Academies of Sciences, "with some focusing their research and development and advanced technology deployment more squarely on ZEVs, and others more focused on advanced HEVs to maximize ICE efficiency."88 During the last two years, 17,000 research articles were published that focus on improving ICEVs or lowering their carbon footprint with liquid fuel technologies, such as lower carbon fuel production technologies, the substitution of lower carbon feedstocks and lower carbon fuels, and by optimizing fuel properties like octane.89 Instead of focusing on advances to ICEV technologies when setting the standards, the Proposed Rule relies on ZEVs as the only relevant advanced technology, which is arbitrary and capricious given that many ICEV technologies, unlike mass adoption of ZEVs, "permit the development and application of the requisite technology" within the time necessary to comply with the forthcoming standards.90 [EPA-HQ-OAR-2022-0829-0733, pp. 22-23]

88 National Academies of Sciences, Engineering, and Medicine. 2021. Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035. Washington, DC: The National Academies Press. p. 369. https://doi.org/10.17226/26092.

89 Fuels Institute. Literature Review Summary: Future Capabilities of Combustion Engines and Liquid Fuels. Nov. 2022.

90 42 U.S.C.(a).

Organization: American Honda Motor Co., Inc.

Unlike with previous automotive emissions regulations, in which an OEM had numerous compliance technology pathways and could strategically invest in a package of technologies that best suited its customers' needs, this proposal sets stringencies at such a level where there is just one way to comply: significant levels of electrification. Yet should the market not pan out within the agency's ambitious timeline – even for reasons entirely beyond an automaker's control, such as a slower-than-expected rollout of public charging infrastructure that has a chilling effect on consumer interest in EVs – there is no safety net, no alternate package of technologies to which an OEM can pivot and maintain compliance. Regulated parties will simply fall short, facing a profoundly disruptive and costly set of noncompliance obligations. [EPA-HQ-OAR-2022-0829-0652, p. 5]

In fairness, it is reasonable for the agency to consider announced industry targets as evidence of automakers' meaningful shift toward an electric portfolio. Similarly, however, it is equally reasonable to expect that the agency also consider automakers' stated concerns – the availability and pricing of critical minerals, the availability of sufficient domestic battery production capacity, the availability and reliability of public charging infrastructure and today's comparatively modest consumer uptake of EVs that falls well short of the agency's high expectations for only a few years down the line. In our view, the agency has not adequately addressed the above noted concerns, or properly accounted for them in its standard-setting process. [EPA-HQ-OAR-2022-0829-0652, p. 22]

Organization: American Petroleum Institute (API)

iii. Non-electrification solutions.

EPA's analysis is flawed in that it failed to account for non-electrification solutions. [EPA-HQ-OAR-2022-0829-0641, pp. 9-10]

1. Technology neutrality – all solutions should be allowed to compete.

In the preamble to the proposed rule, EPA states that "[t]he proposed standards are performance based and do not mandate any specific technology for any manufacturer or any vehicle type" and "[e]ach manufacturer is free to choose its own set of technologies with which it will demonstrate compliance…".20 We disagree, as the stringency of the proposed standards – and even the technology mixes suggested by EPA in the proposal – essentially forces manufacturers to solely focus development efforts on BEVs. [EPA-HQ-OAR-2022-0829-0641, pp. 9-10]

20 88 Fed. Reg. 29329 (May 5, 2023).

Although EPA asserts that the proposed rule standards do not mandate any specific technology, EPA demonstrates compliance with its proposed standards by modeling new light-duty BEV sales that increase from 36% in 2027 to 67% in 2032. That means, within 5 years, the ratio of new BEV sales to total sales will increase from one third to two thirds of new car sales. For the MDV category, EPA21 modelled compliance with average new sales reaching 46% in 2032, up from 17% in 2027. EPA modeling relies heavily on the electrification of vans, which reaches 98% by 2032. These compliance projections are much higher than sales of battery electric MDVs in 2020 of less than 1 percent.22 [EPA-HQ-OAR-2022-0829-0641, pp. 9-10]

21 88 Fed. Reg. 29331 (May 5, 2023).

22 Table 3-1. "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles - Draft Regulatory Impact Analysis", EPA-420-D-23-003. April 2023.

API strongly believes in an all-of-the-above strategy to reducing emissions, and we recommend that EPA adjust the standards to allow all solutions the ability to compete. Further, doing so would provide more time for other technologies to be proven with less risk to vehicle original equipment manufacturers (OEMs) and the public if electrification expansion of LMDVs does not pan out in the proposal's implementation timeframe. [EPA-HQ-OAR-2022-0829-0641, pp. 9-10]

To that end, various studies have highlighted the importance of allowing all technologies to be utilized to reduce emissions faster, more effectively, and at a lower cost.23,24 By limiting the scope to tailpipe emissions, the proposal is inherently not technology neutral. Setting strict tailpipe-only standards results in a limited, prescribed solution set. [EPA-HQ-OAR-2022-0829-0641, pp. 9-10]

23 National Academy of Sciences. "Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles." 2015. https://nap.nationalacademies.org/download/21744.

24 National Academy of Sciences. "Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy 2025-2035." 2021. https://nap.nationalacademies.org/download/26092.

e. API Supports Consumer Choice for Vehicles.

API 53 supports the concept that different vehicle technologies that reduce greenhouse gas emissions should be allowed to compete equally for consumer and market acceptance and growth. However, API has concerns with regards to the EPA's approach and its effect on consumer choice. [EPA-HQ-OAR-2022-0829-0641, pp. 18-19]

53 https://www.api.org/news-policy-and-issues/blog/2021/05/18/us-consumers-need-balance-choice-in-transportation-policy.

The stringency of the proposed standard is essentially forcing electrification of the transportation sector and is not in alignment with most Americans that, according to a Pew Center survey,54 favor "using a mix of energy sources to meet the country's needs" and a majority of survey respondents oppose phasing out gasoline powered vehicles by 2035. Concerns with charging availability55 could be relieved with vehicle technologies (e.g., PHEVs56) where the length of an average daily trip is approximately 30 miles.57 [EPA-HQ-OAR-2022-0829-0641, pp. 18-19]

54 Tyson, A. et al. "Gen Z, Millennials Stand Out for Climate Change Activism, Social Media Engagement With Issue." Pew Research Center. May 2021. https://www.pewresearch.org/science/2021/05/26/gen-z-millennials-stand-out- for-climate-change-activism-social-media-engagement-with-issue/.

55 Noblet, S. "Closing The Great EV Charging Gap." August 2021. Forbes. https://www.forbes.com/sites/stacynoblet/2021/08/10/closing-the-great-ev-charging-gap/?sh=6cf9107f73f4.

56 EPA is proposing a fleet utility factor (FUF) curve that will increase CO2 compliance values for PHEVs. 88 Fed. Reg. 292557 (May 5, 2023).

57 2019 Bureau of Transportation data indicates 49% of 2019 national trips by distance were less 25 miles.

Organization: BlueGreen Alliance (BGA)

And while automakers will certainly need to produce and sell zero-emission vehicles to meet the standards laid out in EPA's range of proposals, the standards are ultimately performance-based, which means that manufacturers can leverage a range of pollution-reducing technologies to help bring their fleets into compliance with both the GHG emissions standards and the local pollutant emissions standards within the proposals. These technologies include plug-in hybrids, waste heat recovery systems, aerodynamics, lightweighting, and gas particulate filters (GPFs). [EPA-HQ-OAR-2022-0829-0667, pp. 4-5]

The range of EPA's proposals effectively advances research, development and deployment of zero-emission technologies like those in battery electric and fuel cell vehicles, while also pushing other pollution reducing technologies. The tech-forcing and tech-agnostic nature of EPA's proposals means that the standards have the potential to create and protect domestic manufacturing jobs in a diverse range of facilities, from those producing battery components for plug-in hybrids to those making gas particulate filters for pickup trucks (see Figure 3). A standard that advances the deployment of zero emission and tailpipe pollution-reducing technologies provides manufacturers with ample flexibility as they determine how they will meet the requirements, while also maximizing the standards' potential to create and protect jobs in the domestic automotive supply chain. [EPA-HQ-OAR-2022-0829-0667, pp. 4-5]

SEE ORIGINAL COMMENT FOR Figure 3: Zero Emission, Fuel Efficiency, and Tailpipe Pollution Reduction Technology Manufacturing for Light- and Medium-Duty Vehicles Source: BGA Research [EPA-HQ-OAR-2022-0829-0667, pp. 4-5]

Organization: BorgWarner Inc.

BorgWarner supports performance-based regulations and opposes technology mandates.

We advise regulators to develop standards that are technology neutral and performance-based to encourage innovation.5 All technology pathways with practical applications should be included as potential solutions to assist the U.S. in achieving its environmental goals. Regulations based on the end goals of a clean environment, minimizing CO2 emissions, and preserving resources should not give preferential treatment to a specific technology. Public policies should let innovation and market dynamics determine the most effective solutions. [EPA-HQ-OAR-2022-0829-0640, p. 6]

5 See BorgWarner Comments EPA-HQ-OAR-2019-0055; FRL-7165-03-OAR.

HEV, PHEV, BEVs, FCEVs, and H2ICE all have strengths depending on the use case, and regulators must enable every technology solution to reduce GHG emissions as fast as possible. EPA has demonstrated an enthusiasm for BEV and FCEV technologies, and we urge EPA to include pathways for all technologies in its clean transportation strategy. [EPA-HQ-OAR-2022-0829-0640, p. 6]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

While the proposal is technology-neutral, U.S. EPA's modeling shows that ZEVs will in many cases be the most likely pathway to comply with the standards. Indeed, ZEVs can simultaneously reduce greenhouse gas (GHG), toxic air contaminant, and criteria air pollutant emissions while saving consumers money. Consumers have more choices than ever, and ZEVs are increasingly capable of functioning equivalently to their conventional gasoline- and diesel-fueled counterparts. U.S. EPA has also rightly recognized the availability of improved technologies to control emissions from conventional internal combustion engine vehicles, and the proposed standards will help maintain emission benefits from these vehicles that will remain on the road. [EPA-HQ-OAR-2022-0829-0780, pp. 7-8]

Organization: Competitive Enterprise Institute

The MY 2023-2026 standards are estimated to increase EV market penetration "from about 7 percent market share in MY 2023 (including both fully electric vehicles (EVs) and plug-in hybrid vehicles (PHEVs)) up to about 17 percent in MY 2026."10 The EPA acknowledges that the standards coerce increased EV sales, as that is the only way automakers can comply: "Compliance with the final standards will necessitate greater implementation and pace of technology penetration through MY 2026 using existing GHG reduction technologies, including further deployment of BEV and PHEV technologies." 11 [EPA-HQ-OAR-2022-0829-0611, p. 4]

10 EPA, Revised 2023 and Later Model Year 2023 Greenhouse Gas Emission Standards, Final Rule, 86 FR 74434, 74438, December 30, 2021, https://www.govinfo.gov/content/pkg/FR-2021-12-30/pdf/2021-27854.pdf.

11 86 FR 74493 (emphasis added). See also 86 FR 74484 ("This is a greater penetration of BEVs and PHEVs than projected in the proposed rule, and is driven by several factors, including the increased stringency of our final standards….") and 86 FR 74485 ("Our updated analysis projects that the final rule can be met with a fleet that achieves a gradually increasing market share of EVs and PHEVs….")

Organization: Consumer Reports (CR)

2.1. Automakers Have Multiple Options for Compliance

EPA's proposal for MY27+ Light- and Medium-Duty vehicle GHG standards are strong, achievable, technology-neutral performance standards. EPA's analysis found that electric vehicles (EVs) are likely to be the most cost-effective compliance pathway for automakers to meet these standards, but they are not the only option. EPA estimated that an EV-only compliance pathway would require 67% of vehicles sold to be EVs by 2032. However, automakers can also use a mix of improvements in internal combustion engine (ICE) fuel efficiency, conventional hybrids, plug-in hybrids (PHEV), and even hydrogen fuel cell electric vehicles (FCEV) to comply with these standards. CR's modeling presented in Section 6.2 shows that automakers can utilize a wide range of options to comply with these rules. Most automakers will be able to comply with these rules while only selling between 50-60% battery electric vehicles (BEVs) by using a mix of widely available and cost effective technologies. Automakers that invest heavily in conventional and plug-in hybrids will be able to comply while selling as few as 40% BEVs in 2032. [EPA-HQ-OAR-2022-0829-0728, pp. 7-8]

6.2. Modeling of Compliance Pathways

EPA's compliance modeling estimates the single most cost-effective compliance pathway for the vehicle fleet under the proposed regulation. However, it is not the only possible compliance pathway automakers can take. Different automakers are likely to take wildly different compliance pathways, with some automakers going all in on EVs, while other automakers may hedge their bets with more hybrids and PHEVs. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

CR modeled a range of reasonable alternative compliance pathways that automakers might consider. The modeling considers different levels of continued ICE improvement and deployment of PHEVs as a percentage of all plug-in vehicles.43 The results of this analysis for model year 2032 are shown in Table 6.1. They show that a wide range of compliance pathways are available to automakers that can reduce the required BEV sales market share for model year 2032 to between 50-60% with varying levels of ICE improvement and PHEV deployment. There is even a feasible compliance option which would allow compliance with only 40% BEVs with heavy investment in hybrid and PHEV technology. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

43 ICE improvements of 1% (low), 3.5% (medium) and 5% (high) are modeled. PHEV market share was modeled as a percentage of all plug-in vehicles with values of 0%, 10%, 20% and 40% modeled.

[See original comment for Table 6.1 - Modeling of Compliance Alternatives for EPA's Proposed Standards for MY2032] [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

A few scenarios were also modeled for EPA's Alternative 1. These results are shown in Table 6.2. They find that with only a small improvement in ICE vehicles (1% per year reduction in emissions), automakers can comply with these stronger standards with a minimal increase in BEV market share from 67% to 68% compared to EPA's modeling of the proposed standards. Further reductions in BEV market share are also possible with further investment in ICE improvement and PHEV deployment. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

[See original comment for Table 6.2 - Modeling of Compliance Alternatives for EPA's Alternative 1 for MY 2032] [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

Overall these results show that automakers have many potential reasonable compliance pathways to comply with either EPA's proposed standards or the stronger Alternative 1. [EPA-HQ-OAR-2022-0829-0728, pp. 20-21]

Organization: Energy Innovation

Ultimately, though, increased adoption of BEVs is the most expedient and effective way to eliminate harmful tailpipe pollutants. We encourage the EPA to push the auto industry to reduce all emissions more rapidly through the adoption of BEVs. [EPA-HQ-OAR-2022-0829-0561, p. 7]

Organization: Environmental Defense Fund (EDF) (1of 2)

Because EPA's OMEGA 2 model is designed to show only the most cost-effective compliance pathways, it does not capture the full range of possible pathways automakers may choose to take based on the numerous factors that influence product lines. To demonstrate that the standards can be met with a range of technologies (including increased deployment of PHEVs), EDF contracted with Roush to project the relative cost of PHEVs and BEVs in the 2024-2035 timeframe.27 EDF then used Roush's cost projections for PHEVs in conjunction with EPA's costs for BEVs and ICEVs to conduct an analysis of compliance costs under possible scenarios in which PHEV and ICEV sales represent a greater proportional share of manufacturers' sales than EPA modeled while still meeting the GHG emissions targets set in EPA's proposal. [EPA-HQ-OAR-2022-0829-0786, pp. 12-13]

27 Vishnu Nair, Himanshu Saxena, Sajit Pillai, Alternative Powertrain Pathways for Light-Duty and Class 3 Vehicles for MYs 2024, 2027, and 2035 to Meet Future CO2 Emission Targets, Roush for EDF (June 2023). (Attachment L)

EDF evaluated 3 alternative pathways towards compliance with EPA's proposed standards:

- Pathway 1 (ICEV Pathway): assumes the greatest possible GHG control from ICEVs using EPA's OMEGA 2 model; assumes no PHEV technologies [EPA-HQ-OAR-2022-0829-0786, pp. 12-13]

- Pathway 2: sets PHEV and BEV sales to roughly equivalent levels leaving ICEV emissions at the level projected in EPA's compliance simulation of its proposed standards [EPA-HQ-OAR-2022-0829-0786, pp. 12-13]

- Pathway 3: increases PHEV sales further than Pathway 2 by maximizing ICEV emission controls as in Pathway 1 [EPA-HQ-OAR-2022-0829-0786, pp. 12-13]

Because Pathway 1 does not assume PHEV deployment, EDF was able to model it using EPA's OMEGA 2 model directly. EDF constrained battery availability in the model to limit BEV sales so that the model would apply more ICEV control technology than EPA modeled.28 By running OMEGA 2 multiple times with various battery capacity caps, we found that limiting annual battery capacity to 954 GWh produced the lowest ICEV emissions while still enabling compliance with the proposed standards. ICEV emissions averaged 205 g/mi and represented 40% of new vehicle sales, with BEVs accounting for the remaining 60 percent. These ICEV emissions were 18% lower than in EPA's simulation, while ICEV sales were 7% higher. [EPA-HQ-OAR-2022-0829-0786, pp. 12-13]

28 The ICEV pathway required both ICEV control and increased BEV sales. Since increased BEV sales are generally more cost effective than reducing ICEV emissions, the only way to force OMEGA 2 to apply more ICEV control was to limit BEV sales. This was done by reducing the total battery capacity available to manufacturers per model year, which is input to the model on line 67 of the batch file.

Recent work performed by the ICCT is consistent with these findings and indicates that even greater levels of ICEV greenhouse gas control could offset BEV sales.29 The ICCT projected that manufacturers could reduce MY 2022 emissions by 25-37% in the 2030-2035 timeframe.30 This is 2-18% more than the potential reduction we found using OMEGA 2 above. This greater degree of ICEV emissions reduction would reduce the number of BEVs required to meet the proposed 2032 GHG standards to as low as 50%, significantly lower than the 60% level EDF modeled above. Moreover, neither EDF's nor ICCTs ICEV analysis separately accounts for the role of PHEVs could play.31 [EPA-HQ-OAR-2022-0829-0786, pp. 12-13]

29 Slowik, Peter, Aaron Isenstadt, Logan Pierce, Stephanie Searle, White Paper, "Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022–2035 Time Frame," The International Counsel on Clean Technologies (2022), https://theicct.org/wp-content/uploads/2022/10/ev-cost-benefits-2035- oct22.pdf (Attachment M).

30 Id.

31 Some manufacturers, including Toyota, have indicated that they will rely more heavily on PHEVs for emissions reductions. Peter Johnson, Toyota's New CEO Adjusts EV Plans but Sticks to a Hybrid Approach, electrek (Apr. 7, 2023), https://electrek.co/2023/04/07/toyotas-new-ceo-adjusts-ev-plans-but-sticks-to-a-hybrid-approach/. Adjusts EV Plans but Sticks to a Hybrid Approach

For Pathways 2 and 3, we evaluated the role PHEVs could play either in isolation (Pathway 2) or in combination with ICEVs (Pathway 3) in allowing manufacturers to meet the standards and, as a consequence, sell fewer BEVs. EPA discusses PHEV technology in its proposal and includes several aspects of PHEV technology in the OMEGA 2 input files. However, the model does not appear to allow the selection of PHEV technology as a compliance pathway. Thus, EDF used estimates of the emissions and cost of PHEVs to adjust OMEGA 2 projections outside of the model. We assumed PHEVs would have an onroad all-electric range of 50 miles, as this is the effective minimum onroad range allowable for a PHEV to qualify as a ZEV under California's Advanced Clean Cars II program. While this is the type of PHEV EDF chose to use in its modeling, vehicle manufacturers would be free under EPA regulations to choose the best mix of PHEV ranges which still met the GHG standards. [EPA-HQ-OAR-2022-0829-0786, pp. 12-13]

Using EPA's proposed formula for calculating a vehicle model's utility factor (UF)—the split of a PHEV's driving between gasoline and electricity—the UF for a PHEV50 is about 0.67. This means that 67% of a PHEV50's mileage is performed using electricity and 33% of its mileage uses gasoline. In terms of CO2 emissions, a PHEV50 can be considered equivalent to two-thirds of a BEV and one-third of a strong hybrid ICEV. EDF further assumed that the GHG performance of a PHEV50 while operating on gasoline would be 205 g/mi, the same level as described in the ICEV control-focused run above.32 [EPA-HQ-OAR-2022-0829-0786, pp. 13-15]

32 Since PHEVs are required to meet the same criteria pollutant emission standards as ICEVs when operating on gasoline, substituting PHEVs for BEVs at equivalent fleetwide GHG levels has no impact on criteria pollutant emissions.

PHEVs cost more than BEVs due to requiring both electric and gasoline powertrains. Because the OMEGA 2 output did not project costs for complete PHEVs, we used the incremental cost difference between Roush's BEV and PHEV50 costs and applied that difference to EPA's BEV costs to derive projected PHEV costs.33 On a sales-weighted basis, considering the difference in electrification costs across vehicle segments and the types of vehicles that OMEGA2 is projecting to become electrified, we found that the average incremental PHEV50 cost, absent IRA vehicle tax credits, was $6,700 in MY 2032 relative to a BEV.34 Following EPA's methodology for applying the IRA vehicle tax credits, we included the credit for the additional number of BEV plus PHEV sales in each pathway, as EPA had already accounted for the tax credits available for BEVs projected in their analysis. [EPA-HQ-OAR-2022-0829-0786, pp. 13-15]

33 Roush's BEV costs are lower than EPA's, so we took this approach in lieu of substituting Roush's costs for both BEVs and PHEV50s.

34 Based on interpolation between costs in MY 2027 and MY 2035.

As the Table shows, manufacturers choosing to comply with increased application of ICEV control technology (per OMEGA 2) (Pathway 1) could reduce the need for BEV sales by 7% in 2032. Average vehicle costs increase to $800 after IRA credits which is more than offset by vehicle savings principally in the form of less fuel usage. Likewise, cumulative net benefits still exceed one trillion dollars. [EPA-HQ-OAR-2022-0829-0786, p. 15]

Manufacturers choosing to comply by adding PHEVs (either on their own or in combination with ICEV improvements) (Pathway 2 or 3) could further reduce BEV sales in 2032 to be anywhere from 31-38% and remain compliant with the standards. These are well below EPA's projected level of 67% in the least cost BEV-only pathway. Per vehicle costs increase to $1,850-$2,900, though still well below operation savings. Cumulative net benefits decrease significantly, but remain above zero due to the relatively high vehicle operation savings. [EPA-HQ-OAR-2022-0829-0786, p. 15]

In summary, EDF's modeling, plus ICCT's projections of manufacturers' capability in reducing CO2 emissions from ICEVs, provides three viable examples of compliance pathways automakers could choose to take—one reliant on ICEVs, one on PHEV controls and the third on both—all of which demonstrate the flexibility afforded manufacturers to cost-effectively reduce emissions using a mix of technologies with lesser reliance on BEV sales than is shown in EPA's modeling. Of course, these are illustrative compliance pathways, and manufacturers could choose to rely on a combination of ICEV improvements and PHEV sales in a manner that would provide yet further cost-effective options to meet EPA's standards. [EPA-HQ-OAR-2022-0829-0786, p. 15]

Organization: Environmental. and Public Health Organizations

5. Automakers can feasibly and inexpensively improve combustion vehicle emissions simply by shifting sales to the cleanest trims of popular models.

Yet another pathway that automakers could use to comply with stronger standards lies in shifting their sales to the cleanest trims of their popular combustion vehicle models. In 2022, 8.6 million sales – more than half of all new automotive sales – were from just twelve combustion vehicle nameplates. These top-selling vehicles were sold by five automakers: Ford, General Motors, Honda, Stellantis, Toyota. Within each nameplate, the automakers provided different powertrain options (such as engine size, transmission gearing, hybridization and other characteristics), and each had their own emissions performance – some better than others. These vehicle options are all in production, and selling more of any one powertrain could lead to reductions in sales volumes of the same nameplate with a different powertrain. These changes in volumes within a nameplate are a regular feature of the automobile market. [EPA-HQ-OAR-2022-0829-0759, p. 47]

An automaker could improve the emissions performance of its vehicles simply by shifting sales within a nameplate to versions with cleaner powertrains. This shift could achieve emissions reductions without an investment in new emissions technologies or large-scale capital expenditures for factory retooling. Similar emissions improvements could also be achieved due to a consolidation or reduction in powertrain options as ZEVs replace sales of these combustion vehicle nameplates. [EPA-HQ-OAR-2022-0829-0759, p. 47]

We estimated the emissions savings that could be achieved by shifting production in a nameplate from the mix of powertrains sold in 2022 to the cleanest powertrain currently available in that nameplate. Table VI.A-5 shows the top-selling twelve nameplates analyzed and the emissions reductions that could be achieved. [EPA-HQ-OAR-2022-0829-0759, p. 47]

SEE ORIGINAL COMMENT FOR Table VI.A-5: Emissions Reductions in Top-Selling Nameplates by Focusing Sales on Cleaner Powertrains127 [EPA-HQ-OAR-2022-0829-0759, p. 48]

127 This analysis relies on sales estimates of each powertrain version within each nameplate and total sales per manufacturer provided by Baum & Associates. Emissions rates per nameplate version were accessed from www.fueleconomy.gov.

The high-volume nameplates analyzed comprise between 25% to 51% of each automaker's total sales in 2022. Adjusting sales within these nameplates toward the versions with the cleanest powertrains would provide significant emissions reductions. [EPA-HQ-OAR-2022-0829-0759, pp. 47-48]

Organization: Exxon Mobil Corporation

EPA's Proposal establishes standards for emissions reductions that can be achieved only through a rapid transformation of the transportation sector and through limited technology pathways. Specifically, the proposed standards could require as many as two-thirds of all new light-duty vehicle purchases to be battery electric vehicles (BEVs) by 2032. ExxonMobil believes BEVs will play an important role in reducing transportation sector emissions. Indeed, we produce plastics that can help reduce vehicle weight and increase fuel efficiency, butyl rubber that improves air retention in tires and can improve BEV range by up to 7 percent,6 and our Mobil EV™ suite of electric vehicle fluids and products help enable further, longer, and safer performance for electric cars, vans, and trucks.7 We believe, however, that EPA should encourage a diversity of technology pathways that allow for consumers to choose between vehicle types. Standards that encourage a combination of BEVs, plug-in hybrids, full hybrids, and efficient internal combustion engine vehicles, that could operate with bio and renewable fuels, are a better way to reduce GHG emissions and manage dependence on foreign critical minerals. Such a technology-neutral policy approach would foster innovation and competition across all technologies and could ultimately help encourage more effective and lower cost solutions for consumers and businesses. [EPA-HQ-OAR-2022-0829-0632, p. 2]

6 ExxonMobil Advancing Climate Solutions 2023 Progress Report (2023), page 20.

7 www.mobil.com/en-us/commercial-vehicle-lube/pds/na-xx-mobil-ev-drive-201-

Organization: Growth Energy

Second, the proposed rule's stringency makes the impact of EPA's failure to consider both the upstream carbon sinks of biofuels and the upstream carbon emissions of EVs much greater. To date, EPA's tailpipe rules have incentivized EVs at the expense of other technologies, but they have done so in a manner that left room for other vehicles and fuels to play an important part in meeting the country's transportation needs. Today, EPA is putting all of its eggs in the EV basket. The only compliance scenario EPA discusses in the proposal would require more than two-thirds of all new vehicles to be EVs by 2032 (and, if it continues on its current trajectory, the percentage will presumably climb from there). That dramatic shift to EVs is fundamentally different than in prior rules. It disincentivizes biofuel use, even where biofuels could help reduce GHG emissions and be more suited to certain applications, like providing a low-carbon option in areas without sufficient charging infrastructure or with a carbon-intensive electric grid. [EPA-HQ-OAR-2022-0829-0580, p. 14]

Organization: Illinois Corn Growers Association

In the current rulemaking, there is only one technology that could achieve the standards in the current rulemaking: electric vehicles. EPA estimates that it will be necessary for automakers to electrify over half of the light and medium duty vehicles they produce and sell by the 2032 model year. This is less than nine years from now. [EPA-HQ-OAR-2022-0829-0756, p. 1]

Moreover, successful electrification of the transportation sector involves sweeping changes in other sectors, such as power generation, energy distribution and the extraction of rare materials essential to making everything from bateries to computer chips. There is no guarantee these changes will be in place by 2032. [EPA-HQ-OAR-2022-0829-0756, p. 1]

The standards being proposed in the current rulemaking are at least as difficult to achieve as those promulgated by the U.S. Environmental Protection Agency (EPA) for criteria pollutants for the 1975 model year. Meeting those standards required the adoption of catalytic converters, unleaded gasoline detuned engines and ultimately on-board computer control. [EPA-HQ-OAR-2022-0829-0756, p. 2]

Today, EPA is proposing even more stringent standards for criteria pollutants and Carbon Dioxide (CO2), the most significant of the greenhouse gases that are altering the global climate. It is estimated that the rise in CO2 levels since the 1950’s has largely been the result of the burning of fossil fuels such as gasoline. [EPA-HQ-OAR-2022-0829-0756, p. 2]

[See original attachment for table titled “Table 1. Fuel Consumption Impact Due to Proposed Standards”] [EPA-HQ-OAR-2022-0829-0756, p. 2]

Table 1 is reproduced from EPA’s Draft Regulatory Impact Analysis for the proposed Multi-Pollutant Emissions Standards.1 According to this table, EPA expects the consumption of liquid fuel in the U.S. (primarily gasoline, diesel and biofuels) to drop by 50% and electrical use to increase by 110% as a result of these rules. Clearly this will result in sweeping changes to the transportation system even greater than the emission standards enacted in the 1970’s. [EPA-HQ-OAR-2022-0829-0756, p. 2]

1 “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis,” EPA-420-D-23-003 April 2023

In justifying the technological feasibility of the standards, the Technical Support Document3 supporting the rulemaking listed 34 technologies automakers could potentially use to comply with the standards. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

3 “Draft Joint Technical Support Document: Proposed Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards Office of Transportation and Air Quality, U.S. Environmental Protection Agency and National Highway Trafic Safety Administration, U.S. Department of Transportation EPA- 420-D-11-901,November 2011

By contrast, in support of the proposed Multi-Pollutant Emissions Standards, EPA listed only 9 potential technologies that they believe could be employed to meet the proposed standards. As shown on Table 2, page 5, the twelve automakers with the most U.S. sales have already significantly adopted these technologies on the vehicles they are producing today. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

For instance:

-9 of the 12 automakers have employed at least one of the technologies on 70% or more of their products sold in the U.S. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

-5 of the 12 automakers have employed at least three of the technologies on at least 70% of their products sold in the U.S. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

-One manufacturer has employed three of these technologies on over 90% of their products sold in the U.S. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

It appears that automakers have already widely utilized those technologies that work best with their company's vehicles and powertrains while meeting the needs of their customers. Technologies that have not found favor with multiple manufacturers are likely to have been found to be ineffective, overly expensive or failure prone. [EPA-HQ-OAR-2022-0829-0756, pp. 4-5]

Organization: International Council on Clean Transportation (ICCT)

Potential technology penetration impacts of improved ICE technology adoption

With the above recommended adjustments to ICE technology costs and effectiveness, potential implementation of such technology on the MY2027-2032 ICEV fleet can result in significant reduction in tailpipe CO2 emissions from ICE vehicles. In its study of updated light-duty vehicle costs,107 ICCT assumed updated ICE technology adoption as described above would continue to provide ICEV improvement equivalent to 3.5% per year through at least 2032. Fuel savings with that level of improvement more than offset incremental technology cost. Starting from a 2022 fuel economy value of 27 mpg (328 g/mi), the overall real-world efficiency of the combustion light-duty vehicle fleet was 32 mpg (275 g/mi) in 2027 and 36 mpg (247 g/mi) in 2030 and 39 mpg (230 g/mi) in 2032. In total, over MY2027-2032, the net reduction in ICE tailpipe emissions is 16.4%. Applying that same annual improvement to the industry average car and truck ICE fleets as modeled for this proposed rule results in a total 16% reduction in ICE tailpipe emissions, reducing the reliance on BEVs as a compliance pathway. Specifically, we find that improvements in ICE efficiencies would reduce the projected BEV shares from 60% in 2030 to about 54%, and from 67% in 2032 to about 59%. In other words, the same GHG levels as proposed can be reached through improved ICE and fewer BEVs. [EPA-HQ-OAR-2022-0829-0569, pp. 40-43]

107 Slowik. P., Isenstadt, A., Pierce, L, Searle, S. (2022). Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame. International Council on Clean Transportation. https://theicct.org/publication/ev-cost-benefits-2035-oct22/

Table 8 summarizes these and additional results under several ICE improvement pathways. The ICE fleet, as modeled in the proposal, shows a net increase in 2-cycle tailpipe emissions in MY2032 versus MY2027. The share of advanced ICE technology, especially mild and strong hybridization, changes little or even decreases within the ICE fleet. Updating the OMEGA model to reflect the full technology options and lower costs we detail above would lead to higher tailpipe GHG reductions from ICE vehicles and, consequently, lower shares of BEVs needed for any particular GHG standards scenario. As just one example, considering the low share of hybrids in the ICE fleet as modeled, there is considerable room for powertrain electrification. With the MHEV and HEV developments discussed above, deeper application of hybridization could yield total ICE improvements of 15%-30%, easily matching 3.5%/year or even 5%/year. The MY2032 ICE vehicles in these scenarios would emit 16%-22% lower CO2 emissions than the ICE vehicles modeled in the proposal. The resulting estimated BEV shares in 2032 could be

12%-20% lower than proposed. The availability of hybrid and other ICE technologies explored above further strengthens the case that automakers have a variety of technological pathways to pursue to meet the proposed standards and realize substantial ICE improvements. The potential impact on the future fleet composition in Table 8 is illustrative of this variety of pathways automakers can choose to meet the proposed targets. Incorporation of the above ICE technology changes into OMEGA and subsequent modeling runs are needed for precise estimates of projected impacts of the above-listed technology updates. [EPA-HQ-OAR-2022-0829-0569, pp. 40-43]

SEE ORIGINAL COMMENT FOR Table 8. Illustrative compliance pathways to meet MY2027-2032 proposed standards [EPA-HQ-OAR-2022-0829-0569, pp. 40-43]

Organization: John Graham

we turn to our critique of EPA's NPRM, whose signature forecast is that the BEV share of new passenger vehicle demand will rise from 8% in early 2023 to 67% in model year 2032. During the same period, the share of HEVs in the new vehicle market will decline from about 10% to virtually zero. The penetration of MHEVs and PHEVs in 2032 will be so small that EPA does not even bother to quantify and report them. EPA would have the reader believe that the proposal is technologically neutral, and the dominance of BEVs in 2032 reflects the simple fact that BEVs are the most cost-effective propulsion technology. We respectfully disagree, as we explain below. [EPA-HQ-OAR-2022-0829-0585, p. 10]

Overall. The real-world marketplace is obviously receptive to HEV offerings. Is it plausible that manufacturers would add HEV systems to their models for just one generation, and then drop them before 2032 or even by 2027? This is what EPA's modeling finds. We believe the more likely explanation is that the inputs to -- and assumptions in -- EPA's OMEGA modeling are not accurate, in part due to outdated inputs for HEVs [EPA-HQ-OAR-2022-0829-0585, p. 15]

Organization: Letter Campaign, Ethanol Producers (7)

[The following letter was submitted by seven commenters; it is reproduced only once: Commonwealth Agri-Energy, LLC (EPA-HQ-OAR-2022-0829-0739). The other commenters are: Highwater Ethanol, LLC (EPA-HQ-OAR-2022-0829-0552), Heartland Corn Products (EPA-HQ-OAR-2022-0829-0622), Absolute Energy, LLC (EPA-HQ-OAR-2022-0829-0716), Trenton Agri Products LLC (EPA-HQ-OAR-2022-0829-0755), Western New York Energy LLC (EPA-HQ-OAR-2022-0829-0753), Southwest Iowa Renewable Energy LLC (EPA-HQ-OAR-2022-0829-0582)]

Commonwealth Agri-Energy, LLC appreciates the Biden administration's goals of increasing vehicle efficiency and reducing carbon emissions. That's why two years ago, we committed to achieving a net-zero carbon footprint for our ethanol plant by 2050 or sooner.1 [EPA-HQ-OAR-2022-0829-0739, p. 1]

1 Letter from RFA Member Companies to President Joe Biden. July 27, 2021. See more at https://ethanolrfa.org/pledge.

However, we firmly oppose regulatory approaches that arbitrarily favor certain technologies over others, which regrettably seems to be the case with this proposed rule. EPA's proposal would effectively force automakers to produce more battery electric vehicles and discourage them from pursuing other technologies that could achieve the same, or even better, environmental performance at a lower cost to American consumers. [EPA-HQ-OAR-2022-0829-0739, p. 1]

If our nation is to reach its goal of net-zero GHG emissions by mid-century, we will need cleaner, more efficient cars AND cleaner, more efficient fuels. To that end, we will need honest accounting using a full lifecycle approach that does not ignore upstream emissions. [EPA-HQ-OAR-2022-0829-0739, p. 2]

Organization: Mass Comment Campaign sponsoring organization unknown (20 signatures)

Protect Affordable Vehicles

The Biden Administration and climate change alarmists are moving swiftly to get rid of gas-fueled carsessentially through abolition. [EPA-HQ-OAR-2022-0829-1714]

The latest proposed rule from Biden's politiczed EPAs effectivly mandate that electric vehicles make up the majority of vehicles sold in America. [EPA-HQ-OAR-2022-0829-1714]

Because the limit would be so severe, it would force carmakers to ensure that two-thirds of the vehicles they sold were all-electric by 2032, or automakers will be forced to pay fines. Automakers buy credits or pay fines if they cannot meet the Corporate Average Fuel Equivalent (CAFE) requirements. [EPA-HQ-OAR-2022-0829-1714]

Stellantis, then known as Fiat Chrysler, paid $152.3 million in total CAFE fines for 2016 and 2017 and faces additional civil penalties. In 2022, NHTSA more than doubled CAFE penalties. [EPA-HQ-OAR-2022-0829-1714]

Essentially, the proposed regulations are depriving the American public of vehicle choice that most fits their lifestyle and could easily affect economic growth in this country by stifling transportation. This is especially true when only one-third of Americans would consider purchasing an electric vehicle. [EPA-HQ-OAR-2022-0829-1714]

Organization: Minnesota Biofuels Association

As proposed, the rule notably deviates from the traditional technology-neutral approach that EPA has historically taken when setting greenhouse gas emissions standards for motor vehicles. The rule effectively compels automakers to produce battery electric vehicles to the detriment of similar technologies that can achieve the same or better environmental performance. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

Organization: Missouri Corn Growers Association (MCGA)

Proposed standards are not "technology neutral."

EPA claims the standards are "technology neutral," implying no favoritism toward a specific fuel or engine type. However, a straightforward reading of the rule paints a different story. Once implemented, the rule will play out as a federal directive to auto manufacturers to produce battery electric vehicles (BEVs). Auto manufacturers will face an impossible federal compliance and legal quagmire if they cannot substantially increase EV sales. To comply with the standards, the proposed rule estimates BEVs will comprise 67% of new passenger vehicle sales by 2032 and 46% of medium-duty vehicle sales. Given the low BEV adoption rates today, rates heavily weighted towards urban areas, these numbers are astonishing. [EPA-HQ-OAR-2022-0829-0578, pp. 1-2]

The proposed standards effectively box automakers into a BEV-only corner, forcing them to produce BEVs at an increasingly rapid rate. The rule gives no consideration or opportunity for other liquid fuel technologies to meet emissions goals. The proposed emissions standards would effectively ban gasoline and diesel-powered vehicles by incentivizing, if not dictating, auto manufacturers build BEVs. In doing so, the federal government has picked winners and losers in the energy/technology sector. If implemented, EPA is unilaterally stripping the freedom of choice away from American consumers and declaring ICE powertrains are on the losing side. [EPA-HQ-OAR-2022-0829-0578, pp. 1-2]

Organization: Renewable Fuels Association (RFA)

II. The Proposed Rule Uses Inappropriate GHG Accounting Gimmicks to Create a De Facto Mandate for Battery Electric Vehicles

For light-duty vehicles, EPA is proposing an industry-wide average GHG emissions target of 82 grams CO2/mile (g/mile) in model year (MY) 2032. This represents a drastic 56% reduction from the MY 2026 target of 186 g/mile and a 63% reduction from the MY 2022 target of 224 g/mile. Notably, the estimated industrywide average GHG emissions rate has exceeded the annual standard each year since 2016, requiring automakers to use banked credits and other adjustments to comply.4 [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

4 Congressional Budget Office. “Emissions of Carbon Dioxide in the Transportation Sector.” December 2022. https://www.cbo.gov/publication/58861.

For the purposes of calculating fleet-average GHG emissions, EPA is proposing to allow auto manufacturers to use a compliance value of 0 g/mile for BEVs, fuel cell electric vehicles (FCEVs), and the electric-only portion of operation for plug-in hybrid EVs (PHEVs). As EPA acknowledges, a compliance value of 0 g/mile for EVs ignores the upstream emissions associated with battery production and electricity generation (i.e., the “fuel” for EVs). [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

Given the stringency of the proposed standards (and the inability of most internal combustion engine (ICE) vehicles to meet them), EPA expects auto manufacturers will be strongly compelled to substantially increase EV production in order to benefit from the 0 g/mile assumption when calculating fleet-wide average emissions. According to EPA’s own analysis, it is highly unlikely that automakers will be able to meet EPA’s proposed emissions standards for 2027-2032 without dramatically increasing the production of EVs and reducing the production of ICE vehicles. The proposal’s forced push toward EVs would be exacerbated by EPA’s proposal to eliminate the “multiplier incentive” that allows automakers to count one BEV as more than one “zero emissions vehicle” in compliance calculations. In this way, EPA is essentially forcing auto manufacturers to increase production of EVs, and in turn forcing the entire transportation supply chain to undergo a massive shift toward electrification. [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

While significantly increasing the production of EVs may help automakers comply with the proposed future emissions standards, such a transition certainly does not guarantee that real-world GHG emissions associated with the full transportation supply chain will be meaningfully reduced. In fact, depending on the sources of electricity used to power EVs and the practices used for extraction and refining of critical battery minerals, EPA's proposal to force increased EV production could fall far short of accomplishing the administration's climate objectives. Thus, EPA's tailpipe emissions standards could perversely incentivize the production and sale of more expensive vehicles that, in reality, have little practical impact on reducing overall emissions. [EPA-HQ-OAR-2022-0829-0602, pp. 4-5]

Organization: Specialty Equipment Market Association (SEMA)

Technology Neutral Alternatives

The proposal intends to lower carbon emissions in a way that essentially forces BEVs to become the only option for automakers to produce. Given the subsidies in place for BEV purchases and production, BEVs are the de facto choice to achieve the rulemaking's climate goals, as other options, such as hydrogen, new synthetic fuels, and multiple renewables, do not enjoy a level playing field of subsidies. SEMA believes government should not pick winners and losers regarding automotive technology. Unfortunately, the EPA has chosen to place their thumb squarely on the scale for electric vehicles. The agency should help the market drive technology solutions like Cummins' 15- liter fuel-agnostic engine platform, capable of running on hydrogen, natural gas, or diesel.7 Further, the EPA must recognize that the U.S. has trillions of dollars' worth of infrastructure already in place for ICE vehicles. The newest ICE vehicle technology can be considered carbon competitive with EVs when all of the vehicle life cycle costs are analyzed, including the ICE infrastructure already in-place and paid for versus EV subsidies to install non-existent EV infrastructure and coax consumers to abandon cost-efficient ICE vehicles. [EPA-HQ-OAR-2022-0829-0596, p. 4]

7 Cummins Fuel-Agnostic Engine Platform Capability Comes to Con-Expo (Link: https://www.cummins.com/news/releases/2023/01/23/cummins-fuel-agnostic-engine-platform-capability-comes-con-expo).

Organization: Stellantis

EPA Needs to Address EV Market Uncertainty & GHG Stringency Concerns [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

As discussed above, EPA has erred by assuming an overly optimistic market adoption of a single EV technology justified by policies that represent partial solutions. The GHG targets justified by these assumptions exceed what industry and the Biden administration jointly agreed to and likely exceed what reasonably can be achieved in a 50-state market. Targets are front-loaded and biased against the most popular trucks and SUVs that customers demand today. [EPA-HQ-OAR-2022-0829-0678, pp. 13-14]

Organization: Steven G. Bradbury

Congress has not delegated to EPA the power to force the conversion to electric vehicles. [EPA-HQ-OAR-2022-0829-0647, p. 6]

EPA is very candid about the goal of its proposed rules: The Agency is trying to use tailpipe emissions limits on carbon dioxide and criteria pollutants as a tool to coerce the automotive industry to build far more electric vehicles (EVs) than market demand would currently support. [EPA-HQ-OAR-2022-0829-0647, p. 6]

Right now, EVs account for less than 6 percent of new light-duty vehicle sales in the United States and an even lower percentage of medium- and heavy-duty commercial truck sales. Following the script laid down by President Biden in an executive order,12 the EPA is aiming to force those percentages way up—to 60 percent of light-duty vehicle sales by 2030 and 67 percent by 2032. [EPA-HQ-OAR-2022-0829-0647, p. 6]

Organization: Toyota Motor North America, Inc.

5.2. Limited Compliance Paths

EPA suggests that manufacturers have the flexibility to pursue alternative paths that require less BEVs than assumed in the preferred alternative. In practice, standards based on 60 to 70 percent of the fleet performing at zero grams per mile severely constrain the ability of non-ZEV technologies to displace the assumed BEV penetration and still comply with the combined fleet target of 102 g/mi standard in 2030 model year and 82 g/mi in 2032 model year. Based on data from the OMEGA model for the 2027 model year, the projected combined-fleet performance for conventional ICE and strong hybrid vehicles, on average, cannot attain the proposed combined-fleet standards for that model year (Table 2). The performance gap of these technologies relative to the standards widens with each following model year. This does not mean every ICE vehicle and hybrid will no longer comply with its footprint target in 2027 model year but increasingly these vehicles will need to be offset with larger and larger shares of BEVs and PHEVs for compliance with the fleet standards. [EPA-HQ-OAR-2022-0829-0620, pp. 27-29]

[Table 2: 2027 Model Year Combined Fleet Performance Relative to the 2027 Model Year Standard

Standard (g/mi): 152

CO2 (g/mi) Performance HEV: 192

CO2 (g/mi) Performance ICE: 240

Comply: No] [EPA-HQ-OAR-2022-0829-0620, pp. 27-29]

In Figure 9, the performance of every 2022 model year vehicle is compared to its respective footprint target proposed for the 2030 model year. Vehicles are distinguished by powertrain technology type with strong and mild hybrids lumped together. BEVs are the only technology for which every vehicle can meet the proposed 2030 standard. This further illustrates that 2030 standards are essentially a BEV mandate. [EPA-HQ-OAR-2022-0829-0620, pp. 27-29]

[See original for graph, Figure 9 U.S. Combined Fleet 2022 MY Performance Relative to 2030 Footprint Targets] [EPA-HQ-OAR-2022-0829-0620, pp. 27-29]

This poses significant risks to consumers, automakers, and the environment. Should the BEV market not mature at the rate EPA expects due to any of the myriad factors already described, consumers may be unable to find suitable non-BEVs that meet their needs as automakers would likely have cut back investment in these products. The result could be that consumers hold on to older, higher-emitting vehicles longer. Such a scenario is not beneficial for consumers or the environment. If automakers can somehow "backfill" weak BEV demand with other vehicles and technologies, they could face compliance challenges. The simple technology market share analysis using combine fleet emissions values (Table 3) shows several scenarios for "USA Motors" in which industry-wide BEV sales fall short of EPA's expected 60% in 2030 and are "backfilled" by other technologies such as ICE, HEV, and PHEV. While these scenarios would be good for consumers, it would clearly place automakers in a difficult compliance situation based on factors outside their control. We expect the GHG credit market would not be equipped to resolve this magnitude of compliance shortfall, especially with off-cycle credits proposed to be eliminated. [EPA-HQ-OAR-2022-0829-0620, pp. 27-29]

[Table 3 U.S. Combine Fleet Recovery Scenarios for Less Than 60% BEV in 2030 MY

Column "Technologies to Comply (CO2 Performance*): Row: "ICE(259 g/mi)": Column "Mix for Assumed 60% BEV Penetration": 37%; Column "Mix for Actual 45% BEV Penetration - PHEV/HEV Recovery": 30%; Column "Mix for Actual 45% BEV Penetration - ICE Recovery": 51%

Column "Technologies to Comply (CO2 Performance*): Row: "HEV(197 g/mi)": Column "Mix for Assumed 60% BEV Penetration": 3%; Column "Mix for Actual 45% BEV Penetration - PHEV/HEV Recovery": 15%; Column "Mix for Actual 45% BEV Penetration - ICE Recovery": 4%

Column "Technologies to Comply (CO2 Performance*): Row: "PHEV (89 g/mi)": Column "Mix for Assumed 60% BEV Penetration": 0%; Column "Mix for Actual 45% BEV Penetration - PHEV/HEV Recovery": 10%; Column "Mix for Actual 45% BEV Penetration - ICE Recovery": 0%

Column "Technologies to Comply (CO2 Performance*): Row: "BEV (0 g/mi)": Column "Mix for Assumed 60% BEV Penetration": 60%; Column "Mix for Actual 45% BEV Penetration - PHEV/HEV Recovery": 45%; Column "Mix for Actual 45% BEV Penetration - ICE Recovery": 45%

Column "Technologies to Comply (CO2 Performance*): Row: "Fleet Performance": Column "Mix for Assumed 60% BEV Penetration": 102 g/mi; Column "Mix for Actual 45% BEV Penetration - PHEV/HEV Recovery": 115 g/mi; Column "Mix for Actual 45% BEV Penetration - ICE Recovery": 140 g/mi

*includes 6 g/mi AC Efficiency Credits for ICEs]

[EPA-HQ-OAR-2022-0829-0620, pp. 27-29]

The ability to pivot on technology strategies and product plans is already severely limited by the resource shift to electrification and becomes more impractical the longer it takes for unresolvable market problems to surface. The only remedy in such a scenario is to revise the standards, which consumes time and complicates automakers' planning and investments. [EPA-HQ-OAR-2022-0829-0620, pp. 27-29]

EPA Summary and Response

Summary:

Exxon Mobil recommended that EPA "encourage a diversity of technology pathways". In its comment, BorgWarner expressed support for performance-based regulations and opposition to technology mandates. EPA agrees with both of these comments, as that is what our final rule does.

Some commenters (Alliance, AFPM, CEI, Growth Energy, Honda, Illinois Corn Growers, Mass Comment Campaign, RFA, SEMA, Stellantis) imply or assert that there is only one technology that could achieve the standards. Other commenters (e.g., Steven Bradbury) imply that the rule forces electric vehicles; the Alliance claims that EPA's proposed rule is "a de facto battery electric vehicle mandate." AFPM concludes the rule is a de facto ban on ICE vehicles and that EPA's approach "ignores the fact that major automakers are on differing technological paths".

EPA disagrees with these claims. For this rulemaking, we are continuing our longstanding approach (with over 50 years of experience in reducing criteria pollutants and 14 years of history for GHGs) of establishing an appropriate and achievable trajectory of emissions reductions by means of performance-based standards. As we state in section I.A.2 of the preamble, we anticipate that a compliant fleet under the final performance-based emissions standards will include a diverse range of technologies. In section I.B.1. of the preamble we discuss the GHG emissions standards and illustrate multiple potential pathways which demonstrate compliance with varying mixes of non-hybrid ICE vehicles, hybrids, PHEVs and BEVs (Table 4). Additional pathway examples are presented as part of our sensitivity scenarios in preamble section IV.F and G.

The Alliance argues that "By 2032, under the proposed standards, only EVs are likely to meet their individual footprint-based targets."

EPA disagrees with this assessment. As we describe in section IV.C.1 of the preamble: at the time of the proposal, we did not specifically model PHEV architectures for the proposed standards, but we did acknowledge that PHEVs could provide significant reductions in GHG emissions, and that we were considering adding them formally into our modeling for the final rule, which we have now done. Electrification technology, including PHEVs, is feasible and readily available in the market today as we discuss in section IV.C.1 of the preamble. EPA has included PHEVs in its modeling for the FRM, and our analysis shows that PHEVs (with an all-electric driving range approaching that needed to meet ACC II requirements) can achieve their individual 2032 MY footprint-based CO2 targets. In addition, EPA demonstrates that there are many potential pathways to compliance with the final standards that include a wide range of potential technology mixes, including various mixes of non-hybrid ICE vehicles, hybrid vehicles, PHEVs and BEVs. See section I.B.1, Table 4 of the preamble.

API claims that our analysis "is flawed in that it failed to account for non-electrification solutions", that "the stringency of the proposed standards... essentially forces manufacturers to solely focus development efforts on BEVs" and it recommends that "EPA adjust the standards to allow all solutions the ability to compete."

Again, EPA disagrees - our standards do not force any one technology. We agree that to meet the standards, various degrees of electrification – which include a continuum of electrified powertrains, including BEVs, PHEVs, strong hybrids and mild hybrids – will be necessary at some level as consistent with the path that automakers are on, as expressed in public comments from automakers. . Manufacturers may also invest in ICE technology development at varying levels of hybridization to supplement their electrified portfolio. Through continued progress in technology advancement, manufacturers have more technology options than they did in the past, and that is reflected in our feasibility assessment commensurate with the level of stringency in the final standards. However, EPA does find that given the increasing penetration of PEV technologies and manufacturers plans to focus development on such technologies, it would be arbitrary and capricious to not consider PEVs as an available technology.

API (and some renewable fuels groups) claim or imply that the proposed standards are not "technology neutral." In response, EPA notes that no engine design is truly neutral to another engine. All engines exhibit different characteristics that distinguish them in terms of performance and emissions. The same can be said for powertrain architectures as a whole. Across the continuum of powertrain and vehicle designs, some technologies exhibit lower emissions than others. The EPA standards are in fact technology neutral in that they do not require the use of any one technology over another – that decision of technology selection rests with the manufacturer who has the choice to select among the wide range of available technologies to select those best suited for its fleet to meet the fleetwide average standards. Considering that these GHG standards are fleet-average standards, no single vehicle is required to meet its individual footprint targets and so no technology is off the table. A manufacturer can choose any technology for a given vehicle, so long as its fleet as a whole complies with the fleet-average standard. As we demonstrate in the rule, we project that manufacturers will meet the standards through their choice of a mix of technologies that they deem best suited for their fleets.

We received several comments in support (and some, in acknowledgement) of performance-based standards:

In its comments, BlueGreen Alliance (BGA) recognizes that while automakers will need to adopt (some level) of ZEVs to meet the standards, the standards are ultimately performance-based. BGA then lists some complementary technologies in addition to zero-emission vehicles and describes the proposal as "tech-forcing and tech-agnostic". EPA agrees with this comment and considers the technologies as viable options towards meeting compliance for the standards.

Energy Innovation commented that BEVs are the most expedient and effective way to eliminate pollutants. Based on our modeling, EPA agrees that manufacturers may find the most cost-effective technology to be BEVs, however, it does not preclude any other technologies from being adopted by manufacturers to meet compliance.

Some commenters provided analyses which corroborated EPA's "multiple pathways" findings after they added PHEVs to their modeling for the final standards. In its comments, Consumer Reports described their own modeling of various technology combinations and found "many reasonable compliance pathways to comply with either EPA's proposed standards or the stronger Alternative 1."

EPA agrees with these comments, and notes that the central case pathway in the proposed standard was modeled as the lowest cost of compliance and is not "the" only approach. As we show, there are varying levels of electrification that may be used to achieve compliance. In fact, in its comments, EDF noted "Because EPA's OMEGA 2 model is designed to show only the most cost-effective compliance pathways, it does not capture the full range of possible pathways automakers may choose to take based on the numerous factors that influence product lines," after which EDF provided a detailed summary of three alternative pathways – with varying levels of advanced ICE technology, PHEV and BEV sales – it independently evaluated using EPA's OMEGA 2 model (but with EDF's independent technology and cost assumptions) that each showed compliance with the proposed standards. We agree with these commenters' assessments.

While affirming that the proposal is technology-neutral, CARB concluded from EPA's modeling that ZEVs will be the most likely pathway towards compliance. EPA agrees with CARB's assessment that the standards are technology-neutral, however we emphasize that the modeling in the proposal is OMEGA's representation of the most cost-effective pathway to compliance but it is one of many potential pathways to compliance for the industry, and for each manufacturer.

In its comments, Environmental and Public Health Organizations noted that "an automaker could improve the emissions performance of its vehicles simply by shifting sales within a nameplate to versions with cleaner powertrains." They show that for some high-volume models, they estimate potential GHG reductions from those models of up to 20% by shifting sales to the cleanest option. EPA agrees that this could be one viable part of a compliance strategy– within a manufacturer's portfolio of trim levels, it could conceivably change the sales mix of its powertrain offerings without requiring significant new investment. However, we recognize that there may be some practical limits to shift all sales to the cleanest trim level, based on, for example, production capacity and consumer demand.

ICCT provided analysis and commentary on potential GHG reductions still available in ICE technology, including lesser levels of electrification such as mild and strong hybridization of the ICE fleet. EPA agrees with this analysis, and while some of these technologies were not modeled due to lack of available inputs (cost and detailed engine efficiency maps) necessary to incorporate into our ALPHA and OMEGA models, EPA agrees that these technologies may be available to manufacturers and provide further evidence of multiple technology pathways. Of course, it will be up to each manufacturer to determine the most appropriate compliance pathway for their business case.

12.5.4 – Sensitivities

<u>Comments by Organizations</u>

Organization: Alliance for Automotive Innovation

Relatedly, <u>we also recommend that the EPA show a full cost-benefit analysis for each of its sensitivity cases,</u> including for high and low battery cost cases, and also for varying assumptions on IRA tax credit eligibility, phase-out, or elimination. [EPA-HQ-OAR-2022-0829-0701, p. 67]

Organization: Institute for Policy Integrity at New York University School of Law

II. While EPA Robustly Analyzes the Proposed Rule's Benefits and Costs, It Should Conduct Additional Analysis Around Key Parameters

Using OMEGA, EPA conducts a thorough and robust analysis of the benefits, costs, and net benefits of the proposed program and its alternatives. EPA's modeling is the product of extensive analysis and reasonably concludes that the benefits of the proposed program and all of its alternatives greatly outweigh their costs. [EPA-HQ-OAR-2022-0829-0601, p. 12]

EPA's analysis is commendable in many ways. The agency estimates many key analytical parameters—such as the rebound rate for ICE vehicles and the elasticity of demand for new vehicles—consistent with the best available evidence. Nonetheless, EPA could perform more analysis around key parameters. For instance, whereas EPA conducted more than sixty sensitivity analyses72 around numerous parameters in the 2020 Rule,73 it presents only seven sensitivity analyses for the Proposed Rule.74 For some key analytical parameters—such as the discount rate and the social cost of carbon—additional valuations reflecting the state-of-the-art economic literature exist and would ensure a more complete presentation of benefits and costs. EPA should conduct additional analysis around these parameters, which generally show that the net benefits of the proposed program and its alternatives are even greater than EPA projects. [EPA-HQ-OAR-2022-0829-0601, p. 12]

72 In regulatory impact analysis, "sensitivity" analysis refers to analysis that "reveal[s] whether, and to what extent, the results of the analysis are sensitive to plausible changes in the main assumptions and numeric inputs." OFF. OF MGMT. & BUDGET, CIRCULAR A-4: REGULATORY ANALYSIS 3 (2003).

73 Final Regulatory Impact Analysis The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021–2026 Passenger Cars and Light Trucks 1769–71 tbl.VII-471 (2020).

74 RIA at 13-43 to -48 (five sensitivities for light-duty vehicles), 13-54 to 13-55 (two sensitivities for medium-duty vehicles).

Specifically, EPA should conduct additional analysis around the social cost of greenhouse gases, discount rate, analytical baseline, BEV rebound rate, safety modeling, and energy security. This section explores each of these issues in turn. [EPA-HQ-OAR-2022-0829-0601, p. 12]

EPA Summary and Response

In its comments, the Alliance requested that EPA conduct a benefit-cost analysis for each of its sensitivity cases provided in the NPRM and requested additional sensitivities and benefit-cost analyses for varying assumptions on the levels of available IRA subsidy. For reasons described at length in RTC 8.1, EPA disagrees with this recommendation and does not provide additional benefit cost analyses for each sensitivity. Regarding IRA sensitivities specifically, EPA worked very closely with DOE and NHTSA in determining the appropriate assumptions regarding the impacts of the IRA on the industry and vehicle market. EPA agrees that additional sensitivities could be conducted on a number of input assumptions, including this one. However, EPA did not have a persuasive reason for determining that the value of the IRA incentives would differ significantly from the central case assumptions. Further, EPA notes that the impact of deviations in the IRA assumptions from the central case, higher or lower, would impact the results through the same mechanism as several of the other sensitivities conducted by EPA; namely that both the battery cost sensitivity and consumer acceptance sensitivity influence the relative consumer preference for the various powertrain technologies, and in the case of the battery costs sensitivity, the producer compliance costs. Therefore, EPA determined that a sensitivity around the IRA assumptions would not provide substantially different information than already provided by the current sensitivities.

The Institute for Policy Integrity (IPI) commented that EPA should conduct a greater number of sensitivity analyses, expanding on those presented in the NPRM. IPI recommended sensitivities around discount rates and the social cost of carbon, as well as possible sensitivities for safety, the rebound rate, the analytical baseline and energy security. In response, EPA notes that for the NPRM and again for this final rule, costs and benefits are presented at both 3 and 7 percent discount rates, and a range of values is used for the social cost of greenhouse gases. More detailed discussion of the choice of discount rates and social cost of carbon values is provided in RIA Chapter 9. EPA has analyzed several new sensitivity cases for this final rule in addition to cases presented in the NPRM. These include cases for more prevalent PHEVs, no additional BEVs beyond already existing models, and no GHG credit trading between manufacturers. Regarding the analytical baseline, the sensitivities included in this final rulemaking analysis cover a wide range of No Action case projections. This range is illustrated in terms of the market penetration of PEVs across the various sensitivity cases in preamble Section IV.B and also by the tables of incremental costs for the sensitivity cases presented in RIA Chapter 12.

12.5.5 - Modeling of MDVs

Comments by Organizations

Organization: Environmental. and Public Health Organizations

a. EPA’s modeling should better reflect the favorable economic case for electric pickup trucks.

A recent report by Roush examined the potential for electrification of MDVs under a range of scenarios, finding that electrification is cost-competitive in the great majority of them. 188 It is clear that some amount of the difference between the uptake of Class 2b-3 pickups and vans in the OMEGA2 modeling stems from the far lower range assumed for vans (150 miles) compared to that of pickups (300 miles). But as illustrated in Table VI.A-1 below, 189 Roush finds that by 2030, even when comparing a low-cost combustion powertrain to the most costly battery chemistry (NMC811) deployed in a 400-mile electric Class 3 pickup, 190 the electric pickup still achieves total cost of ownership (TCO) parity within the typical loan length for a new vehicle (7 years). And when comparing a Class 3 pickup with a low-cost battery (LFP) to a high-cost internal combustion engine powertrain, a 400-mile electric pickup would pay off within 1 year, well within the payback period assumed for consumers by manufacturers within EPA’s OMEGA2 model. [EPA-HQ-OAR-2022-0829-0759, p. 69]

188 Saxena et al., Electrification Cost Evaluation at 26.

189 Table VI.A-1 is adapted from Saxena et al., Electrification Cost Evaluation, Tbl. 24, at 145. Scenario 1 represents the adoption of low-cost BEV and high-cost combustion vehicle technologies; Scenario 2,

medium-cost BEV and combustion vehicle technologies; and Scenario 3, high-cost BEV and low-cost combustion vehicle technologies. Id. at 28-29.

190 Roush used an LFP battery for its low-cost BEV, an NMC811 battery for its medium-cost BEV, and a "10% costlier" NMC811 battery for its high-bost BEV. Id. at 30-31.

Table VIII.A-1. Time to achieve TCO parity for Class 2b-3 BEVs with a 2027 and 2030 purchase timeframe [EPA-HQ-OAR-2022-0829-0759, pp. 69-70]

[See original comment for Table VIII.A-1.]. [EPA-HQ-OAR-2022-0829-0759, pp. 69-70]

When accounting for the impacts of the IRA, the economic case for electrification of Class 2b-3 pickups is even clearer, as shown in Table VI.A-2. Here the impact of the full § 30D credit is shown, which is also the maximum allowable limit of the § 45W (commercial clean vehicle) credit for Class 2b-3 vehicles. 191 Roush's analysis finds that purchase price parity is achieved for virtually all BEV classes in the timeframe of the analysis, so the § 45W commercial vehicle credit is not applicable in the later years of their analysis. 192 In fact, Roush finds that, with the application of IRA credits, by MY 2027 all BEVs except the 400-mile pickup will be priced at or below a comparable combustion vehicle 193; and that all MY 2027 BEVs will achieve TCO parity within the first two years of vehicle ownership. 194 Here it is worth noting that, despite the large share of MDVs that are purchased for commercial fleets, EPA did not directly include the § 45W credit in its analysis, instead applying the same combination of the § 30D and § 45W credit as it did for LDVs. 195 Because the § 45W credit is based on the lesser of $7500 or the difference in purchase price, this credit should act to hedge uncertainty in the Agency's analysis, though that is not how it was treated within the OMEGA2 modeling runs. [EPA-HQ-OAR-2022-0829-0759, pp. 69-70]

191 Id. at 175-79. The § 45W credit is based on 30% of the basis of a vehicle not powered by a gasoline or diesel internal combustion engine, or the difference in purchase price between a qualified clean vehicle and a comparable combustion vehicle. In the case of vehicles that have a GVWR less than 14,000 pounds (which includes Class 2b-3 vehicles), the total credit is capped at $7500.

192 Id. at 195.

193 Id.

194 Id. at 197-98.

195 This is not immediately apparent in the text of the preamble or DRIA but can be assessed by comparing the contents of the vehicle_price_modifications_20230314b.csv input files from the LDV and MDV modeling runs, which are identical.

Table VIII.A-2. Time to achieve TCO parity with IRA § 30D credits for MYs 2023 and 2027 196 [EPA-HQ-OAR-2022-0829-0759, p. 70]

196 This table is adapted from Saxena et al., Electrification Cost Evaluation, Tbl. 30, at 193.

[See original comment for Table VIII.A-2.]. [EPA-HQ-OAR-2022-0829-0759, pp. 70-71]

The Roush report is not the only analysis to find a strong economic rationale for the adoption of zero-emission MDVs. A recent report from the National Renewable Energy Laboratory (NREL) found that cost parity will be achieved before 2035 (even in the absence of the IRA) for medium- and heavy-duty vehicles, including Class 3 vans and Class 4-5 vehicles that share a platform with Class 2b-3 pickups (which were not part of that analysis).197 Similarly, a recent

International Council on Clean Transportation (ICCT) report on electric MDVs finds that purchase price parity with diesel MDVs will be achieved prior to 2032 for 300-mile and lower BEVs, even in the absence of IRA funding.198 And when IRA funding is considered, even 400-mile BEV pickups would achieve purchase price parity in the timeframe of this rule.199 [EPA-HQ-OAR-2022-0829-0759, p. 71]

197 Catherine Ledna et al., NREL, Decarbonizing medium- and heavy-duty on-road vehicles: Zero-emission vehicles cost analysis, Mar. 2022, at 2, 46 https://www.nrel.gov/docs/fy22osti/82081.pdf.

198 Eamonn Mulholland, ICCT, Cost of electric commercial vans and pickup trucks in the United States through 2040 (Working Paper 2022-01), Jan. 2022, at 11 (Fig. 5), https://theicct.org/wp-content/uploads/2022/01/cost-ev-vans-pickups-us-2040-jan22.pdf.

199 See id.

There is some difference in costs between EPA's assessment and other studies such as those described above: on average, according to EPA, Class 2b-3 combustion pickups will cost about $5,000 less (from a purchase price standpoint) than a comparable electric pickup. However, with the Agency's application of an average IRA credit of $6,000 in 2032, this would still yield cost parity, on average, so even EPA's higher cost assessment cannot fully explain the reason for Class 2b-3 pickups electrifying at such a reduced rate in the Agency's modeling. Even more than that, this disparity is almost entirely influenced by the relative price difference of gasoline and diesel pickups in EPA's modeling, with the Agency's BEV300 pickups just $1,100 more expensive than diesel pickups without the IRA incentives, not far off ICCT's conclusion that BEV300 pickups will achieve cost parity with diesel pickups by 2031.200 Despite this, the model's conversion rate of combustion vehicle sales to electric vehicle sales is virtually indistinguishable between gasoline and diesel pickups, at roughly 20% for each, seemingly indicating that neither purchase price nor TCO parity have a significant impact on sales. Given that many Class 2b-3 vehicles are purchased for commercial use,201 such modeling behavior is inconsistent with the economically-driven decisionmaking that would be expected to occur in the real world.202 [EPA-HQ-OAR-2022-0829-0759, p. 71]

200 Id.

201 See id. at 1; Saxena et al., Electrification Cost Evaluation, at 49.

202 For example, EPA's own analysis of the heavy-duty market assumed a conversion rate of 80% when cost parity is achieved. 88 Fed. Reg. at 25992, Tbl. II-23. And analysis from NREL finds this number to be nearly 100%; see comparison at pp. 59-60 of EDF, Comment Letter on GHG Standards for HD Vehicles, June 16, 2023, https://downloads.regulations.gov/EPA-HQ-OAR-2022-0985-1644/attachment_1.pdf (data from Ledna et al. 2022).

Based on EPA's own modeling, BEV variants for over 71% of the Class 2b-3 market achieve first cost parity with their combustion-powered equivalent by 2032 when including IRA incentives, including 57% of the Class 2b-3 pickup truck market.203 This is a substantially higher share of vehicles than the model assumes will be deployed. [EPA-HQ-OAR-2022-0829-0759, p. 72]

203 This was established using the output files for the OMEGA2 MDV runs, using the vehicles file (2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv) to compare in a given model year BEV variants with their combustion equivalent, sharing a base-year vehicle ID.

For all of these reasons, EPA's modeling does not accurately reflect the favorable economic case for commercial MDV electrification, particularly for pickups. While some of these modeling problems can be ascribed to differences in battery costs and EPA's unreasonable choice to include an artificial 25% production cap on BEV pickups, other problems are intrinsic to assumptions made within the model that do not reflect the Agency's own assessment of likely adoption of electrification for commercial vehicles, particularly considering the incentives available under the IRA. [EPA-HQ-OAR-2022-0829-0759, p. 72]

Organization: International Council on Clean Transportation (ICCT)

Paralleling the limited public MDV data availability, the discussion of MDV technology costs and effectiveness within the Preamble and DRIA is not as robust as that discussion for LDV. While certain MD-specific technologies are mentioned (e.g. the MD Ford 7.3L engine which was not incorporated in the analysis, DRIA 3.5.1.2), it is unclear what engine maps apply to MDV, if any technology costs/effectiveness were borrowed from LDV, how LDV costs/effectiveness were modified for MDV (if at all), and if there are any other modeling parameters specific to MDV. [EPA-HQ-OAR-2022-0829-0569, pp. 62-64]

By examining several OMEGA MD input and output files, there are several areas ICCT finds worthy of comment. [EPA-HQ-OAR-2022-0829-0569, pp. 62-64]

The central "vehicles" output file161 shows that all diesel vehicles throughout MY2021-MY2035 are considered to have Miller cycle engines (MIL) and all gasoline vehicles are GDI only. Only these 2 ICE technology packages are available for MD, and both are without any level of electrification (micro through strong hybrid).162 This lack of additional ICE technology packages suggest EPA is significantly underestimating the possibility for improved ICE-based MD pickups and vans. As there are many cost-effective ICE technologies available, the lack of detail in the analysis likely overstates the cost of compliance. Relatedly, it is unclear which engine (and electric motor) maps were used to develop the technology packages' RSEs, as well as the appropriateness of approximating diesel engines' CO2e emissions with those of Miller cycle engines. The MD cost equations appear identical to the LD costs.163 While this may be appropriate for many technologies that are shared between LD and MD, there are certain performance and utility differences between LD and MD that may lead to differing costs (consider, in particular, costs related to diesel powertrain improvement, which are unassessed in the LD analysis). [EPA-HQ-OAR-2022-0829-0569, pp. 62-64]

161 2023_03_17_13_57_07_md_central_v3_Proposal_vehicles.csv

162 simulated_vehicles_rse_ice_MD_input_rse_only.csv

163 powertrain_cost_20230314.csv

EPA Summary and Response

Summary:

Environmental and Public Health Organizations commented that EPA's modeling does not accurately reflect the favorable economic case for commercial MDV electrification, particularly for pickups. In support, they cite several studies finding the total cost of ownership for electric pickups to be lower than their conventional counterparts by the 2030s. The commenter also notes that this is in part due to differences in EPA's cost assessment, and also that EPA did not directly include the 45W credit in its analysis, but instead applied the same combination of the 30D and 45W credit as for LDVs.

ICCT commented that modeling of medium-duty technology costs and effectiveness in the proposal was not as robust as light duty modeling. In particular, engine technology was limited to Miller and GDI engines, and no hybridization was modeled for MDVs. Additionally, medium duty costs appeared to be identical to light duty costs, which is not appropriate in all cases (for example, costs related to diesel powertrain improvement, which were unassessed).

Response:

In response to comments on modeling of electric MDVs, EPA stands by its modeling process. MDV pickups and vans are true work vehicles that are designed for much higher towing and payload capabilities than are light-duty vehicles. The technologies applied to light-duty vehicles are not all applicable to MDVs at the same adoption rates, and the internal combustion engine technologies often produce a lower percent reduction in CO_2 emissions when used in many medium-duty vehicles. For example, electrification of an MDV pick-up designed and used solely for high towing capacity may be more challenging in the earlier years of the program. Conversely, delivery vans or payload-oriented pick-ups that operate over limited distances and daily routes present a significant opportunity for electrification, as evidenced by current last mile delivery companies' announcements and purchase orders for EVs in this segment. Electrification technologies applied to MDVs reflect the expected usage of these vehicles, with fully electric BEVs as the primary electrification pathway for medium duty vans, and both BEV and PHEV technology applied to 2b/3 pickups in roughly equal proportions. It is important to note that this is a projection and represents only one of many possible compliance pathways manufacturers could choose.

Further responses to comments on battery costs are included in section 12.2.1 of this RTC and further responses to comments on modeling of IRA incentives are included in section 12.5.3 of this RTC.

In response to comments on limited modeling of MDV technology, EPA believes that our modeling of MDV technologies was reasonable and sufficiently robust to support the feasibility of the standards. For this final rule, EPA has updated the modeling of MDV and increased the variety of powertrains modeled. In modeling for the final rulemaking, EPA used a diesel engine (rather than the Miller surrogate mentioned by ICCT) and incorporated both turbocharged and naturally aspirated (the Ford 7.3L engine) gasoline engines for MDV modeling, as further explained in the RIA, chapter 3.5.1. In addition, EPA modeled fully electric BEVs as the primary electrification pathway for medium duty vans, and both BEV and PHEV technology applied to 2b/3 pickups in roughly equal proportions, as further explained in the RIA, chapter 3.5.3. While it is true that EPA could have modeled even more technologies for MDV (as for LDV), the modeling that we did perform sufficiently demonstrates the feasibility of the standards.

In response to the comment on MDV costs, EPA stands by its modeling of cost inputs. As noted by ICCT, many technologies that are shared between LD and MD have appropriately shared costs. For those few technologies not shared (for example, the development of the PHEV technology applied to 2b/3 trucks), costs were developed appropriately for the MDV modeling. Powertrain improvements to diesels were not included as a pathway in this analysis, though manufacturers are free to choose this pathway as part of their technology mix under the performance-based standards.

12.5.6 - Modeling of the no action case

Comments by Organizations

Organization: American Council for an Energy Efficient Economy (ACEEE)

EPA's baseline BEV projections are well below estimated penetration rates expected from IRA and IIJA programs and investments (FR 29333, Table 99). Multiple analyses project that the IRA, in particular, will lead to new-vehicle BEV adoption rates of over 60% by the early 2030s, compared to EPA's baseline, "No Action", scenario where BEVs only reach roughly 40% of new vehicle sales between MYs 2030 and 2032.8 EPA's standards should fully account for the impact of activities outside of the federal standards to drive vehicle electrification and set targets more stringent than what the market is expected to deliver. Alternative 1 is the strongest proposed option that EPA can adopt to maximize net benefits. [EPA-HQ-OAR-2022-0829-0642, pp. 2-3]

8 https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23.pdf; https://rmi.org/insight/how-inflation-reduction-act-will-affect-ev-adoption-in-the-united-states/

Organization: American Petroleum Institute (API)

The AEO 202359 contains long term projections based on current laws and regulations in place at the time of modeling. As part of that modeling, the AEO includes projections for vehicle sales and vehicle sales projections include consumer choice modeling60. EIA's consumer choice modeling includes fuel choice, sales penetration among similar technologies, market share among different technology sets, and vehicle attributes (i.e., sales price, fuel economy, battery replacement costs, range, etc.). EIA reported that for the first time since 2010, critical mineral prices increased "significantly" in 2022 resulting in the first year to year increase in electric vehicle battery prices. According to AEO projections, which consider current policies and regulations, and consumer choice, BEV sales penetration remains well below EPA's estimates in the proposed rule, which are induced by its proposed stringent standards. EPA must explain why its projections differ so significantly from EIA. Furthermore, EIA61 projects electric vehicles to be less competitive from a cost standpoint than gasoline powered vehicles in the much larger non-luxury market. [EPA-HQ-OAR-2022-0829-0641, p. 19]

59 U.S. Energy Information Administration. "Annual Energy Outlook 2023." March 2023. https://www.eia.gov/outlooks/aeo/.

60 https://www.eia.gov/outlooks/aeo/assumptions/pdf/TDM_Assumptions.pdf

61 61 U.S. Energy Information Administration. "Issues in Focus: Inflation Reduction Act Cases in the AEO2023." March 2023. Annual Energy Outlook 2023. https://www.eia.gov/outlooks/aeo/IIF_IRA/.

Organization: California Attorney General's Office, et al.

Our States and Cities add three observations to EPA's analysis of costs and lead time. First, EPA's projected costs likely overstate the actual costs attributable to reaching the standards in the allotted lead time, due to conservative assumptions in EPA's no-action case that omit the myriad state and local actions to promote electric vehicle adoption. See supra 18-21; CARB Comment at 16. [EPA-HQ-OAR-2022-0829-0746, p. 33]

However, EPA's conservative methodology for constructing the no-action scenario likely ends up overstating the proposed standards' costs significantly, for two key reasons. [EPA-HQ-OAR-2022-0829-0746, pp. 33-34]

First, EPA assumes that auto manufacturers will produce electric vehicles to comply with standards in a "purely cost-minimizing" way. 88 Fed. Reg. at 29,296. As EPA acknowledges, however, auto manufacturers have planned for far higher rates of electric vehicle sales in response to both policies that recognize the significant role of the internal combustion engine in the climate crisis and the surging demand for electric vehicles. Id. A model of industry behavior that minimizes costs without accounting for these other drivers of electric vehicle adoption likely understates electric vehicle penetration in a no-action scenario.186 And, given that respected organizations like Bloomberg New Energy Finance are estimating battery electric vehicle penetrations rates near 52% by 2030 even without considering EPA's proposed standards,187 EPA's no-action scenario projection of 40% penetration is likely an underestimation. See 88 Fed. Reg. at 29,329 (Table 81). [EPA-HQ-OAR-2022-0829-0746, pp. 33-34]

186 See Consumer Reports Amicus Brief, Doc. No. 1988445 in Texas v. EPA, Case No. 22-1031 (D.C. Cir. Mar. 3, 2023), at 4-15.

187 Ira Boudway, More Than Half of US Car Sales Will Be Electric by 2030, Bloomberg (Sep. 20, 2022), available at https://www.bloomberg.com/news/articles/2022-09-20/more-than-half-of-us-car-sales-will- be-electric-by-2030. Second, EPA's no-action scenario likely underestimates the baseline battery electric vehicle penetration rate, because it does not account for numerous state and local actions that promote electric vehicle adoption. 88 Fed. Reg. at 29,296. As discussed in the Proposal, EPA did not model compliance with California's Advanced Clean Cars II program ("ACCII"), which requires 100% of in-state new vehicle sales to be zero-emission or plug-in hybrid electric vehicles by 2035; as EPA notes, 11 other States have adopted or plan to adopt ACCII by model-year 2027 under Section 177 of the Clean Air Act. Id.; id. at 29,334. EPA's decision not to include ACCII in the no-action scenario is appropriate at this stage, because EPA has not yet granted California's pending waiver application for ACCII under Section 209(b). However, EPA's sensitivity study with ACCII in the no-action scenario demonstrates that ACCII would reduce the costs of EPA's standards if EPA were to grant the waiver. See id. at 29,335. Further, beyond ACCII or other state-law sales mandates, states and their political subdivisions have enacted a host of incentives to promote electric vehicle adoption, which the no-action scenario does not account for either. See supra at 18-21. These omitted state-law incentives mean that, even apart from ACCII, EPA's no-action scenario likely understates electric vehicle adoption without the proposed standards, and thus the proposed standards' costs are likely less than EPA's projected estimates. [EPA-HQ-OAR-2022-0829-0746, p. 34]

EPA's conservative estimates provide the industry and other stakeholders important information on the upper bounds of the proposed standards' costs, and our States and Cities acknowledge the technical challenges of rigorously modeling the above state laws and market dynamics. Nevertheless, EPA should be candid that the real-world costs fairly traceable to the final standards will likely be significantly lower than those disclosed, even apart from ACCII's potential effects, and EPA should consider adopting standards more stringent than the proposed standards. [EPA-HQ-OAR-2022-0829-0746, p. 34]

Organization: Center for American Progress (CAP)

EPA's Baseline is Too Conservative

By 2027, the incentives contained within the IRA will have made a significant impact on domestic EV production while increasing the number of EVs that qualify for consumer facing credits. A subset of the total incentives contained in the IRA is expected to bring the EV market at least in line with EPA's expected compliance path for the proposed rule. Accounting for California's Advanced Clean Cars II standard, the 30D, and 45W credits as well as limited portions of the 45X credit, the International Council on Clean Transportation (ICCT) finds that EVs are expected to achieve 67 percent penetration by 2032.9 This same analysis finds that EVs are expected to achieve price parity with ICE vehicles between 2023 and 2025. This conclusion is supported by analysis by the Rocky Mountain Institute (RMI) which finds that electric sedans will achieve price parity in 2023, electric SUVs between 2023 and 2024, and electric pickup trucks between 2024 and 2025.10 Further, RMI finds that EVs could reach 76 percent market penetration by 2032, which significantly exceeds even the proposed Alternative 1. [EPA-HQ-OAR-2022-0829-0658, pp. 2-3]

9 Slowik et al. "Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States," The International Council on Clean Transportation, January 2023, available online: https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23-2.pdf

10 McNamara et al. "How Policy Actions can Spur EV Adoption in the United States," Rocky Mountain Institute, June 2023, available online: https://rmi.org/insight/how-inflation-reduction-act-will-affect-ev-adoption-in-the-united-states/#:~:text= The%20passage%20of%20the%20Inflation,production%2C%20and%20charging%20infrastructure%20development

Organization: Environmental. and Public Health Organizations

b.EPA should more fully account for the impact of state regulations on the adoption of Class 2b-3 ZEV pickups and vans.

In addition to market forces, state regulatory requirements will have a significant impact on the adoption of Class 2b-3 ZEV pickups and vans, not just through ZEV sales requirements but through the corresponding industrial development and production that will occur to meet related demand. EPA does not appear to have considered the relative impact of such state regulations as part of its OMEGA2 modeling.204 [EPA-HQ-OAR-2022-0829-0759, p. 72]

204 While the Agency has conducted a sensitivity analysis around the Advanced Clean Cars II program, for which California has not yet received a waiver, it has not similarly included any sensitivity or analysis incorporating into its compliance modeling the Advanced Clean Trucks regulation, for which California has already been granted a waiver.

Under the Advanced Clean Trucks (ACT) regulation, manufacturers must ensure that 40% of their sales of Class 2b-3 vehicles are ZEVs by 2032, en route to an eventual target of 55% ZEV sales in 2035.205 ACT has already been adopted in eight states as of the date of this comment letter, and these states make up nearly 20% of the heavy-duty market (including Class 2b-3 vehicles) overall.206 While there are no strict requirements on the mix of vehicles a manufacturer must sell in order to achieve these targets, the sheer size of the Class 2b-3 pickup market means that manufacturers cannot simply rely on the widespread deployment of ZEV commercial vans in order to meet the ACT-required level of ZEV adoption. [EPA-HQ-OAR-2022-0829-0759, p. 72]

205 Table A-1, California Code of Regulations § 1963.1.

206 Based on new vehicle registration data from Polk/IHS Markit for 2019-2021 Class 2b-8 trucks, by state, obtained from Atlas Public Policy.

These state regulations will yield a base level of Class 2b-3 ZEVs, even in the absence of EPA standards, that the Agency has not adequately considered in its No Action scenario or in its modeling. As a separate matter, these regulations (and the ZEV development and deployment efforts that manufacturers have already undertaken to achieve compliance with them) also validate the Agency's assessment that electrification will be a critical emissions control technology in the MDV space moving forward. [EPA-HQ-OAR-2022-0829-0759, p. 73]

207 88 Fed. Reg. at 29341-42; DRIA at 3-12–3-18.

Organization: Hyundai Motor America

In addition, state readiness to successfully implement the ACC II ZEV Regulation remains an outstanding question. We are concerned there simply is not enough time to delivery key infrastructure to support the ACC II ZEV Regulations in Section 177 States ("S177 States"). Many of the current S177 States that have adopted the ACC II ZEV Regulation lack the necessary charging infrastructure to support even the MY 2026 ZEV requirements. Further, several states are on track to become first-time S177 States and are significantly even farther behind in terms of infrastructure and other supportive ZEV policies to ensure regulatory success. To the degree the No Action case assumes equal success of the ACC II ZEV Regulations among S177 States, it overlooks the realities on the ground. These assumptions carry forward risk into the Proposed Rule with an overly ambitious objective for BEV penetration ramp from the current starting point nationwide of under five percent BEV sales today.13 For purposes of forecasting the No Action case, we caution against equating compliance credits 1:1 with BEV penetration. Notably, the ACC II ZEV Regulation includes PHEVs and FCEVs – coincidentally consistent with Executive Order 14037. These are just a few assumptions we encourage the EPA to reconsider in its No Action case. [EPA-HQ-OAR-2022-0829-0599, pp. 3-4]

13 Experian EV Registration database, 2022 Calendar Year through Q1 2023 Calendar Year. Accessed May 10, 2023.

Organization: Institute for Policy Integrity at New York University School of Law

C. EPA Should Update the Baseline to Ensure Full Consideration of the Inflation Reduction Act

In regulatory impact analysis, the baseline refers to "the best assessment of the way the world would look absent the proposed action."90 Developing an accurate baseline is important for conducting benefit-cost analysis, but challenging when baseline conditions are in flux. That is the case here given last year's passage of the Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

90 Circular A-4, supra note 86, at 15.

To model the baseline for the Proposed Rule, EPA adopts key variables from the Annual Energy Outlook 2021 (AEO 2021), such as fleet size, new vehicle sales shares, fuel prices, electricity prices, and vehicles miles traveled.91 However, AEO 2021 was developed before the IRA's passage and thus does not include the effects of that law. While it was reasonable for EPA to rely on AEO 2021 in this proposal, it should consider adjusting the baseline in the final rule to fully incorporate the IRA's impacts. In particular, according to the 2023 version of Annual Energy Outlook (AEO 2023), the IRA will decrease both short-run and long-run electricity prices relative to the no-IRA case.92 AEO 2023 also projects that the IRA will decrease long-run gas prices, with a minimal short-run impact.93 Gasoline and electricity prices are important modeling inputs, as they affect the relative cost of ownership between ICE vehicles and BEVs and thereby influence the sales of these vehicles. These prices also affect the fuel-cost savings, the rebound effect, and related environmental impacts. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

91 See RIA at 9-1.

92 See infra p. 30 fig.2 (difference between AEO 2023 with IRA (solid-blue line) and AEO 2023's "No IRA" case (dotted-blue line)).

93 See infra p. 30 fig.1 (difference between AEO 2023 with IRA (solid-blue line) and AEO 2023's "No IRA" case (dotted-blue line)).

There are several potential options for EPA to consistently account for the IRA across modeling inputs. One option is for EPA to adopt AEO 2023 for parameters where it currently uses AEO 2021. This would presumably also entail updating future BEV penetration, which, although EPA models separately, is based in part on parameters from AEO 2021. If EPA updates its baseline to incorporate AEO 2023, it should beware that AEO 2023 models only certain aspects of the IRA but does not include the producer-side battery tax credit.94 To blunt the resulting potential underestimate of the IRA's full impact, EPA should consider using the "High uptake of the IRA" sensitivity case provided in AEO 2023. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

94 U.S. Energy Information Administration, Transportation Demand Module Assumptions 26 (Mar. 2023), https://www.eia.gov/outlooks/aeo/assumptions/pdf/TDM_Assumptions.pdf.

If updating the baseline to AEO 2023 is infeasible, a more feasible alternative may be for EPA to continue to use AEO 2021 as its baseline and then add the IRA's impact on other parameters on top of that. Data within AEO 2023 enables this type of assessment, as AEO 2023 provides sensitivity analysis in which it models the world with and without the IRA.95 This enables a direct comparison to assess the IRA's effect on key parameters, including electricity prices and gas prices.96 As noted above, EPA should consider adopting the "High uptake of the IRA" sensitivity case in AEO 2023 for comparison purposes.97 [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

95 See Projection Tables for Side Cases, Annual Energy Outlook 2023, https://www.eia.gov/outlooks/aeo/tables_side_xls.php (providing tables for "No IRA" case).

96 EPA acknowledges that it has estimates of future retail electricity prices that account for the IRA and that these estimates exhibit lower prices compared to a scenario without the IRA. But due to the absence of corresponding information on gasoline price estimates under the IRA and a desire for consistency across variables and model components, EPA opts not to use these estimates. RIA at 2-84.

97 See Projection Tables for Side Cases, supra note 95 (providing tables for “High uptake of the IRA” case).

This modeling adjustment could have meaningful effects (though it’s unclear whether this would increase or decrease net benefits overall, and it would almost certainly not change the sign or ordering of net benefits). According to projections from AEO 2023, the retail electricity price for transportation could be lower by an average of 0.45 cents per kWh from 2027 to 2032 under a high-IRA uptake scenario compared to a scenario without the IRA. This could translate to a decrease of about $50 in the “generalized cost,” 98 i.e. the purchase price net of vehicle ownership and operation costs.99 The lower cost of operating an electric vehicle would translate to greater BEV uptake than EPA projects in its baseline fleet. This suggests, among other implications, that the Proposed Rule’s compliance costs may be lower than EPA projects, since automakers may already be closer to complying with the proposed standards under the baseline than EPA recognizes. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

98 Considering the average EV efficiency at 3 miles per kWh, a reduction of 0.45 cent per kWh equates to a savings of 0.15 cents per mile. Incorporating EPA’s assumptions for consumer fuel-cost calculations in their purchase decision—with an annual mileage of 12,000 miles, a 2.5-year fuel-cost valuation period, and a fueling efficiency factor of 0.9—this saving translates to around $50 = 2.5(years) ×{0.15(¢/mile)×12,000(miles/year)÷100(¢/$)}÷0.9.

99 Both producers and consumers use this metric in their decisionmaking processes. See RIA at 4-2 to 4-4.

The Appendix below includes four figures illustrating the data presented in this section. [EPA-HQ-OAR-2022-0829-0601, pp. 15-16]

Organization: Southern Environmental Law Center (SELC)

As noted throughout the proposed rulemaking, there are a number of factors that have resulted in increased ZEV adoption in recent years, and ZEV deployment is only expected to continue to accelerate. EPA, however, has developed a somewhat conservative estimate of BEV penetration in its No Action case59 which may mean it is underestimating the feasibility and impact of more stringent regulations. An inaccurate model that assumes artificially low BEV penetration is likely to cause EPA to adopt standards that are too lenient given business-as-usual conditions. [EPA-HQ-OAR-2022-0829-0591, pp. 7-8]

59 See id. at 29296.

Currently, EPA’s modeling of the No Action case does not account for state-level laws and policies that are likely to impact the nationwide deployment of ZEVs regardless of the status of the federal standards.60 For example, EPA did not seem to consider the Multi-State Medium-and Heavy-Duty Vehicle Memorandum of Understanding that has been signed by 18 jurisdictions and sets a goal of having at least 30 percent of all new medium-and heavy-duty vehicle sales be ZEVs by no later than 2030, and 100 percent of sales being ZEVs by no later than 2050.61 Additionally, although EPA used a sensitivity analysis to consider the impact of California’s Advanced Clean Cars II program, it did not include all jurisdictions that are committed to adopting these standards in its analysis.62 EPA also did not consider manufacturer and other private sector commitments to transition to ZEV fleets. These shifts, along with declining costs and other economic forces, are likely to increase baseline ZEV deployment. Finally, it is unclear whether EPA considered impacts of federal funding available under the Bipartisan Infrastructure Law (BIL) on ZEV deployment.63 The BIL and Inflation Reduction Act (IRA) offer significant funding and incentives for states, local governments, private individuals, and businesses related to ZEV manufacturing, charging infrastructure, and vehicles purchases, and many states and localities have made it a priority to maximize funding opportunities under these laws. EPA should therefore assume robust implementation and deployment of funds under these laws in its modeling. [EPA-HQ-OAR-2022-0829-0591, pp. 7-8]

60 Id.

61 Multi-State Medium-and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding, Ne. States for Coordinated Air Use Mgmt., https://www.nescaum.org/documents/mhdv-zev-mou-20220329.pdf (last updated Mar. 29, 2022).

62 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 83 Fed. Reg. 29334-35 (May 5, 2023). For example, EPA does not consider Virginia's adoption of the Advanced Clean Cars II standards. See Sarah Rankin, GOP leaders want to untie Virginia from California EV rule, AP NEWS (Aug. 26, 2022), https://apnews.com/article/technology-california-pollution-climate-and-environment-e661fe8026ab9ed8d5d521a14bee0858.

63 In explaining its No Action case, EPA makes no mention of the BIL and only notes "the availability of economic incentives for electric vehicles for both manufacturers and consumers provided by the IRA." Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 83 Fed. Reg. 29334-35 (May 5, 2023).

While there is always uncertainty in modeling, these are factors EPA should consider in the No Action case, rather than taking them into account only when assessing the feasibility of the standards [EPA-HQ-OAR-2022-0829-0591, pp. 7-8]

Organization: Valero Energy Corporation

10. EPA's baseline and sensitivity analysis is flawed.

a) EPA's application of price modifications in the "NTR" and "HDP2" no action scenarios is inconsistent with the Inflation Reduction Act and IRS's proposed implementation of 26 U.S.C. §30D.

In Section IV.B of the Preamble to EPA's proposal,53 EPA describes its approach for assessing the baseline case – or "no action" case – as well as several sensitivity cases. Within the Central Compliance Modeling for LDVs, EPA presents the results of two "no action" modeling runs:54 [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

53 EPA's Multi-Pollutant LMDV Proposal at 29295-29297.

54 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip.

- "NTR" run, which incorporates modeling of the impacts of the Inflation Reduction Act 55 (IRA) to LDV sales, and

- "NTA_noIRA" run, which does not. [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

55 117 H.R. 5376 (August 12, 2022).

Similarly, within the Central Compliance Modeling for MDVs, EPA presents the results of two "no action" modeling runs:56

56 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-md-central-compliance-run.zip.

- "HDP2" run, which incorporates modeling of the impacts of the IRA to MDV sales, and

- "HDP2_noIRA" run, which does not. [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

In both the NTR and HDP2 runs, EPA mis-applies the §30D tax credit in the following ways: [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

- As of April 18, 2023, only 14 light-duty vehicles in the MY 2023 fleet are eligible for any credit amount under §30D.57 Nonetheless, EPA applies a price modification to every BEV in the MY 2023 to MY 2032 analysis fleets, without any consideration of: [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

57 https://www.politico.com/news/2023/04/17/ev-treasury-department-regulation-00092123 and https://fueleconomy.gov/feg/tax2023.shtml, accessed 4/28/2023.

- Cost of the vehicle – the §30D tax credit is only available for pick-up trucks, vans and SUVs with an MSRP ≤ $80,000 and other qualified vehicles with an MSRP ≤ $55,000. The BEV to which EPA applies the price modification have OMEGA-projected prices ranging from $24,633 to $360,545;58 [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

- o Location of final assembly – from August 17, 2022, the §30D tax credit is only available for vehicles whose final assembly occurs in North America; [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

- o Battery components – Starting in 2023, the §30D tax credit requires an increasing percentage of battery components to be manufactured or assembled in North America; [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

- o Battery critical minerals – Starting in 2023, the §30D tax credit requires an increasing percentage of battery critical minerals to be extracted, processed or recycled in eligible locations; and [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

- o Purchaser income – the §30D tax credit is only available for taxpayers with adjusted gross income less than thresholds. [EPA-HQ-OAR-2022-0829-0707, pp. 11-12]

58 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "2023_03_25_11_46_49_ld_central_compliance_run_Proposal_vehicles/csv," Column AB.

b) EPA incorrectly accounts for the regionality of BEV adoption in its ACC II sensitivity scenario.

In reference to the Central "no action" case, EPA explains that its analysis "does not include the effect of state-level policies [] because many are still not in effect." 59 For the reasons discussed in detail below, we agree that EPA cannot rely upon a scenario in which a waiver is improperly granted for state policies that are unlawful due to Clean Air Act preemption.

Nevertheless, in anticipation of these state-level policies, EPA models an ACC II sensitivity scenario, "which includes the ZEV requirements of the California Advanced Clean Car (ACC) II program for California and other participating states."60 EPA further explains that "if California were to submit a waiver request for the ACC II program and EPA were to subsequently grant the waiver, then it may be appropriate to update the No Action case in the final rulemaking to reflect the ACC II program."61,62 [EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

59 EPA's Multi-Pollutant LMDV Proposal at 29296.

60 EPA's Multi-Pollutant LMDV Proposal at 29296.

61 EPA's Multi-Pollutant LMDV Proposal at 29334, footnote 737.

62 California submitted a waiver request for the ACC II program on May 22, 2023. See https://www.reuters.com/business/autos-transportation/california-seeks-us-approval-end-gas-only-new-vehicle- sales-by-2035-2023-05-23/.

In its development of the ACC II sensitivity modeling, EPA separates the base year fleet into two "regions,"63 such that: [EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

63 EPA's Multi-Pollutant LMDV Proposal at 29334.

- Vehicles sold into ACC II-adopting states ("ZEV regions") are subject to minimum BEV sales share constraints according to Annual ZEV Requirements in ACC II,64 and
- The remaining vehicle sales within a given fleet year ("non-ZEV regions") are subject to a "minimum BEV sales share value of zero."65 [EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

64 EPA's Multi-Pollutant LMDV Proposal at 29334.

65 EPA's Multi-Pollutant LMDV Proposal at 29334.

In the OMEGA modeling to support the ACC II sensitivity scenario, the minimum BEV sales share requirement for each region is applied as a new constraint within the existing model 66 – i.e., for the non-ZEV regions, which have a minimum BEV sales share of zero, the ACC II sensitivity treatment in OMEGA is no different from the underlying base model run.67 [EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

66 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-15-09-58-39-sensitivityACC2-3alts-20230314, "required_sales_share-body_style_zevregions_withACC2_20230222.csv."

67 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-15-09-58-39-sensitivityACC2-3alts-20230314.zip.

The fatal flaw in EPA's logic is that the underlying base model runs – i.e., the Central Case Alt_linear, Alt_minus10, Alt_plus10, NTR, NTR-noIRA, Proposal, and SAFE runs – do not consider the regionality of BEV adoption.68 By attempting to overlay regional constraints in a model that does not otherwise consider regionality, EPA is double-counting the BEV sales share in the high-adopting states. [EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

68 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip.

EPA provides the following data to define the "ZEV regions" and BEV sales share constraints in the ACC II sensitivity scenario.69 [EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

69 EPA's Multi-Pollutant LMDV Proposal at 29334.

Table 104. Sales share of U.S. new light-duty vehicles in states adopting ACC II, by model year

Model Years	Portion of U.S. new light-duty sales	States adopting ACC II
2018 to 2025	12.6%	CA
2026	22.6%	CA, MA, NY, OR, VT, WA
2027 and later	30.4%	CA, CO, CT, MA, MD, ME, NJ, NY, OR, RI, VT, WA

[EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

Table 105. ZEV Percentage sales requirement within states adopting ACC II, by model year

2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
14.5	17.0	19.5	22.0	35.0	43.0	51.0	59.0	68.0	76.0	82.0	88.0	94.0	100.0

[EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

Table 1 summarizes the nationwide BEV sales fractions projected by OMEGA for the "NTR" no action run within the ACC II sensitivity scenario.

Table 1 – BEV sales fraction under ACC II Sensitivity NTR scenario70

Model Year	2027	2028	2029	2030	2031	2032
Nationwide BEV sales fraction	0.325	0.421	0.494	0.523	0.524	0.545

[EPA-HQ-OAR-2022-0829-0707, pp. 12-14]

70 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-15-09-58-39-sensitivityACC2-3alts-20230314.zip, "2023_03_15_09_58_39_sensitivityACC2_3alts_20230314_NTR_summary_results.csv," Columns DU and BBW.

Although the OMEGA model output does not provide a breakout projection of BEV sales in states not adopting ACC II, one can calculate the information using Equations 1 and 2, below:

[See original for equation calculating the breakout projection of BEV sales in states not adopting ACC II] [EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

where:

BEVU.S. = Nationwide BEV sales fraction (Table 1)

BEVACCII = BEV sales fraction in ACC II adopting states (Table 104 from NPRM)71

BEVnon-ACCII = BEV sales fraction in non-ACC II adopting states (Table 2)

salesU.S. = percentage of U.S. new LDV sales occurring in the U.S. (= 100%)

salesACCII = percentage of U.S. new LDV sales occurring in ACC II adopting states (Table 105 from NPRM)72

salesnon-ACCII = percentage of U.S. new LDV sales occurring in non-ACC II adopting states (calculated per Eq-2)

71 EPA's Multi-Pollutant LMDV Proposal at 29334.

72 EPA's Multi-Pollutant LMDV Proposal at 29334.

????????−????? = ??????.?. − ?????????? Eq-2

[EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

Using the EPA data and equations cited above, Table 2 summarizes the BEV sales fractions that must be achieved in non-ACC II adopting states in order to meet the nationwide BEV sales fractions modeled by EPA in the ACC II sensitivity scenario. [EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

Table 2 – BEV sales fractions that would be needed for non-ACC II adopting states73

73 Example calculation for 2027: 0.28 = [(0.325 x 100%) - (0.43 x 30.4%)] / (100% - 30.4%).

Model Year	2027	2028	2029	2030	2031	2032
BEV sales fraction in non-ACC II adopting states	0.28	0.38	0.45	0.45	0.42	0.42

[EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

Inexplicably, the BEV sales fractions that would be needed for the non-ACC II adopting states under the ACC II sensitivity scenario (Table 2) are actually greater than the nationwide BEV sales fractions modeled in EPA's Central NTR scenario, which are provided in Table 3. [EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

Table 3 – BEV sales fractions modeled in EPA's Central NTR scenario74

74 EPA LMDV OMEGA GHG Compliance Modeling Runs (Document ID EPA-HQ-OAR-2022-0829-0486), 2023- 03-25-11-46-49-ld-central-compliance-run.zip, "2023_03_25_11_46_49_ld_central_compliance_run_NTR_summary_results.csv," Columns DL and ALG.

Model Year	2027	2028	2029	2030	2031	2032
Nationwide BEV sales fraction	0.27	0.32	0.41	0.41	0.40	0.39

[EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

What EPA fails to consider in the ACC II sensitivity scenario is that BEVs are already disproportionately adopted by states that have or will adopt ACC II. Eight of the ten top states for EV market share in the first quarter of 2023, as shown in the figure below published by the Alliance for Automotive Innovation (AAI),75 are also identified by EPA as ACC II-adopting states.76 With the LDV sales associated with those states separated into the "ZEV regions" bucket in the ACC II NTR sensitivity scenario, the "no action" BEV sales fraction in the remaining U.S. states must be less than the Central NTR nationwide average. [EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

75 AAI, "Get Connected Electric Vehicle Quarterly Report, First Quarter 2023, https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023%20Q1.pdf. In this figure, "EV" refers to the sum of BEV, PHEV and FCEV.

76 EPA's Multi-Pollutant LMDV Proposal at 29334.

[See original for graph titled "EV Market Share by State] [EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

Source: AAI "Get Connected Electric Vehicle Quarterly Report", First Quarter 2023 [EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

The modeled producer and consumer behaviors in response to the ACC II policy are not simply additive to the underlying no action (Central NTR) scenario, and EPA cannot reasonably project the impacts of an ACC II sensitivity case without first regionally disaggregating BEV sales within the Central NTR scenario. [EPA-HQ-OAR-2022-0829-0707, pp. 14-16]

c) EPA's ACC II sensitivity scenario relies on unreasonable assumptions regarding the implementation of the ACC II Program. [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

EPA fails to recognize and account for the following complexities of the ACC II Program in its ACC II sensitivity scenario modeling:

• ZEVs are not limited to BEVs. EPA assumes for the purposes of the ACC II sensitivity scenario that "ZEV" means "BEV" and fails to consider that FCEVs are also ZEVs.77 [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

77 California Code of Regulations Title 13, Section 1962.2(i)(18).

• EPA neglects to consider the compliance options and flexibilities available to manufacturers under ACC II. EPA assumes that the Annual ZEV Requirement under the ACC II Program relies wholly on BEV sales, whereas in reality, "manufacturers may meet a portion of their Annual ZEV Requirement with PHEV values, environmental justice values, or early compliance values."78 For instance, [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

78 California Code of Regulations Title 13, Section 1962.4(e).

- ACC II allows manufacturers to satisfy up to 20 percent of their Annual ZEV Requirement through the sale of qualifying PHEVs;79
- o ACC II offers multiplier incentives of up to 1.5x for vehicles used in certain Environmental Justice programs, up to 5 percent of a manufacturer's Annual ZEV Requirement;80 and

o Manufacturers may earn and apply early compliance credits, up to 15 percent of their Annual ZEV Requirement.81 [EPA-HQ-OAR-2022-0829-0707, pp. 16-18]

79 California Code of Regulations Title 13, Section 1962.4(e)(1).

80 California Code of Regulations Title 13, Section 1962.4(e)(2).

81 California Code of Regulations Title 13, Section 1962.4(e)(3).

A. EPA disregards obstacles to ZEV Penetration.

To support its conclusion that the automotive fleet is rapidly electrifying, EPA selectively references projections by third-party sources, but overlooks the caveats and qualifications that accompany these statements. For example, EPA cites to IHS Markit's prediction of "a nearly 40 percent U.S. PEV share by 2030."92 But IHS Markit also cautions that "specific compliance challenges vary from OEM to OEM"93, and according to Mike Fiske, an Associate Director of North America Powertrain Forecasting at IHS Markit, "manufacturers are also keenly aware of the risks associated with a rapid transition to electrification, [which include] consumer acceptance, vehicle range, and affordability among top concerns."94 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

92 EPA's Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles [hereinafter "Proposed Rule"] at 29189 (citing to IHS Markit, ''US EPA Proposed Greenhouse Gas Emissions Standards for Model Years 2023– 2026; What to Expect,'' August 9, 2021).

93 IHS Markit, ''US EPA Proposed Greenhouse Gas Emissions Standards for Model Years 2023– 2026; What to Expect,'' August 9, 2021, https://www.spglobal.com/mobility/en/research-analysis/us-epa-proposed- greenhouse-gas-emissions-standards-my2023-26.html.

94 Id.

EPA also relies on "[m]ore recent projections by Bloomberg New Energy Finance[, which] suggest that under current policy and market conditions, and prior to the IRA, the U.S. was on pace to reach 40 to 50 percent PEVs by 2030."95 However, BNEF's 2022 EV Outlook also provides as follows: [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

95 EPA's Proposed Rule at 29189 (citing to Bloomberg New Energy Finance (BNEF), ''Electric Vehicle Outlook 2022,'' Long term outlook economic transition scenario).

- "Despite the rapid rise in EV adoption, road transport is still not on track for carbon neutrality by 2050. Simply changing out the drivetrain of vehicles may not be the most efficient way to deliver net zero".96 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

96 Bloomberg New Energy Finance (BNEF), ''Electric Vehicle Outlook 2022,'' Long term outlook economic transition scenario, Executive Summary at 1.

- "Raw materials supply constraints for batteries also look very tight for the years ahead."97 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

97 Id.

- "China still dominates [EV battery manufacturing]".98 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

98 Bloomberg New Energy Finance (BNEF), ''Electric Vehicle Outlook 2022,'' Long term outlook economic transition scenario, Batteries at 1.

- "The timing for achieving battery pack prices below $100/kWh on a volume-weighted average basis has become less certain, as raw material prices have significantly impacted costs over the last 12 months."99 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

99 Id.

- “The total demand for lithium surpasses 2.4 million metric tons of lithium carbonate equivalent (LCE) in 2030, up 259% from current demand. Companies have invested in the chemical convertors that produce carbonate and hydroxide, while ignoring upstream raw material extraction. This has led to a squeeze in the upstream market driving lithium prices up over the last 18 months.”100 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

100 Bloomberg New Energy Finance (BNEF), ‘‘Electric Vehicle Outlook 2022,’’ Long term outlook economic transition scenario, Battery materials at 1.

- “About $5.4 billion is needed to ensure the building of 400,000 LCE in lithium raw material supply, a volume that is currently in the pipeline for 2021-2025 but not yet financed. For the chemical convertors, an additional 100,000t LCE carbonate and 300,000t LCE hydroxide capacity planned by 2025 still needs at least $8.4 billion to be successfully developed.”101 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

101 Id. (emphasis added)

- “The announced capacity of upcoming nickel sulfate projects will only be enough to meet demand up to 2023.”102 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

102 Bloomberg New Energy Finance (BNEF), ‘‘Electric Vehicle Outlook 2022,’’ Long term outlook economic transition scenario, Battery materials at 2.

- “The investment to build an extensive charging network is still small in comparison to the size of the electric vehicle market”.103 [EPA-HQ-OAR-2022-0829-0707, pp. 19-20]

103 Bloomberg New Energy Finance (BNEF), ‘‘Electric Vehicle Outlook 2022,’’ Long term outlook economic transition scenario, Charging infrastructure at 5.

Additionally, per EPA, when U.S. ZEV share predictions are “adjusted for the effects of the Inflation Reduction Act, this estimate increases to 52 percent.”104 Yet EPA’s source also caveats that “in 2021, Bloomberg report[ed], [that] less than 5% of new cars sold in the U.S. were electric.”105 EPA also cites to a “another study by the International Council on Clean Transportation (“ICCT”) and Energy Innovation that includes the effect of the IRA estimates that the share of BEVs will increase to 56 to 67 percent by 2032.”106 However, the ICCT’s estimates in this study are inclusive of California’s Advanced Clean Cars program and other Section 177 State adoptions of the Advanced Clean Cars program.107 As such, the scope of the ICCT’s study is not exclusive to an assessment of the IRA’s impact on U.S. ZEV penetration rates. Rather, it encompasses other factors that EPA does not properly account for, thus causing EPA to overestimate the impact of IRA incentives on ZEV penetration. The ICCT study at issue also highlights material context and conditions that EPA does not sufficiently consider in its proposal, including the following statements: [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

104 EPA’s Proposed Rule at 29189 (citing to Tucker, S., ‘‘Study: More Than Half of Car Sales Could Be Electric By 2030,’’ Kelley Blue Book, October 4, 2022)).

105 Tucker, S., ‘‘Study: More Than Half of Car Sales Could Be Electric By 2030,’’ Kelley Blue Book, October 4, 2022.

106 EPA’s Proposed Rule at 29189 (citing to International Council on Clean Transportation, ‘‘Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the US,’’ ICCT White Paper, January 2023).

107 International Council on Clean Transportation, ‘‘Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the US,’’ ICCT White Paper at 13, January 2023.

• “The EV and ZEV sales shares [the ICCT] present[s] are not guaranteed and there remains uncertainty in the electrification transition, especially after the IRA tax credits expire.”108 [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

108 International Council on Clean Transportation, ‘‘Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the US,’’ ICCT White Paper at ii, January 2023.

• The ICCT’s analysis “does not account for other non-financial barriers such as lead time for vehicle manufacturing and charging infrastructure development”.109 [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

109 Id. at iii.

• “The rates of electrification [the ICCT] project[s] here can only be achieved if government and industry invest quickly in ZEV assembly and infrastructure.”110 [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

110 Id.

• “[The ICCT’s] modeling approach carries limitations. The GCAM model logit function is based on a single numerical value that orders consumer purchase preferences. This choice indicator approach does not necessarily capture individual preferences, local variations in cost, and other personal factors that would result in economically inferior choices. Furthermore, should battery prices not decline as predicted or consumer acceptance of electric vehicles stalls, our forecasts could be overly optimistic.”111 [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

111 Id. at 17 (emphasis added).

• “There are two key non-financial barriers not accounted for in this study: manufacturing lead time and charging infrastructure lead time.”112 [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

112 Id.

• “Future supply chain development, particularly for materials used in battery production, is uncertain, as is infrastructure availability.”113 [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

113 Id. At 18.

EPA’s DRIA further provides that “Goldman Sachs projects a 50 percent share for BEVs in the U.S. in 2030, 70 percent in 2035 and 85 percent in 2040.”114 But EPA ignores factors outside the control of regulators and OEMs alike that will be material to the feasibility of EPA’s proposal and are highlighted in EPA’s own citational support. Specifically, the Goldman Sachs forecast states that “the EV sector is beset by some major crosscurrents”, which include “ring prices for electrical power” and “inflation for the materials that make up battery components”.115 Further, “[t]he EV sector has some challenges in the near term.” This includes “‘greenflation’, as demand for batteries pushes up prices for key materials involved in making them, according to strategists in Goldman Sachs Research.”116 These strategists “expect battery costs to increase 6% in 2023 from the year before”.117 Collectively, these issues illustrate the neglected assumptions underpinning EPA’s central trajectory for LD ZEV sales and supporting infrastructure. These issues are central to EPA's proposal and make EPA's proposal unreasonable, arbitrary and contrary to law. [EPA-HQ-OAR-2022-0829-0707, pp. 20-22]

114 DRIA at 3-14 (citing to Goldman Sachs, “Electric vehicles are forecast to be half of global car sales by 2034” (Feb. 10, 2023) https://www.goldmansachs.com/intelligence/pages/electric-vehicles-are-forecast-to-be-half-of- global-car-sales-by-2035.html).

115 Goldman Sachs, “Electric vehicles are forecast to be half of global car sales by 2034” (Feb. 10, 2023) https://www.goldmansachs.com/intelligence/pages/electric-vehicles-are-forecast-to-be-half-of-global-car-sales- by-2035.html .

116 Id.

117 Id. B. EPA disregards caveats regarding ZEV production capabilities.

EPA cites to “[a] proliferation of announcements by automakers in the past two years[,] signal[ing] a rapidly growing shift in product development focus among automakers away from internal-combustion technologies and toward electrification.”118 Drawing support from these announcements, EPA concludes that it is feasible within the next decade to force transition of the domestic LDV fleet to BEV largely on the basis of third-hand sources and news articles taken out of context. Though EPA acknowledges in passing that “manufacturer announcements such as these are not binding, and often are conditioned as forward-looking and subject to uncertainty[,]”119, EPA’s proposed rule is not characterized by any reciprocal flexibilities to adjust ambitious targets in order to accommodate material realities and uncertainties impacting BEV production. In contrast to EPA’s projections, the same OEMs EPA cites to for support of the Proposed Rule have raised material concerns with an accelerated transition to LD BEVs. [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

118 EPA’s Proposed Rule at 29190.

119 EPA’s Proposed Rule at 29193.

For example, EPA cites to a May 2021 announcement from Ford, providing that “they expect 40 percent of their global sales will be all-electric by 2030.”120 However, the Ford press release EPA cites to also contains the following laundry list of caveats:121 [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

120 EPA’s Proposed Rule at 29190 (citing to Ford Motor Company, ‘‘Superior Value From EVs, Commercial Business, Connected Services is Strategic Focus of Today’s ‘Delivering Ford+’ Capital Markets Day,’’ Press Release, May 26, 2021).

121 Ford Motor Company, ‘‘Superior Value From EVs, Commercial Business, Connected Services is Strategic Focus of Today’s ‘Delivering Ford+’ Capital Markets Day,’’ Press Release, May 26, 2021).

“Cautionary Note on Forward-Looking Statements

Statements included or incorporated by reference herein may constitute ‘forward- looking statements’ within the meaning of the Private Securities Litigation Reform Act of 1995. Forward-looking statements are based on expectations, forecasts, and assumptions by our management and involve a number of risks, uncertainties, and other factors that could cause actual results to differ materially from those stated, including, without limitation: [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford and Ford Credit's financial condition and results of operations have been and may continue to be adversely affected by public health issues, including epidemics or pandemics such as COVID-19; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford is highly dependent on its suppliers to deliver components in accordance with Ford's production schedule, and a shortage of key components, such as semiconductors, can disrupt Ford's production of vehicles; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's long-term competitiveness depends on the successful execution of its Plan;

- Ford's vehicles could be affected by defects that result in delays in new model launches, recall campaigns, or increased warranty costs; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford may not realize the anticipated benefits of existing or pending strategic alliances, joint ventures, acquisitions, divestitures, or new business strategies; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Operational systems, security systems, and vehicles could be affected by cyber incidents and other disruptions; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's production, as well as Ford's suppliers' production, could be disrupted by labor issues, natural or man-made disasters, financial distress, production difficulties, or other factors; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's ability to maintain a competitive cost structure could be affected by labor or other constraints; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's ability to attract and retain talented, diverse, and highly skilled employees is critical to its success and competitiveness; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's new and existing products and mobility services are subject to market acceptance and face significant competition from existing and new entrants in the automotive and mobility industries; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's results are dependent on sales of larger, more profitable vehicles, particularly in the United States; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- With a global footprint, Ford's results could be adversely affected by economic, geopolitical, protectionist trade policies, or other events, including tariffs; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Industry sales volume in any of Ford's key markets can be volatile and could decline if there is a financial crisis, recession, or significant geopolitical event; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford may face increased price competition or a reduction in demand for its products resulting from industry excess capacity, currency fluctuations, competitive actions, or other factors; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Fluctuations in commodity prices, foreign currency exchange rates, interest rates, and market value of Ford or Ford Credit's investments can have a significant effect on results; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford and Ford Credit's access to debt, securitization, or derivative markets around the world at competitive rates or in sufficient amounts could be affected by credit rating downgrades, market volatility, market disruption, regulatory requirements, or other factors; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford's receipt of government incentives could be subject to reduction, termination, or clawback; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford Credit could experience higher-than-expected credit losses, lower-than-anticipated residual values, or higher-than-expected return volumes for leased vehicles; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Economic and demographic experience for pension and other postretirement benefit plans (e.g., discount rates or investment returns) could be worse than Ford has assumed; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Pension and other postretirement liabilities could adversely affect Ford's liquidity and financial condition; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford could experience unusual or significant litigation, governmental investigations, or adverse publicity arising out of alleged defects in products, perceived environmental impacts, or otherwise; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford may need to substantially modify its product plans to comply with safety, emissions, fuel economy, autonomous vehicle, and other regulations; [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford and Ford Credit could be affected by the continued development of more stringent privacy, data use, and data protection laws and regulations as well as consumers' heightened expectations to safeguard their personal information; and [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- Ford Credit could be subject to new or increased credit regulations, consumer protection regulations, or other regulations. [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

- We cannot be certain that any expectation, forecast, or assumption made in preparing forward-looking statements will prove accurate, or that any projection will be realized. It is to be expected that there may be differences between projected and actual results. Our forward-looking statements speak only as of the date of their initial issuance, and we do not undertake any obligation to update or revise publicly any forward-looking statement, whether as a result of new information, future events, or otherwise. For additional discussion, see "Item 1A. Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2020, as updated by subsequent Quarterly Reports on Form 10-Q and Current Reports on Form 8-K." [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

Moreover, in March 2023, figures released by Ford highlighted that Ford Motor Co.'s EV business had lost $3 billion before taxes during the past two years and will lose a similar amount this year as the company invests heavily in EV technology.122 Ford's 10-K filed in February 2023 further disclosed: [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

122 Krishner, Tom, Associated Press, "Ford's electricitv vehicle unit losing billions, as company invests in new technology" (March 23, 2023), https://www.pbs.org/newshour/economy/fords-electric-vehicle-unit-losing- billions-as-company-invests-in-new-technology; see also Ford News Release, "'Refounded' Ford to Show How Customer-Focused Segments Will Drive Value and Growth, Changes in Financial Reporting (March 23, 2023) https://media.ford.com/content/fordmedia/fna/us/en/news/2023/03/23/_refounded_-ford-to-show-how-customer-focused-segments-will-driv.html.

- "We have announced plans to significantly increase our electric vehicle production volumes; however, our ability to produce higher volumes of electric vehicles is dependent upon the availability of raw materials necessary for the production of batteries, e.g., lithium, cobalt, nickel, graphite, and manganese, among others."123 [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

123 Ford 10-K Annual Report (Feb. 3, 2023) https://shareholder.ford.com/Investors/financials/sec-filings/sec-filings- details/default.aspx?FilingId=16361873 (emphasis added).

- "As a result of the competition for and limited availability of the raw materials needed for our electric vehicle business, the costs of such materials are difficult to accurately forecast as they may fluctuate during the term of the offtake agreements and other long-term purchase contracts based on market conditions. Accordingly, we may be subject to increases in the prices we pay for those raw materials, and our ability to recoup such costs through increased pricing to our customers may be limited. As a result, our margins, results of operations, financial condition, and reputation may be adversely impacted by commitments we make pursuant to offtake agreements and other long-term purchase contracts."124 [EPA-HQ-OAR-2022-0829-0707, pp. 22-25]

124 Ford 10-K Annual Report (Feb. 3, 2023) https://shareholder.ford.com/Investors/financials/sec-filings/sec-filings- details/default.aspx?FilingId=16361873 (emphasis added).

Organization: Western Energy Alliance

EPA relies on rosy market projections, citing a Bloomberg New Energy Finance analysis suggesting that, "under current policy and market conditions, and prior to the IRA, the U.S. was on pace to reach 40 to 50 percent PEVs by 2030. When adjusted for the effects of the Inflation Reduction Act, this estimate increases to 52 percent." (p. 29189) EPA also cites the International Council on Clean Transportation as projecting an increase in new car sales of 67%. EPA should conduct a more robust market analysis with less biased sources if it is to avoid the charge of being arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0679, p. 8]

EPA Summary and Response

Multiple commenters (Hyundai, Environmental and Public Health Organizations) recommended that EPA include California's ACC II and ACT regulations in our No Action case modeling. In response, for this final rulemaking analysis EPA is again including ACT for medium-duty vehicles, but is not including ACC II for light-duty vehicles in the No Action case. At the time of this rulemaking EPA has not issued a waiver for ACC II. This rule is independent from ACC II standards and our feasibility analysis does not depend on the implementation of ACC II, as discussed further in RTC Chapter 2.3. A sensitivity envisioning a fully implemented

ACC II – based on the participating states, and their respective vehicle sales shares – is included in the State-Level Policies sensitivity, as we discuss in preamble section IV.F. This sensitivity assumes nearly 100% of the Section 177 states achieving the ZEV sales share requirements specified in ACC II. And so, the actual effect of ACC II should be something between the No Action case (assuming no state-level policy effects) and 100% of the state-level policy effects. In this way, Hyundai's expectations of actual ACC II realization should fall somewhere between those two cases. EPA's analysis of the medium-duty GHG standards does include California's ACT regulations in the No Action case. This treatment of a state-level policy in the medium-duty central case analysis is different than for light-duty because EPA has granted a waiver for California's ACT program.

California Attorney General's Office et al. commented in support of EPA's decision to not include modeling of ACC II in the No Action case, and observed that if EPA had included it for the NPRM analysis, the estimated costs of the standards would be lower. EPA agrees with this assessment. The commenter is correct that in EPA's "State-level ZEV policies" sensitivity analysis, the No Action case PEV penetrations are higher, and the costs are lower than the central case. Results for this sensitivity are presented in RIA Chapter 12.1.4.

The Center for American Progress and ACEE commented that EPA's No Action case was conservative in terms of the number of BEVs projected for the NPRM. The commenters cited other projections with higher BEV penetrations than the No Action case in EPA's central analysis. The Center for American Progress cited an ICCT study that accounted for the effects of ACC II and IRA incentives, and with BEV penetrations for 2032 that approached the level of EPA's NPRM projections for the Action case. In response, as discussed above, EPA did not include ACC II in the central case for this final rulemaking analysis. EPA's No Action case PEV penetrations are a function of multiple considerations, inputs and assumptions. Among these considerations are various third-party projections of technology penetration rates in the absence of new standards. The particular study cited by the commenter shows projected PEV penetrations that are higher than the range of studies used by EPA in the calibration of the No Action case PEV market, as described in RIA Chapter 4.1. While EPA has concluded that the level of PEVs projected in our No Action case is not overly conservative, we acknowledge that higher levels such as those cited by the commenter may be plausible, as illustrated by several of the sensitivity cases presented in RIA Chapter 12. Such higher PEV levels further support the feasibility of the final standards.

Western Energy Alliance commented that EPA's No Action case BEV projections were based on "rosy market projections," and recommended that EPA should conduct a market analysis using "less biased sources". In response, EPA disagrees that the third-party sources considered when developing the No Action BEV projections were biased, and we note that the commenter does not provide any explanation or evidence for the assertion of bias. EPA has continued to monitor new studies on this topic, and where appropriate incorporate those studies from respected third-party organizations that specialize in analysis and projections for the automotive market. A discussion of the range of studies considered for the analysis of the No Action case in this final rulemaking is provided in RIA Chapter 4.1.

Valero asserted that EPA projections of BEVs in the No Action case for the "State-level ZEV policies" sensitivity case were incorrect because of double-counting of BEVs in the non-ACC II regions. In the words of the commenter, "[b]y attempting to overlay regional constraints in a model that does not otherwise consider regionality, EPA is double-counting the BEV sales share in the high-adopting states." In response, EPA disagrees that BEV sales are double counted in the ACC II sensitivity. The commenter has apparently incorrectly concluded that the single-region National BEV sales from the central case are carried over unchanged into the non-ZEV region of the sensitivity analysis, and that the ZEV-region BEV sales are added to those carried over sales, which, if it were true, would thus generate an inappropriately high level of total BEV sales. Actually, the model does not use this approach. Instead, the sensitivity analysis has unique input files (vehicles.csv and context_new_vehcile_market.csv) which define the overall sales volumes for the analysis context separately for the two regions. As a result, the sales of the non-ZEV region for the ACC II sensitivity case are appropriately only a portion of the National sales for the central case. Accordingly, the overall BEV sales for the non-ZEV region for the ACC II sensitivity will tend to be less National BEV sales of the central case, contrary to the commenter's assertion that central case BEV sales were "simply additive."

13 - Consumer considerations

13.1 - Response to recurrent comments

Among the comments in this section, which appear below, several themes emerged. For brevity and clarity, we address those recurrent comments here in this introduction titled Response to Recurrent Comments. We also note at the outset that the vast majority of comments address consumer considerations regarding light-duty BEVs and PHEVs; a smaller number of comments addressed consumer considerations regarding ICE and hybrid vehicles and medium-duty vehicles.

First, in several comments, the standards are characterized as plug-in electric vehicle (PEV) mandates, using a variety of terminology such as "mandate", "force", "require", "drive consumers to purchase products", "prescriptive policy", and "dictating". Similarly, in many comments, OMEGA estimates of vehicle technology market shares appear to be perceived and described as a "mandate", "requirement", "preferred option", or "single technology pathway." For example, the American Free Enterprise Chamber of Commerce states that the feasibility of the rule "critically depends on the electric-vehicle adoption rates it projects for model years 2027 through 2032." Relatedly, some commenters appear to perceive and describe the standards and the compliance pathway as not being technology neutral. For example, the National Association of Convenience Stores (NACS) et al. asserts that the "proposal … artificially tilts the scale toward electric vehicles." In these and all similar comments, these misunderstandings and misrepresentations of the standards and compliance pathways are incorrect. As a consequence, subsequent arguments based on these mischaracterizations are invalid.

In response, the standards do not mandate PEV adoption; the standards are performance-based emissions standards and manufacturers choose the mix of technologies to comply (e.g., see Preamble I.B.1). In the final rulemaking, we clarify the nature of the standards and demonstrate several alternate pathways for compliance in the RIA in addition to the central case. We have demonstrated multiple potential compliance pathways that include ICE vehicle, hybrids, BEVs, and PHEVs. See sensitivity scenarios in Chapter 4.1 and Chapter 12.1.4 of the RIA. Among alternative pathways, we demonstrate that manufacturers can comply with these standards without increasing the market share of BEVs (i.e., see the No Additional BEVs case, RIA Chapter 12.1.4.4 and Section IV.F.5 of the Preamble).

We respond further by noting that the converse of this faulty PEV mandate argument is also incorrect; the standards and the OMEGA estimates of technology shares do not limit the ability of manufacturers to produce, or for consumer to purchase, ICE vehicles. Likewise, further extensions of this incorrect notion, such as fossil fuel bans, are also incorrect. The central case estimates in the FRM present the most reasonable estimate of vehicle technology market shares according to our analyses. However, within the flexibility of these standards, we expect that manufacturers will choose their respective compliance pathways and match their production portfolio to the highly varied demands of their diverse customers (e.g., households, farmers, ride-hailing drivers, commuters, businesses).

Second, many commenters suggested that EPA's estimates of PEV acceptance (aka demand, attitudes, preferences) and PEV market shares are unreasonable or, for example, "extremely aggressive." In contrast, some commenters assert that EPA's estimates of PEV acceptance and market shares are not sufficiently reflective of state initiatives and manufacturer commitments, and therefore, estimated PEV market shares were too low. According to the California Air Resources Board, "the proposal is not only achievable, but that manufacturers could exceed the standards."

In response, the PEV market shares projected in the FRM central case are reasonable estimates of vehicle technology market shares according to the parameters of our analyses. Our parametrization of PEV acceptance is based on the scientific literature on consumer acceptance, and the resulting central case estimate of future PEV market shares in the No Action case is consistent with third-party estimates that do include projected effects of the IRA and do not include projected effects of this rule (See RIA Chapter 4.1.2). Importantly, we acknowledge the uncertainty inherent in any estimate, and as a result, we have tested the sensitivity of our modeling to different parameterizations of PEV acceptance. Through these sensitivities, we show that compliance does not rely or rest on a specific assumption about PEV acceptance, and therefore, also does not rest upon, for example, the "effect of interacting policies on consumer acceptance." Rather, compliance can be achieved across a broad range of potential developments in consumer acceptance.

Third, some commenters advocate for greater certainty. For example, Consumer Reports states, "By guaranteeing that greater numbers of EVs will be manufactured in the coming years, the new standards will help give private industry the confidence it needs to invest in infrastructure." The corollary is that PEV adoption will also rise since charging access enables PEV adoption. While we agree with this logic, according to our analyses and assuming manufacturers engage in cost-minimizing decision making,[470] EPA's central case projections for vehicle technology shares are likely. As such, we agree with Zero Emissions Transportation Association's (ZETA's) comment that "the adoption of more stringent emissions standards would incentivize the production of more EVs" among the many available technologies that manufacturers may choose in complying with the standards—not guarantee that result. We note that beyond our central case analysis, we have demonstrated through a range of sensitivity

[470] Specifically, OMEGA, incorporates RSEs, technology costs, and other inputs into its algorithms for finding cost-efficient pathways for manufacturers to achieve compliance with desired emissions standards.

scenarios that manufacturers can comply with the standards through a range of technology pathways, including various mixes of ICE, hybrids, PHEVs and BEVs.

Fourth, several commenters stated that these standards would reduce consumer choice, with Competitive Enterprise Institute going so far as to suggest that the standards amount to a "cartelization of the auto industry." We disagree. In response and in contrast to those comments, consumer choice can be preserved and expanded through a variety of combinations of body styles, price points, and powertrains not yet available in today's vehicle market. Greater numbers and diversity of PEVs introduce choices that past consumers did not have, choices that consumers might have made if more PEV options had been available. For example, Forsythe et al. (2023) found that the projected reductions in the BEV price-premium "have driven substantial increases in consumer choices of BEV cars and SUVs over their conventional gasoline vehicle counterparts." Continuing ZETA's comment from above, "the adoption of more stringent emissions standards would incentivize the production of more EVs to meet growing consumer demand while also spurring innovation and increased model availability to meet the needs of an increasingly wider range of consumers." We have seen evidence of a favorable response to increased PEV options, as noted by commenters, enthusiastic response to the introduction of BEV pickup and SUV models. In general, CALSTART expects growth in consumer choice and in "equitable access to clean transportation options."

Regarding non-PEVs, the findings from Consumer Reports (CR) indicate that vehicle options will most likely increase, on the whole, with substantially more vehicle options that meet the desire of the majority of consumers for improved fuel economy. CR states that the remaining non-PEVs "will have to compete with better and better EV offerings," especially in light of "consumer demand for cleaner, more efficient gasoline vehicles." Preference for more efficient vehicles is supported by a preponderance of survey evidence provided by commenters. For example, CR finds that "seven in ten American drivers say that fuel economy is either 'very important' or 'extremely important'" to their purchase decision; "43% of drivers selected improvement in fuel economy" as the attribute of their vehicles that leaves the most room for improvement; and "85% of Americans agree that automakers should continue to improve fuel economy across vehicle types." Relatedly, we have assumed in our modeling that ICE vehicle emissions will not worsen.

Fifth, several commenters, including the Alliance for Automotive Innovation, state that "customers may simply reject new offerings and remain in older vehicles longer, further increasing the rising average age of vehicles on the road and delaying rollouts of other technologies. Any of these outcomes would detract from achieving the agency's overall goals of reduced emissions and improved fuel economy." In response, EPA models the interaction of producer production decisions and consumer purchase decisions, where these decision makers minimize their respective estimation of costs. See RIA Chapter 2.6 and RIA Chapter 4.1. In addition, "OMEGA estimates the effects of a policy on new vehicle sales volumes as a deviation from the sales that would take place in the absence of the standards." See RIA Chapter 4.4.1. As a result, our modeling accounts for consumers who choose not to purchase a new vehicle. Our modeling also accounts for consumers that will not purchase PEVs and purchase ICE vehicles instead. Furthermore, our modeling takes into account the cost and non-cost criteria that influence consumer purchase decisions, many of which were highlighted by commenters. Since our modeling accounts for changes in sales as a result of the standards, we disagree with commenters' claims that an unaccounted for "rejection of new offerings" will yield an aging vehicle fleet, delayed technology rollouts, and fewer emissions reductions. It's worth noting that this is a familiar critique and is called the Gruenspecht Effect. Notably, EPA does in fact model changes in sales as the result of the standards. See RIA Chapter 4.4. Furthermore, given the nature of transportation and vehicle mileage accumulation in the U.S., most existing vehicles will eventually be scrapped and replaced.[471] In the presence of these standards, that future vehicle is likely to be more fuel efficient than it would be otherwise.

We note that commenters further attribute a hypothesized unwillingness or inability of consumers to purchase the vehicles comprising a compliant fleet to a variety of factors such as technology costs, vehicle purchase price, ownership costs, affordability, inconvenience, access, reliability, and durability. In short, some commenters disagree with EPA's characterization of consumer demand, purchase decisions, and behavior. We address assertions regarding the underpinnings of consumer demand, purchase decisions, and behavior in more detail in subsequent sections. We believe that Our representations of ICE vehicle and PEV acceptance and consumer attitudes and preferences, purchase decision, and behavior are based on the scientific literature in the public record, as discussed in RIA Chapter 4.1. The resulting central case estimates of future vehicle technology market shares in the No Action case are consistent with third-party estimates. Our consumer-related modeling assumptions and methods are substantiated and reasonable and based on the best available information including our consideration of the public comments, as are the resulting estimates.

Sixth, many comments cite historical and current statistics (e.g., sales, survey results), prices (e.g., vehicles, fuels), costs (e.g., battery, emissions control technology, infrastructure), and availability (e.g., critical mineral, charging stations and ports) to argue the inaccuracy of EPA's projections. In response, we note that the information provided by commenters comes from a wide variety of sources, some of which agree and some of which do not. These differences and similarities occur for a variety of generally accepted reasons (e.g., timing of the study, survey design, sampling population, sample design) and from a variety of familiar sources (e.g., academic journals, media, public and private sector reports). We question the strength of an argument based on those quantities alone, especially those that do not take into account the dynamic nature of vehicle markets (e.g., See RIA Chapter 4.1 regarding diffusion of innovations). Instead, to commenters for whom these historical or current quantities are at the crux of their argument, we reply that scientific, regulatory, governmental, consumer, and manufacturing communities are in agreement that a significant transition toward PEVs is underway. We project and substantiate changes in vehicle markets over the next 8 years. Throughout the Preamble and RIA, we provide detailed descriptions of the analyses behind the conclusions we reach. We offer our detailed analyses as our response to comments for which historical and current quantities are at the crux of their arguments.

Lastly, consumer characteristics, issues, impacts, and consideration and therefore comments regarding consumers cannot be siloed. Many of the comments addressed here regarding consumer preferences and attitudes, purchase decision, ownership behavior, and savings and

[471] Specifically, EPA projects changes in new vehicle sales as a result of the standards and associated changes in new vehicle purchase prices. EPA also accounts for the distributions of vehicle age and VMT across the vehicle stock. The net effect of this approach is that the small reduction in new vehicle sales tend to increase the portion of miles driven by older vehicles, and therefore tend to increase their overall impacts relative to a case where there is no change in new sales. Our modeling includes a consumer choice element that considers out-of-pocket expenses when purchasing a new vehicle, projected operating savings and incentives available by the IRA.

expenses relate to other aspects of this rule. We also acknowledge that this is especially true for comments regarding PEV acceptance, the consumer-facing nature of PEV technology and the interconnectedness of PEV acceptance and other market conditions. Specifically, many commenters correctly link consumer demand for and acceptance of vehicle technologies, particularly PEV technology, to vehicle attributes such as body style, range, battery durability, and price; fueling and charging conditions such as feasibility of home and work charging, access to public charging, time to fuel and charge, reliability of EVSE; and other factors. In response to all of the comments in this chapter, we address only consumer aspects of the comments here and refer readers to the substantive analyses regarding other related aspects of this rule to the relevant sections of this RTC, the RIA, and the Preamble.

13.2 - Consumer demand

Comments by Organizations

Organization: Alliance for Automotive Innovation

C. Historical Technology Adoption Versus EV Penetration Assumptions

Figure 2 shows the penetration rate of automotive technologies that have been introduced in the last nineteen years. Technologies that follow the most aggressive growth curve are those that are generally transparent to the customer. Eight speed transmissions, gasoline direct injection (GDI) engines, and stop-start have become standard features, and have little or no impact on customer driving behaviors. BEVs, on the other hand, require drivers to make active changes to their driving habits and potentially additional investments (e.g., home charging equipment). In short, BEVs require change, whereas many of the most successful automotive technologies do not. [EPA-HQ-OAR-2022-0829-0701, pp. 29-30]

EPA is assuming that automobile manufacturers can increase BEV production as quickly as they have adopted new transmission or engine technologies, despite the need to build entirely new supply chains and manufacturing facilities. Underlying such rapid growth is also an assumption that the majority of new vehicle buyers will accept BEVs and their inherent changes to driving habits. [EPA-HQ-OAR-2022-0829-0701, pp. 29-30]

[See original comment for Figure 2: Examples of historical automotive technology adoption29 compared to projected BEV market share under the EPA proposal.30]

29 U.S. Environmental Protection Agency, Automotive Trends Report (Mar. 2023), Detailed data. Available at htps://www.epa.gov/automotive-trends/explore-automotive-trends-data#DetailedData. See Detailed Real-World Fuel Economy, CO2 Emissions, and Vehicle Attribute and Technology data.

30 Reflects EPA proposal, central analysis.

EPA has assumed a steep growth in BEV adoption at rates typically only seen in the evolution of disruptive technologies such as the cell phone, the television and microwave ovens, all of which added significant direct convenience and other benefits to customers and that cost substantially less at the time of purchase than an automobile. BEVs, on the other hand, have not thus far experienced such rapid adoption. In terms of convenience or additional new utility, BEVs offer generally superior acceleration performance, home refueling (a convenience not available to all customers), potentially lower fuel costs (that are dependent on where and when a vehicle is charged), and environmental benefits (important to some, but transparent to many). [EPA-HQ-OAR-2022-0829-0701, p. 31]

Thus, EPA makes an extremely aggressive assumption for a nascent technology that has not been fully embraced by the consumer and that faces many additional industrial and market challenges. [EPA-HQ-OAR-2022-0829-0701, p. 31]

Rapid adoption is generally achieved through customer interest and demand for products. According to the latest JD Power EV Index, the percentage of Americans who say they are "very unlikely" to buy an electric vehicle as their next car is growing.34 JD Power has found that the EV-skeptic contingent has steadily grown from 18% to 21% of respondents between January and March 2023. Those "very likely" to go electric has stayed flat this year at 27%.35 These trends are seen across buyer demographics as well. While the majority of baby boomers and pre-boomers are not considering EVs, 33% of Generation Z shoppers also told JD Power they were either "somewhat unlikely" or "very unlikely" to buy an EV.36 [EPA-HQ-OAR-2022-0829-0701, p. 32]

34 JD Power (2023, May 1). EV Divide Grows in U.S. As More New-Vehicle Shoppers Dig in Their Heels on Internal Combustion. JD Power E-Vision Report. Retrieved June 10, 2023, from htps://www.jdpower.com/business/resources/ev-divide-grows-us-more-new-vehicle-shoppers-dig-their-heels- internal-combustion

35 JD Power (2023, May 1). EV Divide Grows in U.S. As More New-Vehicle Shoppers Dig in Their Heels on Internal Combustion. JD Power E-Vision Report. Retrieved June 10, 2023, from htps://www.jdpower.com/business/resources/ev-divide-grows-us-more-new-vehicle-shoppers-dig-their-heels- internal-combustion

36 JD Power (2023, May 1). EV Divide Grows in U.S. As More New-Vehicle Shoppers Dig in Their Heels on Internal Combustion. JD Power E-Vision Report. Retrieved June 10, 2023, from htps://www.jdpower.com/business/resources/ev-divide-grows-us-more-new-vehicle-shoppers-dig-their-heels- internal-combustion

b) Market Concerns

The premise that “Modern vehicles have sufficient power without the use of enrichment”288 is highly subjective and ultimately decided by the customer and their increasing demand for vehicle utility. Such a broad declaration gives the impression that EPA believes that vehicle utility has reached a practical zenith or that any incremental utility can and should now be capped in order to facilitate a new, narrow emissions reduction strategy through the elimination of enrichment. This is in contrast with EPA’s historical practice of setting performance-based standards that generally assume at least maintaining current levels of performance (i.e., not negatively affecting a vehicle’s utility). [EPA-HQ-OAR-2022-0829-0701, pp. 182-183]

288 NPRM at 68.

New vehicle purchasers generally desire increased vehicle features, including power, not less. Power, and the enhanced utility and driving dynamics it enables, are core customer-demanded functional attributes of a vehicle and engine combination. The preference of customers for improved features transcends all price points and vehicle segments. New vehicle purchasers consistently raise the bar on what they decide to be sufficient. [EPA-HQ-OAR-2022-0829-0701, pp. 182-183]

In the past, customers who sought greater vehicle utility or higher performance did so through selection of optional engines with greater displacement. However, industry, driven in part by GHG and fuel economy regulations, has developed entire families of downsized engines that have proven capable of meeting customer demands for power while simultaneously increasing efficiency and lowering GHG emissions. This is exactly the strategy that EPA previously identified as the technological pathway to meeting increasingly stringent GHG emissions regulations while maintaining existing performance levels. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Enrichment is a critical strategy that has enabled this technological shift to lower displacement engines, ensuring their safe and durable operation in transient high-power demand situations. Manufacturers use enrichment to ensure that when customers demand high power, they can do so without the risk of costly damage or interrupted performance. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Customer needs for power include, but are not limited to, the ability to tow a large trailer up an occasional steep grade, to operate the vehicle with a full load of passengers and cargo, and to rapidly accelerate on a short freeway entrance ramp to safely merge into traffic. Other customers, for example those purchasing supercars, expect superior performance and racetrack i. In each case, the power requirement from the engine depends on the customer’s usage, and if its “sufficient power” is inadequate to accomplish their task, then the customer may be exposed to potentially unsafe and inadequate operation and will be dissatisfied with their vehicle’s utility. A sudden reduction or interruption of power in the midst of a driving maneuver (e.g., passing on a grade) could be disruptive to the driver and confusing to other drivers. In some cases, this may create an unsafe traffic condition if the vehicle suddenly loses power, forcing other drivers to take evasive actions. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Customers who seek specific power levels and are dissatisfied with the reduced power of downsized engines due to prohibitions on enrichment would likely revert to seeking out higher displacement engines or shift into larger vehicle segments. Worse yet, customers may simply reject new offerings and remain in older vehicles longer, further increasing the rising average age of vehicles on the road and delaying rollouts of other technologies. Any of these outcomes would detract from achieving the agency’s overall goals of reduced emissions and improved fuel economy. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

The agency’s conclusion that compliance with the proposed rule is feasible critically depends on the electric-vehicle adoption rates it projects for model years 2027 through 2032. EPA expects that by 2032, 67 percent of light-duty vehicles and 46 percent of medium-duty vehicles will be battery-electric. 88 Fed. Reg. at 29,329, 29,331. Those numbers are staggering. Current adoption rates are much lower, and the assumptions that EPA makes to project such sizeable increases are unwarranted. [EPA-HQ-OAR-2022-0829-0683, p. 19]

a. Current Adoption Of Electric Vehicles

Today, battery-electric vehicles make up a small minority of vehicles in both the light- and medium-duty categories. Manufacturers offer a limited number of models, and relatively few consumers buy them. [EPA-HQ-OAR-2022-0829-0683, p. 19]

Although EPA claims that the production of electric vehicles is growing rapidly, see 88 Fed. Reg. at 29,188–89, the U.S. Department of Energy reports that there are only 68 models of light- and medium-duty battery-electric vehi- cles available for the current model year. See U.S. Dep't of Energy, Alternative Fuels Data Ctr., Alternative Fuel and Advanced Vehicle Search, https://ti- nyurl.com/y853dwvt (last accessed June 26, 2023). Thirty-five of them are se- dans or wagons; twenty-nine are SUVs; four are pickup trucks; and none are vans. Id. This limited number of options may be a result of exceedingly low demand. According to the agency, in 2022, battery-electric vehicles accounted for only 807,000 new car sales, or about 5.8 percent of the new light-duty pas- senger-vehicle market. 88 Fed. Reg. at 29,346. Currently, "in most of the United States, the share of EVs is zero or near-zero." Kenneth T. Gillingham et al., Has Consumer Acceptance of Electric Vehicles Been Increasing?, Forthcoming, Am. Econ. Ass'n, at 6 (Jan. 2023) ("Consumer Acceptance"). This is particularly true in rural areas. In Wyoming for example, there were "only 456 electric cars and light trucks registered statewide as of March 2022." Robert N. Charette, The EV Transition Explained: Converting Gasoline Superusers, IEEE Spectrum (Dec. 11, 2022) ("EV Transition"), https://tinyurl.com/5dnry66s. [EPA-HQ-OAR-2022-0829-0683, p. 19]

By and large, the light- and medium-duty sectors have not embraced a shift from internal-combustion-engine vehicles to electric ones. [EPA-HQ-OAR-2022-0829-0683, p. 19]

EPA's projected increase in electric-vehicle adoption also rests on unrealistic expectations of increased future sales. In addition to assuming that "consumer uptake" will increase as more models become available and charging infrastructure develops—issues addressed elsewhere in this comment—the agency asserts that growing interest and satisfaction with electric-vehicle tech- nology, as well as decreasing costs, will play a substantial role in turning the tides toward electrification. See 88 Fed. Reg. at 29,189, 29,312; Draft RIA at 4- [EPA-HQ-OAR-2022-0829-0683, pp. 21-22]

17. Available data, however, demonstrate that these assumptions suffer from critical flaws.

Consumer Interest and Satisfaction. Although nearly 95 percent Americans in the market for a new car chose not to purchase an electric vehicle last year, EPA claims that American consumers are increasingly interested in, and satisfied with, electric-vehicle technology. That assertion rests on a collection of un- justified inferences. [EPA-HQ-OAR-2022-0829-0683, pp. 21-22]

First, EPA cites one recent survey reporting that more than one-third of Americans said that they would either "seriously consider or definitely buy or lease" a battery-electric model today if they were in the market for a new vehicle. 88 Fed. Reg. at 29,189. But other data undermine EPA's reliance on abstract consumer "affinity" (id.) for electric vehicles. Other polls show that, even when there is an expressed interest in purchasing an electric vehicle, consumers often do not follow through. For example, "[a] 2022 CarGurus survey found that 35 percent of new car buyers expressed an interest in purchasing a hybrid, but only 13 percent eventually did." Robert N. Charette, Convincing Consumers to Buy EVs: How Range, Affordability, Reliability, and Behavioral Changes Figure into Purchase Decisions, IEEE Spectrum (Jan. 23, 2023) ("Convincing Consumers"), https://tinyurl.com/3p26536j. "Similarly, 22 percent expressed interest in a battery electric vehicle . . . , but only 5 percent bought one." Id. Just as manu- facturer announcements are not a reliable indicator of actual future production, abstract consumer surveys are not a reliable indicator of actual future purchase. [EPA-HQ-OAR-2022-0829-0683, pp. 21-22]

Second, EPA asserts that most drivers who have opted for electric vehicles in the past have chosen to buy another one and often “express resistance to returning to an [internal-combustion-engine] vehicle.” 88 Fed. Reg. at 29,189. But repeat purchases of electric vehicles by current electric-vehicle owners does not contribute to meaningful growth in electric-vehicle adoption, especially to the extent they purchase new electric vehicles to replace existing ones. Moreo-ver, a significant number of electric-vehicle owners do, in fact, switch back to conventional models. Sean Szymkowski, Surprising Number of EV Owners Switch Back to Gas Power, Study Says, CNET (May 4, 2021), https://ti-nyurl.com/ybt2mxy3. Even in California—which has a high rate of adoption, the most charging infrastructure in the country, and a history of state-law measures designed to incentivize the purchase of electric vehicles—18 percent of electric-vehicle owners traded their electric models in for gas-powered vehicles between 2015 and 2019, largely due to insufficient home charging set-ups. Id. Various factors—such as the price of electricity, safety concerns, and reliability—may cause that trend to continue or even increase in the future. At this early stage in electric-vehicle technology, it is far from clear that any pur-chaser—let alone most of them—will make a permanent switch from tried and true internal-combustion-engine models. [EPA-HQ-OAR-2022-0829-0683, pp. 22-23]

Finally, EPA cites sales data purportedly showing that “some segments” of the market prefer electric vehicles to their internal-combustion-engine counter- parts. 88 Fed. Reg. at 29,189–90. One of the studies the EPA relies on, how- ever, makes clear that those segments are in the “high price brackets”—i.e., generally luxury vehicles—and that “the number of vehicles sold in these high price brackets is relatively small.” Gillingham, Consumer Acceptance at 8; see also Charette, EV Transition (“Battery-electric vehicle owners ‘earn a lot more than not just the U.S. population but [also] the population of new vehicle buyers.’”). EPA offers no reason to believe that the preferences of the limited number of consumers who are interested in and able to purchase those high-end models is a reliable indicator of future purchases by the majority of American drivers. [EPA-HQ-OAR-2022-0829-0683, p. 23]

Perhaps recognizing this weakness, EPA instead suggests that sales data for high-end electric vehicles is indirect evidence that forcing manufacturers to increase their electric-vehicle offerings may result in increased adoption. Citing the asserted preferences for electric vehicles in those high-end “segments,” EPA posits that the lack of widespread penetration in the light- and medium-duty markets at large is “at least partially [] constrained due to the lack of offerings needed to convert existing demand into market share.” 88 Fed. Reg. at 29,190. But EPA’s conjecture that increased offerings would cause increased demand does not follow. Manufacturers already offer low-priced models and the number of drivers that purchase them remain low. For example, the Nissan Leaf, which is “the most affordable new electric car in the United States” (starting at $27,800) was purchased by only 1,276 drivers during the third quarter of 2022. Colin Ryan, 2023 Nissan LEAF, Kelley Blue Book (June 21, 2022), https://ti-nyurl.com/mw2372hc; see also Mark Kane, U.S.: Nissan LEAF Sales Noted the Worst Third Quarter Even, Inside EVs (Oct. 9, 2022), https://ti- nyurl.com/mryu23e7. [EPA-HQ-OAR-2022-0829-0683, p. 23]

In addition, lack of offerings may be merely one among a number of limi- tations that constrains broader adoption of electric vehicles. That purchasers in high-end segments (where electric-vehicle offerings are more available) might prefer electric vehicles to a greater extent does not mean that increasing offerings in other segments will inexorably drive up demand among all consumers with different needs. This is especially true for consumers in rural areas.

See Charette, EV Transition. For example, drivers in states like Idaho, Montana, and South Dakota “are likely to have additional concerns about buying EVs” because of battery life. Charette, EV Transition. One report indicates that a high- mileage driver switching from a Ford-150 to a Lightning and driving it the same number of miles “will find that their battery warranty will expire in about 3.5 years,” with the cost of replacement running between $28,556 and $35,960. Id. Ford’s CEO himself acknowledged that, “in mountainous states, driving re-quirements are ‘different than how we’ve designed (our EV) vehicle so far.’” Id. And “[a]nother potential bump in the road” is that “EVs are designed for over- the-air software service and feature updates, but cell service can be highly un- reliable in rural areas,” making “[l]engthy trips to dealers . . . inevitable.” Id. The Department of Transportation explains that “[r]educed battery perfor- mance and EV range during winter months, as well as protection from the ele- ments while waiting for a vehicle to charge, are a further concern for rural com- munities in cold climates, particularly to those that do not have access to relia- ble electric service.” Implementation Challenges and Evolving Solutions for Rural Communities, U.S. Dep’t of Transp., https://tinyurl.com/3rkwfxpw. [EPA-HQ-OAR-2022-0829-0683, pp. 23-24]

Each of these problems must be resolved before a widespread shift to elec- tric vehicles is plausible. “[E]ven in cases where consumer appetite for ZEVs is high, a lack of adequate charging infrastructure could hold the market back and potentially stall progress.” Marie Rajon Bernard et al., Deploying Charging Infra- structure to Support an Accelerated Transition to Zero-Emission Vehicles, ZEV Tran- sition Council, at 4 (Sept. 2022). And multiple studies report that charging is a top concern among prospective electric-vehicle buyers. See, e.g., Barajas, Cali-fornia’s Rural Areas (“[C]oncerns remain, including hesitant consumers wary of ‘range anxiety,’ the fear of being stranded without the ability to recharge, or in some cases not having access to charging capacity at their apartment complex or work.”); Kampshoff, Building Electric-Vehicle Charging Infrastructure at 1 (“[N]early half of US consumers say that battery or charging issues are their top concerns about buying EVS.”); Nichols, Estimating Electric Vehicle Charging at 1 (“Exactly how much charging infrastructure will be needed and what it will cost are top questions for prospective electric vehicle owners.”). Until ade- quate home, workplace, and public charging infrastructure develops at the rate, in the places, and at the quality desired by consumers, consumers are unlikely to purchase anything close to the volume of electric vehicles that EPA intends to mandate that manufacturers provide. The agency has not offered a reasonable basis for assuming that the necessary expansions and improvements are possible, let alone likely, within less than a decade. [EPA-HQ-OAR-2022-0829-0683, pp. 46-47]

Organization: American Freedom and America First Policy Institute (AFPI)

Most Americans Prefer Gas-Powered Vehicles

EVs have advantages and disadvantages compared to gas-powered automobiles. Charging an EV typically costs owners less than fueling a conventional car, and EVs also have lower maintenance costs and faster acceleration. However, EVs cost substantially more than gas-powered vehicles, have shorter ranges, and can take a while to fully charge. [EPA-HQ-OAR-2022-0829-0699, pp. 2-3]

Although some Americans want EVs, Americans generally prefer conventional vehicles. The Deloitte 2022 Global Automotive Study found that 69% of Americans prefer their next car purchase to be a gas-powered vehicle, 5% prefer an entirely battery-powered car, and 22% prefer a hybrid vehicle. Range and price concerns were particularly important factors for respondents who prefer gas-powered vehicles; most Americans (53%) indicated they would not pay more for an electric vehicle (Edelstein, 2022) (Link: https://www.greencarreports.com/news/1134702_americans-dont-want-ev-yet-half-wont-pay-extra-for-electrified). A recent survey of car dealerships also found that 45% of dealerships reported they would not sell EVs under any circumstances (Lewis, 2023) (Link: https://electrek.co/2023/05/09/us-car-dealers-evs/). [EPA-HQ-OAR-2022-0829-0699, pp. 2-3]

After purchasing an EV, a significant proportion of drivers switch back to conventional vehicles. One study found that one-fifth of California EV owners returned to purchasing gas-powered vehicles, primarily because of the inconvenience of charging EVs (Powell et al., 2022, p. 39) (Link: https://javatar.bluematrix.com/pdf/N8T7PT0N). Another survey looked at all Americans—not just Californians—who purchased a new vehicle in 2017. That study found that about half of EV owners chose not to buy another EV when they bought a new car. Respondents indicated that range, recharging time, and reduced performance in cold weather were key reasons for switching back to gas-powered vehicles (Dua & Bansal, 2021, p. 3) (Link: https://www.kapsarc.org/research/publications/once-consumers-adopt-an-electric-vehicle-do-they-go-back/). [EPA-HQ-OAR-2022-0829-0699, pp. 2-3]

EVs appeal to some Americans, but without substantial government intervention, they would likely remain a niche market. However, EPA proposes to force automakers to primarily produce—and Americans to purchase—EVs. This EV mandate would create significant challenges for energy supply chains, particularly by creating mineral dependencies on foreign powers.2 The EV mandate also threatens many auto manufacturing jobs. [EPA-HQ-OAR-2022-0829-0699, pp. 2-3]

2 China dominates the global market for refined energy minerals, surpassing OPEC's dominance in oil markets. China holds a 40% market share in aluminum, a metal vital for manufacturing electric vehicles. Each EV requires about 400 pounds more aluminum than a conventional gasoline-powered vehicle (Mills, 2022, p. 8) (Link: https://media4.manhattan-institute.org/sites/default/files/the-energy-transition-delusion_a-reality-reset.pdf). Chinese firms can refine minerals for EV batteries at a lower cost than U.S. firms, due in part to less stringent environmental regulations (Chang & Bradsher, 2023) (Link: https://www.nytimes.com/interactive/2023/05/16/business/china-ev-battery.html).

Organization: American Fuel & Petrochemical Manufacturers

EPA offers no support for its conclusion that there will be substantial consumer adoption of ZEVs to achieve the increases projected by the Proposed Rule. To the contrary, recent polling shows that most Americans continue to say that they are unlikely, or will categorically refuse, to buy an EV. As just one example, a Gallup poll conducted in April revealed that only 4 percent of adults owned an EV and just 12 percent are seriously considering buying one. However, 41 percent of adults said they would never buy an EV, raising fundamental questions about how EPA can predict that ZEV sales will reach 67 percent in 2032.136 [EPA-HQ-OAR-2022-0829-0733, p. 31]

136 Megan Brenan, Gallup, Most Americans Are Not Completely Sold on Electric Vehicles (April 12, 2023). Retrieved a https://news.gallup.com/poll/474095/americans-not-completely-sold-electric-vehicles.aspxt .

According to Wards Intelligence, through May 2023, Americans purchased 5.9 million ICEVs, representing 93 percent of all LDVs sold during the first five months.137 At this pace, more than 14 million new ICEVs will be purchased during 2023.138 With the continued sales of ICEVs, this Rule's effort to limit the ability to purchase ICEVs, and more than 50 percent of ICEVs remaining in service, it is mindboggling, as discussed in Section IV.6 below, that EPA never considered the alternative scenarios using vehicle technologies and lower carbon fuels. [EPA-HQ-OAR-2022-0829-0733, p. 31]

137 John Eichberger, Decarbonizing Combustion Vehicles – A Critical Part in Reducing Transportation Emissions, Transportation Energy Institute, June 2023. Available at Decarbonizing Combustion Vehicles – A Critical Part in Reducing Transportation Emissions - Transportation Energy Institute.

138 Id.

Importantly, successful implementation of EPA's Proposed Rule depends on consumer choice as much as it depends on technological improvements. But there is evidence that premature embrace of ZEV may backfire if consumers grow frustrated with inadequate infrastructure. Consumer market demand will not, and cannot, increase to meet the Proposal's required supply. Charging capabilities is a key apprehension for nearly half the U.S. consumer market. [EPA-HQ-OAR-2022-0829-0733, p. 32]

For example, in California, roughly one-fifth of consumers who initially purchased PHEVs or ZEVs subsequently went back to ICEVs based on frustration with convenience factors such as unavailability of charging.143 As the study on discontinuance cited by EPA states, "[R]ange isn't correlated with discontinuance in PHEVs or ZEVs but satisfaction with and access to charging [is]."144 Those with multiple vehicles and a single-family home find it easier to continue ownership than those with fewer vehicles or living in multi-unit dwellings, which could lower ZEV adoption rates as the ZEV market becomes more mainstream.145 Finally, a survey of PHEV owners in California found that current PHEV would not purchase their PHEV without incentives, therefore EVs and PHEVs adoption may face more challenges over time.146 Moreover, EPA ignores that current ZEV sales are linked to mandates that force increased prices of ICEVs to subsidize the mandated ZEV sales. Those mandates are under judicial review. [EPA-HQ-OAR-2022-0829-0733, p. 32]

143 Hardman, S., and Tal, G., Discontinuance Among California's Electric Vehicle Buyers: Why are Some Consumers Abandoning Electric Vehicles, April 21, 2021, Report for National Center for Sustainable Transportation. available at https://ncst.ucdavis.edu/research-product/discontinuance-among-californias-electric-vehicle-buyers-why-are-some-consumers

144 Id. at 26.

145 Id.

146 Id. See also JATO Blog, "A breakdown of the US EV market by State shows more incentives equals more sales", April 9, 2019 (latest research shows current tax credits and other incentives in the US are unequal among states, and that EV sales are growing at the fastest rate in states offering financial incentives).

As discussed in more detail below, consumer market demand will not, and cannot, increase to meet the Proposal's required supply. Charging capabilities, which creates range anxiety, is a key apprehension for nearly half the U.S. consumer market. EVs have less range, both technically and practically. As noted by J.D. Power, "[T]he majority of EVs provide between 200 and 300 miles of range on a full charge."147 This same article, however, also noted that EVs with less than 200-mile ranges (such as the 2022 Nissan Leaf at 149 miles or the 2022 Mazda MX-30 at 100 miles) are “either affordable or focused on performance.”148 With respect to longer range vehicles, claimed vehicle ranges of up to 516 miles are available, but this range comes at considerable cost. The number 1 range-rated vehicle by Car and Driver, the 2023 Lucid Air, carries a base price of $113,650. And while three out of the ten top-rated EVs by Car and Driver were more “reasonably priced” from $44,630 to $56,630, all other models within the top 10 cost anywhere from $74,800 to $110,295.149 [EPA-HQ-OAR-2022-0829-0733, pp. 32-33]

147 See Sebastian Blanco, List of EVs Sorted by Range (Sept. 1, 2022), www.jdpower.com/cars/shopping-guides/list-of-evs-sorted-by-range.

148 Id.

149 See Nicholas Wallace, Austin Irwin, & Nick Kurczewski, Longest Range Electric Cars for 2023, Ranked (Mar. 23, 2023), https://www.caranddriver.com/features/g32634624/ev-longest-driving-range/.

EPA requests comment on their approach to determining charging time, as set forth in the DRIA, Chapter 4.155 EPA’s analysis is contingent on unsupported assumptions regarding (1) U.S. consumers’ adoption of and ability to purchase more expensive ZEVs (see Sections IV.B.2 and IV.E.2.ii); (2) the type of ZEV purchased (used ZEVs or PHEVs compatible with slower charging units or new ZEVs that can use DCFC) (Section IV,B.2 addresses charging times); (3) the availability of critical minerals and metals to expand the supply of reliable and renewable electricity (see Section I.B); and (4) the availability of reliable and affordable charging for all users (see Sections IV.B.4). Given the flaws in EPA’s methodology that omits significant data sources and other factors and makes unsupported assumptions, EPA should revise its analysis concerning charging time and continue with promulgating a final rule for future emissions standards, that accounts for the reality of today’s automotive market and not the public pronouncements of the automotive industry, a single state or group of states, or other unsupported estimates of future market growth. [EPA-HQ-OAR-2022-0829-0733, pp. 33-34]

155 88 Fed. Reg. at 29,367.

As previously mentioned, EPA did not fully consider the impact of the rule on fleet turnover. The Agency is aware that the higher purchase price of new ZEVs will keep older cars and trucks on the road longer and that new ZEVs will increase particulate matter (“PM”) emissions through increased tire and road wear. [EPA-HQ-OAR-2022-0829-0733, p. 45]

EPA’s Proposal fails to evaluate how government credits are embedded in vehicle pricing. For example, neither federal or state governments, or auto manufacturers explain how state ZEV credits, EPA GHG multiplier credits, and NHTSA CAFE EV multiplier credits are accounted for in both ZEV and ICEV vehicle price. There is increasing evidence that regulations which mandate EV sales—along with the cross-subsidies from gasoline and diesel vehicle buyers—are leading manufacturers to abandon sales of the least expensive and higher fuel economy gasoline and diesel vehicles that do not receive similar subsidization.236 Cox Automotive found that “in December 2017, automobile makers produced 36 models priced at $25,000 or less. Five years later, they built just 10,” pushing low-income buyers out of the new-car market and into the used- car market. Conversely, in December 2017 automobile manufacturers offered 61 models for sale with sticker prices of $60,000 or higher and in December 2022, they offered 90.237 This is unacceptable. EPA and its sister agencies cannot create credits and then claim they do not affect vehicle price solely because they have not sought to quantify them. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

236 Steven G. Bradbury, Distinguished Fellow, The Heritage Foundation, Prepared Statement for the hearing entitled "Driving Bad Policy: Examining EPA's Tailpipe Emissions Rules and the Realities of a Rapid Electric Vehicle Transition," before the Subcommittee on Economic Grown, Energy Policy, and Regulatory Affairs of the U.S. House of Representatives Committee on Oversight and Accountability, at 10 (May 17, 2023) available at https://oversight.house.gov/wp-content/uploads/2023/05/Bradbury- Prepared-Statement-for-17-May-2023-Oversight-Hearing.pdf

237 See Sean Tucker, Are we witnessing the demise of the affordable car? Automobile makers have all but abandoned the budget market (MarketWatch Feb. 28, 2023), available at https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have-all-but-abandoned-the-budget-market-a68862f0 (last visited May 24, 2023).

Tellingly, EPA never estimates the annual price of a comparable ZEV and ICEV, for each year in which EPA proposes standards. EPA's bias towards EVs is demonstrated by EPA's statement that its OMEGA modeling "now incorporates a consumer choice element. This means that the impacts of, for example, a $40,000 BEV versus a $35,000 ICE vehicle of similar utility (i.e., a 14 percent increase for the BEV) is a much different consideration than a $6,000 incremental BEV cost versus a $1,000 incremental ICE cost (a 500 percent increase for the BEV)."238 In other words, EPA set up its model to show the consumer price (not the actual real-world cost) of EVs have a lower percentage cost increase than the incremental absolute cost of switching from ICEVs to ZEVs. [EPA-HQ-OAR-2022-0829-0733, pp. 51-52]

238 See RIA page 2-42, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf.

v. Costs to upgrade electricity generation, transmission, and distribution

For EPA to achieve its GHG reduction aspirations in this Proposed Rule, all three of these challenges must be met: (1) sufficient materials to manufacture the required EVs, chargers, and grid upgrades, (2) consumer willingness to substitute ZEVs for ICEVs currently for sale, and (3) a low-carbon power generation grid capable of reliably supplying energy for this mode of transportation. Combined with other issues, such as a disorderly transformation of the generation base as conventional units are replaced with intermittent resources, raises questions of the grid's ability to reliably meet consumer demand on a regional basis. Despite these challenges, EPA incredibly assumes no increase in the cost of electricity to consumers (whether EV owners or others) associated with the proposed rulemaking. EPA underestimates the cost of electricity to all consumers, including EV owners, and omits the cost of grid upgrades and distributed energy resources have been excluded from these estimates.260 [EPA-HQ-OAR-2022-0829-0733, pp. 56-57]

260 U.S. Department of Energy, National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." June 2023. https://driveelectric.gov/files/2030-charging-network.pdf.

EPA incorrectly assumes that ZEV owners will pay the national average residential electricity price to charge their vehicles. EPA fails to consider that the majority of ZEVs in the U.S. are located in utility service territories with some of the highest electricity rates in the country and that the average EV owner currently pays a much higher price to charge their ZEV at home than the national average residential electricity rate. Given that EV penetration has varied widely across the U.S., it would be arbitrary to assume that EVs will, unlike in the past, penetrate uniformly across the U.S. and thus that the average electricity price would be representative of the actual cost electricity. For example, California, which has roughly 40 percent of all registered ZEVs in the U.S., has a residential electricity rate that is roughly double the national average. Considering that EPA is modeling its rule after a California-like approach to mandate ZEVs, it would be more appropriate for EPA to assume similar real-world costs (at a minimum, given California's temperate climate). Moreover, EPA fails to consider that mandating such a high ZEV sales rate will necessarily require exponential increases in commercial ZEV charging at rates that are currently three, four or five times higher than the current national average residential electricity rate, depending on location and charging speed. Those customers who are not homeowners and not able to install their own charging stations and take advantage of charging at low-cost times will be adversely impacted. Instead, EPA uses a residential rate for electricity and does not consider peak power or time of use charges. California electric prices rose 42 percent - 78 percent between 2010 and 2020 and are projected to rise an additional 50 percent by 2030 as shown in Figure 9. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

SEE ORIGINAL COMMENT FOR Historic and Forecasted Residential Average Rates Based on Most Recent 5-year Average Rate Increase. Figure 9: Source: Michael Shellenberger, Twitter (citing California Public Advocate's Office data), April 27, 2021). [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Heaping additional demand for EV charging into this market could exacerbate already high electricity prices. This will be especially impactful to lower-income homeowners who may not be able to install dedicated charging units, forcing them to pay more out of pocket for charging during peak demand periods.265 [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

265 Hardman, Scott, et al., "A Perspective on Equity in the Transition to Electric Vehicles." MIT Science Policy Review, (Aug. 20 2021), available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/ (accessed June 29, 2023).

EPA must revise its analysis to account for realistic electricity prices. The proposed ZEV mandate will require an enormous investment in power generation and distribution, resulting in nationwide increases in electricity bills that EPA has not considered. Of course, considering the additional trillions of dollars in costs would paint a clear picture that the costs of forced electrification far exceed even the inflated benefits EPA presented in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Organization: American Highway Users Alliance

More specifically, EPA's proposal in this docket appears to be premised on huge and rapid growth in the portion of light-duty and medium-duty vehicles that are electric powered (EVs) as well as on rapid transformation of the marketplace in a number of related areas that are not the subject of the proposed regulation. EPA seems to have made favorable assumptions on many issues bearing on the feasibility of the proposal, including as to the issues set forth below. The Highway Users, on the other hand, drawing on the expertise of its members, questions that, within the MY 2027 – 2032 timeframe of the proposed rule, all or most of the following will occur, that -- [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

• high-speed and other electric charging stations will be sufficiently available to service light-duty and medium-duty EVs in quantities and locations sufficient to encourage customers to buy EVs,

• electric utilities can timely provide connections from the electric grid to those charging stations, or hydrogen fueling stations – and provide the refueling and charging connections at reasonable cost,

• the electric grid will have the capacity to meet the demand for electricity that will be required to support increased electrification of trucks, buses, and passenger cars, even if the connections can be timely made to charging stations (both public and private) that do not yet exist in sufficient numbers,

• charging times can be reduced sufficiently to encourage customers to buy these EVs,

• major industries, including vehicle manufacturers and their suppliers, can implement major changes in vehicles as rapidly as the NPRM assumes (given the limited current market penetration of these EVs),

• there will be an adequate supply of rare earth and other critical minerals, and the ability to process them, with those minerals being so essential to the manufacture of EVs and batteries,

• with a large portion of such minerals being sourced and/or processed overseas, including in China and Africa, whether the national interest in sourcing and processing such minerals in the United States can be met, and

• potential customers of these EVs will proceed to purchase them in sufficient quantity, notwithstanding significantly higher up-front costs, uncertain availability of charging facilities, and other concerns. [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

This last consideration is highly important because if the potential customers of these EVs do not become actual customers to a sufficient extent, the manufacturers are unlikely to produce the vehicles in the quantities EPA has estimated will be required to be compliant with the regulations, in turn greatly reducing the benefits of the proposal as EPA estimated. [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

Organization: American Honda Motor Co., Inc.

Over the past decade, the U.S. Environmental Protection Agency (EPA)1 has played a key role in helping successfully pivot the entire auto industry toward an electrified future. Previous debates about whether such a transformation would occur are now merely conversations about when it will happen. In fact, today all of industry is pursuing this transition at a fever pace. [EPA-HQ-OAR-2022-0829-0652, p. 4]

1 Henceforth referred to as "the agency"

Amidst a backdrop of this activity, in May 2023, the agency published what EPA Administrator Michael Regan referred to as "the strongest-ever federal pollution technology standards for both cars and trucks."2 His reference to "technology standards" was decidedly on-point. In contrast to the agency's longstanding approach of setting technology-neutral, performance-based standards, this NPRM proposes to dramatically limit vehicle emissions in the

United States, effectively requiring – according to EPA's own analysis – two-thirds of all new vehicles sold in model year (MY) 2032 to be electric vehicles (EVs). This amounts to a ten-fold increase in electric vehicle adoption nationally, requiring EVs to move beyond today's early adopters, past ubiquity on main street, and extend to small towns and rural areas across the nation – all in a mere eight years. It is an exceedingly ambitious attempt to re-envision Americans' relationship with personal mobility. [EPA-HQ-OAR-2022-0829-0652, p. 4]

2 Davenport, C. E.P.A. Lays Out Rules to Turbocharge Sales of Electric Cars and Trucks. New York Times. April 12, 2023. https://www.nytimes.com/2023/04/12/climate/biden-electric-cars-epa.html

While perhaps well-intentioned, basing standards on an assumed swift and seamless EV market transition – completely unprecedented in nature – strikes us as a questionable choice for policy design. As the agency is well aware, risk management is especially important in the automotive industry due to market uncertainties, high capital expenditures and long lead times needed for the design, development and manufacture of products. By mandating a single path to compliance, the agency shifts a considerable amount of this risk squarely upon automakers and, ultimately, their customers. It is a risky approach that could not only undermine fragile public trust and support for the EV transition, but also create hardships for low income and marginalized communities facing imbalanced infrastructure availability and the still-high cost of technology. [EPA-HQ-OAR-2022-0829-0652, p. 5]

According to S&P Global-IHS Markit data, over the past 12 months, electric vehicles – including all BEV, PHEV and FCEV models – accounted for approximately seven percent of nationwide sales. The agency's proposal, on the other hand, would require ten-fold that level of adoption, all in a mere eight years across all vehicle classes. When examining expected adoption levels based on specific vehicle categories, the EPA analysis assumes these levels of electrification would actually be achieved two years sooner – in 2030 or just six years from now. This is a staggeringly optimistic assumption about the pace of technology transformation in the auto industry. To illustrate how unprecedented this is, consider EPA's own Automotive Trends report. As shown in Figure 3 and the associated table below, there is no historical auto industry analogue to EPA's projected pace of EV adoption, even when generously characterizing EVs today as having already seen "significant use" nationwide for a few years. [EPA-HQ-OAR-2022-0829-0652, pp. 22-23]

All of the technologies shown in Figure 3 took well over eight years to reach 67 percent market adoption and, in some cases, two to three times as long. Even more importantly, none of the identified technologies required any kind of behavioral change on the part of the vehicle owners. For all intents and purposes, apart from experiencing better fuel economy and vehicle performance, it is possible owners may not have even known those technologies existed on the vehicle. In contrast, although electrification has many positive attributes, it does require the owner to embrace a different approach to vehicle use and management, such as ensuring sufficient charging infrastructure is available for a given trip and that sufficient time is available to recharge. These factors are important considerations when evaluating the pace of technology adoption from the general (i.e., non-early adopter) vehicle purchasing population. [EPA-HQ-OAR-2022-0829-0652, p. 23]

SEE ORIGINAL COMMENT FOR Figure 3. Years to Reach 67% Market Penetration after First Significant Use. Source: EPA. The 2022 EPA Automotive Trends Report: Greenhouse Gas

Emissions, Fuel Economy, and Technology since 1975, p. 71. Table at right added by Honda for clarity. [EPA-HQ-OAR-2022-0829-0652, p. 23]

to vehicle use and management, such as ensuring sufficient charging infrastructure is available for a given trip and that sufficient time is available to recharge. These factors are important considerations when evaluating the pace of technology adoption from the general (i.e., non-early adopter) vehicle purchasing population. [EPA-HQ-OAR-2022-0829-0652, p. 23]

Organization: American Petroleum Institute (API)

iii. Review of Annual Energy Outlook (AEO) data and projections.

EPA's BEV projections differ significantly from other federal agencies and reflect that EPA is improperly mandating that a significant proportion of new LDV and MDV must be powered by electric drivetrains and setting unrealistic tailpipe emission standards. The EIA published market share projections for light-duty BEV and PHEV sales in its Annual Energy Outlook35 2023 (AEO 2023). The AEO 2023 Reference Case modeling includes laws, such as the IRA and the BIL, and other adopted regulations in its analysis. The AEO 2023 incorporates the IRA by adjusting EV purchase prices to account for the Clean Vehicle Credit using offcial estimates of vehicles that will be eligible for tax credits. In addition to the Reference Case, the AEO conducts a range of scenario modeling, that considers different assumptions and uncertainties. Across the range of modelled scenarios in AEO 2023, EIA36 concluded that sales of BEVs and PHEVs do not exceed 29% and the share of the on-road light-duty vehicle stocks comprised of BEVs and PHEVs did not exceed 26%, over the projection period to 2050. [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

35 U.S. Energy Information Administration. "Annual Energy Outlook 2023." March 2023. https://www.eia.gov/outlooks/aeo/.

36 U.S. Energy Information Administration. "Incentives and lower costs drive electric vehicle adoption in our Annual Energy Outlook." Today in Energy. Accessed May 15, 2023. https://www.eia.gov/todayinenergy/detail.php?id=56480.

Analysis of BEV-only37 sales data from the AEO 2020 (pre-COVID) and 2023 (most recent) editions indicate BEVs sales are projected to increase in comparison to the respective Reference Cases. For example, in 2032, BEV sales are projected to reach 13% in the AEO 2023 Reference Case up from 5% in the AEO 2020 Reference Case. Increased BEV sales in AEO 2023 compared to AEO 2020 likely reflect emerging trends, technological improvements, relative manufacturing costs and purchase prices, subsidies, consumer behavior, and other factors. Also, minimum projections for BEV sales in the AEO 2023 are nearly identical to the AEO 2020 Reference Case (see chart below). However, projections for maximum BEV sales in AEO 2023 reach only 23% in2032. Figure 1 below illustrates BEV sales across a wide range of scenarios as projected by EIA. [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

37 Transportation supplemental tables for AEO 2020 and AEO 2023 can be found here: https://www.eia.gov/outlooks/aeo/.

BEV sales projected by EPA,38 under a scenario to meet the proposed standards and a "no action" scenario, are included in the chart. BEV sales required to meet EPA's proposed standards or "no action" scenario are significantly higher than any scenario projected by EIA in its AEO 2023 analysis. Differences in trajectories between EPA's proposed standards and the AEO projections illustrate EPA selecting and essentially forcing one technology over others and setting an unrealistic stringency for tailpipe emission standards. Although EIA has projected BEV sales to increase (i.e., AEO 2023 vs. AEO 2020) because of recently enacted federal subsidies and expenditures (i.e., BIL and IRA), along with technological advancements, 2032 BEV sales are projected to reach to only 13% in the AEO 2023 Reference Case compared to EPA's proposed standard at 67%. This is a significant difference in projected BEV sales and the agency has not provided adequate information to explain this major difference. EPA must explain why its projections differ so significantly from its sister agency with far more expertise in such projections than EPA. [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

38 Table 108, 88 Fed. Reg. 29335 (May 5, 2023).

[See original for graph titled "Figure 1. Battery Electric Vehicle Sales Projected by EIA and EPA"] [EPA-HQ-OAR-2022-0829-0641, pp. 13-14]

e. API Supports Consumer Choice for Vehicles.

API 53 supports the concept that different vehicle technologies that reduce greenhouse gas emissions should be allowed to compete equally for consumer and market acceptance and growth. However, API has concerns with regards to the EPA's approach and its effect on consumer choice. [EPA-HQ-OAR-2022-0829-0641, pp. 18-19]

53 https://www.api.org/news-policy-and-issues/blog/2021/05/18/us-consumers-need-balance-choice-in-transportation-policy.

The stringency of the proposed standard is essentially forcing electrification of the transportation sector and is not in alignment with most Americans that, according to a Pew Center survey,54 favor "using a mix of energy sources to meet the country's needs" and a majority of survey respondents oppose phasing out gasoline powered vehicles by 2035. Concerns with charging availability55 could be relieved with vehicle technologies (e.g., PHEVs56) where the length of an average daily trip is approximately 30 miles.57 [EPA-HQ-OAR-2022-0829-0641, pp. 18-19]

54 Tyson, A. et al. "Gen Z, Millennials Stand Out for Climate Change Activism, Social Media Engagement With Issue." Pew Research Center. May 2021. https://www.pewresearch.org/science/2021/05/26/gen-z-millennials-stand-out- for-climate-change-activism-social-media-engagement-with-issue/.

55 Noblet, S. "Closing The Great EV Charging Gap." August 2021. Forbes. https://www.forbes.com/sites/stacynoblet/2021/08/10/closing-the-great-ev-charging-gap/?sh=6cf9107f73f4.

56 EPA is proposing a fleet utility factor (FUF) curve that will increase CO2 compliance values for PHEVs. 88 Fed. Reg. 292557 (May 5, 2023).

57 2019 Bureau of Transportation data indicates 49% of 2019 national trips by distance were less 25 miles.

Organization: Betsy Cooper

Today's PHEVs do not have enough range to meet Americans' driving needs. The average American drives 37 miles a day [Link: https://www.kbb.com/car-advice/average-miles-driven-per-year/#miles-per-day]. Moreover, the average American commute may be as high as 41 miles a day [Link: https://www.zippia.com/advice/average-commute-time-statistics/]. Thus, almost no PHEVs on the market will allow the average American commuter to complete their commute without switching on to gas.2 It is no coincidence that the longest electric range mid-tier car, the

Toyota RAV4 – with 42 miles of range – has a wait time of between 5 and 24 months [Link: https://rav4resource.com/rav4-prime-availability/] and dealer markups of more than $10,000! [Link: https://markups.org/search.html?title=RAV4+prime] [EPA-HQ-OAR-2022-0829-0654, pp. 1-2]

2 This is particularly problematic because most EV batteries degrade over time. Our 2019 Volt now gets 45 miles of range—a 15 percent drop. An EV with only 40 miles of range to start will degrade to well below the average commuter's distance.

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Feasibility of proposed standards

California's effective vehicle GHG fleet average emission rate for new vehicles is similar to U.S. EPA's proposal due to similar expected shares of ZEVs entering the market in the 2026 through 2032 MYs and beyond. California's ACC II regulations require that an increasing share of new vehicle sales be zero-emission, ramping up from 35 percent for the 2026 MY to 100 percent for the 2035 MY. As part of the ACC II rulemaking, CARB estimated that 75 percent of new car sales in California in 2032 will be BEVs to comply with the ACC II regulations (with a small percentage of additional fuel cell and plug-in hybrid electric vehicles). In comparison, U.S. EPA projects a 67 percent BEV market share nationwide to comply with the proposed federal GHG standards in the same year. [EPA-HQ-OAR-2022-0829-0780, pp. 12-13]

In establishing its ZEV sales requirement, CARB assessed the technical feasibility and cost of ZEV technologies to determine a feasible pace of ZEV introduction in California. 7 This assessment found several market trends that will drive widespread ZEV penetration in the coming years, including a rapidly expanding number of ZEV models, increasing all-electric range, technological battery and fuel cell advancements, energy efficiency improvements, and declining battery costs. These market trends are also occurring at the national and international levels, and they underpin the technical feasibility of U.S. EPA's proposed standards. Further, as U.S. EPA notes in its proposal, every manufacturer has a public commitment to significant if not full electrification in the next 20 years. 8 Based on public announcements, it is expected that over 100 ZEV and PHEV models will be available to consumers before the 2026 MY. [EPA-HQ-OAR-2022-0829-0780, pp. 12-13]

7 CARB. ACC II ISOR. Appendix G: ACC II ZEV Technology Assessment. April 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/appg.pdf.

8 87 Fed. Reg. at 29,191 - 192.

In addition to these existing market trends, the implementation of ACC II in California and an expanding number of other states will further spur technological development, supporting widespread ZEV deployment and providing additional support that the proposal is not only achievable, but that manufacturers could exceed the standards as proposed. [EPA-HQ-OAR-2022-0829-0780, pp. 12-13]

Organization: California Attorney General's Office, et al.

Finally, consumer demand for electric vehicles has significantly risen, in large part due to environmental concerns, greater vehicle choice, improved battery capacity, and cost savings.124 [EPA-HQ-OAR-2022-0829-0746, p. 21]

124 Javier Colato and Lindsey Ice, Charging into the future: the transition to electric vehicles, U.S. Bureau of Labor Statistics (Feb. 2023), available at https://www.bls.gov/opub/btn/volume-12/charging-into-the-future-the-transition-to-electric-vehicles.htm#ednref4.

Organization: CALSTART

3. Equity

Importantly, this regulation presents an opportunity for greater equity. Rapid expansion of the LD ZEV market through ZEV regulations would not only increase the stock of new ZEVs but would also increase the stock of used ZEVs quickly. Additional stock of used ZEVs would dramatically expand equitable access to clean transportation options, particularly to communities disproportionately burdened by transportation pollution. [EPA-HQ-OAR-2022-0829-0618, p. 4]

Barriers and Solutions

There are several common barriers that arise when discussing more ambitious standards like Alternative 1. Below, we address three commonly discussed barriers and offer some context that helps explain why these perceived barriers should not delay progress. These include concerns related to expected EV deployment timelines, infrastructure, and fleet electrification. [EPA-HQ-OAR-2022-0829-0618, p. 4]

Organization: Ceres BICEP (Business for Innovative Climate and Energy Policy) Network

Existing policies, market trends, and available funding, including the Advanced Clean Cars II (ACC II) rule adopted by California and six other states; manufacturer and corporate zero-emission vehicle (ZEV) commitments; and the significant incentives provided by the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) for vehicle and battery manufacturers, purchasers, and charging infrastructure, all justify standards supporting greater ZEV sales shares. [EPA-HQ-OAR-2022-0829-0600, p. 1]

Organization: Clean Fuels Development Coalition et al.

III. The Proposed Rule is Not Feasible for Other Reasons.

While the proposal's gross misstatement of vehicle technology costs is the primary reason EPA's proposal is not feasible, the agency also overlooks many other important aspects of the problem. Despite EPA's hopeful projections, very few American want to buy electric vehicles and even fewer will at the prices they will inevitably command. Non-binding company commitments and (unlawful) regulations designed to enforce these commitments do little to change this. Even if consumers did want to purchase these electric vehicles in the volumes EPA projects, the proposal fails to confront several barriers to its rapid electrification plans, including limits on the supply of minerals necessary to manufacture batteries, inadequate charging infrastructure and electrical supplies, and the complex interactions between this rule and other proposed rules all of which will further hinder this development. In light of these many barriers, it is unreasonable for the agency to conclude that compliance with its proposed emission standards is feasible. [EPA-HQ-OAR-2022-0829-0712, pp. 25-26]

A. Very few Americans want to buy electric vehicles.

The projections for battery electric vehicle adoption are based on very few— and very small—real-world data points. See generally 88 Fed. Reg. 29,187–90. Battery electric vehicles made up 5.8 percent of the new light-duty passenger vehicle market in 2022. Id. at 29,189. To comply with its proposed standards, EPA needs these sales to increase ten times over the next 8 years. [EPA-HQ-OAR-2022-0829-0712, pp. 26-27]

But if EPA expects 67 percent of vehicles sold to be electric vehicles, it must point to at least something that suggests 67 percent of Americans would be willing to buy them. Instead, the best the proposal can do is point to "[a] 2022 survey by Consumer Reports [which] shows that more than one third of Americans would either seriously consider or definitely buy or lease a BEV today, if they were in the market for a vehicle." 88 Fed. Reg. 29,189. This is a far cry from the two-thirds of American's EPA needs to want to buy electric vehicles for its proposal to succeed. And of that one third surveyed by Consumer Reports, only 14% said that they would "definitely" buy an electric vehicle. Jeff S. Bartlett, More Americans Would Buy an Electric Vehicle, and Some Consumers Would Use Low-Carbon Fuels, Survey Shows, Consumer Reports (July 7, 2022), https://www.consumerreports.org/hybrids-evs/interest-in-elec- tric-vehicles-and-low-carbon-fuels-survey-a8457332578/. [EPA-HQ-OAR-2022-0829-0712, pp. 26-27]

The studies the proposal cites in support of its projections are also unreasonable. For example, the proposal states that "Goldman Sachs projects a 50 percent share for BEVs in the U.S. in 2030, 70 percent in 2035 and 85 percent in 2040,"15 DRIA 3-14. EPA provides no analysis of why it believes this is correct, or how it can accept projections of 85% electric vehicle adoption across the nation, while simultaneously acknowledging that 20% of early adopters—the most sympathetic group—are already discontinuing electric vehicle usage when purchasing another vehicle. 88 Fed. Reg. 29,189 n.51; Hardiman, S., and Tal, G., Understanding discontinuance among California's electric vehicle owners, 6 Nature Energy 538 (Apr. 2021). [EPA-HQ-OAR-2022-0829-0712, pp. 26-27]

15 N.B.: The 50 percent of sales Goldman Sachs projects is much less than the 60 percent of sales EPA projects. Indeed, those 10 percent of sales that the proposal waves away represent a larger share of the auto market than electric vehicles have ever achieved. While EPA is not required to look into a "crystal ball" in making its projections, it is "subject to the restraints of reasonableness." NRDC v. EPA, 655 F.2d 318, 328 (D.C. Cir. 1981). Assuming an overshot of already unreasonable projections by more sales than have ever occurred leaps over these restraints.

Organization: Competitive Enterprise Institute

II. The Proposed Standards Imperil Consumer Choice, Vehicle Affordability, and Market Liberty

EPA's proposal will restrict consumers' freedom to choose which types of vehicles they want to buy.12 [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

As the EPA acknowledges, Congress is already providing tens of billions of dollars in EV-related subsidies, such as the IRA's $7,500 tax credit, "effectively making some BEVs more affordable to buy and operate today than comparable ICE vehicles."13 The only purpose for heaping EV mandates on top of EV subsidies is to eliminate choices consumers would otherwise make. [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

12 Diana Furchtgott-Roth, “Biden’s Plan to Phase Out Gas-Powered Cars Is All Pain for Consumers and No Gain,” The Hill, June 12, 2023, https://www.heritage.org/government-regulation/commentary/bidens-plan-phase-out-gas- powered-cars-all-pain-consumers-and-no. 13 88 FR 29190.

13 88 FR 29190.

EVs have several well-known drawbacks that regulatory mandates do not remove but rather intensify by restricting the supply of ICE vehicles available for purchase. Those disadvantages include the high purchase price,14 price volatility due to supply-chain bottlenecks,15 range anxiety 16(especially in towing mode),17 long recharging times,18 reduced performance in extreme heat and cold,19 and less reliability during blackouts from hurricanes and other disasters. 20 [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

14 For example, in 2022, the initial purchase price of a conventional Ford F-150 was $40,960, that of the electric Ford-150 Lightning was $54,769. Roberto Baldwin, Sasha Richie, and Dave Vanderwerp, “EV vs. Gas: Which Cars Are Cheaper to Own?” Car and Driver, October 28, 2022, https://www.caranddriver.com/shopping- advice/a32494027/ev-vs-gas-cheaper-to-own/. The authors conclude that overall EV ownership costs are lower than those for gasoline powered vehicles (factoring in expenses for maintenance and fuel). Nonetheless, the higher EV purchase is a disadvantage that undoubtedly matters to many consumers.

15 Mark P. Mills, Testimony, “Exposing the Environmental, Human Rights, and National Security Risks of the Biden Administration’s Rush to Green Policies,” Subcommittee on Environment, Manufacturing, and Critical Materials, U.S. House Committee on Energy and Commerce, April 26, 2023, https://media4.manhattan- institute.org/wp-content/uploads/Testimony_House_Energy_Mills_4-26-2023.pdf; Institute for Energy Research, “Transition Mineral Prices Are Soaring and the Industry Is Short of Workers,” June 9, 2023, https://www.instituteforenergyresearch.org/uncategorized/transition-mineral-prices-are-soaring-and-the-industry-is- short-of-workers/.

16 Analytics Team, “Survey: Price and Range, Not Gas Prices, Dominate Worries about EVs,” Autolist.Com, July 20, 2022, https://www.autolist.com/news-and-analysis/2022-survey-electric-vehicles.

17 Alex Knizek, “How Well Can an Electric Pickup Tow?” Consumer Reports, April 21, 2023, https://www.consumerreports.org/cars/hybrids-evs/how-well-can-an-electric-pickup-truck-tow-a1149286680/: “As capable and smooth as the EVs are, they simply cannot match the heavy long-distance towing capabilities of gas, hybrid, and diesel-powered trucks. This is primarily due to the severely limited range, and the amount of time that would be required for charging during the trip. Accessing a public charger with a trailer in tow also presents potentially significant logistical challenges.”

18 Ronald Montoya, “How Long Does It Take to Charge an Electric Car?” Edmunds.Com, March 7, 2023, https://www.edmunds.com/electric-car/articles/how-long-does-take-charge-electric-car.html

19 Steve Hanley, “Electric Cars, Winter Driving, Range Anxiety, and You,” CleanTechnica, February 25, 2022, https://cleantechnica.com/2022/02/25/electric-cars-winter-driving-range-anxiety-you/.

20 Shawn A. Adderly, Daria Manukian, Timothy D. Sullivan, and Mun Son. 2018. Electric vehicles and natural disaster policy implications. Energy Policy 212: 437-448, https://www.sciencedirect.com/science/article/abs/pii/S0301421517305906; Diana Furchtgott-Roth, “Electric Vehicles Powerless During Hurricanes,” Forbes, September 5, 2021, https://www.forbes.com/sites/dianafurchtgott- roth/2021/09/05/electric-vehicles-powerless-during-hurricanes/?sh=107d1bfe48da.

The proposed standards would impose disproportionate burdens on low-income, single-vehicle households. My colleague Ben Lieberman explains:

The higher purchase price of an EV is prohibitive enough, but it is only part of the story. Fully one-third of American households are single-vehicle households, including many low-income ones.21 However, the limitations of EVs make them impractical as a household's one and only vehicle. This includes long charging times (especially inconvenient for renters who are less likely to be able to charge at home) as well as limited range. Indeed, nearly 90 percent of EVs currently in use are part of wealthier multi-car households that include one or more gas-powered vehicles.22 Thus, the EV agenda not only involves the higher sticker price relative to gasoline-powered vehicles, but also the additional cost of a conventional vehicle to back it up.23 [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

21 The Geography of Transport Systems, Percentage of Households by Number of Vehicles, 1960-2020, https://transportgeography.org/contents/chapter8/urban-transport-challenges/household-vehicles-united-states/ (accessed July 5, 2023).

22 Lucas W. Davis. 2019. How much are electric vehicles driven? Applied Economics Letters, Vol. 26, No. 18, 1497- 1502, https://faculty.haas.berkeley.edu/ldavis/Davis%20AEL%202019.pdf.

23 Ben Lieberman and Donna Jackson, "Costlier cars help the poor, according to EPA," Open Market, June 26, 2023, https://cei.org/blog/costlier-cars-help-the-poor-according-to-epa/.

Government's cartelization of the auto industry via regulations and preferential subsidies poses an insidious threat to consumer welfare. The IRA and the EPA's mandates increase automakers' dependence on political subventions while preventing both industry incumbents and new entrants from competing on price, range, and ease-of-fueling by selling gasoline-powered cars. Energy analyst Robert Bryce recently reported that Ford loses $64,466 on every EV it sells, "and isn't making up for it in volume." 24 Bryce cautions that "if a business isn't profitable, it isn't sustainable." [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

24 Robert Bryce, "Ford Is Losing $64,446 on Every EV It Sells," Substack, May 3, 2023, https://robertbryce.substack.com/p/ford-is-losing-66446-on-every-ev.

Organization: Consumer Reports (CR)

4. There is Strong Consumer Demand for Cleaner Vehicles

In January and February 2022, Consumer Reports fielded a nationally representative survey of 8,027 US adults on consumer awareness of BEV and low carbon fuels.17 The survey found that 71% of Americans express some level of interest in buying or leasing an electric vehicle, as shown in Figure 4.1. Within that group, 14% of Americans would "definitely buy" an EV if they were to buy or lease a vehicle today. This translates to approximately 36 million "EV-ready" buyers, which is an increase of 350% between 2020 and 2022. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

17 Battery Electric Vehicles & Low Carbon Fuels Survey, Consumer Reports, April 2022, https://article.images.consumerreports.org/image/upload/v1657127210/prod/content/dam/CRO-Images-2022/Cars/07July/2022_Consumer_Reports_BEV_and_LCF_Survey_Report.pdf.

[See original comment for Figure 4.1: Likelihood of Buying or Leasing an Electric-Only Vehicle Today] [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

Unfortunately, automakers have not kept up with orders. As a result, for every single EV being manufactured, there are 45 consumers ready to buy or lease one.18 The imbalance between supply and demand is resulting in long waitlists and dealer markups. Automakers are making investments to improve supply, but the growth in supply has been lagging the growth in demand. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

18 Excess Demand, The Looming EV Shortage, Consumer Reports, March 2023, https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf.

Absent strong action and direction from the federal government, this gap between supply and demand will only continue to widen. This is because the barriers to EV adoption identified in CR's 2022 survey of BEV and low carbon fuels awareness are being addressed: purchase cost for EVs is declining, charging infrastructure is expanding, consumers are gaining more experience with EVs, and automakers are investing in new models and increased production.19 These trends tend to reinforce one another in a virtuous cycle to create even more demand for these vehicles. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

19 Battery Electric Vehicles & Low Carbon Fuels Survey, Consumer Reports, April 2022, https://article.images.consumerreports.org/image/upload/v1657127210/prod/content/dam/CRO-Images-2022/Cars/07July/2022_Consumer_Reports_BEV_and_LCF_Survey_Report.pdf.

The EPA's GHG standards can be especially helpful in solving the chicken-and-egg problem with infrastructure. By guaranteeing that greater numbers of EVs will be manufactured in the coming years, the new standards will help give private industry the confidence it needs to invest in infrastructure, knowing that greater demand for reliable charging infrastructure is on the way. Private corporations are already beginning to see the opportunity that EV charging can provide, with Walmart, 7-11, Starbucks, and Subway all recently announcing major EV charging initiatives. This increased private investment combined with the $7.5b in federal investment in charging infrastructure from the Bipartisan Infrastructure Law can help reduce a major barrier to consumer adoption of EVs. As consumers become more confident in the availability and reliability of the charging network, their interest in purchasing an EV is likely to increase. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

Another key driver of EV purchase interest is direct experience with EVs. This is illustrated in Figure 4.2, in which the three pie graphs represent low, medium, and high levels of experience with battery electric vehicles.20 CR found that consumers with the most direct experience were almost ten times as likely to say they would "definitely buy" an electric vehicle today as consumers with no direct experience (58% vs 6%).21 More EVs on the road means more opportunities for Americans to gain more direct experience and exposure to EVs. Right now, broad consumer experience with EVs is very limited, but that is likely to change as more people see family, friends, and neighbors bring home their first EV. This data show that as consumers gain that greater familiarity with EVs they will be more likely to consider purchasing them. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

20 Id.

21 Experience was measured based upon "yes" answers to four different questions:

1) Have you seen an EV in your neighborhood in the past month

2) Do you know someone with an EV

3) Have you been a passenger in an EV in the past year

4) Have you driven an EV in the past year

[See original comment for Figure 4.2 - Survey Results on EV Demand by Experience with EVs] [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

Automaker investments and consumer costs have been discussed in other areas of this comment letter, but they also have the potential to drive increased consumer demand. As automakers deliver more volume, economies of scale and intensified competition for customers will further feed cost declines, which will feed back into the cycle, and lead to increased EV demand. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

However, it's not just that consumers are showing increased interest in EVs; they're also showing declining interest in conventional gasoline vehicles. CR's car buying survey from March and April 2022 found that 30% of licensed drivers who were then in the market to buy or lease a new (and not a used) vehicle were not even considering a conventional, non-hybrid vehicle.22 This however, isn't just something consumers are telling us, it's also showing up in the market. Sales of new ICE vehicles decreased by 26% from 2019 to 2022, while combined sales of BEVs, PHEVs and conventional hybrids increased by 144%. BEV sales alone increased by 244% over that same period.23 [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

22 Car Buying: A National Representative Multi-Mode Survey, 2022 Results, Consumer Reports, May 2022, https://article.images.consumerreports.org/prod/content/dam/surveys/Consumer_Reports_Car_Buying_March_2022.pdf.

23 Consumer Reports analysis of Wards Intelligence annual sales data, available with subscription at: https://wardsintelligence.informa.com/datacenter.

Consumers who are still considering gasoline powered vehicles want them to keep getting more efficient. In a 2022 CR survey of 2,161 US adults assessing Americans' beliefs and attitudes about fuel economy, seven in ten American drivers say that fuel economy is either "very important" or "extremely important" to them when considering what vehicle to purchase or lease.24 In addition, when asked which attributes of the vehicle they drive most often have the most room for improvement, 43% of drivers selected improvements in fuel economy, the most commonly selected attribute, which beat out purchase price (30%), maintenance costs (27%), and eleven other features.25 The full results are shown in Figure 4.3. Finally, 85% of Americans agree that automakers should continue to improve fuel economy across vehicle types.26 This underscores the urgency of this rule to ensure that there is a stringent path forward for automakers to not only increase access to EV technology, but to improve the efficiency of conventional vehicles that some consumers will still be buying. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

24 CR nationally representative survey of 2,161 US adults in September and October, Consumer Reports, 2022, https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Consumer-Reports-Fuel-Economy-20 22-National-Sample-Report.pdf.

25 Id.

26 Id.

[See original comment for Figure 4.3 - Vehicle Attributes with the Most Room For Improvement] [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

Unfortunately, the communities most harmed by transportation emissions and pollution are adopting electric vehicles at disproportionately low rates.27 Despite considerable interest in EVs across race and ethnicity, inequities in EV adoption persist. The BEV and low carbon fuel awareness survey found that overall interest in purchasing EVs was high across all demographics, with communities of color showing at least as great a level of interest in purchasing an electric vehicle as white consumers: 33 percent of White, 38 percent of Black, 43 percent of Latino, and 52 percent of English-speaking Asian Americans say they would "definitely" or "seriously consider" purchasing or leasing an EV.28 [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

27 Survey Says: Considerable Interest in Electric Vehicles Across Racial, Ethnic Demographics, September 2022, Consumer Reports, Union of Concerned Scientists, EV Noire & Green Latinos, https://advocacy.consumerreports.org/wp-content/uploads/2022/09/EV-Demographic-Survey-English-final.pdf.

28 Id.

The same survey found that although exposure to EVs was roughly the same among members of the Black community as white and Latino Americans (either through personal interactions, observations in their community, or through riding or driving an EV), they reported being less familiar with the fundamentals of owning an EV than any other group. This finding further stresses the need to prioritize increasing EV sales in communities that are disproportionately affected by transportation pollution. EPA should therefore consider the needs of consumers in all demographics and income levels. [EPA-HQ-OAR-2022-0829-0728, pp. 10-14]

6. Specific Technical Comments On EPA's Proposal and Modeling

6.1. Internal Combustion Engine Vehicle Backsliding

EPA's modeling accurately considers the high effectiveness of battery EVs at delivering both significant emissions reductions and consumer savings. EPA's modeling finds that EVs are so cost-effective that emissions from the remaining ICE fleet actually increase over the period of the rule by an average of around 4%. This is because EPA's model finds that it would be cost-effective for automakers to remove already developed technology from their ICE vehicles to save money while building more EVs. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

However, this modeling result does not seem likely in the real world. Consumer demand for EVs is rapidly increasing, and technology improvements will mean that the remaining gasoline powered vehicles will have to compete with better and better EV offerings.36 In order to continue to find buyers for their remaining gasoline powered vehicles, automakers will need to make them better, not worse. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

36 Excess Demand, The Looming EV Shortage, Consumer Reports, March 2023, https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf.

Furthermore, this result ignores consumer demand for cleaner, more efficient gasoline vehicles. Consumer Reports' 2022 fuel economy survey found continued strong consumer demand for more efficient vehicles.37 [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

37 Fuel Economy: A Nationally Representative Multi Mode Survey, Consumer Reports, November 2022, https://article.images.consumerreports.org/image/upload/v1670867143/prod/content/dam/surveys/Consumer_Reports_Fuel_Economy_National_September_October_2022.pdf.

- 95% of American drivers said fuel economy is at least somewhat important to them when considering what vehicle to purchase or lease, and seven in 10 (70%) say it is very important or extremely important. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

- 85% of Americans agreed that automakers should continue to improve fuel economy for all vehicle types. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

- 78% of American drivers agreed that they expect each new generation of vehicles available on the market to be more fuel-efficient than the last. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

EPA specifically estimates that hybrid vehicles will drop from 4% of the vehicle fleet in 2027 to 0% of the fleet in 2031 and 2032.38 Research from CR has shown that many hybrids on the market today are extremely cost-effective for consumers, delivering a payback on their cost in 3 years or less, with some delivering savings instantly.39 CR's 2022 nationally representative car buying survey of 6,960 US adults found that 32% of consumers planning to purchase or lease a vehicle within a year were considering a hybrid car or truck.40 While consumer demand for EVs is likely to continue to grow rapidly, EVs do not yet work for all consumer lifestyles, and hybrids offer a viable and cost-effective alternative for these consumers to both reduce their emissions and their fuel spending. EPA's modeling that shows that this popular and cost-effective technology will be completely abandoned by the entire market by the end of the decade is at odds with the data on consumer preferences for these vehicles. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

38 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Draft Regulatory Impact Analysis, EPA-420-D-23-003, Table 13-68

39 Regardless of Gas Prices, Some Hybrids Pay for Themselves Immediately, Consumer Reports, March 2, 2023, https://www.consumerreports.org/cars/hybrids-evs/hybrids-vehicles-pay-for-themselves-a1092610835/.

40 Fuel Economy: A Nationally Representative Multi Mode Survey, Consumer Reports, November 2022, https://article.images.consumerreports.org/image/upload/v1670867143/prod/content/dam/surveys/Consumer_Reports_Fuel_Economy_National_September_October_2022.pdf.

Finally, over the duration of this proposed rule, EVs will be gaining significant market share. As they do so, ICE vehicles will by necessity be losing market share. Automakers will need to make decisions about which ICE vehicles and powertrains to keep producing and which ones to discontinue. The most logical approach to meeting these standards would be to phase out their oldest and least efficient vehicles and powertrains, while keeping their newest, most advanced, and most efficient powertrains. This process has the potential to result in significant improvements in average vehicle emissions without automakers having to deploy any additional technology. For example, in the 2023 model year, the best selling Ford F150 offers ICE variants that range in emissions from 352 g/mi to 741 g/mi.41 This large range in emissions leaves a lot of room for improving fleet performance by focusing future production on the lowest emitting variants and eliminating the highest emitting variants. A more detailed analysis from the Natural Resource Defense Council found that shifting to the lowest emitting powertrains could result in emissions reductions of between 19 and 65 grams per mile, compared to the current sales weighted average, for the 12 best selling vehicles.42 [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

41 Fuel Economy of 2023 Ford F150, U.S. Department of Energy, 2023, https://www.fueleconomy.gov/feg/PowerSearch.do?action=noform&path=1&year1=2023&year2=2023&make=Ford&baseModel=F150&srchtyp=ymm&pageno=1&rowLimit=50.

42 Shifting to Cleaner Gas Engines Can Help Reduce Emissions, Natural Resource Defense Council, July 5, 2023, https://www.nrdc.org/bio/kathy-harris/shifting-cleaner-gas-engines-can-help-reduce-emissions

Given the above, CR makes the following general recommendations to improve EPA's modeling: [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

- EPA's model should not remove technology that automakers have already invested in adding to their existing ICE vehicles.

- As EV market share increases over the course of the rule, EPA should model a reduction in the number of ICE powertrains that automakers continue to build in such a way that the newest and most advanced options are kept, and the oldest and least advanced are phased out over time. [EPA-HQ-OAR-2022-0829-0728, pp. 18-20]

Organization: Countymark

Another issue related to EVs is their weight, ranging from 1,000 to 3,000 pounds more than gas-powered vehicles. This additional weight results in more damage to American roads, necessitating increased infrastructure repair costs funded by taxpayers. Mandating a transition to EVs can lead to increased consumer prices and reduced vehicle choices. It also raises concerns about the financial burden on low-income families and the potential for increased infrastructure repair costs due to the heavier weight of EVs. [EPA-HQ-OAR-2022-0829-0665, p. 2]

Organization: Daniel Hellebuyck

Consumer Choice: There is a large percentage of the population that have no desire for an EV. It may be the extra up-front costs in purchasing an EV, lack of charging stations, limited range, the vehicle not being suitable for long trips or frequent long-distance rural driving, or the time it talks to fully charge an EV compared to an ICE counterpart. In the past, the government has done a poor job of dictating which products or services that customers should purchase and as a result, consumers lost the freedom of choice that made this country so powerful, and employees who provided products and services to these consumers lost their jobs. [EPA-HQ-OAR-2022-0829-0526, p. 1]

Organization: Doug Peterson

Consumer desire for additional range may also put downward pressure on fuel economy. Conventional vehicles have the upper hand with this critical vehicle attribute. Gasoline tanks are sized to provide adequate range. Inadequate range is currently a major convenience drawback for BEVs, and they will not sell in large numbers until range figures increase substantially. Poor range also compounds the convenience drawback of slow refueling because it increases the frequency of charging station visits when travelling far from home. When battery packs are enlarged to provide additional range, fuel economy often suffers. [EPA-HQ-OAR-2022-0829-0500, pp. 10-11]

The relationship between range and electric fuel economy is complex. Higher fuel economy increases range, but automakers can achieve the same result by increasing the size of the battery pack. This approach adds considerable weight to the vehicle and tends to reduce fuel economy. The tradeoff between range and efficiency will shift as engineers improve the gravimetric energy density of battery cells, and impressive breakthroughs appear to be just around the corner. It is also worth noting that some automakers are producing BEV models that deliver impressive range along with outstanding fuel economy. Still, the EPA should be very concerned that its failure to regulate BEV fuel economy will result in the unrestrained upsizing of battery packs. The trend will increase demand for limited supplies of resources like lithium which will also be needed for batteries that store intermittent renewable energy. In the near term, the inability to secure an adequate supply of battery materials will slow BEV proliferation. [EPA-HQ-OAR-2022-0829-0500, pp. 10-11]

Consumer trends favoring larger, more powerful vehicles have undermined regulatory efforts to improve the overall fuel economy of the conventional fleet. The compelling statistics are summarized each year in the EPA’s Automotive Trends Report, and the agency would be wise to not let history repeat itself with the emerging electric fleet. The footprint model was specifically designed so that automakers would not be held accountable for market trends that affect the composition of their fleets. The dubious argument applied here was that automakers have no control over purchasing decisions made by consumers that determine their fleet mix. There is strong evidence that automakers have actively encouraged consumer trends that are known to waste gasoline, and they will do the same thing with BEVs if not held accountable for upstream emissions. The proposed policy will supercharge these wasteful trends just as the electric fleet is taking shape, and it will be very difficult to restore efficiency to the fleet after it has evolved. [EPA-HQ-OAR-2022-0829-0500, pp. 11-12]

There is already a strong public perception that electric fuel economy is environmentally meaningless, and this should be very troubling to the EPA. When automakers advertise their BEVs, MPGe ratings are rarely even cited. The vast disparity between the most efficient BEVs and the least efficient plug-in hybrids is also being blurred in the eyes of the public. If a vehicle is “electrified”, it is marketed as being very environmentally beneficial, but this is often not the case. Plug-in hybrids are sometimes even called “zero-emission vehicles”. Ardent BEV enthusiasts are especially indifferent to MPGe disparities, viewing BEVs as environmentally superior vehicles that are all equally beneficial. The Electric Vehicle Association has no reservations about electron guzzlers, but the EPA certainly should. [EPA-HQ-OAR-2022-0829-0500, pp. 11-12]

Organization: Departments of Transportation of Idaho, Montana, North Dakota, South Dakota and Wyoming

Moreover, EVs are not well suited for all of our nation’s climates, especially in states that are rural, are at high altitude, or both. In such areas lon such areas long distance travel in often extreme temperature ranges significantly impact EV range and the ability of Americans to access healthcare, food, and other neg distance travel in often extreme temperature ranges significantly impact EV range and the ability of Americans to access healthcare, food, and other necessities. [EPA-HQ-OAR-2022-0829-0525, p. 2]

Organization: Energy Innovation

As of the first quarter of 2023, the U.S. hit an all-time high of EV sales, which made up just over 8 percent of new car sales.35 And over the last six months, the U.S. has exceeded the 5 percent tipping point for EVs—a trend established by 18 countries, suggesting that a quarter of new car sales could be electric by the end of 2025.36 [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

35 Maria Olano, "Chart: EV Sales on Pace to Break 1 Million in US This Year," Canary Media, April 21, 2023, https://www.canarymedia.com/articles/electric-vehicles/chart-ev-sales-on-pace-to-break-1-million-in-us-this-year.

36 Tom Randall, "US Crosses the Electric-Car Tipping Point for Mass Adoption," Bloomberg.com, July 9, 2022, https://www.bloomberg.com/news/articles/2022-07-09/us-electric-car-sales-reach-key-milestone#xj4y7vzkg.

See Figure 7.

[See original attachment for line graph "How Fast Is the Switch to Electric Cars?"] [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

Figure 7. Graph charting the countries that have reached the 5 percent tipping point for EVs. Source: Tom Randall, "US Crosses the Electric-Car Tipping Point for Mass Adoption" (Bloomberg, July 2022), available at: https://www.bloomberg.com/news/articles/2022-07- 09/us-electric-car-sales-reach-key-milestone#xj4y7vzkg. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

The trajectory for greater electrification follows the trend over the past decade of increasing EV ranges and overall improvements to performance as more models become available. As illustrated in Figure 8, the average EV range has almost tripled over the past 10 years, going from just under 80 miles in 2010 to 220 miles in 2021. These improvements in vehicle performance will continue the positive feedback loop of increased consumer acceptance and vehicle affordability, further accelerating adoption of EVs in this decade. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

[See original attachment for line graph titled "Average range of electric vehicles"] [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

Figure 8. The average range of EVs, 2010 – 2021. Source: Ritchie, Hannah, "The End of Range Anxiety: How Has the Range of Electric Cars Changed over Time," Sustainability by Numbers, February 26, 2023, available at: https://www.sustainabilitybynumbers.com/p/electric-car-range#footnote-anchor-1-104582203. [EPA-HQ-OAR-2022-0829-0561, pp. 12-15]

Organization: Environmental. and Public Health Organizations

XV. ZEV Penetration in the Absence of the Proposed Standards is Likely to Exceed EPA's Estimates, Supporting the Feasibility of More Stringent Standards.

To support the feasibility of Alternative 1 with a steeper increase in stringency after 2030, we now turn to the market growth of ZEVs and anticipated baseline (or "no action") levels of ZEV penetration. EPA's No Action scenario projected that BEVs will comprise 39% of the LDV fleet in 2032. To assess the reasonableness of this projection, EPA reviewed literature and other analytical projections, which clearly supported ZEV penetration at least as high as EPA's projections. While EPA's approach is reasonable, real-world "no action" levels of BEVs are likely to be even higher than EPA's No Action scenario. This supports making the finalized standards more stringent than proposed. [EPA-HQ-OAR-2022-0829-0759, p. 100]

XIX. Consumer Acceptance of PEVs Is Not a Barrier to Feasibility of EPA's Proposed Standards or More Stringent Standards.

In this section and in Sections XX and XXI, we explain how consumer acceptance considerations support strong final standards. As detailed below, PEVs offer significant economic and performance benefits to consumers, and consumer interest in PEVs continues to grow. [EPA-HQ-OAR-2022-0829-0759, p. 151]

A. EPA has broad discretion in considering consumer preferences when promulgating emission standards but should not give undue weight to that factor.

As explained in EPA's Proposal and Section II of these comments, when promulgating new emissions standards under Clean Air Act § 202(a), EPA must consider the statutory criteria of technological feasibility, cost of compliance, and lead time.412 EPA may consider other factors, and in the past has considered a rule's various impacts on vehicle purchasers.413 [EPA-HQ-OAR-2022-0829-0759, p. 152]

412 42 U.S.C. § 7521(a); 88 Fed. Reg. at 29186.

413 88 Fed. Reg. at 29186.

While EPA has often considered consumer acceptance in its Section 202 rulemakings, the Agency may not let the unique preferences of each and every consumer dictate its consideration of the appropriateness or feasibility of emission standards. In International Harvester Company v. Ruckelshaus, 478 F.2d 615, 640 (D.C. Cir. 1973), the D.C. Circuit Court of Appeals concluded:

We are inclined to agree with the Administrator that as long as feasible technology permits the demand for new passenger automobiles to be generally met, the basic requirements of the Act would be satisfied, even though this might occasion fewer models and a more limited choice of engine types. The driver preferences of hot rodders are not to outweigh the goal of a clean environment. [EPA-HQ-OAR-2022-0829-0759, p. 152]

While International Harvester involved emission requirements for light-duty vehicles under a provision of the 1970 Amendments, the principles the court expressed apply just as well to standards under Section 202(a)(1). As detailed in Section II, Congress intended EPA's standards to push the industry toward greater emission reductions and did not expect them to preserve the market dominance of any particular type of powertrain or power source. EPA should not give oversized weight to arguments questioning consumer preferences, which is not a factor Congress identified in Section 202(a)(1). [EPA-HQ-OAR-2022-0829-0759, p. 152]

While EPA has discretion whether to consider and how much weight to give purchaser acceptance in setting emission standards, that discretion is limited by EPA's primary statutory duty to set standards that adequately protect public health and welfare. An understanding of consumers' willingness to purchase and drive PEVs could inform the feasibility and effectiveness of EPA's regulations. EPA's attention to consumer preferences, however, cannot compromise its overall Clean Air Act mandate to mitigate the automobile's "devastating impact on the American environment," International Harvester, 478 F.2d at 622, or the Agency's primary duty to protect public health and welfare by minimizing harmful air pollution. Most importantly here, however, is that consumer acceptance of PEVs is widespread and growing, and PEVs provide the vehicle features and characteristics that drivers want and need. Thus, as this section will explain, consumer acceptance is not a barrier to PEV penetration at the levels projected by EPA's Proposal or at levels consistent with Alternative 1 with increasing stringency after 2030. [EPA-HQ-OAR-2022-0829-0759, pp. 152-153]

B. Consumer acceptance of PEVs is not a barrier to feasibility because consumer acceptance is widespread and growing.

Under EPA's Proposed Standards and under Alternative 1 with a faster ramp-up after 2030, consumer preferences generally align with the most economically advantageous and cost-effective compliance pathway (increasing the deployment of PEVs within the light-duty fleet) toward meeting strong emission standards that fulfill EPA's statutory mandate. American drivers have shifted and are continuing to shift toward acceptance of—and, increasingly, preference for—PEVs. As several original equipment manufacturers (OEMs) have themselves explained, "[r]educed interest in legacy products due to technology advancements and consumer preference shifts are an inevitable reality of the market and occur in all sectors of the economy." See Initial Brief for Industry Respondent-Intervenors at 13-14, Ohio v. EPA, No. 22-1081 (D.C. Cir. Feb. 13, 2023).414 Here, as PEV technology advances and both the public health and driver-experienced benefits of PEVs become apparent, consumer's preferences are naturally shifting away from combustion vehicles and toward PEVs. [EPA-HQ-OAR-2022-0829-0759, p. 153]

414 Automaker industry respondent-intervenors on this brief include Ford Motor Company, BMW of North America, LLC, Volkswagen Group of America, Volvo Car USA LLC, American Honda Motor Co., Inc., and the National Coalition for Advanced Transportation (whose members include Rivian and Tesla). The Initial Brief for Industry Respondent-Intervenors is available at https://blogs.edf.org/climate411/files/2023/02/Industry-Respondent-Intervenors-Initial-Brief-Feb.-13-2023_.pdf.

EPA's Proposal accurately highlights the already "greatly increased acceptance [of PEVs] by consumers," 88 Fed. Reg. at 29187, and that "consumer affinity for PEVs is strong." Id. at 29189. This market-based consumer acceptance is evidenced at least in part by recent rapid growth in PEV market share—growth that has outpaced historical estimates considered ambitious just a decade ago. EPA's 2012 Rule, for example, assumed electric vehicles would account for only 3% of the car market and 2% of the combined car and light-duty truck market by 2025. 77 Fed. Reg. at 62874, 62875 Tbl.III-52. By 2021, however, combined car BEV and PHEV market share had already outpaced that estimate for 2025, reaching about 4.2% of LDV sales and double the 2020 market share.415 By 2022, electric vehicle market share had again reached a new high, with combined LDV BEV and PHEV market share totaling 7.6% for 2022416—already more than double EPA's 2012 Rule projection for 2025. As of the first quarter of 2023, U.S. light-duty PEV sales were up again, to 8.3%,417 an increase of 60% compared to the same period in 2022.418 As discussed in the Proposal, forecasts based on consumer demand now suggest U.S. passenger car PEV sales percentages of 40% to more than 50% by 2030, 88 Fed. Reg. at 29192, and public announcements by major automobile manufacturers support baseline PEV sales at this level or higher. Id. at 29190-2; DRIA at 3-16.. [EPA-HQ-OAR-2022-0829-0759, pp. 153-154]

415 Plug In America, The Expanding EV Market: Observations in a Year of Growth 4 (Feb. 2022), https://pluginamerica.org/wp-content/uploads/2022/03/2022-PIA-Survey-Report.pdf; David Gohlke et al., Assessment of Light-Duty Plug-In Electric Vehicles in the United States, 2010–2021, Argonne National Laboratory 4 (Nov. 2022), https://publications.anl.gov/anlpubs/2022/11/178584.pdf; Argonne National Laboratory, Light Duty Electric Drive Vehicles Monthly Sales Updates, https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates); EPA, The 2022 EPA Automotive Trends Report 57 (Dec. 2022), https://www.epa.gov/system/files/documents/2022-12/420r22029.pdf.

416 Colin McKerracher et al., Electric Vehicle Outlook 2023, BloombergNEF (June 8, 2023). Subscription required.

417 Argonne National Laboratory, Light Duty Electric Drive Vehicles Monthly Sales Updates, https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates (showing, as of May 2023, PEV car sales over 10% of total car sales, and combined PEV car and light-duty truck sales of 8.36% of total light-duty sales).

418 International Energy Agency, Global EV Outlook 2023, at 22 (April 2023), https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEVO2023.pdf.

Data regarding PEV registrations and preorders also shows strong and growing consumer demand for these vehicles and signals widening consumer acceptance. In the first three months of 2022, registrations for new PEVs increased 60% in the United States, even though overall new car registrations were down 18%.419 Looking at consumer sales shares, however, is likely an inadequate proxy for actual consumer interest in PEVs, given the fact that many consumers do not yet have access to these vehicles. A recent analysis by Sierra Club found that 66% of car dealerships nationwide did not yet have a single EV available for sale.420 When new PEV models enter the market, consumers race to place orders. In late 2022, for example, GMC's new Sierra model electric pickup truck averaged more than 500 reservations per day and reached roughly 20,000 reservations after a little over a month, on top of over 170,000 reservations for GMC's Silverado EV pickup.421 Similarly, the Dodge Ram 1500 REV pickup reached its maximum number of preorders in just 5 days earlier this year.422 [EPA-HQ-OAR-2022-0829-0759, p. 154]

419 Jayme Deerwester, Registrations for Electric Vehicles Soar, Signaling Increasing Mainstream Acceptance, USA Today (May 16, 2022), https://www.usatoday.com/story/money/cars/2022/05/16/electric-vehicle-registration-soars/9798645002/.

420 Sierra Club, Rev Up Electric Vehicles: A Nationwide Study of the Electric Vehicle Shopping Experience (May 2023), https://www.sierraclub.org/sites/www.sierraclub.org/files/2023-05/SierraClubRevUpReport2023.pdf.

421 Peter Holderith, 2024 GMC Sierra EV Waitlist Proves People Want All the Electric Pickups, thedrive.com (Nov. 29, 2022), https://www.thedrive.com/news/2024-gmc-sierra-ev-waitlist-proves-people-want-all-the-electric-pickups.

422 Peter Johnson, Ram Closes Reservations for Its First Electric Truck, the 1500 REV, After 5 Days, electrek (Feb. 17, 2023), https://electrek.co/2023/02/17/ram-closes-reservations-for-its-first-electric-truck-the-1500-rev/.

This consumer purchase data shows Americans' increasing desire for PEVs, and is backed up by other data and research. Specifically, as this section will explain, peer-reviewed research and analyses, customer-based surveys, and comparisons with international sales trends provide further evidence of broad and expanding consumer preference for PEVs. [EPA-HQ-OAR-2022-0829-0759, p. 154]

1. Recent peer-reviewed academic literature supports broad and growing consumer acceptance of PEVs.

Several recent peer-reviewed papers have shown that consumers are in fact ready and willing to adopt electric vehicles. EPA references some of these papers in the Proposal, and should also consider additional research on PEV consumer acceptance, including research that is recently published. For example, a recent study by leading academics in this field, and not discussed in EPA's Proposal, examined consumer choices of plug-in electric vehicles (including BEVs and PHEVs) relative to conventional gasoline vehicles.423 The study, Forsythe et al. (2023), found that when consumers' basic demands for vehicle attributes are met, they accept or prefer BEVs to combustion vehicles.424 The analysis was conducted through a nationwide survey-based consumer discrete choice experiment from December 2020 to September 2021, in which new vehicle consumers—weighted to be representative of the U.S. population—chose among potential vehicle options in a manner that mimicked the process of comparing vehicles on an automaker's website.425 In order to examine how consumer preferences might be changing over time, the experiment was designed to be compared to an earlier discrete choice experiment conducted in 2012–2013.426 The Forsythe et al. (2023) experiment was well-designed in that it (1) mitigated typical concerns of stated-preference experiments by "incorporat[ing] multiple features into the survey design that tend to improve the ability for survey responses to reveal comparable preferences as when making true purchase decisions";427 (2) included a substantial number of participants (734 car-buyers and 862 SUV-buyers) recruited using both Amazon's Mechanical Turk (to mirror the earlier comparative study) and Dynata (which includes older and higher-income respondents), and weighted to ensure representativeness of the U.S. new vehicle buying population;428 and (3) evaluated expected technology for a near-future hypothetical vehicle based on extensive research conducted by the National Academies of Sciences, Engineering, and Medicine, thus reflecting what PEV models could realistically be available to consumers in the short term.429 [EPA-HQ-OAR-2022-0829-0759, pp. 154-155]

423 Connor R. Forsythe, Kenneth T. Gillingham, Jeremy J. Michalek & Kate S. Whitefoot, Technology Advancement is Driving Electric Vehicle Adoption, PNAS (May 2023), https://www.pnas.org/doi/epdf/10.1073/pnas.2219396120.

424 Id.

425 Id. at 1, 3.

426 Id. at 1; see also J.P. Helveston, et al., Will Subsidies Drive Electric Vehicle Adoption? Measuring Consumer Preferences in the U.S. and China, 73 Transp. Res. Part A: Policy Pract. 96-112 (2015), https://reader.elsevier.com/reader/sd/pii/S0965856415000038?token=029105616ECD043F67531E36FA6FBC42FD
0801DE87C8B7FB2771B0B4E37E79E91CA7AE0CBC4CC7EFA61DCFC6A671DDFC&originRegion=us-east-1&originCreation=20230518185020.

427 Forsythe et al. (2023) at 3 (listing features incorporated to mitigate any limitations of stated-preference surveys). See also C.A. Vossler, M. Doyon & D. Rondeau, Truth in Consequentiality: Theory and Field Evidence on Discrete Choice Experiments, 4 Am. Econ. Journal: Microeconomics 145-171 (2012), https://www.aeaweb.org/articles?id=10.1257/mic.4.4.145.

428 Forsythe et al. (2023) at 3.

429 Id. at 2–3; see also National Academies of Sciences, Engineering, and Medicine, Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035 (2021), https://nap.nationalacademies.org/catalog/26092/assessment-of-technologies-for-improving-light-duty-vehicle-fuel-e conomy-2025-2035.

Forsythe et al. (2023) was the first to examine "the degree to which consumer willingness to trade off relevant vehicle attributes associated with electrification (e.g., range, operating cost, price, etc.) may have changed over time due to technology improvements or other factors and what this could imply for the sales of new vehicles in upcoming years."430 The results indicated that "any perceived disadvantages of BEVs relative to gasoline vehicles are often compensated by the BEV's improved operating cost, acceleration, and fast-charging capabilities, particularly for BEVs with a longer range."431 [EPA-HQ-OAR-2022-0829-0759, pp. 155-156]

430 Forsythe et al. (2023) at 2.

431 Id. at 2.

In short, the study reveals that the attributes consumers look for in their vehicles have most likely stayed consistent between the 2012 stated-preference experiment and Forsythe et al. (2023)'s most recent. As BEVs are able to provide more of those attributes, consumers choose BEVs more often. The authors ultimately concluded that reasonable forecasted improvements of BEV range and price—based on extensive research on technology development by the National Academies of Sciences—show that "consumer valuation of many BEVs is expected to equal or exceed their gasoline counterparts by 2030," resulting in 40% to nearing 60% of consumers choosing BEV powertrain options over combustion powertrain options for the same vehicle.432 Moreover, "[a] suggestive market-wide simulation extrapolation indicates that if every gasoline vehicle had a BEV option in 2030, the majority of new car and near-majority of new sport-utility vehicle choice shares could be electric in that year due to projected technology improvements alone."433 Finally, Forsythe et al. (2023) suggested that, with the assumed technological projections, even if all BEV purchase incentives were entirely phased out, BEVs could still have a market share of about 50% relative to combustion vehicles by 2030, based on consumer choice alone.434 [EPA-HQ-OAR-2022-0829-0759, p. 156]

432 Id. at 1, 5 Fig.3 (showing U.S. BEV car market shares in MY 2030 over 50% and U.S. BEV SUV market shares in MY 2030 over 40%).

433 Id. at 1. These projected technology improvements follow the projections from National Academies of Sciences, Engineering, and Medicine, Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035 (2021), https://nap.nationalacademies.org/catalog/26092/assessment-of-technologies-for-improving-light-duty-vehicle-fuel-e conomy-2025-2035.

434 Forsythe et al. (2023) at 6.

As discussed in EPA's Proposal and the Agency's January 2023 literature review of consumer acceptance research,435 other recent studies show a similar trend of increasing consumer preference for PEVs. For example, Carley et al. (2019) found that American consumers were more intent on purchasing PEVs in 2017 than in 2011.436 Gillingham et al. (2023), cited briefly in EPA's Proposal, is especially illustrative of the increasing consumer demand for PEVs. That study used data on all new light-duty vehicles sold in the United States between 2014 and 2020 (a dataset of over 106 million observations), and found that in the vehicle segments and classes where EVs were available, they were competing very successfully with comparable combustion vehicles, with relative market shares "exceeding 30% in recent years."437 The results of this investigation could imply that fleet-wide LDV PEV market share in 2020 was around 2% not because only 2% of buyers wanted PEVs, but at least in part due to “the (near-)absence of EV offerings in many segments of the vehicle market”438 where purchasers are interested in purchasing vehicles. If consumers want to purchase a particular vehicle type and there are no PEVs available within that market segment, they will buy a combustion vehicle. Gillingham et al. (2023) shows that when PEVs are available in those market segments, consumers already often choose the PEV over the combustion vehicle. [EPA-HQ-OAR-2022-0829-0759, pp. 156-157]

435 EPA & Lawrence Berkeley National Laboratory, Literature Review of U.S. Consumer Acceptance of New Personally Owned Light Duty Plug-In Electric Vehicles (Jan. 2023), https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=OTAQ&dirEntryId=353465.

436 Sanya Carley, Saba Siddiki & Sean Nicholson-Crotty, Evolution of Plug-In Electric Vehicle Demand: Assessing Consumer Perceptions and Intent to Purchase Over Time, 70 Transp. Res. Part D: Transp. Environ. 94-111 (2019), https://www.sciencedirect.com/science/article/abs/pii/S1361920918311635.

437 Kenneth T. Gillingham, Arthur A. van Benthem, Stephanie Weber, Mohamed Ali Saafi & Xin He, Has Consumer Acceptance of Electric Vehicles Been Increasing? Evidence from Microdata on Every New Vehicle Sale in the United States, American Economic Association: Papers & Proceedings 333–334 (May 2023).

438 Id. at 334.

A number of studies in addition to those cited in EPA’s literature review of consumer acceptance have considered the impacts of various factors on consumer acceptance of PEVs, and these—coupled with the current rapid pace of technological development and vast investment in PEV infrastructure—provide additional evidence that consumer acceptance is not a barrier to PEV penetration at levels consistent with EPA’s Proposal or with Alternative 1 with increasing stringency after 2030. One body of research, for example, reveals that consumer demand is responsive to the availability of public charging infrastructure. When this infrastructure is available—as it increasingly is and will be, see Section XVII—consumer acceptance of and demand for PEVs increases. Cole et al. (2023) concluded that for encouraging PEV sales, “[s]pending on charging stations is more effective than spending on rebates,” with shifting spending from rebates to charging station programs increasing projected EV penetration share in 2030 from 48% to 68%.439 Similarly, Li (2017) found that, between 2011 to 2013, the federal income tax credit of up to $7,500 for EV buyers contributed to about 40% of EV sales, but “[a] policy of equal-sized spending but subsidizing charging station deployment could have been more than twice as effective in promoting EV adoption.”440 Using data from Norway, Springel (2021) found that spending on charging station subsidies, at least initially, resulted in more EV purchases than spending on consumer price subsidies.441 Given the extensive investments in PEV infrastructure, detailed in Section XVII, PEV demand would be expected to be responsive to these investments, and increasing. Additionally, Herberz et al. (2022) studied BEV adoption and found that “car owners systematically underestimate the compatibility of available battery ranges with their annual mobility needs and that this underestimation is associated with increased demand for long battery ranges and reduced willingness to adopt electric vehicles.”442 Researchers found that simply providing tailored compatibility information increased consumer willingness to pay for BEVs, even more than information about easy access to charging infrastructure. [EPA-HQ-OAR-2022-0829-0759, pp. 157-158]

439 Cassandra Cole, Michael Droste, Christopher Knittel, Shanjun Li & James Stock, Policies for Electrifying the Light-Duty Fleet in the United States, American Economic Association: Papers & Proceedings 320 (May 2023).

440 Shanjun Li, Lang Tong, Jianwei Xing & Yiyi Zhou, The Market for Electric Vehicles: Indirect Network Effects and Policy Design, 4 Journal of the Association of Environmental and Resource Economists 89 (Jan. 2017).

441 Katalin Springel, Network Externality and Subsidy Structure in Two-Sided Markets: Evidence from Electric Vehicle Incentives, American Economic Journal: Economic Policy 393, 425–426 (Nov. 2021).

442 Mario Herberz, Ulf J. J. Hahnel & Tobias Brosch, Counteracting Electric Vehicle Range Concern with a Scalable Behavioural Intervention, Nature Energy 503 (2022).

2. Consumer surveys also support broad and growing consumer acceptance of PEVs.

Many well-designed, real-world consumer surveys also confirm significant and growing consumer interest in purchasing PEVs. A report on a recent, nationally representative survey of 8,027 Americans conducted by Consumer Reports with input from the Union of Concerned Scientists, GreenLatinos, and EVNoire, conducted between January 27 and February 18, 2022, found that "[o]verall interest in EVs is high" across all racial demographics.443 Between 33% and 52% of respondents (depending on racial demographics) would "definitely" or "seriously consider" purchasing or leasing an EV as their next vehicle.444 Only 28% of Americans would not consider getting an electric-only vehicle if they were to buy or lease a vehicle today.445 Even in rural areas, the survey showed that current interest in EV purchases is high, with up to 29% of rural drivers at least seriously considering buying or leasing an EV.446 Between 2020 and 2022, Consumer Reports surveys have shown a 350% increase in consumer demand for BEVs.447 [EPA-HQ-OAR-2022-0829-0759, p. 158]

443 Consumer Reports, et al., Survey Says: Considerable Interest in Electric Vehicles Across Racial, Ethnic Demographics: Smarter Policies Can Help Overcome Barriers 2 (Sept. 2022), https://www.ucsusa.org/sites/default/files/2022-09/ev-demographic-survey_0.pdf.

444 Id.

445 Consumer Reports, Battery Electric Vehicles & Low Carbon Fuel Survey: A Nationally Representative Multi-Mode Survey 3 (Apr. 2022), https://article.images.consumerreports.org/image/upload/v1657127210/prod/content/dam/CRO-Images-2022/Cars/0 7July/2022_Consumer_Reports_BEV_and_LCF_Survey_Report.pdf. See also Lydia Saad, Gallup Vault: Misjudging Cellphone Adoption (Feb. 16, 2018), https://news.gallup.com/vault/227810/gallup-vault-misjudging-cellphone-adoption.aspx (noting that Americans have not always accurately judged their acceptance of future behavior and have underestimated their acceptance of newer technologies, with almost a quarter of Americans saying in 2000 that they had no intention of ever having a mobile phone).

446 Maria Cecilia Pinto de Moura, Survey Shows Pathway to Speeding Up EV Adoption in Rural Areas, Union of Concerned Scientists (March 14, 2023), https://blog.ucsusa.org/cecilia-moura/survey-shows-pathway-to-speeding-up-ev-adoption-in-rural-areas/.

447 Chris Harto, Excess Demand: The Looming EV Shortage, Consumer Reports 2, 4 (Mar. 2023), https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf.

Survey responses in the 2022 Capital One Car Buying Outlook also overwhelmingly show that Americans envision a future in which they will be driving PEVs. Over 60% of American car buyers and 84% of American car dealers surveyed agreed that electric vehicles are the future.448

Additionally, 46% of car buyers already believe they will be driving an electric vehicle within the next 10 years.449 The annual global EY Mobility Consumer Index found a similar level of consumer demand for and interest in PEVs, and also emphasized that this is a global trend with which the United States must keep pace in order to remain globally competitive. The investigation, conducted in March 2022, surveyed approximately 13,000 respondents from 18 countries including the United States on themes including EVs, mobility and travel behavior, and car buying. It found that preference for fully electric cars for those surveyed tripled between 2020 and 2022,450 and 52% of global car buyers currently prefer their next car purchase to be an EV, PHEV, or hybrid vehicle.451 [EPA-HQ-OAR-2022-0829-0759, pp. 158-159]

448 Capital One, 19 Percent of Consumers Find Car Buying Process Transparent (July 26, 2022), https://www.capitalone.com/about/newsroom/car-buying-outlook-deep-dive/ (summarizing findings of Capital One's 2022 Car Buying Outlook).

449 Id.

450 Gaurav Batra, Ankit Khatri, Akshi Goel & Menaka Samant, EY Mobility Consumer Index 2022 Study 4 (May 2022), https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/automotive-and-transportation/automotive-transporta tion-pdfs/ey-mobility-consumer-index-2022-study.pdf.

451 Id.

Very recent surveys from this year also show strong consumer interest in PEVs. KPMG's Consumer Pulse Summer 2023 survey of 1,000 Americans showed that nearly half of U.S. combustion vehicle owners are considering switching to PEVs or hybrid electric vehicles, prompted in large part by increasing gas prices and environmental concerns.452 A 2023 online poll of 4,410 Americans by Reuters/Ipsos found that already just over a third of Americans would consider buying an EV for their next car purchase.453 J.D. Power's most recent U.S. Electric Vehicle Consideration Study, released in June 2023, also found high interest in EVs. The study found the number of car buyers "very likely" and "overall likely" to consider purchasing an EV increased over 2002, with 26% of shoppers "very likely" and 61% "overall likely" to consider purchasing an EV.454 [EPA-HQ-OAR-2022-0829-0759, p. 159]

452 KPMG, Consumer Pulse Summer 2023 Report, Consumer & Retail 3, 45–46 (Apr. 2023), https://advisory.kpmg.us/content/dam/advisory/en/pdfs/2023/consumer-pulse-summer-2023-report-april.pdf.

453 David Shepardson, One-Third of Americans Would Consider EV Purchase - Reuters/Ipsos Poll, Reuters (Mar. 21, 2023), https://www.reuters.com/technology/one-third-americans-would-consider-ev-purchase-reutersipsos-poll-2023-03-21 /; Ipsos, Reuters/Ipsos Issues Survey March 2023 (March 24, 2023), https://www.ipsos.com/en-us/reutersipsos-issues-survey-march-2023.

454 J.D. Power, Action Needed to Keep Charging from Short Circuiting EV Purchase Consideration, J.D. Power Finds (June 15, 2023), https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-consideration-evc-study.

3. A "tipping point" in PEV adoption can signify rapid mass consumer acceptance, and the United States has reached this milestone.

Analysis from other countries shows that once 5% of a country's new car sales are electric—a threshold the United States has crossed—the country has reached an "electric-car tipping point" which "signals the start of mass EV adoption, the period when technological preferences rapidly flip."455 So far, 18 countries have reached this "tipping point," and assuming the United States follows their trend, "a quarter of new car sales could be electric by the end of 2025. That would be a year or two ahead of most major forecasts."456 This "tipping point" occurs because technologies generally follow an S-shaped adoption curve. "Sales move at a crawl in the early-adopter phase, then surprisingly quickly once things go mainstream….In the case of electric vehicles, 5% seems to be the point when early adopters are overtaken by mainstream demand. Before then, sales tend to be slow and unpredictable. Afterward, rapidly accelerating demand ensues."457 This S-shaped pace of technology adoption has been observed for numerous emerging technologies since the early 1900s, including the telephone, the automobile, electricity, refrigeration, clothes washers and dryers, air conditioning, microwaves, computers, cellphones, and the internet, as Figure XIX.B-1 shows.458 [EPA-HQ-OAR-2022-0829-0759, pp. 159-160]

455 Tom Randall, U.S. Crosses the Electric-Car Tipping Point for Mass Adoption at 1, Bloomberg (July 9, 2022), https://www.bloomberg.com/news/articles/2022-07-09/us-electric-car-sales-reach-key-milestone; See also McKinsey & Company, Why the Automotive Future is Electric at 7 (Sept. 2021), https://www.mckinsey.com/~/media/mckinsey/industries/automotive%20and%20assembly/our%20insights/why%20 the%20automotive%20future%20is%20electric/why-the-automotive-future-is-electric-f.pdf (noting that the global "tipping point in passenger EV adoption occurred in the second half of 2020, when EV sales and penetration accelerated in major markets despite the economic crisis caused by the COVID-19 pandemic").

456 Tom Randall, U.S. Crosses the Electric-Car Tipping Point for Mass Adoption at 1, Bloomberg (July 9, 2022), https://www.bloomberg.com/news/articles/2022-07-09/us-electric-car-sales-reach-key-milestone.

457 Id. at 3.

458 Rita McGrath, The Pace of Technology Adoption is Speeding Up, Harvard Business Review (Nov. 25, 2013), https://hbr.org/2013/11/the-pace-of-technology-adoption-is-speeding-up.

SEE ORIGINAL COMMENT FOR Figure XIX.B-1. Consumption Spreads Faster Today459 [EPA-HQ-OAR-2022-0829-0759, p. 160]

459 This figure is reproduced from id.

Moreover, the pace of adoption has been speeding up consistently across new technologies, as Figure XIX.B-1 also shows. For example, "[i]t took decades for the telephone to reach 50% of households, beginning before 1900. It took five years or less for cellphones to accomplish the same penetration in 1990."460 The automotive industry has not been left out of this increasing speed of technological adoption, with automotive design cycles decreasing from 60 months to 24 or 36 months over a period of five years.461 [EPA-HQ-OAR-2022-0829-0759, p. 161]

460 Id. See also Michael DeGusta, Are Smart Phones Spreading Faster than Any Technology in Human History, MIT Technology Review (May 9, 2012), https://www.technologyreview.com/2012/05/09/186160/are-smart-phones-spreading-faster-than-any-technology-in- human-history/ (showing that it took 25 years for telephones to reach a 10% adoption rate and an additional 39 years for telephones to reach a 40% penetration rate, but smart phones reached 40% penetration in just 10 years).

461 Rita McGrath, The Pace of Technology Adoption is Speeding Up, Harvard Business Review (Nov. 25, 2013), https://hbr.org/2013/11/the-pace-of-technology-adoption-is-speeding-up.

Between 2021 and 2022, the United States reached this "tipping point" level of PEV penetration, jumping from 4% to over 7.6% PEV sales share.462 As this tipping point is reached, it is likely that Americans' exposure to PEVs increases. Importantly, "studies show that increasing knowledge and exposure to these [electric] vehicles results in lasting, positive impressions."463 A comprehensive literature review regarding consumer adoption of BEVs found that social interactions can influence BEV adoption.464 Some consumers have no interest in purchasing a PEV simply because they lack information about the characteristics of PEVs, but when consumers learn about PEVs, they are more likely to be interested in purchasing one. For example, a study considering hybrid electric vehicle ("HEV") adoption—which "can be used as a proxy for future PEV adoption"—found that there is a strong "direct neighbor effect" by which each consumer's HEV-adoption decision can be influenced by the HEV-adoption decisions of geographic neighbors.465 Another study, using a survey of vehicle customers in California and a spatial and statistical analysis, found that having more neighbors and work colleagues who have EVs increases EV adoption.466 Yet another study using very rich data from Sweden found the same result: having more neighbors and work colleagues who drive EVs increases EV adoption. This study also explored reasons for the effect, finding that information transmission is likely very important.467 [EPA-HQ-OAR-2022-0829-0759, p. 161]

462 Colin McKerracher et al., Electric Vehicle Outlook 2023, BloombergNEF (June 8, 2023). Subscription required.

463 CARB, California's Advanced Clean Cars Midterm Review, Appendix B: Consumer Acceptance of Zero Emission Vehicles and Plug-In Hybrid Electric Vehicles B-2 (Jan. 18, 2017), https://ww2.arb.ca.gov/sites/default/files/2020-01/appendix_b_consumer_acceptance_ac.pdf.

464 M. Coffman et al., Electric Vehicles Revisited: A Review of Factors that Affect Adoption, Transp. Rev. 37, 79–93 (2017).

465 X. Liu, M. Roberts & R. Sioshani, Spatial Effects on Hybrid Electric Vehicle Adoption, Transportation Research Part D: Transport and Environment 52A, at 86 (2017), https://www.osti.gov/pages/biblio/1346139.

466 Debapriya Chakraborty, David S. Bunch, David Brownstone, Bingzheng Xu & Gil Tal, Plug-In Electric Vehicle Diffusion in California: Role of Exposure to New Technology at Home and Work, Transportation Research Part A: Policy and Practice 156, pp. 133-151 (2022).

467 Sebastian Tebbe, Peer Effects in (Hybrid) Electric Vehicle Adoption, working paper, see https://sebastiantebbe.github.io/files/YST_Slides.pdf.

Survey data again corroborates this research. The 2022 Consumer Reports survey found that for all groups of consumers, "experience with EVs strongly correlated to interest in purchasing or leasing an EV."468 The survey found, for example, that "Americans who are more likely to say that they will buy/lease an electric-only vehicle if they were to get a vehicle today have had more exposure to them. They see them where they live and have friends, relatives, or co-workers who own one."469 In fact, 71% of those who said they would definitely buy or lease an EV if they were getting a vehicle today had seen EVs in their neighborhood, compared to 44% of all survey respondents.470 "There is … a strong relationship between having some personal experience with an electric-only vehicle and the likelihood of buying or leasing one."471 Seventeen percent of all survey respondents had been a passenger in an electric-only vehicle in the past 12 months, compared to 39% of people who said they would definitely buy or lease an electric-only vehicle if they were to buy or lease a vehicle today. Only 7% of survey respondents had driven an EV in the past 12 months, but 20% of those who would definitely buy or lease one have driven one.472 Two surveys commissioned by the Consumer Federation of America to study consumer attitudes towards PEVs similarly found that "the more consumers know about PEVs, the more positive their attitudes towards them and the more likely they are to consider acquiring one."473 And J.D. Power's 2023 U.S. Electric Vehicle Consideration Study found that the number of consumers reporting they are "very likely" to consider purchasing an EV was more than double for consumers who had ridden as a passenger in an EV compared to those with no personal experience with EVs.474 [EPA-HQ-OAR-2022-0829-0759, p. 162]

468 Consumer Reports, et al., Survey Says: Considerable Interest in Electric Vehicles Across Racial, Ethnic Demographics: Smarter Policies Can Help Overcome Barriers 2 (Sept. 2022), https://www.ucsusa.org/sites/default/files/2022-09/ev-demographic-survey_0.pdf.

469 Consumer Reports, Battery Electric Vehicles & Low Carbon Fuel Survey: A Nationally Representative Multi-Mode Survey 7 (Apr. 2022), https://article.images.consumerreports.org/image/upload/v1657127210/prod/content/dam/CRO-Images-2022/Cars/0 7July/2022_Consumer_Reports_BEV_and_LCF_Survey_Report.pdf.

470 Id.

471 Id. at 8.

472 Id.

473 Consumer Federation of America, New Data Shows Consumer Interest in Electric Vehicles Is Growing (Sept. 19, 2016), https://consumerfed.org/press_release/new-data-shows-consumer-interest-electric-vehicles-growing/; Consumer Federation of America, Knowledge Affects Consumer Interest in EVs, New EVs Guide to Address Info Gap (Oct. 29, 2015), https://consumerfed.org/press_release/knowledge-affects-consumer-interest-in-evs-new-evs-guide-to-address-info-g ap/.

474 J.D. Power, Action Needed to Keep Charging from Short Circuiting EV Purchase Consideration, J.D. Power Finds (June 15, 2023), https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-consideration-evc-study.

This exposure effect is also evident when reviewing the outcome of events specifically aimed at exposing potential buyers to PEVs. For example, research by CARB has found that “exposure to PEVs through ride and drive events or car-sharing programs seem to result in lasting, positive impressions and serve to be one of the most influential information sources for helping consumers decide on a PEV. Second to a vehicle test drive, another PEV driver is the other most influential information source for new buyers to choose a PHEV or BEV.”475 CARB explained that “[t]he impact of exposure to PEVs through participation in ride and drive events and carsharing programs has been shown to have a positive effect on attitudes towards PEVs and increase interest in PEV adoption.”476 Furthermore, “simply giving consumers more information on PEVs also increases their interest in acquiring one. A study analyzed the effect of providing information on fuel costs of different vehicle technologies for specific commuting patterns on attitudes regarding PEVs,” and found that after utilizing an online tool that allowed users to compare fuel costs for different vehicles based on their own commuting patterns, local fuel prices, and charging opportunities, “[p]articipants reported a significantly greater intention to acquire a PEV.”477 [EPA-HQ-OAR-2022-0829-0759, pp. 162-163]

475 CARB, California’s Advanced Clean Cars Midterm Review, Appendix B: Consumer Acceptance of Zero Emission Vehicles and Plug-In Hybrid Electric Vehicles B-39 (Jan. 18, 2017), https://ww2.arb.ca.gov/sites/default/files/2020-01/appendix_b_consumer_acceptance_ac.pdf.

476 Id. at B-50 to B-51.

477 Id. at B-52.

This “tipping point” concept, and the resulting wider PEV exposure when a location reaches the tipping point, is possibly already playing out in microcosms of high PEV sales within the nation. In California, for example—a state even further past this “tipping point” than the United

States as a whole—sales of EVs reached more than 21% of all new vehicles sold in early 2023,478 and at least one survey shows almost three-quarters of California vehicle shoppers say they are "overall likely" to consider an EV.479 The phase of rapid PEV adoption also has already been underway in several individual cities. For example, 32.9% of monthly new vehicle registrations in the San Francisco metro area were EVs in January 2023, up from 26.7% in January 2022, and 17.2% of new vehicle registrations in Seattle were EVs in January 2023, up from 8.4% in January 2022.480 Passenger EV sales shares for the first quarter of 2023 were 29.1% of sales in San Francisco and 20.7% of sales in Los Angeles.481 In the New York City metro area in 2020, there were about three EVs per 1,000 people; today there are about seven EVs per 1,000 people—growth that has been "propelled by more varied models, more charging stations and lower prices."482 [EPA-HQ-OAR-2022-0829-0759, p. 163]

478 Amy Chen, Yuri Avila & Dustin Gardiner, EV Sales are Booming in California. Charts Show How Tesla is Quickly Losing Market Share, San Francisco Chronicle (Apr. 26, 2023), https://www.sfchronicle.com/projects/2023/ev-tracker-california/.

479 J.D. Power, Action Needed to Keep Charging from Short Circuiting EV Purchase Consideration, J.D. Power Finds (June 15, 2023), https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-consideration-evc-study.

480 Emily Harris, EVs Dominate San Francisco Market as Choices Expand, Axios (Apr. 7, 2023), https://www.axios.com/local/san-francisco/2023/04/07/evs-tesla-dominate-san-francisco-market-brand-choices-expa nd; Melissa Santos & Joann Muller, Electric Vehicle Adoption Doubles in Seattle, Axios (Apr. 20, 2023), https://www.axios.com/local/seattle/2023/04/20/electric-vehicles-seattle-registrations.

481 California Energy Commission, New ZEV Sales in California, https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev- sales (filtered to show ZEV sales in San Francisco and Los Angeles counties).

482 Robin Shulman Agueros, Why the New York Area Is Seeing an Explosive Growth in Electric Cars, New York Times (Mar. 7, 2023), https://www.nytimes.com/2023/03/05/nyregion/electric-vehicles-cars-nyc.html.

This concept could also shed light on one possible reason that PEV sales percentages have been unevenly distributed across the nation, with more sales in cities than rural areas, in a way that minimizes any concerns that rural consumers could have insufficient demand for PEVs. A 2023 survey conducted by the Union of Concerned Scientists and Consumer Reports "uncover[ed] that there isn't sufficient familiarity with EVs in rural areas. The overwhelming majority of respondents—96%—has never owned or leased an EV."483 The survey found that only 6% of rural respondents said they were very familiar with the fundamentals of buying and owning an EV, while 30% said they were somewhat familiar, and concluded that "[o]ne of the reasons for this lack of familiarity could be the scarcity of EVs in rural areas: only 27% of rural dwellers have seen an EV in their neighborhood in the past month compared to more than half of urban dwellers, and even fewer have a friend, relative or co-worker who owns an EV. A whopping 90% of rural dwellers have never been a passenger in an EV, and almost nobody has ever driven one."484 As efforts are made to increase familiarity with PEVs in rural areas, more Americans will learn about the very real benefits and advantages of PEVs, especially for rural drivers, see Section XIX.C.6 below, and this "neighbor effect" will begin to take hold in more places. [EPA-HQ-OAR-2022-0829-0759, p. 164]

483 Maria Cecilia Pinto de Moura, Survey Shows Pathway to Speeding Up EV Adoption in Rural Areas, Union of Concerned Scientists (Mar. 14, 2023), https://blog.ucsusa.org/cecilia-moura/survey-shows-pathway-to-speeding-up-ev-adoption-in-rural-areas/.

484 Id.

C. When considering the attributes consumers care about most, EVs are a great fit.

One of the reasons this "neighbor effect" may occur is because when consumers learn about PEVs, they often realize that PEVs offer a superior fit for the attributes they care about most in their driving and vehicle-owning experience. Forsythe et al. (2023) found that key factors Americans consider when purchasing vehicles and considering PEV options are operating cost, range, fast-charging capabilities, and performance characteristics such as acceleration.485 Consumer surveys and other studies have found the same attributes, along with fuel economy, as key to purchase decisions.486 As explained briefly in this section and in more detail in Sections XIX.C and XX, PEVs offer superior satisfaction of these consumer preferences. Any existing or perceived barriers to PEV adoption based on consumer acceptance are either minimal or surmountable, policies are already in place to support rapid elimination of any remaining barriers, and the pace of PEV incorporation into the fleet will allow for consumer preferences to be fulfilled. [EPA-HQ-OAR-2022-0829-0759, pp. 164-165]

485 Forsythe et al. (2023) at 1–2.

486 See, e.g., Consumer Reports, Consumer Attitudes Towards Fuel Economy: 2020 Survey Results 3-4, 6 (Feb. 2021), https://advocacy.consumerreports.org/wp-content/uploads/2021/02/National-Fuel-Economy-Survey-Report-Feb-202 1-FINAL.pdf (showing high value placed on fuel economy in purchase decisions); Alexey Sinyashin, Optimal Policies for Differentiated Green Products: Characteristics and Usage of Electric, U.C. Berkeley Haas School of Business (Nov. 8, 2021) https://drive.google.com/file/d/1KEYJWa25DjH_g89ukSRW3PymjsTkUq4c/view (finding range and charging station availability as key elements in purchase decisions); J.D. Power, EV Price Pressure Grows as Government Incentives and Lease Deals Wield Outsized Influence on Consumer Demand (Mar. 29, 2023), https://www.jdpower.com/business/resources/ev-price-pressure-grows-as-government-incentives-and-lease-deals-wi eld-outsized-influence-on-consumer-demand#:~:text=At%20the%20current%20trajectory%2C%20J.D.,is%20expec ted%20to%20surpass%2075%25 ("Consumer interest in EVs is increasingly being heavily swayed by price"); Consumer Reports, Consumer Attitudes Towards Fuel Economy: 2020 Survey Results 6 (Feb. 2021), https://advocacy.consumerreports.org/wp-content/uploads/2021/02/National-Fuel-Economy-Survey-Report-Feb-202 1-FINAL.pdf (finding that 94% of potential vehicle purchasers considered fuel economy to be "extremely important," "very important," or "somewhat important" when purchasing a vehicle).

1. PEVs are increasingly favorable from a total cost of ownership perspective and save drivers money over the life of the vehicle. As more models become available, this benefit will be accessible to more consumers.

First, PEVs are increasingly favorable from an operating cost and total cost of ownership (TCO) perspective—a factor that is very important to U.S. consumers when deciding which vehicles they want to buy. A 2020 nationally representative survey of potential vehicle purchasers found that 94% of potential purchasers considered fuel economy to be important when purchasing a vehicle.487 PEVs excel in the area of fuel cost savings. As EPA's Proposal shows, the incremental costs of PEVs over combustion vehicles are increasingly insignificant or nonexistent—especially in light of various state and federal incentives—resulting in PEVs saving drivers money in very short periods of time. And as operating costs are reduced, consumers are willing to pay more for their vehicles. Forsythe et al. (2023) found car buyers willing to pay upfront an additional $1,960 per 1 cent/mile reduction in operating cost, and SUV buyers willing to pay an additional $1,490.488 The paper also found that any perceived PEV disadvantages were made up for by favorable operating costs (along with fast-charging capability), and that lower operating costs "can help increase consumer adoption."489 Forsythe et al. (2023) further found that reductions in the BEV price-premium, which are projected to occur, "have driven substantial increases in consumer choices of BEV cars and SUVs over their conventional gasoline vehicle counterparts."490 A March 2023 J.D. Power survey reflected one example of this consumer responsiveness to price, finding that consumer interest in the Ford Mustang Mach-E and Tesla Model Y measurably increased when both manufacturers announced price drops and both models were made eligible for the IRA's $7,500 federal tax credit.491 A June 2023 J.D. Power survey also indicated that consumers are recognizing these savings, finding that "[t]he more miles that vehicle owners drive, the more likely they are to consider an EV. As in prior-year studies, daily commuters faced with higher fuel expenses are trading in their gas-powered vehicles for EVs."492 [EPA-HQ-OAR-2022-0829-0759, pp. 165-166]

487 Consumer Reports, Consumer Attitudes Towards Fuel Economy at 3-4, 6.

488 Forsythe et al. (2023) at 5.

489 Forsythe et al. (2023) at 1–2, 6 (assuming sufficiently long range).

490 Forsythe et al. (2023) at 2.

491 J.D. Power, EV Price Pressure Grows as Government Incentives and Lease Deals Wield Outsized Influence on Consumer Demand (Mar. 29, 2023), https://www.jdpower.com/business/resources/ev-price-pressure-grows-as-government-incentives-and-lease-deals-wi eld-outsized-influence-on-consumer-demand#:~:text=At%20the%20current%20trajectory%2C%20J.D.,is%20expec ted%20to%20surpass%2075%25.

492 J.D. Power, Action Needed to Keep Charging from Short Circuiting EV Purchase Consideration, J.D. Power Finds (June 15, 2023), https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-consideration-evc-study.

Up until recently, nearly all PEV models on the market were sedans or hatchbacks, or vehicles in the luxury car segment of the market,493 leaving vehicle purchasers looking for other types of vehicles without many options. But dozens of new models are entering the market in the next year, in all vehicle segments.494 Additional PEV model availability will provide a wider range of price points and greater diversity of vehicle types and features for potential PEV purchasers, further driving down average PEV costs and resulting in a PEV "fit" superior to a comparable combustion vehicle for more consumers. Research by ICCT has shown that "[g]reater availability of models in more vehicle segments and in higher volumes that meet consumers' wide range of needs and preferences is critical to market growth," and "states with greater model availability tend to have higher electric vehicle uptake."495 In recent years, average PEV costs have appeared higher than average combustion vehicle costs because many PEVs have been offered only in the luxury vehicle market. Gillingham et al. (2023)'s review of its dataset containing every new LDV sale in the United States between 2014 and 2020 revealed that, during that time period, "the market share of EVs and PHEVs is quite high in several price brackets at the high end, but the number of vehicles sold in these high price brackets is relatively small," and that "EVs can make up a large market share in the U.S. new car market," and "there is a great deal of untapped product space for EVs in the lower price brackets."496 Drivers of non-luxury vehicles want PEVs—and their benefits—as well. Automakers understand this demand and are expanding their PEV options, and an appropriately stringent rule by EPA will go further to accelerate this trend by offering automakers regulatory certainty. [EPA-HQ-OAR-2022-0829-0759, p. 166]

493 See, e.g., Gillingham et al. (2023) at 329, 332–333 (noting that EVs are overrepresented in the luxury market segments and that in the hatchback category—"a small market segment with a relatively large number of EV offerings"—sales of PEVs have been "close to 15% of the market in some years").

494 Jeff S. Bartlett & Ben Preston, Automakers are Adding Electric Vehicles to Their Lineups. Here's What's Coming, Consumer Reports (Mar. 10, 2023), https://www.consumerreports.org/hybrids-evs/why-electric-cars-may-soon-flood-the-us-market-a9006292675/.

495 Anh Bui, Peter Slowik & Nic Lutsey, Briefing: Evaluating Electric Vehicle Market Growth Across U.S. Cities, ICCT 13-14 (Sept. 2021), https://theicct.org/wp-content/uploads/2021/12/ev-us-market-growth-cities-sept21_0.pdf.

496 Gillingham et al. (2023) at 331–332.

Already, the number of light-duty PEV options has grown dramatically. The Alliance for Automotive Innovation states that at the end of 2022, there were 95 PEV models available in the United States.497 More models are forthcoming, including additional truck and SUV models along with the expansion of a wider range of EV sedans.498 EPA's Proposal notes research by EDF and ERM projecting that there will be over 180 PEV models available by the end of 2025, 88 Fed. Reg. at 29190 n.59, but EDF and ERM have since updated their analysis and now project that there will be 197 PEV models available by the end of 2025.499 Many of the world's largest automakers have committed to significantly expanding PEV production in the next few years, even absent additional standards,500 which will naturally lead to a larger array of model choices. For example, BMW, Volkswagen, and Stellantis have each committed to fleets half comprised of zero-emission vehicles by 2030.501 Mercedes-Benz, Ford, and GM have committed to an entirely zero-emission fleet by 2035.502 Volvo announced its fleet will be all electric by the end of the decade.503 J.D. Power's EV Index and EV Consideration Pulse Survey found that half of all new car shoppers will have a viable EV option by the end of 2023, and three out of four shoppers will have a viable EV option by the end of 2026.504 [EPA-HQ-OAR-2022-0829-0759, pp. 166-167]

497 Alliance for Automotive Innovation, Get Connected: Electric Vehicle Quarterly Report, First Quarter, 2023 2 (2023), https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023% 20Q1.pdf.

498 Consumer Reports, Hot, New Electric Cars That Are Coming Soon (June 9, 2023), https://www.consumerreports.org/cars/hybrids-evs/hot-new-electric-cars-are-coming-soon-a1000197429/.

499 Rachel MacIntosh et al., Electric Vehicle Market Update, Environmental Defense Fund and ERM 7 (Apr. 2023), https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf.

500 Zifei Yang, Beyond Europe: Are There Ambitious Electrification Targets Across Major Markets?, Int'l Council on Clean Transp. Staff Blog (Nov. 15, 2022), https://theicct.org/global-oem-targets-cars-ldvs-nov22/.

501 Id.

502 Id.

503 Id.

504 J.D. Power, EV Price Pressure Grows as Government Incentives and Lease Deals Wield Outsized Influence on Consumer Demand (Mar. 29, 2023), https://www.jdpower.com/business/resources/ev-price-pressure-grows-as-government-incentives-and-lease-deals-wi eld-outsized-influence-on-consumer-

demand#:~:text=At%20the%20current%20trajectory%2C%20J.D.,is%20expected%20to%20surpass%2075%25.

2. PEVs offer meaningful refueling (charging) benefits to consumers.

Americans are interested in how quickly they can refuel their vehicles. Again, PEVs have real advantages that should not be underestimated. While opponents to PEVs frequently assert what they believe will be fundamental changes to how Americans get to work, school, and run errands, a closer look at the issue reveals that PEVs can offer meaningful benefits. Most trips are well below the average PEV range, and charging for these trips can often be done when vehicles are parked at home, work, or in public in between trips. In fact, recent research has shown that 90% of trips could be completed in vehicles with 124 miles of range—well below the capabilities of the current average EV range in the United States (almost 300 miles).505 Even as of 2016, researchers at MIT found that electric vehicles at the time could handle almost 90% of all car travel in the U.S.506 [EPA-HQ-OAR-2022-0829-0759, p. 167]

505 Mario Herberz, Ulf J. J. Hahnel & Tobias Brosch, Counteracting Electric Vehicle Range Concern with a Scalable Behavioural Intervention, Nature Energy 503 (2022) (finding that 90% of trips could be completed in vehicles with 124 miles of range); Tom Randall, Americans Insist on 300 Miles of EV Range. They're Right, Bloomberg (May 4, 2023), (noting that U.S. EVs have almost reached 300 mile average range).

506 Catherine Caruso, Why Range Anxiety for Electric Cars is Overblown, MIT Technology Review (Aug. 15, 2016), https://www.technologyreview.com/2016/08/15/158319/why-range-anxiety-for-electric-cars-is-overblown/.

Drivers with access to a garage or dedicated overnight parking spot may simply charge at home while they sleep, and most do. EY's Mobility Consumer Index 2022 survey found that 80% of EV owners use home charging,507 and other research has found that more than half of all reported EV charging takes place at home.508 Once a home charger is installed, "the home then has its own permanent home refueling station that can likely be used with all future PEVs."509 Substantial investments in infrastructure incentives will help to reduce any consumer concerns over range or charging availability. About half of Americans (49%) say "discounts to install a home charger" are the incentives that would most encourage them to get an EV.510 The Inflation Reduction Act extended the EV charger credit, which covers 30% (up to $1,000 per unit) of the cost of charging equipment for individual/residential uses. See 26 U.S.C. § 30C. Many states and local jurisdictions offer additional installation incentives that can further reduce costs. [EPA-HQ-OAR-2022-0829-0759, p. 168]

507 Gaurav Batra, Ankit Khatri, Akshi Goel & Menaka Samant, EY Mobility Consumer Index 2022 Study 5 (May 2022), https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/automotive-and-transportation/automotive-transporta tion-pdfs/ey-mobility-consumer-index-2022-study.pdf.

508 Rob Stumpf, Americans Cite Range Anxiety, Cost as Largest Barriers for New EV Purchases: Study (Feb. 26, 2019), https://www.thedrive.com/news/26637/americans-cite-range-anxiety-cost-as-largest-barriers-for-new-ev-purchases-s tudy.

509 David P. Tuttle & Ross Baldick, Technological, Market and Policy Drivers of Emerging Trends in the Diffusion of Plug-In Electric Vehicles in the U.S., Electr. J. 7 (Aug./Sept. 2015), https://users.ece.utexas.edu/~baldick/papers/plugindiffusion.pdf.

510 Consumer Reports, Battery Electric Vehicles & Low Carbon Fuel Survey: A Nationally Representative Multi-Mode Survey 4 (Apr. 2022),

https://article.images.consumerreports.org/image/upload/v1657127210/prod/content/dam/CRO-Images-2022/Cars/0 7July/2022_Consumer_Reports_BEV_and_LCF_Survey_Report.pdf.

Furthermore, "[e]lectric vehicles have the meaningful advantage of refueling at a far wider array of locations than gasoline stations."511 Gas stations "must be carefully located to achieve scale economies to pay for expensive sturdy buried fuel storage tanks, environmental and safety protection methods, and gas pumps. In contrast, PEVs can charge at millions of potential home, work, or public locations."512 And, with increasing numbers of chargers available in places where drivers otherwise spend their time, "drivers can simply plug in and charge at a variety of locations where they would naturally park their vehicle for long periods of time."513 Recently, Walmart announced plans to install new BEV fast-charging stations at thousands of Walmart and Sam's Club locations across the country, in addition to the 1,300 BEV fast-charging stations the retailer has already made available.514 Other retailers already offering significant levels of BEV charging include 7-Eleven, Cinemark, Ikea, Kohl's, Kroger, Macy's, Starbucks, Subway, Taco Bell, Walgreens, and Whole Foods.515 PlugShare's charger locator can be searched based on various types of charging locations, revealing chargers at hiking, dining, shopping, camping, park, and grocery locations throughout the country.516 As far back as 2015, drivers who parked on the street could access street lights for charging in some dense urban areas,517 and this cost-effective technology518 is expanding in Europe and the United States, with U.S. pilot programs in New York, Charlotte, and Kansas City,519 and a large number of BEV charging stations on streetlight poles in Los Angeles.520 In addition, experts anticipate that charging equipment will increasingly be distributed widely throughout apartment building and multi-family garages.521 Research on parking has found that the average car is parked for 95% of its useful life,522 leaving plenty of time to charge in a large variety of locations. As these public chargers increase, PEVs become a viable and attractive option for more drivers, including those without access to easy home-charging.523 [EPA-HQ-OAR-2022-0829-0759, p. 169]

511 Tuttle & Baldick (2015) at 7.

512 Id.

513 Id.

514 Vishal Kapadia, Leading the Charge: Walmart Announces Plan to Expand Electric Vehicle Charging Network, Walmart (Apr. 6, 2023), https://corporate.walmart.com/newsroom/2023/04/06/leading-the-charge-walmart-announces-plan-to-expand-electri c-vehicle-charging-network (noting that this will offer customers and members the convenience of "being able to pick up essentials for their families or grab a bite to eat while they charge").

515 Dan Avery, 12 Places That Offer EV Charging While You Shop, CNET (Apr. 19, 2023), https://www.cnet.com/roadshow/news/12-places-that-offer-ev-charging-while-you-shop/.

516 PlugShare, Map of EV Charging Locations, https://www.plugshare.com/.

517 See Tuttle & Baldick (2015) at 8 ("Charging cords with wireless revenue-grade meters that plug into street lights are now offered for drivers who park on the street in dense urban areas.").

518 Research by WRI found that compared to ground-mounted chargers, pole-mounted chargers result in installation cost savings of up to 55% and overall cost reductions of 30% because they use existing electrical connections and have minimal costs associated with construction, materials, and labor. See Emmett Werthmann & Vishant Kothari, Pole-Mounted Electric Vehicle Charging: Preliminary Guidance for a Low-Cost and More Accessible Public Charging Solution for U.S. Cities, World Resources Institute 12 (Nov. 2021), https://files.wri.org/d8/s3fs-public/2021-11/pole-mounted-electric-vehicle-charging-preliminary-guidance.pdf?Versi onId=xNjP5je_Ohc5WnFVVCbxWGmmk_vMIqpu.

519 Jay Ramey, Are Lamppost EV Chargers Ideal for City Dwellers?, Autoweek (Jan. 23, 2023), https://www.autoweek.com/news/green-cars/a42618155/ubitricity-lamppost-ev-chargers-curbside/; EVANNEX, Study Finds On-Street Lampost EV Chargers Are Lowest-Carbon Solution, Inside EVs (Nov. 5, 2022), https://insideevs.com/news/619989/using-lamposts-for-ev-charging-reduces-carbon-footprint/.

520 Bradley Berman, LA Adds Hundreds of EV Chargers to Streetlights, Giving Renters a Place to Plug In, Electrek (Nov. 13, 2019), https://electrek.co/2019/11/13/la-adds-hundreds-of-ev-chargers-to-streetlights-giving-renters-a-place-to-plug-in/ (noting over 130 EV chargers on streetlights as of 2019); LA Lights, EV Charging Stations, https://lalights.lacity.org/connected-infrastructure/ev_stations.html (map showing streetlight chargers across Los Angeles); Emmett Werthmann & Vishant Kothari, How Utility Poles and Streetlights Can Improve Equitable Access to EV Charging in U.S. Cities, The City Fix, World Resources Institute (Nov. 30, 2021), https://thecityfix.com/blog/how-utility-poles-and-streetlights-can-improve-equitable-access-to-ev-charging-in-u-s-cit ies/ (noting 431 streetlight chargers and 44 utility pole chargers in Los Angeles and a pilot project in Charlotte, North Carolina).

521 Joshua Stein, How Electric Cars Might Affect Multifamily And Other Real Estate, Forbes (May 25, 2023), https://www.forbes.com/sites/joshuastein/2023/05/25/how-electric-cars-will-affect-multifamily-and-other-real-estate/?sh=59d16f66317c.

522 Ruth Eckdish Knack, Pay As You Park, Planning Magazine (May 2005), http://shoup.bol.ucla.edu/PayAsYouPark.htm#:~:text=%22Most%20people%20in%20transportation%20focus,learn%20from%20that%2095%20percent.

523 Cassandra Cole, Michael Droste, Christopher Knittel, Shanjun Li & James Stock, Policies for Electrifying the Light-Duty Fleet in the United States, American Economic Association: Papers & Proceedings 321 (May 2023) (noting that “providing additional [public] charging stations enables EV ownership” for more drivers).

PEV charging is increasingly taking less time, further enhancing the convenience benefits of PEV ownership. Hyper-fast Level 3 DC fast chargers can charge a BEV in as little as 30 minutes or less, adding up to 10 miles of range for each minute of charging time,524 and consumers have expressed strong willingness-to-pay for this capability.525 Research has shown that availability of more fast-chargers “reduce[s] range anxiety and make[s] it possible to use EVs in the way that drivers now use ICEs.”526 [EPA-HQ-OAR-2022-0829-0759, p. 170]

524 Electrify America, Charging with Electrify America, https://www.electrifyamerica.com/what-to-expect/ (noting full charging in 30 minutes); Jessica Shea Choksey, What is DC Fast Charging?, J.D. Power (May 10, 2021), https://www.jdpower.com/cars/shopping-guides/what-is-dc-fast-charging (noting ability to charge to 80% “in anywhere from 15 minutes to 45 minutes”); DriveClean, Electric Car Charging Overview, CARB https://driveclean.ca.gov/electric-car-charging (noting that DC fast charging can add “up to 10 miles of range per minute of charging time”); ICCT, Five Things You Know About Electric Vehicles That Aren’t Exactly True (July 19, 2021), https://theicct.org/stack/explaining-evs/ (high-powered DC fast chargers can charge a long-range EV in 20–36 minutes).

525 Forsythe et al. (2023) at 5 (noting additional willingness to pay $4,140 for BEV fast charging capability).

526 Cassandra Cole, Michael Droste, Christopher Knittel, Shanjun Li & James Stock, Policies for Electrifying the Light-Duty Fleet in the United States, American Economic Association: Papers & Proceedings 321 (May 2023).

PEV charging has additional benefits on top of saving drivers money and eliminating weekly trips to the gas pump. First, PEVs with bi-directional charging capability have potential to serve as back-up home generators in temporary power outages, with a typical BEV storing about 67 kWh in its battery—more than three days’ worth of electricity.527 In fact, when a 2021 ice storm in Texas left millions of residents without electricity, Ford “lent out their hybrid F-150s as home generators."528 More makes and models are expected to offer bi-directional charging,529 with the potential that this capability becomes the norm. Additionally, vehicle-to-grid (V2G) charging offers potential benefits for both the grid and PEV owners. RMI found that by 2030, "virtual power plants" including parked vehicles supplying energy to the grid could reduce peak loads in the United States by 60 gigawatts.530 As this capability continues to develop, there could be additional "revenue opportunities for PEV owners for providing these grid services."531 Research in Germany has shown that bidirectional EV charging can generate significant revenue for the typical German household: between 310 and 530 euros per year.532 A recent successful vehicle-to-grid demonstration in North Carolina, taking place over two years, reveals the potential for V2G not only to improve grid optimization and resilience, but also to save consumers money. The North Carolina Clean Energy Technology Center explained that "[q]uantifying the potential value streams from bidirectional charging allows utilities to begin considering incentive payments and other EV program options for customers and members. By demonstrating significant positive value, this study encourages utilities in similar market conditions to help customers overcome the financial barriers to purchasing an EV, particularly in low- and moderate-income areas where these costs may restrict EV adoption."533 The University of Delaware has partnered with local electric utilities and a regional transmission organization to have their vehicles plugged in and available when called upon for grid support, with the transmission organization paying the university the market rate, or roughly $1,200 per year per BEV.534 Research by NREL has also considered net revenue generation from V2G services, including from private LDVs, and found significant potential.535 [EPA-HQ-OAR-2022-0829-0759, pp. 170-171]

527 Michael J. Coren, Electric Vehicles Can Now Power Your Home for Three Days, Washington Post (Feb. 17, 2023), https://www.washingtonpost.com/climate-environment/2023/02/07/ev-battery-power-your-home/.

528 Id.

529 Id. (noting that makers of the Hyundai Ioniq 5, Lucid Air, Kia EV6, VW ID.4, Mitsubishi Outlander, and Chevy Silverado EV, in addition to Ford's F-150, have announced plans for offering electricity services in the next year or so).

530 Id.; Kevin Brehm, Avery McEvoy, Connor Usry & Mark Dyson, Virtual Power Plants, Real Benefits, Rocky Mountain Institute (2023), https://rmi.org/insight/virtual-power-plants-real-benefits/.

531 Tuttle & Baldick (2015) at 11 (citing Quinn, C. et al., The Effect of Communication Architecture on the Availability, Reliability and Economics of Plug In Hybrid Vehicle-to-Grid Charging, 195 J. Power Sources 1500-1509 (Mar. 5, 2010)).

532 Timo Kern, Patrick Dossow & Elena Morlock, Revenue Opportunities by Integrating Combined Vehicle-to-Home and Vehicle-to-Grid Applications in Smart Homes, 307 Applied Energy 1 (Feb. 2022), https://www.sciencedirect.com/science/article/pii/S0306261921014586.

533 North Carolina Clean Energy Technology Center, NC Cooperative Demonstration of Vehicle-to-Grid Smart Charger Concludes with Positive Results (May 8, 2023), https://nccleantech.ncsu.edu/2023/05/08/nc-cooperative-demonstration-of-vehicle-to-grid-smart-charger-concludes/.

534 U.S. Department of Energy, Federal Energy Management Program, Bidirectional Charging and Electric Vehicles for Mobile Storage, https://www.energy.gov/femp/bidirectional-charging-and-electric-vehicles-mobile-storage.

535 Darlene Steward, Critical Elements of Vehicle-to-Grid (V2G) Economics, NREL (Sept. 2017), https://www.nrel.gov/docs/fy17osti/69017.pdf.

3. PEV range has increased enough to meet the demands of nearly all American car trips.

American consumers are interested in how far their cars can travel, as Americans currently drive an above average number of vehicle miles per day (compared to the rest of the world),536 and demand "roughly a third more [range] than the global average."537 While range was therefore once a key challenge for PEV adoption, it is no longer. In fact, "many EVs are approaching the range of an average gasoline vehicle," and "the combined electric and gasoline range for PHEVs often exceeds gasoline-only vehicles."538 [EPA-HQ-OAR-2022-0829-0759, p. 171]

536 Bryn Huxley-Reicher, Fact File: Americans Drive the Most, Frontier Group (Feb. 14, 2022), https://frontiergroup.org/resources/fact-file-americans-drive-most/.

537 Tom Randall, Americans Insist on 300 Miles of EV Range. They're Right, Bloomberg (May 4, 2023).

538 EPA, The 2022 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology Since 1975 E-2, 60 (Dec. 2022), https://www.epa.gov/system/files/documents/2022-12/420r22029.pdf (finding that the efficiency of EVs has increased by about 18% in the last ten years).

The average BEV range has skyrocketed in recent years, making range issues no longer a real concern. Average BEV range reached 298 miles in MY 2021, "or about four times the range of an average EV in 2011,"539 when range was in fact a real concern. Longer-range BEVs are available for consumers with more substantial driving needs,540 PEVs are becoming more efficient,541 and several PHEVs exceed 500 miles of total range.542 The well-designed stated-preference experiment conducted by Forsythe et al. (2023) found that "[m]ost vehicles with a range of at least 300 miles were valued by consumers equivalently or more than their conventional gasoline vehicle counterparts."543 BEV range is "on the cusp of exceeding 300 miles, a key psychological barrier."544 This level of range handily fulfills the needs and preferences of almost every American driver. The average U.S. one-way commute is about 27.6 minutes,545 and the average single-car American household drives about 30 miles per day546—both well within the range of all PEVs in today's vehicle market. ICCT has explained that "87% of American car drivers drive on average less than 100 kilometers (60 miles) a day—that is, only half the range capacity of the e-Golf, one third of the Leaf's, and less than a quarter of the Tesla's range on a single charge."547 Chakraborty et al. (2021) examined how much PEVs were used within households, and concluded that "BEVs and PHEVs appear to be viable as alternatives to conventional vehicles in terms of meeting the travel needs of households," and that "[s]ince most new and upcoming BEVs are longer-range vehicles, we expect this to mean BEVs will largely be suitable replacements for conventional vehicles in household fleets."548 [EPA-HQ-OAR-2022-0829-0759, pp. 171-172]

539 Id. at 60.

540 See, e.g., Nicholas Wallace et al., Longest Range Electric Cars for 2023, Ranked, Car and Driver (Mar. 23, 2023), https://www.caranddriver.com/features/g32634624/ev-longest-driving-range/ (listing U.S. PEVs with longest driving range).

541 EPA, The 2022 EPA Automotive Trends Report, at 60.

542 Id. at E-2.

543 Forsythe et al. (2023) at 6.

544 Tom Randall, Americans Insist on 300 Miles of EV Range. They're Right, Bloomberg (May 4, 2023).

545 Charlynn Burd et al., Travel Time to Work in the United States:2019, U.S. Census Bureau 1 (2019), https://www.census.gov/content/dam/Census/library/publications/2021/acs/acs-47.pdf.

546 U.S. Department of Energy, Daily Vehicle Miles Traveled Varies with the Number of Household Vehicles (Sept. 17, 2018), https://www.energy.gov/eere/vehicles/articles/fotw-1047-september-17-2018-daily-vehicle-miles-traveled-varies-number.

547 ICCT, Five Things You Know About Electric Vehicles That Aren't Exactly True (July 19, 2021) https://theicct.org/stack/explaining-evs/.

548 Debapriya Chakraborty, Scott Hardman & Gil Tal, Integrating Plug-In Electric Vehicles (PEVs) into Household Fleets – Factors Influencing Miles Traveled by PEV Owners in California, U.C. Davis 2, 33 (Aug. 2021), https://escholarship.org/content/qt2214q937/qt2214q937.pdf.

As consumer understanding of the capabilities inherent in this amount of range increases, range anxiety would be expected to decline and consumer acceptance of PEVs to match the vehicles' other benefits. Forsythe et al. (2023) explained that range increase is a key advancement in BEV technology that has "driven substantial increases in consumer choices of BEV cars and SUVs over their conventional gasoline vehicle counterparts."549 And Herberz et al. (2022) found that 90% of trips could be completed in cars with less than half of the current U.S. average range, but that most drivers do not understand this.550 Surveys by automakers have also found that range anxiety is the largest factor in consumers refraining from purchasing PEVs, explaining that drivers can be fearful they will run out of power before being able to recharge their vehicles, though some of these surveys were conducted in 2019 or earlier, when average PEV ranges were lower.551 Simply providing tailored compatibility information regarding the ability of BEVs to fulfill drivers' range needs increased willingness to pay for BEVs even more than information about easy access to charging infrastructure.552 [EPA-HQ-OAR-2022-0829-0759, pp. 172-173]

549 Forsythe et al. (2023) at 1-2.

550 Herberz et al. (2022) at 503, 506–507. See also Jennifer Sensiba, Putting Two Ford Announcements Together Shows Us How It Thinks About EV Range (May 29, 2023), https://cleantechnica.com/2023/05/29/putting-two-ford-announcements-together-shows-us-how-it-thinks-about-ev-range/ (noting that 90% of all drives are within range of home).

551 Rob Stumpf, Americans Cite Range Anxiety, Cost as Largest Barriers for New EV Purchases: Study, The Drive (Feb. 26, 2019), https://www.thedrive.com/news/26637/americans-cite-range-anxiety-cost-as-largest-barriers-for-new-ev-purchases-study.

552 Herberz et al. (2022) at 503.

Even for longer travel and trips in excess of the average daily drive—which make up a very small percentage of U.S. driving—PEVs provide a good fit for most consumers' needs and wants. U.S. Bureau of Transportation Statistics data shows that trips longer than 250 miles make up a miniscule fraction of U.S. daily driving. In 2022, U.S. drivers took between 1.3 billion and 1.5 billion vehicle trips per day, with fewer than 2 million trips per day 500 miles or longer and between about 1.5 million and 2.5 million trips per day between 250 and 500 miles.553 Charging infrastructure is rapidly developing to support this small percentage of longer drives. As Section XVII explains, the number of public PEV charging stations is growing rapidly,554 and the BIL and IRA are funding new PEV charging corridors. Alternative Fuels Data Center's map of nationwide PEV charging stations shows that already—with 8.3% PEV sales penetration in the first quarter of 2023555—charging stations are widespread.556 In May, U.S. and Canadian officials announced the first Binational EV Corridor, covering a nearly 900-mile stretch between the United States and Canada, with PEV chargers every 50 miles.557 Similarly, last year four states announced plans to build a 1,100-mile PEV charging circuit along Lake Michigan.558 In Washington, Oregon, and California, the West Coast Electric Highway provides DC fast charging stations every 25 to 50 miles along Interstate 5, Highway 99, and other major roadways.559 Electrify America's DC fast-charging network includes two cross-country routes (one from Los Angeles to Washington, DC, and another from San Diego to Jacksonville), along with a route covering much of the East Coast on Interstate 95 (from Portland, Maine to Miami, Florida), and most of the West Coast along Interstate 5 (from Seattle, Washington to San Diego, California).560 GM and Pilot Company just announced plans to collaborate on a national DC fast charging network of 2,000 charging stalls at up to 500 travel centers across the country, to "help enable long-distance electric travel of people and vehicles across the U.S."561 These chargers will be capable of the fastest 350 kW charging speeds.562 [EPA-HQ-OAR-2022-0829-0759, pp. 173-174]

553 See U.S. Bureau of Labor Statistics, Trips by Distance Band, https://www.bts.gov/browse-statistical-products-and-data/covid-related/trips-distance-groupings-national-or-state.

554 Alternative Fuels Data Center, Alternative Fueling Station Locator, https://afdc.energy.gov/stations/#/analyze?country=US&fuel=ELEC&ev_levels=all&access=public&access=private (noting 57,882 station locations and 155,449 EVSE ports available) (last accessed June 30, 2023); see also EPA, The 2022 EPA Automotive Trends Report, at E-2.

555 Argonne National Laboratory, Light Duty Electric Drive Vehicles Monthly Sales Updates, https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates.

556 Alternative Fuels Data Center, Electric Vehicle Charging Station Locations, https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC.

557 Kalea Hall, EV Corridor to Run Nearly 900 Miles from Kalamazoo to Quebec, US and Canada Officials Say, The Detroit News (May 16, 2023), https://www.detroitnews.com/story/business/autos/2023/05/16/binational-ev-corridor-to-run-860-miles-from-kalama zoo-to-quebec/70224111007/.

558 Id.

559 West Coast Green Highway, West Coast Electric Highway, http://www.westcoastgreenhighway.com/electrichighway.htm.

560 Stephen Edelstein, Electrify America Finishes First Cross-Country Fast-Charging Route for EVs, Green Car Reports (June 24, 2020), https://www.greencarreports.com/news/1128610_electrify-america-finishes-first-cross-country-fast-charging-route-f or-evs. See also Electrify America, Locate A Charger, https://www.electrifyamerica.com/locate-charger/ (showing map of fast-charging network across the United States).

561 Anne LeZotte, GM and Pilot Company to Build Out Coast-to-Coast EV Fast Charging Network, Pilot Flying J, https://pilotflyingj.com/press-release/19335.

562 Id.

Infrastructure will continue to build out rapidly on highways with increasing PEV penetration, fulfilling the needs for even these comparatively less frequent longer drives. Survey data from Europe shows that as PEV penetration rates increase and drivers become more experienced with PEV operation, they become comfortable taking longer trips in their vehicles and are "more relaxed" about traveling long distances and when they charge their vehicles.563 In addition, other developing technologies could make both short and longer drives even more seamless, such as possible “electrified” roadways that contain wireless charging infrastructure under the asphalt and wirelessly charge PEVs while driving.564 Such projects are already in development or testing in the United States and Europe.565 [EPA-HQ-OAR-2022-0829-0759, p. 174]

563 Shell Global, Shell Recharge Research Suggests Increasing EV Adoption is Driving Range Confidence (June 23, 2023), https://www.shell.com/energy-and-innovation/mobility/mobility-news/shell-recharge-research-suggests-increasing-e v-adoption-is-driving-range-confidence.html.

564 Joann Muller, A Roadway Will Charge Your EV While You’re Driving, Axios (Feb. 6, 2022), https://www.axios.com/2022/02/02/a-roadway-will-charge-your-ev-while-youre-driving.

565 Id.

4. PEVs have additional attributes that are superior to combustion vehicles.

PEVs have additional superior attributes related to the driving and ownership experience that are widely attractive to drivers. These include faster acceleration; improved performance; better noise, vibration, and harshness characteristics; and reduced maintenance. Sections XIX.C, XX, and XXI detail these additional superior attributes and the benefits that they provide for drivers and vehicle owners. These attributes will continue to further increase consumer preference for PEVs. [EPA-HQ-OAR-2022-0829-0759, p. 174]

5. American consumers also place high importance on environmental sustainability, and EPA should not ignore these preferences.

When considering consumer preferences, EPA cannot overlook the importance that American consumers place on sustainability. U.S. consumers increasingly place high priority on protecting the environment, and PEVs are well positioned to satisfy this aspect of consumer preference. Numerous consumer surveys, including by YouGov, CarMax, and others have found that protecting the environment is a top consideration in purchasing a vehicle.566 In CarMax’s survey, over 60% of people said a car’s “fuel emissions are moderately or extremely important to them, while only 7.3% of people found fuel emissions not at all important.”567 [EPA-HQ-OAR-2022-0829-0759, p. 175]

566 Bill Howard, Survey: 23% of Americans Would Consider EV as Next Car, Forbes (Oct. 8, 2021), https://www.forbes.com/wheels/features/ev-survey/ (YouGov poll for Forbes Wheels); CarMax, Green-Conscious: Exploring Americans’ Views on Hybrid and Electric Vehicles (Aug. 23, 2021), https://www.carmax.com/articles/green-cars-trend.

567 CarMax, Green-Conscious: Exploring Americans’ Views on Hybrid and Electric Vehicles (Aug. 23, 2021), https://www.carmax.com/articles/green-cars-trend.

6. PEVs are a great fit for the needs and demands of rural drivers.

PEVs are a great fit even for rural drivers. Although rural Americans are currently adopting PEVs at slower rates than urban Americans,568 PEVs actually excel at meeting the demands of rural drivers. “Fuel savings for rural households are larger than for urban households, because trips in rural areas are longer than in urban areas, and vehicles tend to be older and less efficient, requiring more fuel per mile, [P]EVs require fewer trips to a mechanic for repairs and maintenance. Because of the high torque and low center of gravity, they have excellent performance, which is important on rough, curvy and steep roads.”569 A survey by the Union of Concerned Scientists and Consumer Reports found that “there is plenty of interest [in PEVs] in rural areas, but there is a huge knowledge gap about what it is like to own an EV."570 Correcting for this knowledge gap and educating rural consumers on PEVs' real benefits will undoubtedly significantly increase PEV adoption in rural areas, allowing all Americans to reap their benefits. [EPA-HQ-OAR-2022-0829-0759, p. 175]

568 U.S. Department of Transportation, Individual Benefits of Rural Vehicle Electrification (May 4, 2023), https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/individual-benefits (noting that rural EV adoption is currently roughly 40% lower than urban EV adoption, but explaining that EVs can have significant benefits for rural drivers); Maria Cecilia Pinto de Moura, Survey Shows Pathway to Speeding Up EV Adoption in Rural Areas, Union of Concerned Scientists (March 14, 2023), https://blog.ucsusa.org/cecilia-moura/survey-shows-pathway-to-speeding-up-ev-adoption-in-rural-areas/.

569 Maria Cecilia Pinto de Moura, Survey Shows Pathway to Speeding Up EV Adoption in Rural Areas, Union of Concerned Scientists (March 14, 2023), https://blog.ucsusa.org/cecilia-moura/survey-shows-pathway-to-speeding-up-ev-adoption-in-rural-areas/.

570 Id.

7. Most PEV drivers purchase or plan to purchase another PEV, indicating high satisfaction.

The appeal of these beneficial PEV attributes is made clear from the fact that most PEV buyers purchase another PEV for their next vehicle and through the ample available information pointing to satisfied PEV drivers. As far back as almost a decade ago, Tesla's Model S had the highest owner satisfaction of any vehicle in the U.S. market.571 A recent analysis of S&P Global Mobility vehicle registration data found that roughly two-thirds of EV-owning households that bought a new car in 2022 purchased another EV.572 Other surveys and analyses have found the same. In 2021, Plug In America surveyed over 5,500 EV owners and more than 1,400 potential EV purchasers and found that 90% of EV owners said that it was "likely" (13%) or "very likely" (77%) that their next vehicle purchase would be an EV.573 In Plug In America's most recent survey (conducted between December 2022 and February 2023), again 90% of EV owners said it is "likely" or "very likely" that their next purchase will be another EV.574 Even as of January 2017, CARB found that over 10% of recent PEV buyers were already driving their second or subsequent PEV.575 [EPA-HQ-OAR-2022-0829-0759, pp. 175-176]

571 Consumer Reports, Tesla Model S Takes the Top Spot in Consumer Reports Car Owner-Satisfaction Ratings (Nov. 21, 2013).

572 Joann Muller, Most Electric Car Buyers Don't Switch Back to Gas, Axios (Oct. 5, 2022), https://www.axios.com/2022/10/05/ev-adoption-loyalty-electric-cars.

573 Plug In America, The Expanding EV Market: Observations in a Year of Growth 1, 11 (Feb. 2022), https://pluginamerica.org/wp-content/uploads/2022/03/2022-PIA-Survey-Report.pdf.

574 Plug In America, 2023 EV Driver Survey 1 (May 2023), https://pluginamerica.org/wp-content/uploads/2023/05/2023-EV-Survey-Final.pdf.

575 CARB, California's Advanced Clean Cars Midterm Review, Appendix B: Consumer Acceptance of Zero Emission Vehicles and Plug-in Hybrid Electric Vehicles B-2 (Jan. 18, 2017), https://ww2.arb.ca.gov/sites/default/files/2020-01/appendix_b_consumer_acceptance_ac.pdf.

As Forsythe et al. (2023) explain, "technology progress projections are key for future BEV adoption projections used in policy planning and cost–benefit analyses."576 Here, it is clear that technological progress is sufficient to support significant consumer acceptance of (and satisfaction with) PEVs. Even considering consumer acceptance as a relevant and permissible factor in EPA's analysis, EPA should enact standards consistent with Alternative 1 with increasing stringency after MY 2030. Consumer acceptance is not a barrier to PEV sales at a pace consistent with this level of stringency, when desirable vehicles are available—as they are expected to be—and purchasers have information about their benefits.577 [EPA-HQ-OAR-2022-0829-0759, p. 176]

576 Forsythe et al. (2023) at 6.

577 EPA's approach to modeling consumer acceptance through the Global Change Analysis Model ("GCAM"), utilizing an S curve, while by no means the only approach to modeling consumer acceptance, is a reasonable one. Specifically, as recent analyses show, GCAM is a random utility discrete choice model equivalent to a logit model with a particular utility function form. Eric G. O'Rear et al., Projecting Vehicle Sales: A Review of Light-Duty Vehicle Adoption Models, Rhodium Group 15-16 (Mar. 24, 2023), https://rhg.com/wp-content/uploads/2023/03/Projecting-Vehicle-Sales-A-Review-of-Light-Duty-Vehicle-Adoption- Models.pdf.

Organization: Environmental Defense Fund (EDF) (1of 2)

EV Adoption Projections

Many organizations have made projections using a variety of models and methods to establish forward-looking estimates of ZEV sales. All of the projections included were conducted after the adoption of the Inflation Reduction Act and incorporate the sizable impact the legislation will have on cost and access to charging infrastructure. The projections are from ICCT, Rhodium Group, Energy Innovation, and Bloomberg NEF.106.107,108,109 The first three studies included multiple scenarios. For this analysis the central scenario or one of the central scenarios was chosen as the best representation of each study. The projections for ZEV adoption by 2030 range from 32% to 58% of LDV sales. [EPA-HQ-OAR-2022-0829-0786, p. 37]

106 Peter Slowik et al., Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States. 2023. The International Council on Clean Transportation, https://theicct.org/publication/ira-impact-evs-us- jan23/]

107 John Larsen et al., A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act. 2022. Rhodium Group, https://rhg.com/research/climate-clean-energy- inflation-reduction-act/. (Attachment AA).

108 Sara Baldwin and Robbie Orvis. Implementing the Inflation Reduction Act: A Roadmap for Federal and State Transportation Policy. 2022. Energy Innovation, https://energyinnovation.org/wp-content/uploads/2022/11/Implementing-the-Inflation-Reduction-Act-A-Roadmap-For-Federal-And-State-Transportation-Policy.pdf. (Attachment BB).

109 Ira Boudway. More Than Half of US Car Sales Will Be Electric by 2030. 2022. Bloomberg Hyperdrive, https://www.bloomberg.com/news/articles/2022-09-20/more-than-half-of-us-car-sales-will-be-electric-by-2030.

All of the above demonstrates EPA's projections of baseline levels of ZEV deployment are reasonable (if not conservative) and that there are many factors that are accelerating the growth of ZEV sales apart from EPA's standards. They also show that EPA's proposed standards are reasonable and that even greater levels of reduction are possible (as we discuss below). Notably, across all of the indicators we evaluated, manufacturer investments in vehicle and battery manufacturing capacity show some of the highest levels of ZEV deployment, particularly in the near term. This finding is consistent with historical precedent showing periods of rapid technological change often occur more swiftly than models or secondary indicators are able to predict. [EPA-HQ-OAR-2022-0829-0786, p. 37]

Organization: Exxon Mobil Corporation

Linked fuel and lifecycle vehicle CO2 standards offer a preferred, technology-neutral policy pathway relative to BEV-only mandates. A policy that aims to reduce GHG emissions from existing fuels and that recognizes WTW emissions from new vehicles, can help retain consumer choice for the type of vehicle they prefer to drive, would avoid overdependence on foreign critical minerals, would retain high-paying jobs throughout the transportation sector, could grow the role of agriculture in providing energy feedstocks, and ultimately, would be supported through a credit-based system, not taxes. [EPA-HQ-OAR-2022-0829-0632, p. 4]

ExxonMobil respectfully recommends that EPA consider the role it can play in developing and implementing policy to reduce GHG emissions from both new and existing vehicles through the development of WTW emission standards for new vehicles and complementary support for a federal low carbon fuel standard. We would welcome the opportunity to collaborate with the agency and share in greater detail our views on what a comprehensive policy approach might look like. [EPA-HQ-OAR-2022-0829-0632, p. 4]

Organization: Ford Motor Company

Ford is enthusiastic and optimistic about the ICE-to-ZEV transition, and we are already delivering electrified light- and medium-duty EVs at scale. While we remain optimistic, we are also mindful of the considerable challenges and uncertainties that lie ahead. The pace of electrification has been and may continue to be limited by many factors and forces, many of which are outside the control of vehicle manufacturers. These include the availability of critical minerals for battery manufacturing, the need to allocate finite resources between EV programs and efforts toward incremental reductions in emissions from ICE vehicles, consumer demand especially as we proceed beyond early-adopters to the majority of new vehicle purchasers, economic turbulence, geopolitical events, and, of course, electric vehicle charging infrastructure. [EPA-HQ-OAR-2022-0829-0605, pp. 2-3]

Limits on EV Growth

Ford is already delivering electrified light- and medium-duty EVs at scale. While we remain optimistic that EVs will constitute a steadily growing portion of new vehicle sales in the US, we are also mindful of the considerable challenges and uncertainties that will affect the rate of growth. The pace of electrification has been and may continue to be limited by many factors and forces, many of which are outside the control of vehicle manufacturers. A few deserve mention here. [EPA-HQ-OAR-2022-0829-0605, pp. 6-7]

Consumer preference is difficult to predict out to 2032. While EV adoption is growing quickly, and we are seeing enthusiasm for EVs among the early adopters, we cannot assume the same enthusiasm from the early majority let alone the late majority. Market studies suggest many people are interested in purchasing an EV, but not at any cost and not while charging infrastructure remains at a nascent stage. [EPA-HQ-OAR-2022-0829-0605, pp. 6-7]

Last, economic turbulence and geopolitical events will impact EV adoption rates over the 2027 – 2032 timeframe. At this time, automakers and regulators can only guess how and to what extent. [EPA-HQ-OAR-2022-0829-0605, p. 8]

These and other forces have and will continue to limit the growth of EV production and consumer adoption, regardless of an automaker's commitment to electrification. A more conservative path to achieve the proposed 2032 endpoint better accounts for these considerations. [EPA-HQ-OAR-2022-0829-0605, p. 8]

Organization: GROWMARK, Inc.

Lack of EV Capability for Farmers

Current electric vehicles do not provide the capabilities that farmers rely on to carry out their operations. According to a study recently released by the American Automobile Association (AAA), the Ford F-150 Lightning saw its range decrease by almost a quarter when loaded close to its maximum payload capacity.4 A gasoline-powered truck, however, would only lose 14 percent of its range with the same amount of weight, and of course it would be quicker and more convenient to refuel.5 [EPA-HQ-OAR-2022-0829-0560, p. 2]

4 American Automobile Association. (2023, June). Effect of payload on driving range of battery electric truck. https://urldefense.com/v3/ https:/u7061146.ct.sendgrid.net/ls/click?upn=4tNED-2FM8iDZJQyQ53jATUZvOEO3mirlEl3vtAic9l7ghAOXNRXkwKaKICrDXA3ZoT75TOvo955EZ6-2FJiQG-2FErJaPZeKHTyfflQJiv4TMR5A-3DMLSQ_wwmARy8TMTevifjaQtiXjzeH-2FSc8WPX2ToRxYAJ5XFXCYIVurVZ- 2F7aCPZDngjq-2BQuMDruqnM8cSNwQPzi5UIwwpztKldVzphs52jy6vxI2xgPnkdzJy3C9ftadJYj76WuUf2T26mkgeQA4pLiS2I3PjMzAEYZZu-2BUbgcPfolgmcVfQ7aEf7LxjMjPw-2B8WF3EQEdXTpy-2BAUfR52wN4rM91gx75Pxivc VYDED1S55BpuarlzGYrR-2Bk3PvHnJeb3rGPLd5dXXuQ8SwSjo-2BWWPLN8Jrn1ZD1e0j05qXvdpcFmg7-2FbUtbDUzAhjkGZGxVpfcOxvWD4YC810LuMOxWhv3kzMP1Xq9BQ4VUljZwYsOjU-2BI-3D;!!A1OrVxnpM0w!A Qdah29wRyKcLjIUYyHo21FIzdyG78ee-sIEhfNe4_m8Dkjdh8iAFlUoJGGzPw1xORQ0wI8g1EedoHHou9l8NRN7$

5 Tucker, S. (2023, June 6). Study: EVs lose range to hauling, more than gas trucks. Kelly Blue Book. https://www.kbb.com/car-news/study-evs-lose-range-to-hauling-more-than-gas-trucks/

Additionally, EVs will have worse results when it comes to towing than ICE vehicles. For example, while an ICE Ford F-150 can tow up to 14,000 pounds, the EV Ford F-150 Lightning has a max towing capacity of two tons less than that.6 Furthermore, testing of towing any considerable weights with the EV truck resulted in dramatic decreases in range, up to a 70 percent decrease in one test.7 [EPA-HQ-OAR-2022-0829-0560, p. 2]

6 Brandt, E. (2022, August 18). Payload and towing capacity on electric vehicles. Kelly Blue Book. https://www.kbb.com/car-news/how-far-can-an-electric-truck-tow/

7 Brandt, 2022.

These figures are simply not acceptable to farmers who rely on their vehicles to do their jobs. Farmers use their trucks to take products to market, bring supplies to their fields, and move livestock. Vehicles that have less capability than current ICE technology will lead to decreased efficiency and increased cost at the farm gate, which will lead to further farm consolidation and threaten our nation's food security. [EPA-HQ-OAR-2022-0829-0560, p. 2]

Organization: HF Sinclair Corporation

I. Executive Summary

HF Sinclair believes that such government policies must be technology-neutral and not manipulate the energy market by picking winners and losers. EPA cannot and should not promulgate inequitable regulations that mandate compliance through a single technology pathway. Consumer choice must be allowed in order to drive vehicle manufactures, or original equipment manufacturers ("OEMs"), to provide a fleet mix that meets emission limits sufficient to improve air quality in a reliable and efficient manner. [EPA-HQ-OAR-2022-0829-0579, pp. 1-2]

Finally, EPA has not considered the foreseeable, indirect impacts the Proposed Rule will have on ambient air quality. First, with the high purchase price of new PEVs, consumers will likely hold on to their older, higher-emitting ICE vehicles to avoid the increased purchase price of a PEV. [EPA-HQ-OAR-2022-0829-0579, pp. 9]

Setting aside the fact that the production capacity necessary to meet EPA's proposed adoption rates is not available,62 EPA takes for granted that the average consumer cannot and that nearly half of the population would not purchase a PEV. The average consumer cannot afford an expensive, new PEV or is otherwise not willing to sacrifice the range and convenience provided by an ICE vehicle—especially when the average EV is nearly $15,000 on average more than an ICE vehicle and that cost is increasing.63 Consumer demands and willingness to purchase PEVs are muted given the disparate range and cost differences.64 But EPA overinflates the potential effect of the IRA tax incentives to change consumers' minds, especially because the new PEV tax credit is limited to PEVs that meet certain domestic sourcing requirements and, as discussed below, domestic sourcing of critical battery materials is not currently reliable or practical for a vast majority of OEMs.65 [EPA-HQ-OAR-2022-0829-0579, p. 14]

62 Hong Yang and Lewis Fulton, TRANSPORTATION RESEARCH PART D: TRANSPORT AND ENVIRONMENT 118, "Decoding US investments for future battery and electric vehicle production" (May 2023) available at https://www.sciencedirect.com/science/article/pii/S1361920923000901 ("By comparing announced capacities to EV sales targets, we find that in the most ambitious scenario where US achieves 66% EV sales by 2030, the planned 5.1-million EV production falls short by over half; with tentative plans included, the gap closes to 4.6 million. In a less rapid scenario (40% by 2030), tentative plans are sufficient. Needed investments across these scenarios range from $20 to $143 billion, compared to current firm and tentative commitments of $75 to $108 billion, respectively.").

63 See Bryson Hull, BUSINESSWIRE, "Electric Vehicle Mandates Carry Major Price, Electricity Supply Risks That Must Be Addressed to Avert Potential Harm" (Jun. 8, 2023) available at https://www.businesswire.com/news/home/20230608005281/en/Electric-Vehicle-Mandates-Carry-Major-Price- Electricity-Supply-Risks-That-Must-Be-Addressed-to-Avert-Potential-Harm.

64 Jack Ewing, THE NEW YORK TIMES, "Electric Cars Too Costly for Many, Even With Aid in Climate Bill" (Aug. 8, 2022) available at https://www.nytimes.com/2022/08/08/business/energy-environment/electric-vehicles-climate- bill.html.

65 Ewing, supra n. 2 ("'Right now with our lack of capacity for materials, I don't think there is any product that will meet that today,' Carla Bailo, president of the Center for Automotive Research in Ann Arbor, Mich., said of the standards. "Tesla is probably close, but the rest of the manufacturers, no way.'").

e. EPA Fails to Consider Current PEV Market Demands

EPA improperly relied on the general characterization of recent years of the light-duty and medium-duty market as supplemented by incentives in the BIL and IRA to support its proposition that there will be a sufficiently rapid increase in EV market penetration to achieve compliance with the proposed standards. [EPA-HQ-OAR-2022-0829-0579, p. 14]

As mentioned above, charging capability is a key apprehension for nearly half the U.S. consumer market. 66 Importantly, successful implementation of the Proposed Rule depends on consumer choice as much as depends on technological improvements. But, in California as an example, consumer discontinuance occurs at a rate of 20% for plug-in hybrid electric and 18% for PEVs—once again based on the dissatisfaction with the convenience or availability of charging.67 [EPA-HQ-OAR-2022-0829-0579, pp. 14-16]

66 Phillipp Kampshoff, et al., McKinsey & Co., "Building the electric-vehicle charging infrastructure America needs" (Apr. 18, 2022) available at https://www.mckinsey.com/industries/public-sector/our-insights/building-the- electric-vehicle-charging-infrastructure-america-needs.

67 See EPA-HQ-OAR-2022-0829-0077, Abstract (Content restricted for copyright), available at https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0077.

Moreover, this high purchase price of new PEVs relative is an especially important consideration, especially for low-income consumers. Although EPA concedes that the Proposed Rule will result in "increases in upfront purchase costs [that] are likely to be of particular concern to low-income households" EPA discounts this concern because of a hypothetical anticipation that "automakers will continue to offer a variety of models at different price points."68 EPA's next conclusion—that low-income households will save money long-term in decreased fuel costs, will utilize the used-car market, and be cushioned by federal tax incentives69—completely misses the mark and illustrates the vacuum in which EPA is proposing these new standards. For example, the IRA tax credit for used cars would apply only to those sold for $25,000 or less, but less than 20 percent of used PEVs fit that category today.70 [EPA-HQ-OAR-2022-0829-0579, pp. 14-16]

68 Proposed Rule at 29,344.

69 Id.

70 Ewing, supra n. 2.

The current market share illustrates this issue. Although EPA attempts to circumvent these market realities by relying on the rapid increase in number of PEV models available in recent years, the number of PEV models is an improper surrogate for the number of actual units sold and in use.71 In reality, as EPA acknowledges, the facts show that in model year 2021, only between 3 and 5% of all vehicles certified by the agency were electric (including hybrid).72 Thus, the ambitions of even the most aggressive OEM from an PEV adoption rate perspective would require nearly exponential growth over each of the next seven years.73 There is no support for concluding there will be substantial consumer adoption of PEVs to achieve the 40–60% increase by 2030 projected by the Proposed Rule. This nearly 60% anticipated increase would require a similar increase in adoption rates over the same seven year period. For comparison, PEV sales increased from 0.2% to 4.6 over the ten year period between 2011 and 2021.74 EPA's overreliance on the BIL, IRA, and success of California's Advanced Clean Cars II program further underscores the insufficiency of the Proposal's analysis, especially where it is speculative at best whether the Advanced Clean Cars program will be active as currently proposed during the MY27–32 timeframe. [EPA-HQ-OAR-2022-0829-0579, pp. 14-16]

71 See, e.g., Proposed Rule at 29,190.

72 Proposed Rule at 29,189; Sebastian Blanco, Car And Driver, “Strict EPA Rules for 2027 – 2032 Vehicles Announced, Garnering a Range of Reactions (Apr. 13, 2023) available at https://www.caranddriver.com/news/a43546970/new-strict-epa-mpg-rules-for-2027-2032-vehicles/.

73 VOLVO GROUP, “Report on the first quarter 2023,” available at https://www.volvogroup.com/content/dam/volvo- group/markets/master/news/2023/apr/4519530-volvo-group-q1-2023.pdf; TUBES AND LUBES DAILY, “Volvo launches electric truck with longer range in N. America” (Jan. 2021) available at https://www.fuelsandlubes.com/volvo-launches-electric-truck-with-longer-range-in-n- america/?mc_cid=b124969b23&mc_eid=4a00dc8f80 (Volvo Trucks set target that half of all trucks sold are electric by 2030); VOLVO GROUP, “Geared for Growth – Annual Report 2022,” available at https://www.volvogroup.com/content/dam/volvo-group/markets/master/investors/reports-and-presentations/annual- reports/AB-Volvo-Annual-Report-2022.pdf.

74 Javier Colato and Lindsey Ice, Bureau of Labor Statistics, “Charging into the future: the transition to electric vehicles” (Feb. 2023) available at https://www.bls.gov/opub/btn/volume-12/charging-into-the-future-the-transition- to-electric-vehicles.htm.

f. EPA Fails to Properly Account for the Cost Impact of the Proposed Rule

As noted above, EPA must consider both feasibility and cost of compliance. In addition to the infeasibility of delivering an electric grid that can support the PEVs that OEMs must now produce, EPA has failed to adequately account for the cost of the Proposed Rule. Namely, EPA has severely underestimated the cost impact on lower-income households. Given the low cost of carbon-based transportation fuel, fluctuations in the electricity market, and higher insurance costs, the “break-even” point for a higher-cost PEV – which may be upwards of $15,000 more than its ICE counterpart – is not a mere few years as EPA predicts, but decades.75 And this calculus is heavily dependent on the $7,500 tax credit provided by the IRA, which will change if future policymakers eliminate it or otherwise require PEVs to compete in the market without a subsidy.76 Not only will this hinder the widespread adoption of PEVs, but it will also drive up the cost used car prices across the country as consumers hold off on buying new cars.77 [EPA-HQ-OAR-2022-0829-0579, p. 16]

75 Id. at 5, 13.

76 This subsidy results in a cost-shifting mechanism from middle-class to wealthy families, id. at 14, which may not be supported by future elected officials.

77 Id. at 6.

Organization: Hyundai America Technical Center, Inc. (HATCI)

The result of these massive investments in new and expensive technology, upgraded ICE engine development, and construction of new testing facilities will undoubtedly result in higher prices for new vehicles, which increases the cost of both new low-emission ICE vehicles and ZEVs. These increased costs could lead consumers to reject purchasing new vehicles, extend the life of the used car market, and reduce the environmental gains desired by the EPA with these proposed regulations. [EPA-HQ-OAR-2022-0829-0554, p. 3]

Organization: Illinois Corn Growers Association

Thus, even if in the next eight years automakers, suppliers and retailers can retool their businesses to supply an estimated 7.5 million new vehicles in 2032 and beyond, it is far from assured that: [EPA-HQ-OAR-2022-0829-0756, p. 3]

-The marketplace is willing to buy that many vehicles in spite of their higher purchase cost, charging requirements, limited utility and extremely high batery replacement costs. [EPA-HQ-OAR-2022-0829-0756, p. 3]

Organization: Illinois Farm Bureau (IFB)

Illinois farmers share the societal goal of reduced greenhouse gas ("GHG") emissions across the broader economy and, specifically from energy production, transportation, and use by society. IFB supports federal policies that accomplish these goals, but also believes it is critical to preserve consumers' access to affordable, dependable, and efficient transportation. We are advocates for clean air and believe the environment is in better condition than it was 50 years ago, but we must also balance additional regulation and its impacts on our industries and communities. [EPA-HQ-OAR-2022-0829-0532, p. 2]

Per IFB Policy, "[w]e support policies that keep agriculture viable and address the costs and benefits of those programs using sound, economic analysis." USEPA's proposal inhibits the marketplace from identifying the most efficient, lowest cost opportunities to reduce GHG emissions from vehicles and restricts consumer choice. We are concerned that such a prescriptive policy is not in the best interest of the consumer or the U.S. economy. [EPA-HQ-OAR-2022-0829-0532, p. 2]

Organization: Institute for Policy Integrity at New York University School of Law

G. EPA Should Further Explain Its Choices Around Scrappage, Pass-Through, and Vehicle Sales

EPA should provide additional explanation around certain modeling choices—namely scrappage, pass-through, and sales. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

"Scrappage" refers to the rate of which drivers discard old automobiles. OMEGA treats scrappage as exogenous, meaning that the rate of scrappage does not depend on the Proposed Rule's other effects.144 This choice is reasonable: While economic theory and evidence suggest that scrappage depends in part on the Proposed Rule's other effects (most notably the rate at which the Proposed Rule affects new vehicle prices and sales),145 this effect is very difficult to model due to data limitations, and past attempts by EPA and NHTSA to model scrappage have fared poorly.146 Moreover, the increasing movement to electric vehicles provides even more reason to treat scrappage as exogenous, as virtually no analysis on the scrappage of BEVs exists. However, the Proposed Rule provides no discussion of scrappage or EPA's choice not to model it. Particularly since EPA endogenously modeled scrappage in the 2020 Rule, the agency may wish to explain its decision not to follow this approach in the Proposed Rule and a discussion of how it may affect the results. Moreover, to the extent feasible, EPA should attempt to model scrappage in future standards. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

144 See RIA at 9-3 to 9-5.

145 See Howard K. Gruenspecht, Differentiated Regulation: A Theory with Applications to Automobile Emissions Control (1982); Howard K. Gruenspecht, Differentiated Regulation: The Case of Auto Emissions Standards, 72 Am. Econ. Rev. 328 (1982); ENV'T PROT. AGENCY, THE EFFECTS OF NEW-VEHICLE PRICE CHANGES ON NEW- AND USED- VEHICLE MARKETS AND SCRAPPAGE 3-6 to 3-11 & 5-7 to 5-7 to 5-12 (2021).

146 Inst. for Pol'y Integrity, Comments on the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks 66–71 (Oct. 26, 2018), https://policyintegrity.org/documents/Emissions_Standards_EPA_NHTSA_Comments_Oct2018.pdf.

"Pass-through" refers to the degree to which manufacturers pass on cost increases to consumers. EPA in prior tailpipe rules has assumed 100% pass-through to consumers in the vehicle market—meaning that every dollar of additional cost to the automaker is ultimately borne by the purchaser.147 EPA appears to repeat this assumption in the Proposed Rule. That approach is also reasonable given consistency with the agency's prior approach and the very limited economic evidence on vehicle pass-through. Nonetheless, that limited available evidence (from a 2010 paper) indicates that pass-through in the vehicle market may be below 100%.148 Accordingly, EPA should discuss and provide a rationale for its approach. EPA should also support further research in this area, given its potential importance. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

147 E.g. 2020 Rule, 85 Fed. Reg. at 24,594–95.

148 Using regression analysis, Hellerstein and Villas-Boas (2010) find only partial pass through for the vehicle industry with an average pass-through rate of 38%. Rebecca Hellerstein, & Sophia B. Villas-Boas, Outsourcing and Pass-Through, 81 J. INT'L ECON. 170, 175 (2010).

Finally, with regard to sales, EPA should clarify how OMEGA treats how producers expect consumers to value fuel costs. Within the model, consumers and producers shape their preferred new vehicle mix independently,149 each informed by their unique perspectives on fuel costs: Consumers weigh their expected fuel expenses, whereas producers consider how they think consumers will weigh their expected fuel expenses. In the RIA, EPA explains that consumers are assumed to factor in fuel costs of 12,000 miles annually for 2.5 years.150 However, the OMEGA input files suggest that producers expect consumers to consider fuel costs up to 15,000 miles annually.151 Although this difference is not inherently problematic, especially if EPA posits imperfect information between consumers and producers,152 EPA should explain this difference. This might also be a minor programming error, such that EPA intended for producers to accurately peg consumer valuation of fuel costs at 12,000 miles annually. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

149 The model then searches for solutions for a set of vehicle attributes, purchase prices, and quantities such that the sales and production shares match.

150 RIA at 4-2.

151 This information is derived from the 'sales_share_params_ice_bev_pu_b0p4_k1p0_x02031-cuv_b2p0_k1p0_x02029_nu8p0-sdn_b0p4_k1p0_x02020_nu1p0_20230228.csv' file for consumers, and the 'producer_generalized_cost-body_style_20220613.csv' file for producers, both located within the '2023-03-14-22- 42-30-ld-central-run-to2055\all_inputs' folder, downloadable from the 'Light-duty central case (zip)' section on EPA's website: https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions-greenhouse-gases

152 EPA, OMEGA Documentation Sec. 4.3.2 (last revised May 8, 2023), https://omega2.readthedocs.io/en/2.1.0/index.html#gl-label-producer-generalized-cost ("The producer, as an independent decision-making agent, will not have perfect information about the internal consumer decision process. Within the Producer Module, OMEGA allows the user to define the consumer decisions from the producer's perspective, which may be different from (or the same as) the representation within the Consumer Module.").

Organization: International Council on Clean Transportation (ICCT)

MARKET READINESS

The global transition to zero-emission vehicles is accelerating. The U.S. is the third largest electric vehicle market, behind China and Europe. In 2022, new U.S. plug-in electric vehicle sales reached nearly 1 million units, representing over 7% of new light-duty vehicle sales.1 This growth is expected to continue, as evidenced by the more than $1.2 trillion in announced automaker spending on electric vehicles, widespread consumer demand, and billions of dollars in new federal tax credits, incentives, and investments.2 Many electric vehicles have multi-month long wait times, indicating that demand is outpacing supply, and consumer research surveys show that demand for BEVs in the United States continues to increase and that 30% of licensed drivers aren't even considering gasoline vehicles for their next purchase or lease.3 Substantial public and private sector investments and state and federal policies have primed the market for a rapid shift to electric vehicles. [EPA-HQ-OAR-2022-0829-0569, p. 6]

1 Based on data from EV-Volumes. (2023). https://www.ev-volumes.com/datacenter/

2 Lienert, P. (2022, October 25). Exclusive: Automakers to double spending on EVs, batteries to $1.2 trillion by 2030. Reuters. https://www.reuters.com/technology/exclusive-automakers-double-spending-evs-batteries-12-trillion-by- 2030-2022-10-21/

3 Kiai, E. (2023, May 6). Waiting times for new electric car deliveries down by 42% since October peak. Electrifying. https://www.electrifying.com/blog/article/waiting-times-for-new-electric-car-deliveries-down-by-42-since-october- peak; Consumer Reports (2023). Automakers must increase production of electric vehicles or risk losing customers, new analysis finds. https://advocacy.consumerreports.org/press_release/new-analysis-of-consumer-ev- demand/

Organization: Jeremy Michalek et al.

The EPA assesses the potential for future demand for electric vehicles by first simulating a ”No Action” scenario, representing a future scenario without the proposed policy but accounting for other policies such as the IRA. They then simulate a future scenario that includes the additional effects of the proposed policy. In both cases, the consumer demand model's parameters (the ”share weights,” which we refer to as alternative specific constants to be consistent with the discrete choice literature) are calibrated so that future shares in the ”No Action” scenario match those projected in an IHS report (Fiske et al., 2021), resulting in the projections summarized in Figure 1. We compare these projections to new results from our research based on an empirical investigation of (1) past trends in consumer preferences and (2) expected technology trends. [EPA-HQ-OAR-2022-0829-0705, p. 4]

[See original for graph titled “Graphical summary of EPA's assessment of expected BEV adoption by vehicle class in the proposed rule (US Environmental Protection Agency, 2023)”] [EPA-HQ-OAR-2022-0829-0705, p. 4]

1.1 Cars and SUVs

In an attached study, published this year in Proceedings of the National Academy of Sciences, we compare results from a discrete choice survey experiment conducted with over 1500 people in 2020-2021 with those of a similar survey conducted in 2012-2013 (Forsythe et al., 2023a). This experiment importantly investigates the likelihood of mainstream U.S. new vehicle consumers choosing BEVs, where our sample is weighted to be representative of the U.S. new car and SUV buying population across household income, age, education, gender, marital status, and household size. We find that technological improvements in battery electric vehicles (BEVs) - particularly increasing range of these vehicles - have driven increases in consumers' likelihood of choosing these vehicles over their conventional gasoline vehicle counterparts. We find that the consumer preference parameters defining what consumers want in vehicle characteristics and what they are willing to pay for have not changed (in to- day's dollars) enough to identify statistically significant trends over this 8 year period. This implies that consumer preferences (independent of technology improvements) have been relatively static. The findings suggest that consumers are buying more electric vehicles today because the technology has improved, and that as BEV technologies continue to improve in the future, it will further increase consumer likelihood of choosing BEVs over conventional vehicle counterparts. [EPA-HQ-OAR-2022-0829-0705, p. 4]

Using the consumer preferences estimated from the choice experiment, we examine consumers' likelihood of purchasing a BEV when choosing between two vehicles: one that has a conventional gasoline powertrain and one that has a battery electric powertrain, but otherwise have very similar characteristics (such as the BMW i4 and the BMW 4-Series Gran Coupe, and the Nissan Leaf and the Nissan Versa). We find that, if consumer prefer-ence parameters continue at today's values and if the technology for range and cost improve to levels predicted by the National Academies (NASEM, 2021), then consumers will become roughly indifferent, on average, between electric and gasoline versions of several car and SUV models by 2030 (see Figure 2 from Forsythe et al. (2023a)). [EPA-HQ-OAR-2022-0829-0705, p. 5]

We further simulate market shares for BEVs across the full U.S. new car and new SUV markets. We find that in a case where BEVs are equally available as conventional gasoline vehicles (every conventional gasoline vehicle has a counterpart BEV with the same body style, brand, and other characteristics important to consumers), BEV technology improvements follow those projected by the National Academies (NASEM, 2021), and consumer preference parameters remain steady at today's values, we find that simulated BEV market shares of both new cars and new SUVs would be approximately 50% by 2030 (see Figure 3 from (Forsythe et al., 2023a)). [EPA-HQ-OAR-2022-0829-0705, p. 5]

Our findings support that large increases in consumer demand for BEVs in the near future is feasible. The research suggests that mainstream consumer demand for BEVs is likely to sharply increase due to expected BEV technology improvements alone. It also supports that BEV demand could grow high enough by 2030 so that BEVs become the majority of new passenger cars, and SUVs nearly the majority, through expected BEV technology improvements and equal availability of BEVs and conventional vehicles. It is important to note that these findings do not incorporate the reduced cost of maintenance and repair or the cost of at-home charger installation. If the net balance of these provides cost savings to consumers as the EPA predicts, then we would expect consumer demand for BEVs would be even larger than predicted in our study. [EPA-HQ-OAR-2022-0829-0705, p. 5]

The proposed EPA rule may further increase consumer demand for BEVs trends by (1) encouraging automakers to shift price margins to encourage more BEV sales, (2) encouraging automakers to reduce gasoline vehicle offerings in favor of increasing BEV offerings, (3) encouraging automakers to invest in electrification technology advancement, potentially exceeding National Academy projections, (4) triggering network effects, such as vehicle buyers being more likely to purchase a BEV as they know more friends and family who own them, and (5) encouraging other efforts - including advertising, dealership practices, and other actions - that would increase consumers' likelihood of purchasing BEVs over conventional vehicles. [EPA-HQ-OAR-2022-0829-0705, p. 5]

In a working paper, we conducted a similar discrete choice experiment of 52 pickup truck owners across the U.S. to characterize their preferences. This sample represented a range of pickup truck consumer household incomes, ages, education, gender, and household size and was weighted to be representative of the U.S. new pickup truck buying population. We find that most pickup truck owners (78%) are open to purchasing electric pickup trucks if the technology provides sufficient performance attributes, including range, operating cost, towing capacity and payload capacity. We find that the largest group, representing 43% of our consumers, choices between a BEV or conventional gasoline pickup truck are driven primarily by what the vehicle can do, rather than its powertrain type (we call this group "tech indifferent" because the don't value the powertrain technology in and of itself, only what it can deliver). Another group, representing an additional 13% cared about payload capacity and operating cost, but did not otherwise value the powertrain technology in and of itself. 17% of pickup truck owners were "BEV enthusiasts" who were willing to pay significantly more for a BEV pickup truck than a conventional gasoline pickup truck, even if they had identical characteristics (including operating costs, towing, payload, and brand). We find that 22% of pickup truck owners are strongly opposed to all types of electrification, including hybrid, plug-in hybrid and battery electric pickup trucks. For this group, a substantial change in consumer preferences would be necessary for the group to opt for electric pickup trucks over gasoline pickup trucks. [EPA-HQ-OAR-2022-0829-0705, p. 8]

We simulate market shares for BEVs across the full U.S. new pickup truck market. We find that in a case where BEV pickup trucks are equally available and diverse as conventional gasoline pickup trucks (every conventional gasoline and diesel truck has a counterpart BEV with the same towing, payload, brand, and other characteristics important to consumers), BEV technology improvements follow those projected by the National Academies (NASEM, 2021), and consumer preference parameters remain steady at today's values, where all gasoline or diesel pickup trucks offer a BEV powertrain option and technology trends match those suggested by the National Academies (NASEM, 2021), we estimate that, despite the notable group opposed to electrification of pickup trucks, over half of pickup truck owners would choose the electric powertrain by 2030 (Figure 4), exceeding EPA's assessment of expected BEV pickup truck adoption in 2030 (Figure 1). [EPA-HQ-OAR-2022-0829-0705, p. 8]

Implications for EPA. Our findings support that large increases in consumer demand for BEV pickup trucks in the near future is feasible. The research suggests that mainstream consumer demand for new BEV pickup trucks is likely to sharply increase due to expected BEV technology improvements in the future. It also supports that, although some pickup truck owners are strongly opposed to purchasing BEV pickup trucks, the majority of pickup truck owners value BEV pickup trucks equally to conventional gasoline pickup trucks as long as they have sufficient performance characteristics. The research supports that consumer de- mand for BEV pickup trucks may exceed EPA's scenario of BEV pickup truck adoption in 2030. It is important to note that our study does not incorporate the reduced cost of main- tenance and repair or the cost of at-home charger installation. If the net balance of these provides cost savings to consumers as the EPA predicts, then we would expect consumer demand for BEVs would be even larger than predicted in our study. The proposed EPA rule may further increase consumer demand for BEV trucks by (1) encouraging automak- ers to shift price margins to encourage more BEV sales, (2) encouraging automakers to reduce gasoline pickup truck offerings in favor of increasing BEV pickup truck offerings, (3) encouraging automakers to invest in electrification technology advancement, potentially ex- ceeding National Academy projections for pickup trucks, (4) triggering network effects, such as pickup truck buyers being more likely to purchase a BEV as they know more friends and family who own them, and (5) encouraging other efforts - including advertising, dealership practices, and other actions - that would increase consumers' likelihood of purchasing BEV pickup truck over conventional trucks. [EPA-HQ-OAR-2022-0829-0705, pp. 8-9]

[See original for Figure 4, titled "Hypothetical share of BEV pickup trucks for model year 2020 and 2030"] [EPA-HQ-OAR-2022-0829-0705, pp. 8-9]

Organization: John Graham

Tables 82 and 83 in the Preamble (page 29329) show EPA's projected market penetrations for strong HEVs drops to virtually zero in both the proposed standards and the No Action case. The preamble states, [EPA-HQ-OAR-2022-0829-0585, p. 12]

"While manufacturers may in fact choose HEVs, the modeling indicates they are less cost effective than the BEVs which have been subsidized by the IRA and emit 0 g/mi tailpipe CO2." [EPA-HQ-OAR-2022-0829-0585, p. 12]

"In the proposed standards case, the steady decline in projected HEVs is primarily a result of continued projected reductions in battery costs which make BEVs increasingly more cost effective relative to HEVs." [EPA-HQ-OAR-2022-0829-0585, p. 12]

If the results of EPA's OMEGA modeling were correct, we should already observe HEVs weakening in the marketplace. While the proposed rule projects penetration of virtually zero hybrids in 2032,10 the real world reveals hybrids flourishing in the marketplace. [EPA-HQ-OAR-2022-0829-0585, p. 12]

10 Tables 13-65 through 13-94 in the DRIA indicate that 100% of market share is comprised of Turbo12, ATK, and BEV technologies for all cases except for Alterative 1, where 100% of market share includes 6% strong hybrids.

EPA's own analyses confirm the recent large increase in hybrid market share. Section 3.1.1.2 Hybrid Electric Technologies in the DRIA (page 3-3) states:

"Hybrid electric vehicles (HEVs) were first introduced in the U.S. marketplace in model year 2000 with the Honda Insight. As more models and options were introduced, hybrid production increased to 3.8 percent of all vehicles in model year 2010, before declining somewhat over the next several years. However, in model year 2021 hybrid production reached a new high at 9.3 percent and is projected to reach 10.1 percent in model year 2022, as shown in Figure 3-2 (U.S. EPA 2022)." [EPA-HQ-OAR-2022-0829-0585, pp. 12-13]

"The growth of hybrids in the pickup vehicle type is largely due to the introduction of "mild" hybrid systems that are capable of regenerative braking and many of the same functions as other hybrids but utilize a smaller battery and an electrical motor that cannot directly drive the vehicle.

These mild hybrids account for about a third of hybrid production in model year 2021." [EPA-HQ-OAR-2022-0829-0585, pp. 12-13]

Against this recent rapid increase in hybrid sales, note that OMEGA forecasts only 4% hybrids in 2027 for the No Action scenario (preamble Table 83) and 3% for the Proposed Standards (preamble Table 82). [EPA-HQ-OAR-2022-0829-0585, pp. 12-13]

Organization: KALA Engineering Consultants

Comment 5. The Law of Unintended Consequences or Reactions

A. We believe public sentiment toward the obvious potential results of adoption of the Docket ID No. EPA–HQ–OAR– 2022–0829 rulemaking of "forcing" manufacturers to predominately produce BEVs in order to meet the proposed standards may well have a host of unintended consequences.

Despite the glowing polling results reported in the Federal Register rulemaking document regarding eager acceptance of BEVs and polls of PHEV and BEV owners that would be willing to purchase such vehicles again, we believe that most of those respondents fall into several categories such as 'Early Adopters,' electric car zealots and wealthy people who can afford BEVs and want to impress their friends and neighbors with how "Green they are. Seriously, a person who buys an obscenely ostentatious Lucid 1,000 horsepower electric vehicle cannot be considered representative of the majority of people who will be presented with BEVs as, essentially, their only choice in new car showrooms in a few years. We think there may well be elderly people who buy a new car after 2027 that will get the BEV home and be wondering, "Where do I put in the gas for this thing?" [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

We looked at several polls, as did several other commenters, but the one we chose to discuss here has international representation in several developed countries in Europe as well as the US. The poll was conducted by UK-based Kantar Public in their Journal- 04 publication of polling data on public attitudes towards the environment, sustainability, and climate change. If you go to ResearchGate and request the actual PDF of the research, you will get the graphics and discussion we are about to share with EPA. https://www.researchgate.net/publication/355734467_European_attitudes_to_climate_change_implication s_for_citizens_institutions_and_governments [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

The Guardian also published excerpts from the polling in 10 countries here:

https://www.theguardian.com/environment/2021/nov/07/few-willing-to-change-lifestyle-climate-survey [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

From those sources we present the second of two graphics below from the survey and then comment on the results. The most interesting results we found were from the following question "How would you rate in terms of importance, the following measures aimed at preserving the environment and the planet?: [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Replacing fossil fuels with renewable energy – 45% say important Reducing people's energy consumption – 32% say important Favoring the use of public transport over cars – 25% say important And most pertinent to this comment's discussion: [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Banning fossil fuel vehicles – 22% say important [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

[See original attachment for poll on how people ranked, in terms of importance, the following measures aimed at preserving the environment and the planet] [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Only 22% felt that banning fossil fuel vehicles (22%) was important to preserve the planet. We would characterize this level of response to that question as dismal at best, people do not want to use electric vehicles. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

In the US, Transportation accounts for slightly more Greenhouse Gas (GHG) emissions than does electricity generation. However, in most other large emitter countries, the opposite is true with Electricity generation being far greater than Transportation. This is especially true of China (the largest global GHG emitter), where much of the country is still rural in nature, most electrical generation is by exceedingly dirty coal-fired power plants and the thought of a personal vehicle being a birthright is a foreign (i.e. US) notion. The most frightening aspect of what we call the "Lifestyle Gap" is the desire by most people in other countries to have a similar lifestyle to what they observe in the US. Having personal transportation (something bigger and more enclosed than a motor scooter) is very high on that desire list. That implies that as other countries catch up to a US lifestyle, Transportation GHG emissions will continue to rise from that sector. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Most other countries that do not have oil reserves, look to the US for what to do about Climate Change. The reasoning goes, the US is the most technically advanced country in the world and whatever solutions the US comes up with must be the "correct" solutions. These facts make it doubly important for the US to act as the leader of the world on Climate Change with truly "correct" and nearly universally applicable solutions. Yet, we do not have a set of National Climate Change Solution Plans that the Federal Government has endorsed as policy and has committed funding and regulations to implement. So far, there have been "Band Aid" measures on Transportation GHG emissions such as the Biden plan to place electric vehicle charging stations all across the country, a partial solution that KALA disagrees with, not on the viability of electric vehicle charging stations, but the lack of focus on deployment in locations that desperately need reductions in emitted vehicle pollution (these are known as EPA's nonattainment areas such as large cities where most of the pollution that creates the nonattainment condition is from vehicles). The opposite is true in China where big city pollution is mostly from nearby electrical generation. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

These dichotomies between nations and their levels of technology and emission profiles also makes it important for the solutions developed by the US be largely applicable to nations with lower levels of technology and wealth. The battery electric vehicle solution so often touted as "THE" solution to transportation GHG emissions, will NEVER apply to the hundreds of millions of motor bikes, motor scooters, motor trikes, motorized boats and various other transport modes, which all use petroleum-based liquid fuels, found all across Asia, India, Indonesia, the

Philippines, the Middle East, Africa and South America. Many countries that are considered "Developed" (I'm thinking Russia and the former USSR vassal states) may not have citizenry that can easily afford a transition to an entirely different vehicle propulsion method, such as battery electric, and will struggle to maintain their existing fleets of vehicles that still use fossil petroleum fuels. In fact, the less developed and lower income nations around the world will balk at implementing the so-called "solution" that seems to be prevalent in the thinking of the United States for Transportation GHG emissions, i.e. Battery Electric Vehicles (BEV). Oil producing states, such as Russia and Saudi Arabia, where oil income is the principal national revenue will be outright hostile to the notion of changing the vehicle propulsion method. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

In response to the Kantar polling as to why they would be hesitant to make drastic changes to help with Climate Change: "I need more resources and equipment from public authorities" (69%) together with "I can't afford to make those efforts" (60%) were major responses. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Any policy makers who see these results, especially in the US, MUST rethink where policy making should go on Transportation GHG reductions. When someone says, "I can't afford to make those efforts" what are they most likely talking about? In our view, for most people, they are referring to the cost of replacing their current gasoline vehicle with an electric vehicle. In the US, vehicles are usually the second most costly item of personal ownership, with a home being in first place. For those who cannot afford home ownership, a large percentage of the Democratic Party's base, a vehicle is their most costly personal possession. If those individuals are middle to lower income, their budgets are usually very tight and the thought of being forced to purchase a vehicle that is 20% to 50% more costly than a gasoline vehicle is generally out of the question even with generous tax rebates that actually mostly apply to more wealthy individuals with high personal incomes. We believe that they will instead, choose to buy a replacement vehicle, when needed, from the existing stock of gasoline-burning used cars for as long as they can. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

This analysis brings up the issue of how little time we have left to actually make the most significant changes to GHG emissions. We simply do not have time for people to run out of gasoline-burning used car choices, which could amount to 20 years or more, for them to finally buy the supposed "solution" to transportation GHG emissions, a BEV. Related to this lower to middle income demographic is the issue of their vehicle being able to provide "Dual Duty." A Dual Duty vehicle is one that can provide short-distance (short time frame) transportation for daily needs such as grocery getting and the back and forth to work commute AND provide a way to take long trips for such things as vacations and family gatherings. Let me relate an interesting response to a question I posed to a Nissan representative at a Denver car show about the Leaf All-Electric vehicle (BEV). I asked what about trips up into places like Wyoming where they will not be welcoming to electric vehicles in that oil producing state? Incredulously, the Nissan rep said, "Oh, you don't use the Leaf for longer trips – you use your 'Other car' for that." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Such a response shows an unbelievable elitism about lower cost BEVs, such as the Leaf and the Chevrolet Bolt, that the owner of such BEVs will have the financial means to have two or more vehicles, one of which is capable of long-distance trips without the bother of waiting 3 to 7 hours for a recharge after the car's battery is exhausted. This has become known as "Recharge

Anxiety." It is a real thing and represents the problem all BEVs have in public perception of: What happens when you run out of battery charge on a long trip or in a traffic jam? Will it take hours to recharge even if I can find an open and working recharge outlet? Why would I ever try to take a BEV on a long trip when I can "recharge" (i.e. refuel) my gasoline vehicle in less than 10 minutes? BEV makers have tried to address this problem, Tesla for example, by providing a Supercharging option at special recharge stations designed to recharge a half-discharged battery in about 15 minutes. But, even Tesla admits that rapid recharge is not good for the individual cells in the battery pack and should not be done too often. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

B. If the EPA attempts to "force" people into BEVs, there may be an unexpected and unforeseen political reaction among people who have traditionally been the base of the Democratic Party who may switch their political allegiance to the other Party who won't force them to drive BEVs.

So, what choices do the lower and middle income people that comprise a large percentage of the Democratic Party base have when it comes to the supposed Transportation GHG emission "solution," the BEV. The answer is not much, because for the ONE car they can afford, they need the Dual Duty vehicle that is represented best by a gasoline-fueled vehicle that can be refueled on longer trips in less than 10 minutes and then they are on their way again. If the Democratic party at the behest of a Democratic president through a regulatory agency attempts to force those people to purchase and deal with all the recharge problems that BEVs have, they might well not be Democrats anymore. Republicans will NEVER support forcing people to buy BEVs (they are in the back pockets of the oil companies after all) and that may well drive people who were reliable Democratic voters into the Republican camp over this single issue. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

So, the question to EPA administrators is simple. Do you want to risk political reprisals in the form of election of Republican legislators and the head of the executive branch, the president, because you felt this was your chance to "force" the adoption of a vehicle type, the BEV, down peoples throats that, frankly, we believe we have shown conclusively will not perform the GHG reduction function that the EPA claims it will. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Didn't you see what happened when Donald Trump was president and the EPA was rendered powerless and, now that the Supreme Court is constituted the way it is with ultra-conservative judges, how do you think court cases that make it to SCOTUS will turn out for EPA on this and other regulatory Docket issues? Now look, we are not saying to the EPA to be fearful and hunker down and not do anything about GHG and criteria pollutants from transportation. PLEASE review our set of alternatives in Comment Section 4, which we think makes more sense, especially from a GHG reduction standpoint than trying to "force" adoption of BEVs into the US fleet at unreasonable numbers. Making people buy and drive very different vehicle types may not be the answer, especially for GHG reductions. We think the "Fuel Change Out" approach with high GHG reduction potentials and better criteria emissions profiles is a better way to meet the needs for health risk reductions and more importantly, as we have argued above, for dramatic reduction in GHG emissions by substituting fossil carbon containing fuels for carbon-neutral fuels made from biomass. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

We have the technology to make these carbon-neutral fuels that come very close to the properties of gasoline and dramatically reduce GHG emissions if we just have the will and foresight to do so. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

C. The consequences that may arise from full implementation of Docket ID No. EPA–HQ–OAR– 2022–0829 rulemaking standards and requirements may produce something that could be described as a quiet rebellion against what many people would view as government overreach via regulation.

To give you a better "feel" or Flavor for the reaction to the docket's provisions, we would invite EPA to look at a YouTube video by long-time YouTube maven on automotive issues, Scotty Kilmer. https://www.youtube.com/watch?v=j1R0wTBsK3I [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

In this video presentation, Kilmer starts out blaming President Biden and by association the Democratic Party as the villains who want to take your gasoline car away from you and limit your buying choices in the future. Here are some of the comments elicited from the video with many of the obvious Trumpian attitudes filtered out: [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"How do we do this when 90% of Americans cannot afford a new car?"

"As someone who has never bought a new car. I can assure you I will never be buying a used electric car." "We can barely get enough minerals to power our phones, and now we want 60%of cars to run on batteries."

"They can build all they want, but you cannot force people to buy them."

"Just where am I supposed to get $61,500 for a car? That is absolutely insane! This is legislation through regulation. Who voted for those EPA bureaucrats? There is exactly ZERO percent probability that I will buy an EV." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"This is the closest thing to government mandating what people get to choose and eliminating a free market based on consumer demand."

"We just need a group of people with the know-how and the financial ability to sue the EPA to stop infringing on our rights to purchase what we want. They're just basically taking our freedom away through regulation without actually saying we don't have the freedom to choose what we want."

"Thanks to Scotty's advice we just bought a 2023 Camry V-6. We're good for 20 years or 300,000 miles." "I have a Tesla but forcing everyone to get an EV is insane. Many don't have the capability to charge at home and a lot of homes need panel upgrades to make room for a EV charger. All of this costs a lot of money for people to afford." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"In our office people are buying hybrid cars instead of EV cars. It make more sense, 500 miles of range, fill the tank in 6 minutes and probably last longer and they are about the same price or less and are proven technology."

"This sounds like used vehicle prices are going to skyrocket worse than before - probably not a good sign for those of us stuck as pizza drivers."

“The EPA doesn't have the authority to change the law or the regulations. The people through congress will make that decision thank you.”

“American people remember you have the power to choose your president and who makes the laws, if it’s affecting you who cannot afford to change your car then get someone who sides with the working classes and will help you make your own choices, the fact that making batteries pollutes more than gasoline engines produce doesn’t matter to these politicians who don’t know what it’s like to have to work for a living.”

“Is it at all possible for congress to stop this insane man [presumably Pres. Biden]? [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

So, does the EPA get some of the rebellion flavor in those comments? It is our opinion that one of the unintended consequences of implementing this Docket may be to create a rebellion of sorts among millions of Americans. We think that people may decide to hold on to their gasoline vehicles much longer than they otherwise might. We also think that once BEVs are about the only vehicles on dealer’s showroom floors, the price of used gasoline vehicles may well increase dramatically. If that happens, millions of low income people may be priced out of the used car market. What may happen is “Cubanization” of the US used car market. Cuba has long been banned from importing vehicles from the US and elsewhere. With the parts Cubans are able to smuggle in and automotive machine shops making some hard-to-get parts, the car owners in that country are driving around in cars from the Fifties and Sixties with no end in sight. Fortunately, Cuba is a small island, but the idea is that there could be new “cottage industries” like the ones in Cuba pop up all across our country that would be mechanics, auto machine shops, and detailers and upholsterers who keep those old cars in good shape. The very same thing could conceivably happen here in a “Resistance” movement against the regulations the EPA is advocating for. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

The temporal upshot of these possible consequences is that the gasoline part of the US fleet will continue to use gasoline and spew the usual GHG and criteria pollutants as time goes by. The problems we foresee are that as engines in those older vehicles that people in the Resistance Movement are holding onto will get tired and transmissions get less efficient, the amount of pollutants and GHGs could go up – exactly what the efforts to implement these new regulations are meant to avoid. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

George H. W. Bush stated it best when he said, “The American life-style is non-negotiable.” And in this context, that means that stubborn Americans are not going to be told what they can and can’t drive and they will resist what they might view as an intrusive government trying to alter their “life-style.” [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Organization: Kentucky Office of the Attorney General et al.

3. Consumers are not willing to accept the Proposed Rule’s electrification mandate.

All of the above questions whether it is possible to make EVs in the numbers the Proposed Rule dictates. Assuming the Agency could explain away those concerns, another important aspect of the problem would persist: Consumers will not buy that many EVs. [EPA-HQ-OAR-2022-0829-0649, p. 15]

The entire proposal depends on increased—much increased—EV demand. And demand undoubtedly is growing. But it is not likely that sales will "rapidly grow" enough that 67% of new passenger cars, trucks, and SUVs will be electric in the next handful of years. 88 Fed. Reg. at 29,189, 29,329. After all, EVs comprised under 6% of the market last year. Sebastian Blanco, Strict EPA Rules for 2027-2032 Vehicles Announced, Garnering a Range of Reactions, Car and Driver (updated Apr. 13, 2023), https://www.caranddriver.com/news/a43546970/new-strict-epa-mpg-rules-for-2027-2032-vehicles/. Taking another 60% of the market by model year 2032 is unrealistic. Consumers' "vehicles are near and dear to their hearts," so "[f]or most people," EPA's manipulation of the new-vehicle market "could be really problematic." David Ferris, Gasoline car bans: EV savior or 'stupid' idea?, E&E News (Feb. 14, 2020), https://bit.ly/43PIP8I. A March 2023 Gallup survey undercuts EPA's market assumptions, too: Only 12% of U.S. adults are "seriously considering" buying an EV, while 41% "unequivocally" say they would not consider buying one. Megan Brenan, Most Americans Are Not Completely Sold on Electric Vehicles, Gallup (Apr. 12, 2023), https://news.gallup.com/poll/474095/americans-not-completely-sold- electric-vehicles.aspx. Add in recent cuts on tax credits for electric-car buyers, and the indications that the Proposed Rule relies on wildly inaccurate demand projections keep growing. [EPA-HQ-OAR-2022-0829-0649, p. 15]

Organization: Matthew DiPaulo

My company produces motor oil for passenger car vehicles with proprietary formulations which exceed industry specifications, improve fuel economy, reduce emissions, and can be used in hybrid vehicles [EPA-HQ-OAR-2022-0829-1514, p. 1]

The premature rush to transition the U.S. vehicle fleet to EV's will reduce my sales. [EPA-HQ-OAR-2022-0829-1514, p. 1]

The large-scale shift to electric vehicles, which would comprise two-thirds of all new-car sales in the U.S. by 2032 under this proposal, will hurt workers, small businesses, and consumers while doing little to help the environment. The proposed rule would lead to fewer vehicle choices for individuals and families, reducing the selection of vehicles that fit their household budgets and unique needs. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: Mazda North American Operations

The proposed rule is the most stringent light duty vehicle regulation that EPA has promulgated to date. The electrification and carbon reduction goals are incredibly challenging and will require not just a coordinated effort to achieve but also solutions addressing consumer demand, affordability, charging network, power grid capacity, rare earth mineral availability, and striking the right balance regarding China policy [EPA-HQ-OAR-2022-0829-0595, p. 2]

Summary

Mazda is proud of its heritage and contributions to personal mobility, and we celebrated our 100th anniversary in 2020. Mazda has also long been an engineering leader known for innovative powertrains like the rotary engine and Skyactiv technology. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

We look at EPA's NPRM and its preferred option through the lens of a company that is already working towards an electrified future. It's not a matter of if this transformation will happen, but when and how. Mazda, like the rest of the industry, faces many challenges: [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

- Will charging infrastructure be sufficient?

- Can the electric grid handle the increased demands?

- How will EV incentives on the federal and state level impact this shift? [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

- Will suppliers be able to develop and produce components like batteries (that currently require critical minerals, many from China) quickly enough and in enough volume?

- How might future laws or regulations in trade and re-shoring impact our ability to meet goals?

- Are consumers ready and willing to move away from "tried and true" internal combustion engines in numbers sufficient to meet these goals?

- Can OEMs remain sufficiently profitable to fuel the transition to EVs? [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Mazda strongly requests that EPA take these considerations into account and make necessary adjustments to the proposed rule as it works towards a Final Rule. We feel the Final Rule should have more realistic targets and associated ramp ups, include PHEVs, and adopt CARB's current LEV IV for criteria emissions. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Organization: Minnesota Pollution Control Agency (MPCA)

There is strong and growing demand for EVs in Minnesota, especially as the variety of EV options grows. During our Clean Cars Minnesota rulemaking, we heard from Minnesotans that demand for EVs was outstripping supply – Minnesotans were seeking EVs and sitting on long waitlists or going out of state to obtain them. EV sales in Minnesota increased by more than 2.5 times between 2020 and 2022.5 [EPA-HQ-OAR-2022-0829-0557, p. 3]

5 Alliance for Automotive Innovation, 2023, Advanced Technology Sales Dashboard, retrieved June 14, 2023. https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard

Organization: Mitsubishi Motors North America, Inc. (MMNA)

To determine a realistic maximum volume of EVs the market can support for each of the model years covered by the rule, we believe EPA should consider certain critical factors. Among these factors, we believe EPA must make a thorough and realistic year-by-year assessment of key factors like projected battery costs, projected supply of battery critical-minerals, projected residential and public charging infrastructure availability, projected electrical grid capacity, and consumer acceptance of BEV technology in the broader arena. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Organization: National Association of Convenience Stores (NACS) et al.

Renewable fuels such as ethanol materially lower gasoline's carbon footprint. If properly incentivized, these technologies' capability to reduce emissions can continue to grow alongside other decarbonization technologies such as clean electricity. Pursuing one solution does not require abandoning others. [EPA-HQ-OAR-2022-0829-0628, pp. 1-2]

As articulated in this letter, and in our associations' respective comments in response to the Proposal, we are concerned that EPA is pursuing a single technology as the solution to decarbonize light-duty transportation. The speed at which the Agency appears to anticipate the market and consumers will transition to electric vehicles is divorced from our members' assessment of reality. The Proposed Rule does not appreciate the market obstacles associated with such a massive transition in consumer behavior. It also abandons proven decarbonization technologies, such as higher-octane liquid fuels, that can deliver material emissions reductions using existing infrastructure, existing vehicles, and working with consumers' existing behavior. [EPA-HQ-OAR-2022-0829-0628, pp. 1-2]

Our associations support the Agency's stated goal of improving the emissions consequences of over-the-road transportation. The Proposed Rule's approach toward realizing that objective, however, is flawed. A technology-neutral approach to transportation decarbonization will help to mitigate costs, promote innovation, and address the practical challenges associated with electrification. All fuels and technologies should be treated equally within the context of emissions standards. The Proposal does not do this, but instead artificially tilts the scale towards electric vehicles ("EVs") by only accounting for emissions from one segment of the value chain: vehicle tailpipes. [EPA-HQ-OAR-2022-0829-0628, pp. 1-2]

Organization: National Automobile Dealers Association (NADA)

NADA has long supported continuous vehicle emissions improvements that are technologically achievable and affordable for household and commercial new vehicle customers. As noted above, NADA's franchised dealer members are "all-in" with selling and servicing the new EVs being produced by the OEMs they represent. In fact, nationwide, NADA expects franchised dealers to spend some $5 billion installing EV chargers, buying EV-related equipment, parts, and tools, and investing in EV training for sales and service personnel. As evidenced by these investments and by the EV-related activities at the 2022 and 2023 NADA Shows,22 America's new motor vehicle dealers recognize their importance to the broad, mass market adoption of EVs. However, they also are concerned that EPA's proposal could undermine that adoption. [EPA-HQ-OAR-2022-0829-0656, p. 4]

22 See Exhibit A: "Everything Electric" at NADA Show 2022-2023.

Appropriately structured standards must involve a national, holistic approach to improving tailpipe emissions. EPA claims that it is not proposing to mandate specific technologies or the production of specific vehicle types, but its proposal is anything but technology neutral. Unlike prior rules governing tailpipe emissions, EPA's proposed standards cannot be met by ICE vehicles alone and would phase-out existing credits for ICE vehicle and hybrid technologies that have to date helped OEMs to achieve better emissions compliance. Moreover, they are premised on overly aggressive assumptions regarding future EV market penetration. If adopted, the cumulative practical effect of the proposal would be to greatly reduce the market availability of new ICE vehicles. This “if you build them, they will come” approach ignores the fact that, while franchised dealers are the OEMs’ primary customers, actual emission reductions cannot be achieved unless and until new EVs take to the road. [EPA-HQ-OAR-2022-0829-0656, p. 5]

Unlike for many regulated goods, prospective purchasers of new light-duty vehicles have transportation options, including the used vehicle marketplace, the service and repair of existing vehicles, and alternatives like public transit and micro-mobility. Consequently, vehicle consumer purchase behaviors must be viewed through the lens of an ever-changing marketplace that hinges on the willingness and ability of prospective purchasers to buy ever more expensive new vehicles with enhanced emissions performance. Similarly, new commercial medium-duty vehicle purchase decisions hinge on affordability, cost-efficiency, and reliability (i.e., uptime). At bottom, the market will avoid new vehicles that are too costly, that offer performance comprises, or that pose unacceptable downtime risks. [EPA-HQ-OAR-2022-0829-0656, p. 5]

EPA’s current proposal is flawed in that it disregards these critical demand-side marketplace factors. It also appears aimed at promoting EVs to the exclusion of ICE, hybrid, and other alternative fuel vehicles. It will likely cause OEMs to produce fewer new technology ICE and alternative fueled vehicles and will increase their cost, thereby dissuading consumers from considering their purchase. EPA’s final rule should set truly technology-neutral emissions standards that maximize, not inhibit, fleet turnover. Doing so is critical to maximizing emissions reduction given that, as noted above, regulatory objectives will not be achieved unless and until new vehicles subject to more stringent emissions standards are bought. [EPA-HQ-OAR-2022-0829-0656, p. 5]

Less than 10 percent of new vehicle sales are cash transactions, meaning that over 90 percent of prospective new vehicle purchasers finance their transactions. Today’s high interest rates are compounding the affordability dilemma and driving consumers out of the market.26 As a result, Americans are holding onto their existing vehicles longer, extending the average age of the on-road fleet to 12.5 years.27 And, dealers are selling fewer new vehicles, about 13.9 million in 2022, down 8 percent from 2021 and well down from the 17.2 million sold in 2018.28 [EPA-HQ-OAR-2022-0829-0656, p. 6]

26 See Auto Loan Interest Rates Hit Highest Level Since 2008 and Drive Record Share of $1,000+ Monthly Payments in Q1, | Edmunds.

27 See Average Age of Light Vehicles in the US Hits Record High 12.5 years, | S&P Global (spglobal.com).

28 See Cox Automotive Forecast: U.S. Auto Sales Expected to Finish 2022 Down 8% Year Over Year, as General Motors Reclaims Top Spot, Honda and Nissan Fall Significantly - Cox Automotive Inc. (coxautoinc.com); New- Vehicle Sales Reach 17.3 million; 2019 Less Rosy - Cox Automotive Inc. (coxautoinc.com).

American consumers generally support incremental emissions improvements, and a recent survey shows that 61 percent of new vehicle car shoppers say that they are “overall likely” to consider purchasing an EV.29 But intender surveys are of limited value and often do not reflect what prospective purchasers will do, or what they care about most. For example, polling by Centrist Democrats of America shows that while Americans generally support EVs, they do not support bans on the sale of new ICE vehicles, or prioritizing funding for public EV charging over building schools and police and fire resources.30 Moreover, a recent Gallop poll shows that 41 percent of U.S. adults state that they will not consider purchasing an EV.31 and a recent poll by the Energy Policy Institute at the University of Chicago and the Associated Press-NORC found that 47 percent of respondents are unlikely to purchase an EV.32 In May 2023, J.D. Power reported that 21 percent of U.S. car shoppers are "very unlikely" to consider an EV for their next vehicle purchase, and a GOBankingRates survey found that 22 percent of respondents said they do not ever want to own an EV.33 [EPA-HQ-OAR-2022-0829-0656, pp. 6-7]

29 See 2023 U.S. Electric Vehicle Consideration (EVC) Study | J.D. Power (jdpower.com).

30 See Democrats should be wary of banning gas vehicles | The Hill.

31 See Most Americans Are Not Completely Sold on Electric Vehicles (gallup.com).

32 See 47 percent in new poll say it's unlikely they would buy EV | EPIC (uchicago.edu); 47 percent in new poll say it's unlikely they would buy EV | The Hill.

33 See EV Divide Grows in U.S. as More New-Vehicle Shoppers Dig in Their Heels on Internal Combustion | J.D. Power (jdpower.com); 22% of Americans Never Want To Own an Electric Vehicle | GOBankingRates.

Now, some of these polls focused on Americans generally versus on prospective new vehicle shoppers. But they raise real concerns that EPA must consider when setting standards designed to achieve continuous emission improvements that maximize, not inhibit, fleet turnover. [EPA-HQ-OAR-2022-0829-0656, pp. 6-7]

Now, some of these polls focused on Americans generally versus on prospective new vehicle shoppers. But they raise real concerns that EPA must consider when setting standards designed to achieve continuous emission improvements that maximize, not inhibit, fleet turnover. [EPA-HQ-OAR-2022-0829-0656, pp. 6-7]

1. EPA's Use of a Cost-of-Ownership Payback Analysis Is Flawed and Problematic.

EPA correctly acknowledges that under its proposed standards "the average purchase price of vehicles is estimated to be higher," which it attributes to an anticipated larger share of EVs in the market. However, its assertion that lower EV operating costs and IRA purchase incentives will offset these higher up-front costs is unsound.34 As NADA has explained previously, for most prospective new vehicle purchasers, using a total cost of ownership (TCO) "payback" cost/benefit analysis is flawed and problematic for several reasons. [EPA-HQ-OAR-2022-0829-0656, pp. 7-8]

34 88 Fed. Reg. at 29201, 29328-29, 29344, 29364.

First, consumers shopping for vehicles with better fuel economy35 must be willing and able to pay for it. As noted above, 67 percent of Americans presently cannot afford any new vehicle. And of the 33 percent who can, high interest rates are driving many of them out of the market. NADA takes issue with EPA's projections that its proposal will result in only a small change in total new light-duty vehicle sales and no change in new medium-duty vehicle sales. NADA's projections differ significantly, showing vehicle sales declines corresponding with the higher vehicle costs attributable to EPA's proposed standards. [EPA-HQ-OAR-2022-0829-0656, pp. 7-8]

35 For at least two practical reasons, improved fuel economy performance is a surrogate for better emissions performance. First, strategies for improving a vehicle's fuel economy often result in improved emissions performance, especially with respect to GHGs. Second, while some prospective purchasers seek

and are willing to pay for improved fuel economy performance, few seek and are willing to pay for improved emissions performance.

Second, consumer demand for fuel efficiency fluctuates with fuel prices. Prospective purchasers form expectations of the net present value of future fuel savings that are related, but not closely related, to a standardized financial calculation.36 During dramatic upward fuel price swings followed by heavy media coverage, consumers place a large value on fuel economy, as revealed by shifts in demand to more fuel-efficient segments of the market. But during slow and steady increases in the price of liquid fuels with little or no media attention, consumer demand reveals a diminished value for fuel economy. [EPA-HQ-OAR-2022-0829-0656, pp. 7-8]

36 See Exhibit B, Walton & Drake, Willingness to Pay for MY 2025 Fuel Economy Mandates: Government Estimates v. Economic Reality, February 2012.

Third, a consumer's willingness to purchase improved fuel economy must be viewed in the context of other vehicle attributes. When assessing the value of fuel economy improvements to prospective purchasers, the financial benefits of future fuel savings cannot be separated from the utility lost by necessary reductions to other vehicle qualities and performance. A study released earlier this year examined the tradeoff between fuel economy and vehicle performance in connection with NHTSA's most recent round of fuel economy mandates.37 It found evidence that consumers and OEMs undervalued fuel economy compared to the predictions of a rational-choice model. However, it also found that fuel economy mandates resulted in foregone performance, upon which consumers placed a value approximately equal to that of any fuel-savings benefits resulting from the standards. And it found that models attempting to assess the new vehicle buying public's willingness to purchase fuel economy, without controlling for performance tradeoffs, likely suffered from omitted variables bias. [EPA-HQ-OAR-2022-0829-0656, p. 8]

37 Leard, Linn, Zhou; How Much Do Consumers Value Fuel Economy and Performance? Evidence from Technology Adoption, The Review of Economics and Statistics (2023); 105(1), 158-74.

EPA assumes that consumers value any fuel savings associated with new vehicle purchases over a 30-month period (at most) but suggests erroneously that there is no consensus regarding how consumers value fuel efficiency. EPA also made no real attempt to assess how new light-duty vehicle consumers actually value emissions reduction/fuel economy technology when making purchase decisions.38 Instead, EPA made reference to a so-called "energy efficiency gap" and asserted that the issue will become less relevant as the share of EVs in the market increases.39 But the aforementioned study suggests that the proper approach for setting fuel economy mandates designed to maximize the achievement of regulatory objectives is to control for consumer willingness to purchase changes in both a vehicle's performance and fuel economy. EPA's failure to do so undermines its ability to set emissions reduction mandates premised on realistic and accurate conclusions. [EPA-HQ-OAR-2022-0829-0656, p. 8]

38 88 Fed. Reg. at 29370, 29397.

39 88 Fed. Reg. at 29397.

Organization: National Parks Conservation Association (NPCA)

The historic passage of the Bipartisan Infrastructure Law and Inflation Reduction Act underscores the immense public investment now available for ZEVs and associated infrastructure. This public support is being further met with significant private investment from manufacturers and associated entities, while interest in EVs and ZEVs at the individual consumer level is expanding year after year. For instance, more than a quarter million battery-electric vehicles were sold in the first quarter of 2023 alone — a nearly 45% increase over the same period last year.17 Unlike past EPA efforts that may have relied on expected future improvements in technologies, EVs and ZEVs are here now and are growing as a share of the LDV and MDV market. While ZEV technology will continue to improve and evolve, a rapid transition to ZEVs is already the clear option when it comes to the on-road vehicle technology that achieves the greatest degree of emission reductions. [EPA-HQ-OAR-2022-0829-0607, p. 4]

17 Cox Automotive, Another Record Broken: Q1 Electric Vehicle Sales Surpass 250,000, as EV Market Share in the U.S. Jumps to 7.2% of Total Sales (Apr. 12, 2023), https://www.coxautoinc.com/market-insights/q1-2023-ev-sales/.

Organization: Nebraska Corn Board (NCB) and Nebraska Corn Growers Association

Expecting rural Americans who have a lower median income than those in urban areas to pay $10,000 -$20,000 for an electric vehicle is out of touch and does not benefit the consumers. Today, out of the 267 million light-duty vehicles on the road only 1% of them are battery-powered. As we have seen post-pandemic, legacy vehicles are becoming more common as consumers are holding onto their car longer and are going further in mileage. [EPA-HQ-OAR-2022-0829-0583, pp. 1-2]

Organization: Nissan North America, Inc.

Nissan appreciates the Administration's focus on and support for advancing electrification and carbon neutrality and shares the same long-term goal of transitioning to zero emission vehicle society. However, Nissan believes that market realities, infrastructure needs, consumer impacts, and lack of battery critical mineral availability necessitate an adjustment of the GHG standard stringency in this rulemaking timeframe. [EPA-HQ-OAR-2022-0829-0594, p. 1]

Beyond the significant market and governmental challenges posed by such a drastic implementation timeline, consumer adoption will be critical to success. Consumer adoption of EVs has historically lagged behind expectations, leaving a significant hurdle to encourage a large and swift shift to EVs. Consumers need to be convinced not only of the appeal, safety, affordability, and reliability of EVs themselves, but they need to adopt the necessary community and home charging equipment to facilitate their use. Consumers will need to adapt their trip planning and driving behavior to allow for vehicle charging needs. The only way to drive these significant behavioral changes is to assure consumers that charging infrastructure is available and reliable. This is simply not a reality today and is unlikely to be a reality in time to drive such a significant shift within the timeline of the Proposed Multi-Pollutant Rule. These challenges are magnified due to the unclear and uncertain benefits under the Inflation Reduction Act, which place significant limitations on EV consumer incentive programs and charging infrastructure programs. Moreover, many consumers are reluctant or unable to purchase EVs due to their significant price premium. The Proposed Multi-Pollutant Rule will only exacerbate these inequalities, with EV prices likely to increase even more due to extreme investments required by all market sectors involved. Driving too much change too quickly will shut out many communities who need clean vehicles the most. It will likely force consumers who are uncertain about ZEV adoption to continue to operate aging ICE vehicles much longer. This is contrary to the intent of the proposal. [EPA-HQ-OAR-2022-0829-0594, p. 5]

Organization: Paul Bonifas and Tim Considine

Moreover, the EPA claims unrealistically low residential electricity charging rates while simultaneously admitting that low-income households won't have access to, nor be able to afford installation of, residential charging ports. The EPA admits that low-income households will have to rely on commercial charging ports that cost 2-3 times more3, yet they don't consider this in their net impact calculations. The EPA's rule will have a negative impact on the entire population but will disproportionately negatively impact the poorest Americans. Correcting for these EPA oversights leads to a more realistic fuel "savings" of NEGATIVE $108 billion, a $998 billion cost increase from the EPA's calculations. [EPA-HQ-OAR-2022-0829-0551, pp. 2-3]

3 Page 601 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Organization: Plug In America

2. EPA requests comments on data, methods, and perspectives on the role of fuel consumption in the vehicle purchase decision. [EPA-HQ-OAR-2022-0829-0625, p. 2]

Plug In America conducts an annual survey of thousands of EV drivers across the United States.4 Our research shows that EV drivers consistently rank "cost savings" as one of the most important considerations for EV purchases. A full report of this survey can be found on Plug In America's Website. [EPA-HQ-OAR-2022-0829-0625, p. 2]

4 https://pluginamerica.org/survey/.

Organization: POET, LLC

F. Plug-in Hybrid Electric FFVs (PHEV FFVs) Provide a Key Compliance Solution that Must be Incentivized.

EPA has recognized the need to incentivize emerging technologies under its vehicle GHG program. With the proper incentives, PHEVs can rapidly scale up to dramatically reduce GHGs while providing consumer friendly fuel flexibility to adjust low carbon fuel choices to market conditions. For instance, a PHEV FFV allows consumers to maximize the bioethanol blend used in a vehicle or rely more heavily on the vehicle battery, depending on the varying costs and availability of biofuels, electricity, and electric charging infrastructure. [EPA-HQ-OAR-2022-0829-0609, pp. 19-20]

Various technical analyses show that bioethanol flex-fuel paired with hybrid electric technology can reduce lifecycle emissions just as effectively as comparable BEVs.64 At a minimum, PHEVs provide a supplemental means to meeting the Proposed Rule's significant GHG reduction targets. [EPA-HQ-OAR-2022-0829-0609, pp. 19-20]

64 See ePure, New research confirms important role for renewable ethanol in reducing car emissions (September 1, 2022), finding that "plug-in hybrid vehicles running on E85 ethanol blend are at least as climate-friendly as battery electric vehicles," available at https://www.epure.org/press-release/new-research-confirms-important-role-for- renewable-ethanol-in-reducing-car-emissions/. See also, Mueller and

Unnasch, High Octane Low Carbon Fuels: The Bridge to Improve Both Gasoline and Electric Vehicles (March 22, 2021), p. 1, available at https://erc.uic.edu/wp-content/uploads/sites/633/2021/03/UIC-Marginal-EV-HOF-Analysis-DRAFT- 3_22_2021_UPDATE.pdf. Here, this Mueller and Unnasch study found that "High octane fuel vehicles with ethanol provide very similar GHG savings compared to EVs (within 5 gCO2e/MJ of each other) for many states" and "E85 and HOF-plug-in hybrids are the lowest GHG emitting technology as these vehicles are both able to take advantage of the low carbon intensity of ethanol in their combustion engine and the low carbon intensity of the electricity grid in hybrid mode of operation."

The Proposed Rule correctly explains, "PHEVs may help provide a bridge for consumers that may not be ready to adopt a fully electric vehicle."65 The Proposed Rule specifically "requests comment on the types of PHEVs EPA could consider in our analysis for the final rulemaking."66 The same emissions credit for FFVs discussed above (e.g., the 0.15 Volumetric Conversion factor or a comparable incentive based on the real-world lifecycle benefits of bioethanol) could apply to PHEV FFVs for that portion of those hybrid vehicles that operate on bioethanol E85, MLEBs, or other higher-level ethanol blends. [EPA-HQ-OAR-2022-0829-0609, pp. 19-20]

65 See 88 Fed. Reg. at 29298.

66 Id.

EPA also assumes that customers will prefer BEVs over conventional ICE vehicles without sufficient support or much analysis into the many different factors that affect consumer choices apart from just the costs of BEVs compared to conventional ICE vehicles.101 [EPA-HQ-OAR-2022-0829-0609, p. 24]

101 Id. at 8.

EPA's vehicle GHG program is unlike most EPA programs that rely on manufacturers or other industry participants being directly regulated (under command and control regulations) or undertaking certain actions in response to a price imposed on industry. The success of EPA's vehicle GHG program ultimately depends on the willingness of consumers to buy vehicles. The Proposed Rule cites an EPA and national lab study purporting to support EPA's expansive "anticipation" of two-thirds of new car purchasers suddenly going electric, but this report EPA cites also states that the "experiences of current PEV adopters . . . do not fully reveal the mechanisms that will lead to large scale PEV adoption" and "access in the United States" to PEVs is "low in general."102 Similarly, EPA relies on an ICCT modeling regarding projections of consumer demand but that ICCT report states that "it does not account for . . . barriers such as lead time for vehicle manufacturing and charging infrastructure development."103 The ICCT report further states "should battery prices not decline as predicted or consumer acceptance of electric vehicles stalls, our forecasts could be overly optimistic."104 Those reports EPA relies on in the Proposed Rule in fact undermine EPA's overly optimistic projections about BEV adoption in the United States. [EPA-HQ-OAR-2022-0829-0609, p. 24]

102 See 88 Fed. Reg. at 29342, n. 744, citing Jackman et al, Jackman, D K, K S Fujita, H C Yang, and M Taylor. Literature Review of U.S. Consumer Acceptance of New Personally Owned Light Duty Plug-in Electric Vehicles (2023), and pages 52, 54 within that report.

103 See 88 Fed. Reg. at 29346, footnote 761, citing ICCT, "Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the US," and the Executive summary, p. iii, in that ICCT report.

104 ICCT report, supra, at 17.

OnLocation also identifies factual issues that call into question the robustness of EPA's assumptions regarding future EV penetration rates. For instance, EPA's projections of BEV sales are almost nine times higher than those of EIA.122 EPA may also be making overly optimistic assumptions regarding battery manufacturing capacity and domestic lithium production.123 [EPA-HQ-OAR-2022-0829-0609, p. 27]

122 Id. at 2.

123 Id.

Consumer acceptance of BEVs is another important issue related to BEV penetration with or without the Proposed Rule. U.S. EPA discusses consumer acceptance of BEVs at length in Chapter 4.1 of the DRIA and purports to perform a sensitivity analysis of its assumptions in that regard using two cases it labels as "faster BEV acceptance" and "slower BEV acceptance). In describing the faster acceptance case U.S. EPA states (DRIA Chapter 4.1.3): [EPA-HQ-OAR-2022-0829-0609, pp. 60-61]

We acknowledge, however, that a very rapid transition to electric vehicles may be underway as appears to be reflected in the popular media. In a Faster BEV Acceptance case, BEV acceptance could rise very quickly and exceed acceptance of ICE vehicles by orders of magnitude. For sedans and wagons this could mean that within just a few years BEV acceptance will match that of an ICE vehicle. In fact, recent evidence suggest that BEVs may already be preferred all else equal. [EPA-HQ-OAR-2022-0829-0609, pp. 60-61]

In contrast, in describing the slower adoption case U.S. EPA states (DRIA Chapter 4.1.3):

Though we believe it to be very unlikely given the thoroughness of the Central case and evidence of BEV acceptance discussed throughout this chapter, we acknowledge that BEV acceptance may be slower than characterized in the Central case. [EPA-HQ-OAR-2022-0829-0609, pp. 60-61]

And

…acceptance begins to grow less rapidly in the early to mid-2030's, roughly coincident with the expiration of the IRA produce and consumer incentives. [EPA-HQ-OAR-2022-0829-0609, pp. 60-61]

The results of the consumer acceptance "sensitivity analysis" on BEV penetration are presented in Chapter 13 of the DRIA. The results relevant to the proposed standards for the combined light-duty fleet (passenger cars and trucks) are shown in DRIA Tables 13-49, 13-73, 13-110, 13,-111, 13-114, and 13-115. Under the faster acceptance case, MY 2032 incremental vehicle costs drop from $1,164 to $712 and BEV penetration increases from 67 to 75%. Under the slower acceptance case, MY 2032 incremental costs increase from $1,164 to $1,498 and BEV penetration is actually increased from 67% to 68%. Perhaps not surprisingly given the descriptions of the two cases, U.S. EPA's sensitivity analysis concludes that regardless of consumer acceptance of BEVs, BEV penetration, at least in MY 2032 will be equal to or higher than that forecast for the Proposed Rule. A reasonable conclusion is that U.S. EPA has assumed, without proper support, that consumers will prefer BEVs to conventional ICE vehicles and as a result failed to perform a meaningful sensitivity analysis of consumer acceptance. [EPA-HQ-OAR-2022-0829-0609, pp. 60-61]

Organization: RV Industry Association (RVIA)

RVIA strongly opposes EPA's overreaching proposed rule for the reasons discussed below and requests the agency exclude motor homes from having to comply with the proposed medium- duty vehicle standards. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

In contradiction to this NPRM, the EPA has already proposed, in the Phase 3 GHG rule (see 88 FR 25996), to establish standards for motor homes that correctly acknowledge the reality that motor homes are not well-suited for electrification. Under the proposed Phase 3 GHG rules, the EPA would establish a CO2 standard of 226 g/mi for MY2027 and later motor homes. As discussed in the Phase 3 GHG NPRM, the agency has proposed this standard given the negative implications of electrifying the motor home chassis. To power a motor home, the batteries would take up space that is otherwise necessary for housing the various elements of a motor home. It would also add significant amounts of weight to the motor home making it no longer capable of being equipped with the components typically found in a motor home. It makes no difference whether a motor home falls under the MD/HD Phase 3 GHG rules or the LD/MD rules, the issues are the same. Standards which can only be met by battery-powered vehicles are not practicable for motor homes. EPA staff who authored the Phase 3 GHG rule have acknowledged this. In establishing standards for medium-duty vehicles within this rule, staff need to be consistent and exclude motor homes from standards that would force them to be electrified. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Motor homes are often operated in locations where there is no electricity. This is known as "boondocking." Frequently, motor homes will be operated for weeks at a time at such locations. When motor homes are operated in a boondocking scenario, there is no possibility of EV charging. Electrification simply does not work for this operating use case. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Unlike medium-duty vehicles that might be conveniently recharged overnight, motor homes are routinely driven 500 miles or more a day making it necessary to fully recharge mid-trip. A multi- hour charging event is simply not something the typical motor home driver would find acceptable. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Motor homes are typically a discretionary purchase by families who tend to be very cost sensitive. Large increases in price for a vehicle that is operated on average only 20 days per year and that travels on average only 4,000 miles will not be viewed favorably by potential buyers. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

The ability to recoup higher vehicle costs through refueling savings is minimal given motor homes are driven sparingly by their owners. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

If finalized, EPA's rule will severely limit the use and affordability of motor homes. As a result, it will severely hurt motor home manufacturers, dealers, their employees and their families. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Regarding the certification of medium-duty motor homes powered by internal combustion engines, as well as vehicles used to tow RVs, RVIA supports the concerns raised by the Alliance for Automotive Innovation in its comment letter. Such concerns include: [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

• EPA's proposed rule is neither reasonable nor achievable in the timeframe provided.

• EPA's proposed rule is a de facto battery electric vehicle mandate.

• EPA outstrips Biden administration's own 50 percent light-duty electrification executive order from 2021.

• EPA underestimates battery costs and makes unrealistic battery electric vehicle (BEV) sales assumptions.

• EPA makes no concurrent requirements to support the infrastructure and battery critical minerals for the required EVs or the drivers that must buy them. [EPA-HQ-OAR-2022-0829-0629, pp. 1-2]

Organization: Senator Shelley Moore Capito et al.

Perhaps the most conspicuous flaw that will leap out to the American public is that these proposed actions were taken with complete disregard to consumer choice or affordability. In addition to potentially lacking access to charging at home, work, or public charging stations, consumers looking to purchase a new car may be unable to purchase these vehicles due to the higher purchase price or lack of availability. Today, the average purchase price of EV cars in 2022 was approximately $65,000-which is more than what 46 percent of American households earn in income in a year.8 Adding demand to the grid amid the confluence of other EPA regulations referenced above will drive up the cost of electricity, making powering these vehicles less affordable and undermining the EPA' s claims of savings for consumers that ignore or understate the increase in vehicle and energy prices. Taken together, the erosion of choice and affordability of vehicles will have profound impacts on how American families run errands, get to school, commute to work, and recreate. Additionally, there are serious concerns about the range of electric vehicles and the performance in rural areas of the country, where people may have to drive much longer distances to reach a charger, especially in locations where cold weather can impact the range the vehicle can drive. [EPA-HQ-OAR-2022-0829-5083, p. 3]

8 See Kelley Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1%, and all United States Household Income Percentiles, DQYDJ.

Organization: South Coast Air Quality Management District

3. Set a minimum range for ZEVs. ACC II requires a minimum certification range of 200 miles for zero emission vehicles. This is to ensure that new ZEVs will provide useful EV miles to meet the everyday needs of consumers, which will lead to higher acceptance and uses, and greater reductions of emissions from on-road vehicles. This range is also easily achievable with technologies that are currently available. We concur with the need for a minimum range requirement and recommend a similar range limit for the proposed rule. Setting a 200-mile range minimum threshold will prevent manufacturers from producing ZEVs with limited ranges simply for the sake of compliance with State and federal regulations, including the Corporate Average Fuel Economy (CAFÉ) standards. [EPA-HQ-OAR-2022-0829-0659, p. 3]

Organization: South Dakota Department of Agriculture and Natural Resources (DANR)

Electric Vehicle Battery and Range Limitations

South Dakota is a large state with significant driving distance between many of our communities. Although several new electrical vehicles indicate they have a 200 mile or greater range (note - it is 224 miles one way from Pierre to Sioux Falls), a recent study shows electric vehicles (EVs) do not consistently achieve EPA's range estimates. In addition, all batteries degrade over time. Reports indicate EV vehicle batteries will degrade between 10 and 40 percent over a 10-year life span. To maintain the battery's life, manufactures recommend batteries are not frequently depleted below 10 percent capacity or charged above 90 percent capacity. This means that an electrical vehicle should be limited to 80 percent of its capacity range to maintain the battery's life. In addition, cold, hot, and windy weather conditions may reduce an EV vehicle's range between 20 to 40 percent and may further impact the reliability of EV. South Dakota is known to have cold and windy winters and hot and windy summers, which, with current EV ranges, batteries conditions, and availability of charging stations, makes widespread use of EVs impractical in South Dakota. [EPA-HQ-OAR-2022-0829-0523, p. 2]

Cost

EPA acknowledges the cost of an electrical vehicle will be greater than a gasoline powered vehicle but justifies the additional expense by stating the "purchase price could be reduced by any state and federal purchase incentives available to consumers. Under the Inflation Reduction Act, consumers are eligible for up to $7,500 for the purchase of an electric vehicle." DANR disagrees with EPAs efforts to use the proposed emissions standards and incentives to force consumers into purchasing vehicles that may not meet their actual driving needs or budget. In fact, EPA's approach along with the cost of EVs may encourage South Dakota car owners to hold on to their older, less efficient vehicles in perpetuity to avoid purchasing a vehicle that will not meet their driving needs. The proposed rules may also encourage a person to own more than one vehicle to meet their actual needs. [EPA-HQ-OAR-2022-0829-0523, pp. 2-3]

Organization: Specialty Equipment Market Association (SEMA)

Vehicle Choice and Cost for Consumers

The EPA’s multipollutant proposal flies in the face of consumers having the freedom to purchase the vehicles that best suit their personal needs and those of their family. The EPA’s rush to further limit tailpipe emissions in the U.S. will cause great economic harm to many consumers across the country. According to an April 2023 report from Kelley Blue Book, the average cost of a BEV is $58,000, which is over 20% more than the average cost of a non-BEV.8 The average cost of a BEV outpaces the median salary in 2022 in the United States of $54,132 as reported by the Bureau of Labor Statistics.9 In addition to the increased up-front costs to consumers to purchase a BEV, J.D. Power reported that approximately 28 million American homeowners must spend on average an additional $1,300 to install at home chargers, putting additional financial burden on American consumers.10 [EPA-HQ-OAR-2022-0829-0596, pp. 4-5]

8 Kelley Blue Book: New-Vehicle Transaction Prices Trend Downward as Incentives Rise (Link: https://mediaroom.kbb.com/2023-03-08-New-Vehicle-Transaction-Prices-Trend-Downward-as-Incentives-Rise%2C-According-to-Kelley-Blue-Book).

9 First Republic: How Much Does the Average American Make in 2022? (Link: https://www.firstrepublic.com/insights-education/how-much-does-the-average-american-

make#%3A%7E%3Atext%3DAccording%20to%20the%20U.S.%20Bureau%2Cwould%20equal%20%2454%2C132%20a%20year).

10 J.D. Power: What Does an EV Home Charger Cost? (Link: https://www.jdpower.com/cars/shopping-guides/what-does-an-ev-home-charger-cost#%3A%7E%3Atext%3DPrices%20for%20these%20home%20EV%20chargers%20range%20from%2Can%20independent%20seller%2C%20can%20charge%20any%20new%20EV).

Despite 8.5% of new vehicles sold are BEV currently, a May 2023 report from J.D. Power found that 21% of consumers are very unlikely to consider purchasing a BEV due to issues such as price, range, and limited charging availability.11 SEMA questions the presumption that this rulemaking will result in the lofty goal that 67% of new vehicles sold will be BEVs in 2032 given the many legitimate concerns that American consumers have surrounding BEVs and the tradeoffs of owning these vehicles. [EPA-HQ-OAR-2022-0829-0596, pp. 4-5]

11 J.D. Power: EV Divide Grows in U.S. as More New-Vehicle Shoppers Dig in Their Heels on Internal Combustion (Link: https://www.jdpower.com/business/resources/ev-divide-grows-us-more-new-vehicle-shoppers-dig-their-heels-internal-combustion).

Organization: Stellantis

Electrification Rates Misaligned to Market and Exceed Commitments

Stellantis fully supports comments submitted through The Alliance for Automotive Innovation (AAI or the Auto Innovators) detailing the challenges associated with EPA's overly optimistic expectation for EV market growth. Stellantis remains steadfast to delivering on our commitments to achieve an electrified future, and we acknowledge EPA's efforts with this rulemaking to help support this difficult yet critical transition. However, the proposed rule significantly underestimates the actions needed to build the targeted EV market. Addressing concerns such as manufacturing capacity, battery production, charging infrastructure, and consumer acceptance of EVs will be paramount to the success of this ambitious proposed regulation. [EPA-HQ-OAR-2022-0829-0678, pp. 2-3]

Organization: Steven G. Bradbury

EPA's notices of proposed rulemaking (NPRMs) discuss the possibility of alternative adjustments to its proposed emissions limits for different pollutants, but those alternatives fall within a narrow band above and below EPA's proposed levels. They do not encompass any true alternative approaches, and they do not even leave room for automakers to rely on the various different powertrain modalities that consumers have shown a greater willingness to embrace, such as hybrid vehicle technologies and bio-fuel options, to achieve improved environmental performance. [EPA-HQ-OAR-2022-0829-0647, p. 3]

Where does EPA purport to find this authority in the Clean Air Act?

The logic is as follows:

Because most automakers have announced ambitious timetables for transitioning to the production of EVs going forward and have pledged to make large capital investments to finance this gradual switchover,13 and because Congress has recently approved generous federal subsidies for some EV purchases and charging infrastructure,14 EPA says it can now declare that battery-electric vehicle technology is a “feasible” alternative to the tradi- tional internal-combustion engine (ICE) powertrain.15 And on that basis, EPA is proposing to treat EVs as an available “control technology” for achieving compliance with the tailpipe emissions restrictions under Clean Air Act section 202.16 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

13 See 88 FR at 29191, Figure 1 (reproducing a chart prepared by the Environmental Defense Fund depicting the automakers’ announced goals for future electrified vehicle sales as a percentage of total sales); id. at 29193-94 (summarizing automakers’ announced plans for investments in EV technology).

14 See id. at 29195-96; Infrastructure Investment and Jobs Act, Public Law 117–58, 135 Stat. 429 (2021), https://www.congress.gov/117/plaws/publ58/PLAW117publ58.pdf; Inflation Reduction Act of 2022, Public Law 117–169, 136 Stat. 1818 (2022), https://www.congress.gov/117/bills/hr5376/BILLS117hr5376enr.pdf.

15 See 88 FR at 29194 (light-duty and medium-duty vehicles); 88 FR at 25972 (heavy-duty trucks).

16 See 88 FR at 29284 (for light-duty and medium-duty vehicles); 88 FR at 26015 (for heavy-duty trucks).

This reasoning obviously depends on a kind of feedback loop. The automakers are pledging to invest in the transition to EVs because governments around the world—like China, the EU, the Biden White House, and Governor Gavin Newsom and his climate regulators in California—are demanding that they do so. But everyone knows there is a large looming impediment to this Green Dream: resistance from American consumers. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

The American public is not jumping on the electric bandwagon. EVs are expensive— beyond the reach of many American families—and most Americans remain skeptical that EVs will reliably serve the full range of their needs, that quick and convenient charging stations will be widely available, that EVs will maintain their promised driving range over time or in cold weather, that they will have any significant resale or trade-in value down the road, and that insurance carriers will cover the huge costs of battery replacement when the battery wears out or is damaged in a minor accident.17 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

17 See Nick Carey, Paul Lienert, and Sarah McFarlane, “Scratched EV battery? Your insurer may have to junk the whole car,” Reuters, March 20, 2023, https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk-whole-car-2023-03-20/ (“For many elec- tric vehicles, there is no way to repair or assess even slightly damaged battery packs after accidents, forcing insurance companies to write off cars with few miles—leading to higher premiums and under-cutting gains from going electric.”).

To push the automakers to convert to EV production in the absence of sufficient mar- ket demand, EPA plans to ratchet down the emissions limits for carbon dioxide and for the traditional criteria and other pollutants associated with smog (such as unburned hydrocar- bons, particulate matter, oxides of nitrogen, and ozone) to super-stringent levels that are technologically impossible for gas-powered vehicles (even hybrids) to satisfy.18 At the same time, EPA is proposing to phase out certain regulatory buffers that allow automakers to report better emissions compliance results, such as “off-cycle credits” for the addition of onboard technologies that improve the fuel efficiency of ICE vehicles.19 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

18 See, e.g., 88 FR at 29237-38; id. at 29257-61.

19 See id. at 29249-50.

The automakers' only recourse will be to replace more and more of the ICE vehicles in their fleets (including hybrids) with the "alternative control technology" of battery-electric vehicles. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

And here is the trick: For enforcement purposes, EPA applies the emissions limits to each automaker on a fleetwide average basis, and it proposes to reduce these fleetwide averages dramatically each model year from 2027 through 2032 on a ramp rate calculated to achieve the Biden administration's desired percentage mix of EVs in the U.S. auto fleets. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

In other words, EPA is now proposing to set fleetwide average tailpipe pollution limits that are intended by design to apply increasingly over time to vehicles that have no tailpipes and that EPA says emit none of the pollutants covered by the regulations.20 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

20 Automakers can avoid violating the average emissions limits in certain circumstances with regulatory "credits," earned by producing vehicles, like EVs, that outperform the limits. Under the EPA's rules, credits can be "banked" from one model year to another within limits, "transferred" from one fleet to another (for example, from the automaker's light truck fleet to its passenger car fleet), or "traded" between automakers, which usually involves a privately negotiated purchase. Tesla, which manufactures nothing but EVs and accounts for approximately 70 percent of the U.S. EV market, receives a large portion of its income from selling emissions credits to the other automakers. Predictably, the EPA is proposing to retain this credit system to continue the subsidization of EV manufacturing. See 88 FR at 26245-46.

The 39-40 percent no-action baseline also assumes that American car buyers will suddenly drop their resistance to EVs. In effect, EPA is banking on a near-term future in which market demand for the new fleet of EVs will be just as high as it currently is for the most popular brands of ICE and hybrid vehicles, like the Ford F-150 pickup, the Chevy Silverado pickup, or the Toyota Camry. That assumption is highly suspect: the average price of an EV today is $61,000 (24 percent higher than the average ICE vehicle),30 and EVs come with limitations and question marks that concern many buyers.31 EPA is untroubled; it casually predicts that the price of EVs will fall and buyer demand will rise greatly in the years ahead, assumptions that are critical to EPA's ability to minimize the true cost effects of its proposals. [EPA-HQ-OAR-2022-0829-0647, p. 12]

30 See https://www.kbb.com/car-news/average-new-car-price-tops-49500/.

31 For example, reports suggest that some electric pickups may have a greatly reduced effective range when towing heavy loads—a limitation likely to be of concern to prospective pickup buyers. See https://www.motortrend.com/reviews/ford-f150-lightning-electric-truck-towing-test/.

In the real world of the marketplace, the automakers cannot manage the huge capital costs of EPA's assumed production switchover to battery-electric technology unless con- sumer demand for EVs is strong. Without sufficient market demand, at levels far more robust than currently seen, the effective costs of these rules will be much higher than EPA recognizes and will not be sustainable for the automakers. It is not always true that "if you build it, they will come"—just ask Facebook about the Metaverse. [EPA-HQ-OAR-2022-0829-0647, p. 12]

EPA also undercounts the cost of electricity charging over the life of the EV. EPA relies on a pricing model that claims to show that electricity prices will somehow not rise significantly in a world where EVs comprise more than half of new cars sold in the U.S., but that claim is wholly unrealistic. Even absent high EV penetration, the Bureau of Labor Statistics reports that electricity prices are steadily rising in the U.S.38 Increased EV charging demand will only cause those prices to rise even faster. Driving a single EV 15,000 miles per year and charging it at home could raise the annual electricity bill for the average family by 50 percent or more.39 If the nation converts to EV ownership at the rates EPA is aiming for, such a large increase in overall electricity demand will inevitably cause electricity rates to rise significantly. [EPA-HQ-OAR-2022-0829-0647, pp. 14-15]

38 See generally https://data.bls.gov/pdq/SurveyOutputServlet (allowing user to generate graph showing the rise from 2003 to the present in the average price of electricity in the U.S.).

39 The Energy Information Agency reports that the average American household uses about 886 kilowatt hours of electricity per month, https://www.eia.gov/tools/faqs/faq.php, and the EPA says the average EV consumes 36 kilowatt hours of electricity per every 100 miles driven, https://www.epa.gov/greenvehicles/comparison-your-car-vs-electric-vehicle. If the family's EV is driven 15,000 miles per year, or 1,250 miles per month, it would consume 450 kilowatt hours of electricity every month.

The EPA's glib premise that car buyers in the U.S. will respond with strong demand for the supposed flood of future EVs (notwithstanding the practical concerns, cost consid- erations, and other uncertainties that surround EVs in the minds of American consumers), is typical of the consistently rosy—almost relentlessly rosy—assumptions about cost factors and consequential risks that underlie all parts of EPA's supporting analysis. [EPA-HQ-OAR-2022-0829-0647, pp. 14-15]

EPA fails to consider the negative societal consequences and second-order cost effects of its proposals. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

In putting forward regulatory proposals designed to force upon the American people a vast and rapid industrial transformation, EPA has an obligation to go further than just considering the direct cost effects of its proposals (which are themselves woefully under- estimated, as highlighted above); it must also consider the broader indirect economic con- sequences and negative societal costs that would follow if these rules are finalized as pro- posed. So far in these rulemakings, the Agency has either ignored or deliberately down- played these second-order effects. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

Some of the most consequential burdens and negative ramifications of the proposed rules that EPA hides, disregards, or minimizes include the following: [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Stifling consumer choice at the dealership. Many of the vehicle models most pop- ular with American families will no longer be sustainable under the EPA's proposed rules. Automobiles have long been America's favorite freedom machines. When the models of ICE vehicles Americans love the most disappear from dealerships, that will represent an enormous drop in consumer welfare (in basic happiness and well- being) for the average American family and for the U.S. economy as a whole. For many of these ICE vehicle models, there is no EV option likely to be available that could provide the same performance, utility, or recreational value at a comparable price (or at all). EPA makes no real effort to quantify this generational loss of consumer welfare. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Increasing the purchase price of all new vehicles. Notwithstanding EPA's gaming of the numbers, the true costs of the industrial transformation forced by the EPA's proposed rules will be spread across the automakers' fleets, resulting in a significant increase in the prices of all new vehicles, with greater price increases concentrated on those vehicles for which the demand is highest relative to supply. All Americans will be harmed by these price increases, but the biggest losers will be lower-income Americans who cannot afford to buy an EV or to pay more for a gas-powered vehicle at the dealership, as well as those who live in rural areas and need to drive longer distances and for whom EVs are impractical. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Destroying jobs in the U.S. auto industry. The loss of popular new vehicle options and the significant price increases at the dealership will mean that fewer new vehicles will be purchased—almost certainly far fewer than EPA is predicting. This drop-off in demand will challenge the profitability of the auto industry and lead to a loss of jobs for tens of thousands of America's autoworkers, as well as a loss of jobs in the many U.S. companies that supply inputs for the production of auto- mobiles and heavy trucks.40 The United Auto Workers union has warned of the potential for job losses from the transition to EVs,41 as automakers announce more plant closures and layoffs due to the costs of electrification.42 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

40 See Technality, "Ford Just Proved How Far Ahead Tesla Really Is: Profitability May Continue to Be a Struggle for All Legacy Automakers," May 10, 2023, https://medium.com/tech-topics/ford-just-proved-how-far-ahead-tesla-really-is-6a4d95cff519 ("Despite wanting to be a fully-electric brand by 2035, as of Q4 2022, Ford's average net margin on the Mustang Mach-E was -40.4%. Unfortunately, that's a figure that's only gotten worse since, to the point where Ford is now losing an average of $58,000 for every EV sold.").

41 See Press statement, United Auto Workers, "UAW Statement on Job Cuts at Stellantis," April 26, 2023, https://uaw.org/uaw-statement-job-cuts-stellantis.

42 See Michael Wayland, "Stellantis to indefinitely idle Jeep plant, lay off workers to cut costs for EVs," CNBC.com, December 9, 2022, https://www.cnbc.com/2022/12/09/stellantis-to-idle-jeep-plant-lay-off-workers-to-cut-costs-for-evs.html.

• Causing more deaths and serious injuries on America's highways. As new vehicle models become unaffordable or unappealing, many American families will be left driving older and older used cars, and the age of the nation's auto fleet will rise dramatically. Already, the average age of a car on the road in the United States is approaching 13 years, and many cars are on their fifth or sixth owners. The aging of the American fleet has very negative safety consequences, as NHTSA statistics show that older vehicles are much less safe than newer models in an accident.43 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

43 See https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/newer-cars-safer-cars_fact-sheet_010320-tag.pdf.

If U.S. consumers do not embrace EVs as quickly and enthusiastically as the EPA assumes they will, or if even one of the EPA's other overly optimistic assumptions comes a cropper, the consequences of these rules will be catastrophic—for America's industrial base, our nation's workforce, and the safety and wellbeing of Americans, particularly medium- and lower-income Americans. [EPA-HQ-OAR-2022-0829-0647, p. 21]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

Also, we think that willingness to pay is the correct question to ask regarding PHEV cost. As long as there is consumer demand, some car and truck makers will target this market. That consumers pay very high prices for luxury vehicles today illustrates this point. A Strong PHEV especially offers many compelling benefits to consumers even if they are priced higher than a BEV. [EPA-HQ-OAR-2022-0829-0646, p. 22]

The experience of the last fifteen years has shown that many residential and commercial users of vehicles will first adopt a PHEV instead of a BEV. In addition, we believe that long range PHEVs are a no-regrets solution for EPA to encourage in the long term. In other words, uncertainty in speed of adoption of battery EVs and fuel cell EVs, especially by fast followers and late adopters, requires agencies such as EPA to be fuel and technology neutral in their regulations. Including in the rule additional alternatives such as Strong PHEVs results in a faster path to a net zero carbon future.25 [EPA-HQ-OAR-2022-0829-0646, p. 25]

25 Bistline, J.E.T., Blanford, G., Grant, J., Knipping, E., McCollum, D. L., Nopmongcol, H.S., Shah, T., and Yarwood, G. (2022). Economy-wide evaluation of CO2 and air quality impacts of electrification in the United States. Nature communications, 13, 6693, https://doi.org/10.1038/s41467-022-33902-9

Strong PHEVs provide the flexibility that is key to convincing the hard-to-convince individuals and fleets to adopt advanced technology. Many consumers for political or personal reasons are very skeptical about BEVs and FCEVs, but we have found that Strong PHEVs appeal to them. [EPA-HQ-OAR-2022-0829-0646, p. 28]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

Almost three-quarters of vehicles sold are previously owned cars.7 In 2022, the last year for which complete data on used car sales are available, Americans bought 36 million used cars8 and 14 million new cars.9 But people do not want to buy used electric vehicles, because it is difficult to evaluate how long the battery will last. Replacing an EV battery can cost anywhere from $5,000 to $20,000.10 The poor and middle class will suffer most from higher prices for used vehicles, because they cannot afford the new electric vehicles. EPA has not fully discussed the effects on the used car market. [EPA-HQ-OAR-2022-0829-0674, p. 3]

7 Mathilde Carlier, Statista, New and Used Light Vehicle Sales in the United States, 2010 to 2021, https://www.statista.com/statistics/183713/value-of-us-passenger-cas-sales-and-leases-since-1990/ (accessed April 28, 2023).

8 C.J. Moore, Used Car Sales Hit Lowest In Decade, Automotive News,January 13, 2023, https://www.autonews.com/used-cars/used-car-volume-hits-lowest-mark-nearly-decade (accessed June 6, 2023).

9 Edmunds, 2023 Predictions: Edmunds Experts Forecast 14.8 Million New Vehicles Will Be Sold in New Year, https://www.edmunds.com/industry/press/2023-predictions-edmunds-experts-forecast-14-8-million-new-vehicles- will-be-sold-in-new-year.html (accessed June 6, 2023).

10 Recurrent, "Updated: Electric Car Battery Replacement Costs," March 26, 2023, https://www.recurrentauto.com/research/costs-ev-battery-replacement (accessed April 28, 2023).

Battery-powered vehicles lack sufficient range to satisfy some customers. Although 60 to 70 miles of range is enough for most trips, people buy cars for all circumstances, including vacations and cold weather. Moreover, batteries lose up to 40% of their range in cold climates.13

A study by Autocar14 shows that electric vehicles lose, on average, a third of their range in the winter, which reduces the typical 240-mile range to 160 miles. If a heat pump is added to the car, the loss is less, but still the 240-mile range would shrink to 180. The effects of the cold are not sufficiently accounted for by EPA. [EPA-HQ-OAR-2022-0829-0674, p. 4]

13 Ellen Edmonds, "Icy Temperatures Cut Electric Vehicle Range Nearly in Half," AAA News Room, February 7, 2019, https://newsroom.aaa.com/2019/02/cold-weather-reduces-electric-vehicle-range/ (accessed April 28, 2023).

14 Move Electric, "Electric Vehicle Range Test Reveals Up to 20% Drop in Winter," Autocar, March 17, 2022, https://www.autocar.co.uk/car-news/move-electric/electric-vehicle-range-test-reveals-20-drop-winter (accessed April 28, 2023).

Car results varied. The Fiat 500 42kWh Icon lost 40% of its range in the winter.15 The Ford Mustang Mach-E Extended Range RWD lost 35%, and the Porsche Taycan 4S Performance Battery Plus, with heat pump, lost 22% (the Taycan costs between $83,000 and $166,000).16 The loss of range in cold weather is one reason why, at the end of 2021, the latest full year available, North Dakota had 380 electric vehicle (EV) registrations, the fewest in the United States, according to the Energy Department.17 [EPA-HQ-OAR-2022-0829-0674, p. 4]

15 Ibid.

16 Ibid.

17 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Electric Vehicle Registrations by State Data Set, updated June 2022, https://afdc.energy.gov/data/10962 (accessed April 28, 2023).

In addition, if people choose not to buy the mandated electric vehicles, carmakers will have to reduce their prices and raise prices of popular pickup trucks and SUVs to stay profitable.27 Lower-income and Americans in rural areas will be paying more for their preferred vehicles, subsidizing better-off residents in cities and California, who are the main purchasers of electric vehicles. EPA does not account for this. [EPA-HQ-OAR-2022-0829-0674, p. 6]

27 For a detailed analysis, see Steve Bradbury, "Observation: Cliff Notes," Substack: Adespotoi, September 16, 2022, https://adespotoi.substack.com/p/observation-cliff-notes (accessed May 1, 2023).

Organization: Transfer Flow, Inc

Consumers are more likely to adopt near-zero technologies if given a menu of near-zero emission technologies to choose from. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

Many consumers disapprove of the government dictating which near-zero technologies they're allowed to utilize. Unfortunately, the EPA has not provided for a battery directive such as the UN has required setting sustainability requirements for batteries placed on the market, including responsible sourcing of raw materials, hazardous substances, carbon footprint, and measures to improve the collection, treatment, and recycling of these waste batteries ensuring materials recovery. Many concerned citizens do not support the human rights violations associated with mining cobalt, lithium, and other minerals required for battery manufacturing. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

A major concern for consumers is how they would charge an electric vehicle. For citizens living in apartment buildings or utilizing on-street parking, managing an electric vehicle would be inconvenient and challenging. The image below from Deloitte's 2022 Global Automotive Consumer Study17 illustrates consumer powertrain preferences for their next vehicle, which are not aligned with the EPA's proposed Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

17 https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Consumer-Business/us-2022-global-automotive-consumer-study-global-focus-final.pdf

[See original attachment for "Consumer powertrain preferences for their next vehicle"] [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

Electric Vehicles require the ramp-up of many new electricity-generating power plants to provide enough power to charge all the projected electric vehicles, and then those electricity-generating power plants must rely heavily on carbon capture technologies to keep the emissions from these electricity-generating power plants out of the atmosphere. Current carbon capture technologies are experimental and may prove dangerous.22 [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

22 https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f

In many places, such as rural environments or for use in utility vehicles, electric vehicles are not a practical solution. Utility companies working on phone lines, power lines, and performing construction work all need reliable power sources that can be used for transporting people and powering equipment, as well as function when the electric power grid may be in need of repair. Electric vehicles do not have a network in remote areas or the energy density to effectively transport and power auxiliary equipment needed to, among other functions, install or perform repairs to electric power lines. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

Pacific Gas and Electric (PG&E), two years after the historical Dixie Fire, is still powering affected Californians with diesel-powered generators as the infrastructure required to bring electricity into homes has still not been rebuilt. Citizens living in these affected areas would need to charge electric vehicles using electricity created from diesel generators, and the logistics of that simply do not make sense. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

For a myriad of reasons, people may be hesitant to adopt electric vehicle technology. Near-zero technologies are going to be more agreeably adopted if consumers feel they have a choice of which near-zero technology works best for them. In Northern California, many citizens affected by various wildfires still harbor animosity towards PG&E for negligently causing various wildfires that have ruined thousands of people's lives. In 2020 PG&E pled guilty to 84 counts of manslaughter for starting the historically devastating Camp Fire.23 Many citizens affected by these wildfires don't want electric vehicles because they don't believe they can trust PG&E. Not encouraging a choice of which near-zero technology consumers choose to implement runs the risk of having the opposite intended effect. Consumers will likely choose to hold on to their old, dirtier vehicles, defeating the intended purpose. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

23 https://www.nytimes.com/2020/06/16/business/energy-environment/pge-camp-fire-california-wildfires.html

Organization: Valero Energy Corporation

Further, EPA does not consider the impact of charger performance and consumer experience on consumer acceptance of electric vehicles. A report by the National Renewable Energy Laboratory (NREL) on electric vehicle charging infrastructure development notes that “This analysis envisions a future national charging network that is strategic in locating the right amount of charging, in the right locations, with appropriate charging speeds. However, this vision is irrelevant if the public concludes that charging infrastructure is ultimately unreliable. Even if a relatively small amount of infrastructure fails drivers, this could negatively impact the public’s perception of electric mobility.”153 There is good reason for NREL to raise this concern. A national survey of 26,500 charging attempts at Level 2 and Level 3 public stations found that 20% failed to obtain a charge.154 Common reasons for failure included software glitches, payment processing errors, and vandalism. In 75% of the failures, the charger was out of service. [EPA-HQ-OAR-2022-0829-0707, p. 31]

Footnoet 153: Id.

154 Hannah Lutz, “Negative Charge: One in Five Charging Attempts Failed in 2022, JD Power Data Shows,” Automotive News, February 13, 2023.

This type of consumer frustration may cause drivers who initially purchase electric vehicles to return to ICE vehicles, a phenomenon known as “discontinuance.” For example, a 2021 UC Davis study found that approximately 20% of California drivers who bought a BEV between 2023 and 2018 replaced that vehicle with an ICE vehicle. Seventy percent of those drivers cited lack of access to charging infrastructure as a basis for their decision.155 [EPA-HQ-OAR-2022-0829-0707, p. 31]

155 Hardmand, S., Tal, G.”Understanding discontinuance among California’s electric vehicle owners.” Nature Energy 6, 538-545 (2021). https://doi.org/10.1038/s41560-021-00814-9

Despite these indications that both the availability and the performance of charging stations may be a significant impact on consumers’ willingness to purchase or to keep EVs, EPA does not consider the limitations of charging infrastructure in determining that the proposed rule is feasible. [EPA-HQ-OAR-2022-0829-0707, p. 31]

I. EPA fails to adequately consider the environmental justice impacts of the proposed rule.

Disadvantaged communities already face significant access barriers to electric vehicles, such as: higher upfront costs to electric vehicle ownership; a lack of existing charging infrastructure available to them in low-income, minority populated, and rural areas; and costlier and time-intensive charging due to a greater reliance on public charging infrastructure, particularly for individuals living in multi-family housing. [EPA-HQ-OAR-2022-0829-0707, p. 55]

EPA’s EJ analysis must be thorough and inclusive of factors that may impact the price of transported goods, such as ZEV affordability, the availability of public charging, reasonable charging practices, and a lifecycle analysis of electric vehicles and power generation emissions. Without doing so, EPA runs the risk of intensifying price disparities and access to transport relative to the baseline for EJ communities. EPA’s EJ analysis must be thorough and inclusive of electric vehicle affordability, the availability of public charging, reasonable charging practices, and a lifecycle analysis of electric vehicles and power generation emissions. Without doing so, EPA runs the risk of intensifying price disparities and access to transport relative to the baseline for EJ communities. These impacts can be both quantitatively and qualitatively characterized.300 EPA's silence on these disparities is especially worrisome given EPA's prior binding commitments to EJ analysis for the benefit of disadvantaged and low-income communities. [EPA-HQ-OAR-2022-0829-0707, p. 55]

300 See, i.e., supra.

To date, the target electric vehicle customer base for OEMs consists of "mostly male, high-income, highly educated, homeowners, who have multiple vehicles in their household and have access to charging at home."301 Additionally, according to the U.S. Department of Transportation (DOT), "the rate of EV adoption in rural areas is roughly 40% lower than it is in urban areas, and EV charging infrastructure expansion has mostly been concentrated in cities and along major highways".302As a result, electric vehicle ownership remains primarily concentrated in affluent, large metropolitan and urban areas.303 By contrast, the supporting electricity generation necessary to support EPA's proposal is predominantly located in more remote, rural regions that are geographically isolated from urban centers. [EPA-HQ-OAR-2022-0829-0707, pp. 55-56]

301 Scott Hardman*, Kelly L. Fleming, Eesha Khare, and Mahmoud M. Ramadan, A perspective on equity in the transition to electric vehicles, MIT SCIENCE POLICY REVIEW (Aug. 30, 2021) available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/.

302 U.S. Department of Transportation, Community Benefits of Rural Vehicle Electrification (last updated February 2, 2022), available at https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/community- benefits.

303 See, i.e., Shuocheng Guo, Eleftheria Kontou, Disparities and equity issues in electric vehicles rebate allocation, Energy Policy, Volume 154, 2021, 112291, ISSN 0301-4215, available at https://doi.org/10.1016/j.enpol.2021.112291.

EPA's proposal directly impacts EJ communities by contributing to additional, local emissions to meet electric vehicle charging demand. Consequently, in theory, EJ communities incur an incremental burden in exchange for the subsidization of electric vehicles for more affluent consumers. And this subsidy occurs at expense of our most vulnerable communities burdened by emissions as a direct result of the proposal, with no corresponding benefit, since electric vehicles are likely to remain concentrated in affluent areas. Further, these communities remain unable to afford EPA's chosen mode of transport and are particularly vulnerable to rising electricity costs. [EPA-HQ-OAR-2022-0829-0707, pp. 55-56]

Notwithstanding EPA's hope that its proposal may serve to incentivize the purchases of electric vehicles, these vehicles are significantly more expensive on average than their ICE vehicle counterparts and unaffordable for many households. These are costs are also likely understated as each electric vehicle already enjoys thousands of dollars' worth of Federal and state subsidies, which are ultimately funded by taxpayers. Additionally, an automakers' ability to sell electric vehicles to consumers depends on substantial price subsidies in the form of credit support. EPA ignores the reality that many EJ stakeholders are currently unable to afford the upfront costs of purchasing an electric vehicle in the first place. With the cost of transition minerals expected to escalate exponentially in the coming years as a function of limited supply and increasing demand, the costs to manufacture and purchase electric vehicles will likely rise. [EPA-HQ-OAR-2022-0829-0707, p. 56]

EPA should also consider the effects of the proposal on electricity prices, as low-income populations often spend a larger percentage of their earnings on essential utilities compared to the rest of the United States. Reliance on electric vehicles has been shown to spur increases in load and demand during peak periods, which impact electricity prices. Because EPA lacks expertise in the area of electrical grid management and economics, EPA should consult with other agencies and credible experts in these areas in order to adequately evaluate these impacts.304 EPA should ensure that the proposal meets reliability and affordability criteria and helps EJ communities make informed decisions about their own energy needs. Additionally, EPA's EJ assessment fails to acknowledge the likelihood that many owners will lack access to residential charging, which will substantially increase their operating expenses. Consistent reliance on fast charging also shortens electric vehicle battery life, resulting in a need to replace the battery and/or the vehicle more frequently. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

304 See, West Virginia, 142 S.Ct. at 2612-13 (stating that EPA admitted that opining on trends in electricity transmission, distribution, and storage requires technical and policy expertise not traditionally needed in EPA regulatory development and finding that there is little reason to think Congress assigned such decisions to the EPA).

If EJ is truly a commitment for EPA, it should carefully consider criticisms like those leveled by The Two Hundred, which point out the disproportionate impacts to working and minority communities as a result of California's climate approach regarding electrified transport; those impacts and concerns remain true, and indeed are magnified under the proposed standards.305 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

305 See Plaintiffs' Complaint, The Two Hundred for Homeownership, et al. v. California Air Resources Board, et al., No. 1:22-CV-01474.

It is critical from the outset to design standards to minimize the potential for price shocks and supply disruptions. As written, the proposal ultimately benefits electric vehicle manufacturers at the expense of disadvantaged communities by subsidizing unaffordable transportation that is not fit for the purposes of commuting to and from EJ communities. At minimum, EPA should perform a thorough EJ assessment specific to its LDV proposal that is comprehensive of both transport challenges and impacts faced by EJ stakeholders and the government-wide Justice40 Initiative. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

The average purchase price of EV cars in 2022 was approximately $65,000, which is more than what 46 percent of American households earn in income in a year.306 While the average "used" EV sold for $42,895 in March of 2023.307 While EPA's DRIA anecdotally indicates that "emerging consensus suggests that purchase price parity is likely to occur by the mid-2020's for some vehicle segments and models"308, Ford CEO Jim Farley told attendees at its 2023 Capital Markets Days that EV cost parity may not come until after 2030.309 Moreover US auto makers are focusing their efforts on producing higher priced electric SUVs and trucks, including Fords $100,000 F150 Lightening Platinum310 and GM's announcement that its luxury brands, Cadillac and Buick, will be its first all-electric product lineups.311 While smaller EV's like the Chevy Bolt, touted by the Biden Administration as being affordable alternatives, are being discontinued.312 The reality is that most middle- and lower-income families simply cannot afford to purchase a new or used EV, even when taking into account available tax incentives and rebates. In fact, middle – and lower -income families are more likely to purchase older used vehicle, due to their lower upfront costs, and to hold onto those vehicles for longer periods.313 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

306 Kelly Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1% and all United States Household Income Percentiles, DQYJD

307 What to know about buying a used electric vehicle as more hit the auto sale market, CNBC, May 21, 2023

308 EPA DRIA, 3.1.3.1, 4-15

309 Ford CEO says EV cost parity may not come until after 2030, Reuters, May 31, 2023

310 https://www.ford.com/trucks/f150/f150-lightning/models/

311 Cadillac and Buick will be GM's first all-EV brands, Automotive News, July 1, 2022

312 GM Killed the Chevy Bolt- and the dream of a small, affordable EV, The Verge, April 26, 2023

313 Supporting Lower-Income Households' Purchase of Clean Vehicles: Implications From California-wide Survey Results, UCLA Luskin Center for Innovation, 2020

Organization: Volvo Car Corporation (VCC) (DONE)

In addition, it is also uncertain how complimentary US policies (infrastructure, utility capacity, consumer incentives etc.) could impact consumer demand. [EPA-HQ-OAR-2022-0829-0624, p. 2]

Organization: Western Energy Alliance (DONE in readiness memo and in advantages and disadvantages)

Technical Infeasibility and Impracticalities for Consumers: EPA uses flawed analysis about the technical feasibility of the rule, but the behavior aspects are also seriously deficient. There is little evidence that EVs are being accepted by consumers other than a small niche of high-end, wealthy individuals who can afford to purchase an expensive vehicle with limited range.11 Given the long refueling times and battery drain when operating the heater or air conditioning, only those who can afford a second or third vehicle for exclusive use in-town are currently purchasing EVs. There has been no evidence to date that these problems of limited range and functionality will be overcome soon to achieve the high market penetration EPA hopes with this rule. [EPA-HQ-OAR-2022-0829-0679, p. 6]

11 The Energy Information Administration (EIA) shows that 2/3 of households with EVs have incomes over $100,000. Electrified vehicles continue to see slow growth and less use than conventional vehicles, EIA, May 2018

EPA's assertion is simply not supported by facts:

"The year-over-year growth in U.S. PEV sales suggests that an increasing share of new vehicle buyers are concluding that a PEV is the best vehicle to meet their needs. Many of the zero-emission vehicles already on the market today cost less to operate than ICE vehicles, offer improved performance and handling, have a driving range similar to that of ICE vehicles, and can be charged at a growing network of public chargers as well as at home." (p. 29189) [EPA-HQ-OAR-2022-0829-0679, p. 6]

At only 5.8% of new vehicle sales, EVs has a long way to go to meet the targets EPA is setting of 67%, a more than ten-fold increase that is a far goal from the "increasing share of new vehicle buyers…" Further, asserting that the range is similar to an ICEV is preposterous, especially in anything less than the most favorable mild weather conditions, as EVs lose range in cold and hot weather.12 [EPA-HQ-OAR-2022-0829-0679, p. 6]

12 Winter & Cold Weather EV Range Loss in 7,000 Cars, Recurrent, December 12, 2022.

Organization: Wisconsin Automobile and Truck Dealers Association

The EPA also cites trends showing an increased demand for the EV product. What the EPA does not recognize is huge increases in trends are easy to show when the starting point is single digit percentages. The EPA does not recognize that many families show interest in adding an EV to their household, not forsaking ICE vehicles all together. Consumers recognize that the network will take over a decade to build out. The desired and necessary ranges and convenience can currently only be met by ICE vehicles. Yet the EPA is comfortable in driving the price of both ICE and EV technology to the point of completely unaffordable. The Midwest consumer will be forced to drive their ICE vehicle beyond the average of 12 years, and/or purchase an EV that will not be able to keep their family warm in the winter, achieve the necessary range in the winter, and overwhelm an electrical grid that Northern Wisconsin will not be able upgrade due to numerous reasons. [EPA-HQ-OAR-2022-0829-0494, pp. 1-2]

Organization: Zero Emission Transportation Association (ZETA)

2. There is Strong Consumer Demand for EVs

American consumers are quickly becoming accustomed to EVs, and demand is rising rapidly as EVs become more ubiquitous. From 2020 to 2022, Consumer Reports found there was a 350% increase in consumer demand for EVs.5 A similar ZETA poll found that 71% of Americans are considering an electric vehicle for their next car.6 The best-selling vehicle worldwide in the first quarter of 2023 was Tesla’s Model Y, an all-electric SUV.7 In the U.S., Tesla's Model 3 was ranked 10th for overall vehicle sales, and the Model Y came in 4th–behind the top-3 vehicles which were all pickup trucks.8 [EPA-HQ-OAR-2022-0829-0638, p. 6]

5 “Excess Demand - The Looming EV Shortage,” Consumer Reports, (March 2023) https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf

6 “New National Poll Shows That A Large, Bipartisan Majority of Voters Favor Policies To Accelerate Electric Vehicle Adoption,” ZETA, (March 28, 2022) https://www.zeta2030.org/news/new-national-poll-shows-that-a-large-bipartisan-majority-of-voters-favor-policies-to-accelerate-electric-vehicle-adoption

7 “Tesla Model Y Was The World's Best-Selling Car In Q1 2023,” Motor1, (May 25, 2023) accessed June 18, 2023 https://www.motor1.com/news/669135/tesla-model-y-worlds-best-selling-car-q1-2023/

8 “The 25 Bestselling Cars, Trucks, and SUVs of 2023 (So Far),” Car and Driver, (April 10, 2023) https://www.caranddriver.com/news/g43553191/bestselling-cars-2023/

This strong interest in EVs is expected to continue to grow throughout 2023, with more than two million EVs sold in the first quarter of this year. IEA expects more than 14 million EVs will be sold globally this year, which would comprise 18% of total passenger vehicle sales.9 In fact, demand for EVs is expected to exceed supply at the current trajectory. Consumer Reports found there are 45 buyers for every EV produced.10 Today, EV demand is driven by factors that include cost-savings, environmental protection, increasing model availability, and the ability of an EV to meet a driver’s day-to-day needs. The adoption of more stringent emissions standards would incentivize the production of more EVs to meet growing consumer demand while also spurring innovation and increased model availability to meet the needs of an increasingly wider range of consumers. [EPA-HQ-OAR-2022-0829-0638, p. 6]

9 “Demand for electric cars is booming, with sales expected to leap 35% this year after a record-breaking 2022,” IEA, (April 26, 2023) https://www.iea.org/news/demand-for-electric-cars-is-booming-with-sales-expected-to-leap-35-this-year-after-a-reco rd-breaking-2022

10 Id. at footnote 5

a. Consumers Prefer to Drive EVs

One of the easiest ways to convert drivers to an EV is to get them behind the wheel of one. EVs have faster acceleration, are a quieter ride, and have a low center of gravity making for a safer and more enjoyable drive.11 As a result, performance is the most frequently cited reason (75%) among drivers who switched to a premium EV. 12 According to J.D. Power, the Rivian R1T ranks highest overall among premium EVs, with a satisfaction score of 794 out of 1,000-points. In particular, owners are pleased with the R1T’s driving performance and style.13 [EPA-HQ-OAR-2022-0829-0638, pp. 6-7]

11 “Top 5 Reasons to Drive Electric,” California Air Resource Board, accessed June 30, 2023 https://driveclean.ca.gov/top-reasons

12 “Owner Satisfaction Gets a Jolt from New Models as Electric Vehicle Market Grows, J.D. Power Finds,” J.D. Power, (February 28, 2023) https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-experience-evx-ownership-study

13 Id. at footnote 12

A study by AAA found that once drivers own an EV, their previously held concerns (e.g., range anxiety, cost, lack of charging) largely disappear. For example, 77% said they had little to no range anxiety after owning an EV.14 This underscores that many of the commonly-cited barriers to EV adoption can be addressed through experience and education. [EPA-HQ-OAR-2022-0829-0638, pp. 6-7]

14 “Owning an Electric Vehicle is the Cure for Most Consumer Concerns,” AAA Newsroom, (January 22, 2020) https://newsroom.aaa.com/2020/01/aaa-owning-an-electric-vehicle-is-the-cure-for-most-consumer-concerns/

In addition to vehicle owners who purchase an EV for personal use, there are a growing number of rideshare operators purchasing or renting EVs. These drivers travel significantly more miles than a typical American, which is on average 40 miles a day.15 Additionally, they have expressed satisfaction with the EV driving experience. Because of the greater distance traveled, rideshare drivers stand to see the greatest fuel and maintenance cost savings. In fact, cost savings were the number one reason ride-share drivers adopted an EV. Not only have EV drivers seen higher earnings, but 94% of drivers have reported a positive experience with their EV,16 and up to 93% of them would choose an EV as their next vehicle according to a survey of Uber drivers.17 Among drivers who do not currently use an EV, more than 60% would switch to an EV.18 [EPA-HQ-OAR-2022-0829-0638, pp. 6-7]

15 “Average Miles Driven Per Year: Why It Is Important,” Kelley Blue Book, (May 15, 2023) https://www.kbb.com/car-advice/average-miles-driven-per-year

16 “Equitable Electrification: Early Findings from the Uber-Hertz Partnership,” Uber Under the Hood, (September 15, 2022) https://medium.com/uber-under-the-hood/equitable-electrification-early-findings-from-the-uber-hertz-partnership-27 74b6f39d9b

17 “How Uber helps drivers go electric,” Uber Under the Hood, (August 29, 2022) https://medium.com/uber-under-the-hood/how-uber-helps-drivers-go-electric-9e637b69f4de

18 Id. at footnote 17

Many consumers prefer to purchase American-made products and vehicles are no exception. Fortunately, some of the top-selling EVs are made in America. In fact, the top two vehicles on Cars.com American Made Index are the Tesla Model Y and Model 3, with the Model X and Model S coming in 5th and 6th place, respectively.19 With increasing domestic production requirements tied to the EV tax credit in the IRA, more EVs will be manufactured in America. Automakers have already announced new EV factories across the country, with new models such as the Rivian R1T, Lucid Air, Ford’s F-150 Lightning, Polestar 3, and Volkswagen ID.4 being produced in the U.S. [EPA-HQ-OAR-2022-0829-0638, pp. 7-8]

19 “2023 Cars.com American-Made Index: Which Cars Are the Most American?,” Cars.com, (June 21, 2023) https://www.cars.com/articles/2023-cars-com-american-made-index-which-cars-are-the-most-american-467465/

Another reason the EV market is growing is simply because consumers prefer the new features and technology in EVs. An article published in June 2023 from Inside Climate News indicated that while some people buy an EV on principle, the rapid rise in sales is poised to continue because consumers like the features that EVs offer.20 This includes features such as longer battery ranges, faster acceleration, lower total cost of ownership, and that EVs have a higher ride quality than comparable ICEV. As more features are added and technology of EVs improves, more consumers are likely to switch just based on those facts, independent of the environmental or climate change incentive to do so. This indicates that the EV market is broadening to a wider consumer base, which further amplifies the trend of greater adoption among consumers that the market is currently experiencing. [EPA-HQ-OAR-2022-0829-0638, pp. 7-8]

20 “It’s the Features, Stupid: EV Market Share Is Growing Because the Vehicles Keep Getting Better,” Inside Climate News, (June 8, 2023) https://insideclimatenews.org/news/08062023/inside-clean-energy-electric-vehicle-market-features/

b. EV Sales are Increasing

Consumer demand for EVs has grown exponentially over the last few years and so too have EV sales. Global passenger EV sales jumped from 1 million in 2017 to over 10 million in 2022. In the first half of the decade, it took the same amount of time for sales to grow from 100,000 to 1 million.27 This is because Consumer demand is increasing, and will continue to do so as more and more models for all different use cases are offered. [EPA-HQ-OAR-2022-0829-0638, p. 9]

27 “Global EV Outlook 2023: Trends in electric light-duty vehicles,” IEA, (2023) https://www.iea.org/reports/global-ev-outlook-2023/trends-in-electric-light-duty-vehicles

In California, EVs comprised more than 21% of new car sales in the first quarter of 2023.28 Much of the growth in the electric vehicle stock has occurred over the last few years, with nearly 10% of all EVs sold in the U.S. occurring in the first quarter of 2023. The U.S. is on pace to sell over 1 million EVs this year.29 The more than 300,000 EVs sold in Q1 is nearly equivalent to the total number sold in the entirety of 2020. Figure 1 depicts the exponential growth in EV sales since 2011. [EPA-HQ-OAR-2022-0829-0638, p. 9]

28 “Record-Shattering EV Sales Continue in Q1 2023 as California Reaches the 1.5 Million EVs Sold Milestone Two Years Ahead of Schedule,” Veloz, (April 21, 2023) https://www.veloz.org/record-shattering-ev-sales-continue-california-reaches-1-5-million-evs-sold/

29 “Chart: EV sales on pace to break 1 million in US this year,” Canary Media, (April 21, 2023) https://www.canarymedia.com/articles/electric-vehicles/chart-ev-sales-on-pace-to-break-1-million-in-us-this-year

[See original comment for Figure 1: EV Sales in California and the U.S. as of April 2023] [EPA-HQ-OAR-2022-0829-0638, p. 9]

30 Id. at footnote 28

c. State Consumer Incentive Programs are Well-Utilized

In the United States, clear evidence exists that consumer incentives drive EV sales. The states with the greatest number of EV registration per thousand people were California, Hawaii, Washington, Oregon, Vermont, and Colorado.31 These states all have relatively generous state and local subsidies in addition to available federal subsidies. However, the surge in EV demand and uptick in applications for state rebates and incentives is leading several states to actually halt their programs due to overwhelming demand. It is evident that consumers are increasingly choosing an EV for their next vehicle, and policy development must keep pace. [EPA-HQ-OAR-2022-0829-0638, pp. 10-11]

31 “These 7 US states lead the nation in EV registrations,” Green Car Reports, (March 12, 2023) https://www.greencarreports.com/news/1138974_these-7-us-states-lead-the-nation-in-ev-registrations

New Jersey

Rebate programs like “Charge Up New Jersey” have contributed to the significant growth in EV sales in the Garden State. In May 2020, New Jersey began to offer a $5,000 rebate for EV purchases. Since then, annual EV sales increased by over 40% in 2020 from 2019, which was the highest growth rate in the nation.32 Over that period, Charge Up New Jersey has dispersed funding for more than 25,000 new EVs in the state. In total, there are more than 91,000 EVs on the roads of New Jersey.33 [EPA-HQ-OAR-2022-0829-0638, pp. 10-11]

32 “Annual Enacted EV Policies More Than Double Between 2015 and 2020,” Atlas EV Hub, (May 7, 2021) https://www.atlasevhub.com/data_story/annual-enacted-ev-policies-more-than-double-between-2015-and-2020/

33 “New Jersey halts electric vehicle rebates; demand too high,” Associated Press, (April 18, 2023) https://apnews.com/article/new-jersey-electric-vehicle-rebate-02c6965ef22f23ffc88fcc4f68857955

However, the program well exceeded expectations and the program was paused three months earlier than planned as it had already exceeded its $35 million annual budget after providing rebates to more than 10,000 New Jerseyans who qualified that year.34 [EPA-HQ-OAR-2022-0829-0638, pp. 10-11]

34 Id. at footnote 33

Oregon

A similar situation occurred in Oregon, as they paused the Oregon Clean Vehicle Rebate program in May of 2023. It surpassed its $15.5 million budget as the program became more popular than anticipated.35 Unless additional funding is provided by the state, the program will not be restarted until the next fiscal year begins March 2024. [EPA-HQ-OAR-2022-0829-0638, pp. 10-11]

35 "Oregon to temporarily suspend popular EV rebate program," OPB, (March 15, 2023) https://www.opb.org/article/2023/03/15/oregon-ev-rebate-program-electric-vehicles-environment-greenhouse-gas-e missions

Next year, the estimated program costs are over $33 million, more than doubling this year's budget.36 While the pause on the credit might be disappointing for EV purchasers in the state, it is a positive sign that EV adoption is growing and federal, state, and local policies need to adopt accordingly. [EPA-HQ-OAR-2022-0829-0638, pp. 10-11]

36 Id. at footnote 35

California

California leads the U.S. in EV sales with over 1 million full BEV registrations as of April 2023– making up 40% of the total US EV fleet. In the first quarter of 2023, EVs comprised 21.1% of all vehicle sales in the state.37 [EPA-HQ-OAR-2022-0829-0638, p. 11]

37 "New ZEV Sales in California," California Energy Commission, accessed June 28, 2023 https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev- sales

California's success in EV market share is partially due to their Clean Vehicle Rebate Project (CVRP), the first state incentive for EV purchasers. Since 2010, the program has provided more than 500,000 rebates.38 To cut costs, the program was modified to target more lower-income residents by setting income and MSRP caps. This was because the program was oversubscribed, with demand far exceeding the program's budget. Every year, CVRP's funding runs out, with a lengthy waitlist for when more funding becomes available.39 As of June 2023, there was more than $275 million in funding available for the CVRP program.40 [EPA-HQ-OAR-2022-0829-0638, p. 11]

38 "Why States Need Electric Vehicle Incentives Now," Center for Sustainable Energy, (March 27, 2023) https://energycenter.org/thought-leadership/blog/why-states-need-electric-vehicle-incentives-now

39 "California Electric Car Rebate: Everything You Need to Know," Car and Driver, accessed June 28, 2023 https://www.caranddriver.com/research/a31267652/california-ev-tax-credit/

40 "CVRP Overview," California Clean Vehicle Rebate Project, accessed June 30, 2023 https://cleanvehiclerebate.org/en/cvrp-info

e. EV Production and New Model Availability

EVs are now available in all light- and medium-duty classes, with many presenting owners with a favorable total cost of ownership today. That should be expected to further improve over the MY 2027-2032 time frame covered by these proposed emissions standards and continued innovation by industry will only increase product offerings and vehicle capabilities in the coming years. [EPA-HQ-OAR-2022-0829-0638, p. 70]

While EV manufacturing investments in the U.S. have been ramping up over the past decade, the passage of the BIL and IRA have supercharged investment. Before the passage of these bills, several automakers had already committed to electrify large portions or all of their vehicle offerings. These targets were in recognition of the need to meet environmental goals and a result of the market's movement towards EVs. As EPA notes in the proposed rule, several major automakers set ambitious goals for a 100% electrified fleet. To meet these targets, they have significantly expanded their EV model offerings alongside manufacturing capability. [EPA-HQ-OAR-2022-0829-0638, p. 70]

EPA Summary and Response

Many individuals and institutions spoke to the issues related to demand,[472] including consumer preferences and attitudes, purchase decision, and sales. The following, very general logical sequence applies to these comments. Many factors underpin preferences and attitudes. Preferences and attitudes drive the desire to consider and purchase a particular vehicle or set of vehicles. A purchase of a desired vehicle, or equivalently a sale, takes place if the desired vehicle is available and best matches a consumer's criteria. Comments also vary from general to specific. Some are descriptive and, when substantiated, are derived from survey results, sales statistics, sales projections, or some combination thereof. Some leverage assumed or demonstrated causal relationships (i.e., factors underpinning preferences and attitudes, purchase decision, and sales). We organize our responses to the content of these comments from general to specific, and as a consequence, address sales and market share and projections followed by survey-based comments and assertions about causal relationships.

Before we proceed with our response to demand-related comments, we make three overarching observations. First, as in RTC Chapter 13.1, we note that the vast majority of comments regarding demand relate to light-duty BEVs and PHEVs. A smaller number of demand-related comments address ICE and hybrid vehicles and medium-duty vehicles. This distribution of comments will be evident in the summary and response.

Second, public relations (PR) announcements, news media, and surveys (sometimes referred to as "stated preference"), sales and registration statistics which are direct measures of behavior (sometime referred to as "revealed preference"), and sales projections (often achieved through modeling of some sort) are all generally accepted forms of information or methods that inform this rulemaking. Each has well known advantages and disadvantages. Commenters have tended to focus on disadvantages. For example, people and organizations do not always behave in ways that are consistent with what they say. Historical sales and registration data for PEV adopters has been limited to a small percentage of households and small number of vehicles, and preferences are inferred from sales and registration statistics, not truly "revealed." Models are careful, simplified representations of systems; projections are not predictions. Each of these methods, however, has advantages, too. In response to comments that deride these methods and their applicability to this rulemaking, we note that EPA is mindful of the advantages and disadvantages of different types of information and methods. We integrate information from many sources, including data on PEV adopters, survey information from PEV adopters and non-PEV adopters, manufacturer announcements, public comments, known relationships between

[472] We employ a colloquial definition of "demand" that include preferences attitudes, quantity consumed, purchase behavior, and purchases.

factors underlying consumer purchase and use behaviors, and historical evidence regarding the uptake of technological advancements. EPA's analyses are rooted in the full body of relevant science, and we believe our findings are reasonable and robust as discussed in RIA Chapter 4.

Third, commenters perceive and frame information differently, even when the information is identical. For example, in EPA's review of PEV acceptance, we cite a UC Davis study in which roughly one in five PEV owners replaced their PEV with an ICE vehicle (Hardman & Tal, 2021). Some comments presented this information as evidence of low PEV acceptance and losses in future sales. In contrast, EPA's presentation of that information was positive. We observed 80% continuance under past circumstances that were far less favorable than what exists now and will exist in the future. Given, for example, the smaller number or vehicle models available at the time of the UC Davis study, the lower average range of PEVs during that time, the absence of the BIL and IRA incentives, and less expansive charging infrastructure during that timeframe – all of which are obstacles to PEV adoption and retention – an 80% continuance rate "reveals" a rather high level of consumer satisfaction with PEVs. PEV satisfaction (aka "approval" per (Jackman, Fujita, Yang, & Taylor, 2023)) is a key enabler of PEV adoption. Similarly, while some comments cite recent PEVs sales statistics to argue that EPA's PEV market share projections are "overly optimistic," Energy Innovation offers a very different interpretation. They note that "the U.S. hit an all-time high of EV sales" and proceed with a discussion of how the "U.S. has exceeded the 5 percent tipping point for EVs" and laud the "increasing EV ranges and overall improvement to performance" that "will continue the positive feedback loop … further accelerating adoption of EVs in this decade." Relatedly, some commenters, such as the American Free Enterprise Chamber of Commerce, suggest that EPA has inappropriately described historical growth in PEV production, number and diversity of PEV models, PEV sales, and/or PEV demand as "rapid" or some synonymous wording. While the definition of "rapid" and synonyms may be arguable, we have documented the mathematically exponential growth in PEV production, the number of PEV models, and PEV sales in the Preamble Section IV. Correspondingly, approval of PEVs have grown and are expected to continue to grow exponentially assuming that the number of PEVs that consumers want is at least equal to sales and may be higher if there is unmet demand or supply shortages.[473]

Non-PEV Demand

Several commenters highlight current and future demand for hybrid, PHEV, and ICE vehicles as well as the attributes of these vehicles. These commenters asserted that demand for these vehicles was not adequately reflected in the proposal. For example, Consumer Report states that "CRs's 2022 nationally representative car buying survey of 6,960 US adults found that 32% of consumers planning to purchase or lease a vehicle within a year were considering a hybrid car or truck…. EPA's modeling that shows that this popular and cost-effective technology will be completely abandoned by the entire market by the end of the decade is at odds with the data on consumer preferences for these vehicles." Some of these commenters also claimed that some attributes of ICE vehicles were superior to PEVs. For example, API states that "vehicles powered by internal combustion engines (ICE) offer outstanding drivability and reliability" in contrast to

[473] Relatedly, we apply Roger's (2003) diffusion of innovation framework in estimating future PEV acceptance and adoption. See RIA Chapter 4.1.2.2.2. In this framework, as observed for many technologies, early levels of technology adoption are often low and unpredictable, and also exponential, after which growth in adoption accelerates.

the "reliability issues" of EVs. Regarding comments that EVs are less reliable than ICE vehicles, we note that, as discussed in Chapter 4.3.7 of the RIA, and Section VIII.B.3 of the preamble, research indicates that maintenance and repair costs for PEVs is lower than that for ICE vehicles, and that when issues that may impact the reliability of PEVs arise, they are often covered under warranty and are often related to infotainment or other technology features and not with drivetrain or other major mechanical issues.[474] In response to these and similar comments, we repeat general responses from above. First, we have included PHEVs in our modeling for the FRM. Second, we have demonstrated multiple compliance pathways that include BEVs, PHEVs, hybrids, and ICE vehicles. Third, the standards are technology neutral. Via a logit formulation that includes generalized cost elements (e.g., repair and maintenance costs) and non-cost elements (e.g., perceptions of drivability and reliability) of purchase decisions, the consumer module of OMEGA estimates distributions of consumer purchase decisions across vehicle technologies. Critically, the non-cost elements of OMEGA's representation of vehicle choice include acceptance of different vehicle technologies. As discussed in RIA Chapter 4.1, our parameterization of PHEV acceptance is always lower than ICE vehicle acceptance, and BEV acceptance for sedans, wagons, SUVs, and CUVs is lower than ICE vehicle acceptance until 2030.

A notable subset of comments addressed consumer preferences for vehicle performance related to enrichment. EPA is not finalizing its proposal to limit enrichment, but instead will revisit this issue in a future rulemaking, as discussed in section 4.1.6 of this RTC.

PEV Demand

Regarding PEVs, some commenters assert that consumer demand for PEVs may not or will not be sufficient to match the EPA proposal's Central case estimates of new PEV sales in the 2027 to 2032 timeframe. For example, Stellantis describes EPA's "expectation for EV market growth" as "overly optimistic." American Honda Motor Co., Inc. calls it "a staggeringly optimistic assumption about the pace of technology transformation in the auto industry." Some commenters note historical PEV sales statistics, compare them to EPA's proposed Central case PEV penetrations, and conclude that EPA projections are implausible. They assert that EPA has incorrectly extrapolated current PEV market share (i.e., roughly 9 percent of new vehicle sales in the first quarter of 2023) to unreasonably high market shares for PEVs in 2027 and later. These arguments derive from a few lines of reasoning. Some commenters incorrectly characterize PEV market shares from the Central case as assumptions. Other commenters point to factors underlying demand such as vehicle attributes (e.g., range, purchase price), current and/or future system conditions (e.g., electric grid and EVSE availability, capacity, and reliability), and preferences, needs, and use cases or attributes of consumers or certain groups of consumers (e.g., long distance driving, towing, low income).

In response, first, we note that EPA is finalizing GHG standards that are less stringent than the proposal in the early years of the program to provide additional lead time for manufacturers, and thus, the pace of PEV penetration projected under the final standards is slower than that of the proposed standards. Second, EPA has not "assumed" growth in PEV adoption. Rather, we

[474] Clean Technica, "Adding Context to That Consumer Reports Electric Car Reliability Report", January 2024, https://cleantechnica.com/2023/12/03/adding-context-to-that-consumer-reports-electric-car-reliability-report/ and Green Cars, "Are Electric Cars More Reliable?", July 2023, https://www.greencars.com/expert-insights/are-electric-cars-more-reliable.

have estimated vehicle technology adoption using OMEGA. PEV adoption estimates are model outputs that follow from several modeling inputs, including acceptance, technology costs, and consumer costs. They also follow from the modeled interaction of producer and consumer decision making. See RIA Chapters 8.1, 8.2, and 8.3. Consumer acceptance of PEVs, a precursor of PEV adoption, is represented with shareweight parameters. The parameterization of consumer acceptance is supported by the scientific literature and consistent with third party estimates. See RIA Chapter 4.1. Acceptance parameters for PEVs increase but do not exceed ICE vehicle acceptance in any of the demonstrated compliance pathways except the Faster BEV Acceptance case. We received no comments that negatively assess our parameterization of BEV acceptance but did receive positive support for our parameterization of BEV acceptance (e.g., Jeremy Michalek et al.).

Many commenters, in addition to expressing concerns regarding insufficient demand, point to factors underlying negative or ambivalent attitudes toward PEVs, and therefore insufficient demand for and adoption thereof. In general, commenters attribute the factors limiting demand for PEVs to characteristics of consumers, attributes of vehicles and consumers' perceptions thereof, and market conditions. EPA conducted a thorough review of the scientific literature regarding consumer acceptance of new, light-duty plug-in electric vehicles in the United States and published primarily between 2016 and early 2022 (Jackman, Fujita, Yang, & Taylor, 2023). Based on the scientific literature, we developed a framework to define and evaluate PEV acceptance consisting of four stages – awareness, access, approval, and adoption. This framework facilitated identification of enablers of and obstacles to PEV acceptance among new, light-duty vehicle consumers in the U.S. attributable to consumer characteristics, attributes of vehicles, and market conditions.

The obstacles and corresponding enablers identified via EPA's review of the consumer acceptance literature encompasses the obstacles noted by commenters with few exceptions. Thus, we refer readers to this report and specifically to Figure 8 in Jackman et al. (2023), which provides a summary of enablers identified in the review. Note that PEV acceptance obstacles are the converse of the enablers appearing in Figure 8. Note also that the brevity of the figure relies upon combining concepts. For example, cold weather range is not explicitly shown in the Figure but is encapsulated in location, range, and driving performance enablers and obstacles. With this review in mind, there is significant overlap among the factors that commenters identify as influencing demand and the enablers identified in EPA's review of PEV acceptance, though commenters tend to frame them as obstacles (e.g., the inconvenience of inaccessible charging rather than the convenience of accessible charging). In other words, EPA agrees with commenters that many factors underly demand. EPA has identified the same or similar drivers of demand that commenters identify with few exceptions. A key exception relates to the small number of commenters who disagree with the conclusion that, as automakers have introduced and continue to introduce additional PEV models, the U.S. has and will continue to experience increasing PEV market shares. In response, we point to the evidence supporting the conclusion that the introduction of additional PEV models invites consumers who might not otherwise consider a PEV into the PEV market by virtue of satisfying consumers' non-compensatory, inflexible criteria (e.g., body style) with more than one powertrain (e.g., BEV, PHEV, hybrid, and/or ICE vehicle), which appears to be a more flexible criteria for consumers on average (Fujita, Yang, Taylor, & Jackman, 2022) (Taylor, Fujita, & Campbell, 2024). Forsythe et al. (2023), published in PNAS, show that "when consumers' basic demands for vehicle attributes are met, they accept or prefer BEVs to combustion vehicles." (EPA discusses this paper in further detail in RIA Chapter 4). Furthermore, and more generally, factors identified by commenters which do not appear in this review in some fashion, do not, in EPA's assessment, significantly affect consumer acceptance for PEVs. For example, a commenter's interest in the U.S. as a global policy leader does not significantly affect consumer acceptance of PEVs.

Some commenters challenge EPA's assessment that these enablers are present and growing and that these obstacles have been and are continuing to be fewer and less consequential to PEV adoption. In other words, these comments argue that, for example, charging infrastructure will not grow fast enough, the grid will not be reliable enough, supply chains will not be sufficiently robust, critical minerals will be scarce, or prices will be higher. In summary, some commenters argue that conditions will not be as we estimate in the Central case and will not support the PEV adoption projected in our Central case. In response to those comments, we refer readers to respective sections of the Preamble, RIA, and this RTC for the analyses of the many enablers of PEV acceptance (e.g., grid, infrastructure, battery technology, supply chain, critical minerals). Our conclusion from the most current and best science available, described in those sections, is that the enablers and obstacles of PEV acceptance have been and are likely to continue to evolve over time in a way that is consistent with our Central case representation of consumers' purchase decisions and resulting PEV market shares.

Many comments cite a variety of PEV advantages and disadvantages as impediments to adoption of PEVs, especially among mainstream consumers. In response, we do not agree or disagree uniformly with any of posed advantages or disadvantages. Rather we note that these advantages and disadvantages are not inherent to the vehicle. What is perceived as an advantage or disadvantage depends on the consumer (e.g., driver, household, and user) and on the context, which are heterogenous and dynamic. Thus, we also disagree with commenters who claim that BEVs are or will remain a niche market (e.g., Western Energy Alliance). We note that current PEV owners differ from non-PEV owners – e.g., higher income, technological affinity, pro-environmental – but they are diverse (i.e., not a monolith) and changing (Jackman, Fujita, Yang, & Taylor, 2023). In other words, PEV adopters are starting to look more and more like mainstream consumers and we expect this trend to accelerate as PEV adoption increases (Taylor, Fujita, & Campbell, 2024). In addition, a large number of non-PEV owners appear to be well-positioned and "ready" right now to add a PEV to their households. One study shows that many non-PEV owners share important enabling characteristics with PEV owners (Fujita, Campbell, & Taylor, 2024). This does not include all of the current non-PEV owners who will be drawn into the PEV market via PEVs on-going technological improvements, purchase incentives, exposure to PEVs, experience with PEVs, fuel savings, maintenance and repair savings, charging convenience, expanding infrastructure, increased productions, and more PEV model choices among other enablers.

Different from the evolution of PEV acceptance enablers are consumers' perceptions of themselves, vehicle capabilities, and context. For example, even when vehicle range, charging access, and charging speeds meet or exceed consumers' perceived needs, the "key apprehension" regarding "charging capabilities" that American Fuel & Petrochemical Manufacturers claims is present "for nearly half of the U.S. consumer market" may impede PEV adoption. In this case the key enablers support awareness, that is, exposure to and experience with PEVs and accurate information about PEV technology and the practical aspects of PEV ownership. Environmental and Public Health Organizations highlights the importance of awareness with regard to PEV acceptance in rural areas: “This concept could also shed light on one possible reason that PEV sales percentages have been unevenly distributed across the nation, with more sales in cities than rural areas, in a way that minimizes any concerns that rural consumers could have insufficient demand for PEVs. A 2023 survey conducted by the Union of Concerned Scientists and Consumer Reports ‘uncover[ed] that there isn’t sufficient familiarity with EVs in rural areas. The overwhelming majority of respondents—96%—has never owned or leased an EV.’ The survey found that only 6% of rural respondents said they were very familiar with the fundamentals of buying and owning an EV, while 30% said they were somewhat familiar, and concluded that ‘[o]ne of the reasons for this lack of familiarity could be the scarcity of EVs in rural areas: only 27% of rural dwellers have seen an EV in their neighborhood in the past month compared to more than half of urban dwellers, and even fewer have a friend, relative or co-worker who owns an EV. A whopping 90% of rural dwellers have never been a passenger in an EV, and almost nobody has ever driven one.’ As efforts are made to increase familiarity with PEVs in rural areas, more Americans will learn about the very real benefits and advantages of PEVs, especially for rural drivers …, and this “neighbor effect” will begin to take hold in more places.” EPA logically extends the argument made above to other areas and subpopulations where the primary obstacles to PEV adoption is awareness.

Other commenters indicate that demand for PEVs is very strong, will continue to grow, and perhaps surpass EPA estimates of PEV market penetration. For example, according to California Attorney General’s Office et al., “consumer demand for electric vehicles has significantly risen, in large part due to environmental concerns, greater vehicle choice, improved battery capacity, and cost savings.” Citing “the past decade of increasing EV ranges and overall improvements to performance as more models become available" Jeremy Michalek et al. compared EPA projections to their “empirical investigation of (1) past trends in consumer preferences and (2) expected technology trends.” They find that “large increases in consumer demand for BEVs in the near future is feasible…Mainstream consumer demand for BEVs is likely to sharply increase due to expected BEV technology improvements alone… BEV demand could grow high enough by 2030 so that BEVs become the majority of new passenger cars, and SUVs nearly the majority, through expected BEV technology improvements and equal availability of BEVs and conventional vehicles… These findings do not incorporate the reduced cost of maintenance and repair or the cost of at-home charger installation. If the net balance of these provides cost savings to consumers as the EPA predicts, then [Jeremy Michalek et al.] would expect consumer demand for BEVs would be even larger than predicted in their study.”

Consumer Reports (CR) describes a virtuous circle in which consumer demand for PEVs will continue to grow. “As automakers deliver more volume, economies of scale and intensified competition for customers will further feed cost declines, which will feed back into the cycle, and lead to increased EV demand.” Consumer Reports argues that we have already observed this effect. “This is because the barriers to EV adoption identified in CR’s 2022 survey of BEV and low carbon fuels awareness are being addressed: purchase cost for EVs is declining, charging infrastructure is expanding, consumers are gaining more experience with EVs, and automakers are investing in new models and increased production. These trends tend to reinforce one another in a virtuous cycle to create even more demand for these vehicles.” In response and as is evident in the Central case of the FRM, we agree that PEV demand is strong, growing, and part of a positive feedback loop wherein PEV adoption leads to more PEV adoption. Like Consumer Reports, EPA interprets the large collection of PEV acceptance enablers (and diminishing obstacles) as part of a robust feedback loop. But some commenters, in contrast, provide a different interpretation. In our view, they misrepresent each enabler as a necessary condition. In this interpretation, every single enabler is required for PEV acceptance to increase/for PEV market shares to grow. In other words, the absence of any single enabler entirely undermines PEV acceptance. Relatedly, Volvo Car Corporation highlights the uncertainty of interacting enablers, that is the uncertainty regarding "how complimentary US policies (infrastructure, utility capacity, consumer incentives etc.) could impact consumer demand."[475] In response, we disagree with the interpretation that the system of enablers is fragile. Notably, PEV adoption has already grown primarily based on technology advancement (Forsythe, Gillingham, Michalek, & Whitefoot, 2023). The introduction of more PEV models, especially SUVs and pickups, has brought more new car buyers into the PEV market. Purchase incentives lead to more purchases. Easy, accessible charging leads to higher PEV satisfaction; higher satisfaction correlates with more purchases. Environmental and Public Health Organizations quotes Forsythe et al. (2023) in their comments, "With the assumed technological innovations, even if all purchase incentives were entirely phased out, BEVs could still have a market share of about 50% relative to combustion vehicles by 2030, based on consumer choice alone." While these enablers can enhance each other, the absence of any one of these enablers does not appear to diminish the independent effect of the others. In short, the system doesn't have to be perfect for PEV acceptance to increase and expand.

Consumer Heterogeneity

Many commenters assert that PEVs will not satisfy every consumer.[476] For example, Consumer Reports urges the EPA to "consider the needs of consumers in all demographic and income levels," noting that interest in EVs is strong and diverse but knowledge, exposure, and adoption are uneven. More specifically, commenters often note the challenges associated with PEV adoption for specific use cases and certain groups of consumers. Use cases that appeared frequently in comments include towing, hauling, long distance driving, and cold weather driving. For example, GROWMARK, Inc. notes that "farmers use their trucks to take products to market, bring supplies to their fields, and move livestock." Consumer groups mentioned frequently by commenters include rural households, low-income populations, and used vehicle consumers. For example, American Free Enterprise Chamber of Commerce (AmFree) et al. reminds us that "in most of the United States, the share of EVs is zero or near-zero."

In response, EPA absolutely agrees that consumers are heterogeneous. To the extent that evidence and scientific methods exist to characterize differences among consumers, we have considered "the needs of consumers in all demographic and income levels." See RIA Chapters 4.1 and 4.2. We note, however, that the science of modeling consumer heterogeneity is not sufficiently advanced to include in this rule making. In fact, in their comments Jeremy Michalek et al. advise against attempting to capture additional consumer heterogeneity in our modeling that is not already reflected in aggregate and on average via logit and shareweight parameters. Furthermore, historical, "revealed preference" data on PEV adoption is too limited to support robust distributional analyses. As a result, EPA has looked to survey data and qualitative

[475] We note that uncertainty is inherent in any estimate, by definition, and goes both ways.
[476] We recognize that consumers are heterogenous. We also believe that the vast majority of our commenters also recognize that consumers are heterogeneous, whether they clearly state it or not.

analyses to estimate PEV demand overall and consider differences among various U.S. populations.

Many individuals and organizations provided results from a wide variety of surveys in their comments on this rulemaking. We thank them for their contributions to an ever-growing set of survey results regarding vehicle demand (or lack thereof). We note, however, that those comments were not intended as a contribution to a body of scientific literature, but rather to argue that PEV demand is (not) or will (not) be sufficient to support future PEV market shares projected to be produced by manufacturers under the proposed standards . For example, "Consumer Reports found that '71% of Americans expressed some level of interest in buying or leasing an electric vehicle,' and 14% of Americans within that group would 'definitely buy' an EV if they were in the market for a vehicle." American Fuel & Petrochemical stated that "41 percent of adults said they would never buy an EV, raising fundamental questions about how EPA can predict that ZEV sales will reach 67 percent in 2032." The same survey also stated that "a majority of Americans now say they are at least open to buying an EV in the future," and acknowledged the limitations of surveys for assessing consumer acceptance, noting that "[p]revious Gallup polling has found that Americans aren't always the best judge of their future behavior when it comes to technology. For example, as recently as 2000, a quarter of Americans thought they'd never own a smartphone."[477] A survey from Consumer Reports in 2022 indicates that more than 70 percent of survey respondents felt that BEVs are as good or better than ICE vehicles, up from about 46 percent in 2017 (Bartlett, 2022). One might conclude from this result that 70 percent of respondents would have been willing to purchase a BEV in 2022, noting, at minimum, that the percentage has grown significantly since 2017 and possibly also concluding that the percentage will continue to grow dramatically after 2022. Furthermore, Consumer Reports (CR) "car buying survey from March and April 2022 found that 30% of licensed drivers who were then in the market to buy or lease a new (and not a used) vehicle were not even considering a conventional, non-hybrid vehicle. This however, isn't just something consumers are telling us, it's also showing up in the market. Sales of new ICE vehicles decreased by 26% from 2019 to 2022, while combined sales of BEVs, PHEVs and conventional hybrids increased by 144%. BEV sales alone increased by 244% over that same period." As illustrated with these examples, survey results reflect a snapshot in time. They vary depending on many factors including survey design and frame, sample population, sample, sampling design, and timing. In short, none of the survey results provided by commenters were surprising or provocative. They fit within the breadth of survey results with which we were already familiar. In addition, EPA is well versed in the many pros and cons of survey design, sample design, data collection, statistical summaries and inferences. Consistent with our intention to consider the full breadth and depth of the scientific literature on PEV acceptance, many surveys as well as the survey statistics provided by commenters informed EPA's parameterization of PEV acceptance in the Central case as well as the sensitivity analysis of those parameters included in the final rule making.[478] While the Central case estimates of market share are the most plausible and cost minimizing

[477] https://news.gallup.com/poll/474095/americans-not-completely-sold-electric-vehicles.aspxt

[478] Our modeling assumptions regarding PEV acceptance and consumer demand are based on the scientific literature which we cite throughout the RIA, particularly in RIA Chapter 4, Chapter 8, and Chapter 9.

pathway, we have demonstrated multiple, potential feasible compliance pathways that manufacturers could choose .

In addition to acknowledging consumer heterogeneity, we also acknowledge that PEV acceptance will occur at different rates for different consumers, and possibly not at all for some. These differences among consumers are reflected in OMEGA. While OMEGA does not directly represent different types of new vehicle consumers, the consumer module of OMEGA does capture heterogeneity in new vehicle consumer choice in any given year (i.e., via the logit parameters) and over time (i.e., via the shareweight parameters). OMEGA models the distribution of choice across vehicle technologies via a generalized logit formulation that includes generalized cost and non-cost elements of purchase decisions. See RIA Chapter 4.1. We also note that all of the demonstrated compliance pathways in this FRM project that some consumers will not purchase PEVs.

The modeling approach employed in OMEGA applies broadly to all use cases and consumer groups. Our modeling does not exclude any use cases or consumer groups from the option of choosing a PEV or any other available technology. EPA notes that PEV ownership is feasible and acceptable to many consumers for towing, hauling, long distance driving, and cold weather driving. EPA also notes that many consumer groups, including lower income buyers and non-white consumers purchase PEVs and indicate interest in PEVs (Consumer Reports, 2022). Furthermore, there appears to be no evidence that PEVs cannot meet the demands of many rural consumers. Instead, there is evidence that information about, exposure to, and access to PEVs and EVSE has been less in rural areas than in urban areas, and the resulting lack of awareness and access has been the primary cause of lower adoption rates in rural areas. According to comments from Environmental and Public Health Organizations, "A 2023 survey conducted by the Union of Concerned Scientists and Consumer Reports 'uncover[ed] that there isn't sufficient familiarity with EVs in rural areas. The overwhelming majority of respondents—96%—has never owned or leased an EV.' The survey found that only 6% of rural respondents said they were very familiar with the fundamentals of buying and owning an EV, while 30% said they were somewhat familiar."[479] Environmental and Public Health Organizations also note that "although rural Americans are currently adopting PEVs at slower rates than urban Americans, PEVs actually excel at meeting the demands of rural drivers. 'Fuel savings for rural households are larger than for urban households, because trips in rural areas are longer than in urban areas, and vehicles tend to be older and less efficient, requiring more fuel per mile, [P]EVs require fewer trips to a mechanic for repairs and maintenance. Because of the high torque and low center of gravity, they have excellent performance, which is important on rough, curvy and steep roads.' A survey by the Union of Concerned Scientists and Consumer Reports found that 'there is plenty of interest [in PEVs] in rural areas, but there is a huge knowledge gap about what it is like to own an EV.'"[480]

Regarding low income and used vehicle market consumers emphasized by many commenters, EPA recognizes that most consumers want and some really need both lower purchase price and lower operating costs, and that different customers have different abilities to purchase vehicles at any given price points. Not every consumer will be able to purchase a new motor vehicle, whether that is a PEV or an ICE vehicle. At the same time, we expect that PEVs will generate

[479] [EPA-HQ-OAR-2022-0829-0759, p. 164]
[480] [EPA-HQ-OAR-2022-0829-0759, p. 175]

large savings for consumers over the lifetime of the vehicle, and we also see a significant trend toward decreasing consumer upfront costs for purchasing PEVs. First, purchase incentives are available for eligible new and used PEVs for buyers who qualify (See RIA Chapter 2.6.8). Second, the price difference for BEVs is widely expected to narrow or disappear as the cost of batteries and other components fall in the coming years.[481] Among the many studies that address cost parity of BEVs vs. ICE vehicles, an emerging consensus suggests that purchase price parity is likely to begin occurring by the mid- to late-2020s for some vehicle segments and models, and for a broader segment of the market on a total cost of ownership (TCO) basis (ICCT, 2022) (EDF and ERM, 2022). Specifically, the International Council on Clean Transportation (ICCT) projects that price parity with conventional vehicles will "occur between 2024 and 2026 for 150- to 200-mile range BEVs, between 2027 and 2029 for 250- to 300-mile range BEVs, and between 2029 and 2033 for 350- to 400-mile range BEVs" (ICCT, 2022). The Environmental Defense Fund notes that "most industry experts believe wide-spread price parity will happen around 2025" (EDF and ERM, 2022). By some accounts, a compact car with a relatively small battery (for example, a 40 kilowatt-hour (kWh) battery and approximately 150 miles of range) may already be possible to produce and sell for the same price as a compact ICE vehicle (Walton, 2020). Many expect total cost of ownership (TCO) parity to precede purchase price parity by several years, as it accounts for the reduced cost of operation and maintenance for BEVs (ICCT, 2022) (EDF and ERM, 2022). See Preamble Sections IV.C.1 and IV.C.6. Third, in our modeling, we assume that a mix of technologies will be used to meet the standards. Our assessment projects there will be variation in the types of technologies that automakers adopt to meet the standards, providing consumers increased fuel economy and associated fuel savings via PEV and ICE vehicle technologies in the new vehicle market and eventually also in the used vehicle market. We expect that automakers recognize the diversity of their consumers and will leverage the flexibilities built into the standards to provide consumers with PEV and ICE vehicle choices over a wide range of utility and price points.

Uptake of technological advancements

In concluding our response to comments related to consumer demand, we acknowledge the comments regarding the projected pace of PEV adoption. Most of those commenters indicated that the pace was too rapid and not justified by available evidence. Some commenters conjectured that the actual pace of PEV adoption will outpace EPA’s projections as has been observed in the past. As with any scientific or modeling endeavor, we agree with these commenters that our Central case projections are not predictions. They may be too high or too low. However, our Central case projections are the best estimate of technology market shares based on our analyses of consumer demand and factors underlying consumer demand. Our Central case projections are consistent, though more conservative as described in Section IV.C.6 of the preamble, with third party estimates. In other words, other researchers have reached the same conclusion regarding likely rates of PEV uptake as the EPA. Nevertheless, we provide an additional response to concerns about the projected demand for PEVs. We also note, that in addition to our central case estimates, we present numerous sensitivity scenarios which demonstrate that the standards can be met through various mixes of technologies including ICE, hybrids, PHEV and BEVs, and thus a wide range of PEV levels.

[481] International Council on Clean Transportation, "Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Time Frame," October 2022.

By most accounts, vehicle markets are in transition. In the words of American Honda Motor Co., Inc., “Previous debates about whether such a transformation would occur are now merely conversations about when it will happen. In fact, today all of industry is pursuing this transition at a fever pace.” Honda continues, however, by misrepresenting and exaggerating proposed, projected PEV market shares as “requiring EVs to move beyond today's early adopters, past ubiquity on main street, and extend to small towns and rural areas across the nation – all in a mere eight years.” They characterize these projections an “assumed swift and seamless EV market transition.” Furthermore, they state that “there is no historical auto industry analogue to EPA’s projected pace of EV adoption” and provide examples. They also highlight that “apart from experiencing better fuel economy and vehicle performance, it is possible owners may not have even known those technologies existed on the vehicle” which is, admittedly, different from the consumer-facing nature of PEV technology and the “different approach to [PEV] use and management”.

In response, we acknowledge that it took several years for the PEV technologies to achieve current levels of adoption, while also emphasizing that growth in PEV market share “has outpaced historical estimates considered ambitious just a decade ago” according to comments from Environment and Public Health Organizations. We also agree that it is important to consider technology-specific factors when projecting technology adoption, particularly the behavior changes and awareness and access challenges associate with PEVs that have been identified by commenters as well as the EPA. We respond to the behavioral component of PEV adoption in four ways. First, as noted about, we are aware of and have accounted for the challenge of awareness and access in our estimates, as stated above. Second, unprecedented public and private investment in vehicle electrification, separate from this rulemaking, has occurred and is expected to continue. Third, EPA has engaged in similarly unprecedented analyses, for example, regarding infrastructure, grid, supply chains, critical mineral availability, related to PEV acceptance, as is clearly evidenced in the Preamble, RIA, and other sections of this RTC. Fourth, we apply Rogers’ robust theory of technology diffusion in our modeling of PEV market shares. As Environmental and Public Health Organizations describes, “’sales move at a crawl in the early-adopter phase, then surprisingly quickly once things go mainstream… Before then, sales tend to be slow and unpredictable. Afterward, rapidly accelerating demand ensues.’ This S-shaped pace of technology adoption has been observed for numerous emerging technologies since the early 1900s, including the telephone, the automobile, electricity, refrigeration, clothes washers and dryers, air conditioning, microwaves, computers, cellphones, and the internet.” Though Honda notes this pattern as well, they compare the longer transition of these technologies to the shorter, roughly decade-long transition to roughly two-thirds of new vehicle sales being PEVs in EPA proposal. It is important to remember that EPA’s proposal projects new vehicle sales, not fleet composition. Statistics on telephones, microwaves, etc. are more comparable to the later metric. It is also important to know that the pace of technological innovation and diffusion in the 21st century is much faster than in the 20th century. According to Environmental Public Health Organizations, “the pace of adoption has been speeding up consistently across new technologies … “‘[i]t took decades for the telephone to reach 50% of households, beginning before 1900. It took five years or less for cellphones to accomplish the same penetration in 1990.’ The automotive industry has not been left out of this increasing speed of technological adoption, with automotive design cycles decreasing from 60 months to 24 or 36 months over a period of five years.” We discuss diffusion of innovation, PEV adoption, and PEV acceptance in See RIA Chapter 4.1.

13.3 - Vehicle ownership behavior

Comments by Organizations

Organization: American Fuel & Petrochemical Manufacturers

EPA's total cost of EV ownership incorrectly assumes each vehicle type of all new ICEV and ZEV will travel the same miles each year.249 EVs have less range, both technically and practically. As noted by J.D. Power, "the majority of EVs provide between 200 and 300 miles of range on a full charge."250 Studies show that the average electric car is driven 9,059 miles per year, compared with 12,758 miles for ICEVs.251 By overestimating VMT, EPA compounds all other errors in its assumptions that all work in favor of ZEVs and to the detriment of ICEVs. [EPA-HQ-OAR-2022-0829-0733, p. 55]

249 DRIA at 4-20, Table 4-7 (e.g., EPA assumes EV and ICEV sedans/wagons will both travel 15,700 miles per year).

250 See Sebastian Blanco, List of EVs Sorted by Range (Sept. 1, 2022), www.jdpower.com/cars/shopping-guides/list-of-evs-sorted-by-range.

251 iSeeCars, The Most and Least Driven Electric Cars (May 22, 2023), https://www.iseecars.com/most-driven-evs-study.

Organization: Anonymous

2. EPA's consumer demand module isn't explained and leads to strange results

EPA's analysis includes an estimate of consumer demand of vehicles by powertrain, which it describes as "the share weight parameter changes over time to account for factors that are not included in the generalized costs, such as greater access to charging infrastructure or greater availability and awareness BEVs". EPA does not explain how they built their S curve or how it behaves and relies on a single paragraph in its draft RIA to describe this approach (it reserves conversation of the 'cost' metrics for a different section of the RIA). More importantly, EPA does not explain why consumer demand increases because of their proposal across the alternatives when their proposal shouldn't impact these considerations. EPA's proposal does not increase the amount of chargers available or reduce range anxiety. If these things are assumed to change because of EPA's rule, the explanation should be clear in EPA's analysis, and EPA should also carry the costs of forcing increases to the grid and charger access as a cost to their rule. [EPA-HQ-OAR-2022-0829-0565, p. 3]

In considering costs, EPA states "consumers assume that approximate annual VMT is 12,000 miles, annual non-fuel ownership costs for BEVs are $1,600, and annual non-fuel ownership costs for ICE vehicles are $2,000" but does not explain where those assumptions come from and deprives commenters from being able to meaningfully comment and contribute. This basis of non-fuel costs for ICE vehicles being higher by 20% leads to ICE vehicles being disadvantaged. [EPA-HQ-OAR-2022-0829-0565, p. 3]

EPA analysis also seems to gloss over range anxiety which is a leading consideration for many consumers in whether to purchase a BEV (https://www.caranddriver.com/news/a40119553/survey-range-anxiety-evs/#:~:text=The%20bad%20news%3F,list%20their%20top%20three%20concerns) or the time it takes to charge a vehicle, in their analysis of consumer demand. These oversights seriously undermine the value of EPA's model. [EPA-HQ-OAR-2022-0829-0565, p. 3]

Ironically, EPA also assumes 0% rebound for BEVs. Rebound is a sign that consumers value driving a vehicle more and will do so as cost decreases. However, EPA's assumption assumes that there is no additional value to driving a BEV as it becomes more efficient. So on the one hand, BEVs confer the same or better benefits to their drivers, on the other, consumers do not value additional BEV miles. [EPA-HQ-OAR-2022-0829-0565, p. 3]

Organization: Delek US Holdings, Inc.

b. BEV charging consumes significantly more time than refueling ICE- powered vehicles.

The Proposed Rule fails to consider the impact that increased charging times will have on consumer adoption rates and whether end users will be willing to such disruptions to daily travel in addition to the increased prices and upfront costs. According to DOT, Level 1 EVSE, which provides charging through a 120-volt AC outlet, can take 40–50+ hours to fully charge (80%) a BEV from empty; Level 2 EVSE, which offers a higher-rate AC charging and is typically used for home, workplace and public charging, can take 4–10 hours to fully charge a BEV from empty; and direct current fast charging EVSE, which provides rapid charging along heavy-traffic corridors where already installed, can take up to an hour to fully charge a BEV from empty.42 Regardless of fast charging, most PHEVs currently on the market do not work with the DCFC equipment.43 But under any scenario, these ZEVs will incur additional downtime for more frequent, and longer, charging times as compared to the equivalent ICE. And faster charging infrastructure is larger and more expensive, making it difficult for the average consumer to comfortably travel unless there is sufficient access to fast and convenient charging. Yet the Proposed Rule fails to consider whether, in light of these impacts, consumers will purchase ZEVs at the rate necessary to meet EPA's targets regardless of whether a manufacturer can produce them. [EPA-HQ-OAR-2022-0829-0527, p. 9]

42 DEP'T OF TRANSPORTATION, "Charger Types and Speeds" (May 4, 2023), available at https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds#:~:text=EVs%20can%20be%20charged%20using,6%20hours%20for%20a%20PHEV.

43 Id.

Organization: Departments of Transportation of Idaho, Montana, North Dakota, South Dakota and Wyoming

The proposed rule in this docket would rapidly accelerate a shift from the use of internal combustion engine vehicles to electric vehicles (EVs). The Alliance for Automotive Innovation has already submitted testimony in this docket that the proposed rule would require 2/3 of vehicles covered by this docket to be battery electric vehicles by 2032. In today's market the share of new light-duty and medium-duty vehicles that are EVs is one-tenth of that share nationally, and far, far lower in our states and many regions of the country. [EPA-HQ-OAR-2022-0829-0525, p. 1]

Organization: Donn Viviani

2) Errors/omissions in the proposal and the RIA.

Not addressed in the RIA is the effect the IRA incentivizing carbon capture and sequestration (CCS) used for enhanced oil recovery (EOR) will have on fuel prices . Setting aside the unsettled question of how much net car- bon is sequestrated after the oil produced in turn emits additional CO2, as not germane to the EV rule15. [EPA-HQ-OAR-2022-0829-0546, p. 5]

What is germane is that the oil will be pro- duced at marginally lower cost. While the rebound effect is taken into con- sideration in the RIA based on increased vehicle milage efficiency, the de- creased cost of fuel from EOR is not. Cheaper fuel will also have a re- bound effect, encouraging more driving, and reducing the pressure to tran- sition to a BEV16. This effect needs to be reflected in the RIA, otherwise the RIA is incomplete and presents a distorted projection. [EPA-HQ-OAR-2022-0829-0546, p. 5]

15 It's estimated a ton of injected CO2 will produce about 2 barrels of oil which when combust- ed, will emit about a ton of CO2

16 Small, K., and Hymel Kent. "The rebound effect from fuel effciency standards: measurement and projection to 2035." Prepared for US EPA, Washington, DC (2011)

Organization: Environmental. and Public Health Organizations

XXV. EPA's Use of a 10% Rebound Effect for Combustion Vehicles, While Reasonable, Is Clearly at the High End of Estimates, Leading to a Possible Overestimation of Costs and Underestimation of Benefits.

This section explores EPA's consideration of rebound effects. As detailed below, while the Agency has justified a 10% rebound effect in its prior rulemakings, it should consider using a lower value here. It is also reasonable for EPA to assume no rebound driving for BEVs. [EPA-HQ-OAR-2022-0829-0759, p. 189]

A. EPA has provided a thorough and sufficient justification for a 10% rebound effect in several prior rulemakings.

EPA's Proposal estimates the vehicle miles traveled (VMT) rebound effect for combustion vehicles to be 10%. DRIA at 4-16. The quantitative estimate of the rebound effect—which indicates the amount of additional driving that will occur as the cost of driving decreases due to fuel economy improvements—significantly influences multiple factors considered in promulgating new GHG regulations for light-duty vehicles. Additional driving leads to more accidents, road congestion, and noise, while also reducing the fuel savings and emission reductions associated with more stringent standards. Therefore, without a reasonable estimate of the rebound effect, the magnitude of a new rule's costs and benefits cannot be properly understood. [EPA-HQ-OAR-2022-0829-0759, p. 189]

The use of a 10% rebound effect is not new. EPA also estimated the rebound effect to be 10% in the 2010 and 2012 Final Rules and the Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards finalized in 2021. See 75 Fed. Reg. 25324, 25517 (May 7, 2010); 77 Fed. Reg. 62624, 62716 (Oct. 15, 2012); 86 Fed. Reg. 74434, 74476 (Dec. 30, 2021). During each of these previous rulemakings, EPA considered a large body of both historical and recent literature that reported a very broad range of rebound estimates arrived at through a variety of research methods. EPA understood that simply averaging all of the rebound estimates from all of the studies was an unreasonable and inadequate method for reaching an accurate estimate of rebound for the vehicles subject to the relevant standards.616 For example, many of the studies considered old research, data from other countries with vastly different driving habits, or estimates that were not forward-looking to the years when the covered vehicles would be driven. 77 Fed. Reg. at 62924. Historically, EPA has correctly acknowledged that rebound research should be weighted based on its relevance to GHG emissions regulations in the United States.617 [EPA-HQ-OAR-2022-0829-0759, p. 189]

616 77 Fed. Reg. at 62924; EPA & NHTSA, Joint Technical Support Document, Final Rulemaking for 2017-2025 Light Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, EPA-HQ-OAR-2018-0283-0654, at 4-22 to 4-26 (Aug. 2012) (2012 TSD); EPA & NHTSA, Joint Technical Support Document, Final Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, at 4-15 to 4-22 (Apr. 2010).

617 See 77 Fed. Reg. at 62924 (noting a focus on U.S. estimates and declining to use estimates of elasticity of demand for gasoline to measure the VMT rebound effect); 2012 TSD at 4-25 (noting that historical estimates may overstate the rebound effect because the magnitude of the rebound effect declines over time, so more recent studies were entitled to increased weight). See also EPA, Technical Support Document, Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, at 3-20 to 3-21 (Nov. 2016), available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100Q3L4.pdf (2016 TSD) (finding some rebound estimates in the literature to be more applicable to the standards than others and according those more weight).

In the 2010 Final Rule, EPA concluded that while the historical research dating back to the 1950s suggested higher rebound values, the most recent literature supported a 10% “or lower” rebound effect. 75 Fed. Reg. at 25517. In the 2012 Final Rule, EPA again assumed a 10% rebound effect, and in 2016, EPA confirmed three times that a 10% rebound effect was appropriate. In both the 2016 Draft Technical Assessment Report and the 2016 Final Technical Support Document under the Midterm Evaluation, EPA cited multiple studies demonstrating that the rebound effect shrinks as incomes rise, and again explained that older studies were likely to be less reliable than more recent research.618 Also in 2016, EPA used a 10% rebound effect in adopting standards for heavy-duty pickups and vans.619 [EPA-HQ-OAR-2022-0829-0759, p. 190]

618 EPA & NHTSA, Draft Technical Assessment Report, Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, EPA-HQ-OAR-2015-0827-0926, at 10-10, 10-13 & 10-20 (July 2016), available at https://nepis.epa.gov/Exe/ZyPDF.cgi/P100OXEO.PDF?Dockey=P100OXEO.PDF (2016 Draft TAR); 2016 TSD at 3-10 to 3-13, 3-16 & 3-20.

619 Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, Proposed Rule, 80 Fed. Reg. 40138, 40453 (July 13, 2015) (“Since [HD pickups and trucks] are . . . more similar in use to large light-duty vehicles, we have chosen the light-duty rebound effect of 10 percent . . .”); Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, Final Rule, 80 Fed. Reg. 73478, 73746 (Oct. 25, 2016) (finalizing use of 10%).

The 2020 Rule was the only recent rule to depart from this 10% rebound rate, and the revised MY 2023 and later standards, finalized in 2021, returned to the 10% rebound rate after EPA conducted a rigorous review of the rebound literature in order to prioritize the most relevant rebound studies. EPA's current Proposal refers to the 2021 rule as support for its proposed 10% rebound rate for combustion vehicles. In the 2021 rule, EPA built on well-established precedent, citing much of the same support provided in the 2010 and 2012 rulemakings, along with additional more recent research. EPA also provided even more clarity into the Agency's approach to the broad body of rebound literature spanning many decades. EPA is correct in its belief that "it is important to critically evaluate which studies are most likely to be reflective of the rebound effect that is relevant to the final standards," and that "one cannot just take the 'average' rebound estimates from literature to use for the VMT rebound effect." See EPA, Revised 2023 and Later Model Year Light Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis (Dec. 2021) ("2021 RIA"), at 3-13. When agencies consider a range of studies, they should focus on those that are similar to the relevant policy context.620 [EPA-HQ-OAR-2022-0829-0759, p. 190]

620 See, e.g., U.S. Office of Management and Budget, Circular A-4 (Sept. 17, 2003) at 25. https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf; see also EPA, Science Advisory Board (SAB) Consideration of the Scientific and Technical Basis of the EPA's Proposed Rule titled The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, EPA-HQ-OAR-2018-0283-7659, at 27 (Feb. 27, 2020) (SAB Report) (stating that "the rebound estimate [should] be reconsidered to account for the broader literature, and that it be determined through a full assessment of the quality and relevance of the individual studies rather than a simple average of results," and "recent papers using strong methodology and U.S. data should be weighted more heavily than older papers, or those from outside the U.S., or those with weaker methodology.").

Specifically, in the 2021 rule reasoning on which EPA continues to rely for its 10% combustion vehicle rebound estimate, EPA appropriately identified factors for weighting rebound studies that reflect their relevance to the proposed rulemaking: (1) geography/timespan relevance (priority given to U.S. studies as opposed to international estimates); (2) time period of study (priority given to recent studies); (3) reliability/replicability of studies (priority given to studies using odometer readings vs. household surveys such as the 2009 National Household Travel Survey); and (4) statistical/methodological basis (priority given to studies employing a strong statistical/methodological basis). 2021 RIA at 3-13. EPA further explained why these factors are important and why they lead to more accurate estimates of the rebound effect. As a result, the Agency provided a clear and well-reasoned basis for its decision to give more weight to studies based on these four key criteria, and thus to conclude that the seven papers listed in Table 3-4 of the 2021 RIA should be given the most significant weight in developing the rebound estimate used in the Proposal. See 2021 RIA at 3-14 to 3-15. [EPA-HQ-OAR-2022-0829-0759, p. 191]

B. Even the 10% rebound effect is too high, and EPA should consider using a rebound effect of a lesser magnitude.

The two most reliable rebound estimates based on U.S. national data from EPA's preferred studies are 10% (Greene (2012)) and around 4% (Hymel and Small (2015)).621 Hymel and Small (2015) noted that their data indicated that fuel economy rebound could be lower than fuel price rebound, meaning that even the 4.0% and 4.2% values could be too high.622 Moreover, another paper in the list of EPA's seven preferred studies, Gillingham et al. (2015), estimates the rebound effect at 10%. But the study also found that "a high percentage of vehicles are almost entirely inelastic in response to gasoline price changes" and that "the lowest fuel economy vehicles in the fleet drive the responsiveness, with higher fuel economy vehicles highly inelastic with respect to gasoline price changes."623 While Gillingham et al. (2015) does not offer an alternative best rebound estimate for higher fuel economy vehicles, it is fair to assume that the 10% estimate is at the high end of reasonable estimates for the vehicles impacted by this rulemaking. [EPA-HQ-OAR-2022-0829-0759, p. 191]

621 See Kenneth A. Small, Comment Letter on Proposed MY 2021-2026 Standards, NHTSA-2018-0067-7789, at 1 (Sept. 14, 2018) ("A better characterization of the most recent study would be that it finds a long-run rebound effect of 4.0 percent or 4.2 percent under two more realistic models that are supported by the data.").

622 Hymel K. & K. Small, The Rebound Effect for Automobile Travel: Asymmetric Response to Price Changes and Novel Features of the 2000s, 49 Energy Econ. 93, 97 (2015); see also Greene, D., Rebound 2007: Analysis of U.S. Light-Duty Vehicle Travel Statistics, 41 Energy Pol'y 14 (2012) (although fuel prices "had a statistically significant impact on VMT, . . . fuel efficiency did not.").

623 Kenneth Gillingham et al., Heterogeneity in the Response to Gasoline Prices: Evidence from Pennsylvania and Implications for the Rebound Effect, 52 Energy Economics S41–S52 (2015).

Other factors would also suggest that even the best and most relevant existing studies could lead to a rebound estimate that is too large. For example, the rebound effect's magnitude diminishes over time, largely due to increasing income and decreasing driving costs, a fact that EPA has historically understood.624 As incomes rise over time, any fuel efficiency improvement will have less of an effect on the total vehicle miles traveled, and thus the rebound effect will decline. In both 2010 and 2012, EPA chose to use a 10% rebound effect as "a reasonable compromise between historical estimates and projected future estimates."625 The 2012 Final Rule noted, however, that several high-quality studies indicated that the rebound effect's magnitude is significantly diminishing over time as incomes rise.626 This income effect on rebound makes clear that the projected future estimates are in fact much more accurate than historical estimates. Moreover, more than 15 years will have passed since the 2010 Final Rule found a 10% rebound effect to be a good compromise and the implementation of the Proposed Standards, and income has continued to grow since that time, supporting a substantially diminished rebound effect. [EPA-HQ-OAR-2022-0829-0759, p. 192]

624 See, e.g., 2016 Draft TAR at 10-14 and 10-20; 77 Fed. Reg. at 62924, 62995; accord Small K. & K. Van Dender, Fuel Efficiency and Motor Vehicle Travel: The Declining Rebound Effect, 28 Energy J. 25 (2007); Hymel, K. et al., Induced Demand and Rebound Effects in Road Transport, 44 Transp. Rsch. Part B 1220 (2010).

625 77 Fed. Reg. at 62924.

626 NHTSA, Corporate Average Fuel Economy for MY 2017-MY 2025 Passenger Cars and Light Trucks: Final Regulatory Impact Analysis, at 851-52 (2012) (citing Small & Van Dender (2007) (finding average rebound to be 22% for 1966-2001, but declining to 11% when looking at only 1997-2001); Hymel et al. (2010) (finding that average rebound for 1966 through 2004 was 24%, but rebound by 2004 was only 13%); Greene, D., Rebound 2007: Analysis of Light-Duty Vehicle Travel Statistics (Mar. 2010) (internal EPA research) (estimating the rebound effect would be 10% in 2010 and 8% in 2030, using 1966-2007 data); see also Greene (2012) (same)).

EPA should give more weight to the fact that the rebound effect varies with income over time. In the 2021 rule, the agency cited Gillingham (2014) to assert that the evidence of how the rebound effect varies with income is "mixed," but then also correctly excluded that study from its list of preferred studies. Gillingham (2014) specifically considers the response to the 2008 gasoline price shock in California. EPA is correct to conclude that this was "an unusual period when gasoline prices were particularly salient to consumers." 2021 RIA at 3-6 to 3-7. As EPA noted, Gillingham explained in a follow-up paper in 2020 that the Gillingham (2014) results should not be used for developing an estimate of the VMT rebound effect for fuel economy or GHG standards. 2021 RIA at 3-7. The Gillingham (2014) paper is equally irrelevant to the question of the income effect on rebound. Various papers have confirmed that the rebound effect is declining over time and one study certainly should not be used as the basis for giving this factor “less weight,” especially a study whose own author acknowledges its irrelevance to this rulemaking context and to which EPA gives little to no weight otherwise. Because of this, EPA should more fully consider the impacts of the income effect on rebound, and in doing so, could support a rebound effect of a magnitude lower than 10%. [EPA-HQ-OAR-2022-0829-0759, p. 192]

In fact, the income effect on rebound is particularly important in the context of setting LDV GHG emissions regulations for two reasons. First, even the most recent relevant studies on which rebound estimates are based consider data only from 2013 and earlier. The historical growth rate of per capita personal income was 1.4% between 2001 and 2019,627 and thus income growth since 2013 would indicate a declining rebound effect even in the time since the most recent data utilized were collected. Second, EPA’s final standards will affect the fuel efficiency—and therefore the rebound effect—for vehicles for the next 30 years or more. Private forecasts have estimated approximately 1.6% growth in real personal income per year over the next 30 years, see 85 Fed. Reg. at 24675 n.1763, meaning that when most vehicles subject to the regulations are retired, incomes will be at least 61% higher than they are today (which are already higher than during the time periods in which the available rebound studies were conducted).628 More recent projections in AEO 2023 anticipate incomes rising even more than prior estimates—an average of 2.4% per year through 2050.629 This income growth would be expected to cause a large reduction in the magnitude of the rebound effect, supporting a rebound effect for the vehicles subject to EPA’s final standards of a magnitude well below 10%. [EPA-HQ-OAR-2022-0829-0759, pp. 192-193]

627 See Amicus Brief of Economists at 16 for calculation of 1.4% growth rate.

628 Amicus Brief of Economists at 16.

629 U.S. Energy Information Administration, Annual Energy Outlook 2023, Table 20: Macroeconomic Indicators, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2023&cases=ref2023&sourcekey=0.

C. It is reasonable for EPA to assume no rebound driving for BEVs.

Based on several recent studies looking at VMT for BEVs, and two studies specifically considering BEV rebound, EPA’s Proposed Rule assumes that the rebound effect for BEVs is 0% rather than the 10% value the Agency uses for combustion vehicles. It is reasonable for EPA to assume no rebound driving for BEVs for the reasons stated in the DRIA, see DRIA at 4-14 to 4-17, and because longstanding rebound research indicates that rebound is likely more a response to fuel prices than to fuel efficiency. [EPA-HQ-OAR-2022-0829-0759, p. 193]

The rebound effect relevant to these standards—for all vehicles, but especially with respect to BEVs—is fuel efficiency rebound. A substantial body of research indicates that fuel price or fuel cost rebound effects are higher than fuel economy rebound effects, meaning that rebound may be more responsive to fuel prices than fuel efficiency. Both Greene (2012) and Hymel and Small (2015)—two of EPA’s seven most preferred studies—came to this conclusion. Other studies cited by EPA—Gillingham (2012), Small and Van Dender (2007), West et al. (2015), and Wang and Chen (2014)—also concluded the same. Kenneth A. Small has explained that his studies indicate that the fuel economy rebound effect "is statistically indistinguishable from zero," and that "[t]his is also true of the vast majority of other studies that have tried to measure separately these two responses."630 He further explained that "the most defensible result empirically is that people do respond to fuel prices as expected, but that they do not respond to fuel economy at all," and that "Small and Van Dender (2007) make this point explicitly, and point out that we are therefore assuming a positive [fuel economy] rebound effect when actually we cannot prove that it's greater than zero."631 Greene (2012) also found that the impact of fuel efficiency on VMT was not statistically significant, a point EPA referred to in the 2016 Draft TAR to suggest that the relevant rebound effect for policymaking purposes "could be zero." 2016 Draft TAR at 10-14.632 And Wenzel & Fujita (2018) found that vehicles with the highest fuel economy—but still vehicles significantly less efficient than BEVs—had notably lower rebound rates than vehicles with lower fuel economy, with an average rebound effect well below 10%.633 [EPA-HQ-OAR-2022-0829-0759, pp. 193-194]

630 Kenneth A. Small, Comment Letter at 2.

631 Id. In the 2020 Final Rule, EPA relied on Linn (2016) to support an argument that fuel economy rebound is greater than fuel price rebound. Linn (2016), however, described the separate coefficients for fuel price and fuel economy changes as statistically insignificant. Linn, J., The Rebound Effect of Passenger Vehicles, 37 Energy J. at 277 (2016). Moreover, Linn also explained that self-reported VMT data (as was used for his research) "may be noisy when compared to VMT calculated from multiple odometer readings," and that therefore studies that use VMT based on multiple odometer readings—such as all of those enumerated above—"should have lower measurement error, and yield preferable estimates from a statistical point of view." Joshua Linn, Comment on Proposed MY 2021-2026 Standards, NHTSA-2018-0067-7188, at 2 (Oct. 11, 2018).

632 Additionally, this point is relevant to the discussion above regarding 10% rebound being a maximum estimate for combustion vehicles. Because some of EPA's seven most preferred studies consider fuel prices rather than fuel efficiency, the most accurate rebound estimate would be no higher than—and likely lower than—the average of those studies' best estimates.

633 Tom Wenzel & K. Sydney Fujita, Elasticity of Vehicle Miles of Travel to Changes in the Price of Gasoline and the Cost of Driving in Texas, Lawrence Berkeley National Laboratory (Mar. 2018) at iv (explaining that rebound for "high MPG" vehicles—which are still less efficient than BEVs—is estimated to be 5.2%).

Additional very recent research that has been presented but is not yet published provides further support for EPA's 0% BEV rebound effect. Spiller et al. (2023) investigated the existence of rebound effects in annual miles driven for BEV owners.634 The study "compile[d] household level fleet data in Massachusetts to perform an event-study and difference-in-difference analysis, comparing miles driven after new vehicle purchases" across BEVs and combustion vehicles.635 The analysis distinguished between BEVs purchased as additions to the household fleet versus replacement vehicles, and used propensity score matching to find an appropriate control group. Spiller et al. (2023) "estimate[d] the elasticity of VMT to changes in gasoline prices for households with and without BEVs, using a fixed effect model and instrumenting for the price of gasoline with the price of crude oil in the international markets," and found that "EV households shift VMT to EVs when gasoline prices increase, although the increase in driving after the purchase of a new vehicle does not differ across fuel type, suggesting the absence of a rebound effect."636 EPA should include discussion of Spiller et al. (2023) in its final rule if the research is published or available in a working paper form prior to promulgation of the final rule. [EPA-HQ-OAR-2022-0829-0759, p. 194]

634 See American Economic Association, AASA Annual Meeting 2023 Program, Abstract for Beia Spiller, Kenneth Gillingham & Mart Talevi, The Electric Vehicle Rebound Effect (Jan. 6, 2023), https://www.aeaweb.org/conference/2023/program/1610?q=eNqrVipOLS7OzM8LqSxIVbKqhnGVrAxrawGlCArI.

635 Id.

636 Id.

Organization: Green Diesel Engineering LLC

- Electric is a good solution for local driving patterns. It is not good for long distance runs or pulling loads and does suffer in range with extreme cold or heat. [EPA-HQ-OAR-2022-0829-0457, p. 6]

Organization: Institute for Policy Integrity at New York University School of Law

E. EPA Should Consider a Range of Rebound Effect Assumptions for BEVs While Upholding Its Current Assumption for ICE Vehicles

The “rebound effect” refers to “the additional energy consumption that may arise from the introduction of a more efficient, lower cost energy service.”118 In the Proposed Rule, EPA reasonably, and consistently with prior rules, assumes 10% rebound for ICE vehicles119—meaning that for every 1% improvement in fuel efficiency, there is a 0.9% drop in total fuel use and a corresponding increase in vehicle miles traveled. EPA’s adoption of a 10% rebound rate for ICE vehicles is consistent with the literature.120 [EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

118 RIA at 4-13.

119 Id. at 4-16.

120 See generally Inst. for Pol’y Integrity, Comments on Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards (Sep. 27, 2021),

While a wealth of economic literature supports a small rebound effect for ICE vehicles, there is comparatively little economic research on the rebound effect for BEVs. Based on the research available, EPA assumes a rebound effect of 0% for BEVs.121 This rebound assumption has two implications. First, it assumes that drivers do not switch their driving behavior when they switch from an ICE vehicle to a BEV,122 despite cost differences.123 Second, it assumes that any change in per-mile cost for BEVs, including from the introduction of more efficient BEVs or fluctuations in electricity prices, does not affect driving behavior. In effect, EPA’s projection of no rebound for BEVs over the long term presumes that there is something fundamentally different about consumer perceptions of BEVs compared to ICE vehicles, and not simply an issue of familiarity or technological constraints that will be overcome in the future. [EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

121 RIA at 4-16.

122 Id. at 4-17 (stating that “BEVs are not driven more than ICE vehicles”).

123 According to predictions from OMEGA, under the Proposed Rule, the average per-mile fuel cost of BEVs is projected to be approximately 62% lower than that of ICE vehicles between 2022 and 2055. This data is sourced from the '20230315_091353_MY_period_costs.csv' file in the '20230315_091353_effects_central' folder, downloadable from the 'Light-and medium-duty effects' section on EPA's website: https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions- greenhouse-gases

EPA's assumption of no rebound effect for BEVs relies on the empirical evidence available, namely Chakraborty et al. (2022) and Nehiba (2022).124 Although insightful, these studies leave reason for uncertainty. For instance, both studies employ cross-sectional data and do not fully address the endogeneity between vehicle choices and usage, which is discussed further below. This correlation between consumer vehicle choices and usage could significantly vary between early adopters of BEVs and average ICE vehicle owners, thereby impacting the study conclusions. While these studies contribute to the emerging body of research in this field, their findings should thus be interpreted with some caution. Beyond Chakraborty et al. (2022) and Nehiba (2022), we are aware of several other studies that purport to use better data and identifying assumptions and also find zero rebound for electric vehicles (but do not yet have working papers available).125 [EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

124 RIA at 4-14.

125 Wendan Zhang et al., Brookings Institution Electric Vehicle Adoption and Combustion Mile Displacement Across Demographics: Short Run Evidence and Implications For Policy, 2023 AERE Presentation (finding a negative rebound effect for electric vehicles.); Beia Spiller, Kenneth Gillingham & Marta Talevi. The Electric Vehicle Rebound Effect, 2023 AEA Conference.

While the available research provides some support for a 0% rebound rate for BEVs based on historical evidence, there is reason to believe that effect may not hold in the future. One potential explanation for the current BEV rebound findings is that "[c]onsumers are quite price inelastic, because they are inattentive."126 With the costs of BEV charging often consolidated into electricity bills, this alteration in cost perception could augment price inelasticity, rendering BEV owners less sensitive to per-mile cost variations.127 But this effect may become less pronounced as BEVs become more common. In particular, as infrastructure grows, electricity price salience may increase as gas stations convert to charging stations and prominently display electricity prices. Relatedly, the current literature could be shaped by the demographic profile of past and current BEV owners—predominantly early adopters—who may not reflect the population that purchases BEVs in the future.128 As BEV penetration accelerates, the associated rebound effect could potentially deviate from current estimates: Outside the vehicle context, economic literature documents a small rebound effect as electrical appliances become more efficient,129 which could hint at similar patterns in the future for BEVs. [EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

126 Xavier Gabaix, Behavioral Inattention at 311, in 2 Handbook of Behavioral Economics: Applications and Foundations (2019).

127 See generally Ben Gilbert & Joshua Graff Zivin, Dynamic Salience with Intermittent Billing: Evidence from Smart Electricity Meters, 107 J. ECON. BEHAVIOR & ORG. 176 (2014) (finding that households tend to decrease their consumption in response to billing information—an effect that wanes as the bill's salience fades); Steven Sexton, Automatic Bill Payment and Salience Effects: Evidence from Electricity Consumption, 97 REV. ECON. & STAT. 229 (2015) (finding that automatic bill payments decreases price responsiveness).

128 RIA at 4-14 (acknowledging that the available data is “not likely representative of the current and future general population of car buyers and their driving behavior”).

129 Kenneth Gillingham et al., The Rebound Effect is Overplayed, 493 NATURE 475, 476 (2013) (finding a 10% rebound effect). Later, Gillingham et al. (2016) also highlight that the rebound effect for both gasoline and electricity generally falls within a range of 5% to 40%, with the majority of studies suggesting a rebound effect between 5% and 25%. Kenneth Gillingham et al., The Rebound Effect and Energy Efficiency Policy, 10 REV. ENV’T ECON. & POL’Y 68, 75 (2016).

In light of these complexities and uncertainties, EPA should consider exploring a range of possible rebound estimates for BEVs, including the same 10% assumption used for ICE vehicles. EPA should conduct sensitivity analysis to assess the implications of a range of rebound effects between 0% and 10%. [EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

Notably, such an analysis would have a very limited impact on EPA’s assessment of net benefit. Policy Integrity reran OMEGA using a 10% rebound rate for BEVs and found that this change decreased total net benefits by just 0.43–0.71%, leaving the rule highly net beneficial overall. In fact, when total net benefits were rounded to two significant figures, as EPA does in the Proposed Rule and RIA, they appeared unchanged. (See Table A-1 in the appendix below for full results.) This is likely because additional BEVs resulting from the Proposed Rule make up a small share of the total fleet, particularly in the earlier years in the analysis that are weighted more as a result of discounting. In future standards, the BEV rebound effect could become more significant as BEVs make up a larger share of the vehicle fleet. [EPA-HQ-OAR-2022-0829-0601, pp. 18-20]

G. EPA Should Further Explain Its Choices Around Scrappage, Pass-Through, and Vehicle Sales

EPA should provide additional explanation around certain modeling choices—namely scrappage, pass-through, and sales. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

“Scrappage” refers to the rate of which drivers discard old automobiles. OMEGA treats scrappage as exogenous, meaning that the rate of scrappage does not depend on the Proposed Rule’s other effects.144 This choice is reasonable: While economic theory and evidence suggest that scrappage depends in part on the Proposed Rule’s other effects (most notably the rate at which the Proposed Rule affects new vehicle prices and sales),145 this effect is very difficult to model due to data limitations, and past attempts by EPA and NHTSA to model scrappage have fared poorly.146 Moreover, the increasing movement to electric vehicles provides even more reason to treat scrappage as exogenous, as virtually no analysis on the scrappage of BEVs exists. However, the Proposed Rule provides no discussion of scrappage or EPA’s choice not to model it. Particularly since EPA endogenously modeled scrappage in the 2020 Rule, the agency may wish to explain its decision not to follow this approach in the Proposed Rule and a discussion of how it may affect the results. Moreover, to the extent feasible, EPA should attempt to model scrappage in future standards. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

144 See RIA at 9-3 to 9-5.

145 See Howard K. Gruenspecht, Differentiated Regulation: A Theory with Applications to Automobile Emissions Control (1982); Howard K. Gruenspecht, Differentiated Regulation: The Case of Auto Emissions Standards, 72 Am. Econ. Rev. 328 (1982); ENV’T PROT. AGENCY, THE EFFECTS OF NEW-VEHICLE PRICE CHANGES ON NEW- AND USED- VEHICLE MARKETS AND SCRAPPAGE 3-6 to 3-11 & 5-7 to 5-7 to 5-12 (2021).

146 Inst. for Pol'y Integrity, Comments on the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks 66–71 (Oct. 26, 2018), https://policyintegrity.org/documents/Emissions_Standards_EPA_NHTSA_Comments_Oct2018.pdf.

"Pass-through" refers to the degree to which manufacturers pass on cost increases to consumers. EPA in prior tailpipe rules has assumed 100% pass-through to consumers in the vehicle market—meaning that every dollar of additional cost to the automaker is ultimately borne by the purchaser.147 EPA appears to repeat this assumption in the Proposed Rule. That approach is also reasonable given consistency with the agency's prior approach and the very limited economic evidence on vehicle pass-through. Nonetheless, that limited available evidence (from a 2010 paper) indicates that pass-through in the vehicle market may be below 100%.148 Accordingly, EPA should discuss and provide a rationale for its approach. EPA should also support further research in this area, given its potential importance. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

147 E.g. 2020 Rule, 85 Fed. Reg. at 24,594–95.

148 Using regression analysis, Hellerstein and Villas-Boas (2010) find only partial pass through for the vehicle industry with an average pass-through rate of 38%. Rebecca Hellerstein, & Sophia B. Villas-Boas, Outsourcing and Pass-Through, 81 J. INT'L ECON. 170, 175 (2010).

Finally, with regard to sales, EPA should clarify how OMEGA treats how producers expect consumers to value fuel costs. Within the model, consumers and producers shape their preferred new vehicle mix independently,149 each informed by their unique perspectives on fuel costs: Consumers weigh their expected fuel expenses, whereas producers consider how they think consumers will weigh their expected fuel expenses. In the RIA, EPA explains that consumers are assumed to factor in fuel costs of 12,000 miles annually for 2.5 years.150 However, the OMEGA input files suggest that producers expect consumers to consider fuel costs up to 15,000 miles annually.151 Although this difference is not inherently problematic, especially if EPA posits imperfect information between consumers and producers,152 EPA should explain this difference. This might also be a minor programming error, such that EPA intended for producers to accurately peg consumer valuation of fuel costs at 12,000 miles annually. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

149 The model then searches for solutions for a set of vehicle attributes, purchase prices, and quantities such that the sales and production shares match.

150 RIA at 4-2.

151 This information is derived from the 'sales_share_params_ice_bev_pu_b0p4_k1p0_x02031-cuv_b2p0_k1p0_x02029_nu8p0-sdn_b0p4_k1p0_x02020_nu1p0_20230228.csv' file for consumers, and the 'producer_generalized_cost-body_style_20220613.csv' file for producers, both located within the '2023-03-14-22- 42-30-ld-central-run-to2055\all_inputs' folder, downloadable from the 'Light-duty central case (zip)' section on EPA's website: https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions-greenhouse-gases

152 EPA, OMEGA Documentation Sec. 4.3.2 (last revised May 8, 2023), https://omega2.readthedocs.io/en/2.1.0/index.html#gl-label-producer-generalized-cost ("The producer, as an independent decision-making agent, will not have perfect information about the internal consumer decision process. Within the Producer Module, OMEGA allows the user to define the consumer decisions from the producer's perspective, which may be different from (or the same as) the representation within the Consumer Module.").

Organization: Kentucky Office of the Attorney General et al.

Furthermore, the Proposed Rule implicates "question[s] of deep economic and political significance," King v. Burwell, 576 U.S. 473, 486 (2015), due to the huge "number of people affected," United States Telecom Ass'n v. Fed. Commc'ns Comm'n, 855 F.3d 381, 423 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from the denial of rehearing en banc). Because "Americans place a high value on car ownership," almost 92% of households have at least one vehicle, and over 22% have access to at least three. Car Ownership Statistics 2023, Forbes (May 8, 2023), https://bit.ly/3NnPXnn. A regulation affecting so many people is bound to collide with "a significant portion of the American economy," West Virginia, 142 S. Ct. at 2608 (cleaned up), and require "billions of dollars in spending by private persons or entities," id. at 2621 (Gorsuch, J., concurring) (quoting King, 576 U.S. at 485). By EPA's own estimate, technology increases "through 2055 are estimated at $260 billion to $380 billion." 88 Fed. Reg. at 29,344. [EPA-HQ-OAR-2022-0829-0649, pp. 6-7]

The Proposed Rule somewhat attempts to deal with this concern by predicting that sales will increase as consumers become more familiar with EVs as they see broader "charging infrastructure" and more electric cars "on the road." 88 Fed. Reg. at 29,189. But that raises another buyer-focused concern that makes it even less likely consumers will change their purchasing habits to the extreme degree EPA predicts. For people who "rely on street parking," park in a garage over 25 feet from a power source, or own a condo where the building association is not willing to "pay for upgrading the electrical panel or service," where and how to charge a new electric car is a real concern. Rachel Kurzius, Considering an electric vehicle? Here's how to prep your home for one, Wash. Post (Sept. 26, 2022), https://bit.ly/3N4Y3zZ. Even for the slowest and most basic "Level 1" charging option, potential EV customers are out of luck; their "home probably can't accommodate" an EV. Id. And those who are able to upgrade their home parking situations may find themselves in a long line as the need for more complex and expensive charging mechanisms grows at a fast clip. See EV Chargers: How many do we need?, S&P Global (Jan. 9, 2023), https://bit.ly/3X1xFeM (predicting that the EV population uptick will require "about 700,000 Level 2 and 70,000 Level 3 chargers deployed, including both public and restricted-use facilities," 1.2 million and 109,000 nationally by 2027, and 2.13 million and 172,000 by 2030, "all in addition to the units that consumers put in their own garages"). [EPA-HQ-OAR-2022-0829-0649, pp. 15-16]

Even those who already own EVs may be in for some unpleasant surprises. A recent study concluded, for example, that "[t]he vast majority of electric vehicle owners [who] charge their cars at home in the evening or overnight" are "doing it wrong" and should instead "move to daytime charging at work or public charging stations" so as to not overwhelm the grids. Golden, supra. But standard electricity pricing "charg[es] commercial and industrial customers big fees based on their peak electricity use." Id. "This can disincentivize employers from installing chargers, especially once half or more of their employees have EVs." Id. Some of these vehicle owners may thus be left in a vehicle-charging no-man's land. [EPA-HQ-OAR-2022-0829-0649, pp. 15-16]

Organization: Marie Gluesenkamp Perez, and Mary Sattler Peltola, Members of Congress, Congress of the United States

We are writing to express our concerns about the impacts the Environmental Protection Agency's (EPA) new proposed rules, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 may have on rural communities. [EPA-HQ-OAR-2022-0829-0522, p. 1]

Like you, we believe climate change is a threat to communities across the country, and the federal government plays a critical role in developing a clean energy apparatus and helping our communities improve air quality. However, in making that transition, we cannot leave rural communities or working families behind. The administration's Executive Order 14037 and subsequent National Blueprint for Transportation Decarbonization set an ambitious goal for 50 percent of new passenger cars to be electric vehicles (EVs) by 2030. Last year's Inflation Reduction Act included many concrete policies promoting EV production that will drive costs down and improve affordability. We are concerned the EPA, along with the Department of Transportation (DOT) and the Department of Energy (DOE), have not done enough work to ensure rural communities will have the necessary charging infrastructure in place to make widespread EV adoption possible. The imposition of additional regulations in the auto market without key infrastructure investments will reduce consumer choice, which is a recipe for disaster in rural America. [EPA-HQ-OAR-2022-0829-0522, p. 1]

Rural communities, like ours, have more unique transportation and service options compared to cities or suburbs. Like many people who live in rural America, we spend a fair amount of time traveling, whether on or off the road system to get where we need to go. When your job, your pharmacy, or your child's daycare is over an hour away, you need to know that your car, snow machine, or ATV, will get you there and back. The ability to refuel a gas-powered vehicle quickly is valuable given the daily realities of rural life. That option is available because our country has a robust network of gas stations, and the requisite gas infrastructure, to support communities of all kinds. An equally robust infrastructure for EV charging must exist before this transition takes place to ensure working people and rural communities have consumer choices similar to cities and suburbs. And that infrastructure, especially fast-charging options, is not being built fast enough in many rural areas. EV charging programs included in the Infrastructure Investment and Jobs Act will help, but federal agencies remain focused on travel corridors along interstate highways, leaving many rural communities behind. [EPA-HQ-OAR-2022-0829-0522, pp. 1-2]

Washington's third congressional district has fewer than 100 level 2 and DC fast chargers available to the public, and they are largely concentrated in just two cities. Alaska has only 60 publicly available EV charging stations. In Congresswoman Gluesenkamp Perez' home county of Skamania, there are only two EV charging stations right now, and both are located at resorts. In Congresswoman Peltola's borough of Bethel, along with all the other boroughs of Western Alaska, there are zero EV charging stations. As DOT has acknowledged, the costs of installing EV chargers in rural areas can be higher, especially for direct current fast charging stations, because they are more likely to require expensive electrical service upgrades. Furthermore, for many working families, installing an EV charger at home remains out of reach, especially for those who don't own their homes. Bottom line: for EVs to be a meaningful and workable emissions reduction solution in rural America, we must have a ubiquitous and affordable charging infrastructure with access to abundant, cheap electricity. That simply does not exist right now. [EPA-HQ-OAR-2022-0829-0522, p. 2]

We are only four years away from model year 2027, and we are concerned the EPA's regulations are not paired with a plan to ensure adequate charging infrastructure on such a short timeline. Installing hundreds of thousands of new EV chargers and upgrading associated electrical infrastructure will also require tens of thousands of electricians. We are already experiencing a nationwide shortage of qualified electricians – anyone who's currently waiting six months for a residential electrician knows this all too well. Workforce shortages, particularly for those in the trades, are even more acute in rural communities. We want to ensure the EPA has considered the significant workforce development challenges that must be addressed to train electricians for a large-scale roll out of EV charging infrastructure. [EPA-HQ-OAR-2022-0829-0522, p. 2]

We request that the EPA, DOT, and DOE respond to the following questions:

1. What have the EPA, DOT, and DOE done to ensure rural communities are not left behind in the transition to electric vehicles?
2. Is there a clear and detailed deployment plan for electric vehicle charging infrastructure in rural areas?
3. How do the EPA and DOE anticipate potential shortages of trained electricians will impact the deployment of charging infrastructure? Further, have agencies evaluated the disparate impacts these shortages may have in rural communities?
4. Beyond using limited Inflation Reduction Act funding, how do the EPA, DOT, and DOE plan to address existing and future shortages of trained electricians?
5. Going forward, how do the EPA, DOT, and DOE plan to work together to ensure public charging infrastructure is abundant and accessible in rural areas? [EPA-HQ-OAR-2022-0829-0522, pp. 2-3]

We also request that you share how you plan to deploy necessary EV charging infrastructure in a timeframe that matches the implementation of the proposed rules. Building out this infrastructure will ensure that rural communities are not disproportionately impacted and left behind in a changing market. While it is critically important that we move toward a clean energy future, it must be a future that works for all Americans, including those in rural areas. [EPA-HQ-OAR-2022-0829-0522, pp. 2-3]

Organization: Nissan North America, Inc.

Beyond the significant market and governmental challenges posed by such a drastic implementation timeline, consumer adoption will be critical to success. Consumer adoption of EVs has historically lagged behind expectations, leaving a significant hurdle to encourage a large and swift shift to EVs. Consumers need to be convinced not only of the appeal, safety, affordability, and reliability of EVs themselves, but they need to adopt the necessary community and home charging equipment to facilitate their use. Consumers will need to adapt their trip planning and driving behavior to allow for vehicle charging needs. The only way to drive these significant behavioral changes is to assure consumers that charging infrastructure is available and reliable. This is simply not a reality today and is unlikely to be a reality in time to drive such a significant shift within the timeline of the Proposed Multi-Pollutant Rule. These challenges are magnified due to the unclear and uncertain benefits under the Inflation Reduction Act, which place significant limitations on EV consumer incentive programs and charging infrastructure programs. Moreover, many consumers are reluctant or unable to purchase EVs due to their significant price premium. The Proposed Multi-Pollutant Rule will only exacerbate these inequalities, with EV prices likely to increase even more due to extreme investments required by all market sectors involved. Driving too much change too quickly will shut out many communities who need clean vehicles the most. It will likely force consumers who are uncertain about ZEV adoption to continue to operate aging ICE vehicles much longer. This is contrary to the intent of the proposal. [EPA-HQ-OAR-2022-0829-0594, p. 5]

Organization: Senator Shelley Moore Capito et al.

Perhaps the most conspicuous flaw that will leap out to the American public is that these proposed actions were taken with complete disregard to consumer choice or affordability. In addition to potentially lacking access to charging at home, work, or public charging stations, consumers looking to purchase a new car may be unable to purchase these vehicles due to the higher purchase price or lack of availability. Today, the average purchase price of EV cars in 2022 was approximately $65,000-which is more than what 46 percent of American households earn in income in a year.8 Adding demand to the grid amid the confluence of other EPA regulations referenced above will drive up the cost of electricity, making powering these vehicles less affordable and undermining the EPA' s claims of savings for consumers that ignore or understate the increase in vehicle and energy prices. Taken together, the erosion of choice and affordability of vehicles will have profound impacts on how American families run errands, get to school, commute to work, and recreate. Additionally, there are serious concerns about the range of electric vehicles and the performance in rural areas of the country, where people may have to drive much longer distances to reach a charger, especially in locations where cold weather can impact the range the vehicle can drive. [EPA-HQ-OAR-2022-0829-5083, p. 3]

8 See Kelley Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1%, and all United States Household Income Percentiles, DQYDJ.

Organization: Zero Emission Transportation Association (ZETA)

A common misconception is that range anxiety continues to pose a significant barrier to adoption across all vehicle classes. The average U.S. household travels 37 miles per day.21 The average range on an electric vehicle is 291 miles. The EV models currently available can meet the needs of most American households.22 Vehicles capable of traveling distances up to 520 miles, such as the Lucid Air Dream Edition R,23 are being produced today and those with ranges greater than 600 miles are expected after 2023.24 [EPA-HQ-OAR-2022-0829-0638, p. 8]

21 “Average Miles Driven Per Year: Why It Is Important,” Kelley Blue Book, (May 15, 2023) https://www.kbb.com/car-advice/average-miles-driven-per-year/#:~:text=Drivers%20in%202021%20drove%20an,a bout%2035%20miles%20per%20day.

22 “Longest Range Electric Cars for 2023, Ranked,” Car and Driver, (March 23, 2023) https://www.caranddriver.com/features/g32634624/ev-longest-driving-range/

23 “An absolute triumph of efficiency, Lucid Air achieves 520 miles of range,” Lucid Newsroom, (September 16, 2021) https://www.lucidmotors.com/stories/lucid-air-achieves-520-miles-of-range

24 “Volvo targets 621-mile EV range by 2030 as part of tech focus,” Autocar, (June 30, 2021) https://www.autocar.co.uk/car-news/electric-cars/volvo-targets-621-mile-ev-range-2030-part-tech-focus

In the LDV segment, a recent study found that the majority of EVs that have been driven more than 100,000 miles still have at least 90 percent of their original range left.25 Bloomberg recently reported that the average range for an EV in the U.S. has quadrupled since 2011, and is today a third higher than the global average.26 Average range climbed to 291 miles for U.S. EVs in 2022 which addresses another key consumer-focused barrier as EV adoption becomes more widespread. [EPA-HQ-OAR-2022-0829-0638, p. 8]

25 “New Study: How Long Do Electric Car Batteries Last?” Recurrent Auto, (March 27, 2023) https://www.recurrentauto.com/research/how-long-do-ev-batteries-last

26 “US Electric Cars Set Record With Almost 300-Mile Average Range,” Bloomberg, (March 9, 2023) https://www.bloomberg.com/news/articles/2023-03-09/average-range-for-us-electric-cars-reached-a-record-291-mile s#xj4y7vzkg

EPA Summary and Response

Comments regarding vehicle ownership behavior includes three broad categories: what people do with vehicles (i.e., buy, lease, sell, scrap), how people use their vehicles (i.e., vehicle miles traveled, rebound, and use case like commuting, towing, long trips), and activities they undertake to support use of their vehicles (e.g., trip planning, charging, maintenance and repair). Among ownership behaviors, we do not discuss type of purchase (i.e., buy and lease) or sell/trade-in decisions in this section. We note that we have responded to purchase-related comments in Chapter 13.2 of this RTC where we discuss demand-related comments and there were no comments on selling and trading in a vehicle. We also defer responses to comments regarding maintenance and repair comments to Chapter 13.4 of this RTC where we discuss consumers’ savings and expenses. In addition, where a comment addresses topics other than vehicle ownership behavior – such as PEV demand in rural communities, charging availability, program design, sales, consumer purchase and producer decision making, affordability– we refer readers to the appropriate sections of the Preamble, RIA, and this RTC where those topics are addressed.

What people do with vehicles

The Institute for Policy Integrity at New York University Law School comments on vehicle scrappage. They note that “OMEGA treats scrappage as exogenous” and describe “this choice is reasonable.” They suggest, however, the EPA provide a discussion of our “choice not to model it.” In response, we agree and have briefly discussed this choice in RIA Chapter 4.2.3.

How people use their vehicles

Some commenters called attention to people who live and work in rural environments, stating that “people who live in rural America … spend a fair amount of time traveling.” Relatedly, they expressed “serious concerns about the range of electric vehicles and performance in rural areas of the country, where people may have to drive much longer distances to reach a charger” as well as concerns that government entities “have not done enough work to ensure rural communities will have the necessary charging infrastructure in place to make widespread EV adoption possible.” One commenter asserted that “the ability to refuel a gas-powered vehicle quickly is valuable given the daily realities of rural life.” Relatedly, Green Diesel Engineering LLC simply states that BEVs are a “good solution for local driving patterns. It is not good for long distance runs, or pulling loads and does suffer in range in extreme cold or heat." While these comments focus on number of miles, we know from comments in Chapter 13.2 of this RTC, that consumers use their vehicles in a variety of ways that have greater energy requirements, like hauling and towing, which may be especially important to rural communities. We also know that extreme conditions like very cold temperatures and heavy towing, affect the performance (e.g., fuel or energy efficiency) of PEVs and ICE vehicles. In response, we repeat some of what we discuss in RTC Chapter 13.2. All of the compliance pathways presented in the FRM show a substantial market share of new ICE vehicles. We expect that automakers will continue to produce vehicles, from ICE to hybrids to PEVs, that meet the needs of rural consumers. Second, the so-called advantages and disadvantages of any vehicle are not inherent to the vehicle. What is perceived as an advantage or disadvantage depends on the consumer and on the context, which are heterogenous and dynamic. While rural drivers may drive more miles on average per day, "the average U.S. household travels 37 miles per day," "the average electric range on an electric vehicle is 291 miles," and "U.S. Bureau of Transportation Statistics data shows that trips longer than 250 miles make up a miniscule fraction of U.S. daily driving." Even in cold weather or under high energy demands, average PEV range will likely prove adequate most of the time to "run errands, get to school, commute to work, and recreate" without recharging, as well as make long trips. While the range of PEVs will satisfy many rural drivers, rural or other drivers who log a lot of miles may also enjoy the savings associated with vehicle operation. Also, consumers who purchase PEVs are able to choose between vehicles with different range capabilities that suit their needs. With respect to comments about BEV use in extreme temperatures, just as with ICE vehicles, cold and hot weather can increase EV energy consumption due to use of cabin heating and cooling and defrosting. Because EVs are more efficient, less waste heat is available to heat the cabin so the energy must come from the battery. However, climate control requires only a fraction of the energy needed to drive a vehicle, and most of today's EVs have a substantial driving range of about 300 miles or more that can easily accommodate climate control needs. Also, we note that under these standards, ICE vehicles will still be available to purchase for those consumers who continue to prefer ICE vehicles.

In another section, one commenter stated that EPA "glossed over range anxiety." We disagree. While limited range used to be a practical concern to many households due to the much lower range of early PEVs, technology has advanced and will continue to do so. Households are no longer subject to the range limitations of early PEVs. While range anxiety persists today, it is unlikely to remain a concern as consumers gain experience with and exposure to the realities of PEV ownership. We also expect charging infrastructure to advance, increase in availability, and expand geographically. PEV range, range anxiety, charging behavior, charging availability and access are among the factors that influence PEV acceptance and are included in our analyses and representation of PEV acceptance. See Preamble Section IV.C.6, RIA Chapter 4.1, and RTC 13.1 and 13.2 regarding PEV acceptance. See Chapter 17 of this RTC and RIA Chapter 5 regarding charging infrastructure.

In addition to vehicle miles and use cases, Environmental and Public Health Organizations and Institute for Policy Integrity at New York University School of Law comment extensively on rebound. The former generally provided support for EPA's assessment of rebound for ICE vehicles and BEVs. The later provided more cautious support for EPA's BEV rebound assumptions, suggesting that "the associated rebound effect could potentially deviate from current estimates" as BEV penetration accelerates and recommended that "EPA should conduct sensitivity analysis to assess the implications of a range of rebound effects between 0% and 10%." Environmental and Public Health Organizations made three clear recommendations. First, they recommend that EPA consider an abstract on BEV rebound, Spiller et al. (2023) which "provides further support for EPA's 0% BEV rebound effect." In response to these rebound relevant recommendations, we have reviewed the Spiller et al. 2023 abstract. The results stated in the abstract are not directly relevant to BEV rebound as we have defined it, and the paper appears not to have been published. Second, they suggest that "EPA should consider using a rebound effect [for ICE vehicles] of a lesser magnitude" and relatedly that "EPA should more fully consider the impacts of the income effect on ICE vehicle rebound." As discussed in Chapter 8.3.3 of the RIA, as in the 2021 rule and our proposal, we to continue our estimate of a 10% rebound for ICE vehicles in the final rule analysis. The Institute for Policy Integrity recommended that EPA test a range of rebound estimates for BEVs, but then also noted that their own analyses show very little sensitivity to this assumption. In response, we agree that future measures of BEV use may indicate different rebound than currently assumed. EPA will continue to keep abreast of the literature on this topic. We also appreciate the recommendation to conduct sensitivity analysis of BEV rebound, though we have not done so based on the small effect we expect and the small effect that was found by the commenter.

Regarding rebound, EPA also received comments regarding the effect of IRA incentivizing carbon capture and sequestration (CCS) used for enhanced oil recovery . . . on fuel prices. The commenter states that "oil will be produced at a marginally lower cost" leading to "the decreased cost of fuel" and subsequent rebound. The commenter did not provide any economic analysis of this issue that we could review. At this time, we conclude that there is too much uncertainty to determine how many CCS projects with EOR in the U.S. will result from the IRA legislation over the time frame of analysis of the LMDV rule (2027-2055). We also note that oil prices are set in the global market. The impacts on U.S. fuel prices of IRA provisions on EOR may be very modest. Given these uncertainties, we are not able to quantify this effect. However, we anticipate that the fuel price effect and the subsequent rebound effect would be fairly small. The issue, the impact of CCS on oil prices and, in turn, the rebound effect for LMDVs, is a topic for further study in EPA's view.

Activities people undertake to support vehicle use

In closing out our response to comments regarding vehicle ownership behavior, commenters discussed a few more topics – charging and the behavior necessary to accommodate charging. Delek US Holdings, Inc. commented on the time it takes for BEVs to be fully charged, the additional downtime they claim charging will require, and the discomfort of travel in the absence of "fast and convenient charging." Kentucky Office of Attorney General et al. points out that consumers will need to know "where and how to charge a new electric car" including time of day or night. Nissan also cites charging behaviors and the trip planning and driving behavior to accommodate charging needs.

In response, we first note that most vehicles are in use just a few hours per day. Depending on the vehicle's location when it is not in use, charging could occur when the vehicle is parked. Under those conditions, there is effectively no downtime for charging which is reflected in the refueling time included in the NPRM and in the revised refueling time estimates in the FRM. Mid-trip charging, which the EPA does estimate, is not necessarily uncomfortable or inconvenient. It also does not require fast charging or long duration. For example, in some circumstances, a full charge might be required, in which case fast charging could be preferred. However, depending on one's needs, a driver might not require a full change and either charge for a shorter period of time and/or at a slower rate, stopping before a full charge is reached. There are, of course, exceptions to the above, but, as discussed above, the advantages and disadvantages of any vehicle is not inherent to the vehicle. Rather the perception of vehicle attributes depends on the user and the context. Also as discussed above and throughout this RTC, we have demonstrated multiple example compliance pathways which include various mixes of ICE, hybrids, PHEVs and BEVs. With the flexibility of performance-based standards, we expect that automakers will continue to produce a wide selection of vehicles to meet consumer needs.

We also note that learning and adaptation will occur as PEV markets shares grow and charging infrastructure expands. For consumers who choose a PEV, more exposure and experience, the multiplicative nature of network and neighborhood effects, and people's innate ability to learn and adapt strongly suggest, in combination, that the behaviors associated with charging will emerge and become "second nature" in very much the same way that visiting a gas station is today.

13.4 - Consumers' savings and expenses

Comments by Organizations

Organization: A. Longo

The proposed regulation seeks to impose a number of restrictions on the transportation sector, such as rigorous emissions standards, increased fuel efficiency requirements, and limitations placed on certain modes of transportation. Specifically, the Environmental Protection Agency (EPA), aims to establish new greenhouse gas emissions standards placed upon vehicles that meet the definition of light to medium-duty. These standards seek to achieve an aggressive and sum what arbitrary thirty percent reduction in emissions by 2030 and a fifty percent reduction by 2050. According to the EPA's own analysis, the reduction in emissions would save $1,500 over the life of the vehicle primarily due to savings in fuel costs, and economic value of reduced emissions. However, a number of industry groups have challenged this analysis including the American Trucking Associations, the National Association of Manufacturers, the Alliance of Automobile Manufacturers, the Trucking Alliance, and the Owner- Operator Independent Drivers Association. All have challenged the figure indicating that the analysis does not include the full economic impact. [EPA-HQ-OAR-2022-0829-0517, p. 1]

While these measures target environmental concerns around the improvement in air quality, it is necessary to consider their economic impact. According to a recent study led by the International Council on Clean Transportation (ICCT), implementing more rigorous emissions standards on light to medium-duty vehicles will likely lead to significant increases in manufacturing costs. These increases are routinely passed on to consumers in the form of higher vehicle prices. This would result in decreased affordability and potentially contribute to significant inflationary pressures [1]. Additionally, the American Trucking Association conducted a study indicating that the proposed regulations would increase the cost of manufacturing medium-duty vehicles by $10,000 to $20,000 per vehicle, leading to higher prices for consumers [2]. According to the Department of Transportation, the CPI sub-index for

Transportation reached an all-time high of 284 points in June of 2022 and is holding close to that level, which is well above the last 25-year average. Inflation in the transportation sector increases the price of all consumer goods brought to market and negatively affects our economy. [EPA-HQ-OAR-2022-0829-0517, p. 1]

1 International Council on Clean Transportation (ICCT). (2017). " A HISTORICAL REVIEW OF THE U.S. VEHICLE EMISSION COMPLIANCE PROGRAM AND EMISSION RECALL CASES." Retrieved from https://theicct.org/sites/default/files/publications/EPA-Compliance-and-Recall_ICCT_White- P aper_12042017_vF.pdf

2 American Trucking Associations. (2023). " ATA Statement on EPA's Greenhouse Gas Emission Proposals for Light to medium-Duty Trucks" https://www.trucking.org/news-insights/ata-statement- epas-greenhouse-gas-emission-proposals-light to medium-duty-trucks

Organization: Alliance for Automotive Innovation

3. Affordability

The auto industry has made significant progress driving down battery and fuel cell costs. Even still, further research and development investments will be needed to realize cost, utility, and convenience parity between EVs and their internal combustion counterparts. EVs currently cost more to produce than equivalent ICE vehicles, and in many instances are sold at a loss. This divide grows when considering convenience and utility parity, which requires larger batteries to support longer EV ranges commensurate with consumer expectations and needs. Larger vehicles (e.g., pickup trucks and SUVs) used by individuals and businesses for towing or heavy payloads require even higher-capacity batteries to support payload and towing needs. [EPA-HQ-OAR-2022-0829-0701, pp. 80-82]

When discussing affordability, EPA looks at the savings associated with a BEV compared to an ICE vehicle over an eight-year period.140 According to EPA, consumers who chose to purchase a new MY 2032 BEV instead of an ICE vehicle save between $400 and $4,000 at the time of purchase and between $9,000 and $13,000 on operating expenses over the first eight years of vehicle life (DRIA Table 4-7). [EPA-HQ-OAR-2022-0829-0701, pp. 80-82]

140 DRIA at 4-21 (Table 4-8).

First, these costs rely heavily on steep reductions in battery costs reductions in the 2026-2032 timeframe, which as we discuss in Section I.F. (Lithium-Ion Battery Cost) above, are likely unrealistic for a host of reasons, not the least of which is the vast increase in global demand across all sectors for lithium batteries during that same period. Second, the analysis in NPRM Tables 4-7 and 4-8 assume maximum $7,500 IRA tax credits in 2032, which as we've discussed earlier is simply not accurate – all vehicles and all buyers will NOT qualify for the maximum IRA tax credit of $7,500. Moreover, even if they did, what happens in 2033? The standards remain the same but the IRA tax credit is not available. Finally, the differential prices between ICE and BEV are not consistent with at least the current market, where EVs have consistently carried a price premium of close to $10,000 as shown in Figure 30 below. For example, in March 2023, KBB reports the average EV transaction price was $59,553 compared to the average new vehicle transaction price of $48,289.141 [EPA-HQ-OAR-2022-0829-0701, pp. 80-82]

141 https://www.coxautoinc.com/wp-content/uploads/2023/04/March-2023-Kelley-Blue-Book-Average-Transaction- Price-data-tables.pdf

Figure 30: Automotive Vehicle Transaction Price by Segment (Auto Innovators) [EPA-HQ-OAR-2022-0829-0701, pp. 80-82]

The higher EV purchase prices require larger down payments and/or longer-term loans at today's higher interest rates than most people can afford. According to the JD Power EV index report, there are only nine vehicles that reached total cost of ownership parity compared to an ICE as of March 2023.142 [EPA-HQ-OAR-2022-0829-0701, pp. 82-83]

142 htps://www.jdpower.com/business/resources/ev-divide-grows-us-more-new-vehicle-shoppers-dig-their-heels- internal-combustion

Consumer interest in EVs is heavily swayed by the purchase price. According to the April 2023 JD Power E-Vision Intelligence report,143 the primary barriers to EV purchase over the past 10 months have been the lack of public charging infrastructure and price (Figure 31). [EPA-HQ-OAR-2022-0829-0701, pp. 82-83]

143 JD Power (n.d.). JD Power EV Index. JD Power EV Index. Retrieved June 10, 2023, from htps://www.jdpower.com/business/e-vision

Figure 31: Top 10 Reasons for EV Purchase Rejection144 [EPA-HQ-OAR-2022-0829-0701, pp. 82-83]

144 EV Divide Grows in U.S. as More New-Vehicle Shoppers Dig In Their Heels on Internal Combustion, J.D. POWER (May 1, 2023), htps://www.jdpower.com/business/resources/ev-divide-grows-us-more-new-vehicle-shoppers-dig- their-heels-internal-combustion.

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

Decreasing Costs. EPA's claims about the costs of purchasing and owning an electric vehicle also suffer multiple flaws.

EPA acknowledges that retail prices are typically higher for electric vehi- cles, but it asserts that the price difference is expected to "narrow or disappear" in the coming years. 88 Fed. Reg. at 29,190. That prediction rests primarily on EPA's expectations regarding declining costs of batteries and purchase incen- tives provided in the Inflation Reduction Act ("IRA"). EPA overestimates the effect that these factors will have on upfront purchase prices. [EPA-HQ-OAR-2022-0829-0683, pp. 24-25]

EPA also assumes without justification that manufacturers will pass sav- ings on to purchasers in the form of lower vehicle prices. EPA must assess— not guess—the impact that the Advanced Manufacturing Production Credit is likely to have in the relevant years before relying on that credit to justify its determination regarding feasibility. [EPA-HQ-OAR-2022-0829-0683, p. 30]

EPA separately claims that, even if retail prices remain higher, the total cost of ownership for electric vehicles is lower and will in turn incentivize purchasers to buy them despite higher up-front outlays. 88 Fed. Reg. at 29,190, 29,312. According to the agency, electric-vehicle buyers will save "between $9,000 and $13,000 on operating expenses over the first 8 years of vehicle life." Draft RIA at 4-21. But not all consumers can make purchasing decisions based on savings that they hope to experience years later. "Buying a new car is the second most expensive purchase a consumer makes behind buying a house." Charette, Con- vincing Consumers. In many cases, the price for an electric vehicle will amount to “nearly 100 percent of an annual US median household income.” Id. Poten- tial customers “may not be interested” in those operating-cost savings “if meet- ing today’s monthly auto payments is difficult.” Id. In addition, consumers who focus on the total cost of ownership of a vehicle must consider not only day-to- day operating expenses but also other “extra costs” of purchasing an electric vehicle—such as the need to install home charging equipment, “which can add several thousand dollars more,” and higher insurance costs that “could add an extra $500-$600 a year.” Id. The total cost of ownership, therefore, may not be a selling point for many consumers in the vehicle market. [EPA-HQ-OAR-2022-0829-0683, p. 30]

For these reasons, EPA falls far short of supporting the projected adoption rates upon which its analysis of the feasibility of its proposed rule rests. [EPA-HQ-OAR-2022-0829-0683, p. 30]

Second, EPA concludes that the costs of the proposed rule would be offset by a $580 billion reduction—which EPA counts as a “benefit”—in “mainte- nance and repair costs” that it expects consumers to realize by shifting to elec- tric vehicles. 88 Fed. Reg. at 29,372, 29,385. As support for this enormous sum, EPA points to a single study suggesting that lifetime repair-and-maintenance costs for electric vehicles will be less than for combustion-engine vehicles. See Draft RIA at 4-32. In so doing, the agency unreasonably ignores countervailing sources suggesting the opposite. For instance, Consumer Reports has found that consumers report more problems with electric vehicles than combustion- engine vehicles—including issues with battery packs, charging, electric drive motors, and heating and cooling systems unique to electric vehicles. Jake Fisher, Tesla and Nissan Make the Most Reliable Electric Vehicles, Consumer Reps. (Dec. 14, 2022), https://tinyurl.com/mryx9z6c. It also takes longer, and costs more, for problems with electric vehicles to get resolved. Charette, Convincing Consumers. And there are fewer qualified technicians to resolve them: out of 229,000 auto-repair technicians in the United States, only 3,100 are certified for electric vehicles. Id. Moreover, if a manufacturer goes out of business (much more common in the nascent electric-vehicle industry), purchasers of that com-pany’s vehicles will be on their own in seeking to repair the vehicles, without standard manufacturer-servicing support. Beia Spiller et al., Medium- and Heavy- Duty Vehicle Electrification: Challenges, Policy Solutions, and Open Research Questions, Res. for the Future, at 13 (May 2023). Any final rule must explain why EPA’s fuel-savings figures are realistic in the face of this contrary evidence. [EPA-HQ-OAR-2022-0829-0683, pp. 62-63]

Third, EPA asserts that consumers will receive $890 billion in fuel savings— in other words, that operating electric vehicles will be cheaper than operating combustion-engine vehicles because consumers will no longer need to purchase fuel directly. See 88 Fed. Reg. at 29,362. But this figure depends on consumers’ choosing to switch from their familiar combustion-engine vehicles to electric vehicles in overwhelming numbers. Even if all of the obstacles to manufactur- ing and charging electric vehicles discussed above could be overcome, the fuel savings EPA posits still would not materialize unless individuals decide to pur- chase those vehicles. For the reasons already noted, there is ample reason to doubt that consumers would do so, including based on concerns about electric vehicles’ higher up-front costs and perceptions that charging and maintenance facilities are inadequate. [EPA-HQ-OAR-2022-0829-0683, pp. 63-64]

To the extent EPA believes that the prospect of fuel and other operational savings itself would motivate consumers to adopt electric vehicles in sufficient numbers, experience thus far indicates otherwise. As EPA acknowledges, if abandoning combustion-engine vehicles in favor of electric vehicles actually resulted in net operating savings, rational users of combustion-engine vehicles would likely already be switching to electric vehicles in much greater numbers than they are today. See 88 Fed. Reg. at 29,397; Draft RIA at 4-38–39 (noting that "[c]onventional economic principles" would lead "people [to] buy [electric vehicles]"). The fact that consumers are not doing so—but instead currently "tend to favor [combustion-engine] vehicles over" the electric vehicles that are available now even "when two vehicles are comparable in cost and capability," 88 Fed. Reg. at 29,342—is a strong indication that EPA's asserted savings do not in reality outweigh the costs of switching to electric vehicles. [EPA-HQ-OAR-2022-0829-0683, pp. 63-64]

EPA attempts to sidestep this problem by invoking a supposed "energy ef- ficiency gap," positing a market failure that is responsible for skewing consum- ers' decisions away from purchasing electric vehicles. 88 Fed. Reg. at 29,397. But EPA provides no evidence demonstrating that low adoption of electric ve- hicles is actually the result of any such market failure, as opposed to well- founded concerns about the drawbacks of the technology. EPA offers only a hope that nothing "immutable within consumers or inherent to" electric vehi- cles will "irremediably obstruct[] acceptance." Id. at 29,312. But in light of the gap between the data and consumer behavior on the one hand, and EPA's rosy savings estimates on the other, any final rule must explain why EPA's fuel- savings figure is realistic and why it is an appropriate offset for the rule's costs. See Am. Pub. Gas Ass'n v. DOE, 22 F.4th 1018, 1027–28 (D.C. Cir. 2022). EPA cannot justify an economy-altering rule by invoking an ill-defined, unsubstan- tiated market failure of its own imagining. [EPA-HQ-OAR-2022-0829-0683, pp. 63-64]

Organization: American Fuel & Petrochemical Manufacturers

Additional barriers to ZEV adoption by particularly low-income stakeholders, include but are not limited to restricted driving/battery range; inability to charge in different housing and work situations; high price points to purchase, maintain, and insure EVs; availability of replacement parts and qualified mechanics, as well as ease and cost of repairs; and unpredictability regarding future electricity costs. EPA cannot ignore these real-world limitations. [EPA-HQ-OAR-2022-0829-0733, p. 33]

EPA also assumes the increased supply of ZEVs—resulting from OEMs' planned production expansions and offering of more ZEV models, charging infrastructure, purchase incentives, and lower battery prices—will lead to lower ZEV prices.239 EPA ignores that battery prices have begun to rise due to limited supply of minerals.240 While there are some affordable EVs, these EVs typically have a range below 200 miles on a full charge.241 If consumers want longer range EVs, they will pay a considerable purchase price as seven of the top ten, range-rated EVs cost anywhere from $74,800 to $110,295.242 EPA's analysis also fails to account for the increased vehicle sales tax and property tax associated with the higher purchase price of ZEVs (even after myriad subsidy programs). [EPA-HQ-OAR-2022-0829-0733, pp. 52-53]

239 DRIA at 4-23.

240 BLOOMBERGNEF "Lithium-ion Battery Pack Prices Rise for First Time to an average of $151/kWh" (Dec. 6, 2022) available at https://about.bnef.com/blog/lithium-ion-battery-pack-prices-rise-for-first-time-to- an-average-of-151-kwh/

241 See Sebastian Blanco, List of EVs Sorted by Range (Sept. 1, 2022), www.jdpower.com/cars/shopping-guides/list-of-evs-sorted-by-range.

242 See Nicholas Wallace, Austin Irwin, & Nick Kurczewski, Longest Range Electric Cars for 2023, Ranked (Mar. 23, 2023), https://www.caranddriver.com/features/g32634624/ev-longest-driving-range/.

EPA's cost benefit analysis is implicitly built around much longer battery life than is currently achieved, as EPA does not factor in battery replacement costs or the environmental implications of additional battery production, recycling, and disposal. EPA cannot have it both ways – either the batteries are remarkably durable, or the costs of this Proposed Rule are dramatically understated. Even with massive direct and indirect subsidies, EVs are more expensive on average than their ICEV counterparts and unaffordable for many households. In the first calendar quarter of 2022, the average price of the top-selling light-duty ZEV in the U.S. was about $20,000 more than the average price of top-selling ICEV.243 The price disparity has not improved, with the average price of light-duty EVs near $66,000 in August 2022 and continuing to rise.244 [EPA-HQ-OAR-2022-0829-0733, pp. 52-53]

243 Registration-weighted average retail price for the 20 top-selling ZEVs and ICEVs in the U.S. S&P Global, Tracking BEV prices – How competitively-priced are BEVs in the major global auto markets? May 2022.

244 Andrew J. Hawkins, EV prices are going in the wrong direction (The Verge Aug. 24, 2022), available at https://www.theverge.com/2022/8/24/23319794/ev-price-increase-used-cars-analysis-iseecars (last visited May 24, 2023); see also Justin Banner, Latest Ford F-150 Lightning Price Hike Hands Chevy Silverado EV a $20K Advantage--The least-expensive electric F-150 Lightning now costs $4,000 more than it did late last year (Motortrend Mar. 30, 2023), available at https://www.motortrend.com/news/2023- ford-f-150-lightning-pro-price-increase-msrp/ (last visited May 24, 2023).

iv. Total cost of ownership

EPA's proposal also vastly underestimates the cost of ownership for ZEV owners by assuming ZEVs achieve real-world fuel economy that is equivalent to EPA's test methods. They do not and it is not close. This error significantly undermines EPA's estimates of costs for both ZEV owners and associated power infrastructure and charging infrastructure requirements. As noted in the environmental benefits discussion above, EPA's proposal is based on performance data estimates of ICEV fuel economy using EPA's "5-cycle method." If EPA's analysis were based on real-world fuel economy testing of ZEVs, it would show they use vastly higher amounts of electricity to travel the same distance, with a corresponding increase in ZEV owner costs for electricity and ZEV maintenance and battery replacement. EPA must account for these real costs. [EPA-HQ-OAR-2022-0829-0733, p. 55]

EPA's total cost of EV ownership incorrectly assumes each vehicle type of all new ICEV and ZEV will travel the same miles each year.249 EVs have less range, both technically and practically. As noted by J.D. Power, "the majority of EVs provide between 200 and 300 miles of range on a full charge."250 Studies show that the average electric car is driven 9,059 miles per year, compared with 12,758 miles for ICEVs.251 By overestimating VMT, EPA compounds all other errors in its assumptions that all work in favor of ZEVs and to the detriment of ICEVs. [EPA-HQ-OAR-2022-0829-0733, p. 55]

249 DRIA at 4-20, Table 4-7 (e.g., EPA assumes EV and ICEV sedans/wagons will both travel 15,700 miles per year).

250 See Sebastian Blanco, List of EVs Sorted by Range (Sept. 1, 2022), www.jdpower.com/cars/shopping-guides/list-of-evs-sorted-by-range.

251 iSeeCars, The Most and Least Driven Electric Cars (May 22, 2023), https://www.iseecars.com/most-driven-evs-study.

Another way that EPA justifies lower EV ownership costs is by failing to fully account for current state excise tax policies and insurance that establish higher costs for ICEV owners and lower costs for ZEV owners. Insurance premiums for PEVs are typically higher than comparable ICEVs because of higher repair and parts cost. The price premium depends on the make and model, age of the driver, geographic location, and state. According to ValuePenguin, insurance on a PHEV, depending on the model, could be 19 percent to 32 percent higher than comparable ICEV.252 Another estimate from an Oct 2022 study from Self Financial concludes PEVs' annual insurance is $1,674, $442 more compared to an ICEV annual insurance premium of $1,232.253 [EPA-HQ-OAR-2022-0829-0733, p. 55]

252 How Much Does Electric Car Insurance Cost? - ValuePenguin.

253 Electric Cars vs Gas Cars Cost in Each State | Self Financial.

Should EPA mandate that most new vehicles will be ZEVs, it will become increasingly untenable for ICEV owners to either further subsidize ZEV owners by paying higher excise taxes, or for states to suffer a shortfall in revenue collections by continuing to give preferential treatment to ZEV owners. EPA must acknowledge these significant costs necessarily must increase for ZEV owners as EPA mandates higher ZEV sales. [EPA-HQ-OAR-2022-0829-0733, p. 55]

Finally, EPA's total cost of ownership analysis assumes dramatically lower retail fuel costs for ZEVs (around 60 percent less) than liquid fuels.254 Real-world data squarely contradicts EPA's cost assumptions on EV charging. For example, California's ZEV mandates have contributed to the inflationary impacts on energy prices and on jobs in certain industries related to traditional fuels and vehicles. According to a 2021 California Public Advocates Office presentation to the California Public Utilities Commission, "it is already cheaper to fuel a conventional internal combustion engine (ICE) vehicle than it is to charge an EV" in the San Diego Gas & Electric Co. service area.255 This is astonishing given that gasoline prices in California are the second highest in the nation, averaging approximately $4.01 per gallon of gasoline in 2021. Future projections afford consumers no relief, as the California Energy Commission projects that both commercial and residential electricity prices will continue to rise, reaching nearly $7 per gasoline-gallon equivalent for the commercial sector. Similarly, many in New England are finding it is costing more to charge up than fill up, paying $0.28 per kilowatt hour (double the price of the national average) in the fall of 2022.256 EPA must revise its analysis to account for realistic electricity prices. [EPA-HQ-OAR-2022-0829-0733, pp. 55-56]

254 DRIA at 4-20, Table 4-7.

255 California Public Utilities Commission, "Utility Costs and Affordability of the Grid of the Future" (May 2021). Presentation from Mike Campbell, Public Advocates Office at 116-117 available at https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/office-of-governmental-affairs-division/reports/2021/senate-bill-695-report-2021-and-en-banc-whitepaper_final_04302021.pdf#page=117.

256 Irina Ivanova, https://www.cbsnews.com/moneywatch?ftag=CNM-16-10abg0dFor some electric vehicle owners, recharging now more costly than filling up, CBS News Money Watch, Feb. 13, 2023. Available at Electric cars 2023: In some parts of the U.S., recharging now more costly than filling up - CBS News.

Finally, charging pricing has been unpredictable, with some stations charging by the minute instead of charging for electricity consumed.257 Other charging stations offer multiple subscription plans or charge different rates at various times of day, resulting in significant price increases over the past few months.258 Boston charging companies raised charging fees in response to New England utilities increasing their rates to 39 cents per kilowatt-hour in February 2023, from 27 cents a year earlier.259 [EPA-HQ-OAR-2022-0829-0733, p. 56]

257 Aaron Pressman, “Inside the crazy, mixed-up world of electric-vehicle charger pricing,” The Boston Globe, March 27, 2023. Available at https://www.boston.com/news/the-boston-globe/2023/03/27/electric-vehicle-charger-pricing.

258 Id.

259 Id.

However, building more charging stations is not enough. “Electricity purchased at a public charger can cost five to ten times more than electricity at a private one.”278 Lower-income consumers cannot afford to install solar photovoltaics, which proponents claim will allow ZEVs to be charged at home with emissions-free electricity.279 Those who cannot afford private charging will end up paying vastly more for a re-charge than the wealthy. For those who simply cannot afford the upfront costs for a new EV or pay higher public charging rates, they may end up retaining older ICEVs for longer. [EPA-HQ-OAR-2022-0829-0733, p. 60]

278 Id.

279 Jonathan A. Lesser, Short Circuit: The High Cost of Electric Vehicle Subsidies 4, Manhattan Institute (May 15, 2018), available at https://media4.manhattan-institute.org/sites/default/files/R-JL-0518-v2.pdf.

Organization: American Highway Users Alliance

We are also concerned that the proposed rule, among other impacts, would increase vehicle costs for consumers. At the end of the first quarter of 2023, the price of an EV was more than double the price of a subcompact car.1 This represents a real financial challenge for middle class mobility; for families that need a basic vehicle to get to work, health care, the grocery store, and other fundamental destinations, and for local business travel, such as meetings and sales calls, particularly for small business. [EPA-HQ-OAR-2022-0829-0696, p. 2]

1 https://www.autosinnovate.org/posts/papers-reports/get-connected-2023-q1 (page 4).

Feasibility of the proposal is highly questionable and benefits are likely overestimated We are skeptical that the GHG and criteria reductions estimated by EPA can be realized in the proposed rule’s timeframe. [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

We noted above the substantially greater cost of EVs. With such a cost differential (even if the differential is reduced somewhat in coming years), many consumers and businesses can be expected to keep and maintain existing vehicles (average age just over 12 years) rather than pay for new, much more expensive electric vehicles. [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

Additionally, the cost of the vehicle itself is not the only consideration for a consumer in making a purchasing decision. Many businesses and hard-working families will not purchase a vehicle unless both the vehicle and fuel are cost effective and meet their needs. At this point the availability of charging stations, while increasing, seems unlikely to approach the current ubiquitous availability of fuel at gas stations within the time frame of the rule. That could result from various electricity supply and transmission issues, including the time delay and cost involved in building out more connections between the grid and charging stations.4 [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

4 A statement submitted to EPA in conjunction with EPA's May 3 hearing in the heavy-duty vehicle Phase 3 docket by ABF Freight System, a major trucking company with over 4,500 Class 8 and Class 6 vehicles, noted a wait of 2 years and counting for added utility infrastructure at a facility to support the company's current EV trucks (only 6) and anticipated EV truck purchases.

Moreover, a recent ATRI study found that electrification of the entire U.S. vehicle fleet would consume 40.3% of the current electricity demand, yet our aging national grid can hardly sustain its current needs.5 [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

5 Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet, American Transportation Research Institute, December 2022. https://truckingresearch.org/2022/12/charging-infrastructure-challenges-for-the-u-s-electric-vehicle-fleet/

For such reasons the benefits of the proposed rule as estimated by EPA appear to be overstated, as the vehicle fleet will not turn over to EVs as quickly as EPA estimated. Further, the proposed rule will limit consumer choice and the mobility of the American public. [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

Organization: American Petroleum Institute (API)

2. ZEV penetration/customer uptake and adoption rates.

LMD ZEVs are currently not available in sufficient quantities or at affordable levels to significantly displace ICEVs. Given the lower costs, current ICEV owners may choose to continue to use and extend the life of their ICEVs to avoid these issues. EPA must address the potential impacts of this likelihood on its emissions projections. [EPA-HQ-OAR-2022-0829-0641, p. 15]

Organization: Anonymous

EPA also incorrectly assumes that the tax credits are free. They use the tax credits to offset the costs of BEVs, but they do not consider the costs to taxpayers to fund the tax credits. This hides the costs of BEVs to the American Population by hundreds of billions. Furthermore, EPA does not address the societal inequities that will be produced by providing tax credits for BEVs. Since BEVs are typically more expensive than basic ICE vehicles and the fact that the tax credits are non-refundable (meaning that you have to carry a tax liability to get the benefits of the tax credit), all taxpayer funds will be going towards funding new BEVs for richer Americans. In this sense, EPA's reduces environmental justice by forcing BEVs. [EPA-HQ-OAR-2022-0829-0565, p. 4]

Finally, EPA's estimates of tax credits overstates their applicability. The Clean Vehicle credit has some restrictions that will limit how many vehicles qualify and how much. EPA should model these restrictions or at the very least make a good faith estimate. For the commercial clean vehicle tax credit, EPA ignores the cost-basis nature of the credit an d assumes that everyone will lease a vehicle to get the EV tax credit while ignoring the lost utility of owning a vehicle. [EPA-HQ-OAR-2022-0829-0565, p. 4]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

The Proposal Will Provide Economic Benefits

Not only would U.S. EPA's proposed standards bring critically important emission reductions to combat climate change, improve air quality, and protect public health, the increased ZEV penetration across the U.S. would also provide important economic benefits such as consumer savings and economic growth in clean technology sectors. As CARB noted in its comments on the DRIA, U.S. EPA's analysis demonstrates considerable net benefits to the nation, and these benefits are likely understated. [EPA-HQ-OAR-2022-0829-0780, p. 65]

U.S. EPA's analysis considers consumer benefits in assessing the impacts of its proposal. Consumers stand to benefit greatly from more stringent emission standards implemented at the national level. CARB notes that ZEV technology costs are rapidly declining, and even today ZEVs are often cheaper for consumers than internal combustion engines when considering the total cost of ownership. 126 In its ACC II rulemaking process, CARB estimated the benefits to individuals associated with ZEV adoption. CARB found that, for BEVs, operational savings will offset any incremental costs over the 10-year period evaluated, with a 300-mile-range BEV providing savings in the first year for the 2026 MY. 127 Statewide, CARB estimated that California vehicle owners would save $11 billion (2020 dollars) from implementation of the regulation, driven primarily by lower fuel costs and dramatic savings in maintenance and repair associated with ZEV ownership. These savings are even greater when paired with incentives that reduce upfront purchase prices like those included in the Inflation Reduction Act. Lower operating and maintenance costs are especially important for lower-income consumers who spend a greater share of their incomes on transportation. U.S. EPA's proposal would help ensure that consumers across the U.S. can realize these cost savings. [EPA-HQ-OAR-2022-0829-0780, p. 65]

126 ACC II FSOR. Appendix F: Updated Costs and Benefits Analysis. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/fsorappf.pdf.

127 ACC II ISOR. pp. 143-145. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf

Organization: Charles Forsberg

The initial cost of light vehicles must not significantly increase. For the majority of Americans, the biggest barrier to vehicle ownership is the initial cost-not long term fuel costs. Vehicle ownership opens up job opportunities because people can get to many different job sites, creates a competitive market for consumer goods and increases life expectancies. When in the early 1900s Ford developed the manufacturing line that enabled low-cost cars, America rapidly converted to automobiles because the benefits of transportation on demand were so obvious to everyone-and ignored by EPA. [EPA-HQ-OAR-2022-0829-0738, pp. 5-6]

Without vehicle ownership, many jobs are off limits. Without vehicle ownership one is held hostage by the local grocery store that knows its customers can't visit the competition down the road and thus it can raise prices. The proposed EPA solutions are for the wealthiest 5% of the planet and the top 20% of Americans. High-cost vehicles are a health disaster because the strongest correlation in health is with income. To use a recent example, China has terrible air pollution but life expectancies have increased rapidly. The small gains in health that EPA believes will derive from electrifying transportation will be totally overwhelmed by the poor health effects of driving down economic opportunities for the bottom half of society by making light vehicles too expensive. The EPA strategy is an economic disaster to rural America and smaller cities where inexpensive transportation is required. [EPA-HQ-OAR-2022-0829-0738, pp. 5-6]

Recommended EPA action. EPA must consider all of American society-not just the top 20%. Incomes of much of the working class have gone down as a direct consequence of failed government policies with good intensions. Poverty generation needs to stop. EPA must consider all health impacts-not just "cherry pick" a small subset where improvements by those metrics to improve health are overwhelmed by large decreases in life expectancy due to "secondary" effects. [EPA-HQ-OAR-2022-0829-0738, pp. 5-6]

I recommend you read the papers referenced above that go into the details-all open access. Good intentions are not enough. The poster child is Germany where they have invested massively in low-carbon technologies for 20 years without significantly changing greenhouse gas emissions. They chose faith-based feel-good strategies rather than hard-headed engineering analysis. That catastrophic failure should be a warning to EPA. [EPA-HQ-OAR-2022-0829-0738, pp. 5-6]

Organization: Charles Gordon

INCONVENIENCE TO PEOPLE

The rapid elimination of new gas-powered cars creates real inconvenience for ordinary people. Those who live in apartment buildings will have to find charging stations where it will take 30 minutes to recharge. This will particularly hurt the poor and minorities. Long trips by car will require careful planning and 30-minute interruptions to recharge. Towing large trailers will be virtually impossible. This is added to the existing inconvenience of more expensive washing machines which take 60 minutes to wash a load-not 30 and dishwashers which take 2 hours to poorly wash dishes. [EPA-HQ-OAR-2022-0829-0747, p. 7]

It may be hard to put a dollar amount on this inconvenience, but it is real nonetheless. EPA needs to take that inconvenience into account when it reviews the proposed rule. [EPA-HQ-OAR-2022-0829-0747, p. 7]

Organization: Consumer Energy Alliance (CEA)

As consumers become more accepting of electric vehicles (EV), taxpayer-funded incentives expand, and automobile manufacturers produce a greater variety of models, EV purchases are expected to keep growing. Policymakers, however, should be increasingly mindful not to put the cart before the horse when it comes to attempting to drive consumers to purchase products they aren't ready to accept, they can't afford to purchase, and that face significant supply-chain bottlenecks that are already limiting supply and increasing costs. This is an area which we explored in-depth in our report Freedom to Fuel: Consumer Choice in the Automotive Marketplace.1 [EPA-HQ-OAR-2022-0829-0788, pp. 1-2]

1 https://consumerenergvalliance.org/cms/wp-content/uploads/2023/06/CEA EV REPORT 2023.pdf

Should this rule be adopted in its current form - lacking both technological feasibility and economic practicality - the result will be limiting consumer options and thwarting environmental progress through depressing innovation. [EPA-HQ-OAR-2022-0829-0788, pp. 1-2]

Organization: Competitive Enterprise Institute

II. The Proposed Standards Imperil Consumer Choice, Vehicle Affordability, and Market Liberty

EPA's proposal will restrict consumers' freedom to choose which types of vehicles they want to buy.12 [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

As the EPA acknowledges, Congress is already providing tens of billions of dollars in EV-related subsidies, such as the IRA's $7,500 tax credit, "effectively making some BEVs more affordable to buy and operate today than comparable ICE vehicles."13 The only purpose for heaping EV mandates on top of EV subsidies is to eliminate choices consumers would otherwise make. [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

12 Diana Furchtgott-Roth, "Biden's Plan to Phase Out Gas-Powered Cars Is All Pain for Consumers and No Gain," The Hill, June 12, 2023, https://www.heritage.org/government-regulation/commentary/bidens-plan-phase-out-gas- powered-cars-all-pain-consumers-and-no. 13 88 FR 29190.

13 88 FR 29190.

EVs have several well-known drawbacks that regulatory mandates do not remove but rather intensify by restricting the supply of ICE vehicles available for purchase. Those disadvantages include the high purchase price,14 price volatility due to supply-chain bottlenecks,15 range anxiety 16(especially in towing mode),17 long recharging times,18 reduced performance in extreme heat and cold,19 and less reliability during blackouts from hurricanes and other disasters. 20 [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

14 For example, in 2022, the initial purchase price of a conventional Ford F-150 was $40,960, that of the electric Ford-150 Lightning was $54,769. Roberto Baldwin, Sasha Richie, and Dave Vanderwerp, "EV vs. Gas: Which Cars Are Cheaper to Own?" Car and Driver, October 28, 2022, https://www.caranddriver.com/shopping- advice/a32494027/ev-vs-gas-cheaper-to-own/. The authors conclude that overall EV ownership costs are lower than those for gasoline powered vehicles (factoring in expenses for maintenance and fuel). Nonetheless, the higher EV purchase is a disadvantage that undoubtedly matters to many consumers.

15 Mark P. Mills, Testimony, "Exposing the Environmental, Human Rights, and National Security Risks of the Biden Administration's Rush to Green Policies," Subcommittee on Environment, Manufacturing, and Critical Materials, U.S. House Committee on Energy and Commerce, April 26, 2023, https://media4.manhattan- institute.org/wp-content/uploads/Testimony_House_Energy_Mills_4-26-2023.pdf; Institute for Energy Research, "Transition Mineral Prices Are Soaring and the Industry Is Short of Workers," June 9, 2023, https://www.instituteforenergyresearch.org/uncategorized/transition-mineral-prices-are-soaring-and-the-industry-is- short-of-workers/.

16 Analytics Team, "Survey: Price and Range, Not Gas Prices, Dominate Worries about EVs," Autolist.Com, July 20, 2022, https://www.autolist.com/news-and-analysis/2022-survey-electric-vehicles.

17 Alex Knizek, "How Well Can an Electric Pickup Tow?" Consumer Reports, April 21, 2023, https://www.consumerreports.org/cars/hybrids-evs/how-well-can-an-electric-pickup-truck-tow-a1149286680/: "As capable and smooth as the EVs are, they simply cannot match the heavy long-distance towing capabilities of gas, hybrid, and diesel-powered trucks. This is primarily due to the severely limited range, and the amount of time that would be required for charging during the trip. Accessing a public charger with a trailer in tow also presents potentially significant logistical challenges."

18 Ronald Montoya, "How Long Does It Take to Charge an Electric Car?" Edmunds.Com, March 7, 2023, https://www.edmunds.com/electric-car/articles/how-long-does-take-charge-electric-car.html

19 Steve Hanley, "Electric Cars, Winter Driving, Range Anxiety, and You," CleanTechnica, February 25, 2022, https://cleantechnica.com/2022/02/25/electric-cars-winter-driving-range-anxiety-you/.

20 Shawn A. Adderly, Daria Manukian, Timothy D. Sullivan, and Mun Son. 2018. Electric vehicles and natural disaster policy implications. Energy Policy 212: 437-448, https://www.sciencedirect.com/science/article/abs/pii/S0301421517305906; Diana Furchtgott-Roth, "Electric Vehicles Powerless During Hurricanes," Forbes, September 5, 2021, https://www.forbes.com/sites/dianafurchtgott- roth/2021/09/05/electric-vehicles-powerless-during-hurricanes/?sh=107d1bfe48da.

The proposed standards would impose disproportionate burdens on low-income, single-vehicle households. My colleague Ben Lieberman explains: [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

The higher purchase price of an EV is prohibitive enough, but it is only part of the story. Fully one-third of American households are single-vehicle households, including many low-income ones.21 However, the limitations of EVs make them impractical as a household's one and only vehicle. This includes long charging times (especially inconvenient for renters who are less likely to be able to charge at home) as well as limited range. Indeed, nearly 90 percent of EVs currently in use are part of wealthier multi-car households that include one or more gas-powered vehicles.22 Thus, the EV agenda not only involves the higher sticker price relative to gasoline-powered vehicles, but also the additional cost of a conventional vehicle to back it up.23 [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

21 The Geography of Transport Systems, Percentage of Households by Number of Vehicles, 1960-2020, https://transportgeography.org/contents/chapter8/urban-transport-challenges/household-vehicles-united-states/ (accessed July 5, 2023).

22 Lucas W. Davis. 2019. How much are electric vehicles driven? Applied Economics Letters, Vol. 26, No. 18, 1497- 1502, https://faculty.haas.berkeley.edu/ldavis/Davis%20AEL%202019.pdf.

23 Ben Lieberman and Donna Jackson, "Costlier cars help the poor, according to EPA," Open Market, June 26, 2023, https://cei.org/blog/costlier-cars-help-the-poor-according-to-epa/.

Government's cartelization of the auto industry via regulations and preferential subsidies poses an insidious threat to consumer welfare. The IRA and the EPA's mandates increase automakers' dependence on political subventions while preventing both industry incumbents and new entrants from competing on price, range, and ease-of-fueling by selling gasoline-powered cars. Energy analyst Robert Bryce recently reported that Ford loses $64,466 on every EV it sells, "and isn't making up for it in volume." 24 Bryce cautions that "if a business isn't profitable, it isn't sustainable." [EPA-HQ-OAR-2022-0829-0611, pp. 4-6]

24 Robert Bryce, "Ford Is Losing $64,446 on Every EV It Sells," Substack, May 3, 2023, https://robertbryce.substack.com/p/ford-is-losing-66446-on-every-ev.

Organization: Consumer Energy Alliance (CEA)

While there are clearly many reasons to pursue EVs as a mobility option, there are many real world economic, social, and practical considerations the U.S. EPA should fully review before adopting overly restrictive transportation policies. Consumer impacts -especially the impacts imposed on those with low- and fixed-incomes -need to be front and center in these discussions. [EPA-HQ-OAR-2022-0829-0788, p. 2]

Regarding the vehicles that will be mandated because of this rule, has the U.S. EPA considered affordability of vehicles for low- and middle-income families? The average EV cost $65,041 in 2022 while the overall average automobile cost only $48,681, according to Kelly Blue Book data - a $16,360 upfront price differential. This differential is more than two times the incentives offered by the federal government to purchase qualifying EVs.5 Clearly, even with the incentive, EVs are out of the price range for the average American. [EPA-HQ-OAR-2022-0829-0788, pp. 2-3]

5 https://b2b kbb com/news/view/new-vehicle-pnces-hit-record-high-in-november 2022/

Will low- and middle-income families fare better in the used vehicle market? [EPA-HQ-OAR-2022-0829-0788, pp. 2-3]

A National Automobile Dealers Association study on the cost of ownership estimated that after five years, EVs depreciate $43,515 in value, while ICE vehicles average only $27,883 in depreciation.6 This depreciation almost eliminates any residual value advantage of the higher priced EVs after only a short period of usage. If EVs become a non-viable option as used cars due to substantial depreciation and cost of battery replacement, used car markets operating under EV mandates will see very constrained supply despite sustained demand, eventually making even used cars too expensive for many working-class families. [EPA-HQ-OAR-2022-0829-0788, p. 3]

6 https://www.nada.orfi/nada/nada-headlines/bevond-sticker-price-cost-ownership-evs-v-ice-vehicles

The initial purchase of an EV Is not one that working-class families can often consider As noted earlier, the price differential between an EV and a comparable ICE vehicle is often greater than $15,000. And contrary to popular opinion, the cost of EVs have been steadily increasing since 2015. Today, the average EV costs well over $60,000, a price which can only be considered affordable by the upper quintiles of income earners This is not an option for the average working-class family. [EPA-HQ-OAR-2022-0829-0788, p. 3]

Organization: Consumer Reports (CR)

1.2. The Benefits of Strong Vehicle Standards to Consumers

Inefficient vehicles impact consumers in a number of ways. Consumers face higher transportation costs when using less efficient vehicles. Inefficient vehicles produce higher levels of air pollution and greenhouse gas (GHG) emissions. Criteria pollutants such as ozone and particulate matter cause health issues such as respiratory diseases, lung cancer, preterm births, and neurological damage,1,2 which lead to increased spending on public and individual healthcare. GHG emissions contribute to extreme weather events such as extreme heat, flooding, and drought which cost consumers billions of dollars in property damage and increased insurance premiums.3 [EPA-HQ-OAR-2022-0829-0728, pp. 5-6]

1 Air Pollution: Everything You Need to Know, Natural Resources Defense Counsel, 2021, https://www.nrdc.org/stories/air-pollution-everything-you-need-know.

2 Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects, Health Effects Institute, 2010, https://www.healtheffects.org/publication/traffic-related-air-pollution-critical-review-literature-emissions-exposure-and-health.

3 U.S. Billion-Dollar Weather and Climate Disasters, NOAA National Centers for Environmental Information, 2022, https://www.ncei.noaa.gov/access/billions.

These issues are exacerbated in overburdened communities, such as communities of color, due to redlining and other historically discriminatory policies which place these communities along ports and high-transit corridors. Increasing the supply of electric vehicles (EVs) and other lower emission vehicle technologies can mitigate these impacts and contribute to an equitable transportation ecosystem for all consumers. [EPA-HQ-OAR-2022-0829-0728, pp. 5-6]

Providing consumers with cleaner and more energy-efficient vehicle technologies can significantly lower these costs, and enables consumers to make purchasing decisions that save them money. [EPA-HQ-OAR-2022-0829-0728, pp. 5-6]

The proposed EPA rule would increase the supply of cleaner, cost-saving transportation options, such as EVs and hybrids, available to consumers. This proposal, particularly the more stringent Alternative 1, would support the transition to a cleaner transportation sector, providing cost savings, as well as other benefits that go beyond the pocketbook. This proposal would save consumers money on fuel and vehicle maintenance. It would also reduce emissions, thus contributing to reduced spending on healthcare costs tied to air pollution, and disaster recovery tied to GHG emissions [EPA-HQ-OAR-2022-0829-0728, p. 6].

These savings are particularly important for overburdened communities who overwhelmingly bear the brunt of the negative impacts of air pollution. Not only do these communities face a disproportionate exposure to vehicle tailpipe emissions,4 but lower income households also spend a greater percentage of their income on transportation costs than their wealthier counterparts, making them more sensitive to fluctuation and uncertainty in fuel prices.5 Thus, policies such as the proposed rule, which reduce pollutant exposure and increase accessibility to clean, reliable modes of transportation, are needed [EPA-HQ-OAR-2022-0829-0728, p. 6].

4 Disparities in the Impact of Air Pollution, American Lung Association, April 2020, https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities.

5 High Cost of Transportation in the United States, Institute for Transportation and Development Policy, May 2019, https://www.itdp.org/2019/05/23/high-cost-transportation-united-states.

1.3. Consumer Petitions in Support of Proposed Rule

Consumer Reports collected 18,817 signatures from consumers in support of strengthening EPA’s current proposal for greenhouse gas standards.6 [EPA-HQ-OAR-2022-0829-0728, p. 6]

6 Petition: More Clean Vehicles = Better Climate Future, Consumer Reports, 2023, https://action.consumerreports.org/nb-20230425-epa-cleancars-petition.

Petition Text:

“We’re urging the EPA and NHTSA to adopt the strongest possible rules to reduce climate- and health-damaging vehicle emissions and greatly reduce fuel consumption, while helping consumers save an estimated $12,000 over the lifetime of a new vehicle. The rules will rapidly accelerate the number of cleaner vehicles like EVs and hybrids in production over the next decade; save lives due to a dramatic decrease in tailpipe pollution; and put us on the route towards a zero emissions future. These rules are a win-win for the climate, consumers’ wallets, and our health.” [EPA-HQ-OAR-2022-0829-0728, p. 6]

5. 2023 EV Ownership Cost Comparison

Many more EVs have entered the market, and significant changes have been made to the federal EV tax credit since CR released its EV ownership cost study in 2020. Given these changes, updated analysis of current EV ownership costs has been performed and is presented in this section.29 [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

This analysis uses similar modeling methodology as the 2020 study with the following changes:30 [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

29 A summary of the results of this analysis can be found in the following fact sheet: CR Fact Sheet: Electric Vehicles Save Consumers Money, Consumer Reports, June 30, 2023, https://advocacy.consumerreports.org/research/cr-fact-sheet-electric-vehicles-save-consumers-money/

30 New analysis from CR finds that the most popular electric vehicles cost less to own than the best-selling gas-powered vehicles in their class, Consumer Reports, October 8, 2020, https://advocacy.consumerreports.org/press_release/new-analysis-from-cr-finds-that-the-most-popular-electric-vehicles-cost-less-to-own-than-the-best-selling-gas-powered-vehicles-in-their-class/.

- Selected vehicles include the 6 mainstream EVs that qualify for at least part of the current federal EV tax credit in June 2023.

- Comparison ICE vehicles are selected with similar utility and features as the EV. Vehicles were selected from the same automaker when possible. When no similar vehicle was available from the automaker, the appropriate trim level of the best selling vehicle in the class was used.

- Energy costs are updated to the reference case from EIA’s Annual Energy Outlook 2023.31

- Public direct current fast charging costs are updated to Electrify America’s current standard charging rate of $0.48/kWh.32

- Average loan interest rates were updated to current (June 2023) average values for prime buyers of 6.4% according to NerdWallet.33 [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

31 2023 Annual Energy Outlook, US Energy Information Administration, March 16, 2023, https://www.eia.gov/outlooks/aeo/.

32 Electrify America is increasing prices at its DC fast charging stations, The Verge, February 23, 2023, https://www.theverge.com/2023/2/3/23584747/electrify-america-price-increase-ev-charging-stations-march-2023.

33 Average Car Loan Interest Rates by Credit Score, NerdWallet, June 27, 2023, https://www.nerdwallet.com/article/loans/auto-loans/average-car-loan-interest-rates-by-credit-score.

The selected vehicles, along with their current market prices according to TrueCar.com, are shown in Table 5.1. The TrueCar price is used rather than MSRP because it better represents the price consumers are actually paying for these vehicles. [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

[See original comment for Table 5.1 - Vehicles for Ownership Cost Comparison]34 [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

34 All vehicles were model year 2023 except for the Chevy Trax which is a 2024 model.

Table 5.2 shows the estimated average market adjustment for the vehicles being compared. The TrueCar price represents the market average transaction prices that consumers are actually paying for the vehicle. This may be higher or lower than MSRP. The market adjustment is the difference between the average transaction price and the MSRP. A positive value of the market adjustment means consumers on average are paying above MSRP and a negative value means that consumers are paying below MSRP. The comparison is made for all four sets of vehicles that are sold at dealers and from the same manufacturer.35 [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

35 Tesla sells all vehicles at MSRP so they are not included here. Also, the comparison is most useful comparing vehicles sold by the same automaker, which isolates any effects that might occur due to the popularity of specific brands or differences in the behavior of different dealer networks, since both vehicles in a pair are sold at the same dealers.

On average, the four EVs were selling at an average transaction price $2,700 more than MSRP, while on average the four ICE vehicles were selling at an average transaction price $2,200 below MSRP. This means that market adjustments are leading to a net increase of $4,900 in the relative price difference between EVs and their gasoline equivalent, compared to what it would be if both vehicles sold for MSRP. The largest difference is seen on the F150 Lightning, which is transacting with a net difference of over $11,000 more than the difference that would have been if both the EV and ICE version were sold at MSRP. This rather large market price difference is continued evidence that EV demand continues to exceed EV supply in the market. [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

[See original comment for Table 5.2 - Vehicle Market Adjustments Compared to MSRP] [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

The results of the ownership cost analysis in Figure 5.1 and Table 5.3 show that despite paying over MSRP for many EVs, the average consumer is still pocketing significant savings by purchasing the EV over the comparable ICE vehicle. All 6 EVs analyzed will deliver savings in the first year to the average American. Overall average savings totaled $4,200 over a 7 year first owner period, and $9,700 over the vehicle lifetime 200,000 miles. Lifetime savings ranged from $6,000-$12,000 for the six vehicles studied. [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

Although the vehicle comparisons are somewhat different from the 2020 study, the results generally show an increase in savings delivered by EVs, especially for the first owner. It is also worth noting that while in 2020 Tesla was largely competing with other luxury brands like Audi and BMW, their recent price cuts have brought their lowest priced vehicles into direct competition with two of the most popular mainstream vehicles in the country, the Toyota Camry and Toyota RAV4. [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

[See original comment for Table 5.3 - EV Net Ownership Cost Savings] [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

[See original comment for Figure 5.1 - EV Net Ownership Cost Savings] [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

All of this indicates that consumers will not have to wait until some date far into the future in order to achieve significant savings from going electric. For many consumers, big savings can already be pocketed today. As more consumers recognize this fact, EV demand will inevitably continue to grow. [EPA-HQ-OAR-2022-0829-0728, pp. 14-18]

Organization: Countymark

In April 2023, the Environmental Protection Agency (EPA) proposed new emissions standards for passenger vehicles and trucks that are significantly more stringent than previous rules. The new proposed standards would require automakers to meet a tailpipe emissions average of 82 grams of CO_2/mile across a company's production by model year (MY) 2032. Your agency estimated this new regulation would result in electric vehicles (EVs) accounting for 67 percent of recent light-duty vehicle sales and 46 percent of new medium-duty vehicle sales in less than ten years. CountryMark believes that this proposal significantly increases costs for American families, undermines American energy security, and falls short of estimated environmental benefits. [EPA-HQ-OAR-2022-0829-0665, p. 1]

Transitioning to electric vehicles (EVs) as a mandated requirement has several negative consequences. Currently, EVs make up a small portion of new vehicle sales, with approximately 6% in the light-duty vehicle segment and less than 1% in the heavy-duty vehicle segment. This demonstrates that EV adoption is still relatively low. One major concern is the higher cost associated with EVs. On average, EVs are priced over $14,000 more than non-luxury vehicles. This increased cost also affects the used car market, as the demand for used EVs rises, leading to higher prices. These higher costs and limited choices in the vehicle market have a more significant impact on low income and disadvantaged families. [EPA-HQ-OAR-2022-0829-0665, p. 2]

Another issue related to EVs is their weight, ranging from 1,000 to 3,000 pounds more than gas-powered vehicles. This additional weight results in more damage to American roads, necessitating increased infrastructure repair costs funded by taxpayers. Mandating a transition to EVs can lead to increased consumer prices and reduced vehicle choices. It also raises concerns about the financial burden on low-income families and the potential for increased infrastructure repair costs due to the heavier weight of EVs. [EPA-HQ-OAR-2022-0829-0665, p. 2]

Organization: David Manley III

Of course, while the proposed rule benefits China without significantly reducing global temperatures, American consumers are penalized because (a) while gas-powered cars take five or 10 minutes to refill, recharging an electric vehicle can take 45 minutes, and personal mobility, including road trips, will be adversely effected since EVs require longer and more frequent interruptions for charging, (b) The common American cannot afford EVs as EVs were on average $11,981 more expensive than gas-powered cars at the end of 2022, and today, for example, the electric version of the Ford F-150 pickup truck, the best-selling vehicle in America, costs an additional $26,000 over the gasoline-powered one while Tesla's EVs start at $39,000 for a Model 3 and go up to nearly $100,000 for a Model X — prices much higher than most families can afford, and (c) American consumers will have to deal with electric power availability problems (even with bidirectional charging that has a negative aspect) as the power grids will not have the capacity to deal with the increased load. [EPA-HQ-OAR-2022-0829-0513, p. 1]

Organization: Donna Jackson

[*From Hearing Testimony, May 10, 2023*] This new proposed rule has the distinction of harming black people on two continents, in the African nation of Congo as well as here in the United States. In the Congo where 75 percent of the world's cobalt needed for rechargeable EV batteries is located, black slave and child labor is readily being used to mine these minerals. It is well documented that their conditions are deplorable. The need for cobalt and thus the extent of the suffering will increase exponentially as a result of the EPA's proposed rule and if that wasn't bad enough, this new proposed rule will create an economic hardship and serious decline in the standard of living for all Americans but especially black Americans. Blacks have more single parent households, lower medium household income and higher poverty rates than the overall population. According to the 2021 U.S. Census Bureau, the median household income for black Americans was $45,000 compared to $71,000 for white Americans and $101,000 for Asian Americans. As such, they can't afford more expensive EV vehicles nor the higher prices for limited supply of gasoline powered vehicles and as it is, many Blacks have already been priced out of the new vehicles markets and can only afford used ones. Overall the consequences of this rule will remove private car ownership from many if not most black Americans. Even if the EVs weren't so expensive, they still don't fit the lives of many Blacks Americans, for example, more Blacks are renters, so fewer have the chance to charge their vehicles at home. Many black Americans live in apartments where street and parking lots is the norm with no ability to charge. In addition, many black households can only afford one vehicle but the reality is EVs are practical only for multi car households and the list goes on. Suffice to say it is that no EV supporter ever bothered to ask the black community if this is what they want or fits the needs of their family. And for those Blacks who want EV vehicle, they are free to choose one with or without an EPA mandate. The proposed rule here only serves to force more expensive vehicles on everyone whether they like it or not. The truth is that black people like most Americans want to make these choices for themselves. For this reason, I urge the EPA to withdraw the proposed rule and instead start thinking of ways to make personal transportation more accessible. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 2]

Organization: Energy Innovation

Other research from the University of California, Berkeley, Grid Lab, and Energy Innovation, 2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future (April 2021), evaluated the technical and economic feasibility (and associated impacts and benefits) of achieving a future scenario where electric vehicles make up 100 percent of new sales of all vehicles by 2035, combined with a 90 percent clean grid (called the DRIVE Clean Scenario).[iv] Compared with the No New Policy scenario (which was pre-IRA and BIL), the total transportation sector pollutant[v] and carbon dioxide emissions reductions in the DRIVE Clean Scenario would reduce ground transportation sector CO2 emissions by 60 percent in 2035 and by 93 percent in 2050, relative to 2020 levels.9 See Figure 3. The DRIVE Clean Scenario would also avoid approximately 150,000 premature deaths and generate nearly $1.3 trillion in health and environmental savings through 2050.10 Compared to the No New Policy, the DRIVE Clean Scenario would also result in approximately $2.7 trillion in consumer savings through 2050 compared—a household savings of about $1000 per year on average over 30 years.11 [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

9 Amol Phadke et al., “2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future” (Goldman School of Public Policy, University of California, Berkeley, GridLab, April 2021), https://www.2035report.com/transportation/downloads/, iv.

10 Phadke et al., iii.

11 Phadke et al., ii.

iv In the Drive Rapid Innovation in Vehicle Electrification (DRIVE Clean) Scenario, EVs constitute 100 percent of new U.S. LDV sales by 2030 as well as 100 percent of MDV and heavy-duty truck sales by 2035. The grid reaches 90 percent clean electricity by 2035. More details and full study findings are available at https://www.2035report.com/transportation/.

v Namely, fine particulate matter, nitrous oxides, and sulfur oxides.

[See original attachment for line graph “CO2 Emissions in the Transportation Sector”] [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

Figure 3. Transportation sector CO2 emissions in the DRIVE Clean and No New Policy scenarios through 2050. Source: Phadke, Amol, et al., 2035 Report 2.0: Plummeting Costs & Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future, University of California Berkeley, Goldman School of Public Policy, Grid Lab, and Energy Innovation, April 2021, available at: https://www.2035report.com/transportation/.[EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

Organization: Environmental. and Public Health Organizations

Looking just at EPA’s analysis (which did not analyze the costs and benefits of any standards more stringent than Alternative 1), standards more stringent than the Proposed Standards are feasible and would produce greater societal benefits. While average incremental vehicle costs increase under Alternative 1, those costs are recouped by the vehicle purchaser through reduced fueling, maintenance, and repair costs. And as EPA notes, “consumer savings would be … somewhat higher under Alternative 1” than under the Proposed Standards. Id. at 29203. The annualized vehicle technology costs through 2055 are $15 billion under the Proposed Standards and $17 billion under Alternative 1, using a 3% discount rate, or a difference of $2 billion. Id. at 29364-65, tbl. 160. But the annualized pretax fuel savings under Alternative 1 are $5 billion higher than those under the Proposed Standards, at $51 billion under Alternative 1 and $46 billion under the Proposed Standards, also using a 3% discount rate. Id. at 19366, tbl. 164. Similarly, consumers’ maintenance and repair costs are further decreased under Alternative 1—from an annualized value of $29.9 billion in savings under the Proposed Standards to $33.3 billion in savings under Alternative 1, both at a 3% discount rate.101 [EPA-HQ-OAR-2022-0829-0759, pp. 24-25]

F. Comparison of Criteria Emissions and Possible Health Benefits

For this part of the analysis, ERM utilized EPA's COBRA model to estimate the public health benefits associated with all the policy scenarios. ERM's analysis shows that stricter standards and increased deployment of clean L/MD vehicles results in greater gains in terms of consumer savings and avoided public health impacts (such as premature death, hospital admissions and emergency room visits, respiratory symptoms, and reduced activity and lost workdays). The policy scenario reflective of our Alternative 1+ recommended approach achieves the most reductions: nearly an 80% reduction in NOx and a 60% reduction in PM in 2040 compared to 2026 levels. An Alternative 1+ approach is also projected to achieve almost $42 billion in monetized value of reductions: nearly $8.5 billion more in monetized value than would occur under EPA's Main Proposal and preferred approach (as shown in Figure V.F-1). [EPA-HQ-OAR-2022-0829-0759, p. 31]

SEE ORIGINAL COMMENT FOR Figure V.F-1: Comparison of Possible Health Benefits112 [EPA-HQ-OAR-2022-0829-0759, p. 31]

112 Id. at 12

ERM's analysis incorporates: EPA's assumed changes in tailpipe emission reductions, EPA's upstream assumptions that rely upon the Integrated Planning Model (IPM) for electricity generated units, and ERM assumptions on changes from reduced demand on refining of finished products for diesel (and gasoline) based on the use of Argonne National Laboratory's Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model. [EPA-HQ-OAR-2022-0829-0759, p. 31]

The benefits associated with the Alternative 1+ approach are further depicted in Table V.F-1, which shows the various scenario criteria emissions (NOx and PM) aggregated from 2026-2040 for each of the policy scenarios, as well as possible reduced health incidents, and the monetized value of these reductions (if realized) compared to EPA's No Action scenario.113 [EPA-HQ-OAR-2022-0829-0759, p. 31]

113 ERM's analysis results in slightly lower cumulative reductions of NOx and PM compared with EPA's net air pollutant impacts for the EPA Main Proposal, Alternative 1, and Alternative 3 policy scenarios (Tables 9-37, 9-38 and 9-40 of the DRIA). However, despite the difference, Alternative 1+ would correspond with approximately a 25% increase in benefits relative to the EPA Main Proposal and a similar increase would be expected under EPA's methodology.

SEE ORIGINAL COMMENT FOR Table V.F-1: Comparison of Possible Health Benefits114 [EPA-HQ-OAR-2022-0829-0759, p. 31]

114 ERM, Impacts Report at 12.

H. Comparison of Incremental Fleet Costs and Savings

While some manufacturers have raised unfounded concerns about the costs associated with shifting to ZEVs, the ERM analysis overall shows that the average BEV reaches life-cycle cost parity with diesel and gasoline vehicles before MY 2027. Additionally, from a cost and savings perspective, purchasing an average MY 2032 BEV would save an owner over $18,000 over the life of the vehicle (as seen in Figure V.H-1). [EPA-HQ-OAR-2022-0829-0759, p. 34]

SEE ORIGINAL COMMENT FOR Figure V.H-1: Possible Net Lifecycle Costs of a BEV vs. a Comparable Diesel or Gasoline Alternative118 [EPA-HQ-OAR-2022-0829-0759, p. 35]

118 Id. at 13.

The analysis depicted in Figure V.H-1 incorporates several different cost categories (including purchasing chargers, charger maintenance, incremental purchase price between combustion vehicles and BEVs, vehicle maintenance savings associated with BEVs, and the difference in fuel costs between purchasing gasoline and diesel fuel versus electricity). For this calculation, fuel and maintenance cost savings are discounted at 3% over 16 years. [EPA-HQ-OAR-2022-0829-0759, p. 35]

1. Comparison of Overall Societal Benefits

The results from ERM's analysis (depicted in Figure V.I-1) show that on a net societal basis––inclusive of the costs to fleets as well as air quality benefits, climate benefits, and reduced utility bills—the greatest benefits are seen with Alternative 1+ at about $125.7 billion through the 2040 timeframe. [EPA-HQ-OAR-2022-0829-0759, p. 35]

SEE ORIGINAL COMMENT FOR Figure V.I-1: Comparison of Possible Annual Net Societal Benefits119 [EPA-HQ-OAR-2022-0829-0759, p. 36]

119 Id. at 15.

This figure depicts net annual societal benefits (which incorporates net incremental fleet cost savings, climate benefits, air quality benefits, and reduced utility bills). [EPA-HQ-OAR-2022-0829-0759, p. 36]

5. New utility rates designed for PEV charging increase the fuel cost savings PEVs can provide.

Gasoline and electricity prices vary across the country, and electricity prices vary depending upon the particular characteristics of the utility rate on which a customer takes service. And many existing commercial and industrial utility rates have "demand charges" that can reduce fuel cost savings for high-powered/low-utilization PEV charging use cases, such as public charging along highways in remote areas. Thankfully, the challenge such demand charges can pose for PEV charging has long been recognized, and across the nation, many utilities and regulators have already implemented solutions or are in the process of doing so. [EPA-HQ-OAR-2022-0829-0759, p. 129]

In fact, the BIL amended the Public Utility Regulatory Policies Act (PURPA) Section 111(d) to require regulators and non-regulated utilities to consider new rates that:

promote affordable and equitable electric vehicle charging options for residential, commercial, and public electric vehicle charging infrastructure; improve the customer experience associated with electric vehicle charging; accelerate third-party investment in electric vehicle charging for light-, medium-, and heavy-duty vehicles; and appropriately recover the marginal costs of delivering electricity to electric vehicles and electric vehicle charging infrastructure.352 [EPA-HQ-OAR-2022-0829-0759, pp. 129-130]

352 H.R.3684. Infrastructure Investment and Jobs Act. 117th Congress. (2021-2022). Section 40431 www.congress.gov/bill/117th-congress/house-bill/3684/text.

This has spurred new regulatory proceedings across the country. But many utilities, regulators, and state legislatures were already acting to address this issue before the BIL became law. [EPA-HQ-OAR-2022-0829-0759, p. 130]

As detailed in a publication of the National Association of Regulatory Utility Commissioners (NARUC) entitled "Best Practices for Sustainable Commercial EV Rates and PURPA 111(d) Implementation," rates designed for EV charging can deliver significant fuel cost savings without relying on cross-subsidies from other utility customers.353 For example, on a new Pacific Gas & Electric rate designed for commercial EV charging that still recovers all associated marginal costs, the San Joaquin Regional Transit District reduced its overall fuel cost per mile from $2.31 to $0.68 (in a utility service territory that has some of the higher underlying marginal costs in the nation).354 The paper also details rates that take a similar approach that were approved for Southern California Edison, San Diego Gas & Electric, and Alabama Power. [EPA-HQ-OAR-2022-0829-0759, p. 130]

353 Nancy Ryan, Alissa Burger, Jenifer Bosco, John Howat, and Miles Muller, Best Practices for Sustainable Commercial EV Rates and PURPA 111(d) Implementation (2022), https://pubs.naruc.org/pub/55C47758-1866-DAAC-99FB-FFA9E6574C2B.

354 Id.

Since the publication of that NARUC paper, many other utilities and regulators have either proposed or secured approval of new rates designed for EV charging. And by the time the standards in this rulemaking take effect in 2027, many more will have followed suit, increasing the fuel cost savings EVs can provide. [EPA-HQ-OAR-2022-0829-0759, p. 130]

C. When considering the attributes consumers care about most, EVs are a great fit.

One of the reasons this "neighbor effect" may occur is because when consumers learn about PEVs, they often realize that PEVs offer a superior fit for the attributes they care about most in their driving and vehicle-owning experience. Forsythe et al. (2023) found that key factors Americans consider when purchasing vehicles and considering PEV options are operating cost, range, fast-charging capabilities, and performance characteristics such as acceleration.485 Consumer surveys and other studies have found the same attributes, along with fuel economy, as key to purchase decisions.486 As explained briefly in this section and in more detail in Sections XIX.C and XX, PEVs offer superior satisfaction of these consumer preferences. Any existing or perceived barriers to PEV adoption based on consumer acceptance are either minimal or surmountable, policies are already in place to support rapid elimination of any remaining barriers, and the pace of PEV incorporation into the fleet will allow for consumer preferences to be fulfilled. [EPA-HQ-OAR-2022-0829-0759, pp. 164-165]

485 Forsythe et al. (2023) at 1–2.

486 See, e.g., Consumer Reports, Consumer Attitudes Towards Fuel Economy: 2020 Survey Results 3-4, 6 (Feb. 2021), https://advocacy.consumerreports.org/wp-content/uploads/2021/02/National-Fuel-Economy-Survey-Report-Feb-202 1-FINAL.pdf (showing high value placed on fuel economy in purchase decisions); Alexey Sinyashin, Optimal Policies for Differentiated Green Products: Characteristics and Usage of Electric, U.C. Berkeley Haas School of Business (Nov. 8, 2021) https://drive.google.com/file/d/1KEYJWa25DjH_g89ukSRW3PymjsTkUq4c/view (finding range and charging station availability as key elements in purchase decisions); J.D. Power, EV Price Pressure Grows as Government Incentives and Lease Deals Wield Outsized Influence on Consumer Demand (Mar. 29, 2023), https://www.jdpower.com/business/resources/ev-price-pressure-grows-as-government-incentives-

and-lease-deals-wi eld-outsized-influence-on-consumer-demand#:~:text=At%20the%20current%20trajectory%2C%20J.D.,is%20expec ted%20to%20surpass%2075%25 ("Consumer interest in EVs is increasingly being heavily swayed by price"); Consumer Reports, Consumer Attitudes Towards Fuel Economy: 2020 Survey Results 6 (Feb. 2021), https://advocacy.consumerreports.org/wp-content/uploads/2021/02/National-Fuel-Economy-Survey-Report-Feb-202 1-FINAL.pdf (finding that 94% of potential vehicle purchasers considered fuel economy to be "extremely important," "very important," or "somewhat important" when purchasing a vehicle).

1. PEVs are increasingly favorable from a total cost of ownership perspective and save drivers money over the life of the vehicle. As more models become available, this benefit will be accessible to more consumers.

First, PEVs are increasingly favorable from an operating cost and total cost of ownership (TCO) perspective—a factor that is very important to U.S. consumers when deciding which vehicles they want to buy. A 2020 nationally representative survey of potential vehicle purchasers found that 94% of potential purchasers considered fuel economy to be important when purchasing a vehicle.487 PEVs excel in the area of fuel cost savings. As EPA's Proposal shows, the incremental costs of PEVs over combustion vehicles are increasingly insignificant or nonexistent—especially in light of various state and federal incentives—resulting in PEVs saving drivers money in very short periods of time. And as operating costs are reduced, consumers are willing to pay more for their vehicles. Forsythe et al. (2023) found car buyers willing to pay upfront an additional $1,960 per 1 cent/mile reduction in operating cost, and SUV buyers willing to pay an additional $1,490.488 The paper also found that any perceived PEV disadvantages were made up for by favorable operating costs (along with fast-charging capability), and that lower operating costs "can help increase consumer adoption."489 Forsythe et al. (2023) further found that reductions in the BEV price-premium, which are projected to occur, "have driven substantial increases in consumer choices of BEV cars and SUVs over their conventional gasoline vehicle counterparts."490 A March 2023 J.D. Power survey reflected one example of this consumer responsiveness to price, finding that consumer interest in the Ford Mustang Mach-E and Tesla Model Y measurably increased when both manufacturers announced price drops and both models were made eligible for the IRA's $7,500 federal tax credit.491 A June 2023 J.D. Power survey also indicated that consumers are recognizing these savings, finding that "[t]he more miles that vehicle owners drive, the more likely they are to consider an EV. As in prior-year studies, daily commuters faced with higher fuel expenses are trading in their gas-powered vehicles for EVs."492 [EPA-HQ-OAR-2022-0829-0759, pp. 165-166]

487 Consumer Reports, Consumer Attitudes Towards Fuel Economy at 3-4, 6.

488 Forsythe et al. (2023) at 5.

489 Forsythe et al. (2023) at 1–2, 6 (assuming sufficiently long range).

490 Forsythe et al. (2023) at 2.

491 J.D. Power, EV Price Pressure Grows as Government Incentives and Lease Deals Wield Outsized Influence on Consumer Demand (Mar. 29, 2023), https://www.jdpower.com/business/resources/ev-price-pressure-grows-as-government-incentives-and-lease-deals-wi eld-outsized-influence-on-consumer-demand#:~:text=At%20the%20current%20trajectory%2C%20J.D.,is%20expec ted%20to%20surpass%2075%25.

492 J.D. Power, Action Needed to Keep Charging from Short Circuiting EV Purchase Consideration, J.D. Power Finds (June 15, 2023), https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-consideration-evc-study.

Up until recently, nearly all PEV models on the market were sedans or hatchbacks, or vehicles in the luxury car segment of the market,493 leaving vehicle purchasers looking for other types of vehicles without many options. But dozens of new models are entering the market in the next year, in all vehicle segments.494 Additional PEV model availability will provide a wider range of price points and greater diversity of vehicle types and features for potential PEV purchasers, further driving down average PEV costs and resulting in a PEV "fit" superior to a comparable combustion vehicle for more consumers. Research by ICCT has shown that "[g]reater availability of models in more vehicle segments and in higher volumes that meet consumers' wide range of needs and preferences is critical to market growth," and "states with greater model availability tend to have higher electric vehicle uptake."495 In recent years, average PEV costs have appeared higher than average combustion vehicle costs because many PEVs have been offered only in the luxury vehicle market. Gillingham et al. (2023)'s review of its dataset containing every new LDV sale in the United States between 2014 and 2020 revealed that, during that time period, "the market share of EVs and PHEVs is quite high in several price brackets at the high end, but the number of vehicles sold in these high price brackets is relatively small," and that "EVs can make up a large market share in the U.S. new car market," and "there is a great deal of untapped product space for EVs in the lower price brackets."496 Drivers of non-luxury vehicles want PEVs—and their benefits—as well. Automakers understand this demand and are expanding their PEV options, and an appropriately stringent rule by EPA will go further to accelerate this trend by offering automakers regulatory certainty. [EPA-HQ-OAR-2022-0829-0759, p. 166]

493 See, e.g., Gillingham et al. (2023) at 329, 332–333 (noting that EVs are overrepresented in the luxury market segments and that in the hatchback category—"a small market segment with a relatively large number of EV offerings"—sales of PEVs have been "close to 15% of the market in some years").

494 Jeff S. Bartlett & Ben Preston, Automakers are Adding Electric Vehicles to Their Lineups. Here's What's Coming, Consumer Reports (Mar. 10, 2023), https://www.consumerreports.org/hybrids-evs/why-electric-cars-may-soon-flood-the-us-market-a9006292675/.

495 Anh Bui, Peter Slowik & Nic Lutsey, Briefing: Evaluating Electric Vehicle Market Growth Across U.S. Cities, ICCT 13-14 (Sept. 2021), https://theicct.org/wp-content/uploads/2021/12/ev-us-market-growth-cities-sept21_0.pdf.

496 Gillingham et al. (2023) at 331–332.

Already, the number of light-duty PEV options has grown dramatically. The Alliance for Automotive Innovation states that at the end of 2022, there were 95 PEV models available in the United States.497 More models are forthcoming, including additional truck and SUV models along with the expansion of a wider range of EV sedans.498 EPA's Proposal notes research by EDF and ERM projecting that there will be over 180 PEV models available by the end of 2025, 88 Fed. Reg. at 29190 n.59, but EDF and ERM have since updated their analysis and now project that there will be 197 PEV models available by the end of 2025.499 Many of the world's largest automakers have committed to significantly expanding PEV production in the next few years, even absent additional standards,500 which will naturally lead to a larger array of model choices. For example, BMW, Volkswagen, and Stellantis have each committed to fleets half comprised of zero-emission vehicles by 2030.501 Mercedes-Benz, Ford, and GM have committed to an entirely zero-emission fleet by 2035.502 Volvo announced its fleet will be all electric by the end of the decade.503 J.D. Power's EV Index and EV Consideration Pulse Survey found that half of all new car shoppers will have a viable EV option by the end of 2023, and three out of four shoppers will have a viable EV option by the end of 2026.504 [EPA-HQ-OAR-2022-0829-0759, pp. 166-167]

497 Alliance for Automotive Innovation, Get Connected: Electric Vehicle Quarterly Report, First Quarter, 2023 2 (2023), https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023% 20Q1.pdf.

498 Consumer Reports, Hot, New Electric Cars That Are Coming Soon (June 9, 2023), https://www.consumerreports.org/cars/hybrids-evs/hot-new-electric-cars-are-coming-soon-a1000197429/.

499 Rachel MacIntosh et al., Electric Vehicle Market Update, Environmental Defense Fund and ERM 7 (Apr. 2023), https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf.

500 Zifei Yang, Beyond Europe: Are There Ambitious Electrification Targets Across Major Markets?, Int'l Council on Clean Transp. Staff Blog (Nov. 15, 2022), https://theicct.org/global-oem-targets-cars-ldvs-nov22/.

501 Id.

502 Id.

503 Id.

504 J.D. Power, EV Price Pressure Grows as Government Incentives and Lease Deals Wield Outsized Influence on Consumer Demand (Mar. 29, 2023), https://www.jdpower.com/business/resources/ev-price-pressure-grows-as-government-incentives-and-lease-deals-wi eld-outsized-influence-on-consumer-demand#:~:text=At%20the%20current%20trajectory%2C%20J.D.,is%20expec ted%20to%20surpass%2075%25.

2. PEVs offer meaningful refueling (charging) benefits to consumers.

Americans are interested in how quickly they can refuel their vehicles. Again, PEVs have real advantages that should not be underestimated. While opponents to PEVs frequently assert what they believe will be fundamental changes to how Americans get to work, school, and run errands, a closer look at the issue reveals that PEVs can offer meaningful benefits. Most trips are well below the average PEV range, and charging for these trips can often be done when vehicles are parked at home, work, or in public in between trips. In fact, recent research has shown that 90% of trips could be completed in vehicles with 124 miles of range—well below the capabilities of the current average EV range in the United States (almost 300 miles).505 Even as of 2016, researchers at MIT found that electric vehicles at the time could handle almost 90% of all car travel in the U.S.506 [EPA-HQ-OAR-2022-0829-0759, p. 167]

505 Mario Herberz, Ulf J. J. Hahnel & Tobias Brosch, Counteracting Electric Vehicle Range Concern with a Scalable Behavioural Intervention, Nature Energy 503 (2022) (finding that 90% of trips could be completed in vehicles with 124 miles of range); Tom Randall, Americans Insist on 300 Miles of EV Range. They're Right, Bloomberg (May 4, 2023), (noting that U.S. EVs have almost reached 300 mile average range).

506 Catherine Caruso, Why Range Anxiety for Electric Cars is Overblown, MIT Technology Review (Aug. 15, 2016), https://www.technologyreview.com/2016/08/15/158319/why-range-anxiety-for-electric-cars-is-overblown/.

Drivers with access to a garage or dedicated overnight parking spot may simply charge at home while they sleep, and most do. EY's Mobility Consumer Index 2022 survey found that 80% of EV owners use home charging,507 and other research has found that more than half of all reported EV charging takes place at home.508 Once a home charger is installed, "the home then has its own permanent home refueling station that can likely be used with all future PEVs."509 Substantial investments in infrastructure incentives will help to reduce any consumer concerns over range or charging availability. About half of Americans (49%) say "discounts to install a home charger" are the incentives that would most encourage them to get an EV.510 The Inflation Reduction Act extended the EV charger credit, which covers 30% (up to $1,000 per unit) of the cost of charging equipment for individual/residential uses. See 26 U.S.C. § 30C. Many states and local jurisdictions offer additional installation incentives that can further reduce costs. [EPA-HQ-OAR-2022-0829-0759, p. 168]

507 Gaurav Batra, Ankit Khatri, Akshi Goel & Menaka Samant, EY Mobility Consumer Index 2022 Study 5 (May 2022), https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/automotive-and-transportation/automotive-transporta tion-pdfs/ey-mobility-consumer-index-2022-study.pdf.

508 Rob Stumpf, Americans Cite Range Anxiety, Cost as Largest Barriers for New EV Purchases: Study (Feb. 26, 2019), https://www.thedrive.com/news/26637/americans-cite-range-anxiety-cost-as-largest-barriers-for-new-ev-purchases-s tudy.

509 David P. Tuttle & Ross Baldick, Technological, Market and Policy Drivers of Emerging Trends in the Diffusion of Plug-In Electric Vehicles in the U.S., Electr. J. 7 (Aug./Sept. 2015), https://users.ece.utexas.edu/~baldick/papers/plugindiffusion.pdf.

510 Consumer Reports, Battery Electric Vehicles & Low Carbon Fuel Survey: A Nationally Representative Multi-Mode Survey 4 (Apr. 2022), https://article.images.consumerreports.org/image/upload/v1657127210/prod/content/dam/CRO-Images-2022/Cars/0 7July/2022_Consumer_Reports_BEV_and_LCF_Survey_Report.pdf.

Furthermore, "[e]lectric vehicles have the meaningful advantage of refueling at a far wider array of locations than gasoline stations."511 Gas stations "must be carefully located to achieve scale economies to pay for expensive sturdy buried fuel storage tanks, environmental and safety protection methods, and gas pumps. In contrast, PEVs can charge at millions of potential home, work, or public locations."512 And, with increasing numbers of chargers available in places where drivers otherwise spend their time, "drivers can simply plug in and charge at a variety of locations where they would naturally park their vehicle for long periods of time."513 Recently, Walmart announced plans to install new BEV fast-charging stations at thousands of Walmart and Sam's Club locations across the country, in addition to the 1,300 BEV fast-charging stations the retailer has already made available.514 Other retailers already offering significant levels of BEV charging include 7-Eleven, Cinemark, Ikea, Kohl's, Kroger, Macy's, Starbucks, Subway, Taco Bell, Walgreens, and Whole Foods.515 PlugShare's charger locator can be searched based on various types of charging locations, revealing chargers at hiking, dining, shopping, camping, park, and grocery locations throughout the country.516 As far back as 2015, drivers who parked on the street could access street lights for charging in some dense urban areas,517 and this cost-effective technology518 is expanding in Europe and the United States, with U.S. pilot programs in New York, Charlotte, and Kansas City,519 and a large number of BEV charging stations on streetlight poles in Los Angeles.520 In addition, experts anticipate that charging equipment will increasingly be distributed widely throughout apartment building and multi-family garages.521 Research on parking has found that the average car is parked for 95% of its useful life,522 leaving plenty of time to charge in a large variety of locations. As these public chargers increase, PEVs become a viable and attractive option for more drivers, including those without access to easy home-charging.523 [EPA-HQ-OAR-2022-0829-0759, pp. 168-169]

511 Tuttle & Baldick (2015) at 7.

512 Id.

513 Id.

514 Vishal Kapadia, Leading the Charge: Walmart Announces Plan to Expand Electric Vehicle Charging Network, Walmart (Apr. 6, 2023), https://corporate.walmart.com/newsroom/2023/04/06/leading-the-charge-walmart-announces-plan-to-expand-electri c-vehicle-charging-network (noting that this will offer customers and members the convenience of "being able to pick up essentials for their families or grab a bite to eat while they charge").

515 Dan Avery, 12 Places That Offer EV Charging While You Shop, CNET (Apr. 19, 2023), https://www.cnet.com/roadshow/news/12-places-that-offer-ev-charging-while-you-shop/.

516 PlugShare, Map of EV Charging Locations, https://www.plugshare.com/.

517 See Tuttle & Baldick (2015) at 8 ("Charging cords with wireless revenue-grade meters that plug into street lights are now offered for drivers who park on the street in dense urban areas.").

518 Research by WRI found that compared to ground-mounted chargers, pole-mounted chargers result in installation cost savings of up to 55% and overall cost reductions of 30% because they use existing electrical connections and have minimal costs associated with construction, materials, and labor. See Emmett Werthmann & Vishant Kothari, Pole-Mounted Electric Vehicle Charging: Preliminary Guidance for a Low-Cost and More Accessible Public Charging Solution for U.S. Cities, World Resources Institute 12 (Nov. 2021), https://files.wri.org/d8/s3fs-public/2021-11/pole-mounted-electric-vehicle-charging-preliminary-guidance.pdf?Versi onId=xNjP5je_Ohc5WnFVVCbxWGmmk_vMIqpu.

519 Jay Ramey, Are Lamppost EV Chargers Ideal for City Dwellers?, Autoweek (Jan. 23, 2023), https://www.autoweek.com/news/green-cars/a42618155/ubitricity-lamppost-ev-chargers-curbside/; EVANNEX, Study Finds On-Street Lampost EV Chargers Are Lowest-Carbon Solution, Inside EVs (Nov. 5, 2022), https://insideevs.com/news/619989/using-lamposts-for-ev-charging-reduces-carbon-footprint/.

520 Bradley Berman, LA Adds Hundreds of EV Chargers to Streetlights, Giving Renters a Place to Plug In, Electrek (Nov. 13, 2019), https://electrek.co/2019/11/13/la-adds-hundreds-of-ev-chargers-to-streetlights-giving-renters-a-place-to-plug-in/ (noting over 130 EV chargers on streetlights as of 2019); LA Lights, EV Charging Stations, https://lalights.lacity.org/connected-infrastructure/ev_stations.html (map showing streetlight chargers across Los Angeles); Emmett Werthmann & Vishant Kothari, How Utility Poles and Streetlights Can Improve Equitable Access to EV Charging in U.S. Cities, The City Fix, World Resources Institute (Nov. 30, 2021), https://thecityfix.com/blog/how-utility-poles-and-streetlights-can-improve-equitable-access-to-ev-charging-in-u-s-cit ies/ (noting 431 streetlight chargers and 44 utility pole chargers in Los Angeles and a pilot project in Charlotte, North Carolina).

521 Joshua Stein, How Electric Cars Might Affect Multifamily And Other Real Estate, Forbes (May 25, 2023), https://www.forbes.com/sites/joshuastein/2023/05/25/how-electric-cars-will-affect-multifamily-and-other-real-estate/?sh=59d16f66317c.

522 Ruth Eckdish Knack, Pay As You Park, Planning Magazine (May 2005), http://shoup.bol.ucla.edu/PayAsYouPark.htm#:~:text=%22Most%20people%20in%20transportation%20focus,learn%20from%20that%2095%20percent.

523 Cassandra Cole, Michael Droste, Christopher Knittel, Shanjun Li & James Stock, Policies for Electrifying the Light-Duty Fleet in the United States, American Economic Association: Papers & Proceedings 321 (May 2023) (noting that "providing additional [public] charging stations enables EV ownership" for more drivers).

PEV charging is increasingly taking less time, further enhancing the convenience benefits of PEV ownership. Hyper-fast Level 3 DC fast chargers can charge a BEV in as little as 30 minutes or less, adding up to 10 miles of range for each minute of charging time,524 and consumers have expressed strong willingness-to-pay for this capability.525 Research has shown that availability of more fast-chargers "reduce[s] range anxiety and make[s] it possible to use EVs in the way that drivers now use ICEs."526 [EPA-HQ-OAR-2022-0829-0759, p. 170]

524 Electrify America, Charging with Electrify America, https://www.electrifyamerica.com/what-to-expect/ (noting full charging in 30 minutes); Jessica Shea Choksey, What is DC Fast Charging?, J.D. Power (May 10, 2021), https://www.jdpower.com/cars/shopping-guides/what-is-dc-fast-charging (noting ability to charge to 80% "in anywhere from 15 minutes to 45 minutes"); DriveClean, Electric Car Charging Overview, CARB https://driveclean.ca.gov/electric-car-charging (noting that DC fast charging can add "up to 10 miles of range per minute of charging time"); ICCT, Five Things You Know About Electric Vehicles That Aren't Exactly True (July 19, 2021), https://theicct.org/stack/explaining-evs/ (high-powered DC fast chargers can charge a long-range EV in 20–36 minutes).

525 Forsythe et al. (2023) at 5 (noting additional willingness to pay $4,140 for BEV fast charging capability).

526 Cassandra Cole, Michael Droste, Christopher Knittel, Shanjun Li & James Stock, Policies for Electrifying the Light-Duty Fleet in the United States, American Economic Association: Papers & Proceedings 321 (May 2023).

PEV charging has additional benefits on top of saving drivers money and eliminating weekly trips to the gas pump. First, PEVs with bi-directional charging capability have potential to serve as back-up home generators in temporary power outages, with a typical BEV storing about 67 kWh in its battery—more than three days' worth of electricity.527 In fact, when a 2021 ice storm in Texas left millions of residents without electricity, Ford "lent out their hybrid F-150s as home generators."528 More makes and models are expected to offer bi-directional charging,529 with the potential that this capability becomes the norm. Additionally, vehicle-to-grid (V2G) charging offers potential benefits for both the grid and PEV owners. RMI found that by 2030, "virtual power plants" including parked vehicles supplying energy to the grid could reduce peak loads in the United States by 60 gigawatts.530 As this capability continues to develop, there could be additional "revenue opportunities for PEV owners for providing these grid services."531 Research in Germany has shown that bidirectional EV charging can generate significant revenue for the typical German household: between 310 and 530 euros per year.532 A recent successful vehicle-to-grid demonstration in North Carolina, taking place over two years, reveals the potential for V2G not only to improve grid optimization and resilience, but also to save consumers money. The North Carolina Clean Energy Technology Center explained that "[q]uantifying the potential value streams from bidirectional charging allows utilities to begin considering incentive payments and other EV program options for customers and members. By demonstrating significant positive value, this study encourages utilities in similar market conditions to help customers overcome the financial barriers to purchasing an EV, particularly in low- and moderate-income areas where these costs may restrict EV adoption."533 The University of Delaware has partnered with local electric utilities and a regional transmission organization to have their vehicles plugged in and available when called upon for grid support, with the transmission organization paying the university the market rate, or roughly $1,200 per year per BEV.534 Research by NREL has also considered net revenue generation from V2G services, including from private LDVs, and found significant potential.535 [EPA-HQ-OAR-2022-0829-0759, pp. 170-171]

527 Michael J. Coren, Electric Vehicles Can Now Power Your Home for Three Days, Washington Post (Feb. 17, 2023), https://www.washingtonpost.com/climate-environment/2023/02/07/ev-battery-power-your-home/.

528 Id.

529 Id. (noting that makers of the Hyundai Ioniq 5, Lucid Air, Kia EV6, VW ID.4, Mitsubishi Outlander, and Chevy Silverado EV, in addition to Ford's F-150, have announced plans for offering electricity services in the next year or so).

530 Id.; Kevin Brehm, Avery McEvoy, Connor Usry & Mark Dyson, Virtual Power Plants, Real Benefits, Rocky Mountain Institute (2023), https://rmi.org/insight/virtual-power-plants-real-benefits/.

531 Tuttle & Baldick (2015) at 11 (citing Quinn, C. et al., The Effect of Communication Architecture on the Availability, Reliability and Economics of Plug In Hybrid Vehicle-to-Grid Charging, 195 J. Power Sources 1500-1509 (Mar. 5, 2010)).

532 Timo Kern, Patrick Dossow & Elena Morlock, Revenue Opportunities by Integrating Combined Vehicle-to-Home and Vehicle-to-Grid Applications in Smart Homes, 307 Applied Energy 1 (Feb. 2022), https://www.sciencedirect.com/science/article/pii/S0306261921014586.

533 North Carolina Clean Energy Technology Center, NC Cooperative Demonstration of Vehicle-to-Grid Smart Charger Concludes with Positive Results (May 8, 2023), https://nccleantech.ncsu.edu/2023/05/08/nc-cooperative-demonstration-of-vehicle-to-grid-smart-charger-concludes/.

534 U.S. Department of Energy, Federal Energy Management Program, Bidirectional Charging and Electric Vehicles for Mobile Storage, https://www.energy.gov/femp/bidirectional-charging-and-electric-vehicles-mobile-storage.

535 Darlene Steward, Critical Elements of Vehicle-to-Grid (V2G) Economics, NREL (Sept. 2017), https://www.nrel.gov/docs/fy17osti/69017.pdf.

3. PEV range has increased enough to meet the demands of nearly all American car trips.

American consumers are interested in how far their cars can travel, as Americans currently drive an above average number of vehicle miles per day (compared to the rest of the world),536 and demand "roughly a third more [range] than the global average."537 While range was therefore once a key challenge for PEV adoption, it is no longer. In fact, "many EVs are approaching the range of an average gasoline vehicle," and "the combined electric and gasoline range for PHEVs often exceeds gasoline-only vehicles."538 [EPA-HQ-OAR-2022-0829-0759, p. 171]

536 Bryn Huxley-Reicher, Fact File: Americans Drive the Most, Frontier Group (Feb. 14, 2022), https://frontiergroup.org/resources/fact-file-americans-drive-most/.

537 Tom Randall, Americans Insist on 300 Miles of EV Range. They're Right, Bloomberg (May 4, 2023).

538 EPA, The 2022 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology Since 1975 E-2, 60 (Dec. 2022), https://www.epa.gov/system/files/documents/2022-12/420r22029.pdf (finding that the efficiency of EVs has increased by about 18% in the last ten years).

The average BEV range has skyrocketed in recent years, making range issues no longer a real concern. Average BEV range reached 298 miles in MY 2021, "or about four times the range of an average EV in 2011,"539 when range was in fact a real concern. Longer-range BEVs are available for consumers with more substantial driving needs,540 PEVs are becoming more efficient,541 and several PHEVs exceed 500 miles of total range.542 The well-designed stated-preference experiment conducted by Forsythe et al. (2023) found that "[m]ost vehicles with a range of at least 300 miles were valued by consumers equivalently or more than their conventional gasoline vehicle counterparts."543 BEV range is "on the cusp of exceeding 300 miles, a key psychological barrier."544 This level of range handily fulfills the needs and preferences of almost every American driver. The average U.S. one-way commute is about 27.6 minutes,545 and the average single-car American household drives about 30 miles per day546—both well within the range of all PEVs in today's vehicle market. ICCT has explained that "87% of American car drivers drive on average less than 100 kilometers (60 miles) a day—that is, only half the range capacity of the e-Golf, one third of the Leaf's, and less than a quarter of the Tesla's range on a single charge."547 Chakraborty et al. (2021) examined how much PEVs were used within households, and concluded that "BEVs and PHEVs appear to be viable as alternatives to conventional vehicles in terms of meeting the travel needs of households," and that "[s]ince most new and upcoming BEVs are longer-range vehicles, we expect this to mean BEVs will largely be suitable replacements for conventional vehicles in household fleets."548 [EPA-HQ-OAR-2022-0829-0759, pp. 171-172]

539 Id. at 60.

540 See, e.g., Nicholas Wallace et al., Longest Range Electric Cars for 2023, Ranked, Car and Driver (Mar. 23, 2023), https://www.caranddriver.com/features/g32634624/ev-longest-driving-range/ (listing U.S. PEVs with longest driving range).

541 EPA, The 2022 EPA Automotive Trends Report, at 60.

542 Id. at E-2.

543 Forsythe et al. (2023) at 6.

544 Tom Randall, Americans Insist on 300 Miles of EV Range. They're Right, Bloomberg (May 4, 2023).

545 Charlynn Burd et al., Travel Time to Work in the United States:2019, U.S. Census Bureau 1 (2019), https://www.census.gov/content/dam/Census/library/publications/2021/acs/acs-47.pdf.

546 U.S. Department of Energy, Daily Vehicle Miles Traveled Varies with the Number of Household Vehicles (Sept. 17, 2018), https://www.energy.gov/eere/vehicles/articles/fotw-1047-september-17-2018-daily-vehicle-miles-traveled-varies-number.

547 ICCT, Five Things You Know About Electric Vehicles That Aren't Exactly True (July 19, 2021) https://theicct.org/stack/explaining-evs/.

548 Debapriya Chakraborty, Scott Hardman & Gil Tal, Integrating Plug-In Electric Vehicles (PEVs) into Household Fleets – Factors Influencing Miles Traveled by PEV Owners in California, U.C. Davis 2, 33 (Aug. 2021), https://escholarship.org/content/qt2214q937/qt2214q937.pdf.

As consumer understanding of the capabilities inherent in this amount of range increases, range anxiety would be expected to decline and consumer acceptance of PEVs to match the vehicles' other benefits. Forsythe et al. (2023) explained that range increase is a key advancement in BEV technology that has "driven substantial increases in consumer choices of BEV cars and SUVs over their conventional gasoline vehicle counterparts."549 And Herberz et al. (2022) found that 90% of trips could be completed in cars with less than half of the current U.S. average range, but that most drivers do not understand this.550 Surveys by automakers have also found that range anxiety is the largest factor in consumers refraining from purchasing PEVs, explaining that drivers can be fearful they will run out of power before being able to recharge their vehicles, though some of these surveys were conducted in 2019 or earlier, when average PEV ranges were lower.551 Simply providing tailored compatibility information regarding the ability of BEVs to fulfill drivers' range needs increased willingness to pay for BEVs even more than information about easy access to charging infrastructure.552 [EPA-HQ-OAR-2022-0829-0759, pp. 172-173]

549 Forsythe et al. (2023) at 1-2.

550 Herberz et al. (2022) at 503, 506–507. See also Jennifer Sensiba, Putting Two Ford Announcements Together Shows Us How It Thinks About EV Range (May 29, 2023), https://cleantechnica.com/2023/05/29/putting-two-ford-announcements-together-shows-us-how-it-thinks-about-ev-range/ (noting that 90% of all drives are within range of home).

551 Rob Stumpf, Americans Cite Range Anxiety, Cost as Largest Barriers for New EV Purchases: Study, The Drive (Feb. 26, 2019), https://www.thedrive.com/news/26637/americans-cite-range-anxiety-cost-as-largest-barriers-for-new-ev-purchases-study.

552 Herberz et al. (2022) at 503.

Even for longer travel and trips in excess of the average daily drive—which make up a very small percentage of U.S. driving—PEVs provide a good fit for most consumers' needs and wants. U.S. Bureau of Transportation Statistics data shows that trips longer than 250 miles make up a miniscule fraction of U.S. daily driving. In 2022, U.S. drivers took between 1.3 billion and 1.5 billion vehicle trips per day, with fewer than 2 million trips per day 500 miles or longer and between about 1.5 million and 2.5 million trips per day between 250 and 500 miles.553 Charging infrastructure is rapidly developing to support this small percentage of longer drives. As Section XVII explains, the number of public PEV charging stations is growing rapidly,554 and the BIL and IRA are funding new PEV charging corridors. Alternative Fuels Data Center's map of nationwide PEV charging stations shows that already—with 8.3% PEV sales penetration in the first quarter of 2023555—charging stations are widespread.556 In May, U.S. and Canadian officials announced the first Binational EV Corridor, covering a nearly 900-mile stretch between the United States and Canada, with PEV chargers every 50 miles.557 Similarly, last year four states announced plans to build a 1,100-mile PEV charging circuit along Lake Michigan.558 In Washington, Oregon, and California, the West Coast Electric Highway provides DC fast charging stations every 25 to 50 miles along Interstate 5, Highway 99, and other major roadways.559 Electrify America's DC fast-charging network includes two cross-country routes (one from Los Angeles to Washington, DC, and another from San Diego to Jacksonville), along with a route covering much of the East Coast on Interstate 95 (from Portland, Maine to Miami, Florida), and most of the West Coast along Interstate 5 (from Seattle, Washington to San Diego, California).560 GM and Pilot Company just announced plans to collaborate on a national DC fast charging network of 2,000 charging stalls at up to 500 travel centers across the country, to "help enable long-distance electric travel of people and vehicles across the U.S."561 These chargers will be capable of the fastest 350 kW charging speeds.562 [EPA-HQ-OAR-2022-0829-0759, pp. 173-174]

553 See U.S. Bureau of Labor Statistics, Trips by Distance Band, https://www.bts.gov/browse-statistical-products-and-data/covid-related/trips-distance-groupings-national-or-state.

554 Alternative Fuels Data Center, Alternative Fueling Station Locator, https://afdc.energy.gov/stations/#/analyze?country=US&fuel=ELEC&ev_levels=all&access=public&access=private (noting 57,882 station locations and 155,449 EVSE ports available) (last accessed June 30, 2023); see also EPA, The 2022 EPA Automotive Trends Report, at E-2.

555 Argonne National Laboratory, Light Duty Electric Drive Vehicles Monthly Sales Updates, https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates.

556 Alternative Fuels Data Center, Electric Vehicle Charging Station Locations, https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC.

557 Kalea Hall, EV Corridor to Run Nearly 900 Miles from Kalamazoo to Quebec, US and Canada Officials Say, The Detroit News (May 16, 2023), https://www.detroitnews.com/story/business/autos/2023/05/16/binational-ev-corridor-to-run-860-miles-from-kalama zoo-to-quebec/70224111007/.

558 Id.

559 West Coast Green Highway, West Coast Electric Highway, http://www.westcoastgreenhighway.com/electrichighway.htm.

560 Stephen Edelstein, Electrify America Finishes First Cross-Country Fast-Charging Route for EVs, Green Car Reports (June 24, 2020), https://www.greencarreports.com/news/1128610_electrify-america-finishes-first-cross-country-fast-charging-route-f or-evs. See also Electrify America, Locate A Charger, https://www.electrifyamerica.com/locate-charger/ (showing map of fast-charging network across the United States).

561 Anne LeZotte, GM and Pilot Company to Build Out Coast-to-Coast EV Fast Charging Network, Pilot Flying J, https://pilotflyingj.com/press-release/19335.

562 Id.

Infrastructure will continue to build out rapidly on highways with increasing PEV penetration, fulfilling the needs for even these comparatively less frequent longer drives. Survey data from Europe shows that as PEV penetration rates increase and drivers become more experienced with PEV operation, they become comfortable taking longer trips in their vehicles and are “more relaxed” about traveling long distances and when they charge their vehicles.563 In addition, other developing technologies could make both short and longer drives even more seamless, such as possible “electrified” roadways that contain wireless charging infrastructure under the asphalt and wirelessly charge PEVs while driving.564 Such projects are already in development or testing in the United States and Europe.565 [EPA-HQ-OAR-2022-0829-0759, p. 174]

563 Shell Global, Shell Recharge Research Suggests Increasing EV Adoption is Driving Range Confidence (June 23, 2023), https://www.shell.com/energy-and-innovation/mobility/mobility-news/shell-recharge-research-suggests-increasing-e v-adoption-is-driving-range-confidence.html.

564 Joann Muller, A Roadway Will Charge Your EV While You’re Driving, Axios (Feb. 6, 2022), https://www.axios.com/2022/02/02/a-roadway-will-charge-your-ev-while-youre-driving.

565 Id.

4. PEVs have additional attributes that are superior to combustion vehicles.

PEVs have additional superior attributes related to the driving and ownership experience that are widely attractive to drivers. These include faster acceleration; improved performance; better noise, vibration, and harshness characteristics; and reduced maintenance. Sections XIX.C, XX, and XXI detail these additional superior attributes and the benefits that they provide for drivers and vehicle owners. These attributes will continue to further increase consumer preference for PEVs. [EPA-HQ-OAR-2022-0829-0759, p. 174]

5. American consumers also place high importance on environmental sustainability, and EPA should not ignore these preferences.

When considering consumer preferences, EPA cannot overlook the importance that American consumers place on sustainability. U.S. consumers increasingly place high priority on protecting the environment, and PEVs are well positioned to satisfy this aspect of consumer preference.

Numerous consumer surveys, including by YouGov, CarMax, and others have found that protecting the environment is a top consideration in purchasing a vehicle.566 In CarMax's survey, over 60% of people said a car's "fuel emissions are moderately or extremely important to them, while only 7.3% of people found fuel emissions not at all important."567 [EPA-HQ-OAR-2022-0829-0759, p. 175]

566 Bill Howard, Survey: 23% of Americans Would Consider EV as Next Car, Forbes (Oct. 8, 2021), https://www.forbes.com/wheels/features/ev-survey/ (YouGov poll for Forbes Wheels); CarMax, Green-Conscious: Exploring Americans' Views on Hybrid and Electric Vehicles (Aug. 23, 2021), https://www.carmax.com/articles/green-cars-trend.

567 CarMax, Green-Conscious: Exploring Americans' Views on Hybrid and Electric Vehicles (Aug. 23, 2021), https://www.carmax.com/articles/green-cars-trend.

6. PEVs are a great fit for the needs and demands of rural drivers.

PEVs are a great fit even for rural drivers. Although rural Americans are currently adopting PEVs at slower rates than urban Americans,568 PEVs actually excel at meeting the demands of rural drivers. "Fuel savings for rural households are larger than for urban households, because trips in rural areas are longer than in urban areas, and vehicles tend to be older and less efficient, requiring more fuel per mile, [P]EVs require fewer trips to a mechanic for repairs and maintenance. Because of the high torque and low center of gravity, they have excellent performance, which is important on rough, curvy and steep roads."569 A survey by the Union of Concerned Scientists and Consumer Reports found that "there is plenty of interest [in PEVs] in rural areas, but there is a huge knowledge gap about what it is like to own an EV."570 Correcting for this knowledge gap and educating rural consumers on PEVs' real benefits will undoubtedly significantly increase PEV adoption in rural areas, allowing all Americans to reap their benefits. [EPA-HQ-OAR-2022-0829-0759, p. 175]

568 U.S. Department of Transportation, Individual Benefits of Rural Vehicle Electrification (May 4, 2023), https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/individual-benefits (noting that rural EV adoption is currently roughly 40% lower than urban EV adoption, but explaining that EVs can have significant benefits for rural drivers); Maria Cecilia Pinto de Moura, Survey Shows Pathway to Speeding Up EV Adoption in Rural Areas, Union of Concerned Scientists (March 14, 2023), https://blog.ucsusa.org/cecilia-moura/survey-shows-pathway-to-speeding-up-ev-adoption-in-rural-areas/.

569 Maria Cecilia Pinto de Moura, Survey Shows Pathway to Speeding Up EV Adoption in Rural Areas, Union of Concerned Scientists (March 14, 2023), https://blog.ucsusa.org/cecilia-moura/survey-shows-pathway-to-speeding-up-ev-adoption-in-rural-areas/.

570 Id.

XX. BEVs Provide Additional Economic and Performance Benefits to Consumers.

A. Slightly higher upfront costs are offset by lower operating and fuel costs, saving drivers money.

EPA is correct to conclude that consumers experience net economic benefits when purchasing electric vehicles because lower operating costs offset increases in vehicle technology costs, irrespective of purchase incentives. 88 Fed. Reg. at 29344. EPA projects that aggregate vehicle technology costs through 2055 will range from $260 billion to $380 billion (7 and 3% discount rates). Id. Yet EPA estimates that total fuel savings over the same period will range from $560 billion to $1.1 trillion, while reduced maintenance and repair costs will range from $280 billion to $580 billion. Id. On net, consumers benefit from the Proposed Standards. [EPA-HQ-OAR-2022-0829-0759, p. 177]

These savings also filter down to the individual buyer. Even under the "high battery costs" sensitivity analysis, EPA found that the average incremental vehicle cost for the Proposed Standards was $1,632, and $2,066 for Alternative 1 (6-year average). Table 117, 88 Fed. Reg. at 29337. (Under the "low battery costs" analysis, incremental cost increases are far lower: $441 for the Proposed Standards, and $1,360 for Alternative 1 (6-year average). Id. at 29336.) These upfront costs are quickly eclipsed as the broader picture of overall costs emerges. First, some BEV models would be eligible for the full $7,500 purchase incentive in the Inflation Reduction Act, while others would be eligible for a partial credit. As EPA notes, this means that net purchase expenses are lowest across all body styles for BEVs (assuming the maximum incentive applies). DRIA at 4-20. Moreover, in operating expenses over 8 years (the average length of time a new owner keeps a vehicle), BEV owners save between $9,040 for sedans to $12,880 for pickups. Id. These operating expenses, which include lower maintenance and repair costs, are highly significant, and only grow larger the longer the owner retains the vehicle. [EPA-HQ-OAR-2022-0829-0759, p. 177]

B. Consumers and businesses will appreciate the stability of electricity prices relative to the volatility of gasoline prices.

In addition to providing significant absolute fuel cost savings relative to gasoline or diesel, driving on electricity also provides a significant price-stability advantage. As shown in Figure XX.B-1, for more than the last two decades, driving a passenger BEV on residential electricity prices has been the cost equivalent of driving on dollar-a-gallon gasoline, whereas the price of gasoline itself jumps up and down in response to world events. [EPA-HQ-OAR-2022-0829-0759, p. 177]

SEE ORIGINAL COMMENT FOR Figure XX.B-1: Equivalent Electricity and Gasoline Prices: January 2001-April 2023578 [EPA-HQ-OAR-2022-0829-0759, p. 177

578 Source data: EIA, Short Term Energy Outlook. Electricity prices shown in "eGallons" a Department of Energy metric that "represents the cost of driving an electric vehicle (EV) the same distance a gasoline powered vehicle could travel on one (1) gallon of gasoline." Methodology available at: https://www.energy.gov/articles/egallon-methodology.

While gasoline prices fluctuate wildly due to uncontrollable events, electricity prices are inherently more stable because electricity is produced from a diverse mix of largely domestic energy sources. Electricity prices also are more stable because the power industry is regulated, while the world oil market and petro-dictatorships are not. [EPA-HQ-OAR-2022-0829-0759, p. 178]

Households and businesses both stand to benefit from the predictable savings that driving on electricity can provide. And low-income households that spend a disproportionate share of their disposable income at the gas pump will benefit financially from getting off the rollercoaster of the world oil market. [EPA-HQ-OAR-2022-0829-0759, p. 178]

C. BEVs provide additional performance and handling improvements for consumers, improving their overall driving experience.

In addition to the clear economic benefits of BEV purchase and ownership described in the previous section, there are other "intangible" factors that make the overall BEV experience better for consumers. EPA cites several of these factors, including responsive acceleration, improved performance and handling, and quiet operation. DRIA at 3-15. Many examples confirm these advantages. [EPA-HQ-OAR-2022-0829-0759, pp. 178-179]

As Consumer Reports notes, "most electric cars deliver instant power from a stop, and they are both smooth and quiet when underway. The driving experience is quite different from a traditional gasoline-fueled car because EVs feel like they glide effortlessly."579 Other reviewers have found that the lower center of gravity in BEVs improves their handling by allowing turning and cornering more quickly and smoothly than gas-powered cars.580 In addition, BEVs' regenerative braking capabilities, which captures energy normally lost during braking, may also improve the driving experience by extending the vehicle's range and provide a "smoother and more controlled" braking experience.581 [EPA-HQ-OAR-2022-0829-0759, p. 179]

579 Consumer Reports, Electric Cars 101: The Answers to All Your EV Questions (March 2, 2023), https://www.consumerreports.org/cars/hybrids-evs/electric-cars-101-the-answers-to-all-your-ev-questions-a7130554 728/.

580 Steer EV, 8 Reasons Why Electric Vehicles Are Safer Than Traditional Cars (Apr. 27, 2023), https://steerev.com/steer-vs-other/8-reasons-why-electric-vehicles-are-safer-than-traditional-cars/.

581 Id.

Car and Driver tested dozens of EVs and compared the data with gasoline-powered cars, finding that EVs are quieter at "max-attack acceleration" as well as at 70 miles per hour, have a more even weight distribution due to battery packs positioned low and in the vehicle's center, and accelerate almost as quickly as their combustion counterparts.582 Several other analysts have concluded that EVs accelerate faster than gas-powered vehicles because they provide instant torque to the wheels.583 For example, a Tesla Model S Plaid (with a starting price of around $108,000) accelerates from 0 to 60 miles per hour in just under two seconds, a full second faster than a supercar like the Ferrari Daytona SP3 that starts at $2,226,935 (about 20 times the cost of the Tesla).584 And the same holds for more affordable vehicles. For example, the Volvo EX30 promises to be a full second faster to 60 miles per hour than a comparably priced Chevy Camaro.585 While EPA did not place undue emphasis on these factors when making its assumptions about BEV adoption rates, these benefits are nonetheless significant and support EPA's finding that BEV performance and handling factors will contribute to high rates of adoption in coming years. [EPA-HQ-OAR-2022-0829-0759, p. 179]

582 Dave Vanderwerp, How EVs Compare to Gas-Powered Vehicles in Seven Performance Metrics, Car and Driver (May 15, 2021), https://www.caranddriver.com/features/g36420161/evs-compared-gas-powered-vehicles-performance/.

583 See, e.g., Jeremy Laukkonen, Lifewire, Want a High-Performance Car? Think EV (Sept. 29, 2021), https://www.lifewire.c/want-a-high-performance-car-think-ev-5203444; Electric Driver, Electric Vehicle Performance, https://electricdriver.co/articles/electric-vehicle-performance/.

584 See Christian Seabaugh, 2022 Tesla Model S Plaid First Test: 0–60 MPH in 1.98 Seconds, Motortrend (Jun. 17, 2021), https://www.motortrend.com/reviews/2022-tesla-model-s-plaid-first-test-review/; Angus MacKenzie, Driven! The Ferrari Daytona SP3 Isn't Rational—and That's the Point, Motortrend (Jul. 31, 2022), https://www.motortrend.com/reviews/2023-ferrari-daytona-sp3-supercar-first-drive-review/

585 See Viknesh Vijayenthiran, 2025 Volvo EX30 hits 0-60 in 3.4 seconds, starts at $36,145, Motor Authority, https://www.motorauthority.com/news/1139801_2025-volvo-ex30-price.

XXI. Consumers Will Experience Significant Savings Due to Reduced Repair and Maintenance Costs for BEVs.

EPA's Proposal accurately projects significant consumer savings due to reduced repair and maintenance costs for BEVs. EPA relies on comprehensive repair and maintenance cost estimates developed by Argonne National Laboratory (ANL) in 2021 to project per vehicle maintenance and repair savings per year of between $430 (BEV sedan/wagons) and $470 (BEV pickups) in 2032. DRIA at 4–20; see also DRIA at 4–32 to 4–37. Other analyses—both those that have relied on the same underlying ANL cost estimates and those that have relied on other data—have found similarly significant maintenance and repair savings. [EPA-HQ-OAR-2022-0829-0759, p. 180]

A 2022 ICCT study considering LDV costs and benefits in the United States between 2022 and 2035 also relied on the ANL cost estimates and found almost identical reductions in per vehicle maintenance costs.586 The ICCT analysis concluded that maintenance costs for BEVs are expected to be about $2,650 lower than for gasoline vehicles over a six-year period,587 which averages to about $442 savings per year. A survey conducted by Consumer Reports in 2019 and 2020 also found very significant self-reported consumer savings on repair and maintenance. The data from surveys of thousands of Consumer Reports members revealed that "BEV and PHEV owners are paying half as much as ICE owners are paying to repair and maintain their vehicles," with lifetime savings of BEVs and PHEVs over combustion vehicles being approximately $4,600.588 Similarly, a study by UBS estimated that the Chevy Bolt (BEV) has total annual maintenance costs of $255 and the VW Golf (combustion vehicle) has repair and maintenance costs of $610.589 An analysis using U.S. Office of Energy Efficiency and Renewable Energy data regarding maintenance and repair costs and U.S. General Services Administration data regarding federal vehicle use calculated that "a hypothetical full-electric government fleet would have saved just over $78 million in maintenance costs" in one year.590 An analysis of repair and maintenance costs in Canada, which found 47% repair and maintenance cost savings for BEVs over combustion vehicles, noted that U.S. studies have found cost savings in similar ranges, and explained that when looking at the top 10 most common U.S. car repair items, none of the repairs in the list apply to a BEV.591 These significant repair and maintenance savings are expected to occur because "[t]ypical BEV drivetrains have 90% fewer moving parts, require no maintenance such as oil changes or timing belts and their ability to use regenerative braking saves energy and makes their brake pads last longer."592 Thus, U.S. drivers and vehicle purchasers stand to gain significant benefits from reduced automotive repair and maintenance needs for BEV. [EPA-HQ-OAR-2022-0829-0759, pp. 180-181]

586 Peter Slowik et al., Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022–2035 Time Frame, ICCT (Oct. 2022), https://theicct.org/wp-content/uploads/2022/10/ev-cost-benefits-2035-oct22.pdf.

587 Id. at 24.

588 Chris Harto, Electric Vehicle Ownership Costs: Today's Electric Vehicles Offer Big Savings for Consumers, Consumer Reports at 9, 11 (Oct. 2020), https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf.

589 UBS, UBS Evidence Lab Electric Car Teardown — Disruption Ahead? 7 (May 18, 2017), https://neo.ubs.com/shared/d1ZTxnvF2k/.

590 Nick Yekikian, The Government Confirms Obvious: Electric Cars Cheaper to Maintain Than Internal Combustion Vehicles, Motortrend (June 21, 2021), https://www.motortrend.com/news/government-ev-ice-maintenance-cost-comparison/.

591 Ryan Logtenberg, James Pawley & Barry Saxifrage, Comparing Fuel and Maintenance Costs of Electric and Gas Powered Vehicles in Canada, 2 Degrees Institute at 5 (Sept. 2018), https://www.2degreesinstitute.org/reports/comparing_fuel_and_maintenance_costs_of_electric_and_gas_powered_v ehicles_in_canada.pdf.

592 Id.

XXII. BEV Ownership, Combined with Supportive Policies, Will Benefit Lower-Income Consumers.

EPA describes several expected outcomes of the Proposed Standards on lower-income households: first, that increased upfront purchase costs may impact highly price-sensitive consumers; and second, that decreased fuel and maintenance costs from BEV ownership may benefit these consumers disproportionately. 88 Fed. Reg. at 29368. While upfront BEV cost concerns may serve as an initial barrier to lower-income consumers, a suite of targeted policies can mitigate this concern. [EPA-HQ-OAR-2022-0829-0759, p. 181]

First, several policies may help with the upfront cost concerns, including the (maximum) $7,500 new vehicle purchase incentive and the first-of-its-kind (maximum) $4,000 incentive for used vehicles in the Inflation Reduction Act. These policies may also be supplemented by state-level initiatives that further reduce the purchase cost for buyers falling under defined income thresholds, such as California's Clean Vehicle Rebate Project.593 Also, as EPA notes, for used BEVs, there is evidence that the original purchase incentive is passed on to the next buyer, which reduces the effective price of BEVs. Taken together, these savings bring the initial cost of several BEV models–and undoubtedly more to come in future years–below the purchase price of a comparable combustion vehicle. See DRIA Ch. 4.2.2. [EPA-HQ-OAR-2022-0829-0759, p. 181]

593 California Clean Vehicle Rebate Project, Eligibility & Requirements, https://cleanvehiclerebate.org/en/eligibility-guidelines.

Moreover, because lower-income households spend a disproportionate amount on vehicle repair and fuel costs,594 they should benefit from these savings that come with BEVs, which continue to accrue year after year. This is especially true because fuel economy, and therefore fuel savings, tends not to degrade much as a vehicle ages, even when the vehicle is sold and resold for a lower price over time. 88 Fed. Reg. at 29368. Separately, from an overall ownership perspective, modifications to the Alternative Fuel Refueling Property Tax Credit in the IRA limit applicability to charging infrastructure in low-income areas and areas that are not urban. DRIA at 5-26. This change may help residents in those communities afford home charging or incentivize businesses to install public chargers, which would improve the BEV ownership experience. [EPA-HQ-OAR-2022-0829-0759, pp. 181-182]

594 See, e.g., Hardman, Fleming et al., A Perspective on Equity in The Transition to Electric Vehicles, MIT Science Policy Review (Aug. 30, 2021), https://sciencepolicyreview.org/wp-content/uploads/securepdfs/2021/08/A_perspective_on_equity_in_the_transition_to_electric_vehicles.pdf.

For these reasons, EPA was correct to consider the effects of BEV purchase and ownership on lower-income consumers. Inclusive policies that ease the burden of any potential higher costs on these consumers merit further study, and it is essential that the benefits of BEV ownership are accessible to all and shared equitably. EPA has shown that the cost savings over time make BEV ownership worthwhile for lower-income households, and that additional policies like the IRA purchase incentives can lessen any upfront cost disparities. [EPA-HQ-OAR-2022-0829-0759, p. 182]

101 See 88 Fed. Reg. at 29385-86, tbls. 196 and 197, adding $21 billion in avoided maintenance costs and $8.9 billion in avoided repair costs under the Proposed Standards, and the analogous values of $24 billion and $9.3 billion, respectively, under Alternative 1.

Organization: Environmental Defense Fund (EDF) (1of 2)

C. Consumers are already seeing savings from today's ZEVs.

Consumers will also benefit from protective standards that help ensure additional adoption of ZEVs. As discussed in section III below, the upfront costs and the lifetime costs of ZEVs are declining rapidly and are expected to continue to do so over the timeframe of this rulemaking, which will further increase the savings of owning a ZEV as compared to an ICEV. But consumers are already seeing savings today. WSP performed an analysis for EDF that compares the lifetime costs, over 10 years, of owning and operating a number of the most popular or widely anticipated current EVs compared to gasoline vehicles.8 The costs considered include purchase and financing of the vehicle and home charger (for EVs) and annual vehicle registration, maintenance, insurance, and fuel costs. The analysis accounts for federal and state EV and charger tax credits. WSP compared the Chevrolet Equinox EV to the Equinox RS, the Ford Mustang Mach-E Premium to the Ford Edge ST-Line, the Volkswagen ID.4 Pro to the Tiguan SE and the Ford F-150 Lightning XLT to the gasoline F-150 XLT. The analysis finds that higher upfront purchase price and insurance costs for EVs are outweighed by the lower maintenance and fuel costs. Over 10 years, all of the studied EVs are estimated to be less expensive to own and operate than the comparable gasoline vehicle, with total life-time savings of up to $18,440. As shown in Figure 2, the Chevy Equinox EV has the greatest savings over 10 years at 29% and the VW ID.4 has the lowest savings at 1%. The analysis also concluded that rural EV drivers would see additional lifetime savings than urban drivers. In addition to cost savings, there are other attributes of EVs that consumers value, including better performance and reduced noise. [EPA-HQ-OAR-2022-0829-0786, pp. 8-9]

8 Electric Vehicle Total Cost of Ownership Analysis, Summary Report, WSP for EDF (July 2023), https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/WSP-Total-Cost-of- Ownership-Analysis-July-2023.pdf (Attachment G).

[See original attachment for Figure 2: Existing EV vs. ICEV – Total Costs After 10 Years] [EPA-HQ-OAR-2022-0829-0786, pp. 8-9]

Source: WSP, Electric Vehicle Total Cost of Ownership Analysis [EPA-HQ-OAR-2022-0829-0786, pp. 8-9]

Organization: Fermata Energy

V2X bidirectional charging is a win-win-win investment: many benefits accrue:

• Achieves EPA's environmental goals. Just like stationary storage, V2X bidirectional charging platforms can reduce carbon and criteria pollutant emissions from generators by shifting electricity consumption to the cleanest hours of the day and removing the need for dirty thermal peaker electricity generation. However, V2X is more cost-effective than stationary storage, as ratepayers don't have to pay for purchase of the EV battery and can accelerate the renewable transition. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

• Provides grid services. With V2X bidirectional charging, utilities gain a low-cost energy storage resource to help integrate renewable energy into the electric grid by shifting energy, providing resource adequacy, and ancillary services (Figure 3). For example, modeling by the CPUC currently projects 14,700 MW of new energy storage is needed in CA by 2032 to support the integration of renewables but only 2,185 MW is operational today.9,10 V2X, with supportive policies, can provide many thousands of MW by 2030. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

9 CPUC Approves Long Term Plans To Meet Electricity Reliability and Climate Goals, CPUC, 2022 (Link: https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-approves-long-term-plans-to-meet-electricity-reliability-and-climate-goals)

10 Infographic: Q4'21 US Battery Storage by the Numbers, S&P Global, 2022 (Link: https://www.spglobal.com/marketintelligence/en/news-insights/blog/infographic-q4-21-us-battery-storage-by-the-numbers)

[See original attachment for Figure 3 - Grid services and value from different Vehicle-Grid-Integration technologies]11 [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

11 California Energy Commission, March 2019, Distribution System Constrained Vehicle-to-Grid Services for Improved Grid Stability and Reliability, (Link: https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-027.pdf) Figure 42

• Lower vehicle ownership costs. EV owners can earn money by selling electricity back to the grid, significantly cutting the cost of vehicle ownership. Offsetting the cost of owning and maintaining an EV supports equitable access to EVs, particularly those EVs in the used car market, such as the low-income EV driving community. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

• Increased resiliency. Unidirectional charging is a grid load. V2X bidirectional charging cost-effectively supports grid resilience. During blackouts and extreme weather events, such as Public Safety Power Shutoffs (PSPS) in CA, EV owners can power their homes, businesses, and critical infrastructure. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

• Ratepayer benefits. EV adoption has already been shown to significantly benefit utility ratepayers and V2X technology can further those benefits.12 For example, a 2018 CEC study projects $1 billion in annual ratepayer benefits if 50% of chargers were V2X capable.13 V2X technology also improves driver economics which would likely drive further EV adoption and even greater ratepayer benefits. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

12 Electric Vehicles Are Driving Electric Rates Down, Synapse Economics, 2019, Electric Vehicles Benefit All Utility Ratepayers, Forbes, 2019 (Link: https://www.forbes.com/sites/jeffmcmahon/2019/02/01/electric-vehicles-benefit-all-utility-customers-as-much-as-their-owners/)

13 Distribution System Constrained Vehicle-to-Grid Services for Improved Grid Stability and Reliability, (Link: https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-027.pdf) CEC 2018, Table 8, High PEV Forecast Scenario

Organization: Ford Motor Company

Vehicle purchase price is a core consideration for prospective buyers, and in general there may not be cost parity between new EVs and new ICE vehicles until the middle or end of the 2027 – 2032 time period. While purchasers consider many other factors that favor EVs including lower cost of ownership and vehicle performance, it is uncertain whether enough purchasers will elect for an EV over an ICE vehicle. [EPA-HQ-OAR-2022-0829-0605, p. 7]

Consumer incentives for EVs help to reduce the upfront cost, however the federal Clean Vehicle Credit for retail consumers under section 30D of the tax code will not be available for many new vehicle purchasers. Indeed, this tax incentive is less available now for people who purchase Ford EVs and PHEVs than was the case before the Inflation Reduction Act. Further, the supply chain eligibility criteria will become even more strict in the 2027 – 2032 timeframe. While some states offer incentives to reduce the costs of clean vehicles, and that can provide material benefit in that state, to meet the proposed GHG standards will require widespread adoption of EVs nationwide. [EPA-HQ-OAR-2022-0829-0605, p. 7]

Organization: Fred Reitman

Electric vehicles are unaffordable. New electric vehicles cost about $20,000 more than gasoline-powered vehicles. More than half of Americans are living paycheck to paycheck and cannot afford the higher cost of an electric vehicle (EV). Further, batteries will need to be replaced and the cost of new electric batteries range from $10,000 - $ 15,000. [EPA-HQ-OAR-2022-0829-0432, p. 1]

Organization: Fuel Freedom Foundation

Minimize consumer disruption and cost. Since first being introduced more than 15 years ago, FFVs have been manufactured and sold with no consumer disruption. The functioning and fueling are virtually indistinguishable to drivers, and from a policy perspective are only limited in utility by uneven availability of E85. However, the state of California offers an illuminating example of FFVs fueled by a more robust fueling infrastructure. Due to a long-term sustained discount of E85 relative to regular gasoline (87 RON), California drivers have continued to increase use in the state. E85 consumption in California has been increasing by an average of 33% per year—and 40% from 2021 to 2022.14 The usage rate of E85 in FFVs was 16% in 2022 for a total of 103 million gallons.15 A primary driver of increased E85 use has been its sustained discount relative to retail gasoline. E85 has consistently offered a steady pump price discount of ~$1.00/gallon in California. Further, when gasoline prices spiked after Russia's invasion of Ukraine, FFV drivers in the State were buffered from the impact. Unlike gasoline prices, ethanol prices are not dependent on world oil prices. Consequently, while gasoline prices spiked, E85 prices remained stable, resulting in a discount of up to $2.50/gallon for E85 relative to regular gasoline, and in some cases more. [see Appendix A] [EPA-HQ-OAR-2022-0829-0711, pp. 4-5]

14 California Air Resources Board E85 consumption data

15 California Air Resources Board and Pearson Fuels data

Organization: Green Diesel Engineering LLC

Proposed Emission Standard Guidelines

- Modify the emission standards on gasoline and diesel with the primary emphasis to be on minimizing CO2. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Increase NOx limit for diesel engines to 3 gram/mile on EPA emission test cycles. This is still cleaner than 1980 standards. With proper engine tuning, the smaller NOx increase allows for a decrease of 100 gram/mile of CO2. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Maintain the theme of clean diesel and keep particulate filters to prevent PM (particulate matter) emissions. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Manufacturers could add GPS software to go into low NOx mode when near NOx abatement zones. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Re-allocate tax incentives for urban residents to purchase BEV (battery electric vehicle) [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Work with states on regional smog issues as these are very limited in geographical area. The top cities are: Los Angeles, Denver, Miami, New York City, Houston, Atlanta, etc. Moving to primarily electric vehicles in dense population zones eliminates point of use emissions. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Work with bio-fuel producers, farmers, refineries as needed to promote plant- based fuels that do not impact the food system. Hemp would be a good starting point as the entire plant can be utilized. The seed oil produces bio-diesel and the stalk produces ethanol. A robust bio fuel industry could reduce CO2 up to 1000 million metric tons yearly. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Electric is a good solution for local driving patterns. It is not good for long distance runs or pulling loads and does suffer in range with extreme cold or heat. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Re-calibrating vehicles in the field for low CO2 will yield the quickest return on investment. [EPA-HQ-OAR-2022-0829-0457, p. 6]

Organization: HF Sinclair Corporation

f. EPA Fails to Properly Account for the Cost Impact of the Proposed Rule

As noted above, EPA must consider both feasibility and cost of compliance. In addition to the infeasibility of delivering an electric grid that can support the PEVs that OEMs must now produce, EPA has failed to adequately account for the cost of the Proposed Rule. Namely, EPA has severely underestimated the cost impact on lower-income households. Given the low cost of carbon-based transportation fuel, fluctuations in the electricity market, and higher insurance costs, the “break-even” point for a higher-cost PEV – which may be upwards of $15,000 more than its ICE counterpart – is not a mere few years as EPA predicts, but decades.75 And this calculus is heavily dependent on the $7,500 tax credit provided by the IRA, which will change if future policymakers eliminate it or otherwise require PEVs to compete in the market without a subsidy.76 Not only will this hinder the widespread adoption of PEVs, but it will also drive up the cost used car prices across the country as consumers hold off on buying new cars.77 [EPA-HQ-OAR-2022-0829-0579, p. 16]

75 Id. at 5, 13.

76 This subsidy results in a cost-shifting mechanism from middle-class to wealthy families, id. at 14, which may not be supported by future elected officials.

77 Id. at 6.

Beyond the cost to the consumer, the Proposed Rule also fails to account for the lost fuel tax revenue that will come from the expected reduction in transportation fuel consumption. In 2020, states brought in over $52.7 billion in motor fuel tax revenue which, combined with over $43 billion collected in federal highway-related excise taxes, funded necessary expenditures on highway and road infrastructure.78 Elimination of ICE vehicles, and the associated transportation fuel consumption revenue, will contribute to a deficit of $741 per household annually. Yet this shortfall is not meaningfully addressed in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0579, p. 16]

78 Id. at.

Organization: Institute for Policy Integrity at New York University School of Law

"Pass-through" refers to the degree to which manufacturers pass on cost increases to consumers. EPA in prior tailpipe rules has assumed 100% pass-through to consumers in the vehicle market—meaning that every dollar of additional cost to the automaker is ultimately borne by the purchaser.147 EPA appears to repeat this assumption in the Proposed Rule. That approach is also reasonable given consistency with the agency's prior approach and the very limited economic evidence on vehicle pass-through. Nonetheless, that limited available evidence (from a 2010 paper) indicates that pass-through in the vehicle market may be below 100%.148 Accordingly, EPA should discuss and provide a rationale for its approach. EPA should also support further research in this area, given its potential importance. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

147 E.g. 2020 Rule, 85 Fed. Reg. at 24,594–95.

148 Using regression analysis, Hellerstein and Villas-Boas (2010) find only partial pass through for the vehicle industry with an average pass-through rate of 38%. Rebecca Hellerstein, & Sophia B. Villas-Boas, Outsourcing and Pass-Through, 81 J. INT'L ECON. 170, 175 (2010).

1. EPA Should Discuss Additional Contributing Market Failures

EPA should describe additional market failures that contribute to the energy efficiency gap. These include dealership incentives, biases, and information asymmetries; institutional myopia; and manufacturer market power. As discussed below, most or all of these market failures apply similarly to electric vehicles as they do to ICE vehicles. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

i. Dealership incentives, biases, and information asymmetries

Salespeople's incentives and biases may cause informational asymmetries that prevent consumers from optimizing fuel efficiency.165 Studies show that dealers and salespeople often believe that electric vehicles and other efficient cars have lower profits for dealers than gas-powered cars,166 for various reasons.167 Consumers (and researchers posing as consumers) have often complained of poor dealership experiences when trying to purchase electric vehicles, citing salespeople's limited knowledge; misinformation and dishonesty about vehicle cost, range, and other attributes; inconsistent enthusiasm for electric vehicles; lack of inventory for more efficient and electric vehicles; poor timeliness for completing paperwork and vehicle delivery; limited promotional materials on energy efficiency; and inability to facilitate consumers' cost comparisons of electric versus gas vehicles.168 Some dealerships have admitted that poor sales training is a major barrier to electric vehicle sales.169 [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

165 See Fred Lambert, After Losing Dealers over Its Electric Move, Cadillac Is Now Gaining New Ones, ELECTREK, Sept. 23, 2021 (reporting that one-fifth of U.S. Cadillac dealers exited from the brand in 2020 rather than commit to selling electric vehicles).

166 Cox Automotive, Evolution of Mobility: The Path to Electric Vehicle Adoption 23 (2019), https://perma.cc/UV7N-42BE (reporting that 54% of surveyed dealers say there is a lower ROI for sales of EVs compared to gas); Eric Cahill et al., New Car Dealers and Retail Innovation in California's Plug-In Electric Vehicle Market (U.C. Davis Inst. Of Transp. Stud., Working Paper UCD-ITS-WP-14-04, 2014), https://perma.cc/DJ7T- SGXT (citing real or perceived profitability concerns, especially for compact or midsized vehicles).

167 Cahill et al., supra note 166, at 10 ("[A]s a category, PEVs may not represent a compelling investment to many dealers."); id. at 9–10 (noting that dealers have the false perception that PEVs entail longer transaction times and lower profits, when in fact dealers make more than average on PEVs in gross profits).

168 Id.; EPA, Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022–2025 at 3-14 (2016) at 6-15; Cox Automotive, supra note 166; Gerardo Zarazua de Rubens et al., Dismissive and Deceptive Car Dealerships Create Barriers to Electric Vehicle Adoption at the Point of Sale, 3 NATURE ENERGY 501 (2018); Lindsay Matthews et al., Do We Have a Car for You? Encouraging the Uptake of Electric Vehicles at Point of Sale, 100 ENERGY POL'Y 79 (2017); Zoe Long et al., Consumers Continue to Be Confused About Electric Vehicles: Comparing Awareness Among Canadian New Car Buyers in 2013 and 2017, 14 ENV'T RES. LTRS. 114036 (2019).

169 Cox Automotive, supra note 166, at 30 (citing lack of OEM support).

ii. Institutional myopia and inattention, including short-termism

Though EPA refers to myopia in both the 2021 RIA170 and (more briefly) in the current RIA,171 this applies to both individual and institutional consumers. In particular, economists find that corporate managers can exhibit similar kinds of inattention as individual consumers and so fail to implement energy efficiency initiatives despite positive paybacks.172 Businesses may also face a kind of myopia called short-termism, in which corporate employees have an incentive to favor short-term profits over long-term investments if, for example, their compensation or career prospects are tied to near-term earnings (or if they must meet a particular budget in a given year).173 Employees with such incentives may have reason to purchase cheaper, less efficient vehicles.174 Studies suggest that short-termism can affect managers' choices about energy efficiency specifically,175 and about environmental sustainability broadly.176 [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

170 2021 RIA at 8-4.

171 RIA at 4-39 (discussing “a lack of foresight [and] an aversion to short term losses relative to longer term gains”).

172 See Suresh Muthulingam et al., Energy Efficiency in Small and Medium-Sized Manufacturing Firms, 15 MFG. & SERV. OPERATIONS MGMT. 596, 612 (2013) (finding that manager inattention contributed to the non-adoption of energy efficiency initiatives, since initiatives that appear lower on a list of efficiency recommendations, and initiatives that require more managerial attention, are less likely to be adopted).

173 A similar dynamic could exist in government, and so affect local, state, and federal government fleet purchases, if officials are rewarded for short-term cost savings rather than long-term fiscal health.

174 This incentive could be muted by a firm’s accounting practices if costs and expenses are amortized over time.

175 See Stephen J. DeCanio, Barriers Within Firms to Energy-Efficient Investments, 21 ENERGY POL’Y 906, 907–08 (1993); Suresh Muthulingam et al., Adoption of Profitable Energy Efficiency Related Process Improvements in Small and Medium Sized Enterprises 1, 7 (Working Paper, 2008) (finding that managers fail to implement energy efficiency improvements with short payback periods for several reasons, including myopia and a stronger focus on upfront costs than on net benefits, attributed partially to short-termism).

176 See Yujing Gong & Kung-Cheng Ho, Corporate Social Responsibility and Managerial Short-Termism, ASIA- PACIFIC J. ACCT. & ECON. (2018).

This market failure should remain prominent as electric vehicles become more widely available, due to the fact that electric vehicles frequently have higher purchasing prices but provide operating-cost savings over time. The limited price salience of electricity, including the use of automatic bill-pay, means that many consumers (including corporate consumers) will not properly factor in long-term operating cost savings. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

iii. Manufacturer market power

Though EPA mentions in both the 2021 RIA and the current RIA that strategic marketing choices by manufacturers can result in inefficient under-supply of fuel economy to some consumer segments,177 EPA does not fully connect this inefficient pattern to market power. Because of the limited competition in at least some segments of the vehicle market, manufacturers may be able to act strategically when pricing vehicles and when producing vehicles with combinations of different fuel economy and other vehicle features to push consumers toward purchases that lead to higher manufacturer profits at the expense of optimal fuel economy.178 There is a relatively small number of firms producing several types of vehicles and engines.179 This market failure therefore could influence purchases by all consumer groups and across several vehicle classifications, including electric vehicles. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

177 2021 RIA at 8-5; id. at 4-39 to -40.

178 See generally Carolyn Fischer, Res. for the Future, Imperfect Competition, Consumer Behavior, and the Provision of Fuel Efficiency in Light-Duty Vehicles (2010), https://www.rff.org/documents/1472/RFF-DP-10-60.pdf.

179 See id. at 3 (explaining that “the largest four firms accounted for 75.5 percent of the value of shipments in the automobile market and 95.7 percent of the light-duty and utility vehicle market”); Nat’l Acad. of Scis., Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025–2035 at 11-356 (2021) (citing that the top ten firms accounted for 90% of light-duty sales in 2018); see also Winston Harrington & Alan Krupnick, Res. for the Future, Improving Fuel Economy in Heavy-Duty Vehicles

(2012), https://media.rff.org/documents/RFF-DP-12- 02.pdf (explaining that the heavy-duty trucking industry "is dominated by a small number of large manufacturers" and is even smaller than it would seem at first glance because of "affiliations, partnerships, and outright ownership of one company by another").

2. EPA Should More Clearly State That Its Model's Constant- Performance Assumption Obviates the Need to Estimate Lost Consumer Welfare

As in prior rules, EPA assumes when modeling the Proposed Rule that manufacturers will incur any additional costs necessary to hold vehicle performance constant. While EPA highlighted this fact in the 2021 RIA,180 it should strongly conclude that the constant-performance assumption built into OMEGA obviates the need to estimate any potential lost consumer welfare from forgone attributes. The reason for this is straightforward: Because EPA already models the costs of maintaining vehicle performance, any alleged reductions in vehicle performance resulting from the Proposed Rule would be offset by a reduction in compliance cost relative to EPA's projection. In effect, therefore, EPA's analysis already accounts for the cost of any possible efficiency-performance tradeoffs through its projection of compliance costs. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

180 2021 RIA at 8-3.

Thus, while EPA sensibly concludes that "the presence of fuel-saving technologies do not lead to adverse effects on other vehicle attributes,"181 it should more forcefully assert that this conclusion does not increase its estimate of net benefits. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

181 RIA at 4-38; see also Davis Noll et al., supra note 155, at 32–33 (discussing how "many fuel economy technologies actually improve various performance attributes").

Organization: Jack Spencer

The proposed rule's impact on low-income Americans is vastly under analyzed in the proposed rule's publication in the Federal Register and the Draft Regulatory Impact Analysis. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

Fully Monetize the Proposed Rule's Impact on Low-Income Households

Though the proposed rule acknowledges "that increases in upfront purchase costs are likely to be of particular concern to low-income households," it goes on to state on page 29368 that "we look more closely into, but do not monetize, the effects of the standards on low-income households and on consumers of low priced new vehicles and used vehicles." [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

Neglecting to fully account for the monetized impact of a proposed rule on disproportionately impacted populations is an inexcusable oversight and matter of gross negligence. Academic research has long demonstrated that environmental regulations impose a higher cost on low-income Americans as compared to the population generally.2 [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

2 Graham, John D., "Saving Lives Through Administrative Law and Economics," University of Pennsylvania Law Review," P. 521, 2008-2009, (https://biotech.law.lsu.edu/blog/graham157upalrev3952008pdf.pdf)

The reality is that environmental regulations increase vehicle costs substantially. One academic study investigated the combined costs of all National Highway Traffic Safety Administration, Environmental Protection Agency, and California Air Resources Board light duty-regulations and found that they increased vehicle prices by $6,000 to $7,000. Put another way, environmental regulation increases the purchase price of most vehicles by 15-20 percent. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

Given that 12.8 percent of Americans live in poverty3 and that the mean income for the lowest two quintiles of American incomes is $13,165 and $34,7674, respectively, low-income Americans are already being financially disadvantaged by environmental regulation. According to Kelly Blue Book, the five least expensive sedans available in 2023 cost between $16,490 and $18,500.5 At current prices, a new car is already beyond the reach of most low-income Americans, which is one reason why only around 17 percent of low-income households purchase new cars.6 Given that, according to Cars.com, the top five least expensive electric vehicles (EVs) range from $27,495 to $35,4857, the proposed rule will undoubtedly make new vehicles unaffordable for nearly all low-income Americans and make purchasing even used vehicles more difficult, if not impossible. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

3 Benson, Craig, United States Census Bureau, "Poverty Rate of Children Higher Than National Rate, Lower for Older Populations," October 4, 2022, (https://www.census.gov/library/stories/2022/10/poverty-rate-varies-by-age- groups.html).

4 Bureau of Labor and Statistics, "Table 1101. Quintiles of Income Before Taxes: Annual Expenditure Means, Shares, Standard Errors, and Coefficients of Variation, Consumer Expenditure Surveys, 2021," (https://www.bls.gov/cex/tables/calendar-year/mean-item-share-average-standard-error/cu-income-quintiles-before- taxes-2021.pdf).

5 "Cheapest Sedans of 2023 & 2024," Kelly Blue Book, (https://www.kbb.com/cheapest-cars/cheapest-sedans/).

6 Klein, Nicholas J., Basu, Rounaq, and Smart, Michael J., "In the Driver's Seat: Pathway to Automobile Ownership for Lower-Income Households in the United States," Transportation Research Interdisciplinary Perspectives 18, p. 4, " 2023, (https://www.sciencedirect.com/science/article/pii/S2590198223000349#:~:text=The%20Survey%20of%20Househ old%20Economics,compared%20with%2013%20%25%20of%20households).

7 "Here are the 11 Cheapest Electric Vehicles You Can Buy," Cars.com, June 23, 2023, (https://www.cars.com/articles/here-are-the-11-cheapest-electric-vehicles-you-can-buy-439849/).

This is an unacceptable outcome for any regulation as research firmly establishes that access to a car comes with a litany of positive social benefits including upward economic mobility, public safety benefits, and healthcare and education opportunities.8 Any public policy that could threaten access to autos for low-income households should be a nonstarter. [EPA-HQ-OAR-2022-0829-0681, pp. 1-2]

8 Klein, N. J., "Subsidizing Car Ownership for Low-Income Individuals and Households," Journal of Planning Education and Research, 2020, (https://doi.org/10.1177/0739456X20950428).

Low Income Americans Accrue Little to No Benefits

The proposed rule suggests, without being monetarily specific, that the rule's additional costs to low-income Americans will be offset with saving on maintenance and fuel savings. Even a cursory look at the academic research on low-income households and car ownership and industry reports demonstrates that none of these claims are legitimate. [EPA-HQ-OAR-2022-0829-0681, pp. 2-3]

The proposed rule states on page 29368 that, “the introduction of more stringent standards leads to higher purchase prices and lower fuel expenditures.” It goes on to argue that the lower fuel expenditures will be of even greater significance to low-income households because fuel costs are a larger portion of the expenses for low-income households, that lower price new cars are generally more fuel efficient, and fuel efficiency does not decline for used vehicles while prices do. [EPA-HQ-OAR-2022-0829-0681, pp. 2-3]

The problem with the EPA’s reasoning is that as demonstrated above, very few low-income households purchase new vehicles and thus will not accrue any of the alleged fuel efficiency savings associated with a new vehicle purchase. This problem will be exacerbated by the proposed rule as more, higher priced EV’s are pushed into the market driving prices even higher, further removing low-income households from the alleged fuel efficiency benefits. [EPA-HQ-OAR-2022-0829-0681, pp. 2-3]

Further, the EPA argues that low-income households will benefit from savings passed on through the used car market. First, buying a used EV is a much different proposition than purchasing a used internal combustion engine vehicle. For instance, much of the cost and value of EVs resides in their batteries, but many used EVs have significantly diminished battery life. A well-maintained internal combustion engine vehicle with 100,000 miles could have a couple hundred thousand miles of life left. An EV with 100,000 miles is a much bigger gamble as most EV batteries are only warrantied for around 100,000 miles.9 Suggesting that low income families saddle themselves with the potential $5,000 to $15,000 costs10 for replacing a lithium ion battery for their newly purchased used EV is hardly a recipe for cost savings. [EPA-HQ-OAR-2022-0829-0681, p. 3]

9 Mcaleer, Brendan, “Electric Car Batter Life: Everything You Need to Know,” Car and Driver, October 26, 2022, (https://www.caranddriver.com/research/a31875141/electric-car-battery-life/).

10 Pratt, Devin, “What Happened to the Old Batteries in Electric Cars?,” Consumer Reports, February 23,2022, (https://www.consumerreports.org/cars/hybrids-evs/what-happens-to-the-old-batteries-in-electric-cars- a1091429417/).

Organization: Jaguar Land Rover NA, LLC (JLR)

Inflation Reduction Act (IRA) Clean Vehicle Tax Credits

Prior to the publication of the IRA last year, our vehicles qualified for the 30D Clean Vehicle Credit. The changing incentive landscape has adversely affected Jaguar Land Rover, with our manufacturing facilities located outside the US, we are now ineligible for the amended 30D credit. Due to the positioning of our vehicles and our customer demographics as a premium luxury vehicle manufacturer, the income and MSRP pre-requisites for the 30D credit also exclude us from claiming. We are fortunately eligible to claim the 45W Commercial Clean Vehicle Credit and we are pursuing this opportunity to potentially benefit our customers. [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

JLR challenges the assumption made by EPA that: “While the restrictions imposed by the IRA on the 30D credit (income, MSRP, critical mineral content, and manufacturing content) limit the vehicles which are eligible for the full $7,500 incentive under 30D, we believe that manufacturers will work to increase the number of vehicles that qualify over time due to the high marketing value of the credit." Despite the work that manufacturers carry out, factors relating to the critical mineral and battery component requirements are largely out of their control. For example, currently 65% of battery cells and almost 80% of cathodes are manufactured in China.15 Until the US develops a robust battery manufacturing industry, it cannot be guaranteed that a high percentage of the fleet will be able to claim. [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

15 IEA (2023), Global EV Outlook 2023, IEA, Paris Trends in batteries - https://www.iea.org/reports/global-ev-outlook- 2023/trends-in-batteries License: CC BY 4.0

We suggest that EPA incorporate the following into the final rule analysis and the monitoring reports mentioned previously to ensure that the portion of BEV sales eligible for credit under 30D in OMEGA is appropriate.

• Industry fleet GWh of cell and battery capacity eligible
• Industry fleet battery minerals extraction eligible
• Number of IRS eligible vehicles [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

JLR requests that EPA amends the central case compliance model to reflect a more accurate and realistic credit utilization of the IRA credits. [EPA-HQ-OAR-2022-0829-0744, pp. 9-10]

Organization: Job Creators Network Foundation (JCNF)

In addition to being unconstitutional, EPA also improperly certifies the proposed rule as not having a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act. That is false. Millions of small businesses use a car or light-duty truck for their work. Cars are an integral part of certain industries, like limousine or other car service providers. But the local landscaper, caterer, interior designer, or even the hairdresser who sees clients at their homes, will use a car for all or a significant part of their business. [EPA-HQ-OAR-2022-0829-0709, p. 2]

Electric cars are at least $10,000 more than the equivalent gas-powered car. For the small business owner operating on razor-thin margins, $10,000 is a significant increased expense. And that is just the cost represented to purchase the vehicle. It does not include the cost of lost time waiting forty-five minutes for an electric car to charge. Or the fact that if the battery pack of an electric vehicle is damaged in an automobile accident, it likely means the car is totaled and would have to be replaced. [EPA-HQ-OAR-2022-0829-0709, p. 2]

EPA should certify that its proposed rule has a significant impact on a substantial number of small entities under the RFA, prepare the required Initial Regulatory Flexibility Analysis, and conduct the required Small Business Advocacy Review Panel. [EPA-HQ-OAR-2022-0829-0709, p. 2]

Organization: Joshua Linn

2. How Would the Proposed Emissions Standards Affect New Vehicle Consumers?

In Section I.D of the proposed standards, “EPA is seeking comment on three alternatives to its proposed standards.” As described in more detail in a new RFF report [Link: https://www.rff.org/publications/reports/how-would-the-proposed-epa-passenger-vehicle-greenhouse-gas-emissions-standards-affect-new-vehicle-consumers/], I use the RFF light-duty vehicle model to estimate the benefits and costs of the proposed standards and two alternatives. I quantify how the benefits to new vehicle consumers vary across income groups. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Despite the Biden administration’s interest [Link: https://www.whitehouse.gov/environmentaljustice/] in environmental justice and equity, the EPA analysis of the proposed standards does not quantify how effects may vary across consumers. The standards will increase sales of plug-in vehicles while simultaneously making gasoline vehicles more fuel efficient. Both changes reduce fuel costs for drivers, which disproportionately benefits low-income households because they spend a much larger share of their income on gasoline than do high-income households. However, low-income households typically have lower demand for plug-in vehicles than high-income households (even putting aside the high up-front purchase price), and by shifting the market from gasoline to plug-in vehicles, the standards may reduce purchasing options for low-income households. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

The model monetizes benefits and costs to new-vehicle buyers by income group, costs to manufacturers, and the GHG benefits of the standards. Table 1 summarizes the main results for two scenarios: a baseline that assumes the standards for year 2026 do not change in subsequent years (this is the same baseline that EPA assumes); and tightening standards by about 40 percent between 2026 and 2030. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Table 2. Aggregate Effects in 2030 of Proposed Greenhouse Gas Emissions Standards

[See original for Table 2] [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

The baseline market share of plug-in vehicles is about 56 percent in 2030, which is slightly higher than the Biden administration’s target. This market share lies in the middle of the wide range [Link: https://rhg.com/research/climate-clean-energy-inflation-reduction-act/] of recent forecasts. The proposed standards would increase plug-in vehicles’ market share to 62 percent, which is comparable to (though slightly lower than) EPA’s analysis. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Expenditure on plug-in vehicle subsidies under the Inflation Reduction Act is about $45 billion in the baseline and $50 billion in the proposed standards. The baseline number is about 20 times greater than the estimate by the Joint Committee on Taxation, reflecting different assumptions about policies (such as the ZEV standards) and consumer preferences. However, the estimate is similar to recent estimates [Link: https://www.brookings.edu/wp-content/uploads/2023/03/BPEA_Spring2023_Bistline-et-al_unembargoedUpdated.pdf] that have used different computer models. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Panel B shows the consumer benefits of purchasing vehicles in 2030. The consumer welfare number measures the benefits of the vehicles compared with hypothetical purchases of used vehicles instead. The proposed standards would increase consumer welfare by $110 billion. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

The tighter GHG standards benefit consumers because people undervalue [Link: https://www.rff.org/publications/working-papers/emissions-standards-and-electric-vehicle-targets-for-passenger-vehicles/] fuel cost savings when they purchase vehicles. Consider a consumer who wants a particular vehicle and is offered the opportunity to purchase an otherwise identical vehicle that has lower fuel costs. Based on purchase choices that consumers make, on average [Link: https://www.rff.org/publications/working-papers/emissions-standards-and-electric-vehicle-targets-for-passenger-vehicles/] a consumer is willing to pay about $35 for a hypothetical $100 reduction in fuel costs—in other words, people don't pay as much as they should for the lower fuel costs. Consequently, they buy vehicles with higher fuel costs than is privately optimal for them. By addressing these mistakes, the standards can increase consumer welfare. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Manufacturer profits are the difference between revenue and costs. The tighter standards reduce manufacturer profits by about $5 billion. This result differs from EPA's since the agency assumes that manufacturers raise prices sufficiently to cover their costs. In contrast, my modeling indicates that competition constrains the extent to which manufacturers can increase their prices. That is, if an individual manufacturer tries to increase its prices enough to offset its higher costs, it will lose customers to other manufacturers. Because vehicle manufacturers cannot coordinate with one another on price changes, this competitive pressure prevents manufacturers from fully passing costs on to consumers. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Panel C shows the GHG emissions (CO2 and methane) from producing and consuming gasoline and electricity to power the vehicles. The emissions numbers represent the emissions from the vehicles sold in 2030 over their lifetimes. The proposed standards reduce climate damages from $72 billion to $49 billion over the lifetimes of vehicles sold in 2030, yielding climate benefits of about $23 billion. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Panel D shows that the proposed standards would increase welfare by about $128 billion, where welfare includes new-vehicle consumer welfare, manufacturer profits, and GHG emissions. The agency's numbers are computed differently from the numbers reported in Table 2, so the two should not be compared explicitly. Rather, the results in Table 2, as well as EPA's analysis, reveal that the proposed standards are likely to yield large welfare gains. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Figure 1 shows how the benefits vary across new vehicle consumers, again comparing the proposed standards with the baseline. The figure plots the average welfare change per household; for example, the blue bar indicates that the proposed standards would benefit the average household in the lowest income group (below $44,000) by about $2,500. These benefits, which include fuel cost savings net of any welfare cost of the policy (such as paying higher vehicle prices) and do not include climate or local air quality benefits, could be substantial. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Figure 1. Change in Consumer Welfare per Household for Proposed Relative to Baseline [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

[See original for graph, Figure 1] [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

That the bars diminish in height from left to right in the diagram means that the proposed standards benefit low-income households more than high-income households. This pattern holds for other levels of stringency and assumptions described in the report. Benefits concentrate among lower-income households because they substantially undervalue [Link: https://www.rff.org/publications/working-papers/vehicle-attribute-tradeoffs-and-the-distributional-effects-of-us-fuel-economy-and-greenhouse-gas-emissions-standards/] fuel cost savings, whereas high-income consumers undervalue by a moderate amount. If there were no GHG or fuel economy standards, low-income consumers would buy vehicles that have higher fuel costs than would be optimal for them; the GHG standards benefit these consumers by reducing their fuel costs. In contrast, without standards, high-income consumers would buy vehicles that have only slightly higher fuel costs than would be optimal, and thus the standards give them smaller benefits. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

An important factor underlying these results is that the modeling indicates that vehicle manufacturers will introduce many low-price electric vehicle options. If it proves challenging for vehicle manufacturers to produce and market low-price electric vehicles, low-income consumers will likely benefit less from the proposed GHG standards than these results indicate. More generally, whether benefits of plug-in vehicles are widespread across consumer income groups will depend on how consumer interest in those vehicles evolves and whether manufacturers can successfully introduce low-price plug-in options. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

3. References [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

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White House. Environmental Justice. https://www.whitehouse.gov/environmentaljustice/. [EPA-HQ-OAR-2022-0829-0635, pp. 7-10]

Organization: KALA Engineering Consultants

We have some things to say about Electrification Step 3 later. In many of the comments EPA has received for the EPA–HQ–OAR– 2022–0829 Docket, many claim that the existing grid is simply not capable of handling (conductor ampacity) the increased power demands for recharging millions of electric vehicles that will replace much of the 250 million vehicle US fleet. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

We have some thoughts on that grid capability issue if we may digress for a moment. The problem with many analyses of electric vehicle switch-out scenarios has been not understanding and taking into account what we call the Most Probable Time-of-Day for Recharge (MPTODR). The scenario put forth by electric vehicle advocates for recharging is everyone who has a BEV will come home from work to their single family home that has been retrofitted with a high-amperage (50 – 70 amps) charging station or stations if the family has more than one BEV. The BEV owner will plug their BEV into the charge station, go inside and enjoy a relaxing evening. That of course, is the elitist part of the whole electrification mythos that other people are like you, being upper middle class people that can easily afford a BEV and the other expenses associated with owning a BEV. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

If we take Tesla as a typical BEV example, the Tesla Wall Charger is an outlet that requires more amperage at 240 Volts than most home outlets for an electric dryer or stove can supply. We found a cost estimate for installing a Tesla Wall Charger in the Denver, CO metro area that came in at about $5,000. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

[See original attachment for photo of EV calculator] [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

Remember that the large wire gauge conductors needed for the Tesla charger are usually run in metal or plastic conduit and the straight-line distance between the electric distribution box and a garage is not the installed length because the conduit must be routed around your house to the garage, where the new wires will enter that space and be connected to the wall charger or chargers (if you need multiple chargers, the conduit size and cost is increased to run multiple sets of wires for each charger). [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

If you want to travel with your Tesla they recommend you should carry recharging gear that will provide flexibility for charging from various outlet types. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

[See original attachment for picture of various types of TESLA recharging gear] [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

It looks to us like that “flexibility” is another $450 or so just to reduce what we call “Recharge Anxiety” for BEV owners. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

Notwithstanding the larger initial cost of the vehicle associated with owning a typical BEV, we would argue that for people who live paycheck to paycheck who might be in the middle to lower income economic strata, such expenses are probably out of reach. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

Organization: Kentucky Office of the Attorney General et al.

Finally, many consumers may not be able to afford electric cars even if they want them. The average new car now costs nearly $50,000. Average New Car Price Tops $49,500, Kelly Blue Book (January 11, 2023) https://bit.ly/3PcSkKT. The typical new car payment is now nearly $800 a month. New Vehicle Affordability Worse Than Ever, Kelly Blue Book (June 18, 2023) https://bit.ly/3X3F8Kt. EPA admits that the Proposed Rule “will result in a rise in the average purchase price for consumers” from even these rates. 88 Fed. Reg. at 29,364. The Agency estimates increased costs for vehicle manufacturers at $7.5 billion annually by 2027. Id. By 2032, the Proposed Rule will cost manufacturers at least $1,200 per vehicle, which they will no doubt pass to consumers. Id. at 29,201. Prices for used cars will rise as well. Id. at 29,364. [EPA-HQ-OAR-2022-0829-0649, p. 17]

The Agency argues that the benefits of EV ownership will offset these costs. Specifically, EPA insists that “projected vehicle technology costs are offset by the savings in reduced operating costs, including fuel savings and reduced maintenance and repair costs.” 88 Fed. Reg. at 29,364. EPA’s reasoning is flawed. [EPA-HQ-OAR-2022-0829-0649, p. 17]

The alleged savings for reduced fuel consumption are based on layers of speculation. The shift to EVs is projected to “reduce liquid fuel consumption (gasoline and diesel) while simultaneously increasing electricity consumption.” 88 Fed. Reg. at 29,365. EPA is correct to consider the net result of these effects when analyzing the costs and benefits of the Proposed Rule. But a necessary part of that analysis relies on correctly forecasting electricity prices over the coming decades. Simultaneous with the forced electrification of vehicles, EPA is attempting to dramatically restructure America’s power-generating portfolio. Whether such a transformation is possible given resource limitations, geopolitical factors, permitting issues, land-use debates, jurisdictional policy differences, and litigation is still to be determined. Even if it is possible, EPA cannot predict with any accuracy the costs to the retail ratepayer for completing such a drastic transition. In short, no one knows with enough certainty to justify massive regulatory shifts whether charging an EV will be more cost-effective than refueling a gasoline engine. [EPA-HQ-OAR-2022-0829-0649, p. 17]

Moreover, low-income consumers will not be able to afford an EV. Despite the Agency’s best efforts to present EVs as increasingly affordable, at the end of 2022 the average new EV sold for

$61,448. Average New Car Price Tops $49,500, supra. This is why the Agency acknowledges "low-income households are more likely to buy used vehicles and own older vehicles." 88 Fed. Reg. at 29,344. But used EVs offer little savings if the buyer has to replace the battery. According to the Department of Energy's National Renewable Energy Laboratory, advanced batteries "wear out eventually," and today's batteries last only 8 to 15 years. Electric Vehicle Benefits and Considerations, U.S. Department of Energy Alternate Fuels Data Center, https://bit.ly/3PcOn9i. Replacing an EV battery costs anywhere from $5,000 to more than $15,000. Electric Car Battery Replacement Costs, Edmunds (May 2, 2023) https://bit.ly/3NutoNS. Such substantial expenses hardly qualify as "reduced repair and maintenance costs." 88 Fed. Reg. at 29,364. [EPA-HQ-OAR-2022-0829-0649, pp. 17-18]

All of this comes at a time of record inflation, historic gasoline prices, and high utility bills. Since President Biden took office, food prices are up over 18%, and energy prices are up over 37%. Introducing the 'Presidential Inflation Rate': Biden trails only Carter, Roll Call (March 15, 2023) https://bit.ly/3qH63jd. Home prices have also surged. In the first quarter of 2023, the average home price in the United States was $516,500, Average Sales Price of Houses Sold for the United States, Federal Reserve Economic Data, https://bit.ly/3p4BenX—an increase of 27% in less than three years. Agencies cannot ignore context when weighing the costs and benefits of a proposed rule. Here, the broader economic landscape is another strong mark against the Proposed Rule. [EPA-HQ-OAR-2022-0829-0649, pp. 17-18]

Organization: Lillian Davey

Creating credits for those who are using off cycle and air conditioning is a very bold incentive. Incentives are almost vital for this kind of legislation as there may be much opposition. One concern I have is for measuring fuel economy and testing fuel specifications. There would have to be very stringent and clear procedures. There are many people that are going to have vehicles that are not going to fit into the electric vehicle category and are going to need to have fuel specifications for measuring fuel economy to be very clear. Another concern of mine is the incentive multipliers. The nature of these incentives would also need to be very clear. The largest concern of mine will be how to make these vehicles affordable to the average person. I think that the EPA and the government will need to work with companies such as Tesla as well as all other major automotive companies that are planning on leveraging these advances in Clean Car Technology. This is not going to be an easy change and many people are not able to afford a Tesla as it sits. [EPA-HQ-OAR-2022-0829-0489, pp. 1-2]

Organization: Marie Gluesenkamp Perez, and Mary Sattler Peltola, Members of Congress, Congress of the United States

We are writing to express our concerns about the impacts the Environmental Protection Agency's (EPA) new proposed rules, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 may have on rural communities.

Like you, we believe climate change is a threat to communities across the country, and the federal government plays a critical role in developing a clean energy apparatus and helping our communities improve air quality. However, in making that transition, we cannot leave rural communities or working families behind. The administration's Executive Order 14037 and subsequent National Blueprint for Transportation Decarbonization set an ambitious goal for 50 percent of new passenger cars to be electric vehicles (EVs) by 2030. Last year's Inflation Reduction Act included many concrete policies promoting EV production that will drive costs down and improve affordability. We are concerned the EPA, along with the Department of Transportation (DOT) and the Department of Energy (DOE), have not done enough work to ensure rural communities will have the necessary charging infrastructure in place to make widespread EV adoption possible. The imposition of additional regulations in the auto market without key infrastructure investments will reduce consumer choice, which is a recipe for disaster in rural America. [EPA-HQ-OAR-2022-0829-0522, p. 1]

Washington's third congressional district has fewer than 100 level 2 and DC fast chargers available to the public, and they are largely concentrated in just two cities. Alaska has only 60 publicly available EV charging stations. In Congresswoman Gluesenkamp Perez' home county of Skamania, there are only two EV charging stations right now, and both are located at resorts. In Congresswoman Peltola's borough of Bethel, along with all the other boroughs of Western Alaska, there are zero EV charging stations. As DOT has acknowledged, the costs of installing EV chargers in rural areas can be higher, especially for direct current fast charging stations, because they are more likely to require expensive electrical service upgrades. Furthermore, for many working families, installing an EV charger at home remains out of reach, especially for those who don't own their homes. Bottom line: for EVs to be a meaningful and workable emissions reduction solution in rural America, we must have a ubiquitous and affordable charging infrastructure with access to abundant, cheap electricity. That simply does not exist right now. [EPA-HQ-OAR-2022-0829-0522, p. 2]

We are only four years away from model year 2027, and we are concerned the EPA's regulations are not paired with a plan to ensure adequate charging infrastructure on such a short timeline. Installing hundreds of thousands of new EV chargers and upgrading associated electrical infrastructure will also require tens of thousands of electricians. We are already experiencing a nationwide shortage of qualified electricians – anyone who's currently waiting six months for a residential electrician knows this all too well. Workforce shortages, particularly for those in the trades, are even more acute in rural communities. We want to ensure the EPA has considered the significant workforce development challenges that must be addressed to train electricians for a large-scale roll out of EV charging infrastructure. [EPA-HQ-OAR-2022-0829-0522, p. 2]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

Mitsubishi shares EPA's goal of achieving net-zero carbon transportation in the future. To be successful in that future - which represents a major transformation to vehicle electrification - it is imperative that the market conditions be aligned with, and capable of, supporting the massive increase in the market share of electric vehicles that will be needed to meet GHG emissions standards. For the reasons laid-out through our trade association, the Alliance for Automotive Innovation's (Auto Innovators), comments, Mitsubishi believes that the very aggressive rate of vehicle electrification assumed in the proposed rule far outpaces what the market can support in that time frame. If finalized as proposed, our experience in this area to date makes us confident the final rule would significantly increase the cost of new vehicles, and would reduce consumer choice. [EPA-HQ-OAR-2022-0829-0682, pp. 1-2]

Mitsubishi participated in the development of - and supports - the comments submitted by Auto Innovators. [EPA-HQ-OAR-2022-0829-0682, p. 2]

In addition, based on its considerable experience discussed previously with BEV and PHEV leadership, Mitsubishi provides the following recommendations to supplement the comments of Auto Innovators: [EPA-HQ-OAR-2022-0829-0682, p. 2]

1. Closely align the multi-pollutant emissions standards with President Biden's 2030 goal by assuming no more than 40-50% PHEVs and FCEVs by 2030, even though our experience leads us to caution that this itself is very ambitious, and is predicated on the assumption that the necessary supportive policies will be effectively implemented.

2. Consider the many benefits of PHEVs to consumers and the environment during the expected period of constrained battery critical minerals production capacity, and how PHEVs are the perfect stepping- stone to full BEV acceptance.

3. Maintain the current PHEV Utility Factor (UF) and work with industry to identify opportunities to increase PHEV electric operation. This is the ideal stepping-stone technology to encourage long-term BEV acceptance and utilization.

4. Keep the proposed approach to determine the passenger car curves, and consider adjusting the cutpoint and stringency levels of the light-duty trucks during the early years of the program.

5. Maintain the existing GHG program flexibilities, such as Air Conditioning and Off-Cycle technologies credits (including the alternative method to apply off-cycle credits), and allow previously approved technologies to continue receiving credits.

6. Align the Tier-4 (criteria pollutants) with CARB's LEV-IV criteria test procedures and standards.

7. Consider the impact that very aggressive GHG standards will have on vehicle affordability, and especially the detrimental impact to low-to-moderate income families. Regardless of the vehicles that regulation may require us to produce, it is critical that regulators always keep the accessibility of consumers in mind. [EPA-HQ-OAR-2022-0829-0682, p. 2]

The rationale for each one of these recommendations is further explained below. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Mitsubishi also is concerned that the increased vehicle cost associated with EPA's proposed ICE criteria pollutant emissions stringency (particularly the cost to meet proposed PM emissions standards) will likely lead consumers to retain their old vehicles longer, thereby offsetting environmental benefits. [EPA-HQ-OAR-2022-0829-0682, p. 9]

7. Vehicle Affordability

Mitsubishi takes great pride in having the lowest fleet GHG emissions of all mass market vehicle manufacturers11 12 while at the same time offering some of the most affordable vehicles in the US market. Many of our customers own and drive cleaner vehicles because the value of our vehicles is a financially viable option to them. This combination is a win-win for US consumers and for the environment. [EPA-HQ-OAR-2022-0829-0682, pp. 10-11]

11 2022 EPA Automotive Trends Report

12 Excludes BEV-only manufacturers

EVs currently cost significantly more to produce than equivalent gasoline cars or trucks. The average price of a BEV today is about $9,000 higher than that of a comparable ICE vehicle13. That price difference is driven mostly by the cost of the batteries. Battery cost have come down significantly in the past, but, contrary to EPA's assumption that the price of EV batteries will be substantially lower in coming years, that trend is not likely to continue. Given the anticipated exponential growth in demand for battery critical minerals to meet the proposed GHG standards, combined with the continued limited supply of those materials for the foreseeable future (resulting from the long lead time needed to ramp up mining and processing capacity), costs of these materials and batteries are expected to rise, thereby widening the price gap between ICEs and BEVs. Mitsubishi agrees with Auto Innovators' assertion that the Agency has not adequately addressed projected battery critical minerals availability and associated cost. [EPA-HQ-OAR-2022-0829-0682, pp. 10-11]

13 New-Vehicle Transaction Prices Trend Downward as Incentives Rise, According to Kelley Blue Book - Mar.8, 2023 (kbb.com).

Setting a very aggressive multi-pollutant emissions standard will substantially increase the cost of all vehicles and reduce consumer choice. If finalized as proposed, EPA's multi-pollutant emissions standards would require OEMs to prematurely phase-out some of the most affordable/cleaner vehicles and replace them with more expensive battery electric vehicles, thereby limiting consumer choice for clean and affordable vehicles. The potential negative consequence in this scenario is price-sensitive car buyers will likely turn to the used car market, thus driving buyers into older, less environmentally friendly vehicles, exactly the opposite of the intention of the GHG regulation. In addition, the resulting increased demand for used cars would also raise used car prices, leaving a growing segment of the US population – mostly low- to-moderate income families - unable to purchase a vehicle at all. [EPA-HQ-OAR-2022-0829-0682, pp. 10-11]

Organization: National Automobile Dealers Association (NADA)

A. The Proposed Standards Will Increase Vehicle Costs and Constrain Fleet Turnover.

Appropriate emission standards must not undermine vehicle affordability. Whether new vehicles are sold or languish on dealer lots depends on whether consumers are able and willing to purchase them. Affordability is critical, but today, most U.S. households cannot afford to purchase a new light-duty vehicle.23 In May 2023, the average price of a new EV was $55,488,[24] down by almost $9,400 from 2022, but higher than the gross income of most Americans.25 [EPA-HQ-OAR-2022-0829-0656, pp. 5-6]

23 See Buying a new car is becoming an out-of-reach, luxury purchase - The Washington Post.

24 See New-Vehicle Sales Incentives Continue to Climb in May, as Transaction Price Increases Moderate, Kelley Blue Book - Cox Automotive Inc. (coxautoinc.com).

25 See Average, Median, Top 1% Individual Income Percentiles - DQYDJ.

The chart below reflects data on the costs and budgeting for an average new light-duty ICE vehicle purchase. Note that only some 33 percent of American consumers can afford a new light-duty vehicle in today's market. Stated another way, 67 percent of U.S. consumers currently are priced out of the new light-duty market. [EPA-HQ-OAR-2022-0829-0656, pp. 5-6]

Year: April 2023 YTD

Type of Vehicle: NADA NV Avg. Transaction Price

Car Price: $47,239

Average Interest Rate: 6.8%

Average Loan Term: 68

20% Down Payment: $9,448

Loan Amount: $37,791

Monthly Payment: $668

Monthly Take Home Pay Necessary for 10% of Take-Home Income: $6,675

Annual Take Home Pay Necessary: $80,101

Assume Americans Pay 27% of Their Income in Taxes: $109,728

Share of U.S. Households That Can Afford: 33.31%

Number of Households that Can Afford: 43,700,000

Total Households: 131,202,000 [EPA-HQ-OAR-2022-0829-0656, pp. 5-6]

2. EPA's Fuel Savings Analysis Is Unclear and Incomplete.

Despite acknowledging that its proposed mandates will result in increased electricity consumption and expenditures, EPA claims that consumers will nevertheless experience fuel savings that will help offset higher upfront EV purchasing costs.40 EPA appears to have premised its conclusion on the modeling of liquid fuel and electricity consumption levels. EPA does not explain how it converted modeled consumption levels into monetary values to show actual consumer savings, and it makes no comparison of fueling costs and electricity rates based on modeled consumption levels. Nor is information provided on individual consumer savings. Thus, the basis for EPA's consumer fuel savings conclusion is unclear, at best. [EPA-HQ-OAR-2022-0829-0656, pp. 8-9]

40 88 Fed. Reg. at 29365-66.

EPA's savings assertion seems questionable. Conceivably, liquid fuel costs could decrease more than electricity costs increase if the proposal is adopted, but even then, EPA's analysis seems to overstate the fuel savings from switching to EVs. According to the Energy Information Agency (EIA), the average American household uses 886 kilowatt hours of electricity per month,41 and EPA reports that the average EV consumes 36 kilowatt hours of electricity per 100 miles driven.42 If the average household drives an EV 15,000 miles per year, or 1,250 miles per month, and the EV is charged at home to the tune of 450 kilowatt hours of electricity per month, the household's electricity bill will increase by around 50 percent. [EPA-HQ-OAR-2022-0829-0656, pp. 8-9]

41 See Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA).

42 See Comparison: Your Car vs. an Electric Vehicle | US EPA.

Moreover, as EV sales increase, electricity rates are likely to rise due to increased power demands. Higher electricity prices will also reflect the cost of increased transmission and generation infrastructure, which some estimates indicate will need to increase 60 percent by 2030, and even more over the following two decades.43 EPA must account for these higher electricity costs when determining accurately whether, and to what extent, commercial and noncommercial purchasers/lessees operating EVs will benefit from any fuel savings. [EPA-HQ-OAR-2022-0829-0656, pp. 8-9]

43 See Queued Up… But in Need of Transmission | Department of Energy.

3. EPA's Modeling Fails to Account for Insurance Costs.

EPA omitted insurance costs from its TCO payback analysis. According to Consumer Reports, electric vehicles may cost more to insure than gasoline-powered cars44 in part due to the uncertainty associated with their projected repair costs. Consumer Reports also notes that insurance companies are more likely to declare an EV a total loss due to battery repair costs. [EPA-HQ-OAR-2022-0829-0656, p. 9]

44 See Electric Vehicles Cost More to Insure Than Gasoline-Powered - Consumer Reports.

Similarly, Progressive, a national insurance company offering auto insurance, has stated that, "[i]nsurance for an electric car may cost more than insurance for a regular gas-powered car. An electric car's higher price tag and more complex equipment means it may cost more to repair or replace if it's in an accident. That can mean higher rates for policyholders who carry comprehensive and collision coverage."45 [EPA-HQ-OAR-2022-0829-0656, p. 9]

45 See Electric Car Insurance: Is It More Expensive? | Progressive.

Both Consumer Reports and Progressive note that the gap in insurance prices between EVs and ICE vehicles should narrow over time but given that it is unknown if or when this will occur, EPA should factor the higher costs of EV insurance into its modeling [EPA-HQ-OAR-2022-0829-0656, p. 9]

4. EPA's Modeling Values the IRA's EV Tax Credits Inconsistently.

EPA's approach for estimating electrification technology costs for its technical feasibility analysis does not assume that all consumers will receive the full $7,500 value of the IRA's EV tax credits, opting instead to combine portions of the Section 30D and Section 45W tax credits in its modeling.46 The initial value of the credit used in the modeling starts at $3,750 in MY 2027 and increases annually until reaching $6,000 in MY 2032.47 But when elsewhere discussing the TCO savings and expenses for a MY 2032 vehicle, EPA assumes a maximum value of $7,500 when comparing the net purchase price of an EV with that of an ICE vehicle.48 [EPA-HQ-OAR-2022-0829-0656, p. 10]

46 88 Fed. Reg. at 29301; EPA DRIA. p. 2-87.

47 88 Fed. Reg. at 29301; DRIA. p. 2-87, Table 2-50.

48 DRIA. p. 4-20, Table 4-7.

This approach is inconsistent. If EPA's own technical feasibility modeling assumes a credit value of only $6,000, the agency should use this same value in its TCO analysis, even if doing so would result in more favorable average purchase price for an ICE powered vehicle versus a comparable EV. For example, assuming application of a $7,500 credit, an EV CUV/SUV may have a net purchase price $400 lower than its ICE counterpart, but assuming application of a $6,000 credit, the ICE CUV/SUV would be $1,100 less expensive than its EV counterpart. [EPA-HQ-OAR-2022-0829-0656, p. 10]

Organization: National Tribal Air Association (NTAA)

Electrified Vehicles

As noted in the announcement of the proposed standards, "EPA's proposal builds upon a proliferation of announcements by automakers that collectively signal a rapidly growing shift…toward zero-emission technologies, including electrification"5. This anticipated reliance on hybrid, plug-in hybrid, and fully electric power trains may be disproportionately burdensome and costly in Indian country. Far too many homes on many reservations lack access to an electric grid. Further, vehicle reliance on centralized or individual battery charging sites as anticipated in the proposed regulations presents a huge challenge. [EPA-HQ-OAR-2022-0829-0504, p. 3]

5 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for cars and trucks to Accelerate Transition to a Clean – Transportation Future, USEPA News Release, April 12, 2023

The NTAA is well aware of many initiatives to enhance the deployment of renewable energy technologies to support the nation's electricity demand. We actively participate in meetings, webinars, forums, etc. as programs emerge under the Bipartisan Infrastructure Law, Inflation Reduction Act, and other climate change – related initiatives. The NTAA continues to formally comment on EPA proposals that emerge which have the potential to impact Indian country. NTAA remains concerned about realistic access to funding and other resources that are essential to advance renewable energy in Tribal communities and are necessary to transition vehicle fleets as anticipated by the proposed light-duty and medium-duty vehicle emissions standards. [EPA-HQ-OAR-2022-0829-0504, p. 3]

Organization: Nissan North America, Inc.

Beyond the significant market and governmental challenges posed by such a drastic implementation timeline, consumer adoption will be critical to success. Consumer adoption of EVs has historically lagged behind expectations, leaving a significant hurdle to encourage a large and swift shift to EVs. Consumers need to be convinced not only of the appeal, safety, affordability, and reliability of EVs themselves, but they need to adopt the necessary community and home charging equipment to facilitate their use. Consumers will need to adapt their trip planning and driving behavior to allow for vehicle charging needs. The only way to drive these significant behavioral changes is to assure consumers that charging infrastructure is available and reliable. This is simply not a reality today and is unlikely to be a reality in time to drive such a significant shift within the timeline of the Proposed Multi-Pollutant Rule. These challenges are magnified due to the unclear and uncertain benefits under the Inflation Reduction Act, which place significant limitations on EV consumer incentive programs and charging infrastructure programs. Moreover, many consumers are reluctant or unable to purchase EVs due to their significant price premium. The Proposed Multi-Pollutant Rule will only exacerbate these inequalities, with EV prices likely to increase even more due to extreme investments required by all market sectors involved. Driving too much change too quickly will shut out many communities who need clean vehicles the most. It will likely force consumers who are uncertain about ZEV adoption to continue to operate aging ICE vehicles much longer. This is contrary to the intent of the proposal. [EPA-HQ-OAR-2022-0829-0594, p. 5]

Organization: North American Subaru, Inc.

EVs are still more expensive than vehicles with ICE powertrains. For many consumers today, affording an EV is out of reach. According to Kelley Blue Book4 the average transaction price (ATP) for an EV in May of this year was $55,488. The ATP for all Subaru vehicles in April was $35,330. [EPA-HQ-OAR-2022-0829-0576, p. 3]

4 KBB. 6/12/23. https://mediaroom.kbb.com/2023-06-12-New-Vehicles-Sales-Incentives-Continue-to-Climb-in-May-as-Transaction-Prices-Increase-Moderately,-According-to-Kelly-Blue-Book.

Organization: North Dakota Farmers Union (NDFU)

Slow Turnover of the Vehicle Fleet

Sales of new vehicles displace a small fraction of the existing vehicle fleet each year. EPA estimates that 67% of new vehicles sales will be battery electric in 2032.5 Even if that growth is achieved, large numbers of new vehicles that burn liquid fuels will continue to be produced for many years, and those vehicles will remain on the road well into the future. The table below shows survival rates for cars and light trucks by vehicle age.6 [EPA-HQ-OAR-2022-0829-0586, p. 3]

5 Environmental Protection Agency (2023, April 12). Biden-Harris administration proposes strongest-ever pollution standards for cars and trucks to accelerate transition to a clean-transportation future [Press Release]. Retrieved from https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever- pollution-standards-cars-and.

6 Davis, S. C., and Boundy, R. G. (2022, June). Transportation energy data book: Edition 40. Oak Ridge National Laboratory. Prepared for the U.S. Department of Energy. Retrieved from https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf.

Based on this data [See original comment for Table 3.15, Survival Rates for Cars and Light Trucks by Vehicle Age], 86% of passenger cars and 78% of light-duty trucks remain on the road for 10 years. Moreover, 16% of passenger cars and 32% of light-duty trucks remain on the road for 20 years. If new electric vehicles are more expensive or less attractive to consumers, it is reasonable to assume older liquid-fueled vehicles will remain on the road even longer. [EPA-HQ-OAR-2022-0829-0586, p. 3]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

C. Market-Enabling Complementary Policies

Many of the NESCAUM and OTC states have state-specific plans to reduce GHGs and air pollution from on-road transportation and have adopted a diverse set of market-enabling policies and programs designed to advance the market for light-, medium, and heavy-duty ZEVs.

Examples include ZEV sales and purchase requirements as discussed above; ZEV and infrastructure purchase incentives; utility programs and investments in ZEV infrastructure; consumer and fleet outreach and education programs; innovative financing mechanisms; multi-family dwelling and workplace charging programs; and deployment of public charging in communities and along major travel corridors. Many states have established requirements or goals to transition state vehicles and transit fleets to ZEVs. In addition, most states have adopted clean energy or renewable portfolio standards, which require a share of power sold by their utilities to come from renewable sources. Some states have adopted 100 percent renewable energy goals. States recognize that transitioning to renewable energy sources will maximize emissions reductions from ZEVs over time. [EPA-HQ-OAR-2022-0829-0584, p. 7]

Organization: Paul Bonifas and Tim Considine

EPA also assumed unrealistically low electricity rates. Not all households have access to home charging ports. The average rate for charging at a Tesla super-charger is 25 cents per kilowatt hour (Kwh)9. In contrast, EPA assumes electricity rates for EV charging are 10.3 cents per kwh in 2027 and fall to 9.3 cents per kwh by 205510. 63 percent of households in the US have garages or car ports, which provides an upper bound for home charging11. Accordingly, 47 percent of households would be paying much higher commercial rates for EV charging. If we assume Tesla's price, this implies that EPA underestimated electricity rates paid for EV charging by 55%. [EPA-HQ-OAR-2022-0829-0551, p. 4]

9 https://www.leafscore.com/tesla/how-much-does-it-cost-to-charge-a-tesla

10 Page 168 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

11 https://www.energy.gov/eere/vehicles/fact-958-january-2-2017-sixty-three-percent-all-housing-units-have- garage-or-carport

Moreover, the EPA did not factor in the impact on electricity rates from their recent power plant rule that would essentially force all remaining coal and natural gas power plants to cut emissions by 90%12. [EPA-HQ-OAR-2022-0829-0551, p. 4]

12 https://www.nbcnews.com/science/environment/biden-administrations-power-plant-rules-underscore-reality- epa-limits-rcna84201

Repair Savings

EPA Claimed Savings: $170 billion

Realistic Savings: NEGATIVE $4 billion [EPA-HQ-OAR-2022-0829-0551, p. 10]

The EPA's "repair savings" also relied on Argonne's study, the same study from which the EPA dubiously reported maintenance costs. Instead of relying on actual consumer data from a reputable organization like Kelley Blue Book, the EPA and Argonne use fancy multi-variable mathematical equations that include a "multiplier" that inherently forces ICE vehicles to be ~50% more expensive to repair than EVs. These equations are used to generate "repair cost curve" diagrams. One must then calculate the integral under their "repair cost curves" to decipher an estimated 5-year repair cost for ICE owners of $1,530 compared to $1,065 for EV owners, a claimed 44% cost increase for ICE owners. [EPA-HQ-OAR-2022-0829-0551, p. 10]

Compare Kelley Blue Book's much more straightforward real-consumer data, and the numbers flip completely. KBB reports five-year repair costs for ICE owners of $1,695 compared to $1,712 for EV owners38. This means that ICE owners save money (-1%) on repairs versus EV owners, and don't pay 44% more like the EPA claims. Scaling back the EPA's claimed ICE repair cost from 44% to -1%, changes the repair value of the EPA's proposed rule from a $170 billion "saving" to a $4 billion cost. [EPA-HQ-OAR-2022-0829-0551, p. 10]

38 https://www.nada.org/nada/nada-headlines/beyond-sticker-price-cost-ownership-evs-v-ice-vehicles

The National Automobile Dealers Association (NADA) also agrees, stating that contrary to popular belief, EV owners pay more for repairs than their ICE counterparts. Though EVs are in the shop less frequently, they're more expensive to repair when they do go in 39. [EPA-HQ-OAR-2022-0829-0551, p. 10]

39 https://www.gobankingrates.com/saving-money/car/experts-factors-to-consider-before-switching-to-ev-electric- car/

Generally, mechanics do not have the training or the technology to work on EVs, causing a supply constraint on EV mechanics for repairs. Because of the lack of options, mechanics that do repair EVs have long wait-times and high prices, as the consumers have no alternative choices. It may also lead to needing to travel for hours to reach a mechanic capable of repairing an EV [EPA-HQ-OAR-2022-0829-0551, p. 10]

Organization: Plains All American Pipeline, L.P.

By 2032—less than 10 years from now—the EPA's Proposal would require nearly 70% of light-duty cars and trucks sold in the U.S. to be electric or "zero tailpipe emission." We have a number of concerns with this approach, a few include: [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• By focusing on tailpipe emissions alone, most internal combustion engine vehicles that run on gasoline, diesel and biofuels would be unable to meet the standards set forth in the Proposal. This overlooks critical efforts of the energy and automotive industries to pursue continued innovation and optimization of fuel/vehicle systems to improve efficiency and reduce emissions.1 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Effectively outlawing most liquid fuel-powered vehicles would undercut U.S. energy security,2 harm our domestic energy industry and leave the U.S. more dependent on foreign-controlled supply chains.3 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Transferring a significant amount of energy demand to electricity will strain already challenged electrical generation and transmission infrastructure. Without substantial additional investment and significant streamlining of electric transmission permitting, it's unclear whether the electrical grid could support charging new EVs at the level necessary to support the proposed emissions reductions.4 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Traditional energy sources are essential for ensuring effective evolution of the energy landscape-including the manufacture and growth of renewable energy sources and EVs. However, the Proposal would reduce energy investments and increase costs to consumers for all forms of energy. Furthermore, this policy risks the continued viability of critical domestic energy manufacturing infrastructure, which, if idled, would be very challenging to restore. [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Eliminating most new gasoline and diesel vehicles from the market limits consumer choice. Significantly fewer new affordable vehicles are available for sale today5 than a few years ago. Used cars are also increasing in price6 as some automakers warn that they will be forced to cut back on supplying popular gasoline models because of government regulations restricting sales of traditional vehicles.7 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

1 https://www.afpm.org/newsroom/news/afpm-epa-vehicle-proposal-will-effectively-ban-gasoline-and-diesel-vehicles

2 https://www.visualcapitalist.com/chinas-dominance-in-battery-manufacturing/

3 https://www.nytimes.com/interactive/2023/05/16/business/china-ev-battery.html

4 https://www.reuters.com/investigates/special-report/usa-renewables-electric-grid/

5 https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have- all-but-abandoned-the-budget-market-a68862f0

6 https://www.consumerreports.org/cars/buying-a-car/when-to-buy-a-used-car-a6584238157/

7 https://www.reuters.com/business/autos-transportation/stellantis-may-limit-some-gas-powered-vehicles-states-adopting-california-2023-05-24/

Organization: POET, LLC

In some instances, U.S. EPA assumes that purchase incentives of $7,500 per BEV apply (see DRIA Table 4-7 for example) but in U.S. EPA's analysis of BEV penetration, somewhat lower values are used which range from $4,750 in MY 2027 to $6,000 in MY 2032 as shown in DRIA Table 2-50.

Organization: Porsche Cars North America (PCNA)

Electromobility will need continued support from public policy.

Recent legislative actions have seeded the ground with support for electric vehicles and the beginning of a robust nationwide charging network. With specifics that continue to be defined, stakeholders are working to maximize the opportunity under these new laws to support customers with valuable purchase incentives, and to help spur the development of new electric vehicle component production and material sourcing. Understandably, the complexity of these laws results in a process that requires careful deliberation with industry representatives working hard to ensure customers have a clear understanding of the support available. Nevertheless, the support within these programs will be critical to the growth rates EPA envisions in this proposal. [EPA-HQ-OAR-2022-0829-0637, p. 3]

Organization: Scott Wilson

Perhaps the most conspicuous flaw that will leap out to the American public is that these proposed actions were taken with complete disregard to consumer choice or affordability. In addition to potentially lacking access to charging at home, work, or public charging stations, consumers looking to purchase a new car may be unable to purchase these vehicles due to the higher purchase price or lack of availability. Today, the average purchase price of EV cars in 2022 was approximately $65,000-which is more than what 46 percent of American households earn in income in a year.8 Adding demand to the grid amid the confluence of other EPA regulations referenced above will drive up the cost of electricity, making powering these vehicles less affordable and undermining the EPA' s claims of savings for consumers that ignore or understate the increase in vehicle and energy prices. Taken together, the erosion of choice and affordability of vehicles will have profound impacts on how American families run errands, get to school, commute to work, and recreate. Additionally, there are serious concerns about the range of electric vehicles and the performance in rural areas of the country, where people may have to drive much longer distances to reach a charger, especially in locations where cold weather can impact the range the vehicle can drive. [EPA-HQ-OAR-2022-0829-5083, p. 3]

8 See Kelley Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1%, and all United States Household Income Percentiles, DQYDJ.

Organization: Senator Shelley Moore Capito et al.

Perhaps the most conspicuous flaw that will leap out to the American public is that these proposed actions were taken with complete disregard to consumer choice or affordability. In addition to potentially lacking access to charging at home, work, or public charging stations, consumers looking to purchase a new car may be unable to purchase these vehicles due to the higher purchase price or lack of availability. Today, the average purchase price of EV cars in 2022 was approximately $65,000-which is more than what 46 percent of American households earn in income in a year.8 Adding demand to the grid amid the confluence of other EPA regulations referenced above will drive up the cost of electricity, making powering these vehicles less affordable and undermining the EPA' s claims of savings for consumers that ignore or understate the increase in vehicle and energy prices. Taken together, the erosion of choice and affordability of vehicles will have profound impacts on how American families run errands, get to school, commute to work, and recreate. Additionally, there are serious concerns about the range of electric vehicles and the performance in rural areas of the country, where people may have to drive much longer distances to reach a charger, especially in locations where cold weather can impact the range the vehicle can drive. [EPA-HQ-OAR-2022-0829-5083, p. 3]

8 See Kelley Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1%, and all United States Household Income Percentiles, DQYDJ.

Organization: Steven G. Bradbury

In addition, the comparative lifecycle costs of owning and operating an EV versus an ICE vehicle are not nearly so different as EPA's NPRMs assert. EPA claims huge cost savings for EV owners over ICE owners from the avoided costs of fuel and maintenance and repairs over the life of the vehicle,33 but EPA's analysis fails to include the full costs of owning an EV: [EPA-HQ-OAR-2022-0829-0647, pp. 13-14]

33 See 88 FR at 29200.

Uncertainty about the remaining life and capacity of the vehicle's battery, com-bined with the high cost of any potential replacement, will likely mean that a used EV will have much lower resale or trade-in value relative to a comparable used ICE vehicle. This loss in value will be a significant cost disadvantage of EV ownership. [EPA-HQ-OAR-2022-0829-0647, p. 14]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

In the longer term, EPA, the DOE or the national labs should conduct a comparative analysis on PHEV and BEV costs with a stakeholder input or working group). PHEVs can be made in a less costly manner than shown in most analyses. Technical maturity, engineering advances, supply chain issues, changes in mineral prices, war and scale-up issues are impacting the costs of BEV and PHEV up-front and operating costs. Today, costs are rapidly changing, especially for batteries. In addition, Argonne National Lab's recent report6 shows that PHEVs are less expensive than BEVs for cars, and our experts at Strong PHEV coalition assert that several additional technical modifications can lower the cost of PHEVs that most analyses do not consider. We think this likely applies to plug-in hybrid cars and trucks but recognize that more analysis is needed. A common mistake we find in reports is not understanding the difference between a strong PHEV and other PHEVs because a strong PHEV can use the same batteries as a BEV which results in significant cost savings. See Appendix D for a more detailed explanation. [EPA-HQ-OAR-2022-0829-0646, pp. 7-8]

6 https://www.anl.gov/argonne-scientific-publications/pub/167396

The use of away-from-home DC fast chargers should be modestly reduced, and the cost of the PHEV including total cost of ownership should be based on work by Argonne national lab for light-duty PHEVs.7 Finally, bidirectional charging using DC off-board chargers should be assumed in our recommended alternative cost analysis for a reasonable percentage of BEVs and PHEVs in order to further reduce the total cost of ownership. [EPA-HQ-OAR-2022-0829-0646, p. 8]

7 Ibid

Organization: T. Becker Power Systems

6- 90%+ of the population of the USA live in areas that do not require increasingly stringent motor vehicle emission standards to meet EPA air quality standards. However, that 90% of the US population will be negatively impacted by this proposed regulation, with higher vehicle purchase costs, higher repair costs (battery replacement costs) and lower vehicle safety. [EPA-HQ-OAR-2022-0829-0567, p. 1]

7- Every issue in items 1-6 has been presented to both EPA and CARB in numerous documents submitted to EPA and CARB by myself and others over the years. [EPA-HQ-OAR-2022-0829-0567, p. 1]

Organization: Tesla, Inc.

As EPA recognizes, "zero and near-zero emission technologies are more feasible and cost-effective now than at the time of prior rulemakings."87. To address this Tesla has been a leader in reducing the costs of high- performance BEVs. A Tesla Model 3's starting price is $40,240 and, inclusive of individual qualification with the current U.S. 30D tax credit, can reach an equivalent price of $32,740.88 As recently reported, the Model 3 sells for now sells for $4,930 less than the average new vehicle sold in the U.S.89 Tesla has further outlined a pathway to reducing the production cost of its next generation vehicle by 50%.90 As evidenced by the popularity of its Model Y and Model 3 vehicles, Tesla has also demonstrated that increases in production volumes can reduce BEV costs to levels favoring them in the marketplace and facilitating broad consumer acceptance.91 [EPA-HQ-OAR-2022-0829-0792, p. 13]

87 88 Fed. Reg. at 29188.

88 Tesla, Model 3 available at h ttps://www.tesla.com/model3

89 Bloomberg, Tesla Undercuts Average US Car by Almost $5,000 in EV Shakeout (Feb. 21, 2023) available at h ttps://www.bloomberg.com/news/articles/2023-02-21/tesla-undercuts-average-us-car-by-almost-5-000-in-ev- s hakeout#xj4y7vzkg

90 Tesla, 2023 Investor Day Presentation (March 1, 2023) at 31-73, 119-131, 158 available at h ttps://digitalassets.tesla.com/tesla-contents/image/upload/IR/Investor-Day-2023-Keynote; Tesla, Impact Report 2022 at 64.

91 88 Fed. Reg. at 29312; See also, Bloomberg, Tesla and BYD Post Record Sales on Surge in Electric-Car Demand (July 3, 2023) available at h ttps://www.bloomberg.com/news/articles/2023-07-02/tesla-sets-a-new-delivery-record-as-price-cuts- y ield-results

Tesla also agrees with the agency that there is an “emerging consensus that purchase price parity is likely to occur by the mid-2020s for some vehicle segments and models, and for a broader segment of the market on a total cost of ownership (TCO) basis.”92 Indeed, this parity has already been reached by Tesla. The Tesla Model 3 has a TCO better than a Toyota Corolla.93 Numerous other studies have found that on a TCO basis BEVs are already competitive with ICE vehicles and overall cheaper to own.94 In short, there is a compelling case to be made that BEV costs already favor their adoption over ICE vehicles in the marketplace. [EPA-HQ-OAR-2022-0829-0792, p. 13]

92 88 Fed. Reg. at 29190; See also, IPCC AR 6 Working Group III, Climate Change 2022: Mitigation of Climate Change (April 4, 2022) at 1079 (stating BEVs are quickly reaching cost parity with ICEVs).

93 Tesla 2023 Investor Day Presentation at 159; Tesla Impact Report 2022 at 63.

94 Energy Innovation, Most Electric Vehicles Are Cheaper to Own Off the Lot Than Gas Cars (May 13, 2022) available at h ttps://energyinnovation.org/wp-content/uploads/2022/05/Most-Electric-Vehicles-Are-Cheaper-Off-the-Lot-Than-Gas- C ars-From-Day-O ne.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top; Atlas Public Policy, Total Cost of Ownership Analysis (Feb. 2022) available at h ttps://atlaspolicy.com/wp-c ontent/uploads/2022/01/Total-Cost-of-Ownership-Analysis.pdf; ICCT, Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022–2035 Time Frame (Oct. 18, 2022) available at h ttps://theicct.org/publication/ev-cost-benefits-2035-oct22/; Pickup & SUV Talk, Ford F-150 deep dive: The cost of owning gas vs. electric trucks (Aug. 25, 2022) available at h ttps://pickuptrucktalk.com/2022/08/ford-f-150-deep-dive-the-cost-of-o wning-gas-vs-electric-trucks/

DOE VTO, FOTW #1251, August 15, 2022: Electric Vehicles Have the Lowest Annual Fuel Cost of All Light-Duty Vehicles (Aug. 15, 2022) available at h ttps://www.energy.gov/eere/vehicles/articles/fotw-1251-august-15-2022-electric-vehicles-have-lowest-annual-fuel-cost-all [EPA-HQ-OAR-2022-0829-0792, p. 13]

Organization: Texas Public Policy Foundation (TPPF)

The LMD Tailpipe Rule Will Unnecessarily Harm Consumers

Similarly, the LMD Tailpipe Rule is regulatory overkill that will harm average Americans and limit innovation. To start, stricter emissions regulations will increase manufacturing costs for automakers. This will lead to higher sticker prices for vehicles, pricing low- to middle-class Americans out of the automotive market, leaving them stranded with little recourse or dependent on public transit, eventually depressing the job market. The government should not place the burden for green energy on the least fortunate Americans, adding yet another obstacle to their economic climb. [EPA-HQ-OAR-2022-0829-0510, pp. 5-6]

Automakers will rush to convert their fleets to feature either all or mostly electric vehicle models, disadvantaging new car buyers in areas without existing electric charging infrastructure. In the same vein, as mentioned above, the strain placed on the electric grid caused by millions of Americans charging their vehicles will cause electric prices to rise markedly and lead to "brown-outs." See, e.g. Nadia Lopez, Race to zero: Can California's power grid handle a 15-fold increase in electric cars?, CALMATTERS (Feb. 6, 2023), https://calmatters.org/environment/2023/01/california-electric-cars-grid/ ("State officials claim that the 12.5 million electric vehicles expected on California's roads in 2035 will not strain the grid. But their confidence that the state can avoid brownouts relies on a best-case — some say unrealistic — scenario: massive and rapid construction of offshore wind and solar farms, and drivers charging their cars in off-peak hours."). [EPA-HQ-OAR-2022-0829-0510, pp. 5-6]

Additionally, electric cars have limited range and require long recharging sessions, and the infrastructure to support the sudden transition to electric vehicles that the LMD Tailpipe Rule would cause simply does not exist. Rural and low-income communities, the people most affected by this regulation, likely will be the last to receive said recharging infrastructure. [EPA-HQ-OAR-2022-0829-0510, pp. 5-6]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

The Rule Would Raise Driving Costs and Inconvenience Americans

New proposed regulations1 on automobile emissions from the Environmental Protection Agency (EPA) would require new car sales to be 60% battery powered electric by 2030 and 67% by 2032, compared to fewer than 6% in 2022. EPA has also proposed new rules for power plants,2 driving up the costs of the electricity needed to charge these vehicles. These rules would raise driving costs for Americans, and poor and middle-class Americans disproportionately would pay the price. EPA has not fully accounted for these price increases. [EPA-HQ-OAR-2022-0829-0674, p. 2]

1 U.S. Environmental Protection Agency. "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." Federal Register, 5 May 2023, www.federalregister.gov/documents/2023/05/05/2023-07974/multi-pollutant-emissions-standards-for-model-years- 2027-and-later-light-duty-and-medium-duty (accessed June 20, 2023).

2 Environmental Protection Agency, "Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants," May 15, 2023, https://www.epa.gov/stationary-sources-air-pollution/greenhouse-gas-standards-and-guidelines-fossil-fuel-fired-power (accessed May 18, 2023).

New electric vehicles cost more than gasoline-powered vehicles. The electric version of the base version of the Ford 150 pickup truck, the best-selling vehicle in America, costs an additional $26,000.3 Tesla's base prices start at about $40,000 for a Model 3 and go up to almost $100,000 for a Model X.4 These are staggering costs to impose on American families. Cars are part of the American Dream for many Americans, a dream that for too many American families is put out of reach by these new regulations. EPA has not analyzed the effects of the increased costs of these vehicles. [EPA-HQ-OAR-2022-0829-0674, p. 2]

3 Ford Motor Company, Models & Specs, 2023 F-150 XL, https://www.ford.com/trucks/f150/models/?gnav=vhpnav-specs (accessed April 28, 2023); and Ford motor Company, Models & Specs, 2023 F-150 Lightning PRO, https://www.ford.com/trucks/f150/f150-lightning/models/?gnav=vhpnav-specs (accessed April 28, 2023).

4 Tesla, Model 3, Purchase Price, https://www.tesla.com/model3/design#overview (accessed April 28, 2023); and Tesla, Model X, Purchase Price, https://www.tesla.com/modelx/design#overview (accessed April 28, 2023).

The push towards expensive electric vehicles as will be required by the EPA rule, directly contradicts the Department of Transportation's focus on "Health and Equity." According to the Department,26 "households in low-income areas typically own fewer vehicles, have longer commutes, and have higher transportation costs." These are the people who will pay the price for new EPA regulations. Their cars will be older, less safe, and break down more frequently, resulting in higher repair and maintenance costs. [EPA-HQ-OAR-2022-0829-0674, p. 6]

26 U.S. Department of Transportation, "Health and Equity," updated December 17, 2013, https://www.transportation.gov/mission/health/health-equity (accessed May 1, 2023).

Organization: U.S. Conference of Catholic Bishops (USCCB)

However, there are some aspects of the proposed rule that raise questions and would be the appropriate grounds for considering modification of the rule. The proposed rule requires two-thirds adoption of EVs by 2032. Although a laudable goal in the abstract, it seems plausible that under current economic conditions, such a transition could have a negative impact on lower-income Americans who cannot afford car prices to increase.18 In addition, the incentives for EV use and purchase do not prioritize low-income households, which it should in order to have a greater environmental impact. The EV market in the United States shows increased trends towards larger, heavier and less efficient SUVs and trucks, which in turn are being sold at higher prices.19 Consequently, incentives and rebates for EV purchases are disproportionately allocated to high-income households, which tend to use EVs as a second or third vehicle, with much lower average mileage use.20 EVs that are seldom used may in fact result in larger emissions than ICEV since EVs create more emissions in their production.21 The lower emissions benefits of EVs are only fulfilled when they are used for high numbers of miles that would have been otherwise powered by gasoline.22 Many well intentioned wealthy beneficiaries of EV tax credits may put their vehicles to good use, but studies show that incentives disproportionately benefit high income households that use their cars less.23 A revised proposed rule should address this concern and have a strategy to improve on this outcome. [EPA-HQ-OAR-2022-0829-0540, p. 4]

18 See, e.g., Davis, L. & Knittel, C. 'Are Fuel Economy Standards Regressive?', Dec. 1, 2016. (While fuel emissions standards are slightly progressive when only new vehicles are considered, they are mildly regressive when used cars are taken into account. The EPA's proposed rule, with very stringent emissions

standards and a reliance on incentives for EV's which ignore the used car market will likely have an even greater regressive impact for used car buyers).

19 See, e.g., Zipper, D., June 1, 2023, https://www.theatlantic.com/ideas/archive/2023/06/large-electric-vehicles-road-safety-crashes/674249/ . (Four in five new vehicles purchased in the U.S. are SUVs or light-duty trucks and of only two of 23 EVs for sale in the last two years have a sale price under $35,000. Even with tax rebates, the price is outside the range of middle class and poor Americans, whose median household income was $70,784 in 2021).

20 Guo, S. & Kontou, 'Disparities and equity issues in electric vehicles rebate allocation'. Energy Policy 154, July 2021.

21 "…because our requisite longevity estimates denote the number of years that must elapse before an EV can deliver an emissions advantage over the counterfactual procurement scenario (namely, driving an ICEV), failing to achieve these estimates could make driving an EV worse than driving an ICEV." Nunes, A., Woodley & Rossetti, Apr. 4, 2022, https://www.nature.com/articles/s41893-022-00862-3

22 Ritchie, H., Jan. 26, 2023, https://www.sustainabilitybynumbers.com/p/ev-fossil-cars-climate?utm_source=profile&utm_medium=reader2

23 Burlig, F. et al, 2021. "Low Energy: Estimating Electric Vehicle Electricity Use." AEA Papers and Proceedings, 111: 430-35.

The greater adoption of EVs can be good for society and the environment when incentives are directed to consumers who will use EVs extensively, such as single-vehicle households, ride sharing drivers, used car buyers and middle- and lower-income households.24 In addition, some aspects of EV infrastructure subsidies, such as in the geographical distribution of charging stations, tend to reflect and perpetuate "disparities across race and income."25 A modified proposed rule should address these concerns with a strategy to allocate EV resources to middle- and low-income households, and also favor users who will be inclined to use the EV for the necessary number of miles so that it produces a net environmental benefit. [EPA-HQ-OAR-2022-0829-0540, pp. 4-5]

24 Hardman, S. et al., Aug. 30, 2021, https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/

25 "The result shows a similar overall pattern of access disparities between the race and ethnicity groups, but the access gap is larger than that found for public chargers overall… The odds of having publicly-funded charger access in Black and Hispanic majority CBGs is less than half of that in White-majority CBGs." Hsu, C. & Figerman, K. 'Public electric vehicle charger access disparities across race and income in California', https://www.sciencedirect.com/science/article/pii/S0967070X20309021.

The EPA's numerous regulations that promote human and ecological health, reduce GHG, and promote the common good are commendable. In these times of growing ecological challenges, increased inequality, and fiscal pressures, aggressive environmental standards must also respect economic and social considerations, driving our nation towards an "energy revolution" that provides "not only sustainable, efficient and clean energy, but also energy that is secure, affordable, accessible and equitable."26 For these same reasons, the light-duty vehicle standards should be improved and optimized to benefit primarily low- and middle-income Americans to reduce racial and economic disparities. [EPA-HQ-OAR-2022-0829-0540, pp. 4-5]

26 USCCB-CRS Letter to the Secretary of State, Feb. 17, 2017, https://www.usccb.org/resources/usccb-crs-letter-secretary-tillerson-care-creation-february-17-2017

Organization: Valero Energy Corporation

2. EPA's analysis of vehicle ownership costs is flawed.

There is a well-developed body of economics literature covering the total cost to the consumer of vehicle ownership (TCO). 157, 158, 159 Such studies include extensive data on powertrain production costs, energy prices, consumption, maintenance and repair costs, depreciation costs, and vehicle miles of travel.160 Rather than draw upon and update this extensive literature, EPA reinvents the wheel and prepares its own TCO analysis without any independent peer review of its approach. [EPA-HQ-OAR-2022-0829-0707, p. 33]

157 Hanna L. Breetz, Deborah Salon, Do Electric Vehicles Need Subsidies? Ownership Costs for Conventional, Hybrid, and Electric Vehicles in 14 U.S. Cities, Energy Policy. 120. September 2018, 238-249.

158 Kate Palmer, Zia Wadud, James E Tate, John Nellthorp, Total Cost of Ownership and Market Share for Hybrid and Electric Vehicles in the UK, US and Japan, Applied Energy. 209. 2018, 109-119.

159 Burnham et al., Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains, Argonne National Laboratory. ANL/ESD-21/4. April 2021.

160 See supra.

Disadvantaged communities already face significant access barriers to electric vehicles, such as: higher upfront costs to electric vehicle ownership; a lack of existing charging infrastructure available to them in low-income, minority populated, and rural areas; and costlier and time-intensive charging due to a greater reliance on public charging infrastructure, particularly for individuals living in multi-family housing. [EPA-HQ-OAR-2022-0829-0707, p. 55]

Notwithstanding EPA's hope that its proposal may serve to incentivize the purchases of electric vehicles, these vehicles are significantly more expensive on average than their ICE vehicle counterparts and unaffordable for many households. These are costs are also likely understated as each electric vehicle already enjoys thousands of dollars' worth of Federal and state subsidies, which are ultimately funded by taxpayers. Additionally, an automakers' ability to sell electric vehicles to consumers depends on substantial price subsidies in the form of credit support. EPA ignores the reality that many EJ stakeholders are currently unable to afford the upfront costs of purchasing an electric vehicle in the first place. With the cost of transition minerals expected to escalate exponentially in the coming years as a function of limited supply and increasing demand, the costs to manufacture and purchase electric vehicles will likely rise. [EPA-HQ-OAR-2022-0829-0707, p. 56]

EPA should also consider the effects of the proposal on electricity prices, as low-income populations often spend a larger percentage of their earnings on essential utilities compared to the rest of the United States. Reliance on electric vehicles has been shown to spur increases in load and demand during peak periods, which impact electricity prices. Because EPA lacks expertise in the area of electrical grid management and economics, EPA should consult with other agencies and credible experts in these areas in order to adequately evaluate these impacts.304 EPA should ensure that the proposal meets reliability and affordability criteria and helps EJ communities make informed decisions about their own energy needs. Additionally, EPA's EJ assessment fails to acknowledge the likelihood that many owners will lack access to residential charging, which will substantially increase their operating expenses. Consistent reliance on fast charging also shortens electric vehicle battery life, resulting in a need to replace the battery and/or the vehicle more frequently. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

304 See, West Virginia, 142 S.Ct. at 2612-13 (stating that EPA admitted that opining on trends in electricity transmission, distribution, and storage requires technical and policy expertise not traditionally needed in EPA regulatory development and finding that there is little reason to think Congress assigned such decisions to the EPA).

If EJ is truly a commitment for EPA, it should carefully consider criticisms like those leveled by The Two Hundred, which point out the disproportionate impacts to working and minority communities as a result of California's climate approach regarding electrified transport; those impacts and concerns remain true, and indeed are magnified under the proposed standards.305 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

305 See Plaintiffs' Complaint, The Two Hundred for Homeownership, et al. v. California Air Resources Board, et al., No. 1:22-CV-01474.

It is critical from the outset to design standards to minimize the potential for price shocks and supply disruptions. As written, the proposal ultimately benefits electric vehicle manufacturers at the expense of disadvantaged communities by subsidizing unaffordable transportation that is not fit for the purposes of commuting to and from EJ communities. At minimum, EPA should perform a thorough EJ assessment specific to its LDV proposal that is comprehensive of both transport challenges and impacts faced by EJ stakeholders and the government-wide Justice40 Initiative [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

The average purchase price of EV cars in 2022 was approximately $65,000, which is more than what 46 percent of American households earn in income in a year.306 While the average "used" EV sold for $42,895 in March of 2023.307 While EPA's DRIA anecdotally indicates that "emerging consensus suggests that purchase price parity is likely to occur by the mid-2020's for some vehicle segments and models"308, Ford CEO Jim Farley told attendees at its 2023 Capital Markets Days that EV cost parity may not come until after 2030.309 Moreover US auto makers are focusing their efforts on producing higher priced electric SUVs and trucks, including Fords $100,000 F150 Lightening Platinum310 and GM's announcement that its luxury brands, Cadillac and Buick, will be its first all-electric product lineups.311 While smaller EV's like the Chevy Bolt, touted by the Biden Administration as being affordable alternatives, are being discontinued.312 The reality is that most middle- and lower-income families simply cannot afford to purchase a new or used EV, even when taking into account available tax incentives and rebates. In fact, middle – and lower -income families are more likely to purchase older used vehicle, due to their lower upfront costs, and to hold onto those vehicles for longer periods.313 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

306 Kelly Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1% and all United States Household Income Percentiles, DQYJD

307 What to know about buying a used electric vehicle as more hit the auto sale market, CNBC, May 21, 2023

308 EPA DRIA, 3.1.3.1, 4-15

309 Ford CEO says EV cost parity may not come until after 2030, Reuters, May 31, 2023

310 https://www.ford.com/trucks/f150/f150-lightning/models/

311 Cadillac and Buick will be GM's first all-EV brands, Automotive News, July 1, 2022

312 GM Killed the Chevy Bolt- and the dream of a small, affordable EV, The Verge, April 26, 2023

313 Supporting Lower-Income Households' Purchase of Clean Vehicles: Implications From California-wide Survey Results, UCLA Luskin Center for Innovation, 2020

While EPA looks to address fuel saving as a component of the total cost of ownership for BEVs in an effort to portray BEV's as being cost competitive, or even advantageous versus their ICE counterparts, EPA fails to properly address insurance and depreciation, claiming they excluded them because they are quite similar for BEV's and ICE vehicles.314 However, EPA provides no support for these conclusions, while in the actual markets Tesla introduced its own insurance products in 2019 in response to high insurance costs for its EVs. More recently Policygenius.com published its "Electric car insurance 2023 guide", reporting that EV car insurance costs are higher than for non-electric vehicles, averaging 27.2% more expensive, with certain models including Tesla Model 3 and Model Y, averaging 43% and 53% more than the average ICE vehicles in their comparisons.315 Nerdwallet.com attributes the higher cost of EV insurance to higher initial sticker prices and specialized repairs.316 More concerning are recent reports from Car and Driver317 and Reuters318 which highlight an all too common phenomena for EV's in even minor collisions, the sheer numbers of low mileage (under 10,000 miles) vehicles siting in salvage yards as insurance companies elect to salvage the vehicle due to the overwhelming cost of repair/replacement of the battery packs. A trend that is likely to continue as OEM's further integrate larger battery packs into the structural design of EV's chassis. "We're buying electric cars for sustainability reasons," said Matthew Avery, research director at automotive risk intelligence company Thatcham Research. "But an EV isn't very sustainable if you've got to throw the battery away after a minor collision."319 [EPA-HQ-OAR-2022-0829-0707, pp. 57-58]

314 EPA DRIA, 4.2.2, 4-22

315 Electric car insurance 2023 guide, Policygenius.com, December 29, 2022

316 What You Need To Know About Electric Car Insurance, Nerdwallet.com, January 26, 2023

317 Tesla EVs, Even Mildly Damaged, Are Being Written of by Insurance companies, Car and Driver, Jan 30, 2023

318 Scratched EV Battery? Your insurer may have to junk the whole car, Reuters, Mar 20, 2023

319 Id.

Organization: Western Energy Alliance

Affordability/Environmental Justice: EPA is assuming that although the retail price of EVs is typically higher than for comparable ICEVs at this time, the price difference will narrow or disappear as the cost of batteries and other components fall in the coming years. EPA is taking a huge leap of faith in the ability of EV manufacturers to innovate in time for the arbitrary deadlines imposed by the president and EPA through this rule. Market projections six months from now are difficult, much less nine years into the future. [EPA-HQ-OAR-2022-0829-0679, p. 7]

Further, a U.K. study has found that EVs depreciate at a rate of 51% compared to 37% for gasoline cars, losing £15,220 ($18,786) versus £9,901 ($12,400).15 Clearly EPA's estimate that

"…the average upfront per-vehicle cost to meet the proposed standards to be approximately $1,200 in MY 2032, as shown in Table 7.131…" is greatly underestimated. EPA mentions but then dismisses the impact on low-income households by just assuming that manufacturers, "will continue to offer a variety of models at different price points…" and that they will save on fuel costs. [EPA-HQ-OAR-2022-0829-0679, p. 7]

13
EV battery costs have soared in 2022, hampering EV affordability," Stephen Edelstein, Green Car Reports, December 8, 2022.

14 Current Strategic Metals Prices, Strategic Metals Invest and D aily Metals Prices, both accessed July 5, 2023.

15 "Electric cars losing value twice as fast as petrol vehicles - drivers may lose £25,000," Felix Reeves, Express, May 3, 2023.

EPA's analysis that EVs have significantly reduced operating costs and would save owners $12,000 versus ICEVs over the life of the vehicle seems to be lacking several aspects. Further, the information EPA relies on to arrive at that number seems cherry picked. First, EPA is not looking at the full refueling costs. Studies call into question EPA's assumption that recharging costs will be lower than the costs of gasoline.16 [EPA-HQ-OAR-2022-0829-0679, pp. 7-8]

16 Comparison: Real World Cost of Fueling EVs and ICE Vehicles, Anderson Economic Group, October 21, 2021.

We wonder at the arrival of EPA's $12,000 lower operating costs, given a Department of Energy study that looked comprehensively at the total cost of ownership and found that after 15 years and found a much lower cost differential. The DOE study compared EV costs to similar gasoline-only models, factoring in the price, maintenance, financing, repairs, federal tax break and fuel costs (emphasis added).17 While it is disingenuous to include subsidies in the calculation, since such are at taxpayer expense, nevertheless the EV version of a small SUV costs $0.4508 per mile, $0.0219 less than the $0.4727 per mile rate of a similar gasoline-based model. Based on the average lifespan of a car of 200,000 miles, the cost of a gasoline-fueled car would be $94,540 while a similar EV would be $90,160. The difference of $4,380 is well short of $12,000. The DRIA references this DOE study but appears to have discounted it. But even assuming EPA is correct about the $12,000 lower operating costs, the $18,000 higher initial cost still results in a net cost to the owner.18 [EPA-HQ-OAR-2022-0829-0679, pp. 7-8]

17 Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains, Argonne National Laboratories, U.S. Department of Energy, April 2021.

18 "Why Are Electric Cars So Expensive?," U.S. News, Cherise Threewitt, November 3, 2022.

Organization: Zero Emission Transportation Association (ZETA)

d. EV Prices are Decreasing

One reason for the explosive growth in EV demand is the increasing cost competitiveness of EV models. In fact, ICCT reported that EVs could be the same cost this year for certain mass market models and are already at parity for a few luxury models due to the purchase and production incentives in the Inflation Reduction Act.41 [EPA-HQ-OAR-2022-0829-0638, pp. 11-12]

41 "Electric Vehicles Could Match Gasoline Cars on Price This Year," The New York Times, (February 14, 2023) https://www.nytimes.com/2023/02/10/business/electric-vehicles-price-cost.html

Cost is the number one cited barrier when it comes to purchasing an EV. Approximately 60% of Americans would purchase an EV if it were the same price as an ICEV.42 The price differential between EVs and ICEVs is rapidly shrinking. In 2020, an EV cost about 42% more than an ICEV.43 Today, an EV costs about 20% more than a similar ICEV, with the average ICEV selling for $48,008, compared to $58,940 for an EV.44 This average selling price is inflated by the popularity of luxury EVs on the market. Out of the top ten best-selling EVs in the U.S., the average starting price is $53,509, which drops to a 10% cost premium over ICEVs.45 [EPA-HQ-OAR-2022-0829-0638, pp. 11-12]

42 "International Electric-Vehicle Consumer Survey 2019," AlixPartners, accessed June 21, 2023 https://www.alixpartners.com/insights-impact/insights/international-electric-vehicle-consumer-survey/

43 "The Average Price of an Electric Car," CarEdge, (September 22, 2022) https://caredge.com/guides/average-price-of-an-electric-car

44 "After Nearly Two Years, New-Vehicle Transaction Prices Fall Below Sticker Price in March 2023, According to New Data from Kelley Blue Book," Kelley Blue Book, (April 11, 2022) https://mediaroom.kbb.com/2023-04-11-After-Nearly-Two-Years,-New-Vehicle-Transaction-Prices-Fall-Below-Stic ker-Price-in-March-2023,-According-to-New-Data-from-Kelley-Blue-Book

45 Id. at footnote 43

Upfront cost parity might be achieved even sooner than anticipated. The tax incentives in the IRA bring down the cost premium even further, with up to $7,500 available from the federal government, in addition to any state and local incentives. After factoring in the $7,500 federal tax incentive under section 30D, the average starting price is $46,009 for the top-10 best-selling EVs, $2,000 cheaper than the average ICEV. [EPA-HQ-OAR-2022-0829-0638, p. 12]

Today, while most EVs are still more expensive than a comparable ICE vehicle, there are a range of models at all different price points. Some of the most affordable EVs start at around $27,495, before factoring in the federal 30D tax credit.46 The Tesla Model 3–one of the most popular models in the world–recently reduced its starting price to $41,880 before any incentives.47 In a similar move, Ford cut the price of its Mustang Mach-E, the third-best selling EV in 2022.48 After two price cuts in 2023, the starting price of the Mach-E premium is $46,995.49 Each year there is a growing number of EV models available under $50,000. [EPA-HQ-OAR-2022-0829-0638, p. 12]

46 "Here Are the 11 Cheapest Electric Vehicles You Can Buy," Cars.com, (June 28, 2023) https://www.cars.com/articles/here-are-the-11-cheapest-electric-vehicles-you-can-buy-439849/

47 "Tesla Model 3 and Model Y Prices Continue to Fluctuate," Car and Driver, (May 3, 2023) https://www.caranddriver.com/news/a43539838/tesla-model-3-price-reduced-again/

48 "2022's top 10 best-selling electric vehicles in the US: Find out why they made the cut," Electrek, (January 9, 2023) https://electrek.co/2023/01/09/the-top-10-best-selling-electric-vehicles-in-the-us-of-2022/

49 "Ford cuts prices of Mustang Mach-E after Tesla moves," Reuters, (May 3, 2023) https://www.reuters.com/business/autos-transportation/ford-cuts-prices-mustang-mach-e-2023-05-02/

The economies of scale and decrease in the cost of components are driving down the price of new models. The production tax credits from the IRA are expected to cut the cost of producing batteries and EVs, savings that can be passed on to customers. With incentives for EV manufacturing, facility upgrades, critical mineral production, and battery manufacturing and assembly, the IRA subsidies could cut costs by up to $9,000 per vehicle.50 The result is record-breaking EV sales every year, driving up the percentage of new car sales that are electric. [EPA-HQ-OAR-2022-0829-0638, p. 12]

50 Id. at footnote 41

b. EVs Have Lower Total Cost of Ownership than Comparable ICE Vehicles

Though a vehicle's total cost of ownership (TCO) depends on several factors, such as the region, driving characteristics, and fuel prices, EVs are consistently cheaper to own than gas-powered cars. A typical driver can expect to save between $6,000 and $12,000 over a vehicle's lifetime by switching to an EV.98 These savings are magnified in rural areas where drivers travel an average of 38% more miles than urban drivers.99 [EPA-HQ-OAR-2022-0829-0638, p. 21]

98 "Electric Vehicles Save Consumers Money," Consumer Reports, (June 2023) https://advocacy.consumerreports.org/wp-content/uploads/2023/06/CR_EVSavings_FACTSHEET_6.2023.pdf

99 "Clean Transportation Strategies for Rural Communities in the Northeast and MidAtlantic States," Union of Concerned Scientists, (November 2020) https://www.ucsusa.org/sites/default/files/2020-11/rural-transportation-opportunities.pdf

EVs have fewer moving parts than their ICE counterparts, which makes them simpler to maintain and reduces the likelihood of a major malfunction.100 Reduced maintenance saves customers both time and money. Notably, the average maintenance costs for an EV are 50% lower than those for a comparable ICEV.101 EVs have significantly fewer components that require regular maintenance like engine oil, transmission fluid, and air filters. According to Argonne National Laboratory, the maintenance costs for an EV averages 6.1 cents per mile, compared to 10.1 cents per mile for a similar ICEV.102 That means for vehicles driven 10,000 miles per year can save $400 per year, totalling $2,000 over five years. Over a vehicle's lifetime, an EV owner can save an average of $4,600 on maintenance costs alone by transitioning away from driving a gas vehicle.103 [EPA-HQ-OAR-2022-0829-0638, p. 21]

100 "Maintenance and Safety of Electric Vehicles" U.S. Department of Energy, accessed June 18, 2023 https://afdc.energy.gov/vehicles/electric_maintenance.html

101 "Consumer Reports Study Finds Electric Vehicle Maintenance Costs Are 50% Less Than Gas-Powered Cars," Great Plains Institite, (November 16, 2020) https://betterenergy.org/blog/consumer-reports-study-finds-electric-vehicle-maintenance-costs-are-50-less-than-gas- powered-cars/

102 "Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains." (April 2021) https://doi.org/10.2172/1780970

103 "EVs Offer Big Savings Over Traditional Gas-Powered Cars," Consumer Reports, (October 8, 2020) https://www.consumerreports.org/hybrids-evs/evs-offer-big-savings-over-traditional-gas-powered-cars/

The average cost of electricity in the U.S. is 16.5 cents per kWh as of May 2023.104 If electricity costs 16.5 cents per kWh, charging an EV with a fully-depleted 100 kWh battery will cost about $16.50 to reach a full charge. While the range of a 100 kWh battery varies depending on a vehicle's efficiency, a typical Tesla Model S can go up to 400 miles on a single charge.105 Comparatively, the average national gasoline price for regular grade was $3.685 in May 2023.106 Filling up a 12-gallon passenger vehicle with a 30 mpg fuel economy would cost

$45.96 to move the vehicle 360 miles. At $16.50 for a full charge, fueling an EV cuts fuel prices by 64%. [EPA-HQ-OAR-2022-0829-0638, p. 22]

According to AAA, over the course of a year the cost of refueling an EV is around $546, compared to $1,255 per year when fueling a gasoline car.107 [EPA-HQ-OAR-2022-0829-0638, p. 22]

104 "Average energy prices for the United States, regions, census divisions, and selected metropolitan areas," U.S. Bureau of Labor Statistics, accessed July 3, 2023 https://www.bls.gov/regions/midwest/data/averageenergyprices_selectedareas_table.htm

105 "Fuel Economy of the 2021 Tesla Model S Long Range," U.S. Department of Energy, accessed July 3, 2023 https://www.fueleconomy.gov/feg/noframes/44051.shtml

106 Id. at footnote 104

107 "True Cost of Electric Vehicles," AAA Automotive, accessed July 3, 2023, https://www.aaa.com/autorepair/articles/true-cost-of-ev

EPA Summary and Response

In the NPRM, EPA prepared a summary of consumer expenses for sales-weighted average vehicles by body style and powertrain for sales-weighted average new, light-duty model year 2032 light-duty vehicles. That summary is an aggregation of analysis substantiated elsewhere in the RIA from which we make several observations. This portion of this RTC is intended to respond to comments directly related to the summary and observations provided in RIA Chapter 4.2.2 and 4.2.3. Some of those comments relate to the derivation of the values that appear in Chapter 4.2.2 but were computed in OMEGA and documented elsewhere. We refer readers to RTC Chapter 12 for responses to comments regarding values estimated using OMEGA as well as to RIA Chapter 2, in which Table 2-1 lists OMEGA topics and their location in the RIA. We refer readers to the cited sources for other values. Other comments suggest that the summaries presented in RIA Chapter 4.2.2 "does not include the full economic impact."[482] In response to such comments, we refer readers to the benefit cost analysis presented in RIA Chapters 9 and 4.3 as well as responses to comments regarding benefit cost analyses in Chapter 8 of this RTC. Also, as clearly stated in the RIA, the summary of consumer expenses for sales-weighted average vehicles by body style and powertrain presented Chapter 4.2.2 of the RIA is not intended to be a total cost of ownership analysis and is not a benefit cost analysis. See RIA Chapter 4.2.2 for clarity regarding the intent and purpose of these summaries. Lastly, other topics evoked in the comments and related to the savings and expense summaries are addressed elsewhere in the RTC, RIA, and Preamble, such as the following: charging infrastructure and battery durability (RTC Chapter 17), power sector and grid reliability (RTC Chapter 18), supply chain and critical minerals (RTC Chapter 15), modeling (RTC Chapter 12), vehicle cost and cost parity (RTC 12.2, RIA Chapter 2.5), environmental justice (RTC Chapter 9), consumer heterogeneity (RTC Chapter 13.2), battery costs (RIA Chapter 2.5.2.1), advances in PEV technology (RIA Chapter 3.1.1 and Preamble Section IV), supply chain and critical minerals (RIA Chapter 3.1.4 and Preamble Section IC.C.7), GHG emissions control technologies (RIA Chapter 3.5), fuel and electricity prices (RTC Chapter 19, RIA Chapters 2 and 5), and IRA provisions (RIA Chapter 2.6.8)

[482] [EPA-HQ-OAR-2022-0829-0517, p. 1]

We list revisions to consumer savings and expenses completed for the FRM. Many revisions are in response to comments and recommendations made by commenters. For the sake of brevity, we consider this list of revisions to stand as our response to those comments. We discuss these issues further in the RIA.

- EPA has updated the dollars values to 2022 dollars.
- EPA has added PHEVs to our analyses and revised inputs accordingly.
- EPA has revised consumer estimates of miles drive per year to 15,000 miles per year, instead of 12,000.
- EPA has included revised estimates of each pre-existing line item. See RIA Chapter 4.2.2 for descriptions of line items as well as the following cross-referenced locations for descriptions OMEGA estimation approaches and procedures.
    - Purchase price: RIA Chapters 2.5 and 4.2.2
    - Average Sales Tax: RIA Chapter 4.2.2
    - Average Federal Purchase Incentive: RIA Chapter 2.6.8
    - Vehicle Miles Per Year: RIA Chapter 4.2.1 and 8.3
    - Annual Retail Fuel Expenses: RIA Chapters 2.6.6, 4.3.3, and 8.5
    - Annual Refueling Time: RIA Chapter 4.3.5
    - Annual Maintenance Expenses: RIA Chapter 4.3.7
    - Annual Repair Expenses: RIA Chapter 4.3.7
    - Annual Registration Expense: See Burnham, Gohkle, et al. (2021)
    - Annual Insurance Expense: RIA Chapter 4.3.6
    - Residential Charging Equipment and Installation Investments: RIA Chapter 5.3
- EPA has revised methods for estimates of refueling time (See RIA Chapter 4.3.5) and rebound (See RIA Chapter 8.3.3).
- EPA has revised the 8-year summary of expenses to include average sales taxes; we have not included property taxes due to their limited applicability.
- EPA has revised the 8-year summary of expenses to include the average estimated purchase incentive.
- EPA has revised the 8-year summary of expenses to include insurance.
- EPA notes that registration includes additional fees for PEVs.
- EPA has updated the range of optional costs associated with the installation of home charging.

- EPA has updated the average savings for PEV consumers compared to ICE vehicle consumers.
- EPA has added tables summarizing the lifetime expenses associated with sales weighted average vehicles in the No Action case and in the Central case.
- EPA has revised text in RIA Chapter 4 to reflect the above.
- EPA has revised text in RIA Chapter 4.2.2 to describe and substantiate our assumption of full pass through of technology costs and producer incentives to the consumer. We also assume that the consumer receives the full purchase incentive for which they are eligible.

We augment the clarifications, cross-references, and revisions provided above in RTC Chapter 13.4 with additional attention to affordability and consumer heterogeneity (i.e., consumers of all demographics, income levels, vehicle types). First, note that we address considerations of specific groups of vehicle consumers in RIA Chapter 4.2.3, including low-income consumers, consumers of lower-price new vehicles, and consumers of used vehicles. We also refer readers to RTC Chapter 13.2 where we discuss comments related to consumer demand and the diversity of vehicle consumers (i.e., consumer heterogeneity). We note that some commenters suggested a quantitative, rather than qualitative assessment of the above. First, we have conducted substantive quantitative analyses as evidenced throughout the Preamble, RIA, and RTC. At this time, the studies and data do not exist to quantitatively examine differences in PEV purchasing behavior across demographic groups, though there is recent evidence to suggest that the stereotypes of PEV buyers is breaking down (i.e., PEV consumers are becoming increasingly diverse and more representative of vehicle consumers (Fujita, Campbell, & Taylor, 2024) (Taylor, Fujita, & Campbell, 2024)..

Regarding vehicle affordability, comments centered around several themes. Comments were concerned with the price of vehicles, accessibility of vehicle ownership due to projected vehicle costs and related issues like financing, and the availability and costs of fueling and charging. Some commenters were also concerned with the impacts of the standards on vehicle choice, especially in the lower priced vehicle categories and markets and for members of disadvantaged communities. Most commenters link those concerns to plug-in electric vehicles. For example,

- Donna Jackson states that the rule “will create an economic hardship and serious decline in the standard of living for all Americans but especially black Americans”
- Joshua Linn states that “low-income households typically have lower demand for plug-in vehicles than high-income households (even putting aside the high up-front purchase price), and by shifting the market from gasoline to plug-in vehicles, the standards may reduce purchasing options for low-income households.
- Valero Energy Corporation states that “the reality is that most middle- and lower-income families simply cannot afford to purchase a new or used EV, even when taking into account available tax incentives and rebates.”
- Texas Public Policy Foundation states that “Rural and low-income communities, the people most affected by this regulation, likely will be the last to receive said recharging infrastructure”

- American Free Enterprise Chamber of Commerce states that “not all consumers can make purchasing decisions based on savings that they hope to experience years later.”

In response, first, our assessment projects there will be variation in the types of technologies that automakers adopt to meet the standards, providing consumers with vehicles with reduced GHG emissions and increased fuel economy and associated fuel savings via PEV and ICE vehicle technologies in the new vehicle market and eventually also in the used vehicle market. We expect that automakers recognize the diversity of their consumers and will leverage the flexibilities built into the standards to provide consumers with PEV and ICE vehicle choices over a wide range of utility and price points. Second, purchase incentives are available for eligible new and used PEVs for buyers who qualify (See RIA Chapter 2.6.8). Third, the price difference for PEVs is widely expected to narrow or disappear as the cost of batteries and other components fall in the coming years.[483] See Preamble Sections IV.C.1 and IV.C.6. Fourth, in our modeling, we assume that a mix of technologies will be used to meet the standards, and we demonstrate several potential compliance pathways.

These and other comments reference impacts on specific communities of vehicle prices, fuel and electricity prices, charging costs and time, and charging infrastructure as well as the approaches, methods, procedures, and resources used to estimate these and other quantities. In response to these and similar comments, we first refer readers to the revisions documented in RIA Chapter 4.2.2. We make clear that the revised summaries of consumer savings and expenses provided in RIA Chapter 4.2.2 are illustrative. These summaries provide sales-weighted average expense and savings information for prospective future consumers of new vehicles. These estimates are not intended to provide information tailored to any particular demographic group such as consumers of luxury or lower-priced new vehicles, rural or urban consumers, or households participating in the used vehicle market. While these estimates will have greater and lesser relevance to different individuals based on their individual circumstance, they nonetheless provide a reasonable analysis of consumer savings and expenses related to this nationwide regulation. Finally, we have qualitatively examined different impacts experienced by different groups. For example, we discuss low-income consumers, consumers of lower priced vehicles, and used vehicle consumers in RIA Chapter 4.2.3, and we address comments regarding our attention to consumer heterogeneity and purchase price and total ownership cost (TOC) parity in RTC Chapter 13.2.

Commenters also provided more favorable assessment of the effects of the standards on vehicle affordability, accessibility, and choice:

- Zero Emissions Transportation Association (ZETA) states that “EVs have [a] lower total cost of ownership than comparable ICE vehicles.”

- Environmental and Public Health Organizations argues that “PEVs are a great fit for the needs and demands of rural drivers,” noting, for example, that “trips in rural areas are longer than in urban areas” and therefore fuel savings would be greater.

- Energy Innovation cites a University of California, Berkeley, Grid Lab, and Energy Innovation study and found that the DRIVE Clean Scenario, “compared to the No

[483] International Council on Clean Transportation, "Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Time Frame," October 2022.

New Policy … [would result] in approximately $2.7 trillion in consumer savings through 2050 … a household savings of about $1000 per year on average over 30 years."

- Joshua Linn states that "the standards will increase sales of plug-in vehicles while simultaneously making gasoline vehicles more fuel efficient. Both changes reduce fuel costs for drivers, which disproportionately benefits low-income households because they spend a much larger share of their income on gasoline than do high-income households."

Among the commenters who contrasted higher upfront purchase expenses and lower operating costs under the standards for all vehicles and particularly for BEV and ICE vehicles, some were critical of the tradeoff arguing that higher upfront costs were too much of a burden especially for lower income households, while others argue that operating savings are important to many consumers across all demographic groups and income levels.

- American Free Enterprise Chamber of Commerce et al. states that "not all consumers can make purchasing decisions based on savings that they hope to experience years later."
- Environmental and Public Health Organizations noted that "BEV ownership, combined with supportive policies will benefit lower-income consumers." More specifically, the state, "While upfront BEV cost concerns may serve as an initial barrier to lower-income consumers, a suite of targeted policies can mitigate this concern."

In response, we acknowledge the many commenters who noted the rising average price of a new vehicles, and we are aware of the strong relationship between new vehicle prices and used vehicle prices. We emphasize that many factors contribute to the rising average price of vehicles, such as fleet mix, larger size, increased performance, vehicle amenities, and increased fuel efficiency. We also note that this historical trend, though likely to continue, is not inevitable. Tradeoffs are inherent in the vehicle purchase process, and this condition may be especially important for "Americans who cannot afford [for] car prices to increase." However, the vast majority of American households own a vehicle, and for the many Americans who do purchase new and used vehicles, those consumers experience the fuel saving benefits associated with vehicles with reduced GHG emissions and improved fuel economy, whether or not consumers consider it fully at the time of purchase.

14 - Vehicle sales

Comments by Organizations

Organization: Alliance for Automotive Innovation

National EV sales have demonstrated consistent linear growth, but nothing like the growth in market share that EPA is projecting for the future (Figure 3). In the first quarter of 2023, automakers sold about 305,000 electric vehicles (EVs), including battery, plug-in hybrid, and fuel cell electric vehicles) in the United States, representing 8.6% of overall light-duty vehicle sales. Year-over-year (YoY), market share increased 2.7 percentage points (pp) compared to the first quarter of 2022.31 [EPA-HQ-OAR-2022-0829-0701, pp. 30-31]

31 See past editions of "Get Connected: Electric Vehicle Report" for previous quarters.

[See original comment for Figure 3: U.S. EV (BEV, PHEV, and FCEV) market share, January 2020 through March 2023.32] [EPA-HQ-OAR-2022-0829-0701, pp. 30-31]

32 Alliance for Automotive Innovation, Get Connected: Electric Vehicle Quarterly Report 2023 (Q1) (Jun. 26, 2023). Available at https://www.autosinnovate.org/posts/papers-reports/get-connected-2023-q1.

EPA's Proposed Rule is projected to require BEV market share that exceeds that of the most mature and forward-leaning EV market in the U.S. Comparing EPA-projected BEV share to California zero-emission vehicle (ZEV) mandate requirements,33 EPA projects greater overall U.S. BEV market share than would be required in California and Section 177 states under the ZEV Mandate that seeks to ban the sale of internal combustion engine (ICE) vehicles by 2035. Figure 4 summarizes the electrification rates projected in the NPRM against the penetration rates required in California's ZEV Mandate. California requires at least 34% BEV market share in 2027, reaching 66% in 2032. EPA's proposed rule exceeds these rates in every year from 2027-2032 and by as much as 6 percentage points in 2030. [EPA-HQ-OAR-2022-0829-0701, pp. 31-32]

33 See 13 C.C.R. § 1962.4.

[See original comment for Figure 4: Comparison with California] [EPA-HQ-OAR-2022-0829-0701, pp. 31-32]

Organization: Alliance for Consumers (AFC)

Moreover, EPA has failed to consider the interplay between the current profits that automakers earn on ICE vehicles as opposed to the losses that most automakers are incurring in their sale of EVs. For example, a recent Ford Motor Company 10-k filing identified a relatively common reality for automakers: "our larger, more profitable vehicles had an average contribution margin that was 118% of our total average contribution margin across all vehicles, whereas our smaller vehicles had significantly lower contribution margins." Ford Motor Company 2021 10-K at 35.3 In short, this identifies the reality that larger, primarily ICE cars and trucks are cross-subsidizing the sale of money-losing EVs to a substantial degree. Yet EPA fails to adequately address the effects of removing a majority of ICE cars from the road and replacing them with EVs in terms of the ability of traditional automakers to continue pricing EVs at current, money-losing levels. Indeed, the same recent Ford Motor Company 10-k notes that EV mandates like what EPA has proposed in this rule: "may increase the cost of vehicles by more than the perceived benefit to consumers and dampen margins." Ford Motor Company 2021 10-K at 35. [EPA-HQ-OAR-2022-0829-0534, pp. 4-5]

3 Available at https://s201.q4cdn.com/693218008/files/doc_financials/2021/q4/Ford- 2021-10-K-Report.pdf.

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA concludes that manufacturers are already on track to transform the nation's automotive industry and projects that the number of available models will grow from 68 today to 180 by model year 2025. 88 Fed. Reg. at 29,190, 29,312. In large part, the agency supports these expectations with announce- ments that various manufacturers have released outlining plans to shift product development toward electrification in the coming decades. See id. at 29,190, 29,192–93. As EPA acknowledges, however, these announcements “are not binding and often are conditioned as forward-looking and subject to uncer- tainty.” Id. at 29,193. They do not prove how many models will actually be available by the time of the compliance period. [EPA-HQ-OAR-2022-0829-0683, pp. 20-21]

Manufacturers may significantly revise their plans or fail to meet their tar- gets—as has happened many times before. Tesla, for example, has fallen re- peatedly fallen behind schedule. In November 2017, the company introduced an electric semi-truck prototype and set a production date for December 2019, but following the exit of an executive and “a series of supply chain issues,” the company pushed the production date back nearly three years (to 2022). Nora Naughton, Another Tesla Semi Was Spotted Apparently Broken Down on the Side of the Road, Bus. Insider (Jan. 20, 2023), https://tinyurl.com/38x8xkvc. In De- cember 2017, Tesla unveiled a second-generation Roadster and said that the vehicle would launch in 2020. See Dan Mihalascu, Tesla Roadster “Hopefully” Entering Production In 2024: Elon Musk, Inside EVs (May 17, 2023) (“Tesla Road- ster”), https://tinyurl.com/39a5jn4d. In 2020, however, the model “was de- layed to 2021, and then pushed back by a year every year.” Id. It is “three years overdue at this point,” and at a recent shareholder meeting, CEO Elon Musk “push[ed] back the car another year, ‘hopefully’ to 2024.” Id. And in 2019, Tesla unveiled the Cybertruck and said that it would be available for sale in 2021. See Jack Ewing, Tesla’s Pickup Truck Is Coming Soon. Maybe., NY Times (Feb. 6, 2023) (“Tesla’s Pickup”), https://tinyurl.com/3d7f9tv7; Lora Kolodny, Tesla Unveils Its First Electric Pickup, The Cybertruck, Starting at $39,900, CNBC (Nov. 21, 2019), https://tinyurl.com/je4esevt. Now production is not expected to begin until the end of 2023. Ewing, Tesla’s Pickup. [EPA-HQ-OAR-2022-0829-0683, pp. 20-21]

Other manufacturers have also experienced setbacks. General Motors, for example, recently “dialed back” an electric-vehicle sales target by more than two years, “citing startup issues with a new battery plant in Ohio.” Bart Ziegler, Electric Vehicles Require Lots of Scarce Parts. Is the Supply Chain Up to It?, Wall St. J. (Nov. 12, 2022), https://tinyurl.com/ynkuw9bd. Stellantis “previously had a stated 2025 target but scrapped it in favor of a new 2030 target.” Bloom-bergNEF, Zero-Emission Vehicles Factbook: A BloombergNEF Special Report Pre- pared for COP27, at 48 (Nov. 2022), https://tinyurl.com/2dyrxn66 (“Zero-Emis- sion Vehicles Factbook”). Lordstown Motors suspended production and deliveries of its electric pickup truck in February 2023 to address performance and quality issues with certain components, see Michael Wayland, Lordstown Halts Production, Shipments of Endurance Electric Trucks to Address Quality Issues, CNBC (Feb. 23, 2023), https://tinyurl.com/ykjwtz39, and last week it filed for Chap- ter 11 bankruptcy protection, after having “produce[d] only 65 of its Endurance pickups since the company’s 2018 founding,” Jeanne Whalen & Hamza Sha- ban, Lordstown Motors Files for Bankruptcy and Sues Foxconn, Wash. Post (June 27, 2023), https://tinyurl.com/35ekmhje. And Ford has fallen far behind on filling purchase orders for the F-150 Lightning pickup truck. See Luc Olinga, Ford Suffers Another Setback, TheStreet (Mar. 11, 2023), https://ti-nyurl.com/ymuuy5nv. [EPA-HQ-OAR-2022-0829-0683, p. 21]

These real-world examples demonstrate that far-in-advance announcements (often in the face of significant political pressure) do not reliably indicate whether electric vehicles will get to the market on time, in the amounts prom- ised, or even at all. Model year 2032 could come and go with far fewer electric models than EPA assumes. [EPA-HQ-OAR-2022-0829-0683, p. 21]

In any event, EPA does not indicate whether additional electric-vehicle of- ferings in other segments that more typical consumers could afford are likely to surface by the time the proposed rule takes effect. And there is reason to doubt that affordable offerings will materialize in time. One recent article notes that legacy automakers are "spending much of their effort producing vehicles that are above the median average annual US household income," and although "some EVs" will soon appear at lower prices, it is unclear whether those models will stay in the lower price brackets. Charette, Convincing Consumers (internal quo- tation marks omitted). Already, various manufacturers such as General Motors and Ford have had to increase the prices of their lower-end models to keep up with industry pressures. Id. For example, last year Ford's least expensive F-150 Lightning Pro model was offered for $41,769; this year, the price has jumped more than 38 percent, to $57,869. Id. Untapped segments of the light- and me- dium-duty market may therefore see little, if any, traction in the near future. [EPA-HQ-OAR-2022-0829-0683, p. 24]

Organization: American Fuel & Petrochemical Manufacturers

EPA likewise assumes that the IRA and the BIL funds will be adequate to build the necessary electrification infrastructure. It is uncertain that (1) critical minerals will be available to manufacture ZEV batteries (see Section I.A.1); (2) consumers will buy EVs at the rate assumed by EPA (see Section IV.B.2); and (3) there will be ample electricity to power these vehicles (see Sections I.B and IV.B.3).127 What is certain is that the Proposal's timeline is unachievable and completely detached from reality.128 EPA also improperly relied on the general characterization of recent years of the light-duty and medium-duty market as supplemented by incentives in the BIL and IRA to support its proposition that there will be a rapid increase in ZEV market penetration. Setting aside the laws of supply and demand and the fact that the future availability of ZEVs is insufficient to meet the ZEV adoption requirements proposed by EPA (as discussed further below), EPA improperly relies on the number of models currently available on the free market as a surrogate for the number of actual units sold and in use. The underlying reality is that without federal regulation requiring vastly increased ZEV penetration, providing automakers certainty for long-term planning, automakers could not financially justify long-term investment in a technology with tepid consumer demand. The referenced electrification projections may be a function of OEMs striving to create certainty and minimize risk as they attempt to comply with forthcoming regulations. Indeed, the CEO of the Alliance for Automotive Innovation recently questioned the feasibility of the Proposed Rule – stating that the proposal was too aggressive and could benefit China: [EPA-HQ-OAR-2022-0829-0733, pp. 29-30]

127 Id.

128 Id.

I've said the EPA proposal wasn't feasible without certain public policies and in light of today's market and supply chain conditions .. . . There's not enough charging and uncertain utility and grid capacity. Here's the big one – and where China looms largest – essentially no domestic or allied supply of battery critical minerals, processing, and components until 2025 (and even then, nowhere near enough to supply what's needed).129 [EPA-HQ-OAR-2022-0829-0733, pp. 29-30]

129 John Bozzella, EPA's EV Rules: What it Means for China and the U.S Auto Market. June 12, 2023, available at https://www.autosinnovate.org/posts/blog/epas-ev-rules-what-it-means-for-china-and-the-us-auto-market (accessed June 23, 2023).

As EPA acknowledges, the facts show that only between 2.2 and 4.4 percent of light duty vehicles produced in 2021 were electric, rising to about 8.4 percent in 2022.133 Production may or may not translate into sales and vehicle registration. State-by-state EV registration data shows that the percentage of EV registrations relative to all registered vehicles ranged from 0.15 percent in Mississippi to 4.01 percent in California.134 Thus, the ambitions of even the most aggressive OEM from a ZEV adoption rate perspective would require unprecedented sales over the next seven years.135 [EPA-HQ-OAR-2022-0829-0733, p. 31]

133 Proposed Rule at 29,189; Sebastian Blanco, Car And Driver, "Strict EPA Rules for 2027 – 2032 Vehicles Announced, Garnering a Range of Reactions" (Apr. 13, 2023) available at https://www.caranddriver.com/news/a43546970/new-strict-epa-mpg-rules-for-2027-2032-vehicles/.

134 2023 EV Charing Station Report: State-by-State Breakdown, June 16, 2023, available at https://zutobi.com/us/driver-guides/the-us-electric-vehicle-charging-point-report.

135 VOLVO GROUP, "Report on the first quarter 2023," available at https://www.volvogroup.com/content/dam/volvo-group/markets/master/news/2023/apr/4519530-volvo-group-q1-2023.pdf; TUBES AND LUBES DAILY, "Volvo launches electric truck with longer range in N. America" (Jan. 2021) available at https://www.fuelsandlubes.com/volvo-launches-electric-truck-with-longer-range-in-n-america/?mc_cid=b124969b23&mc_eid=4a00dc8f80 (Volvo Trucks set target that half of all trucks sold are electric by 2030); VOLVO GROUP, "Geared for Growth – Annual Report 2022," available at https://www.volvogroup.com/content/dam/volvo-group/markets/master/investors/reports-and-presentations/annual-reports/AB-Volvo-Annual-Report-2022.pdf.

Organization: American Petroleum Institute (API)

iv. Vehicle readiness.

1. Technology readiness.

The proposed rule identified various LMD ZEVs available in the marketplace or in production, as well as select manufacturer goals and commitments to producing LMD ZEVs by a certain timeframe. However, there is significant uncertainty regarding EPA's expectation for rapid availability of ZEV powertrains on the proposed rule's timeline. OEM goals and commitments, coupled with IRA/BIL funding may help to increase the availability of LMD ZEVs; however, it will be extremely challenging to meet the proposal's implementation schedule. Based on EIA projections, it seems highly unlikely that vehicles will be available at the rates EPA is projected for the 2027-2032 timeframe. [EPA-HQ-OAR-2022-0829-0641, pp. 14-15]

Even with a fully stocked LMD ZEV market, key barriers to entry include customer uptake, capital costs to purchase vehicles, and infrastructure readiness. [EPA-HQ-OAR-2022-0829-0641, pp. 14-15]

The AEO 202359 contains long term projections based on current laws and regulations in place at the time of modeling. As part of that modeling, the AEO includes projections for vehicle sales and vehicle sales projections include consumer choice modeling60. EIA's consumer choice modeling includes fuel choice, sales penetration among similar technologies, market share among different technology sets, and vehicle attributes (i.e., sales price, fuel economy, battery replacement costs, range, etc.). EIA reported that for the first time since 2010, critical mineral prices increased “significantly” in 2022 resulting in the first year to year increase in electric vehicle battery prices. According to AEO projections, which consider current policies and regulations, and consumer choice, BEV sales penetration remains well below EPA’s estimates in the proposed rule, which are induced by its proposed stringent standards. EPA must explain why its projections differ so significantly from EIA. Furthermore, EIA61 projects electric vehicles to be less competitive from a cost standpoint than gasoline powered vehicles in the much larger non-luxury market. [EPA-HQ-OAR-2022-0829-0641, p. 19]

59 U.S. Energy Information Administration. “Annual Energy Outlook 2023.” March 2023. https://www.eia.gov/outlooks/aeo/.

60 https://www.eia.gov/outlooks/aeo/assumptions/pdf/TDM_Assumptions.pdf

61 61 U.S. Energy Information Administration. “Issues in Focus: Inflation Reduction Act Cases in the AEO2023.” March 2023. Annual Energy Outlook 2023. https://www.eia.gov/outlooks/aeo/IIF_IRA/.

Vehicles powered by internal combustion engines (ICE) offer “outstanding “drivability and reliability” according to the Department of Energy62 and “increasing the effciency of internal combustion engines (ICEs) is one of the most promising and cost-effective approaches to dramatically improving the fuel economy of the on-road vehicle fleet in the near- to mid- term.” Increasing sales of EVs does not necessarily mean they are more reliable. According to this survey data63 “[e]lectric cars are less reliable” than cars powered by petroleum, where software related problems cause reliability issues for consumers. In a Consumer Reports survey,64 data reported by EV owners indicate that EVs, as a category, have “more frequent problems” compared to conventional vehicles. EPA should take into account these factors in their analysis. [EPA-HQ-OAR-2022-0829-0641, p. 19]

62 U.S. Energy Information Administration. “Transportation Demand Module Assumptions.” March 2023. https://www.energy.gov/sites/default/files/2015/11/f27/QTR2015-8C-Internal-Combustion-Engines.pdf.

63 Hull, R. “Electric cars are LESS reliable than petrols and diesels with nearly a third reporting faults taking longer to fix - and Tesla is rated worst overall, says Which?” March 2022. Daily Mail. https://www.dailymail.co.uk/money/cars/article-10569557/Electric-cars-reliable-petrol-diesel-says-Which.html.

64 Tucker, S. December 2022. “Consumer Reports: EVs Less Reliable Than Gas-Powered Cars.” Kelley Blue Book. https://www.kbb.com/car-news/consumer-reports-evs-less-reliable-than-gas-powered-cars/.

No-Action EV Scenario Assumption

The regulation accepts as a baseline a 40% BEV share of new vehicle sales by 2030 as part of the assumed no-action scenario.123 This scenario appears to be driven by OEM announcements for future technology penetration for vehicles sold in the U.S.124 [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

123 Draft Regulatory Impact Analysis EPA-420-D-23-003 April 2023, Table 13-67.

124 40 CFR Parts 85, 86, 600, 1036, 1037, and 1066 [EPA–HQ–OAR–2022–0829; FRL 8953–03– OAR] page 29192 Table 1.

Table 13-67: Projected BEV Penetrations, No Action – Combined [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

Manufacturer	2027	2028	2029	2030	2031	2032
BMW	30%	35%	42%	43%	42%	42%
Ford	29%	26%	32%	35%	36%	36%
General Motors	22%	29%	33%	38%	38%	37%
Honda	30%	35%	40%	42%	41%	40%
Hyundai	29%	36%	42%	43%	43%	42%
JLR	26%	32%	37%	38%	38%	38%
Kia	26%	32%	38%	38%	38%	38%
Mazda	28%	34%	40%	42%	42%	41%
Mercedes Benz	29%	35%	41%	42%	42%	41%
Mitsubishi	26%	33%	39%	41%	40%	39%
Nissan	29%	34%	40%	42%	41%	41%
Stellantis	20%	28%	34%	37%	37%	37%
Subaru	25%	33%	39%	41%	40%	39%
Tesla	100%	100%	100%	100%	100%	100%
Toyota	29%	32%	39%	41%	40%	39%
Volvo	26%	33%	39%	41%	40%	39%
VW	31%	36%	41%	43%	42%	42%
Total	27%	32%	37%	40%	40%	39%

Table 1. Example of U.S. electrified new sales percentages implied by OEM announcements for 2030 or before [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

2022 US Sales Rank (1)	OEM	Share of Total U.S. Sales	Stated EV Share in 2030 (2)	Powertrain (3)	Implied OEM Contribution to 2030 Total PEV Market Share
1	General Motors	16.4%	50%	PEV	8.2%
2	Toyota	15.4%	33%(4)	BEV	5.1%
3	Ford	13.1%	50%	BEV	6.5%
4	Stellantis	11.2%	50%	BEV	5.6%
5	Honda	7.2%	40%	BEV	2.9%
6	Hyundai	5.7%	50%	BEV	2.8%
7	Nissan	5.3%	40%	BEV	2.1%
8	Kia	5.0%	45%	BEV	2.3%
9	Subaru	4.1%	40%	BEV	1.6%
10	Volkswagen, Audi	3.6%	50%	BEV	

					1.8%
11	Tesla	3.4%	100%	BEV	3.4%
12	Mercedes-Benz	2.6%	100%	BEV	2.6%
13	BMW	2.6%	50%	BEV	1.3%
14	Mazda	2.1%	25%	BEV	0.5%
15	Volvo	0.8%	100%	BEV	0.8%
16	Mitsubishi	0.6%	50%	PEV(5)	0.3%
17	Porsche	0.5%	80%	BEV	0.4%
18	Land Rover	0.4%	60%	BEV	0.3%
19	Jaguar	0.07%	100%	BEV	0.07%
20	Lucid	0.02%	100%	BEV	0.02%
	Total	100.9%			48.6%

OEM technology announcements have not always translated to implementation. For example: [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

• GM had made the claim in 2007 that they would have 1 million fuel cells on the road by 2012.125 [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

125 https://www. reuters.com/article/us-gm-fuelcells/gm-aims-to-be-first-to-make-1-million-hydrogen-cars-exec- idUSSHA9988820071114.

• This claim was never reached, and only limited fuel cell vehicles have ever been produced by GM. [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

• Ford made the claim in 2001 that their SUVs would increase their fuel economy by 25% by 2005.126 [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

126 https://www.autoweek.com/news/a2108121/fords-goal-boosting-suv-fuel-economy-2005-proves-elusive/.

• This claim was only reached after the global recession in 2008 forced buyers out of choosing the larger vehicles they were consuming prior to the recession. [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

Even the President of the United States isn't the best source of forecasting automotive technology. In the 2011 State of the Union speech, President Obama claimed that there would be

1 million EVs on the road by 2015.127 The reality was only ~200,000 electric vehicles were on the roads in 2015 and it would take another 6 years (2021) for the 1 million EV goal to finally be reached. [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

127 https://www1.eere.energy.gov/vehiclesandfuels/pdfs/1_million_electric_vehicles_rpt.pdf.

Furthermore, we also question the agency's use of these forward-looking statements as a basis of fact when establishing the baseline cost assumption. The forward-looking statements on BEV penetration rates by the OEMs are predicated on expectations of potential regulatory standards set by the agency. This circular reasoning cannot support EPA's proposal here as the referenced forward-looking statements are largely a function of OEMs striving to create certainty and minimize risk as they attempt to comply with forthcoming regulations. [EPA-HQ-OAR-2022-0829-0641, pp. 47-49]

Organization: Arizona State Legislature

5. The proposed rule relies on erroneous assumptions about vehicle costs. EPA's projections of vehicle costs rely on federal tax credits juicing consumer demand, but prices have increased and few vehicles qualify for the tax credits. [EPA-HQ-OAR-2022-0829-0537, p. 2]

Organization: California Attorney General's Office, et al.

1. There Are Significant Public and Private Investments in and Demand for Zero-Emission Vehicles

Zero-emission-vehicle technologies are widely used in vehicles today to control emissions and their deployment is increasing at a rapid pace. For example, in 2020, the U.S. market penetration of electric vehicles108 was just 2.2%; in 2021, it was 4.4%; and, in 2022, electric vehicles were estimated to reach 8.4% market share. 88 Fed. Reg. at 29,189. This dramatic growth is expected to continue, and forecasts estimate that electric vehicle market share will climb to 40-50% in 2030109 given government policies, manufacturer plans, and growing consumer demand. [EPA-HQ-OAR-2022-0829-0746, p. 18]

108 "Electric vehicles" refers to plug-in electric vehicles, which includes battery electric vehicles and plug-in hybrid electric vehicles.

109 Javier Colato and Lindsey Ice, U.S. Bureau of Labor Statistics, Charging into the future: the transition to electric vehicles (Feb. 2023), available at https://www.bls.gov/opub/btn/volume-12/charging-into-the-future-the-transition-to-electric-vehicles.htm#:~:text=S%26P%20Global%20Mobility%20forecasts%20electric,surpassing%2050%20per cent%20by%202030; Sean Tucker, Kelley Blue Book, More Than Half of Car Sales Could Be Electric by 2030 (Oct. 4, 2022), accessible at https://www.kbb.com/car-news/study-more-than-half-of-car-sales- could-be-electric-by-2030/.

In addition to federal- and state-level laws and policies, "[m]any automakers have detailed plans to electrify large portions of their fleets over the next decade, with some announcing goals for fully electrified lineups within five years."123 These announcements cover the range of zero-emission vehicle technologies, including hydrogen fuel cell electric vehicles. The number of electric vehicle models available for sale in the United States has more than doubled from about 24 in model year 2015 to about 60 in model year 2021, and is expected to increase to more than 180 models by 2025. 88 Fed. Reg. at 29,312. [EPA-HQ-OAR-2022-0829-0746, p. 21]

123 Jeff S. Bartlett, Automakers Are Adding Electric Vehicles to Their Lineups. Here's What's Coming, Consumer Reports (Mar. 10, 2023), available at https://www.consumerreports.org/cars/hybrids-evs/why-electric-cars-may-soon-flood-the-us-market-a9006292675/.

Organization: Ceres Corporate Electric Vehicle Alliance (CEVA)

Members of the Alliance share a goal to electrify their on-road fleets and networked vehicles to reduce their carbon footprint, meet climate goals, and support the community health of their customers and employees, and thus recognize the crucial role of these standards. While the availability and diversity of commercial ZEVs in the U.S. market have improved, significant hurdles remain in securing a greater and more diverse supply of cost-competitive ZEVs to meet long-term corporate demand. The Alliance alone represents robust demand for ZEVs, with members planning to procure approximately 330,000 ZEVs as soon as 2026. Auto and truck manufacturers are also recognizing the business case for transitioning to ZEVs. Many have committed to produce only zero-emission passenger vehicles by 2035 or earlier, and several have made commitments to reach 50-67% medium- and heavy-duty ZEV sales by 2030 and 100% by 2040 or sooner. 7 Manufacturers and fleet operators rely in large part on technology-driving federal policy to close the gap between supply and demand for zero-emission commercial vehicles. Strong standards are needed to spur the availability, production volume, and variety of zero-emission cars and trucks that meet the requirements of commercial fleets (such as the need for vehicles with electronic power-takeoff or exportable power capabilities), as well as reduce harmful pollutants to the maximum extent possible. [EPA-HQ-OAR-2022-0829-0511, p. 2]

7 https://theicct.org/wp-content/uploads/2023/04/hdv-phase3-ghg-standards-benefits-apr23.pdf (p.i).

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

Our agencies strongly support EPA's development of national air pollution and GHG emission standards that are as robust as possible to ensure strong progress nationwide on air pollution and equity. A strong national light- and medium-duty vehicle standard is important to Colorado for at least three reasons. First, air pollution from nearby states crosses into Colorado and affects public health, and the longer duration and increased stringency of the proposed criteria air pollutant standards will reduce interstate air pollution transport into Colorado. Second, Colorado is already experiencing the impacts of climate change, including increased wildfires, floods, and drought. Climate change is a global issue that is impacted by all GHG emissions regardless of geographic source, and the reductions in GHG emissions from the proposed national rule will help reduce the long-term risks of climate change in Colorado. Finally, although the proposed national GHG emissions standards are not an explicit EV sales requirement like Advanced Clean Cars and Advanced Clean Cars II, complying with the standards will effectively require vehicle manufacturers to sell a significantly greater amount of EVs. The economies of scale encouraged by the proposed rules will support the production of more affordable EVs, easing the transition to zero emission vehicles and enabling greater access to their benefits for disproportionately impacted communities. [EPA-HQ-OAR-2022-0829-0694, p. 2]

Organization: Electrification Coalition (EC)

To mitigate the impacts of climate change and to reduce national and economic security threats, the U.S. needs a solution that will decarbonize our economy, reduce dependence on oil and position the U.S. to maintain our status as a global leader in a new economy that is based on minerals. The shift to electricity as a fuel source, also called transportation electrification, is the solution to this triad of concerns. [EPA-HQ-OAR-2022-0829-0588, pp. 2-3]

For these reasons, the adoption of the strongest possible proposal would significantly limit the greenhouse gas emissions from internal combustion engine vehicles and require them to be cleaner, bringing the market for these internal combustion engine vehicles to the tipping point and thereby accelerating the adoption of EVs. The EPA forecasts that the proposed rule would lead to 67% of new sales of LD/MD vehicles being zero-emission (electric) in 2032, depending on the vehicle type. [EPA-HQ-OAR-2022-0829-0588, pp. 2-3]

Therefore, the EC supports the adoption of the strongest possible proposal, as it will accelerate the adoption of EVs in the LD/MD sector. [EPA-HQ-OAR-2022-0829-0588, pp. 2-3]

Organization: Energy Innovation

Other research from the University of California, Berkeley, Grid Lab, and Energy Innovation, 2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future (April 2021), evaluated the technical and economic feasibility (and associated impacts and benefits) of achieving a future scenario where electric vehicles make up 100 percent of new sales of all vehicles by 2035, combined with a 90 percent clean grid (called the DRIVE Clean Scenario).[iv] Compared with the No New Policy scenario (which was pre-IRA and BIL), the total transportation sector pollutant[v] and carbon dioxide emissions reductions in the DRIVE Clean Scenario would reduce ground transportation sector CO2 emissions by 60 percent in 2035 and by 93 percent in 2050, relative to 2020 levels.9 See Figure 3. The DRIVE Clean Scenario would also avoid approximately 150,000 premature deaths and generate nearly $1.3 trillion in health and environmental savings through 2050.10 Compared to the No New Policy, the DRIVE Clean Scenario would also result in approximately $2.7 trillion in consumer savings through 2050 compared—a household savings of about $1000 per year on average over 30 years.11 [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

9 Amol Phadke et al., "2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future" (Goldman School of Public Policy, University of California, Berkeley, GridLab, April 2021), https://www.2035report.com/transportation/downloads/, iv.

10 Phadke et al., iii.

11 Phadke et al., ii.

iv In the Drive Rapid Innovation in Vehicle Electrification (DRIVE Clean) Scenario, EVs constitute 100 percent of new U.S. LDV sales by 2030 as well as 100 percent of MDV and heavy-duty truck sales by 2035. The grid reaches 90 percent clean electricity by 2035. More details and full study findings are available at https://www.2035report.com/transportation/.

v Namely, fine particulate matter, nitrous oxides, and sulfur oxides.

[See original attachment for line graph "CO2 Emissions in the Transportation Sector"]

Figure 3. Transportation sector CO_2 emissions in the DRIVE Clean and No New Policy scenarios through 2050. Source: Phadke, Amol, et al., 2035 Report 2.0: Plummeting Costs & Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future, University of California Berkeley, Goldman School of Public Policy, Grid Lab, and Energy Innovation, April 2021, available at: https://www.2035report.com/transportation/. [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

Organization: Energy Strategy Coalition

In addition to these financial incentives, state and international regulations are promoting greater levels of vehicle electrification. California's Advanced Clean Cars II rule will require that all new light-duty vehicles sold in the state be zero-emission vehicles by 2035.11 California's Advanced Clean Trucks regulation requires that 55% of medium-duty vehicle sales be zero-emission vehicles by 2035.12 And California's Advanced Clean Fleets regulation separately applies phased-in zero- emission vehicle requirements to 142,000 medium-duty vehicles operating in the state.13 States that have adopted one or more of these California regulations include Colorado, Massachusetts, Maryland, New Jersey, New York, Oregon, Vermont, and Washington, with more expected to follow.14 California's rules align with emerging European standards. The European Union has adopted a regulation that incentivizes zero-emission vehicles and requires 100% carbon dioxide emission reductions for both new cars and vans by 2035.15 The European standards establish intermediate emissions reduction targets for 2030 that are set at 55% for cars and 50% for vans.16 [EPA-HQ-OAR-2022-0829-0610, pp. 2-3]

11 About: Advanced Clean Cars Program, CALIFORNIA AIR RESOURCES BOARD (2023) https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/about.

12 Advanced Clean Trucks Fact Sheet, CAL. AIR RES. BD. (Aug. 20, 2021), https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet.

13 See Advanced Clean Fleets Regulation Summary, CAL. AIR RES. BD. (May 17, 2023), https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-summary.

14 See Marie McNamara, Understanding California's Advanced Clean Cars II Regulation, ROCKY MOUNTAIN INSTITUTE (June 13, 2023), https://rmi.org/understanding-californias- advanced-clean-cars-ii-regulation/ (noting states that have adopted Advanced Clean Cars II); Advanced Clean Trucks Spreads, ATLAS EV HUB (May 15, 2023), https://www.atlasevhub.com/weekly-digest/advanced-clean-trucks-spreads/ (noting states that have adopted Advanced Clean Trucks).

15 Fit for 55': Council adopts regulation on CO2 emissions for new cars and vans, COUNCIL OF THE EU (March 28, 2023), https://www.consilium.europa.eu/en/press/press- releases/2023/03/28/fit-for-55-council-adopts-regulation-on-co2-emissions-for-new-cars-and- vans/.

16 Fit for 55: zero CO2 emissions for new cars and vans in 2035, EUROPEAN PARLIAMENT (Feb. 14, 2023) https://www.europarl.europa.eu/news/en/press-room/20230210IPR74715/fit-for- 55-zero-co2-emissions-for-new-cars-and-vans-in-2035.

Given these incentives and regulatory dynamics, some market projections anticipate EV penetration-rates comparable to the levels contemplated by the LMDV proposal. Prior to enactment of the IRA, Bloomberg New Energy Finance projected that the U.S. was on pace to reach 40 to 50 percent electric vehicle sales by 2030.17 More recent studies incorporating the effects of the IRA project that the share of electric vehicle sales is expected to increase to between 56 and 67 percent by 2032.18 [EPA-HQ-OAR-2022-0829-0610, pp. 2-3]

17 88 Fed. Reg. at 29,189 (citing Bloomberg New Energy Finance (BNEF), ‘‘Electric Vehicle Outlook 2022,’’ Long term outlook economic transition scenario).

18 Id. (citing International Council on Clean Transportation, ‘‘Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the US,’’ ICCT White Paper, January 2023. Available at https:// theicct.org/wp-content/uploads/2023/01/iraimpact-evs-us-jan23.pdf). As EPA notes, this study takes into effect state policies (such as the California Advanced Clean Cars II program and its adoption by Section 177 states). Id.

Organization: Environmental. and Public Health Organizations

EPA has both an opportunity and an obligation to dramatically reduce emissions of greenhouse gases (GHGs) and other pollutants from light-duty vehicles (LDVs) and medium-duty vehicles (MDVs). The Agency’s mandate to protect public health and welfare is made urgent by the ever more dire impacts of climate change, as well as the continuing harms to public health from vehicle criteria pollution. And the opportunity to significantly reduce these impacts is clear. Zero-emission vehicles (ZEVs) are not only feasible and cost-reasonable—they are rapidly penetrating the fleet, with more than 250,000 fully battery electric vehicles sold in the first quarter of 2023 alone, a 44.9% increase over the same period last year.1 In addition, numerous emission control technologies for combustion vehicles are also feasible, cost-reasonable, and already extensively deployed on the fleet, yet still have potential for greater application within the fleet of new combustion vehicles that will continue to be produced. [EPA-HQ-OAR-2022-0829-0759, p. 8]

1 Cox Automotive, Another Record Broken: Q1 Electric Vehicle Sales Surpass 250,000, as EV Market Share in the U.S. Jumps to 7.2% of Total Sales (Apr. 12, 2023), https://www.coxautoinc.com/market-insights/q1-2023-ev-sales/.

The feasibility of greater pollution control, as well as growing consumer demand for ZEVs, is demonstrated by automaker commitments to increase the number of ZEV models and by their own investments and sales targets for these vehicles. Indeed, numerous projections of the light-duty fleet show high levels of ZEVs in the coming years, with several predicting more than 50% ZEVs as a portion of light-duty vehicle sales by 2030 even in the absence of new EPA regulations, which is also consistent with automaker announcements.4 [EPA-HQ-OAR-2022-0829-0759, p. 8]

4 See, e.g., U.S. EPA, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles; Proposed rule, 88 Fed. Reg. 29184, 29189, 29192-93 (May 5, 2023).

EPA’s analysis shows that Alternative 1 is also feasible. It relies on the same existing technology—vehicle electrification—at the core of the Proposed Standards, and the share of battery-electric vehicles (BEVs) in the new vehicle fleet projected by EPA under Alternative 1 is very similar to those under the Proposed Standards, with the share under Alternative 1 never exceeding those under the Proposed Standards by more than 3 percentage points through 2032. Id. at 29333, tbl. 99 (BEV penetration of 60% under the Proposed Standards in 2030, versus 63% under Alternative 1). While we are recommending that EPA finalize a modified version of Alternative 1 (which would yield higher levels of BEV penetration, as detailed in Section V below), EPA’s analysis at least shows that BEV levels associated with Alternative 1 are eminently feasible. [EPA-HQ-OAR-2022-0829-0759, p. 25]

According to the Alliance for Automotive Innovation, in the first quarter of 2023, there were 55 BEV models and 40 Plug-in Hybrid (PHEV) models available in the United States, representing a variety of vehicle types, including sedans, crossovers, SUVs, and light-duty trucks.102 The technology is only improving, and the number of models of plug-in electric vehicles (PEVs, which include both BEVs and PHEVs) available in the U.S. is projected to reach 197 by the end of 2025.103 Higher levels of PEV adoption are already driven by strong consumer demand and greater model choice. And as is discussed throughout these comments, the charging infrastructure, electric grid, and vehicle supply chain will be able to accommodate the projected levels of BEVs—indeed, sending a strong regulatory signal will facilitate that process. Moreover, given the flexibility in EPA's program, as well as the fact that EPA's modeling did not include any PHEVs or improvements to combustion vehicle greenhouse gas emissions (and in fact projects increasing GHG emissions from the combustion vehicle fleet, as discussed in Section VI.A), it is likely that the levels of BEVs would be lower in the real-world than EPA projected as automakers employ such technologies to comply with the final standards. That is because making even minor improvements in combustion vehicle GHG emissions—or even simply holding the average emissions of the combustion vehicle fleet constant—or manufacturing PHEVs will allow automakers to achieve compliance with relatively fewer levels of ZEVs than EPA projected. [EPA-HQ-OAR-2022-0829-0759, pp. 25-26]

102 Alliance for Automotive Innovation, Get Connected: Electric Vehicle Quarterly Report, First Quarter, 2023 (2023), https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023% 20Q1.pdf.

103 Rachel MacIntosh et al., Electric Vehicle Market Update, Environmental Defense Fund and ERM 7 (April 2023), https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf; see also Jeff S. Bartlett & Ben Preston, Automakers are Adding Electric Vehicles to Their Lineups. Here's What's Coming, Consumer Reports (Jan. 6, 2023),https://www.consumerreports.org/hybrids-evs/why-electric-cars-may-soon-flood-the-us-market-a9006292675/.

A. Other analyses predict high levels of ZEVs in the period of the Proposed Standards.

In the Proposal, EPA cites several sources that model the global and United States ZEV outlook over the next few decades. 88 Fed. Reg. at 29189, 29192-3.252 These models vary in their assumptions (including whether IRA funding is considered in the projections), but all point to upward momentum of the PEV market globally and in the United States. EPA appears to have considered a variety of analyses available – looking at both aggressive projections and conservative models – to understand the global transition to PEVs. The most relevant of the analyses that EPA considered are those that account for the impact of the IRA in baseline ZEV penetration levels, and each of those supports baseline ZEV sales greater than the baseline levels projected in EPA's proposed No Action scenario. For example, the 2022 Bloomberg New Energy Finance (BNEF) analysis incorporating the IRA projects baseline ZEV sales of 52% in 2030, compared to EPA's projection of 39% in 2032. Id. at 29189. And the analysis by ICCT and Energy Innovation, which also incorporated the impacts of the IRA, projects 2032 baseline ZEV sales between 17% and 28% higher than EPA's projections. Id. An additional analysis by Boston Consulting Group not cited by EPA projects similar baseline ZEV sales, anticipating 53% U.S. market share for light-duty ZEVs in 2030.253 The only analysis EPA considered that projected a baseline close to EPA's projection was IHS Markit—predicting nearly 40% ZEV sales in the U.S. by 2030—but this analysis was pre-IRA and therefore should be considered an underestimate. See 88 Fed. Reg. at 29189. These analyses justify and support strong EPA emission standards, and auto executives have signaled that their sales expectations align with baseline ZEV sales at least as high as—and most likely higher than—EPA's projections, even prior to the passage of the IRA.254 As discussed throughout these comments, we request that EPA adopt at least Alternative 1 based on strong projections of the growth of the PEV market, as well as consider additional new data that became available since the Proposal. [EPA-HQ-OAR-2022-0829-0759, pp. 100-101]

252 IHS Markit (2021) predicted nearly 40% US PEV share by 2030 (pre-IRA); BNEF found the U.S. on pace to reach 40-50% PEVs by 2030, increasing to 52% when adjusted for IRA; ICCT/Energy Innovation found BEV share to be 56% to 67% by 2032 (including IRA); IEA found OEM announcements equal about 50% ZEVs in 2030.

253 Nathan Niese et al., Electric Cars Are Finding Their Next Gear, BCG, Exhibit 1 (June 9, 2022), https://www.bcg.com/publications/2022/electric-cars-finding-next-gear. BCG's projections for 2030 include 47% market share for BEVs and 6% market share for PHEVs.

254 KPMG, 22nd Annual Global Automotive Executive Survey 2021 8 (Nov. 2021), https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2021/11/global-automotive-executive-summary-2021.pdf (finding that, even before the passage of the IRA, auto executives on average expected 52% of new vehicle sales to be all-electric by 2030). See also, Michael Wayland, Auto Executives Say More Than Half of U.S. Car Sales Will Be EVs By 2030, KPMG Survey Shows, CNBC (Nov. 30, 2021), https://www.cnbc.com/2021/11/30/auto-executives-say-more-than-half-of-us-car-sales-will-be-evs-by-2030-kpmg-s urvey-shows.html.

For example, in the Proposal, EPA cites 2022 BNEF data that states that global growth of EVs is projected to reach 21 million in 2025. However, the latest BNEF EV Outlook updates that modeling, and estimates that EV sales will reach approximately 22.4 million by 2025, growing to 26.6 million sales by 2026 and reaching 44% of global sales by 2030. In the United States, EVs are expected to reach 28% of sales by 2026, which equates to over 4 million new ZEV sales, a large growth from the 980,000 new ZEVs sold in 2022.255 [EPA-HQ-OAR-2022-0829-0759, p. 101]

255 BloombergNEF, Electric Vehicle Outlook 2023: Executive Summary (2023).

Figure XV.A-1: Global near-term passenger EV sales and share of new passenger vehicle sales by market

[See original attachment for Figure XV.A-1]. [EPA-HQ-OAR-2022-0829-0759, p. 101]

B. State standards will lead to greater ZEV deployment.

In August 2022, CARB unanimously approved the ACC II standards, which, starting in model year 2026, require manufacturers to sell an increasing number of new ZEVs256 annually, culminating in 100% new ZEV sales by model year 2035. CARB submitted a waiver request for the ACC II standards in late May 2023. [EPA-HQ-OAR-2022-0829-0759, pp. 101-102]

256 Defined as Battery Electric, Plug-in Hybrid, and Fuel Cell Electric Vehicles.

While the ACC II standards cannot be enforced until the waiver is granted by EPA, six additional states257 have adopted the standards in anticipation of waiver approval. These seven states (including California) approximately 25% of the United States vehicle market.258 Further, at least five other states and the District of Columbia have announced their intention to adopt ACC II.259 Should those jurisdictions also adopt ACC II, nearly one-third of the United States vehicle market would be on a trajectory to have 100% new zero-emission vehicle sales by 2035.260 [EPA-HQ-OAR-2022-0829-0759, p. 102]

257 The states that have adopted ACCII as of the date of this comment letter are Oregon, Washington, Virginia, Massachusetts, New York, and Vermont.

258 CARB, States that Have Adopted California's Vehicle Standards under Section 177 of the Federal Clean Air Act, May 13, 2022, https://ww2.arb.ca.gov/sites/default/files/2022-05/%C2%A7177_states_05132022_NADA_sales_r2_ac.pdf

259 These states are: Rhode Island (https://dem.ri.gov/environmental-protection-bureau/air-resources/advanced-clean-cars-ii-advanced-clean-trucks), Delaware (https://news.delaware.gov/2022/03/03/delaware-to-adopt-zero-emission-vehicle-regulation/), Maryland (https://governor.maryland.gov/news/press/pages/Governor-Moore-Announces-Maryland-Adoption-of-the-Advance d-Clean-Cars-II-Rule-to-Combat-the-Effects-of-Climate-Change.aspx), New Jersey (https://nj.gov/governor/news/news/562023/approved/20230215b.shtml), and Colorado (https://cdphe.colorado.gov/coloradocleancars). Earlier this year, Washington D.C completed the public comment period on its proposal to adopt the ACC II regulations (https://doee.dc.gov/release/notice-comment-period-proposed-rulemaking-adoption-california-vehicle-emission-standards)

260 CARB, States that Have Adopted California's Vehicle Standards under Section 177 of the Federal Clean Air Act.

EPA included ACC II in a sensitivity analysis but did not include it in the central analysis, as CARB had not yet submitted the waiver request for ACC II as of the date of the Proposal. However, now that CARB has submitted the waiver request, we ask that ACC II be included in the central analysis if the waiver is granted before the Proposal is finalized. And while ACC II clearly supports the feasibility of stronger federal standards, including through changes to business-as-usual (BAU) PEV penetration, it is also clear that stronger federal standards are feasible and justified even without it. As a result, we encourage EPA to model a scenario in the final rule that does not include ACC II, which will demonstrate that the record supports the final standards even in the absence of ACC II. [EPA-HQ-OAR-2022-0829-0759, p. 102]

The addition of the ACC II sensitivity makes a significant difference in the No Action scenario, as the BAU for PEVs increases from 39% to 54% and the incremental average cost of the standards decreases from $1,164 to $164. It appears that this sensitivity does not include all of the states that have adopted ACC II or intend to adopt ACC II—specifically Virginia—implying that the BAU will increase, and the average incremental costs of the standards will decrease even further when the full range of states are included. The inclusion of the full portfolio of states that have adopted ACC II by the time of the final regulation in the central analysis will provide a more accurate picture of the state of the U.S. PEV market as well as presumed costs of the regulation. [EPA-HQ-OAR-2022-0829-0759, pp. 102-103]

The inclusion of ACC II in the central analysis is also aligned with assumptions EPA has included throughout the Proposal with respect to ACC II adoption, such as the assumption that "anticipated longer all-electric range and greater all-electric performance, partially driven by CARB's ACC II program… should result in performance more closely matching [the] proposed curve," 88 Fed. Reg. at 29254, and the alignment of the NMOG + NOx provisions with ACC II 88 Fed. Reg. at 29275. [EPA-HQ-OAR-2022-0829-0759, p. 103]

C. Private investments and commitments will lead to greater ZEV deployment.

EPA should also consider private investments and commitments that have been announced or implemented throughout the United States thus far that will further facilitate rapid growth of ZEVs. [EPA-HQ-OAR-2022-0829-0759, p. 103]

EPA states in the proposed rule that automakers, based on their public commitments, will achieve approximately 50% ZEV sales by 2030. 88 Fed. Reg. at 29296. EPA also considered additional automaker announcements to accelerate the EV market in the United States, see, e.g., 88 Fed. Reg. at 29193-94. EPA should update these estimates in the final rule, including by recognizing the $210 billion of investments in the United States to accelerate the transition to ZEVs and build up a robust, domestic supply chain – a higher investment than any other country.261 These investments will help increase the availability of ZEVs in the United States and further accelerate the transition to ZEVs that is already well underway in the market. [EPA-HQ-OAR-2022-0829-0759, p. 103]

261 Noah Gabriel, $210 Billion of Annouced Investments in Electric Vehicle Manufacturing Heading for the U.S. (January 12, 2023), https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-he aded-for-the-u-s/.

Organization: Environmental Defense Fund (EDF) (1of 2)

ii. Market developments further support the feasibility and lead time reflected in EPA's proposal.

Market developments, including manufacturer plans to introduce new BEVs, concrete investments to produce these and other vehicles at volume, and future commitments for significant BEV sales are all consistent with and reinforce the conclusions of the above-described analyses and likewise support the feasibility of protective EPA standards. In fact, these market developments in many cases show manufacturers' plans to produce BEVs at even greater volumes than EPA has assumed. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Increasing BEV Availability and Sales Volumes. An updated report by ERM, based on announcements by major auto manufacturers, finds the number of electrified models available in the U.S. is projected to dramatically increase, reaching 197 by the end of 2025, with over 58 new models slated to launch in model years 2022-2025 (Figure 5).58 As Figure 6 shows, these vehicles will be available across all vehicle types and classes, and, as a result of IRA tax incentives, there will be five light-duty EV models available with a net cost of under $30,000 manufacturer's suggested retail price (MSRP) by the end of 2023 and 15 models available for under $40,000.59 In the United States, more than 800,000 light-duty EVs were purchased in 2022, a 65 percent increase from 2021. The first quarter of 2023 saw EV sales reach over 258,000 units, almost a 45 percent year over year increase.60 [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

58 Electric Vehicle Market Update: Manufacturer and Commercial Fleet Electrification Commitments Supporting Electric Mobility in the United States. April 2023. ERM for EDF. https://www.edf.org/sites/default/files/2023-05/Electric%20Vehicle%20Market%20Update%20April%202023.pdf (Attachment S)

59 Id.

60 Id.

[See original attachment for Figure 5: Total Light-duty PHEV and BEV U.S. Models Available by Year] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: ERM, EV Market Update (April 2023)

[See original attachment for Figure 6: Total Light-duty PHEV and BEV U.S. Models Available by Body Type] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: ERM, EV Market Update (April 2023)

Near-Term Investments Dramatically Increase Production Capacity. In addition to introducing new electric vehicles, manufacturers are investing billions of dollars to produce them at volume. As noted above, a report by WSP for EDF found over $120 billion in private EV supply ecosystem investments and 143,000 new jobs announced in the last eight years. That analysis also evaluated the production capacity of announced facilities with concrete investments. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

As shown in the Figures below, by 2026, U.S. manufacturing facilities will be capable of producing an estimated 4.3 million new electric passenger vehicles each year, which represents about 33 percent of all new vehicles sold in 2022. And by 2026, battery manufacturing facilities will be capable of producing more than 1,000 gigawatt hours (GWh) in battery capacity, sufficient to supply up to 11.2 million new passenger vehicles each year, which represents an estimated 84 percent of new vehicle sold in 2022. Both of these levels far exceed EPA's projections for BEV deployment. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

[See original attachment for Figure 7: Total Announced EV Manufacturing Capacity (2020-2026)] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: WSP, U.S. Electric Vehicle Manufacturing Investments and Jobs

[See original attachment for Figure 8: Total Announced Battery Manufacturing Capacity (2017-2027)] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: WSP, U.S. Electric Vehicle Manufacturing Investments and Jobs

Manufacturer Commitments. In addition to near-term model availability and supporting production investments, vehicle manufacturers have articulated medium- to long-term commitments to even more substantially grow ZEV sales with many working toward a full ZEV fleet within the next decade. For instance, according to the recent market update from ERM, Ford expects 50 percent of its global vehicle volume, and 100 percent of its European volume, to be fully electric by 2030 with a goal of producing 2 million EVs annually by 2026; GM plans to offer a lineup of electric-only models by 2035; Honda has a goal of achieving carbon neutrality by 2050 and 100 percent ZEV sales in North America by 2040—with interim sales goals of 40 percent by 2030 and 80 percent by 2035; Volvo has committed to becoming a fully electric car company by 2030—with an interim goal of reaching 50 percent of global EV car sales and having one million EVs on the road by 2025; and Stellantis aims for 100 percent of sales in Europe and 50 percent of sales in the U.S. to be BEVs by the end of the decade,61 As EPA notes in the preamble to this proposal, virtually every major automaker is already planning on widespread electrification across global fleets. Figure 9, below, is an updated synthesis of these manufacturer commitments. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

61 Id.

[See original attachment for Figure 9: Global Sales Goals by Manufacturers] [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

Source: ERM, EV Market Update (April 2023)

Market indicators are consistent with and strongly support protective standards. Manufacturers have (and are planning to continue to) offer new vehicles. They have invested billions of dollars to produce these vehicles at near term volumes that far exceed EPA's projections. And almost every company has articulated medium- to longer term ZEV commitments that are broadly consistent with levels in EPA's proposal. [EPA-HQ-OAR-2022-0829-0786, pp. 23-26]

iv. EDF has quantified EV sales related to the impacts of state policy, manufacturer investments and commitments, and other analyses.

As described above, many independent indicators point toward significant ZEV adoption over the next decade. As Figure 12 below shows, EDF has quantified and plotted the impacts of state action, market developments (including manufacturer investments and commitments and lithium mining supply), as well as projections from a number of different independent organizations. The analysis shows many different indicators plotted together and supports EPA's No Action (baseline) case as well as the feasibility of the proposal. Under the No Action scenario, EPA's modeling projects BEV adoption at 27% in 2027 growing to 40% by 2030. [EPA-HQ-OAR-2022-0829-0786, pp. 29-31]

A description of the methodology and sources for each of the EV sales assessments is included below and importantly, each assessment addresses the independent impacts of each metric on EV deployment and does not evaluate the combined impacts of all taken together. [EPA-HQ-OAR-2022-0829-0786, pp. 29-31]

[See original attachment for Figure 12: Indicators of Significant ZEV Adoption through 2032] [EPA-HQ-OAR-2022-0829-0786, pp. 29-31]

Source: EDF State Action

As discussed above, many states have taken action to promote ZEV adoption. Seven states71 have already adopted ACC II with five additional states72 along with the District of Columbia in the process of adopting. Additionally, many states have adopted the Advanced Clean Trucks (ACT) regulation which sets ZEV sales mandates for medium- and heavy-duty vehicles (MHDVs) including Class 2b and 3 starting with MY2024. The rule requires 5% of Class 2b and 3 sales be ZEV in MY2024 growing to 55% in 2035. Along with California, nine additional states have since adopted ACT.73 To understand the impact of state action on baseline ZEV adoption, we assumed that the 12 states and the District of Columbia adopt ACC II and the 10 states adopted ACT. [EPA-HQ-OAR-2022-0829-0786, pp. 29-31]

71 California, Oregon, Washington, Massachusetts, New York, Vermont, and Virginia

72 Maryland, Delaware, Colorado, Rhode Island, and New Jersey

73 Oregon, Washington, Massachusetts, Vermont, New York, New Jersey, and Colorado have all adopted ACT. Maryland and Colorado have both passed legislation requiring the rulemaking to take place.

To conservatively model sales in non-ACC II and non-ACT states, we used EIA's Annual Energy Outlook (AEO) 2023 ZEV sales projection. AEO2023 does not include ACC II adoption in their modeling and only minimally includes the impacts of the Inflation Reduction Act. The model uses the Congressional Budget Office's estimate for the Clean Vehicle Tax Credit (30D) which assumes roughly only 1 million ZEVs will receive a tax credit over the lifetime of the legislation. The model also does not include the impact of the additional relevant tax credits, such as the $45/kWh battery production tax credit. Given these factors, AEO2023's estimate of ZEV adoption remains a highly conservative estimate of ZEV adoption within the U.S. and might be considered the lowest bound of what is reasonable to expect in non-ACC II and non-ACT states. Nevertheless, an approach along these lines helps to isolate the impacts of ACC II in supporting nation-wide baseline levels of ZEV sales. [EPA-HQ-OAR-2022-0829-0786, pp. 29-31]

To calculate the Class 1/2a non-ACC II state ZEV sales values, we used AEO2023's LDV sales by technology type combining cars and light trucks.74 In 2025, this projects 9% of LDV sales would be ZEVs growing to 16% in 2032. For Class 2b/3, an average of AEO2023's ZEV sales projection for light commercial vehicles (Class 2b) and light medium vehicles (Class 3) was used.75,76 In 2025, we assume non-ACT states have 0.24% ZEV sales rising to 0.30% ZEV sales in 2032. [EPA-HQ-OAR-2022-0829-0786, pp. 29-31]

74 U.S. Energy Information Administration, Annual Energy Outlook 2023, Table 38. Washington, D.C. Accessed April 4, 2023. https://www.eia.gov/outlooks/aeo/supplement/excel/suptab_38.xlsx

75 Annual Energy Outlook 2023, Table 44 https://www.eia.gov/outlooks/aeo/supplement/excel/suptab_44.xlsx.

76 Annual Energy Outlook 2023, Table 49 https://www.eia.gov/outlooks/aeo/supplement/excel/suptab_49.xlsx.

ZEV sales as a result of state action along with low baseline sales in other states results in 30% ZEV sales in 2030 growing to 42% in 2035. The values are plotted above in Figure 12 with the label "ACC II/ACT + Baseline Sales." Under this scenario, Section 177 states account for 61% of the LMD ZEV sales nationwide in 2027 growing to 70% by 2035 even though they only account for 30% of vehicle sales.77 This demonstrates that even with fairly low and unrealistic ZEV sales in non-Section 177 states, a robust nationwide adoption of ZEVs will result from current state action alone. [EPA-HQ-OAR-2022-0829-0786, pp. 29-31]

77 Vehicle sales were based on MOVES3

Vehicle Manufacturer EV Commitments

Many vehicle manufacturers have made commitments to transition a significant portion of their sales to ZEVs. While many of the commitments are for a share of manufacturers' global sales, several OEMs have made U.S. specific commitments or have committed to transition their entire fleet which would mean all of their U.S. sales would be ZEV as well. Even for global commitments, manufacturers with significant U.S. sales volumes will nonetheless need to sell meaningful ZEVs to meet their commitments. Because some sales might exceed these global commitments while others fall short, we used global commitments as a reasonable proxy for U.S. sales share. Table 4 below shows OEM commitments and includes a total using 2022 manufacturer sales shares to calculate a weighted ZEV commitment. [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

[See original attachment for Table 4: Manufacturer ZEV Commitments as Share of Total Sales] [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

78 Jerry Reynolds. Full-Year 2022 National Auto Sales by Brand. 2023. CarPro, https://www.carpro.com/blog/full- year-2022-national-auto-sales-by-brand

79 Paul Eisenstein, Mercedez-Benz Goes All-Electric by 2030, Forbes (Oct. 4, 2021), https://www.forbes.com/wheels/news/mercedes-benz-all-electric-2030/.

80 Luke Wilkinson, Volkswagen 'New Auto' Strategy Predicts Near 100 percent EV Sales by 2040, (July 15, 2021), https://www.carscoops.com/2023/03/bmw-expects-to-smash-50-ev-sales-goal-before-own-2030-deadline/.

81 Mariella Moon, Faraday Future's FF 91 Electric Vehicles Will Cost as Much as $309,000, Engadget (June 1, 2023), https://www.engadget.com/faraday-futures-ff-91-electric-vehicles-will-cost-as-much-as-309000- 053144006.html.

82 Luke Wilkinson, Volkswagen 'New Auto' Strategy Predicts Near 100 percent EV Sales by 2040, (July 15, 2021), https://www.carscoops.com/2023/03/bmw-expects-to-smash-50-ev-sales-goal-before-own-2030-deadline/.

83 David Shepardson, GM Backs Setting Tough U.S Emissions Targets for 2030 (Sep. 20, 2022), https://www.reuters.com/business/autos-transportation/gm-backs-setting-tough-emissions-targets-2030-2022-09-20/.

84 PR Newswire, Honda Targets 100% EV Sales in North America by 2040, Makes New Commitments to Advances in Environmental and Safety Technology (Apr. 23, 2021), https://www.prnewswire.com/news-releases/honda- targets-100-ev-sales-in-north-america-by-2040-makes-new-commitments-to-advances-in-environmental-and-safety- technology-301275727.html.

85 ET Auto, Hyundai to Raise Electric Vehicles Ration to 80% by 2040 (Sep. 7, 2021), https://auto.economictimes.indiatimes.com/news/hyundai-to-raise-electric-vehicles-ratio-to-80-by-2040/85998266.

86 Inside EVs, Hyundai Announces Accelerated Electrification Strategy, https://insideevs.com/news/571125/hyundai-accelerated-electrification-strategy/.

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*Due to rounding, the sum of the market share may not equal the total

All major OEMs have set ZEV targets of at least 30% sales starting in 2030. Considering both U.S.-specific and global commitments would result in 47% of new vehicles sold in the U.S. in 2030 being ZEVs. Even unrealistically assuming only the US-specific commitments and the 100% commitments apply, at least 29% of LDV sales in 2030 would be ZEVs growing to 44% in 2035 and 48% in 2040. The 2030 value is plotted above in Figure 12. We also note that the 2035 and 2040 estimates using both approaches are perhaps significantly understated given that some manufacturers with commitments in 2030 have not made 2035 or later commitments but will nonetheless likely increase ZEV sales during that timeframe. [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

Organization: Governing for Impact and Evergreen Action (GFI)

According to EPA estimates, if the agency declines to finalize any new tailpipe emissions regulations at all — under what the agency calls its central "No Action" baseline — EV sales will nonetheless comprise approximately 39 percent of new car sales by MY 2032.59 As the EPA itself acknowledges, this may prove a conservative estimate of IRA and other non-rule impacts on EV adoption.60 For example, a synthesis of automakers' public EV commitments to date compiled by the International Energy Agency, which the EPA declined to incorporate into its projections, suggested that EVs would comprise 50 percent of new car sales by 2030 (again, even in the Proposed Rule's absence).61 Nor, in reaching its central No Action baseline, did the EPA take into account certain new state level policies, like California's, which may drive EV penetration even further.62 [EPA-HQ-OAR-2022-0829-0621, p. 8]

59 Proposed Rule at 29329, "Fleet BEV Penetration Rates, by Body Style, Under the No Action Case," Table 81. As discussed below, the EPA also conducted alternate No Action sensitivity cases.

60 Proposed Rule at 29296.

61 See Proposed Rule at 29296 ("[F]or purposes of this proposal we have not integrated manufacturer announcements directly into our modeling of the No Action baseline") (citing International Energy Agency, "Global EV Outlook 2022," p. 107, May 2022, https://iea.blob.core.windows.net/assets/e0d2081d-487d-4818-8c59-69b638969f9e/ GlobalElectricVehicleOutlook2022.pdf).

62 Proposed Rule at 29296 ("[O]ur analysis does not include the effect of state-level policies whereas projections from other sources may include those policies. We did not include these policies because many are still not in effect; however, we do anticipate that in the next decade, state level policies may play an important role in driving BEV penetration.").

Moreover, as other advocates have noted elsewhere, adoption of innovative technologies does not follow a linear trajectory, but rather "an S-shaped curve, with the adoption rate increasing more rapidly once a critical mass is reached—as we are now seeing with electric vehicles."63 As a result, now that the United States has crossed the EV "tipping point,"64 we would expect steep growth over the next several years regardless of the EPA's regulatory path. [EPA-HQ-OAR-2022-0829-0621, p. 8]

63 See Proof Brief of the Institute for Policy Integrity, Texas v. E.P.A., D.C. Cir. No. 22-1031 8 (Mar. 3, 2023), https://policyintegrity.org/documents/Amicus_Brief_of_the_Institute_for_Policy_Integrity_4.pdf (citing Everett M. Rogers, Diffusion of Innovations 344 (5th ed. 2003) and Tom Randall, US Crosses the Electric-Car Tipping Point for Mass Adoption, Bloomberg (July 9, 2022), https://www.bloomberg.com/news/articles/2022-07-09/us-electric-carsales- reach-key-milestone (discussing the S-shaped technology adoption curve and noting that the United States has crossed the 5% market share "tipping point" that triggers "rapidly accelerating demand")).

64 See Randall.

Organization: Institute for Policy Integrity at New York University School of Law

G. EPA Should Further Explain Its Choices Around Scrappage, Pass-Through, and Vehicle Sales

EPA should provide additional explanation around certain modeling choices—namely scrappage, pass-through, and sales. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

"Scrappage" refers to the rate of which drivers discard old automobiles. OMEGA treats scrappage as exogenous, meaning that the rate of scrappage does not depend on the Proposed Rule's other effects.144 This choice is reasonable: While economic theory and evidence suggest that scrappage depends in part on the Proposed Rule's other effects (most notably the rate at which the Proposed Rule affects new vehicle prices and sales),145 this effect is very difficult to model due to data limitations, and past attempts by EPA and NHTSA to model scrappage have fared poorly.146 Moreover, the increasing movement to electric vehicles provides even more reason to treat scrappage as exogenous, as virtually no analysis on the scrappage of BEVs exists. However, the Proposed Rule provides no discussion of scrappage or EPA's choice not to model it. Particularly since EPA endogenously modeled scrappage in the 2020 Rule, the agency may wish to explain its decision not to follow this approach in the Proposed Rule and a discussion of how it may affect the results. Moreover, to the extent feasible, EPA should attempt to model scrappage in future standards. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

144 See RIA at 9-3 to 9-5.

145 See Howard K. Gruenspecht, Differentiated Regulation: A Theory with Applications to Automobile Emissions Control (1982); Howard K. Gruenspecht, Differentiated Regulation: The Case of Auto Emissions Standards, 72 Am. Econ. Rev. 328 (1982); ENV'T PROT. AGENCY, THE EFFECTS OF NEW-VEHICLE PRICE CHANGES ON NEW- AND USED- VEHICLE MARKETS AND SCRAPPAGE 3-6 to 3-11 & 5-7 to 5-7 to 5-12 (2021).

146 Inst. for Pol'y Integrity, Comments on the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks 66–71 (Oct. 26, 2018), https://policyintegrity.org/documents/Emissions_Standards_EPA_NHTSA_Comments_Oct2018.pdf.

"Pass-through" refers to the degree to which manufacturers pass on cost increases to consumers. EPA in prior tailpipe rules has assumed 100% pass-through to consumers in the vehicle market—meaning that every dollar of additional cost to the automaker is ultimately borne by the purchaser.147 EPA appears to repeat this assumption in the Proposed Rule. That approach is also reasonable given consistency with the agency's prior approach and the very limited economic evidence on vehicle pass-through. Nonetheless, that limited available evidence (from a 2010 paper) indicates that pass-through in the vehicle market may be below 100%.148 Accordingly, EPA should discuss and provide a rationale for its approach. EPA should also support further research in this area, given its potential importance. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

147 E.g. 2020 Rule, 85 Fed. Reg. at 24,594–95.

148 Using regression analysis, Hellerstein and Villas-Boas (2010) find only partial pass through for the vehicle industry with an average pass-through rate of 38%. Rebecca Hellerstein, & Sophia B. Villas-Boas, Outsourcing and Pass-Through, 81 J. INT'L ECON. 170, 175 (2010).

Finally, with regard to sales, EPA should clarify how OMEGA treats how producers expect consumers to value fuel costs. Within the model, consumers and producers shape their preferred new vehicle mix independently,149 each informed by their unique perspectives on fuel costs: Consumers weigh their expected fuel expenses, whereas producers consider how they think consumers will weigh their expected fuel expenses. In the RIA, EPA explains that consumers are assumed to factor in fuel costs of 12,000 miles annually for 2.5 years.150 However, the OMEGA input files suggest that producers expect consumers to consider fuel costs up to 15,000 miles annually.151 Although this difference is not inherently problematic, especially if EPA posits imperfect information between consumers and producers,152 EPA should explain this difference. This might also be a minor programming error, such that EPA intended for producers to accurately peg consumer valuation of fuel costs at 12,000 miles annually. [EPA-HQ-OAR-2022-0829-0601, pp. 22-23]

149 The model then searches for solutions for a set of vehicle attributes, purchase prices, and quantities such that the sales and production shares match.

150 RIA at 4-2.

151 This information is derived from the 'sales_share_params_ice_bev_pu_b0p4_k1p0_x02031-cuv_b2p0_k1p0_x02029_nu8p0-sdn_b0p4_k1p0_x02020_nu1p0_20230228.csv' file for consumers, and the 'producer_generalized_cost-body_style_20220613.csv' file for producers, both located within the '2023-03-14-22- 42-30-ld-central-run-to2055\all_inputs' folder, downloadable from the 'Light-duty central case (zip)' section on EPA's website: https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions-greenhouse-gases

152 EPA, OMEGA Documentation Sec. 4.3.2 (last revised May 8, 2023), https://omega2.readthedocs.io/en/2.1.0/index.html#gl-label-producer-generalized-cost ("The producer, as an independent decision-making agent, will not have perfect information about the internal consumer decision process. Within the Producer Module, OMEGA allows the user to define the consumer decisions from the producer's perspective, which may be different from (or the same as) the representation within the Consumer Module.").

Organization: International Council on Clean Transportation (ICCT)

The United States is not alone in its commitment to transition to cleaner cars and trucks. EPA's proposal is in line with regulations in leading countries and automaker commitments. If implemented, the proposed rule would put the U.S. on track to catch up with Europe and China, which have led in the global transition to zero-emissions through 2022. Canada, the European

Union, the United Kingdom, and seven U.S. states have committed to entirely phase out the sale or registration of new internal combustion engine vehicles by 2035. EPA's proposal also aligns with announcements from auto manufacturers; Ford, General Motors, Mercedes-Benz, Audi, and others have committed to selling 100% zero-emission vehicles globally or in leading markets by 2035. With the rapid development of ZEV technologies, automakers are constantly updating their targets. In fact, ICCT reviewed EPA's compilation of automaker electric vehicle sales targets and announcements in the proposal and identified several additional announcements that had been made through 2022 beyond those in EPA's assessment, including announcements of expanded and accelerated electric vehicle targets by General Motors, Ford, Stellantis, Mercedes-Benz, Toyota, and Hyundai-Kia. These developments further reflect industry commitment to and desirability of ZEV technologies. [EPA-HQ-OAR-2022-0829-0569, pp. 3-4]

The Inflation Reduction Act (IRA) of 2022 will accelerate electric vehicle sales in the United States across all vehicle types. The $370 billion allocated to climate and clean energy investments dramatically expands tax credits and incentives to deploy more clean vehicles, including commercial vehicles, while supporting a domestic EV supply chain and charging infrastructure buildout. IRA transportation sector provisions will accelerate the shift to zero-emission vehicles by combining consumer and manufacturing policies. Consumer tax credits for new and used EVs and tax credits for commercial EVs, along with individual and commercial charging infrastructure tax credits, will increase sales. Domestic supply chain incentives and investments will boost EV manufacturing and battery production. Critical mineral mining and refining incentives will bolster industrial development. [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

An ICCT and Energy Innovation study assesses the future impact of the IRA on electrification rates for LDV sales in the United States through 2035.4 We analyze the value of the personal and commercial EV tax credits, factoring in the various supply chain, income, and price caps on new EVs, and combine this with new estimates of future light-duty EV cost declines. We find that, on average over the period 2023–2032, the IRA tax credits will reduce EV purchase costs by $3,400 to $9,050 and accelerate the timing for price parity with combustion vehicles. Using methodologies from the Energy Policy Simulator, we project how these changing costs and incentives over time will affect the LDV markets in the United States. [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

4 Slowik, P., Searle, S., Basma, H., Miller, J. Zhou, Y., Rodriguez, F., Buysse, C., Kelly, S., Minjares, R., Pierce, L. (ICCT) Orvis, R., and Baldwin, S. (Energy Innovation). (2023). Analyzing the impact of the inflation reduction act on electric vehicle uptake in the United States. https://theicct.org/publication/ira-impact-evs-us-jan23/

Figure 1 summarizes the results from the ICCT and Energy Innovation IRA study. It shows the findings of estimated new electric vehicle sales shares for different IRA scenarios depending on how certain provisions are implemented and how the value of incentives is passed on to consumers. The figure shows our modeled projection of how the IRA will accelerate electrification. By providing thousands of dollars in financial incentives, the IRA unlocks widespread consumer benefits. We find rapid projected EV uptake when considering both expected manufacturing cost reductions and the IRA incentives, as well as state policies. By 2030, we find a range of a 48%–61% projected EV sales share, increasing to 56%–67% by 2032, the final year of the IRA tax credits. [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

SEE ORIGINAL COMMENT for Figure 1. Baseline, Low, Moderate, and High projections of EV sales share for light-duty vehicles, considering ACC II adoption in only California versus increased states [EPA-HQ-OAR-2022-0829-0569, pp. 6-7]

5 ICCT and Energy Innovation. (2023). Analyzing the impact of the inflation reduction act on electric vehicle uptake in the United States. https://theicct.org/publication/ira-impact-evs-us-jan23/

Electric vehicle uptake

Figure 7 shows the historical EV sales shares from 2015 through 2022 (solid lines) and estimated future sales shares based on regulatory targets (dotted lines) for light-duty vehicles in the United States compared with other major markets. As shown, about 7% of new light-duty vehicle sales in the US. Were plug-in electric in 2022, compared to 8% in Canada, 20% in California, 23% in the United Kingdom and Europe, and 26% in China. Several jurisdictions have set a 100% ZEV target or a zero gram CO2/mile target by 23035, including California, Canada, European Union, and the United Kingdom (UK).45 The figure shows how the estimated 67% EV sales share in 2032, the last year of the proposed EPA standard, somewhat lags compared to the estimated uptake from regulations in California, Canada, Europe, and the UK. Not shown is the 46% EV sales share EPA projects for medium-duty vehicles in 2032. [EPA-HQ-OAR-2022-0829-0569, pp. 18-19]

45 European Union and UK's proposed standards do not include PHEV in ZEV definition

SEE ORIGINAL COMMENT FOR Figure 7. Historical electric vehicle sales shares (solid lines) and regulatory targets or projected ZEV shares consistent with regulatory targets (dotted lines) for light-duty vehicles in major markets [EPA-HQ-OAR-2022-0829-0569, pp. 18-19]

As discussed above and shown in Figure 7, at the state-level, California's Advanced Clean Cars II regulation will lead to 68% electric vehicle sales by 2030 and 100% by 2035. At least a dozen additional states are considering adopting California's new rules. As of May 2023, California, Massachusetts, New York, Oregon, Vermont, Virginia, and Washington have adopted ACC II. It is likely that many other states will continue to follow California's leadership and adopt the new ACC II Program to benefit from the anticipated emissions reduction and health benefits of the program.46 Many additional states currently follow the Advanced Clean Cars regulations through model year 2026; as of May 13th, 2022, 17 U.S. states have adopted all or part of California's low-emission and zero-emission vehicle regulations, and about 37% of national new light-duty vehicle sales meet California's emission standards.47 [EPA-HQ-OAR-2022-0829-0569, pp. 18-19]

46 Houk, J., Huang, J., and Sussman. (2023). Benefits of adopting California's Advanced Clean Cars II standards in sixteen U.S. states. Sonoma Technology Inc. Retrieved from https://theicct.org/publication/benefits-of-state-level- adoption-of-california-acc-ii-regulations/

47 California Air Resources Board. (May 13, 2022). States that have adopted California's vehicle standards under Section 177 of the Federal Clean Air Act. https://ww2.arb.ca.gov/sites/default/files/2022-05/%C2%A7177_states_05132022_NADA_sales_r2_ac.pdf

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

A. ICE Sales Fund EV Transition

The proposed standards must reflect what is feasible for manufacturers to produce and sell to consumers and promote domestic production of cleaner technologies. The continued production of ICE vehicles, particularly light trucks (pickup trucks, sport utility vehicles, vans, and minivans), must be supported by proposed standards. The EV industry is in its infancy. On their own, EVs are not yet profitable.18 Some automakers will lose billions producing EVs and don't expect to reach profitability any time soon.19 Therefore, federal programs and regulation must work in concert to incentivize the production of EVs. While the transition is progressing, the auto industry relies on the continued production of ICE vehicles to reach profitability and fund required investments in electrification. Domestic automakers specifically rely on the sale of light trucks to fund investment into the EV transition. [EPA-HQ-OAR-2022-0829-0614, p. 8]

18 Yeon Baik, Russell Hensley, et. al., "Making electric vehicles profitable", (McKinsey and Company, Mar. 8, 2019), https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/making-electric-vehicles-profitable.

19 Chris Bibey, "Electric Vehicles Are Draining Billions From Profitable ICE Legacy Automakers With Ford Projecting $3 Billion in Losses" (Yahoo Finance, Mar. 30, 2023), https://finance.yahoo.com/news/electric-vehicles-draining-billions- profitable-151050558.html.

Organization: John Graham

The complete ignoring of mild hybrid improvements is reflected in the projected penetration of virtually zero mild hybrids in 2032.18 This is in stark opposition to what is happening in Europe, where mild hybrid market share has risen rapidly from just 0.2% in 2017 and 0.6% in 2018, to 2.2% in 2019, 7.8% in 2020, and 14.0% in 2021, with some manufacturers being far ahead of the average.19 Fiat/FCA projected in 2018 that 40% of its vehicles sold in Europe by 2022 would be MHEVs, which seemed an ambitious projection considering that Fiat sold no mild hybrid vehicles in 2019.20 However, Fiat exceeded this market share in just two years, with 42.4% of its newly registered vehicles being MHEVs by 2021. Other brands also showed rapid MHEV market share increases within a short time. These trends in Europe illustrate that mild hybrids are a cost-effective solution and that mild hybrid systems, at least P0 systems, can be implemented rapidly. [EPA-HQ-OAR-2022-0829-0585, p. 16]

18 Tables 13-65 through 13-94 in the DRIA indicate that 100% of market share is comprised of Turbo12, ATK, and BEV technologies for all cases except for Alterative 1, where 100% of market share includes 6% strong hybrids but still no mild hybrids.

19 ICCT 2022 48V hybrid: Mild-hybrid vehicles: A near term technology trend for CO2 emissions reduction; https://theicct.org/publication/mild-hybrid-emissions-jul22/.

20 Pollard, T. (2018, June 2). Alfa Romeo GTV and 8C return, Maserati Alfieri is a PHEV and diesel is killed off. CAR Magazine. https://www.carmagazine.co.uk/car-news/industry-news/fiat/fiat- chrysler-ceo-sergio-marchionne- outlines-2022-plan-strategy/.

Organization: Mass Comment Campaign sponsoring organization unknown (5,465 signatures)

I am writing today to express my opposition to the EPA's proposed rule regarding tailpipe emissions. [EPA-HQ-OAR-2022-0829-1702]

I am worried that the pace of transition outlined in this proposed rule is too quick for our economy and infrastructure to handle. [EPA-HQ-OAR-2022-0829-1702]

Under this rule, two-thirds of all light-duty vehicles sold in the United States would essentially be required to be all-electric by 2032. Considering electric vehicles only made up 6 percent of total sales in 2022, I am concerned about how such a large gap will be bridged quickly. Even if achievable, forcing the market to transition before the necessary resources and infrastructure are ready raises many concerns and challenges. [EPA-HQ-OAR-2022-0829-1702]

Also, by focusing the EPA's emissions reduction strategy on electric vehicles, this plan could ultimately leave additional reductions on the table by not encouraging the use of lower carbon fuels in the internal combustion vehicles that we currently have on the road considering these are likely to remain on the road for several more years. [EPA-HQ-OAR-2022-0829-1702]

In conclusion, the EPA should work with Congress and other stakeholders to craft a policy that balances and addresses emission reduction goals while addressing serious questions about infrastructure readiness and its impact on Americans. [EPA-HQ-OAR-2022-0829-1702]

Organization: Mercedes-Benz AG

In addition, sales of all-electric Mercedes-Benz passenger cars doubled in 2022, and electric sales continue to accelerate as we've sold more than 20% more EVs in 2023 through May than for all of 2022. [EPA-HQ-OAR-2022-0829-0623, p. 2]

Organization: Minnesota Corn Growers Association (MCGA)

Each year, sales of new vehicles displace a small fraction of the existing vehicle fleet. EPA estimates that 67% of new vehicles sales will be battery electric in 2032. The projections for battery electric vehicle adoption are based on very few—and very small—real-world data points. See generally 88 Fed. Reg. 29,187–90. Battery electric vehicles made up 5.8 percent of the new light-duty passenger vehicle market in 2022. Id. at 21,190. EPA needs these sales to increase by a factor of ten over the next 8 years. [EPA-HQ-OAR-2022-0829-0612, p. 4]

Clearly, a large number of new vehicles that burn liquid fuels will continue to be produced for many years, and those vehicles will remain on the road for many additional years. According to data from the Department of Energy's Oak Ridge National Lab,2 16% of passenger cars and 32% of light-duty trucks remain on the road for more than 20 years. If new electric vehicles are more expensive or less attractive to consumers, older liquid- fueled vehicles will remain on the road even longer. [EPA-HQ-OAR-2022-0829-0612, p. 4]

> 2 Davis and Boundy, "Transportation Energy Data Book: Edition 40", Oak Ridge National Laboratory report ORNL/TM-2022/2376, February 2022; https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf.

Organization: National Corn Growers Association (NCGA)

The proposed rulemaking assumes that BEVs will be the dominant technology for future emissions reductions. But relying on a single technology is a risky strategy; many factors could interfere including the supply and/or cost of critical minerals, lack of BEV recharging infrastructure, slow ramp-up of wind and solar power, poor customer acceptance of BEVs in some market segments, etc. EPA estimates that 67% of U.S. vehicles sales will be BEVs in 2032, but most major automakers predict much lower BEV sales, and the world's largest automaker predicts only 20% in 2030. For comparison, MIT predicts9 that China will achieve only 40% in 2030 despite a head start and extremely strong government interventions. EPA should not base mandatory emissions standards on unrealistic predictions of BEV sales. [EPA-HQ-OAR-2022-0829-0643, p. 4]

9 https://news.mit.edu/2021/chinas-transition-electric-vehicles-0429

It is essential for EPA to utilize life cycle analysis to create a “level playing field” which encourages speedy adoption of HEVs, PHEVs, FFVs, and other technologies (in addition to BEVs) to achieve the most rapid, affordable, robust, and practical GHG emissions reductions in a wide range of vehicle segments, while satisfying diverse customer needs and preferences. Europe is already making progress towards regulation based on life cycle analysis. 10 11 [EPA-HQ-OAR-2022-0829-0643, p. 4]

10 https://www.goldmansachs.com/intelligence/pages/briefly/from_briefings_21-Jan-2020/new-era-in-co2-regulation.pdf

11 Sala et al., "The evolution of life cycle assessment in European policies over three decades", International Journal of Life Cycle Assessment, December 2021; https://doi.org/10.1007/s11367-021-01893-2

Organization: National Farmers Union (NFU)

III. A More Balanced Solution is Needed to Address the Slow Turnover of the Vehicle Fleet

Sales of new vehicles displace a small fraction of the existing vehicle fleet each year. EPA estimates that 67% of new vehicles sales will be battery electric in 2032,6 but clearly large numbers of new vehicles which burn liquid fuels will continue to be produced for many years, and those vehicles will remain on the road well into the future. The table below shows the survival rates for cars and light trucks by vehicle age.7 [EPA-HQ-OAR-2022-0829-0581, pp. 4-5]

6 EPA April 12, 2023 Press Release, Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future, https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards- cars-and; see also 88 Fed. Reg. at 29,329.

7 Stacy C. Davis and Robert G. Boundy, Transportation Energy Data Book: Edition 40, Oak Ridge National Laboratory, ORNL/TM-2022/2376, at 3-20 (2022), available at https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf (citing EPA).

[See original comment for Table 3.15: Survival Rates for Cars and Light Trucks by Vehicle Age] [EPA-HQ-OAR-2022-0829-0581, pp. 4-5]

Based on this data, 16% of passenger cars and 32% of light-duty trucks remain on the road for more than 20 years. If new electric vehicles are more expensive or less attractive to consumers, older liquid-fueled vehicles will remain on the road even longer. [EPA-HQ-OAR-2022-0829-0581, pp. 4-5]

The proposal basically assumes that BEVs will be the dominant technology for future emissions reductions. But relying on a single technology is a risky strategy; many factors could interfere such as the supply and/or cost of critical minerals, lack of BEV recharging infrastructure, slow ramp-up of wind and solar power, poor customer acceptance of BEVs in some market segments, among others. EPA estimates that 67% of U.S. vehicles sales will be BEVs in 2032, but other projections are lower and the U.S. lags behind other countries that are not expected to reach similar levels of sales as predicted by EPA.26 EPA should not base mandatory emissions standards on unrealistic predictions of BEV sales. [EPA-HQ-OAR-2022-0829-0581, p. 12]

26 See, e.g., Nancy W. Stauffer, China's transition to electric vehicles: By 2030, 40 percent of vehicles sold in China will be electric; MIT research finds that despite benefits, the cost to consumers and to society will be substantial, MIT News, Apr. 29, 2021, https://news.mit.edu/2021/chinas-transition-electric-vehicles-0429.

Organization: National Parks Conservation Association (NPCA)

The historic passage of the Bipartisan Infrastructure Law and Inflation Reduction Act underscores the immense public investment now available for ZEVs and associated infrastructure. This public support is being further met with significant private investment from manufacturers and associated entities, while interest in EVs and ZEVs at the individual consumer level is expanding year after year. For instance, more than a quarter million battery-electric vehicles were sold in the first quarter of 2023 alone — a nearly 45% increase over the same period last year.17 Unlike past EPA efforts that may have relied on expected future improvements in technologies, EVs and ZEVs are here now and are growing as a share of the LDV and MDV market. While ZEV technology will continue to improve and evolve, a rapid transition to ZEVs is already the clear option when it comes to the on-road vehicle technology that achieves the greatest degree of emission reductions. [EPA-HQ-OAR-2022-0829-0607, p. 4]

17 Cox Automotive, Another Record Broken: Q1 Electric Vehicle Sales Surpass 250,000, as EV Market Share in the U.S. Jumps to 7.2% of Total Sales (Apr. 12, 2023), https://www.coxautoinc.com/market-insights/q1-2023-ev-sales/.

Organization: North Dakota Farmers Union (NDFU)

Slow Turnover of the Vehicle Fleet

Sales of new vehicles displace a small fraction of the existing vehicle fleet each year. EPA estimates that 67% of new vehicles sales will be battery electric in 2032.5 Even if that growth is achieved, large numbers of new vehicles that burn liquid fuels will continue to be produced for many years, and those vehicles will remain on the road well into the future. The table below shows survival rates for cars and light trucks by vehicle age.6 [EPA-HQ-OAR-2022-0829-0586, p. 3]

5 Environmental Protection Agency (2023, April 12). Biden-Harris administration proposes strongest-ever pollution standards for cars and trucks to accelerate transition to a clean-transportation future [Press Release]. Retrieved from https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever- pollution-standards-cars-and.

6 Davis, S. C., and Boundy, R. G. (2022, June). Transportation energy data book: Edition 40. Oak Ridge National Laboratory. Prepared for the U.S. Department of Energy. Retrieved from https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf.

Based on this data [See original comment for Table 3.15, Survival Rates for Cars and Light Trucks by Vehicle Age], 86% of passenger cars and 78% of light-duty trucks remain on the road for 10 years. Moreover, 16% of passenger cars and 32% of light-duty trucks remain on the road for 20 years. If new electric vehicles are more expensive or less attractive to consumers, it is reasonable to assume older liquid-fueled vehicles will remain on the road even longer. [EPA-HQ-OAR-2022-0829-0586, p. 3]

The proposal basically assumes that BEVs will be the dominant technology for future emissions reductions. But relying on a single technology is a risky strategy. Many factors could interfere with BEV production, including the supply and cost of critical minerals, lack of BEV recharging infrastructure, slow ramp-up of wind and solar power, poor customer acceptance, and more. EPA estimates that 67% of U.S. vehicle sales will be BEVs in 2032, but other projections are lower and the U.S. lags behind other countries that are not expected to reach similar levels of sales in that timeframe.10 [EPA-HQ-OAR-2022-0829-0586, p. 5]

10 Stauffer, N. W. (2021, April 29). China's transition to electric vehicles: By 2030 40 percent of vehicles sold in China will be electric; MIT research finds that despite benefits, the cost to consumers and to society will be substantial. MIT News. Retrieved from https://news.mit.edu/2021/chinas-transition-electric-vehicles-0429.

Organization: Porsche Cars North America (PCNA)

As EPA notes in the NPRM, even with increasing sales of electric vehicles, there will be a portion of new vehicle sales that will continue to be combustion albeit at decreasing rates. Porsche believes it is important to recognize that these future combustion vehicles will include fully phased-in Tier-3 and LEV-III program requirements. As such, these vehicles will be certified to emissions levels and fleet averages that both EPA and CARB have projected to deliver significant, meaningful reductions in pollutants from new light-duty vehicles. Across the industry, fully phased-in Tier-3 and LEV- III fleets will reflect fleet average performance equivalent to Super Ultra Low Emissions Vehicle performance, commonly referred to as SULEV. Many of these new vehicle sales will replace older, higher emitting models often characterized as "gross emitters". Porsche recognizes that both LEV-IV and Tier-4 have sought to identify opportunities for further, incremental improvements in emissions control. Some of these proposals are projected by CARB and EPA to be achievable through changes in emissions control algorithms (i.e., software or calibration strategies), while others may need to rely on new emissions control hardware or other physical changes to emissions control systems. Porsche recommends that EPA carefully consider the extent to which these potential incremental gains beyond the foundational benefits of Tier-3 may consume engineering resources and drive increased costs considering the industry's general shift towards electrification. Porsche offers these comments to help inform a balanced outcome that identifies cost-effective improvements in emissions performance that will allow manufacturers to focus resources on the expansion of zero- emission electrification. [EPA-HQ-OAR-2022-0829-0637, p. 8]

Organization: Renewable Fuels Association (RFA)

IX. EPA's Proposed Rule Ignores Marketplace Realities and Underestimates Barriers to the Adoption of Battery Electric Vehicles

The challenges associated with electrifying the light- and medium-duty fleet are significant. The speed at which the Agency appears to anticipate the market and consumers will transition to electric vehicles is divorced from our assessment of reality. The proposed rule does not appear to appreciate the market obstacles associated with such a massive transition in vehicle technology, energy infrastructure, or consumer behavior. Several of the most pressing challenges are further discussed below. [EPA-HQ-OAR-2022-0829-0602, pp. 14-15]

a. Slow turnover of the vehicle fleet

Sales of new vehicles displace a small fraction of the existing vehicle fleet each year. EPA estimates that 67% of new vehicles sales will be battery electric in 2032, but clearly large numbers of new ICE vehicles that use liquid fuels will continue to be produced for many years, and those vehicles will remain on the road for many additional years. According to data from Oak Ridge National Lab, 16% of passenger cars and 32% of light- duty trucks remain on the road for more than 20 years.31 The Oak Ridge data also show that the average age of vehicles on the road is approximately 15 years. If new EVs are more expensive or less attractive to consumers, older liquid-fueled vehicles will remain on the road even longer. [EPA-HQ-OAR-2022-0829-0602, pp. 14-15]

31 Davis and Boundy, "Transportation Energy Data Book: Edition 40", Oak Ridge National Laboratory report ORNL/TM-2022/2376, February 2022; https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf.

Low-carbon liquid fuels in existing vehicles can achieve GHG reductions faster than new electric vehicles can displace the existing fleet. As shown in the figure below from a recent Fuels Institute report, a relatively simple change such as replacing E10 (10% ethanol) with E15 (15% ethanol) can offer greater GHG reductions than the phase-in of battery electric vehicles, because it can immediately affect a large fleet of vehicles that are already in use.32 [EPA-HQ-OAR-2022-0829-0602, pp. 14-15]

32 Fuels Institute. “Decarbonizing Combustion Vehicles: A Portfolio Approach to GHG Reductions.” June 2023.

[See original comment for Figure 21: Light- and Medum Duty Vehicle GHG Emissions Reduction Scenario (2022-2032)] [EPA-HQ-OAR-2022-0829-0602, pp. 14-15]

Organization: Senator Shelley Moore Capito et al.

The situation for infrastructure to support charging of light- and medium-duty vehicles is only slightly better, with your Agency touting the availability of 130,000 public chargers in its press release announcing its proposals.6 Setting aside their significant reliability issues and lack of broad geographical availability, even a rapid expansion of the number of operational chargers is unlikely to meet the demand for the electrification of two-thirds of the new vehicle fleet by 2032. For reference, 2022 was the worst year for US car sales in a decade with 13.7 to 13.9 million new vehicles sold due to inflation, economic uncertainty, and supply chain disruptions.7 Two--thirds of that depressed sales figure would still represent more than 9 million new vehicles per year being added to the cumulative demand on public charging infrastructure by 2032. [EPA-HQ-OAR-2022-0829-5083, pp. 2-3]

6 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future, US EPA (Apr. 12, 2023).

7 Wayland, Michael. Automakers are cautiously optimistic for a 2023 rebound after worst new vehicles sales in more than a decade, CNBC (Jan. 6, 2023).

In addition to pushing larger, heavier, and more expensive BEV s, domestic automakers are losing money on this transition and are passing costs on to consumers in the form of higher prices for both internal combustion engine (ICE) vehicles and BEVs.9 Ford's electric vehicle business unit is on track to lose $3 billion this year.10 GM announced it will lose money on BEVs until 2025.11 And the Chevy Bolt, cited by multiple members of the Bi den Administration as an affordable alternative is being discontinued in favor of higher-priced electric SUVs and trucks.12 Unless economies of scale and a significant reduction in the cost of presently foreign-sourced input commodities for BEV production reduce costs - the likelihood for both of which remain highly uncertain - ICE vehicle buyers will continue to subsidize purchasers of BEV s directly through taxpayer subsidies and paying fuel excise taxes into the Highway Trust Fund, as well as indirectly through increased sales prices. [EPA-HQ-OAR-2022-0829-5083, p. 4]

9 Borney, Nathan. Gas-powered vehicles are paying for their own funeral, Axios (Mar, 23, 2023).

10 Lienert and Gomes. Ford sees $3 billion pretax loss in its EV business this year, Reuters (Mar. 23, 2023).

11 Holderith, Peter. General Motors Will Lose Money on Its Electric Cars Until 2025: Report, The Drive (Nov. 14, 2022)

12 Seifert, Dan., GM killed the Chevy Bolt - and the dream of a small, affordable EV, The Verge (Apr. 26, 2023).

Organization: Steven G. Bradbury

EPA fails to consider the negative societal consequences and second-order cost effects of its proposals.

In putting forward regulatory proposals designed to force upon the American people a vast and rapid industrial transformation, EPA has an obligation to go further than just considering the direct cost effects of its proposals (which are themselves woefully under- estimated, as highlighted above); it must also consider the broader indirect economic con- sequences and negative societal costs that would follow if these rules are finalized as pro- posed. So far in these rulemakings, the Agency has either ignored or deliberately down- played these second-order effects. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

Some of the most consequential burdens and negative ramifications of the proposed rules that EPA hides, disregards, or minimizes include the following: [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Increasing the purchase price of all new vehicles. Notwithstanding EPA’s gaming of the numbers, the true costs of the industrial transformation forced by the EPA’s proposed rules will be spread across the automakers’ fleets, resulting in a significant increase in the prices of all new vehicles, with greater price increases concentrated on those vehicles for which the demand is highest relative to supply. All Americans will be harmed by these price increases, but the biggest losers will be lower-income Americans who cannot afford to buy an EV or to pay more for a gas-powered vehicle at the dealership, as well as those who live in rural areas and need to drive longer distances and for whom EVs are impractical. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Destroying jobs in the U.S. auto industry. The loss of popular new vehicle options and the significant price increases at the dealership will mean that fewer new vehicles will be purchased—almost certainly far fewer than EPA is predicting. This drop-off in demand will challenge the profitability of the auto industry and lead to a loss of jobs for tens of thousands of America's autoworkers, as well as a loss of jobs in the many U.S. companies that supply inputs for the production of auto- mobiles and heavy trucks.40 The United Auto Workers union has warned of the potential for job losses from the transition to EVs,41 as automakers announce more plant closures and layoffs due to the costs of electrification.42 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

40 See Technality, "Ford Just Proved How Far Ahead Tesla Really Is: Profitability May Continue to Be a Struggle for All Legacy Automakers," May 10, 2023, https://medium.com/tech-topics/ford-just-proved-how-far-ahead-tesla-really-is-6a4d95cff519 ("Despite wanting to be a fully-electric brand by 2035, as of Q4 2022, Ford's average net margin on the Mustang Mach-E was -40.4%. Unfortunately, that's a figure that's only gotten worse since, to the point where Ford is now losing an average of $58,000 for every EV sold.").

41 See Press statement, United Auto Workers, "UAW Statement on Job Cuts at Stellantis," April 26, 2023, https://uaw.org/uaw-statement-job-cuts-stellantis.

42 See Michael Wayland, "Stellantis to indefinitely idle Jeep plant, lay off workers to cut costs for EVs," CNBC.com, December 9, 2022, https://www.cnbc.com/2022/12/09/stellantis-to-idle-jeep-plant-lay-off-workers-to-cut-costs-for-evs.html.

• Causing more deaths and serious injuries on America's highways. As new vehicle models become unaffordable or unappealing, many American families will be left driving older and older used cars, and the age of the nation's auto fleet will rise dramatically. Already, the average age of a car on the road in the United States is approaching 13 years, and many cars are on their fifth or sixth owners. The aging of the American fleet has very negative safety consequences, as NHTSA statistics show that older vehicles are much less safe than newer models in an accident.43 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

43 See https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/newer-cars-safer-cars_fact-sheet_010320-tag.pdf.

Organization: Tesla, Inc.

Since the release of the proposed rule, figures indicate that in Q1 2023 the U.S. recorded the highest BEV sales increase (64%) ever.80 Continuing this rapid growth has led to estimates that by 2024 every third commercially newly registered car could be an electric vehicle.81 This increase is consistent with other projects of rapid BEV sales growth. Some analysts predict that by 2026 60% of new models will be BEVs and PHEVs.82 Others suggest recent forecasts, like those of IEA, still significantly underestimate the pace of electrification.83 Still other analysts project that BEVs could account for 90% of sales by 2027.84 [EPA-HQ-OAR-2022-0829-0792, p. 12]

80 Strategy& (PwC), Electric Vehicle Sales Review Q1-2023: From 2024, every third commercially registered car could be an electric vehicle (May 15, 2023) available at h ttps://www.strategyand.pwc.com/de/en/industries/automotive/electric-v ehicle-sales-review-2023-q1.html

81 Id.

82 Automotive News, Car Wars study: By 2026, 60% of new models will be EV, hybrid (June 30, 2022) (citing a Bank of America Merrill Lynch Car Wars study predicting automakers will launch roughly 245 new models over the next four years.) available at h ttps://www.autonews.com/sales/car-wars-study-2026-60-new-models-will-be-ev-hybrid?utm_source=dont-m iss&utm_medium=email&utm_campaign=20220630&utm_content=hero-headline

83 Sustainability by the Numbers, Electric cars are the new solar: people will underestimate how quickly they will take off (May 8, 2023) available at h ttps://hannahritchie.substack.com/p/ev-iea-p rojections?utm_source=cbnewsletter&utm_medium=email&utm_term=2023-05- 0 9&utm_campaign=Daily+Briefing+09+05+2023

84 Ark Invest, Sales of Gas-Powered Vehicles Could Collapse 85% In the Next Five Years (Nov. 21, 2022) available at h ttps://ark-invest.com/newsletters/issue-343/

Fourth, the agency has not included projected U.S. sales volumes, and ramp of such sales, from a number of emerging BEV-only manufacturers, including Rivian, Lucid, VinFast. Nio, and Fisker. Estimates of the combined U.S. sales from these BEV manufacturers range from almost 234,000 vehicles in 2026 to just under 340,000 in 2032. See Figure 6. Projected North American BEV-Only OEM Sales (Non-Tesla). Combined with the aforementioned severe under projections of Tesla sales, this oversight further results in the agency significantly underestimating the projected volume of BEV sales, under calculating the potential buildup of the overall credit bank available for compliance and, when correctly considered, leads to supporting increasing the stringency of the proposal. [EPA-HQ-OAR-2022-0829-0792, p. 19]

SEE ORIGINAL COMMENT FOR Figure 6. Projected North American BEV-Only OEM Sales (Non-Tesla) [EPA-HQ-OAR-2022-0829-0792, p. 19]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

Light duty sales are overestimated

The study assumes that the proposed rule will decrease light duty vehicle sales by no more than 0.35% in any year (2027), and in some years may actually increase sales (2029 and 2029). (See Table 171.) These results are inconsistent with standard economics: [EPA-HQ-OAR-2022-0829-0674, pp. 13-14]

- As noted above, the rule will increase ownership costs of vehicles, resulting in fewer car purchases;

- Current EV prices, even with tax credits, are substantially above comparable gasoline-powered vehicle or hybrid vehicle prices.

- By definition, regulations reduce consumer choices, leading to less consumer activity.

- If the proposed rule were not a binding constraint on consumer choices, consumers would be purchasing the same vehicles without the rule. The Administration wants the rule to change consumer behavior, not to reinforce it.

For these and other reasons, the number of vehicles purchased under the rule will be substantially less than without the rule. [EPA-HQ-OAR-2022-0829-0674, pp. 13-14]

Organization: Transport Evolved LLC (Transportation Consultancy)

We would add:

1) Transport Evolved also favors a move away from allowing transfer of credits both from year-to-year and from automaker-to-automaker. This allows some automakers to benefit from the hard work of others, and also reduces the incentive for individual automakers to develop their own clean vehicle platforms. While some argue that it incentivises automakers to build and sell EVs, in many other markets the vast majority of automakers (including Stellantis, Ford, GM, and Honda) have fully electric offerings which are not offered for sale in the US. The choice of those automakers not to equip those vehicles for sale here should not be rewarded. [EPA-HQ-OAR-2022-0829-0453, p. 1]

2) Some vehicles (for example, the GMC Hummer EV), use substantial resources that could be used for electrifying multiple smaller vehicles and, at the same time, require substantially more energy to produce and to travel the same distance as a smaller, more efficient vehicle. As such, we would also support moves to more substantially reduce or remove the benefit within the calculation (the "medium duty multiplier") for automakers for building larger, heavier, less efficient vehicles where those vehicles are expected to substitute for a light duty passenger vehicle. [EPA-HQ-OAR-2022-0829-0453, p. 1]

Organization: U.S. Chamber of Commerce

- Vehicles sold today are on average 30% more fuel efficient than vehicles sold in 2004, helping to drive a 6% reduction in transportation sector CO2 emissions even as overall vehicle miles traveled have increased by about 10%. [EPA-HQ-OAR-2022-0829-0604, p. 1]

- Nitrogen oxide (NOx) emissions from model year 2025 vehicles will be 57% lower than vehicles sold in 2004, and 95% lower than those sold in 1994—a major contributor to the more than 20% reduction in ozone levels during that time period.

- More than 90 models of vehicles currently achieve over 40 miles per gallon in fuel efficiency.

- Availability of electric vehicle options has increased dramatically, with 150 different models expected to be available within the next few years

- Automakers have announced plans to invest at least $110 billion in domestic EV manufacturing and battery production by the end of the decade. [EPA-HQ-OAR-2022-0829-0604, p. 1]

Organization: Valero Energy Corporation

a) EPA does not adequately characterize vehicle purchase costs.

ZEVs are more expensive on average than their ICE vehicle counterparts and unaffordable for many households—in the first calendar quarter of 2023, the average price of top-selling light-duty BEV in the U.S. was about $15,000 more than the average price of top- selling ICE vehicles.161 [EPA-HQ-OAR-2022-0829-0707, pp. 33-35]

161 S&P Global, "Tracking battery-electric vehicle prices – 2023 update" at 9 (May 2023).

According to S&P Global, the ten-top selling light-vehicle models in the U.S. market during Q1 2023 were as follows162: [EPA-HQ-OAR-2022-0829-0707, pp. 33-35]

162 S&P Global, "Tracking battery-electric vehicle prices – 2023 update" at 9 (May 2023). All MSRP values (starting price) were taken from Kelley Blue Book, https://www.kbb.com/?ds_rl=1293870&gad=1&gclid=eaiaiqobchmigidqxf-d_wiva2xvbb1a2azaeaayasaaegkjjpd_bwe&gclsrc=aw.ds&psid=20003&utm_campaign=kbb_na_na_national_everg reen_site-visits_na_na&utm_content=keyword_text_na_na_na_20003_na&utm_medium=sem_brand-core_perf&utm_source=google&utm_term=kelley%20blue%20book

Retail price heat map of top-10 selling LV models for BEV & ICE powertrain in Q1 2023 [EPA-HQ-OAR-2022-0829-0707, pp. 33-35]

Rank	BEV 163	2023 MSRP 164 (USD)	ICE & MHEV 165	2023 MSRP (USD)
1	Tesla Model Y	$47,490	Ford F-150	$34,695
2	Tesla Model 3	$40,240	Chevrolet Silverado 1500	$35,600
3	Volkswagen ID.4	$37,495	Ram 1500	$36,820
4	Ford Mustang Mach- E	$42,995	Toyota RAV4	$27,575
5	Ford F-150 Lightning	$55,974	Ford F-250/350	$43,970/$45,015
6	Chevrolet Bolt	$26,500	Toyota Tacoma	$27,250
7	Tesla Model X	$98,490	Toyota Camry	$25,945
8	Hyundai Ioniq 5	$41,450	GMC Sierra 1500	$36,400
9	BMW i4	$51,400	Chevrolet Equinox	$26,600
10	Rivian R1T	$73,000	Nissan Rogue	$27,360

[EPA-HQ-OAR-2022-0829-0707, pp. 33-35]

163 BEV = battery-electric vehicle.

164 All MSRP values (starting price) were taken from Kelley Blue Book, https://www.kbb.com/?ds_rl=1293870&gad=1&gclid=eaiaiqobchmigidqxf-d_wiva2xvbb1a2azaeaayasaaegkjjpd_bwe&gclsrc=aw.ds&psid=20003&utm_campaign=kbb_na_na_national_everg reen_site-visits_na_na&utm_content=keyword_text_na_na_na_20003_na&utm_medium=sem_brand-core_perf&utm_source=google&utm_term=kelley%20blue%20book

165 ICE = Internal combustion engine vehicle; MHEV = mild-hybrid electric vehicle.

Based on MSRP starting price data from Kelley Blue Book166, the average price of the top 10 selling BEVs was approximately $51,503 for Q1 2023. By contrast, the average price of the top 10 selling ICE & MHEV167 in the U.S. was approximately $32,274 during the same period.168 This makes for a $19,230 differential in the average prices of the 10 top selling 2023 BEV and ICEV/MHEV vehicles—a material delta for many demographics.169 By contrast, the per capita and median household incomes in the United States are approximately $37,638 and $69,021, respectively.170 [EPA-HQ-OAR-2022-0829-0707, pp. 33-35]

166 https://www.kbb.com/?ds_rl=1293870&gad=1&gclid=eaiaiqobchmigidqxf-d_wiva2xvbb1a2azaeaayasaaegkjjpd_bwe&gclsrc=aw.ds&psid=20003&utm_campaign=kbb_na_na_national_everg reen_site-visits_na_na&utm_content=keyword_text_na_na_na_20003_na&utm_medium=sem_brand-core_perf&utm_source=google&utm_term=kelley%20blue%20book

167 ICE = Internal combustion engine vehicle; MHEV = mild-hybrid electric vehicle.

168 Id.

169 Id.

170 Over 2017-2021, in 2021 dollars. U.S. Census Bureau, Quick Facts – United States, https://www.census.gov/quickfacts/fact/table/US/SEX255221.

Moreover, in April 2023, GM announced the discontinuation of its best-seller electric vehicle, the Chevrolet Bolt at the end of 2023, despite having sold more than 161,000 vehicles since its introduction to the market in 2016.171 Instead, the company plans to use its capacity at GM's Orion Township Michigan assembly plant to produce larger electric trucks starting in 2024.172 The Chevy Bolt has been "repeatedly touted by the Biden administration as an example of an affordable EV."173 Moreover, "[t]he Bolt EV and EUV don't have direct replacements waiting in the wings",174 And the Chevy Equinox EV "going on sale this year will take over the role of GM's entry-level EV, albeit with a starting price over the $30,000 mark."175 Accounting for the discontinuation of the Chevy Bolt in the above-mentioned data, the average cost of the 9 top-selling BEVs rises to approximately $54,282, with price differential between the ICE & MHEV average being equivalent to approximately $22,008. This further exacerbates price disparity concerns. [EPA-HQ-OAR-2022-0829-0707, pp. 33-35]

171 S&P Global, EV Essentials (May 22, 2023) at 3.

172 Andrew J. Hawkins, "GM is ending Chevy Bolt EV and EUV production at the end of the year". The Verge. https://www.theverge.com/2023/4/25/23697356/gm-chevy-bolt-ev-euv-end-production; See also Caleb Miller, "2023 Chevy Bolt EV and EUV Dead after This Year". Car and Driver. https://www.caranddriver.com/news/a43698537/2023-chevrolet-bolt-ev-euv-ending-production/

173 David Shepardson, "GM to end production of Chevrolet Bolt EV later this year". Reuters. https://www.reuters.com/business/autos-transportation/gm-end-production-first-mass-market-ev-this-year-2023-04- 25/.

174 Caleb Miller, "2023 Chevy Bolt EV and EUV Dead after This Year", Car and Driver. https://www.caranddriver.com/news/a43698537/2023-chevrolet-bolt-ev-euv-ending-production/

175 Id.

Organization: Wisconsin Automobile and Truck Dealers Association

The EPA has lost sight of the multi-track plan to reduce multi-pollutant emissions. Substantial reductions can be accomplished through the continued development of internal combustion engines (ICE), the increased use of hybrid vehicles, plug-in hybrids, plug-in battery, hydrogen fuel cells, as well as new or immerging technologies. A genuine concern arises from consumers getting priced out of the new vehicle market. Dealers are already being notified by automobile manufacturers that products will be limited in states. CARB (California Air Resources Board) states are being notified they will receive fewer ICE vehicles and non-CARB states will receive a limited amount of EVs (electric vehicles). To further compound the problem, automobile manufacturers are going to have to reassign resources to build the number of EVs required in CARB states. That will create fewer ICE vehicles to be distributed throughout the remaining states. When demand is high and inventory is limited, prices increase. The ICE vehicles will quickly escalate to the level of current EV prices. A substantial price increase, coupled with higher interest rates will slow any transformation of consumers to cleaner vehicles. In turn, this will create a strong market for previously owned vehicles containing dated technology and higher levels of pollutants being emitted . [EPA-HQ-OAR-2022-0829-0494, p. 1]

EPA Summary and Response

Summary:

Commenters including the Alliance for Automotive Innovation (Alliance) and Renewable Fuels Association (RFA) stated that the projected EV market share is too high. RFA stated that the projections of BEV penetrations do not account for market obstacles to the transition. Commenters, including the Arizona State Legislature, stated that the projections of costs in the rule are too high, and erroneously rely on federal tax credits. Minnesota Corn Growers Association (MCGA) commented that the BEV projections in the rule are based on very few real world data points. National Corn Growers Association (NCGA), National Farmers Union (NFU), and North Dakota Farmers Union (NDFU) commented that mandatory emissions standards should not be based on unrealistic BEV sales predictions. They stated that relying on a single technology for future emissions reductions is risky because that technology could be influenced by many factors.

The Alliance for Consumers (AFC) stated that EPA failed to consider how ICE vehicle profits and EV losses interplay in the sale of EVs, and that EPA failed to address the effects of removing or replacing ICE vehicles with EVs on the ability of automakers to price EVs at current, what they perceive as, money-losing levels.

Some comments were focused on automaker announcements. AmFree, API and others stated that automaker announcements cannot be used to support the justification for the rule, and they cannot be counted on. Some commenters stated that manufacturers may revise their plans or fail to meet targets, and others stated that these statements rely on federal regulations, so relying on them in proposing the rule is circular. Others, like EDF and ICCT, commented on the fact that we missed some automaker announcements in our proposal, outlining additional announcements surrounding the planned production and sale of electric vehicles over the next five to ten years, or more. EDF also commented that market developments and manufacturer plans support the feasibility of the rule. ICCT and other commented that the IRA will result in increased EV sales across all vehicle types, as well as bolster EV manufacturing, battery production and industrial development.

AmFree, API and others commented that EPA does not indicate whether there will be additional EV offerings in affordable segments by the time the rule becomes effective, continuing on to state they doubt there will be affordable offerings. API stated that the ZEV projections in the proposal will be challenging even given investments supported by the IRA and BIL, giving examples of barriers to uptake. API stated that AEO projections are well below EPA's estimates in the proposal, and commented that EPA must explain why they are so different. On the other hand, commenters including California Attorney General's Office stated that ZEV tech is already in wide use, and that penetration in increasing quickly. CEVA commented that though availability and diversity of commercial ZEVs has improved, there are still barriers to a diverse supply of cost competitive ZEVs. CEVA also commented that strong standards are necessary and manufactures and fleet operators rely on technology driving federal regulations to help close the supply-demand gap for ZEV commercial vehicles.

American Fuel & Petrochemical Manufacturers (AFPM) commented that it is uncertain that the critical minerals needed to support the batteries for the EVs projected by this rule will be available. The also stated that they are uncertain the electric grid will be able to support the charging needs created by this rule.

AFPM commented that the timeline for this rule is unachievable and relies on a general characterization of the number of models currently available on the free market, as opposed actual number of vehicles sold, supplemented by the BIL and IRA incentives. AFPM is uncertain the consumers will purchase EVs at the rate assumed in the analysis for the proposal. They stated that the future availability of ZEVs will not be sufficient to meet ZEV adoption requirements proposed by EPA. AFPM also stated that auto manufacturers could not justify long term EV investment without federal regulations given tepid consumer demand. AFPM also commented that there is not enough charging, uncertain utility and grid capacity, and not enough domestic or allied supply of battery critical minerals.

API commented that EPA should account for EVs being less reliable than ICE vehicles due to software reliability issues, and that increasing the efficiency of ICE vehicles is promising and cost-effective.

Some commenters, including a collection of state offices and departments in Colorado (Colorado) and the Electrification Coalition (EC), commented in support of a strong, robust rule. Colorado stated that strong standards are important to progress air pollution and equity improvements. EC stated that the standards will lead to economies of scale in electrical vehicle production, which will lead to more affordable EVs and support access and benefits for disproportionality impacted communities.EC stated that the strongest possible standards will significantly limit GHG emissions and accelerate the adoption of electric vehicles. A collection of Environmental. and Public Health Organizations (EPHO) recommended EPA adopt a modified version of Alternative 1.

The Energy Strategy Coalition (ESC) commented that, given incentives and regulatory dynamics, public market projections are in line with EPA projections of BEV penetration. EPHO commented that sources that model ZEV outlook including the impact of the IRA in the baseline are most relevant to EPA projections. They also stated that there are additional studies EPA could cite that have become available since the publication of the proposal.

EPHO commented that EPA's mandate to protect public health and welfare is more urgent than ever due to climate change and stated that ZEVs are feasible and cost-reasonable, BEV and PHEV technology is improving, and PEV adoption is driven by strong consumer demand and greater model choice. They commented that the growing consumer demand for ZEVs is demonstrated by automaker commitments. EPHO also commented that there are numerous emission control technology options for ICE vehicles as well, which have potential for greater application within the fleet. EPHO noted that the flexibility of the program and the fact that EPA did not include PHEVs or improvements to ICE vehicles could lead to lower BEV projections that EPA estimated. Wisconsin Automobile and Truck Dealers Association commented that substantial emissions reductions are achievable through the application of ICE technology, hybrids, hydrogen fuel cells as well as new or emerging technology.

Some commenters focused on the availability of infrastructure, the electric grid, and the vehicle supply chain. EPHO commented that all three of these industries will be able to accommodate the projected level of BEVs, and a strong regulatory signal will only make them better. Senator Shelley Moore Capito et al. (Senator Capito) commented that it is unlikely there will be chargers to meet the demand for electrification.

EPHO commented that EPA should include ACC II in the baseline, since CARB has submitted the waiver request. They go on to state that more stringent standards than proposed are feasible and justified even without ACC II in the baseline. EPHO commented that EPA did include a sensitivity with ACC II in the baseline, though they noted that the sensitivity did not seem to include all the states who have adopted or intend to adopt ACC II by the time of the final regulation. EDF commented that even though AEO 2023 estimated low and unrealistic ZEV sales, their estimates show that robust nationwide ZEV adoption will result due to current state actions, namely those in ACC II and the section 177 states. GFI commented that the No Action baseline may be conservative because EPA did not incorporate manufacturer announcement or ACC II. They also stated that, regardless of EPA regulations, a steep growth in EV adoption is expected over the next several years because the U.S. has reached a tipping point in the EV adoption S curve. ICCT also commented that ACC II will lead to increased EV sales, focusing on California and the other states that will adopt the regulation. National Parks Conservation Association (NPCA) commented that electric vehicles are growing as a share of the LD and MD markets, and that a rapid transition to ZEVs is the clear option to achieve emission reductions.

Tesla commented that EPA did not include any newer BEV only manufacturers in sales projections, which led to a significant underestimation of projected BEV sales.

The Institute for Policy Integrity at New York University Law School (IPI) commented that EPA should give more explanation of scrappage, cost pass-through, and sales effects. They stated that the treatment of scrappage in OMEGA is reasonable, but there is no discussion in the proposal on scrappage, and that EPA should attempt to model scrappage in future standards. IPI stated that EPA should clarify how producers expect consumers to value fuel costs, explaining why consumers factor in fuel costs for 12,000 annually over 2.5 years while producer side modeling uses an annual VMT factor of 15,000 miles.

The UAW commented that the proposal must support continued production and sales of ICE vehicles. They stated that domestic automakers rely on the sale of ICE vehicles to fund investments in the transition to electrification since EVs are not profitable. Senator Capito commented that domestic automakers are passing higher costs on to consumers and that ICE vehicles buyers will continue to subsidize purchasers of BEVs through taxpayer subsidies and fuel taxes into the Highway Trust Fund, and through increased sale prices. Steven Bradbury commented that EPA fails to account for the increased purchase price of all new vehicles, which is especially harmful to lower income Americans who can’t afford the higher prices. Valero commented that ZEVs are more expensive than ICE vehicles and are unaffordable for many households.

John Graham commented that the proposal ignores improvements in mild hybrids, which are rapidly gaining market share in Europe. They stated that European trends indicate that hybrids are a cost effective solution.

Commenters in a mass comment campaign states that the pace of the transition is too fast for the economy and infrastructure to handle, and that forcing the transition before resources and infrastructure are ready is concerning. The commenters also stated that focusing on electric vehicles could lead to fewer emission reductions by not focusing on encouraging lower carbon fuels. They stated that the EPA should balance emissions reductions goals while addressing serious questions about infrastructure readiness and the impact of the rule on Americans.

MCGA, NFU, and NDFU commented that liquid fuel burning vehicles will continue to be sold for many years, and that more expensive EVs will lead to ICE vehicles staying on the road longer. RFA stated that low carbon fuels can achieve GHG reductions faster than new EVs can displace the existing fleet.

NCGA stated that EPA should use life cycle analysis in the determining this rule.

Porsche commented it is important to recognize that combustion based vehicles will include fully phased in Tier-3 and LEV-III program requirements, and that EPA should carefully consider potential incremental gains beyond Tier-3 that may consume engineering resources and drive increased costs considering the shift towards electrification.

Steven Bradbury commented that EPA does not account for the loss of jobs that will result due to reduced vehicle demand, and that EPA does not account for the safety issues that will arise due to older, less safe vehicles staying on the road longer.

The Heritage Foundation commented that the sales impacts estimates in the proposal are inconsistent with standard economics. They stated that increased ownership costs of vehicles will lead to lower sales, EV costs will be much higher than ICE vehicles, and that the regulation will reduce consumer choice. They also state that the administration wants to change consumer behavior because if the rule were not a binding constraint consumers would purchase the same vehicles without the rule. Wisconsin Automobile and Truck Dealers Association commented that there will be fewer ICE vehicles available due to this proposal, which will lead to higher prices and slow the transition to cleaner vehicles. They also commented that this will lead to increased demand for used vehicles.

Transport Evolved commented in support of moving away from credit banking and trading, as it allows some manufacturers to benefit from the hard work of other manufacturers. They also commented in support of removing the MD multiplier because it benefits manufacturers that produce larger, heavier, less efficient vehicles over smaller, more efficient vehicles.

<u>Response:</u>

Regarding comments that sales impact estimates in the proposal are inconsistent with standard economics, we do not agree. The estimates of sales impacts for this rule are based on both producer and consumer decisions, and include the impact of estimated vehicle prices. RTC Chapter 12.1 discusses producer and consumer side modeling for this rule. RIA Chapter 4.4.1

discusses how sales impacts were modeled in OMEGA using an elasticity of demand for new vehicles. The results discussed in RIA Chapter 4.4.2 estimate that there will be slightly fewer new vehicles sold due to the final rule.

We agree that the availability of electric vehicles in the market has been growing, both in the number of and models available for purchase. We also agree that PEVs are an important options for manufacturers to consider on the pathway to achieving significant emissions reductions from the light- and medium-duty vehicle market, and that these emissions reductions are important to public health and welfare. Regarding comments on the availability of electric vehicles, as well as how that may affect vehicle purchases, see Section 13 of this RTC. Regarding Tesla's comment that EPA did not include any BEV only manufacturers in determining the baseline, we note that we have updated our baseline since the proposal. Regarding comments on the baseline, or the No Action case, used in the final rule, see Section IV.B of the preamble.

Regarding comments that the rule needs to support continued production and sale of ICE vehicles, and that the availability of ZEVs in the future will not be enough to meet EPA requirements and that emissions reductions are achievable through technology other than ZEVs, we note that this rule is not a ZEV mandate and manufacturers are free to meet the standards using the mix of vehicle technologies that is best for their fleets. The main analysis for this rule assumes one possible pathway to compliance, though, as discussed in preamble IV.F and G, there are many possible pathways to compliance that utilize many different vehicle technologies, including ICE, hybrids, PHEVs and BEVs. Regarding comments that manufacturers could not justify investment in EVs without federal regulations, or that EVs are not profitable we note that manufacturers have been producing vehicles with varying degrees of powertrain electrification, including ranging from mild hybrids to full battery electric, for many years before this rule. For a discussion of consumer demand of electric vehicles, see RTC Section 13. Also, as mentioned above and discussed in RIA Chapter 2.6.4, the analysis for this rule allows for cross-subsidization as part of the producer decision making process, ensuring that producers are able to influence the pricing structure of the vehicles they produce in order to meet the standards in the manner they choose. In addition, we note that the social cost analysis for this rule accounts for costs exclusive of transfers (like fuel taxes), and shows that there are significant social benefits expected from this rule.

Regarding comments on scrappage and cost pass-through, see RTC Section 12.1. Scrappage is also discussed in RIA Chapter 4.4.2. Also, we note that we have always assumed full cost pass-through in LD vehicle regulations in our estimates of consumer impacts. Assuming otherwise might suggest lower consumer costs, therefore this assumption provides us with a conservative estimate. Regarding comments on using a different VMT for producer and consumer side fuel cost assumptions, we note that we have updated our analysis to align the assumption for producers and consumers to both assume 15,000 annual miles in fuel savings estimates. Regarding comments from IPI that we should model scrappage in future regulations, and support further research on pass-through, we note that these are topics EPA will continue to refine for possible future regulations. For more information on topics in the comment provided by IPI, refer to responses in Sections 13.2 and 13.3 of this RTC.

Regarding comments on automaker announcements surrounding electrified vehicles, we note that we have updated our discussion of these announcement in Section IV of the preamble. In addition, as noted in Section 13 of this RTC, mentioning or citing any one study, statistic or information source should not be confused with relying on that information to justify the rule. This information may be supporting information for our analysis, need for this rule, or background information. For information on the justification of this rule, see Sections III and V of the preamble. For information on the IRA and other federal actions discussed in this regulation, see Section I.A of the preamble. Regarding comments from EPHO and others on the effects of ACC II, as discussed in RTC Section 12.1.3, at the time of this final rulemaking EPA has not yet granted a waiver to California for the ACC II program, and the agency believes it would be inappropriate to prejudge the outcome of the waiver request process for program that is still under consideration by the Administrator.

Regarding comments that the timeline for this rule is unachievable, we note that the final standards for both GHGs and criteria pollutants are phased in over time. For information on the phase-ins for this final rule, see Sections III.C and D of the preamble.

Regarding comments on PEV adoption rates, projections of ZEVs in our rule, and the market share of vehicle technologies projected in the analysis for this rule, see responses in RTC Section 13 and RTC Section 12.5.3.

Comments regarding costs are addressed in RTC Sections 8 and 12.

Regarding comments on the ZEV outlook sources EPA cited in the proposal, as well as sources that EPA did not cite, see the updated discussion in RIA Chapter 4.1.

Regarding comments that EPA failed to address automaker abilities to cross-subsidize, we disagree. OMEGA incorporates cross-subsidization into producer decisions. This is discussed in RIA Chapter 2.6.4.

Regarding comments from API that EPA must explain the difference between AEO projections and EPA estimates, see RIA Chapter 8.1, which describes how we use AEO 2023 in our OMEGA analysis. In addition, RIA Chapter 8.2 discusses consistency of OMEGA results with AEO projections.

Regarding comments from API and others on advantages or disadvantages of PEVs over ICE vehicles, including conjectures that EVs are less reliable, see Section 13.2 of the RTC.

The availability of affordable vehicles is also discussed in Section 13 of the RTC. Section 13.4 of the RTC contains a discussion of the cost competitiveness of ZEVs.

Regarding comments on the availability of critical minerals, see Section 15 of this document.

Regarding comments on charging availability, see RTC Section 17.

Regarding comments on the electric grid, see RTC Section 18.

Regarding comments about lower carbon fuels, see RTC Section 19.1.

Regarding comments on the LEV-III and Tier-3 programs, see RTC Section 4.1.

Regarding comments on the adoption of the proposed, or stronger, standards, see Section 1.1 of the RTC.

Regarding comments about employment effects of this rule, see RTC Section 20.

Regarding comments on safety impacts of this proposal, see RTC Section 22.

Regarding comments life cycle analysis, see responses in RTC Section 19.2.

Regarding comments that this rule will lead to reduced fleet turnover and fuel burning vehicles staying on the road longer, we refer to Section 12.1.3 of the RTC.

Regarding comments on banking and trading and comments on the MD multiplier, see RTC Section 3.1.

14.1 - Limited vehicle choice

Comments by Organizations

Organization: Alliance for Consumers (AFC)

Alliance for Consumers, by way of its Executive Director, O.H. Skinner, files this comment to highlight the ways in which the proposed rule fails to serve the interests of everyday consumers and how EPA's proposal is procedurally and substantively deficient and should not be finalized. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

The current EPA proposal is best understood as yet another attempt to weaponize the agency rulemaking process, and the power of the federal government, to wipe away things that everyday consumers overwhelmingly like, use, and rely upon for life's essential needs. [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

EPA is proposing to replace a majority of the cars on the market today with EVs that are currently unpopular with everyday consumers in most parts of the country and do not work within the household budgets of those who need cars to help their families thrive. And that is before considering how EPA's proposed rule is premised on speculative, wholesale changes to other parts of the economy and our national infrastructure outside the purview of EPA (e.g., the energy grid). [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

Make no mistake, this is a proposal to forcibly remove from the market a majority of the cars that everyday consumers currently buy and use. The EPA Fact Sheet for the proposal focuses throughout on electric vehicle technology as the critical aspect of the proposed rule, from how it was conceived, through how it would be complied with. See, e.g., EPA Fact Sheet, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Apr. 2023, at 1 (highlighting EV technologies and support for a "rapid shift away from" "internal combustion engine (ICE) technologies"); id. at 2 (focusing on "vehicle electrification technologies" as central to proposed standards); id. at 6 (emphasizing electric vehicle costs and benefits throughout cost-benefit analysis section).1 [EPA-HQ-OAR-2022-0829-0534, pp. 1-2]

1 Fact Sheet available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017626.pdf.

And then there is the failure by EPA to consider adequately that certain automakers may be forced to limit the sale of ICE vehicles in order to meet the proposed requirements, limiting the availability of cars nationwide, driving up prices, and limiting options for consumers, especially those with families. This consequence is currently playing out with at least one automaker in response to California-led EV mandates. See Patrick George, Stellantis Is Restricting Gas-Only Car Sales In 14 U.S. States Including California And New York, TheAutopian, June 16, 2023; see also Attached Exhibits, infra. Given the stringency of the proposal, and the limited consumer appetite for expensive EVs with limited use-cases for many families (especially larger families), it is a possible aspect of the problem that automakers will be forced to limit the sale of larger, ICE vehicles to something well below the levels that would otherwise be supported by consumer demand in order to meet the requirements EPA is currently considering. Yet EPA did not adequately consider or address this reality, despite it being one that would have dramatic negative consequences for everyday consumers. [EPA-HQ-OAR-2022-0829-0534, pp. 4-5]

Organization: American Highway Users Alliance

We are skeptical that the GHG and criteria reductions estimated by EPA can be realized in the proposed rule's timeframe. [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

We noted above the substantially greater cost of EVs. With such a cost differential (even if the differential is reduced somewhat in coming years), many consumers and businesses can be expected to keep and maintain existing vehicles (average age just over 12 years) rather than pay for new, much more expensive electric vehicles. [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

Additionally, the cost of the vehicle itself is not the only consideration for a consumer in making a purchasing decision. Many businesses and hard-working families will not purchase a vehicle unless both the vehicle and fuel are cost effective and meet their needs. At this point the availability of charging stations, while increasing, seems unlikely to approach the current ubiquitous availability of fuel at gas stations within the time frame of the rule. That could result from various electricity supply and transmission issues, including the time delay and cost involved in building out more connections between the grid and charging stations.4 [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

4 A statement submitted to EPA in conjunction with EPA's May 3 hearing in the heavy-duty vehicle Phase 3 docket by ABF Freight System, a major trucking company with over 4,500 Class 8 and Class 6 vehicles, noted a wait of 2 years and counting for added utility infrastructure at a facility to support the company's current EV trucks (only 6) and anticipated EV truck purchases.

For such reasons the benefits of the proposed rule as estimated by EPA appear to be overstated, as the vehicle fleet will not turn over to EVs as quickly as EPA estimated. Further, the proposed rule will limit consumer choice and the mobility of the American public. [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

Organization: Delek US Holdings, Inc.

EPA's Proposed Rule is based on the flawed notion that vague corporate goals are sufficient to prop up the incredulously stringent standards. EPA relies, in part, on the "proliferation of announcements by automakers" to achieve increased electrification rates between 2030 and 2040," but these broad and general statements are just that - goals.5 In reality, the U.S. Department of Energy forecasts ICE-power cars will continue to dominate U.S. sales through 2050.6 And LD fleets take approximately two decades to turn over completely.7 Indeed, analysts estimate that even with ZEVs making up 25% of new sales by 2035, only 13% of vehicles on the road would be electric.8 Thus the transition to ZEVs will be, and must be, gradual—regardless of regulatory mandates— and much more gradual than EPA's anticipated growth from 4.4% to upwards of 67% in a mere nine years. EPA's proposed standards must better account for these real market conditions and, at the very least, propose more feasible and realistic emissions standards reflective of actual, practicable ZEV adoption rates. [EPA-HQ-OAR-2022-0829-0527, p. 3]

5 Proposed Rule at 29,19–92.

6 Notably, the U.S. Energy Information Administration ("EIA") predicts that the global light-duty electric vehicle fleet will grow to only 31% by 2050, indicating ICE vehicles will continue to dominate global sales through at least that time. EIA, "EIA projects global conventional vehicle fleet will peak in 2038" (Oct. 26, 2021), available at https://www.eia.gov/todayinenergy/detail.phpfiid=50096.

7 Brad Plumer et al., THE NEW YORK TIMES, Electric Cars Are Coming. How Long Until They Rule the Road?" (Mar. 10, 2021), available at https://www.nytimes.com/interactive/2021/03/10/climate/electric-vehicle-fleet-turnover.html; see also Virginia McConnel and Benjamin Leard, RESOURCES FOR THE FUTURE, "Progress and Potential for Electric Vehicles to Reduce Carbon Emissions" (Dec. 8, 2020), available at https://www.rff.org/publications/reports/potential-role-and-impact-evs-us-decarbonization-strategies/#:~:text=Passenger%20vehicle%20fleets%20take%20approximately,important%20in%20the%20following%20decades.

8 Brad Plumer, supra at 7.

Organization: Matthew DiPaulo

My company produces motor oil for passenger car vehicles with proprietary formulations which exceed industry specifications, improve fuel economy, reduce emissions, and can be used in hybrid vehicles [EPA-HQ-OAR-2022-0829-1514, p. 1]

The premature rush to transition the U.S. vehicle fleet to EV's will reduce my sales.

The large-scale shift to electric vehicles, which would comprise two-thirds of all new-car sales in the U.S. by 2032 under this proposal, will hurt workers, small businesses, and consumers while doing little to help the environment. The proposed rule would lead to fewer vehicle choices for individuals and families, reducing the selection of vehicles that fit their household budgets and unique needs. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: Steven G. Bradbury

EPA fails to consider the negative societal consequences and second-order cost effects of its proposals.

In putting forward regulatory proposals designed to force upon the American people a vast and rapid industrial transformation, EPA has an obligation to go further than just considering the direct cost effects of its proposals (which are themselves woefully under- estimated, as highlighted above); it must also consider the broader indirect economic con- sequences and negative societal costs that would follow if these rules are finalized as pro- posed. So far in these rulemakings, the Agency has either ignored or deliberately down- played these second-order effects. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

Some of the most consequential burdens and negative ramifications of the proposed rules that EPA hides, disregards, or minimizes include the following: [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Stifling consumer choice at the dealership. Many of the vehicle models most pop- ular with American families will no longer be sustainable under the EPA's proposed rules. Automobiles have long been America's favorite freedom machines. When the models of ICE vehicles Americans love the most disappear from dealerships, that will represent an enormous drop in consumer welfare (in basic happiness and well- being) for the average American family and for the U.S. economy as a whole. For many of these ICE vehicle models, there is no EV option likely to be available that could provide the same performance, utility, or recreational value at a comparable price (or at all). EPA makes no real effort to quantify this generational loss of consumer welfare. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

Organization: Zero Emission Transportation Association (ZETA)

iii. Recent New EV Model Announcements

In 2022, the number of available EV models worldwide reached 500, up from below 450 in 2021 and more than doubling relative to 2018-2019.272 In particular, OEMs are expanding their SUV and pickup truck offerings in line with consumer demand. Consumer Reports has compiled a noncomprehensive list of at least 30 new EVs in a variety of makes and models that are expected in the U.S. by the end of 2024.273 In addition to new models from legacy automakers, there are a number of new entrants expected in 2024 including Fisker, Indi, Polestar, and VinFast. [EPA-HQ-OAR-2022-0829-0638, pp. 73-74]

272 Id. at footnote 27

273 "Hot, New Electric Cars That Are Coming Soon," Consumer Reports, (June 9, 2023) https://www.consumerreports.org/hybrids-evs/hot-new-electric-cars-are-coming-soon-a1000197429/

In the United States, there were fewer than 100 models available in 2022, but twice as many as before the pandemic.274 EV model availability has been growing quickly, at a compound annual growth rate of 30% over the 2016-2022 period. Such growth is to be expected in a nascent market with a large number of new entrants bringing innovative products to the market, and as incumbents diversify their portfolios. Even companies that had previously urged caution on EV commitments are shifting towards greater electrification. Toyota plans to release at least 10 EV models by 2026. It is also restructuring to create a unit solely dedicated to electric vehicles.275 [EPA-HQ-OAR-2022-0829-0638, pp. 73-74]

274 "Global EV Outlook 2023 Catching up with climate ambitions," IEA, (2023) https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEVO2023.pdf

275 Id. at footnote 261

In the future, the number of models can be expected to continue to increase quickly, as major carmakers expand their EV portfolios and new entrants strengthen their positions, particularly in emerging markets and developing economies.276 [EPA-HQ-OAR-2022-0829-0638, pp. 73-74]

276 Id. at footnote 2

EPA Summary and Response

Summary:

Commenters stated that this rule will lead to reduced vehicle choices for consumers. AFC stated that this rule is going to forcibly remove vehicles from the market that consumers like and rely on, replacing most ICE vehicles with unpopular, expensive EVs. Steven G. Bradbury commented that the proposal is designed to force a rapid industrial transformation and will lead to stifled choice at the dealership where American families will not be able to purchase a vehicle that fits their needs. Bradbury continues on to state that EPA does not attempt to quantify this loss in consumer welfare. ZETA commented that availability of EV models has grown very quickly, and is expected to continue to grow.

AFC also stated that the rule is premised on speculative changes to national infrastructure, like the energy grid. They commented that this rule fails to consider that automakers may be forced to limit ICE sales to meet requirements, which will increase prices and further limit options for consumers. The American Highway Users Alliance (AHUA) commented that higher prices will lead to reduced fleet turnover – consumers will keep used vehicles longer and that this means that the benefits of the rule are overstated. AHUA also stated that it is unlikely that EV charging will be available to a level as ubiquitous as the current fuel availability at gas stations. They also state that the rule, in addition to limiting consumer choice, will limit consumer mobility.

Delek commented that basing the rule on automaker announcements is flawed and that DOE forecasts indicate that ICE vehicles sales will continue to dominate vehicle sales far into the future, and that fleet turnover will take longer than EPA anticipates. They stated that the standards must better account for real market conditions and be reflective of actual, practicable, ZEV adoption rates.

Matthew DiPaulo commented that the shift to EVs under the proposal will hurt workers, small businesses and consumers while doing little to help the environment.

Response:

We do not agree that this rule will lead to reduced vehicle choice. This rule is not a ZEV mandate and allows manufacturers to meet the standards in the most effective way for their fleet, which is expected to lead to the lowest cost path for each manufacturer, yet still achieve the public health and welfare benefits associated with the reduced level of emissions set by the rule. As described in Section IV.F and G of the preamble, we demonstrate that there are multiple pathways to compliance, and that these pathways will continue to offer a wide range of mixes of technologies in the fleet for consumers to choose from, including various mixes of ICE vehicles, strong hybrid vehicles, PHEVs and BEVs. Specifically, EPA has concluded that the standards could be met by additional PHEVs and has identified several additional compliance pathways, with a wide range of BEVs, that can be achieved in the lead-time provided and at a reasonable cost. In all of these pathways, manufacturers continue to produce ICE vehicles. Indeed, as shown in RIA Chapter 8.2, EPA's central case modeling shows that over 84 percent of the on-road fleet will still use gasoline or diesel in 2032, and 58 percent will in 2055. In addition, the increased fuel economy and associated fuel savings via PEV and ICE vehicle technologies provided to consumers in the new vehicle market will also eventually be available in the used vehicle market. Overall, we expect consumers to continue to have access to a wide variety of vehicle choices under the standards. More on continued vehicle choice can be found in RTC Section 13.1. For more information on fleet turnover, see section 12.1.3 of the RTC.

Because we do not agree that this rule will lead to consumers being unable to purchase a vehicle that fits their needs, we do not agree that we should estimate a loss of welfare associated with this. In addition, as discussed in RIA 4.4, we hold performance constant in our analysis, meaning that we deter the need to estimate potential consumer welfare loss due to foregone vehicle attributes.

We do not agree that this rule will limit consumer mobility. In fact, we believe that consumer mobility will increase because of the decreased operating costs we estimate will occur due to this rule. As also discussed in Section 13 of the RTC, many consumers commented that PEVs serve the interest of many consumers. Not only will consumers be able to purchase the vehicles they need, but we estimate that operating costs are going to fall, from significant fuel savings for all vehicles and repair and maintenance savings for PEVs, as described in Sections VIII.B.3 and VII.C of the preamble and Chapter 4 of the RIA. This will make each trip relatively less expensive and, as a result, we estimate that under the "rebound effect" consumers will choose to drive more; thus the rule will actually increase mobility for consumers. See RIA chapter 4.2.1.

Regarding comments that we did not consider vehicle availability or costs in our analysis, we note that this rule uses the OMEGA model to estimate vehicles produced and sold, taking into account the estimated costs of those vehicles. In RIA Chapter 2, we discuss the OMEGA model, including the Consumer Demand module, which estimates the demand for vehicles given the estimated purchase price and other factors, the Producer Module, which estimates the producers will make given costs, policy inputs and other factors, as well as the interaction of the modules.

Regarding comments that the benefits of this rule are overstated, we refer to Section 8 of the RTC, where we discuss benefits of this rule. We disagree that this rule will lead to little environmental benefit, as described in Sections 8 and 11 of the RTC.

Regarding comments on the availability of EV charging in the future, see RTC Section 17.

For our discussion on the energy grid, including grid reliability, see RTC Section 18.

Regarding Delek's comments on basing the rule on automaker announcements, we address this issue in RTC Section 14.

Regarding the comments that the standards must be reflective of actual ZEV adoption rates, we refer to the discussion in Section 13 of the RTC.

Regarding comments about employment impacts, see Section 20 of the RTC.

For information on consumer impacts, see RTC Section 13.

For information on small business impacts, see RTC Section 25.1.

14.2 - Elasticity of demand

Comments by Organizations

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Vehicle Demand Elasticity

The vehicle demand elasticity, which represents how sensitive consumers are to changes in vehicle prices, is an important parameter in determining the costs and benefits of the proposal. The greater the elasticity (in absolute value) that is assumed, the greater new vehicle sales decline in response to price increases, potentially reducing the estimated emission benefits of the proposal. CARB agrees with U.S. EPA that the vehicle demand elasticity assumption of -0.4 is conservative, and thus overstating the effects of price increases, than other better-supported elasticity estimates would suggest. According to a recent U.S. EPA report, once interactions across new and used vehicle markets and other transportation options are accounted for in market equilibrium, the -0.4 vehicle demand elasticity could effectively result in only -0.17 and -0.04 elasticities for new and used vehicles, respectively. 80 These interactions across markets affect the new vehicle elasticity because as consumers substitute buying used vehicles in response to increased cost of new vehicles, used vehicle prices would increase, reducing the incentive to substitute away and implying a lower elasticity in market equilibrium. If the DRIA reflected these better estimates, the estimated climate and public health benefits of the proposal would be expected to be greater. [EPA-HQ-OAR-2022-0829-0780, p. 49]

80 80 Jacobsen, M., R. Beach, C. Cowell, and J. Fletcher. The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage. U.S. Environmental Protection Agency, Washington, D.C., July 31, 2021.

Organization: Environmental. and Public Health Organizations

XXIV. EPA’s Consideration of Sales Impacts Is Reasonable, but the Agency Should Consider Using a Sales Elasticity of Demand Lower in Magnitude for LDVs.

C. Alternative 1+ Results in the Highest BEV Sales Share of All Scenarios

Alternative 1+ results in the highest BEV sales share of all scenarios at 78% by 2032, which helps spur higher in-use BEV share by 2040 (as depicted in Figure V.C-1). The BEV sales share for Alternative 1+ is almost 10 percentage points more than what is projected to occur under EPA Alternative 1 and 13 percentage points more than what is projected to occur under the EPA Main Proposal and EPA Alternative 3 policy scenarios. [EPA-HQ-OAR-2022-0829-0759, p. 29]

SEE ORIGINAL COMMENT FOR Figure V.C-1: Comparison of BEV Adoption Rate Scenarios: Sales Share108

108 ERM, Impacts Report at 7-8.

Based on Sales Share (shown in the left side graph), in-use ZEVs will continue to increase under the Alternative 1+ scenario such that the 2040 in-use share is incrementally higher than all other scenarios analyzed. [EPA-HQ-OAR-2022-0829-0759, p. 30]

Excerpt Text:

D. Alternative 1+ Achieves the Largest Share of In-Use BEVs of All Scenarios

The graphs in Figure V.D-1 show projected shares of in-use vehicles through 2040. As shown, a policy approach implementing our recommended Alternative 1+ provides the highest in-use ZEV percentages of any scenario analyzed. Under this policy scenario, 50% of the light- and medium-duty (L/MD) vehicles on the road are expected to be BEVs by 2040.

SEE ORIGINAL COMMENT FOR Figure V.D-1: Comparison of BEV Adoption Rate Scenarios: In-Use Share109 [EPA-HQ-OAR-2022-0829-0759, p. 30]

109 Id. at 7-8.

In this section, we turn to EPA's consideration of sales impacts. While we support EPA's proposal to use a sales elasticity of demand of zero for MDVs, we recommend that it use a sales elasticity of demand lower than –0.4 for LDVs. [EPA-HQ-OAR-2022-0829-0759, p. 183]

A. EPA should consider using a sales elasticity of demand lower in magnitude than –0.4 for LDVs.

EPA continues to use the new vehicle demand elasticity of –0.4 for its modeling of LDV sales impacts, based on the Agency's final 2021 rule and a 2021 EPA peer reviewed report on this topic. 88 Fed. Reg. at 29,370.597 Recent research supports a sales elasticity value of –0.4, or one even lower in absolute value, as EPA suggests. See 88 Fed. Reg. at 29370 (noting that " –0.4 appears to be the largest estimate (in absolute value) for a long-run new vehicle demand elasticity in recent studies," and that "EPA's report examining the relationship between new and used vehicle markets shows that, for plausible values reflecting that interaction, the new vehicle demand elasticity varies from –0.15 to –0.4"); see also 83 Fed. Reg. at 43075 (based on the available research, the 2020 Rule NPRM conducted a data analysis and projected an elasticity in the range of –0.2 to –0.3.)598 [EPA-HQ-OAR-2022-0829-0759, p. 183]

597 Citing EPA, The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage, EPA–420–R–21–019 (2021), https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=352754&Lab=OTAQ.

598 This number was actually incorrectly calculated and too high due to a spreadsheet error identified in a Comment to the 2018 NPRM. It should be -0.07. See J.H. Stock et al., Comments on Notice of Proposed Rulemaking for The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks, EPA-HQ-OAR-2018-0283-6220, at 6–8 (Oct. 26, 2018). See also Brief of Amici Curiae Economists in Support of Coordinating Petitioners, Competitive Enterprise Institute v. NHTSA, D.C. Cir. No. 20-1145, at 26 (filed Jan. 21, 2021) (hereinafter "Amicus Brief of Economists").

Using a price elasticity of demand that is lower in absolute value could provide a more realistic picture of the sales impacts of LDV GHG regulations, and EPA should consider whether a value lower in magnitude than –0.4 is appropriate here. The price elasticity of demand for new vehicles is a critical factor to consider in setting LDV regulations because without this input EPA could not quantify the rule's effect on vehicle purchases. Changes in demand for new vehicles can have an impact on jobs, emissions, safety, and other factors relevant to the net benefits of revised standards. [EPA-HQ-OAR-2022-0829-0759, pp. 183-184]

Vehicles have different price elasticities depending on the timeframe considered, and sales of automobiles tend to be less sensitive to price fluctuations, especially in the long run.599 This is because in most areas of the United States vehicles are essential goods.600 EPA's Science Advisory Board explained that while "a consumer can easily hold on to their existing vehicle a bit longer[,] . . . an old vehicle will not be functional forever, and thus the long-run price elasticity for new vehicles is likely to be smaller [in magnitude] than the short-run elasticity."601 Therefore, it is common to distinguish between short-run elasticity values (sales effects that take place within one year of a price change)602 and long-run elasticity values (sales effects beginning approximately five years into the future).603 Thus, the 2012 Final Rule explained, while short-run elasticity may apply very briefly at the start of a program, "over time, a long-run elasticity may better reflect behavior." 77 Fed. Reg. at 63102 n.1300. Similarly, in the 2016 Midterm Evaluation Proposed Determination, EPA explained that "short run elasticity estimate[s] . . . may not be appropriate for standards that apply several years into the future."604 [EPA-HQ-OAR-2022-0829-0759, p. 184]

599 Howard, P. & M. Sarinksy, Turbocharged: How One Revision in the SAFE Rule Economic Analysis Obscures Billions of Dollars in Social Harms, N.Y.U. Inst. for Policy Integrity, at 3 (Nov. 2020), https://policyintegrity.org/files/publications/Turbocharged_How_One_Revision_in_the_SAFE_Rule_Economic_An alysis_Obscures.pdf ("Because automobiles are essential goods in most areas of the United States (and lack any comparable substitute), both economic theory and observed behavior finds that vehicle sales are relatively inelastic—meaning that price fluctuations produce just modest changes in vehicle sales").

600 See, e.g., Anderson P.L. et al., Price Elasticity of Demand (1997), https://scholar.harvard.edu/files/alada/files/price_elasticity_of_demand_handout.pdf.

601 EPA, Science Advisory Board (SAB) Consideration of the Scientific and Technical Basis of the EPA's Proposed Rule titled The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, EPA-HQ-OAR-2018-0283-7659, at 22 (Feb. 27, 2020).

602 See Pindyck, R.S. & D.L. Rubinfeld, Microeconomics (8th ed.), at 39 (1989) (describing short-run elasticity as measuring "one year or less").

603 See Klier, T. & J. Linn, The Effect of Vehicle Fuel Economy Standards on Technology Adoption, Resources for the Future Discussion Paper, at 3, 6 (Rev'd 2015), https://media.rff.org/archive/files/document/file/RFF-DP-13-40-REV2.pdf (noting that long-run impacts measure across engine design cycles, and that "models contain redesigned engines about once every five years in the United States"); see also Amicus Brief of Economists at 20 (noting that "long-run" concerns sales effects that begin approximately five to ten years into the future).

604 EPA, Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, EPA-HQ-OAR-2018-0283-7640, at A-40 (Nov. 2016). See also NHTSA CAFE Model Peer Review, at B-35 (rev. July 2019) (advising EPA and NHTSA that the long-run price elasticity of demand provides the "proper focus" for analyzing the 2020 Final Rule's impacts).

Because analyses of LDV GHG emissions standards project sales many years into the future, the long-run price elasticity is the relevant value to apply to the analysis. And because vehicle sales are less elastic in the long run, the price elasticity of demand for vehicles is substantively lower in magnitude in the long run than in the short run. [EPA-HQ-OAR-2022-0829-0759, pp. 184-185]

The chart below provides a comprehensive review of current and historical long-run and short-run elasticity estimates.605 The median elasticity of the studies published since 2000 (including an outlier estimate) is approximately –0.35, with a mean of –0.4, and those numbers decrease when looking only at studies published since 2010.606 The most recent reliable studies, such as Leard (2021) and Stock et al. (2018), would support values even lower in magnitude than –0.4. [EPA-HQ-OAR-2022-0829-0759, p. 185]

605 This review included the sources cited by the agencies in the 2020 Final Rule, 85 Fed. Reg. 24174 (June 29, 2020), as well as other relevant sources (in particular those in National Research Council, Cost,

Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles (June 2015), and previous EPA rules) and more recent studies.

606 These values are consistent with a review done by several economists and detailed in an amicus brief filed in the litigation over the 2020 Final Rule. That review considered what the economists viewed as the four most relevant, distinct estimates of long-run elasticity based on original data analysis since 2000, and found a long-run price elasticity of demand for vehicles subject to the Proposal of between -0.03 and -0.61. See Amicus Brief of Economists at 25-26.

SEE ORIGINAL COMMENT FOR TABLE: Sales Elasticity Estimates

607 Sean P. McAlinden et al., The Potential Effects of the 2017–2025 EPA/NHTSA GHG/Fuel Economy Mandates on the U.S. Economy, Center for Automotive Research (Sept. 2016), https://www.cargroup.org/wp-content/uploads/2017/02/The-Potential-Effects-of-the-2017_2025-EPANHTSA-GHG Fuel-Economy-Mandates-on-the-US-Economy.pdf.

608 F. Owen Irvine, Jr., Demand Equations for Individual New Car Models Estimated Using Transaction Prices with Implications for Regulatory Issues, 49 Southern Economic Journal 764–782 (Jan. 1983).

609 Andrew N. Kleit, The Effect of Annual Changes in Automobile Fuel Economy Standards, 2 Journal of Regulatory Economics 151–172 (1990).

* McAlinden et al. (2016) conducted both a literature review, represented at the top of this table, and separately produced its own elasticity estimates, shown here.

** Inconsistent estimates: Nerlove (1957) as long-run elasticity is higher than short-run elasticity; Evans (1969) as elasticities are extreme outliers with long-run elasticity that is elastic contrary to intuition in the literature; and Berry et al. (2004) as estimate was suggested by General Motors staff despite “impl[ying] a large (in absolute value) own-price semi-elasticity of demand equal to −10.56” and conducted sensitivity analysis using –0.2 and –0.4 (the latter producing more realistic own-price semi-elasticity) (Leard (2021)).610[EPA-HQ-OAR-2022-0829-0759, p. 187]

610 Benjamin Leard, Estimating Consumer Substitution Between New and Used Passenger Vehicles, Resources for the Future 12 (rev. Aug. 2021), https://media.rff.org/documents/WP_19-01_rev_2021.pdf.

B. EPA is correct to use a sales elasticity of zero for MDVs.

For MDV sales impacts, EPA’s Proposal assumes an elasticity of zero, reasoning that MDVs largely serve commercial applications and that business owners are less sensitive to changes in vehicle price. 88 Fed. Reg. at 29372. As EPA explains, “as long as the characteristics of the vehicle do not change, commercial buyers will still purchase the vehicle that fits their needs,” even with a change in price. Id. We agree with EPA that, for this reason, the literature examining LDV sales elasticity does not directly translate to MDV sales elasticity, and that factors such as the importance of fuel efficiency, warranty considerations, maintenance cost, and replacement parts could be more relevant to commercial vehicle purchasers than changes in vehicle price. DRIA at 4-43. [EPA-HQ-OAR-2022-0829-0759, p. 187]

Attributes of MD ZEVs also could help to mitigate vehicle sales impacts, particularly for commercial applications. For example, as with commercial HDVs, educating commercial MDV purchasers regarding the benefits of ZEV ownership such as reduced operating and maintenance costs can be especially effective in mitigating possible sales impacts, 88 Fed. Reg. at 26068,611 as TCO has long been a key consideration for commercial vehicle owners and operators.612 The availability of data analytics tools for commercial fleets also makes it easier for commercial purchasers to understand and evaluate the TCO.613 Medium-duty ZEVs largely have reached TCO parity with their conventional counterparts, or will in the very near future and by the time period covered by the Proposed Rule.614 For commercial HDVs, EPA has projected little to no sales impacts as a result of its newly proposed GHG standards, which are likely to be complied with through increased ZEV penetration,615 and EPA is correct to do the same for MDVs. [EPA-HQ-OAR-2022-0829-0759, p. 188]

611 See also, EPA, Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles: Phase 3, Draft Regulatory Impact Analysis (Apr. 2023), at 411–412.

612 See, e.g., Seth Skydel, Determining ROI to Lower TCO, Fleet Equipment (Nov. 5, 2014), https://www.fleetequipmentmag.com/truck-investment-cost-ownership/ (explaining the importance of TCO to commercial fleets); David A. Kolman, The True Costs of a Truck Purchase, Fleet Maintenance (June 9, 2015), https://www.fleetmaintenance.com/home/article/12072830/the-true-costs-of-a-truck-purchase ("TCO is far more important than initial price when acquiring a vehicle"); Patrick Gaskins, Despite Initial Cost, Purchase Decision is Always About TCO, Fleet Owner (Jan. 13, 2022), https://www.fleetowner.com/operations/article/21213521/despite-initial-cost-purchase-decision-is-always-about-tco ("Don't base your decision on whether to buy a new piece of equipment on the upfront cost alone. Take the time to do a TCO calculation that includes both hard and soft costs. That will tell you whether the time is right to buy."); ICCT & Ricardo Strategic Consulting, E-Truck Virtual Teardown Study 6 (June 11, 2021), https://theicct.org/wp-content/uploads/2022/01/Final-Report-eTruck-Virtual-Teardown-Public-Version.pdf; ("Zero emission truck price should be viewed in the wider context of overall TCO."); McKinsey Center for Future Mobility, Preparing the World for Zero-Emission Trucks 6 (Sept. 2022), https://www.mckinsey.com/~/media/mckinsey/industries/automotive%20and%20assembly/our%20insights/preparin g%20the%20world%20for%20zero%20emission%20trucks/preparing-the-world-for-zero-emission-trucks.pdf (explaining that TCO is a "key factor" in deployment of zero-emission trucks).

613 See, e.g., Seth Skydel, Determining ROI to Lower TCO, Fleet Equipment (Nov. 5, 2014) (detailing data analytics tools that aid fleets in making equipment purchase decisions based on TCO); David A. Kolman, The True Costs of a Truck Purchase, Fleet Maintenance (June 9, 2015) (explaining the use of telematics software in analyzing TCO, and noting that "OEM dealer sales representatives are trained on effectively calculating TCO costs and on assisting truck buyers [to] evaluate and assess planned operation of their trucks.").

614 Saxena et al., Electrification Cost Evaluation, at 26 ("While the economics vary based on several factors, the TCO of most MY 2027 and MY 2030 class 2b–3 BEV types is lower than the TCO of comparable ICEVs, largely due to BEVs' lower maintenance and energy costs. Across the vehicle types and three scenarios of electrification considered in this report, the TCO of BEVs averages $0.334 per mile (ranging from $0.291 per mile to $0.39 per mile), while the TCO of ICEVs averages $0.428 per mile (ranging from $0.336 per mile to $0.574 per mile)."); Ari Kahn, et al., The Inflation Reduction Act Will Help Electrify Heavy-Duty Trucking, RMI (Aug. 25, 2022), https://rmi.org/inflation-reduction-act-will-help-electrify-heavy-duty-trucking/ (finding that the IRA will result in the TCO of electric trucks falling below the TCO of comparable diesel trucks about five years faster than without the IRA).

615 EPA, Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles: Phase 3, Draft Regulatory Impact Analysis (Apr. 2023), at 414.

Organization: American Honda Motor Co., Inc.

It is critical that the impact of a potentially significantly higher new vehicle transaction price on total sales be accounted for by the agency. Unfortunately, the agency's analysis is extremely limited, as their sensitivity cases are independently analyzed and omit the possibility of IRA being weakened. Honda attempted to quantify the impact that a "stacking" of uncertainties would have on average new vehicle price. We examined average new vehicle price from OMEGA 2.0

under EPA's proposal (shown in light blue in Figure 6, below), as well as the resulting increase in price that would occur under two additional stacked scenarios: (1) elimination of IRA incentives, and (2) EPA's high battery cost assumptions. As shown in Figure 6, the cumulative impact of these two uncertainties could increase the average new vehicle price by more than $8,600 (a 25% increase) in 2030, relative to the agency's proposal. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

Qualitatively, one would assume that such a significant increase in price would have a noticeable quelling effect on new vehicle sales. Strangely, the agency's OMEGA output files show very little impact on overall sales, despite the significant price increase. The agency's modeled sales impacts show a long run demand elasticity of just -0.21, notably different than values cited in EPA's Draft RIA as well as by other industry experts.46 47 As shown in Table 3 below, the implication of a different demand elasticity has a significant impact on the magnitude of overall new vehicle sales. If actual demand elasticities are closer to -0.40 (EPA estimate) or -0.61 (CAR estimate), loss of sales due to a 25% price increase would be between 1.5 million and 2.3 million new vehicle sales annually. One can speculate on the potential impact that such a loss of sales would have both on the industry and the economy, as well as the impact on consumer choice, vehicle affordability and equity. [EPA-HQ-OAR-2022-0829-0652, pp. 26-28]

46 EPA, 2023. Draft RIA, p. 4-43. Available online at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

47 McAlinden et al., 2016. The Potential Effects of the 2017-2025 EPA/NHTSA GHG/Fuel Economy Mandates on the U.S. Economy. Center for Automotive Research. Available online at https://www.cargroup.org/wp-content/uploads/2017/02/The-Potential-Effects-of-the-2017_2025-EPANHTSA-GHGFuel-Economy-Mandates-on- the-US-Economy.pdf

Organization: National Automobile Dealers Association (NADA)

Based on OEM fleet electrification investment and production plan announcements and federal subsidies in the Infrastructure Investment and Jobs Act (IIJA) and the IRA, EPA contends that EV technologies have advanced to such a degree that EVs now "are a feasible way to greatly reduce emissions" and can be used "as an emissions control technology to comply with" the proposed standards.15 EPA projects that, although "[t]he proposed standards are performance-based and do not mandate any specific technology...or any vehicle type[,]" new light-duty EV sales will increase from 36 percent in MY 2027 to 67 percent in MY 2032.16 EPA also projects new medium-duty EV sales ranging from 17 percent in MY 2027 to 46 percent in MY 2032.17 [EPA-HQ-OAR-2022-0829-0656, pp. 3-4]

15 88 Fed. Reg. at 29194, 29284, 29341-44.

16 88 Fed. Reg. at 29329.

17 88 Fed. Reg. at 29331.

EPA also projects that its proposed standards will cause new light-duty vehicle sales to decrease a small amount during the first two years, increase a small amount in the next two years, and then decrease by a small amount in the final two years.18 EPA projects no change in new medium-duty vehicle sales as a result of its proposed standards based on an assumption that, because commercial buyers "are less sensitive to changes in vehicle prices than personal vehicle owners[,]" they will not "change purchase decisions if the price of the vehicle changes" and "will still purchase the vehicle that fts their needs."19 [EPA-HQ-OAR-2022-0829-0656, pp. 3-4]

18 88 Fed. Reg. at 29370.

19 88 Fed. Reg. at 29371.

5. EPA's Sales Projections Are Inaccurate.

In discussing its sales response model, EPA states that it used "a demand elasticity of -0.4 for [light-duty] vehicles based on an EPA peer reviewed report (U.S. EPA 2021)."51 EPA assumes that a one percent increase in the average price of new vehicles produces a 0.4 percent decrease in new light-duty vehicle sales. EPA then concludes that its proposed standards would result in only a small change in total new light-duty vehicle sales, which equate to -0.35 percent in 2027, -0.13 percent in 2028, 0.07 percent in 2029, 0.05 percent in 2030, -0.15 percent in 2031, and -0.29 percent in 2032.52 NADA takes issue with EPA's -0.4 percent demand elasticity assumption and the accuracy of its light-duty sales impact projections. Curiously, EPA's demand elasticity response for light-duty vehicles is significantly smaller than the -1.0 elasticity of demand NHTSA used in its most recent fuel economy mandates, and thus implies much smaller price-related impacts on new vehicle sales. [EPA-HQ-OAR-2022-0829-0656, pp. 10-11]

51 88 Fed. Reg. at 29370-71.

52 Id.

As depicted in the table below [See original attachment for table of sales projections] , NADA's sales projections differ significantly from EPA's sales projections and show sales declines in all six years covered by EPA's proposal.53 [EPA-HQ-OAR-2022-0829-0656, pp. 10-11]

53 NADA calculates forecasted price increases using the average year-over-year increase in new vehicle transaction prices from 2016–April 2023 YTD. During this period, new vehicle prices increased annually, on average, by 4.62 percent. Note that because price increases in 2020-2021 and 2021-2022 were abnormally high due to circumstances related to the COVID-19 pandemic and the semiconductor microchip shortage, NADA assumes an annual new vehicle transaction price increase of only 2% for 2024–2032.

54 See DRIA Table 13-45. p. 13-25.

NADA believes EPA's sales impacts are significantly understated based on its use of demand elasticity of -0.4 and asserts that the -1.0 used by NHTSA is a more appropriate elasticity of demand. Nevertheless, based on EPA's assumed demand elasticity of -0.4 percent, the proposal's projected regulatory costs, and reasonable assumptions about increased new light- duty vehicle prices, NADA's analysis suggests that the price increases associated with EPA's proposed standards (and regulatory alternatives) will result in much more significant negative sales impacts. For example, in 2027 EPA projects a sales decline of just 0.35%. After accounting for the additional conservatively forecast market-based price increases, and using EPA's own demand elasticity metric, NADA estimates a new light-duty sales decline of 1.3%, nearly four times greater than EPA's estimate. Sales impacts in subsequent years are understated as well. [EPA-HQ-OAR-2022-0829-0656, pp. 11-12]

EPA did not disclose the baseline pricing data, historical or forecast, on which it relied to calculate its sales projections. Consequently, NADA is unable to fully assess whether EPA's projections are premised on data from outside the regulatory impact period. NADA urges EPA to clarify (and rationalize) how it computed average baseline new vehicle transaction prices, and how it derived its sales impact forecast due to the proposal's increased regulatory costs. [EPA-HQ-OAR-2022-0829-0656, pp. 11-12]

NADA also questions EPA's assumption and use of a demand elasticity of zero when modeling the medium-duty vehicle sales impacts of its proposal. Goods with a demand elasticity of zero are referred to as "necessity goods" for which no reasonable substitute is available. Assuming commercial customers need medium-duty vehicles to run their businesses, they are unlikely to purchase new vehicles if unaffordable or if they fail to meet their business use case needs. [EPA-HQ-OAR-2022-0829-0656, pp. 11-12]

As discussed above and elsewhere, new medium-duty vehicles are not "necessity goods" in that prospective purchasers have several alternative options. For example, prospective commercial medium-duty customers almost always have the option to keep existing vehicles on the road longer than they might otherwise with enhanced maintenance and repair strategies that may even include engine and/or vehicle re-building. Alternatively, they may meet their needs with used vehicles, often at costs significantly lower than that of new medium-duty vehicles subject to EPA's proposed standards. Consequently, NADA urges EPA to use at least a -1.0 elasticity of demand when calculating the impact of its proposed standards on new medium-duty sales. [EPA-HQ-OAR-2022-0829-0656, pp. 11-12]

EPA Summary and Response

Summary:

Comments from CARB stated that the elasticity EPA used in the proposal is conservative, and better, smaller estimates would likely lead to greater estimated climate and public health benefits. Comments from the Environmental and Public Health Organizations stated that, though the consideration of sales impacts in the proposal is reasonable, EPA should consider using smaller elasticity of demand for light duty vehicles, though they agree with the medium duty elasticity of demand of zero used in the proposal. They state that the analysis for this rule supports a long run elasticity, and therefore a smaller elasticity is more relevant.

Honda commented that the long run sales elasticity in the modeled sales impacts is noticeably different than the -0.4 value cited in the proposal, and if demand elasticities are actually closer to that -0.4 level, vehicle sales impacts will be much larger than EPA estimates.

NADA commented that sales impacts in the proposal are understated, the elasticity used in the proposal is too small, and EPA should use an elasticity of -1, like NHTSA used in their recent rules, rather than -0.4 values EPA uses.

NADA commented that the elasticity of demand of zero used for MD vehicles is questionable because MD vehicles are not "necessity goods" and the EPA should also use an elasticity of demand of -1 for MD vehicles. NADA points out that MD customers have the option to keep existing vehicles on the road longer rather than purchase a new vehicle, or may purchase a used vehicle instead of a new one.

Honda commented that the impact of higher purchase prices must be accounted for in the total sales estimates for this rule. They also stated that the sensitivity cases analyzed by EPA are independent and make the analysis extremely limited, and the EPA does not include the possibility of the IRA being weakened.

NADA commented that EPA did not disclose the baseline pricing data that was relied on to calculate sales projections, and the EPA should clarify and rationalize how average baseline new vehicle transaction prices were estimated. They also commented that EPA should clarify how sales impacts of increased costs were forecast.

Response:

We agree with CARB that the elasticity measurement use in our modeling is conservative, and smaller estimates would lead to greater estimated benefits. Regarding comments that EPA should use a different elasticity of demand for LD vehicles, we point to our discussion in RIA Chapter 4.4, where we note the reasons for using an elasticity of demand smaller than -1, as well as why we chose -0.4 as opposed to something smaller. We note that commenters who disagreed with EPA's choice of elasticities used in the analysis did not provide additional data to support these views. EPA believes that our choice of vehicles sales elasticities remains appropriate as it is based on the best available science in the record, as discussed further in RIA Chapter 4.4.

Regarding the comment that MD vehicles are not "necessity goods", we note that necessity goods are generally goods that are inelastic with respect to income, not with respect to price, for example tobacco, and medications. Goods with a demand elasticity of 0, or perfectly inelastic demand, are those whose purchase quantity doesn't change with respect to their own price. Some of these are necessities (like food or water), but others are things that will remain in demand even if the price changes.

Commercial vehicle owners purchase vehicles based on the needs of their business, and we expect them to be less sensitive to changes in vehicle price than personal vehicle owners. As such, we generally expect that purchasers will purchase the MDV that meets their needs. In the short run, it is theoretically possible increased upfront costs may lead to short run sales impacts not modeled here. Short run impacts may include purchasers opting to keep their vehicles on the road longer, or to buy a used vehicle. With respect to purchasers who decide to keep their vehicles on the road longer, we note that this will likely increase the cost of maintenance and may impact the cost of operating the vehicle. As pointed out by other commenters, operating cost, including maintenance costs and fuel efficiency, are strong motivators in the purchase decisions of MDV purchasers. Thus, and as we further explain based on our review of past studies relating to pre-buy and low-buy in preamble VIII.H.2, we expect any possible pre- or low-buy that may occur in the medium-duty segment as a result of this rule would be small and short lived.

Further, these short term impacts will likely even out in the long run. The elasticities in our analysis are long-run elasticities and reflect long-run changes in the market. In the long run, for example, even if a purchaser decides to keep a used MDV for a longer period of time, that used vehicle will eventually be replaced with something that costs less to maintain and operate. This rule is estimated to lead to decreased operating costs for both ICE and PEV vehicles. In addition, assuming the market served by the MDV purchasers does not grow or shrink, one MDV purchaser buying a used vehicle will mean another MDV purchaser buying a new vehicle due to the finite number of used vehicles that will meet the needs of the individual MDV purchaser available in the market.484 .

Regarding comments that the impact of increased purchase price must be accounted for in our analysis, as well as that estimated elasticity of demand is not -0.4 as EPA assumes, we note that the OMEGA model used to estimate impacts from the rule includes the estimated purchase price of the vehicles, and therefore we do not agree that purchase price was not accounted for in the sales estimates. In addition, regarding comments that the modeled sales results show an impact much different than the -0.4 percent elasticity, as discussed in Chapter 4 of the RIA, the elasticity of demand is one input into the estimate of consumer demand for vehicles in OMEGA and the estimate of a change in final new vehicle sales as a function of the change in final new vehicle price (or cost) will not return a value of -0.4. Regarding comments that EPA should use a sales elasticity of -1.0, as NHTSA has used, we note that in the most recent CAFE standards proposed in July 2023, NHTSA uses a sales elasticity of -0.4.485 For more information on how the elasticity of demand is implemented in the analysis of this rule, see Chapter 4.4 of the RIA.

Regarding comments that the sensitivity cases estimated by EPA are independent and the uncertainties addressed by them cannot be 'stacked', we note that this is not the purpose of the sensitivities we analyze. The sensitives published in the final rule are meant to further explore the assumptions made in support of the analysis of our standards and help assess key areas of uncertainty in both underlying data and modeling assumptions. For example, in this final rule, we assess sensitivities about consumer adoption, battery costs, and credit trading. For more information on the sensitives estimated for the final rule, see preamble Sections IV.E, F, G and H.

Regarding comments that EPA does not include an analysis of the possibility of the IRA being weakened, the agency follows OMB Circular A-4, which encourages federal agencies to consider likely paths of future government programs and policies, as well as ground assumptions of the future in sound theories and empirical evidence about current conditions and ongoing and anticipated future trends.[486] Based on current evidence, we continue to support the inclusion of IRA provisions in our modeling assessments. For information on how we include the IRA in modeling for this final rule, see RIA Chapter 2.6.8.

We do not agree that baseline pricing data or how we analyze sales impacts was not disclosed. The base year pricing data used for this analysis was assembled from publicly available MSRP value, and is reported for each vehicle in OMEGA's vehicles.csv input file (in the "msrp_dollars" data column). EPA recognizes that these values do not reflect manufacturer purchase incentives or other adjustments that determine overall transaction prices, but EPA has concluded that MSRP values are appropriate for this analysis because it is a reasonable proxy for the price of the vehicle and because of its consistent availability across all manufacturers. More

[484] Another possibility is increasing the market served by other vehicles in the fleet, which increases the wear, and therefore the maintenance and repair costs, for those other vehicles. This may also lead to the vehicles needing to be replaced sooner than they otherwise would have been.

[485] NHTSA, Preliminary Regulatory Impact Analysis, Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027 and Beyond and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030 and Beyond, July 2023, Chapter 7.1. https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-07/CAFE-2027-2032-HDPUV-2030-2035-PRIA.pdf

[486] OMB Circular No. A-4, November 9, 2023. https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf

information on base year vehicle prices and sales impacts estimates can be found in public documentation for the OMEGA model found in the docket, or through exploration of the OMEGA model itself. Chapter 4.4 of the RIA contains information on how sales impacts were modeled and RTC Section 12 contains responses to comments on the OMEGA model.

14.3 - Energy efficiency gap

<u>Comments by Organizations</u>

Organization: Institute for Policy Integrity at New York University School of Law

III. EPA Should More Robustly Affirm That Standards Help Correct Market Failures That Prevent Consumers From Achieving Valuable Fuel Savings

The "energy efficiency gap" refers to the effect of a suite of market failures that together "lead[] to a slower diffusion of energy-efficient products than would be expected" if consumers maximized their net investment returns.153 EPA correctly recognizes the presence of the energy efficiency gap in the Proposed Rule.154 Accordingly, the Proposed Rule properly counts the full value of energy savings as a benefit, just as it and other agencies have done in prior tailpipe and appliance-efficiency regulations.155 [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

153 Kenneth Gillingham & Karen Palmer, Bridging the Energy Efficiency Gap: Policy Insights from Economic Theory and Empirical Evidence, 26 J. Econ. Perspectives 3, 19 (2014); see also Proposed Rule, 88 Fed. Reg. at 29,397; RIA at 4-38.

154 Proposed Rule, 88 Fed. Reg. at 29,397; RIA at 4-38 to 4-41.

155 See BETHANY DAVIS NOLL ET AL., INST. FOR POLICY INTEGRITY, SHORTCHANGED 21–29 (2020), https://policyintegrity.org/files/publications/Clean_Car_Standards_Rollback_and_Fuel_Savings_Report.pdf.

Despite this consistent practice and the widespread evidence of the energy efficiency gap, certain challengers to the 2021 Rule have disputed the validity of this gap in the ongoing litigation. They have argued that consumers avoid purchasing fuel-efficient vehicles because they prioritize other vehicle attributes that these challengers allege are adversely affected by fuel efficiency, not because of the existence of market failures as is suggested by much of the economic literature.156 While their argument lacks merit,157 its existence counsels EPA to thoroughly document the energy efficiency gap. [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

156 See Brief for Private Petitioners at 65–68, Texas v. EPA (D.C. Cir. filed Nov. 3, 2022). This account echoes reasoning that EPA flirted with (but ultimately declined to adopt) in the 2020 Rule. In that rule—as a sensitivity analysis only—EPA subtracted 42 months of fuel savings per consumer to approximate the alleged loss of welfare from other vehicle attributes. 85 Fed. Reg. 24,174, 24,701–02 (Apr. 30, 2020).

157 See, e.g., Gloria Helfand et al., Searching for Hidden Costs: A Technology-Based Approach to the Energy Efficiency Gap in Light-Duty Vehicles, 98 ENERGY POL'Y 590, 605 (2016) ("We find scant systematic evidence of hidden costs for the primary technologies expected to be used to meet EPA and DOT standards."); Hsing-Hsiang Huang et al., Re-searching for Hidden Costs: Evidence from the Adoption of Fuel-Saving Technologies in Light- Duty Vehicles, 65 TRANSP. RESEARCH PART D: TRANSP. & ENV'T 194, 194 (2018) ("[A]utomakers have typically been able to implement fuel-saving technologies without harm to vehicle operational characteristics.").

Yet EPA provides less analysis of this issue than it did in the 2021 Rule. EPA can bolster its discussion of the energy efficiency gap in three key ways. First, EPA should fully adopt its justification for the energy efficiency gap from the 2021 Rule. Second, EPA should expand upon that justification by offering additional explanations that it omitted in 2021. And third, EPA should affirm the continued relevance of the energy efficiency gap with respect to electric vehicles, and delete language that could be read to question the gap's continued relevance. [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

A. At a Minimum, EPA Should Fully Adopt Its Justification for the Energy Efficiency Gap That It Provided in the 2021 Rule

Although EPA offers support for the existence of the energy efficiency gap in the Proposed Rule and RIA, it offers less evidence now than it did in the 2021 Rule.158 The agency should fully adopt its 2021 explanation of the energy efficiency gap to avoid any confusion as to whether it continues to support the explanation it previously provided. [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

158 See Proposed Rule, 88 Fed. Reg. at 29,397; RIA at 4-38 to 4-41.

For instance, EPA's regulatory impact analysis for the 2021 Rule (2021 RIA) provided significantly more explanations for the market failures that cause the energy efficiency gap and numerous additional supporting citations.159 The current RIA omits several key market failures that the agency recognized previously, including consumer prioritization of attributes that convey status, consumer use of simplified decision rules, and consumer "satisficing" on fuel economy rather than optimization.160 [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

159 2021 RIA at 8-4 to 8-6.

160 Id. at 8-4 (providing all three rationales).

The 2021 RIA also described research identifying problematic assumptions underlying a few studies showing an efficiency-performance tradeoff,161 and clearly explained that, if producers did reduce vehicle performance to comply with fuel-efficiency standards (contrary to the best available evidence), then EPA's estimate of compliance costs would be too high because that estimate assumes that producers retain all performance features.162 While EPA briefly alludes to this research now, it does not offer nearly as detailed a defense for its conclusion that "the presence of fuel-saving technologies do not lead to adverse effects on other vehicle attributes."163 Similarly, EPA nods at the constant-performance modeling assumption without explaining how compliance costs would need to be revised downward without it.164 [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

161 Id. at 8-2 to 8-3.

162 Id. at 8-3.

163 RIA at 4-38.

164 See id. at 4-40.

To avoid any potential confusion over whether EPA still supports the justifications for the energy efficiency gap that it provided in 2021, EPA should fully readopt its previous explanation. EPA can do this through one of two ways: either by expressly incorporating by reference its full 2021 explanation or by inserting the explanations that it provided in 2021 but omits now. [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

B. EPA Should Provide Additional Justifications for the Energy Efficiency Gap in Addition to Those It Provided in the 2021 Rule

While EPA provided considerable support for the energy efficiency gap in the 2021 Rule and 2021 RIA (much of which it restates in this proposal), it could have gone further then. In fact, economic literature offers numerous additional explanations for the energy efficiency gap. Additionally, these further justifications support EPA's correct choice not to devalue consumer fuel savings due to any alleged efficiency-performance tradeoff. EPA should now adopt these additional arguments supporting its treatment of fuel savings, particularly in light of the litigation over this aspect of the 2021 Rule. Similarly, EPA should state (even more clearly than it did in 2021) that its model's constant-performance assumption obviates the need to estimate any potential lost consumer welfare. [EPA-HQ-OAR-2022-0829-0601, pp. 23-25]

1. EPA Should Discuss Additional Contributing Market Failures

EPA should describe additional market failures that contribute to the energy efficiency gap. These include dealership incentives, biases, and information asymmetries; institutional myopia; and manufacturer market power. As discussed below, most or all of these market failures apply similarly to electric vehicles as they do to ICE vehicles. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

i. Dealership incentives, biases, and information asymmetries

Salespeople's incentives and biases may cause informational asymmetries that prevent consumers from optimizing fuel efficiency.165 Studies show that dealers and salespeople often believe that electric vehicles and other efficient cars have lower profits for dealers than gas-powered cars,166 for various reasons.167 Consumers (and researchers posing as consumers) have often complained of poor dealership experiences when trying to purchase electric vehicles, citing salespeople's limited knowledge; misinformation and dishonesty about vehicle cost, range, and other attributes; inconsistent enthusiasm for electric vehicles; lack of inventory for more efficient and electric vehicles; poor timeliness for completing paperwork and vehicle delivery; limited promotional materials on energy efficiency; and inability to facilitate consumers' cost comparisons of electric versus gas vehicles.168 Some dealerships have admitted that poor sales training is a major barrier to electric vehicle sales.169 [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

165 See Fred Lambert, After Losing Dealers over Its Electric Move, Cadillac Is Now Gaining New Ones, ELECTREK, Sept. 23, 2021 (reporting that one-fifth of U.S. Cadillac dealers exited from the brand in 2020 rather than commit to selling electric vehicles).

166 Cox Automotive, Evolution of Mobility: The Path to Electric Vehicle Adoption 23 (2019), https://perma.cc/UV7N-42BE (reporting that 54% of surveyed dealers say there is a lower ROI for sales of EVs compared to gas); Eric Cahill et al., New Car Dealers and Retail Innovation in California's Plug-In Electric Vehicle Market (U.C. Davis Inst. Of Transp. Stud., Working Paper UCD-ITS-WP-14-04, 2014), https://perma.cc/DJ7T- SGXT (citing real or perceived profitability concerns, especially for compact or midsized vehicles).

167 Cahill et al., supra note 166, at 10 ("[A]s a category, PEVs may not represent a compelling investment to many dealers."); id. at 9–10 (noting that dealers have the false perception that PEVs entail longer transaction times and lower profits, when in fact dealers make more than average on PEVs in gross profits).

168 Id.; EPA, Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022–2025 at 3-14 (2016) at 6-15; Cox Automotive, supra note 166; Gerardo Zarazua de Rubens et al., Dismissive and Deceptive Car Dealerships Create Barriers to Electric Vehicle Adoption at the Point of Sale, 3 NATURE ENERGY 501 (2018); Lindsay Matthews et al., Do We Have a Car for You? Encouraging the Uptake of Electric Vehicles at Point of Sale, 100 ENERGY POL'Y 79 (2017); Zoe Long et al., Consumers Continue to Be Confused About Electric Vehicles: Comparing Awareness Among Canadian New Car Buyers in 2013 and 2017, 14 ENV'T RES. LTRS. 114036 (2019).

169 Cox Automotive, supra note 166, at 30 (citing lack of OEM support).

ii. Institutional myopia and inattention, including short-termism

Though EPA refers to myopia in both the 2021 RIA170 and (more briefly) in the current RIA,171 this applies to both individual and institutional consumers. In particular, economists find that corporate managers can exhibit similar kinds of inattention as individual consumers and so fail to implement energy efficiency initiatives despite positive paybacks.172 Businesses may also face a kind of myopia called short-termism, in which corporate employees have an incentive to favor short-term profits over long-term investments if, for example, their compensation or career prospects are tied to near-term earnings (or if they must meet a particular budget in a given year).173 Employees with such incentives may have reason to purchase cheaper, less efficient vehicles.174 Studies suggest that short-termism can affect managers' choices about energy efficiency specifically,175 and about environmental sustainability broadly.176 [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

170 2021 RIA at 8-4.

171 RIA at 4-39 (discussing "a lack of foresight [and] an aversion to short term losses relative to longer term gains").

172 See Suresh Muthulingam et al., Energy Efficiency in Small and Medium-Sized Manufacturing Firms, 15 MFG. & SERV. OPERATIONS MGMT. 596, 612 (2013) (finding that manager inattention contributed to the non-adoption of energy efficiency initiatives, since initiatives that appear lower on a list of efficiency recommendations, and initiatives that require more managerial attention, are less likely to be adopted).

173 A similar dynamic could exist in government, and so affect local, state, and federal government fleet purchases, if officials are rewarded for short-term cost savings rather than long-term fiscal health.

174 This incentive could be muted by a firm's accounting practices if costs and expenses are amortized over time.

175 See Stephen J. DeCanio, Barriers Within Firms to Energy-Efficient Investments, 21 ENERGY POL'Y 906, 907–08 (1993); Suresh Muthulingam et al., Adoption of Profitable Energy Efficiency Related Process Improvements in Small and Medium Sized Enterprises 1, 7 (Working Paper, 2008) (finding that managers fail to implement energy efficiency improvements with short payback periods for several reasons, including myopia and a stronger focus on upfront costs than on net benefits, attributed partially to short-termism).

176 See Yujing Gong & Kung-Cheng Ho, Corporate Social Responsibility and Managerial Short-Termism, ASIA- PACIFIC J. ACCT. & ECON. (2018).

This market failure should remain prominent as electric vehicles become more widely available, due to the fact that electric vehicles frequently have higher purchasing prices but provide operating-cost savings over time. The limited price salience of electricity, including the use of automatic bill-pay, means that many consumers (including corporate consumers) will not properly factor in long-term operating cost savings. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

iii. Manufacturer market power

Though EPA mentions in both the 2021 RIA and the current RIA that strategic marketing choices by manufacturers can result in inefficient under-supply of fuel economy to some consumer segments,177 EPA does not fully connect this inefficient pattern to market power. Because of the limited competition in at least some segments of the vehicle market, manufacturers may be able to act strategically when pricing vehicles and when producing vehicles with combinations of different fuel economy and other vehicle features to push consumers toward purchases that lead to higher manufacturer profits at the expense of optimal fuel economy.178 There is a relatively small number of firms producing several types of vehicles and engines.179 This market failure therefore could influence purchases by all consumer groups and across several vehicle classifications, including electric vehicles. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

177 2021 RIA at 8-5; id. at 4-39 to -40.

178 See generally Carolyn Fischer, Res. for the Future, Imperfect Competition, Consumer Behavior, and the Provision of Fuel Efficiency in Light-Duty Vehicles (2010), https://www.rff.org/documents/1472/RFF-DP-10-60.pdf.

179 See id. at 3 (explaining that "the largest four firms accounted for 75.5 percent of the value of shipments in the automobile market and 95.7 percent of the light-duty and utility vehicle market"); Nat'l Acad. of Scis., Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025–2035 at 11-356 (2021) (citing that the top ten firms accounted for 90% of light-duty sales in 2018); see also Winston Harrington & Alan Krupnick, Res. for the Future, Improving Fuel Economy in Heavy-Duty Vehicles (2012), https://media.rff.org/documents/RFF-DP-12- 02.pdf (explaining that the heavy-duty trucking industry "is dominated by a small number of large manufacturers" and is even smaller than it would seem at first glance because of "affiliations, partnerships, and outright ownership of one company by another").

2. EPA Should More Clearly State That Its Model's Constant- Performance Assumption Obviates the Need to Estimate Lost Consumer Welfare

As in prior rules, EPA assumes when modeling the Proposed Rule that manufacturers will incur any additional costs necessary to hold vehicle performance constant. While EPA highlighted this fact in the 2021 RIA,180 it should strongly conclude that the constant-performance assumption built into OMEGA obviates the need to estimate any potential lost consumer welfare from forgone attributes. The reason for this is straightforward: Because EPA already models the costs of maintaining vehicle performance, any alleged reductions in vehicle performance resulting from the Proposed Rule would be offset by a reduction in compliance cost relative to EPA's projection. In effect, therefore, EPA's analysis already accounts for the cost of any possible efficiency-performance tradeoffs through its projection of compliance costs. [EPA-HQ-OAR-2022-0829-0601, pp. 25-27]

180 2021 RIA at 8-3.

Thus, while EPA sensibly concludes that "the presence of fuel-saving technologies do not lead to adverse effects on other vehicle attributes,"181 it should more forcefully assert that this conclusion does not increase its estimate of net benefits. [EPA-HQ-OAR-2022-0829-0601, pp. 27-29]

181 RIA at 4-38; see also Davis Noll et al., supra note 155, at 32–33 (discussing how “many fuel economy technologies actually improve various performance attributes”).

C. EPA Should Reaffirm the Continued Relevance of the Energy Efficiency Gap, Particularly With Respect to Electric Vehicles, and Remove Confusing Language that Could Be Read to Suggest the Opposite

While EPA supports the energy efficiency gap in the Proposed Rule and RIA, it also makes some confusing statements that could be read to suggest that the gap may be inapplicable to electric vehicles,182 that it has become very small for ICE vehicles,183 or even to question the energy efficiency gap’s existence.184 If EPA does not intend these suggestions and instead means only that a narrow subset of market failures are becoming less impactful, it should clarify its confusing statements. Insofar as EPA intends to suggest that the energy efficiency gap may not apply to electric vehicles, it should rethink these claims. For the reasons explained below, EPA should strongly reaffirm the continued existence and relevance of the energy efficiency gap. [EPA-HQ-OAR-2022-0829-0601, pp. 27-29]

182 Proposed Rule, 88 Fed. Reg. at 29,397 (stating that “it becomes less and less of an issue with the growing share of electric vehicles in the market, and changes in vehicle attributes due to the new technology are clearer”); RIA at 4-40 (similar).

183 Proposed Rule, 88 Fed. Reg. at 29,397 (“[T]here may still exist a slight gap in ICE vehicle purchases due to this uncertainty ”); RIA at 4-40 (“[T]he availability of more fuel efficient vehicles has increased steadily over time, thus narrowing or closing the energy efficiency gap [A] slight gap in ICE vehicle purchases may still exist due to uncertainty surrounding new fuel savings technologies ”).

184 Proposed Rule, 88 Fed. Reg. at 29,397 (describing “uncertainty surrounding the existence or reason behind the energy efficiency gap”). EPA also states that the energy efficiency gap “may still exist,” implying that it may not. Id.; RIA at 4-38, 4-40.

EPA’s problematic statements reference the “invisibility” explanation for the energy efficiency gap—i.e., that “the mainstream consumer would [not] know about” certain fuel-efficient technologies when selecting between vehicles.185 The agency seems to hypothesize that this explanation does not apply to electric vehicles, whose fuel efficiency is more salient.186 However, consumer salience effects should also apply strongly to electric vehicles since consumers often pay their electricity bills automatically (and with a time delay) and therefore may not be aware of how much they can save on fuel costs.187 And, as EPA acknowledges, the energy efficiency gap is caused by a variety of market failures.188 Many of these market failures would not be cured by increased visibility; rather, electric vehicles may exacerbate some market failures that contribute to the energy efficiency gap. For instance, network externalities apply especially strongly to electric vehicles as consumers may be reluctant to purchase electric vehicles until adequate charging and maintenance infrastructure is available. A study finding that homeowners—who have greater incentive to invest in charging infrastructure than more transient home renters189—purchase electric vehicles at a far higher rate supports this hypothesis.190 And as discussed above, research on dealership biases, incentives, and information asymmetries often pertains to electric vehicles.191 [EPA-HQ-OAR-2022-0829-0601, pp. 27-29]

185 Proposed Rule, 88 Fed. Reg. at 29,397; see also RIA at 4-40.

186 Id. at 29,397; RIA at 4-39.

187 Laura Abrardi, Behavioral Barriers and the Energy Efficiency Gap: A Survey of the Literature, 46 J. INDUS. & BUS. ECON. 25 (2019).

188 RIA at 4-39 to -40 ("In fact, the gap likely exists due to a combination of consumer- and producer-side characteristics.").

189 Numerous studies point to a homeowner-tenant agency problem, also known as the split incentives, in residential rental markets whereby landlords fail to sufficiently invest in energy efficiency because their tenants (rather than the landlords themselves) will realize the monetary savings. See, e.g., Jesse Melvin, The Split Incentives Energy Efficiency Problem: Evidence of Underinvestment by Landlords, 115 ENERGY POLICY 342 (2018).

190 Lucas W. Davis, Evidence of a Homeowner-Renter Gap for Electric Vehicles, 26 APP. ECON. LTRS. 927 (2019) (recognizing evidence that "automatic billing increases residential electricity consumption by 4–6%")

191 See supra notes 165–169 and accompanying text.

On the producer side, too, market failures that contribute to the energy efficiency gap apply strongly to electric vehicles.192 For instance, the first-mover disadvantage may be especially prominent for electric vehicles because early movers for electric vehicles must pay to educate consumers about their product.193 Indeed, in the same paragraph where EPA appears to suggest that the energy efficiency gap "becomes less of an issue with the increasing prevalence of BEVs in the market," EPA also states that "the share of [plug-in electric vehicles] in the marketplace is, at least partially, constrained due to the lack of offerings."194 [EPA-HQ-OAR-2022-0829-0601, pp. 27-29]

192 See RIA at 4-40.

193 Todd D. Gerarden et al., Assessing the Energy-Efficiency Gap, 55 J. ECON. LIT. 1486, 1492–93 (2017).

194 RIA at 4-40.

Because many of the justifications for the energy efficiency gap apply to electric vehicles, it is implausible to suggest that this phenomenon will dissipate as electric vehicles become more prevalent. In fact, the Department of Energy has consistently recognized evidence that "consumers undervalue future energy savings" from more efficient electrified appliances, including because of "excessive focus on the short term."195 Likewise, numerous economic studies confirm that the energy efficiency gap applies to electrical appliances.196 [EPA-HQ-OAR-2022-0829-0601, pp. 27-29]

195 Energy Conservation Program: Energy Conservation Standards for Room Air Conditioners, 88 Fed. Reg. 34,298, 34,352 (May 26, 2023).

196 E.g. Gerarden et al., supra note 193, at 1515; Francois Cohen et al., Consumer Myopia, Imperfect Competition and the Energy Efficiency Gap: Evidence from the UK Refrigerator Market, 93 EUR. ECON. REV. 1 (2017); Shigeru Matsumoto, Consumer Valuation of Energy-Saving Features of Residential Air Conditioners With Hedonic and Choice Models, 55 EMPIRICAL ECON. 1779 (2018); Jiaxing Wang et al., Determinations of Household Energy Efficiency Investment: Analysis of Refrigerator Purchasing Behavior, 13 INT'L J. ECON. POL'Y STUDS. 389 (2018).

Regarding ICE vehicles, EPA does not cite any evidence that would justify this seeming break from its prior analyses regarding the significance of the energy efficiency gap.197 To the contrary, most or all of the theoretical explanations for the energy efficiency gap still hold. EPA should therefore delete these unsubstantiated and stray statements regarding the energy efficiency gap and ICE vehicles, or at least provide a balanced literature review. [EPA-HQ-OAR-2022-0829-0601, pp. 27-29]

197 See RIA at 4-40.

Organization: National Automobile Dealers Association (NADA)

1. EPA's Use of a Cost-of-Ownership Payback Analysis Is Flawed and Problematic.

EPA correctly acknowledges that under its proposed standards "the average purchase price of vehicles is estimated to be higher," which it attributes to an anticipated larger share of EVs in the market. However, its assertion that lower EV operating costs and IRA purchase incentives will offset these higher up-front costs is unsound.34 As NADA has explained previously, for most prospective new vehicle purchasers, using a total cost of ownership (TCO) "payback" cost/benefit analysis is flawed and problematic for several reasons. [EPA-HQ-OAR-2022-0829-0656, pp. 7-8]

34 88 Fed. Reg. at 29201, 29328-29, 29344, 29364.

First, consumers shopping for vehicles with better fuel economy35 must be willing and able to pay for it. As noted above, 67 percent of Americans presently cannot afford any new vehicle. And of the 33 percent who can, high interest rates are driving many of them out of the market. NADA takes issue with EPA's projections that its proposal will result in only a small change in total new light-duty vehicle sales and no change in new medium-duty vehicle sales. NADA's projections differ significantly, showing vehicle sales declines corresponding with the higher vehicle costs attributable to EPA's proposed standards. [EPA-HQ-OAR-2022-0829-0656, pp. 7-8]

35 For at least two practical reasons, improved fuel economy performance is a surrogate for better emissions performance. First, strategies for improving a vehicle's fuel economy often result in improved emissions performance, especially with respect to GHGs. Second, while some prospective purchasers seek and are willing to pay for improved fuel economy performance, few seek and are willing to pay for improved emissions performance.

Second, consumer demand for fuel efficiency fluctuates with fuel prices. Prospective purchasers form expectations of the net present value of future fuel savings that are related, but not closely related, to a standardized financial calculation.36 During dramatic upward fuel price swings followed by heavy media coverage, consumers place a large value on fuel economy, as revealed by shifts in demand to more fuel-efficient segments of the market. But during slow and steady increases in the price of liquid fuels with little or no media attention, consumer demand reveals a diminished value for fuel economy. [EPA-HQ-OAR-2022-0829-0656, pp. 7-8]

36 See Exhibit B, Walton & Drake, Willingness to Pay for MY 2025 Fuel Economy Mandates: Government Estimates v. Economic Reality, February 2012.

Third, a consumer's willingness to purchase improved fuel economy must be viewed in the context of other vehicle attributes. When assessing the value of fuel economy improvements to prospective purchasers, the financial benefits of future fuel savings cannot be separated from the utility lost by necessary reductions to other vehicle qualities and performance. A study released earlier this year examined the tradeoff between fuel economy and vehicle performance in connection with NHTSA's most recent round of fuel economy mandates.37 It found evidence that consumers and OEMs undervalued fuel economy compared to the predictions of a rational-choice model. However, it also found that fuel economy mandates resulted in foregone performance, upon which consumers placed a value approximately equal to that of any fuel-savings benefits resulting from the standards. And it found that models attempting to assess the new vehicle buying public's willingness to purchase fuel economy, without controlling for performance tradeoffs, likely suffered from omitted variables bias. [EPA-HQ-OAR-2022-0829-0656, p. 8]

37 Leard, Linn, Zhou; How Much Do Consumers Value Fuel Economy and Performance? Evidence from Technology Adoption, The Review of Economics and Statistics (2023); 105(1), 158-74.

EPA assumes that consumers value any fuel savings associated with new vehicle purchases over a 30-month period (at most) but suggests erroneously that there is no consensus regarding how consumers value fuel efficiency. EPA also made no real attempt to assess how new light-duty vehicle consumers actually value emissions reduction/fuel economy technology when making purchase decisions.38 Instead, EPA made reference to a so-called "energy efficiency gap" and asserted that the issue will become less relevant as the share of EVs in the market increases.39 But the aforementioned study suggests that the proper approach for setting fuel economy mandates designed to maximize the achievement of regulatory objectives is to control for consumer willingness to purchase changes in both a vehicle's performance and fuel economy. EPA's failure to do so undermines its ability to set emissions reduction mandates premised on realistic and accurate conclusions. [EPA-HQ-OAR-2022-0829-0656, p. 8]

38 88 Fed. Reg. at 29370, 29397.

39 88 Fed. Reg. at 29397.

EPA Summary and Response

Summary:

The Institute for Policy Integrity at New York University School of Law (IPI) commented on EPA's energy efficiency gap discussion, stating that there is less analysis in this rule than provided in previous rules, and suggesting that EPA affirm the continued relevance of this topic to EV technology. IPI stated that EPA should offer more detail on how the presence of fuel saving technology does not lead to adverse effects on other vehicle attributes, or how compliance costs would have to be revised downward without the inclusion of this constant performance assumption. They stated that EPA should clearly state that the presence of fuel saving technology not leading to adverse effects on other attributes does not increase the estimate of net benefits because any possible efficiency-performance tradeoffs are accounted for in the projection of compliance costs, and therefore obviates the need to estimate potential lost consumer welfare from foregone attributes.

IPI also outlined additional market failure factors contribute to the energy efficiency gap, including dealership incentives, biases and information asymmetries, institutional myopia, and manufacturer market power. They commented that dealership incentive, biases and information asymmetries are clear in reports from consumers, or researcher posing as consumers, who complain about poor experiences when trying to purchase and electric vehicles at the dealership. They commented that, in addition to consumer myopia, we should discuss institutional myopia, where businesses may have an incentive to favor short-term profits over long-term investments. IPI stated that there is limited competition in some vehicle market segments, leading manufacturers with market power to implement strategic choices in pricing and vehicle attribute offerings, which can influence purchase choice across several vehicle classifications including EVs.

NADA commented that EPA's assumption that lower operating costs and purchase incentives will offset higher upfront costs is unsound. NADA commented that EPA's use of a cost-of-ownership payback analysis is flawed and problematic for three reasons: 1) people must still be willing to pay for any improvements to fuel economy and with the high prices and interest rates today, many consumers cannot afford new vehicles; 2) demand for fuel economy tracks fuel prices and the media attention surrounding those prices; and, 3) prospective purchasers weigh future fuel savings against reductions in other vehicle qualities and performance. NADA references a recent study finding that there is a tradeoff between fuel economy and vehicle performance. NADA also commented that EPA's assessment that there is not a consensus on how consumers value fuel efficiency is "erroneous", and that EPA did not attempt to assess this value. The commenter stated that failing to control for consumer willingness to purchase changes in both vehicle performance as well as fuel economy undermines the conclusions reached in the analysis of the rule.

Response:

As seen in Section VIII.K.1 of the preamble, and RIA Chapter 4.4, we have updated the discussion of the energy efficiency gap to be clearer on its continued relevance, including that the energy efficiency gap discussion applies to both ICE technology and other fuel saving technology, including PEVs. In the preamble discussion, we clearly refer to previous EPA light-duty vehicle regulations and the included, extensive, discussions included in them. In addition, we have added language indicating that some hypotheses presented as likely reasons for the existence of the energy efficiency gap, including myopia and asymmetric information, could apply to both consumers, producers, and dealerships.

Regarding NADA's comments about consumer demand for fuel economy, EPA agrees that fuel economy is an important purchasing criteria for many consumers, and consumers buy what they can afford. EPA agrees that affordability is an important consideration in vehicle purchases and ownership. We do, however, note that affordability is only one criterion among many that influences consumers' vehicle choice, new or used. We address consumer demand and affordability comments further in Chapter 13 of this RTC. In addition, though NADA asserts that the there is consensus in the literature regarding consumer valuation of fuel efficiency, they only point to one paper on the subject. However, as discussed in RIA Chapter 4.4, there is a much broader range of literature. The paper the commenter points to indicates that there is a tradeoff between fuel economy and vehicle performance. However, as also discussed in that RIA chapter, we provide evidence that this tradeoff may not actually be happening. That is to say, we do not observe that vehicles with higher fuel economy and lower GHG emissions are otherwise worse performing vehicles. In some cases, GHG emissions performance and fuel efficiency are improving alongside other aspects of vehicle performance. Regarding NADA's comments disagreeing with the sales impacts estimates of this rule, see RTC Section 14, as well as RIA Chapter 4.4.

Regarding comments about accounting for performance, we note we model constant performance, which obviates the need to estimate potential lost consumer welfare from foregone attributes. Regarding comments about fuel economy being accounted for in our modeling, we note that fuel economy is included through the inclusion of 2.5 years of fuel savings in the consumer decision making modeling. These are discussed in Chapter 4.4 of the RIA.

Regarding NADA's comments regarding sales, we acknowledge NADA's statement that their estimates differ from EPA's, and we acknowledge that NADA attributes their estimates to "higher vehicle costs attributable to EPA's proposed standards." In response, we note that while EPA's estimates of vehicle technology costs (See RIA Chapter 9) may indeed translate into higher upfront purchase costs for consumers, we also estimate that such upfront purchase costs would be more than offset over time with operating cost savings (See RIA Chapter 4). We also note the considerable benefits that the IRA tax credits provide to purchasers of new PEVs. In addition, we note that NADA is unclear on how it estimates these sales impacts, however EPA's OMEGA model estimates sales impacts using an interaction between consumer purchase decisions and producer production decisions as described in RIA Chapter 4.4. We also note that, as discussed in RIA Chapter 2.6 and shown in RIA Chapter 4.3, cost estimates have been updated from the proposal, and therefore, the final sales impacts for this rule have as well. These final sales impacts show minor decreases in sales across MYs 2027 – 2032 and are shown in Chapter 4.4.2 of the RIA.

15 - PEV supply chain, critical minerals, and mineral security

15.1 - General

Comments by Organizations

Organization: 25x'25 Alliance, et al.

First, there are no established supply chains capable of supplying the raw materials to manufacture the millions of vehicles needed—just over the next decade—to supply the projected market. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

Organization: Alliance for Automotive Innovation

Beyond BEV affordability, success of this regulation will be determined by factors outside of the vehicle; the U.S. is sorely behind in this effort (despite over the $150 billion of private sector investment thus far) and the NPRM does little to address these factors. Current charging and fueling infrastructure is inadequate (particularly residential charging), the grid resources are at least 5 to 10 years away (without even factoring in the additional demand for grid resources from the heavy-duty vehicle sector facing similar concerns in a concurrent EPA rulemaking6), and battery critical minerals (except lithium), which primarily determine the affordability and availability of EVs, are minimally addressed in the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 4-5]

6 U.S. Environmental Protection Agency, Proposed Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 (for Model Years 2027-2032), 88 Fed. Reg. 25,926 (Ap. 27, 2023). Hereinafter "EPA HD GHG NPRM)."

No requirements to support required EVs or the drivers that must buy them [EPA-HQ-OAR-2022-0829-0701, p. 5]

The NPRM and all the requirements set forth to date focus solely on the sale of BEVs. They propose no requirements to ensure that infrastructure will be available at homes, businesses, public event venues, highway corridors, transportation hubs, or other public locations. They contain no requirements to provide hydrogen or hydrogen fueling stations, or for utilities to quickly bring reasonably priced high-power charging (5-20 megawats (MW)) to highway service plazas, fleet locations, city centers, or transportation hubs. They do not address the need for battery critical minerals to power everything from light-, medium-, and heavy-duty vehicles, energy storage systems (ESS), lawn and garden equipment, laptops, cell phones, forklitis, and airport services—not just in the United States, but around the world. [EPA-HQ-OAR-2022-0829-0701, p. 5]

To support the vehicle requirements proposed, all these changes are necessary in under 10 years. For perspective, 10 years is the time required to obtain the necessary permits for a mine in the United States. Once permitted, another ten years could elapse before the mine produces at capacity. Ten years is also close to the time required to bring 20 MWs of power to a single location in the United States. Consequently, to the extent we need critical minerals and high-power charging, we must start today. Yet, there is no plan to do so. There is no roadmap to developing these essential pieces necessary for the transformation. Nor is there a commitment from EPA for ongoing monitoring of these factors as the EV market develops over the duration of EPA's proposed standards. [EPA-HQ-OAR-2022-0829-0701, p. 5]

D. Benchmark Minerals Intelligence - U.S. Electric Vehicle Feasibility Study for Auto Innovators

Achieving the EV market share EPA projects in support of its proposed light-duty GHG and criteria pollutant standards will require massive investments in the EV supply chain from cell manufacturing upstream to active material manufacturing, mineral processing, and mineral extraction. In assessing this nascent supply chain, EPA limits itself to only light-duty vehicle cell demand and the potential for the U.S. to satisfy its lithium needs. Its assessment is also limited to only battery electric vehicles, ignoring PHEVs as both a technology option and their impact on EV supply chains. EPA's analysis falls short of what is needed to justify such a transformational rule on an abbreviated timeline relative to the 40-50% EV market share in 2030 that automakers already feel is an aspirational target. [EPA-HQ-OAR-2022-0829-0701, p. 33]

A more robust analysis of the EV supply chain would include: [EPA-HQ-OAR-2022-0829-0701, p. 33]

- U.S. and global Li-ion battery demand across multiple transportation sector segments (e.g., including medium- and heavy-duty vehicles) and other product sectors (e.g., portable devices and stationary energy storage systems). [EPA-HQ-OAR-2022-0829-0701, p. 33]

- Analysis of nickel, cobalt, and graphite supplies and processing in addition to lithium. [EPA-HQ-OAR-2022-0829-0701, p. 33]

- An assessment of U.S. light-duty vehicle automakers' ability to access the necessary manufacturing capacity and raw and processed material supplies both in general, and in the context of IRA 30D-compliant materials that are presumed to be available to eligible taxpayers. [EPA-HQ-OAR-2022-0829-0701, p. 33]

All of these analyses would be done in a manner that includes the time necessary to permit, construct, and start operation of new manufacturing (cell and active materials), chemical processing, and mineral extraction facilities, including their ramp-up to nameplate capacity, and level of risk given their current phase of investment, construction, and other considerations. This level of assessment is particularly important given the timeline that EPA proposes for regulations that, once finalized, cover a timeframe that is two to seven model years away. [EPA-HQ-OAR-2022-0829-0701, p. 33]

Given the broad scale of analysis and level of expertise needed for a more robust assessment, Auto Innovators engaged Benchmark Minerals Intelligence (BMI) to develop a study of U.S. EV feasibility. Benchmark Minerals Intelligence is a well-known, respected consultant in the area of Li-ion battery supply chains from the materials extraction to cell production stage. [EPA-HQ-OAR-2022-0829-0701, pp. 33-34]

The resultant work product, a U.S. Electric Vehicle Feasibility Study37 (the "BMI Study," attached to these comments) addresses many of the shortcomings of EPA's efforts. The BMI Study presents the results of two scenarios – a base case defined as BMI's view of "the most likely demand scenario," and a policy case that assumes 50% U.S. light-duty EV market share (including PHEVs) in 203038 and 100% U.S. light-duty vehicle EV market share by 2035.39,40 The study also examines a "supply constrained" scenario to assess the potential limits of IRA-compliant materials. [EPA-HQ-OAR-2022-0829-0701, pp. 33-34]

37 Benchmark Minerals Intelligence (Q1, 2023), U.S. Electric Vehicle Feasibility Study for Alliance for Automotive Innovation. Hereinafter "BMI Study."

38 I.e., consistent with the Executive Order 14037 and The U.S. National Blueprint for Transportation Decarbonization.

39 BMI Study at 3.

40 The BMI Study explores risks to U.S. light-duty vehicle policy objectives in isolation from the additional U.S. heavy-duty vehicle electrification objectives. (BMI Study at 25.) Auto Innovators believes that inclusion of those heavy-duty vehicle objectives would further increase the overall level of risk described in the BMI Study.

The BMI Study attempts to answer two core questions: (1) What is the feasibility of achieving the two demand scenarios with global supply chains; and (2) What is the feasibility of achieving these two scenarios in a manner that is compliant with the IRA 30D sourcing requirements? BMI assesses these scenarios in the context of a growing global, multi-sector demand for Li-ion batteries. The BMI Study spans the supply chain from raw material extraction and processing (including lithium, nickel, cobalt, and graphite) to active electrode material manufacturing to cell manufacturing. [EPA-HQ-OAR-2022-0829-0701, pp. 33-34]

1. Comparing the BMI Study's Li-Ion Battery Demand to EPA's Projections

As shown in Figures 5 and 6, EPA's proposal exceeds both of the scenarios studied by BMI. In 2032, the EPA-projected Li-ion battery cell demand to meet its proposed standards is nearly double that of the BMI Study's base case. EPA's projected demand is 21% higher in 2032 than that studied by BMI in its policy case. To the extent that the BMI study expresses concerns with the Li-ion battery supply chain, such concerns would only become greater given EPA's projected battery demand. Similarly, BMI's assessment of needed investments would also be expected to increase under a scenario aligned to that of EPA's. Where the BMI Study finds adequate capacity under its scenarios, additional work would be required to assess if supply is adequate under the higher EPA-projected demand. [EPA-HQ-OAR-2022-0829-0701, pp. 34-35]

[See original comment for Figure 5: EPA-projected Li-ion battery demand (GWh) vs. BMI Study base case projections.41] [EPA-HQ-OAR-2022-0829-0701, pp. 34-35]

41 BMI Study data from associated model. EPA data calculated by Auto Innovators from supplied proposal central analysis OMEGA […]vehicles.csv output file.

[See original comment for Figure 6: EPA-projected Li-ion battery demand (GWh) vs. BMI Study policy case projections.42] [EPA-HQ-OAR-2022-0829-0701, pp. 34-35]

42 Id.

2. Results

BMI summarizes U.S. battery supply chain risks in its base case (i.e., demand much lower than EPA's projections) across the Li-ion battery value chains as shown in Figure 7. The first row of data presents the absolute gap between base case demand and supply from the U.S. plus 50% of supply from free trade agreement countries (i.e., an approximation of potentially IRA 30D- compliant supply). The second row shows the relative (percentage) gap to the U.S. / 50% FTA supply. The final row of data responds to the broader question of the risk associated with meeting even base case demand through global supplies. [EPA-HQ-OAR-2022-0829-0701, p. 36]

BMI's assessment suggests that it is unlikely that U.S. and free trade agreement country supply chains will fully satisfy IRA 30D sourcing requirements with most of the supply chain at high risk, including cobalt, nickel, graphite, and anode active material supply. There is some risk to meeting base case demand (about half of EPA's projected demand) even with global supply chains. It is also worthwhile to note that the only raw material that EPA analyzed, lithium, is the only raw material not considered by BMI as a medium or high risk. [EPA-HQ-OAR-2022-0829-0701, p. 36]

[See original comment for Figure 7: Benchmark Minerals Intelligence of U.S. battery value chain supply risks in its base (current OEM plans) case.] [EPA-HQ-OAR-2022-0829-0701, p. 36]

Other take-aways from the BMI Study include: [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

- "Chinese suppliers dominate many of the constituent stages of the LiB supply chain, currently engaged in >50% of global capacity, a fact that potentially circumscribes IRA-compliant sourcing options for U.S. cell makers and OEMs."43 [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

- "Resulting from the extreme concentration of anode value chain manufacturing in China [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

– measuring >60% global capacity from mine to anode – removal of compliant Chinese supply will restrict the application of Clean Vehicle Credits under Section 30D beyond 2025.

This represents the most critical bottleneck for U.S. battery supply."44 [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

- "As a consequence of the availability of compliant anode active materials, the "supply constrained" scenario demonstrates U.S. battery cell manufacturing and ZEV objectives are potentially limited to 15% passenger EV penetration by 2030 vs. a policy driven target of 50% for the same year."45 [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

- "Immediate action is necessary due to the inelastic supply response from elements of the upstream, with lead times for new critical mineral supply extending 5 – 15-years in many jurisdictions while adhering to minimum Western ESG standards." 46 [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

- ". . . [Anode active material] stands out as a section of the supply chain where deficits could prove more resilient, even in the face of IRA incentives." [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

- According to BMI, IRA 30D-compliant cathode active material is also at risk without significant immediate investments in the U.S. and/or free trade agreement countries. "Security of supply via 50% FTA volumes offers some near-term respite for U.S. procurement . . . Expanding to the 'policy driven' demand scenario, additional FTA supply would only support the U.S. market until 2025 before falling short, requiring sustained IRA-compliant capital investment and proactive purchasing strategies."47 [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

- "Scale imports of Chinese [active anode material] will likely be necessary in the near- and medium-term, limiting the application or IRA-derived tax credits from Section 30D. [A]node battery components face sustained structural shortages of units under both the 'base case' and 'policy driven' demand scenarios throughout the modelling period. There is a 74% supply/demand shortfall in 2032 under the high case 'policy driven' despite relying on 50% FTA material deliveries."48 [EPA-HQ-OAR-2022-0829-0701, pp. 37-38]

43 BMI Study at 2. (Emphasis added.)

44 BMI Study at 2. (Emphasis added.)

45 BMI Study at 2. (Emphasis added.)

46 BMI Study at 2.

47 BMI Study at 6.

48 BMI Study at 8.

- Regarding lithium, "Competing requirements from Europe and first-mover advantages from Chinese capital has already secured significant volumes of FTA materials, potentially limiting the availability of unallocated IRA-compliant lithium chemicals for North America."49 "While evidence is growing for direct OEM procurement strategies. there is development risk associated with new capacity."50 [EPA-HQ-OAR-2022-0829-0701, p. 38]

- Regarding nickel, "The USA is limited as it currently produces zero domestic nickel sulphate needed to sustain the growth of its battery value chain; the USA is entirely reliant on imports . . . [S]ourcing primarily from Canada and Australia presents challenges due to allocated volumes in legacy markets. The U.S. nickel sulphate balance is forecast to remain in structural negative balance into the next decade.” [EPA-HQ-OAR-2022-0829-0701, p. 38]

- “[T]he absolute volume of cobalt required to sustain the U.S. growth remains on an upward trajectory . . . [D]omestic and FTA sourcing yields limited compliant volumes . .. [W]ithout immediate capital allocation, there are sustained challenges for alternative sourcing to incumbent Chinese cobalt refining.” [EPA-HQ-OAR-2022-0829-0701, p. 38]

- “U.S. domestic occurrence and output of natural flake graphite is extremely limited . . . Additionally, the availability of IRA-compliant FTA sources are also restricted . . . In the near-term fundamental supply will need to originate from China to meet U.S. base case demand through 2025 . . . [A]lmost 100% of spherical graphite (SPG) processing [is] currently controlled by the FEOC nation . . . IRA credits offer major incentives for SPG processing capacity localised in domestic or FTA regions, although the challenge remains to connect the upstream feedstock in sufficient volumes to maintain utilisation, especially given the extended lead times . . . Despite the encouragement from IRA credits, a strong business case needs to be defined for greenfield production.”51 [EPA-HQ-OAR-2022-0829-0701, p. 38]

- “Common to the critical minerals theme, the structural shortfall of domestic and FTA synthetic graphite output is forecast to be sustained throughout the forecast period, creating a high reliance of imported volumes. While the U.S. is responsible for petroleum coke processing, the value-add graphitization is predominantly associated with China due to the incredible energy requirements for the process (requiring sustained temperatures of 2800-3000°C) . . . The concentration of manufacturing in China therefore presents the most substantial IRA bottleneck in the expansion of U.S. ZEV penetration across the entire battery value chain . . . [O]utsized capital is required in expanding greenfield production capabilities.”52 [EPA-HQ-OAR-2022-0829-0701, pp. 38-39]

- “Expanding the U.S. battery value chain is a critical assignment to draw resilience and competitiveness against the currently established Asian-centric output and optimize the Western transition to a low-carbon economy . . . [M]aping the capacity plans against the operational reality will be challenging without sufficient maturity of [IRA] compliant supply chains from the upstream critical minerals . . . [E]xploring the ‘policy driven’ demand scenario, the U.S. market remains exposed to foreign imports (predominantly from China) to meet domestic EV penetration objectives . . . [E]vidence demonstrates structural shortialls of the entire battery suite, originating from the diffierential lead times to established greenfield, qualified battery-purity material supply.”53 [EPA-HQ-OAR-2022-0829-0701, pp. 38-39]

- “The cumulative global battery industry is forecast to top 1TWh during 2023, swelling to approximately 3.6TWh by 2030 and to 7.8TWh by 2040. The evolution will place major pressure on critical minerals supply. Alignment to U.S. EV penetration objectives under the “policy driven” scenario generates significantly greater global lithium-ion battery demand by 2040 (19% higher in GWh-equivalent terms), with a corollary requirement for additional raw materials.”54 [EPA-HQ-OAR-2022-0829-0701, pp. 38-39]

- “Based on BMI’s current view of existing and planned AAM capacity, Chinese supply could account for almost 90% of the global total by 2030.”55 [EPA-HQ-OAR-2022-0829-0701, pp. 38-39]

49 BMI Study at 10.

50 BMI Study at 11.

51 BMI Study at 15 et seq.

52 BMI Study at 17 et seq.

53 BMI Study at 20 et seq.

54 BMI Study at 38.

55 BMI Study at 52.

3. Recommendation

Based on the results of the BMI Study, Auto Innovators recommends that EPA expand its analysis to critical minerals beyond lithium, that EPA consider cathode and anode active material manufacturing in addition to cell manufacturing, and that EPA reconsider its overly optimistic assumptions for the number of vehicles that will qualify for IRA 30D and 45X incentives. [EPA-HQ-OAR-2022-0829-0701, p. 39]

E. Additional Comments on Critical Minerals

1. Availability

Plug-in electric vehicles (PEVs), which include fully electric and plug-in hybrids, heavily rely on certain critical minerals, such as lithium, cobalt, nickel, and graphite, as well as rare earth elements. Meeting the increasing demand for these minerals raises concerns about responsible sourcing, environmental impacts, and geopolitical challenges. Ensuring a sustainable and ethical supply chain for critical minerals is crucial. [EPA-HQ-OAR-2022-0829-0701, pp. 40-41]

Demand for lithium-ion batteries in North America is forecast to increase nearly six times between 2022 and 2030, according to Benchmark Minerals Intelligence (BMI).56 BMI forecasts lack of upstream mining and midstream processing and cathode/anode production capacity to supply the new battery factories with the necessary battery materials.57 According to BMI, more than 300 new mines will need to be built over the next decade to satisfy critical mineral demand (Figure 8).58 [EPA-HQ-OAR-2022-0829-0701, pp. 40-41]

56 BMI Study at 23.

57 Id. at 35.

58 Benchmark Source, More than 300 new mines required to meet battery demand by 2035 (Sep. 6, 2022). Available at https://source.benchmarkminerals.com/article/more-than-300-new-mines-required-to-meet-battery- demand-by-2035. (Retrieved Jun. 30, 2023.)

[See original comment for Figure 8: Benchmark Minerals Intelligence infographic on mines needed to support demand for critical minerals] [EPA-HQ-OAR-2022-0829-0701, pp. 40-41]

Additionally, recycling will not be able to satisfy society's rising demand in the near term. The current small EV market share coupled with EV batteries' long lifespan (on average between 10- 20 years59) suggests that society will not likely be able to meet the rising demand for critical minerals through recycling. [EPA-HQ-OAR-2022-0829-0701, p. 42]

59 Moscaritolo, A. (2022, June 29). EV Batteries 101: Degradation, Lifespan, Warranties, and More. PCMAG. https://www.pcmag.com/news/ev-batteries-101-degradation-lifespan-warranties-and-more

EPA assumed a normal and predictable behavior of the critical minerals market that is instead experiencing exponential growth; EPA expects that growth to continue to develop smoothly. EPA took only a snapshot in time and smoothly forecasted out in what is expected to be a very unstable market as it continues to develop, without consideration of outside impacts. [EPA-HQ-OAR-2022-0829-0701, p. 42]

EPA has also stated that the potential for cost reductions of battery packs is supported by the EPA observation that analysts largely expect the price of lithium to stabilize at or near its historical low levels by the mid-2020s. Despite diverse geographic lithium development around the world, the role of China in the chemical conversion phase of manufacturing represents 61% global output in 2023 as the nation manufactures and sells large quantities of lithium hydroxide and lithium carbonate.60 Chinese lithium chemical company ownership is “forecast to maintain elevated levels around 70% by 2030, placing potentially challenging procurement conditions as determined by the final IRA definitions for ‘Foreign Entity of Concern.’”61 [EPA-HQ-OAR-2022-0829-0701, p. 42]

60 BMI Study at 41.

61 BMI Study at 21.

In the EPA analysis, the agency highlighted lithium availability and did not bother to look in depth at the other three critical materials needed for EVs. It just assumed that lithium was the bottleneck and biggest concern. Despite EPA’s belief that lithium supplies are adequate, there is growing concern with global supplies given planned EV production. Reuters highlights such concerns in a recent article covering the June 2023 Fastmarkets Lithium and Battery Raw Materials conference.62 [EPA-HQ-OAR-2022-0829-0701, pp. 42-43]

62 Ernest Scheyder, “Lithium producers warn global supplies may not meet electric vehicle demand,” Reuters (Jun. 22, 2023). Available at htps://www.reuters.com/markets/commodities/lithium-producers-warn-global-supplies-may-not-meet-electric-vehicle-demand-2023-06-22/. Retrieved June 26, 2023.

There were 45 lithium mines operating in the world last year, with 11 expected to open this year and seven next year, according to Fastmarkets. That pace is far below what consultants say is needed to ensure adequate global supply . . . Those growth projections assume a best-case-scenario, even as mining companies face difficulty hiring technical talent, rising costs and delay times for crucial equipment. [EPA-HQ-OAR-2022-0829-0701, pp. 42-43]

EPA acknowledged that there is a lack of diverse supply of graphite, describing that U.S. deposits of natural graphite exist, but graphite has not been produced in the U.S. since the 1950s. In addition, significant known resources are largely undeveloped.63 [EPA-HQ-OAR-2022-0829-0701, pp. 42-43]

63 NPRM at 389.

The U.S. does not produce any natural graphite; therefore, it must rely solely on imports to satisfy domestic demand. Nearly 60% of the world’s mined production last year came from China, making it a dominant player in every stage of the graphite supply chain. Almost all graphite processing today also takes place in China because of the ready availability of graphite supplies, weak environmental standards, and low costs.64 [EPA-HQ-OAR-2022-0829-0701, p. 43]

64 Adams, A. (2023). Report: A Global Race to the Top for Critical Minerals. SAFE. htps://secureenergy.org/a-global- race-to-the-top/

According to BMI, the liake graphite feedstock required for all uses in 2021 was just 1 million tons65. BMI estimates the graphite market is nearing an immediate deficit, with the supply shortfall growing to 8Mt by 2040. To fill this gap, the mining industry would need to produce nearly 8x as much graphite as it does currently over the next 18 years.66 [EPA-HQ-OAR-2022-0829-0701, p. 43]

65 (2022, July 22). Graphite deficit starting this year, as demand for EV battery anode ingredient exceeds supply. Mining.com. Retrieved June 10, 2023, from htps://www.mining.com/web/graphite-deficit-starting-this-year-as- demand-for-ev-battery-anode-ingredient-exceeds-supply/#:~:text=According%20to%20Benchmark%20Mineral%20Intelligence%20%28BMI%29%2C%20the%20flake, uses%20in%202021%2C%20was%20just%201%20million%20tonnes.

66 Mineral Commodity Summaries 2022 - graphite - USGS publications warehouse. Available at: htps://pubs.usgs.gov/periodicals/mcs2022/mcs2022-graphite.pdf (Accessed: 06 June 2023).

2. Country of Origin

China dominates minerals processing, processing anywhere from 60 to 100% of all the minerals needed for batteries and electric motors.67 Moreover, China has strategically invested in mineral deposits around the world. For example, Chinese-owned interests have developed vested partnerships in most of the world's lithium deposits, despite only having 8% of global lithium reserves. Chinese companies also control 15 of the 19 cobalt-producing mines in the Democratic Republic of the Congo (DRC).68 China's dominance in cobalt mine ownership allows it to have a major influence over the majority of the cobalt supply, despite having negligible resources of their own. Diversifying the critical mineral supply chains in this environment and competing on cost will be incredibly difficult. [EPA-HQ-OAR-2022-0829-0701, pp. 43-45]

67 Adams, A. (2023). Report: A Global Race to the Top for Critical Minerals. SAFE. htps://secureenergy.org/a-global- race-to-the-top/

68 Adams, A. (2023). Report: A Global Race to the Top for Critical Minerals. SAFE. htps://secureenergy.org/a-global- race-to-the-top/

The world's reliance on China for more than 80% of processing of minerals leaves all global automakers vulnerable to political pressure from China (Figure 9), which has a history of leveraging supply chains influences in times of conflict. Mines and related processing in the U.S. are undeveloped, and new permitting can take as long as ten years, yet EPA's proposed requirements for 67% BEVs by 2032 are less than eight model years away. [EPA-HQ-OAR-2022-0829-0701, pp. 43-45]

Figure 9: Key Mineral Reserves, Mine Production and Processing, 2022 [EPA-HQ-OAR-2022-0829-0701, pp. 43-45]

Source: Adams, A. (2023). Report: A Global Race to the Top for Critical Minerals. SAFE. htps://secureenergy.org/a-global-race-to-the-top/ [EPA-HQ-OAR-2022-0829-0701, pp. 43-45]

"Two-thirds of forecasted lithium chemical production in 2030 will be owned by Chinese companies, despite just half of production taking place in the country in the same year, according to Benchmark's Lithium Forecast. Second to China is the U.S., with companies from the country forecast to own 17% of lithium chemical production at the end of the decade.” 69 The lithium supply will need to double again to reach two million tons of lithium carbonate equivalent demand as soon as 2027, BMI forecasts.70 Annual growth in lithium supply will ease in 2024 to 27%, fading to single figures by 2028.71 This is before prolonged market deficit sets in from 2029 until at least 2040, according to Benchmark’s base forecast.72 [EPA-HQ-OAR-2022-0829-0701, pp. 43-45]

69 Who Will Own Lithium Chemical Production in 2030?, BENCHMARK SOURCE (May 3, 2023), https://source.benchmarkminerals.com/article/who-will-own-lithium-chemical-production-in-2030.

70 Benchmark Minerals Intelligence (2023, April 28). Global lithium supply forecast to hit 1 million tonnes for first time. Benchmarkminerals.com. Retrieved June 10, 2023, from htps://source.benchmarkminerals.com/article/global-lithium-supply-forecast-to-hit-1-million-tonnes-for-first-time?mc_cid=5f206cabf2&mc_eid=54bceb9f14

71 Benchmark Minerals Intelligence (2023, April 28). Global lithium supply forecast to hit 1 million tonnes for first time. Benchmarkminerals.com. Retrieved June 10, 2023, from htps://source.benchmarkminerals.com/article/global-lithium-supply-forecast-to-hit-1-million-tonnes-for-first-time?mc_cid=5f206cabf2&mc_eid=54bceb9f14

72 Benchmark Minerals Intelligence (2023, April 28). Global lithium supply forecast to hit 1 million tonnes for first time. Benchmarkminerals.com. Retrieved June 10, 2023, from htps://source.benchmarkminerals.com/article/global-lithium-supply-forecast-to-hit-1-million-tonnes-for-first-time?mc_cid=5f206cabf2&mc_eid=54bceb9f14

3. Mining/Processing

Not only does China possess an advantage for every critical mineral required for EVs, but as shown in Figure 10, it also dominates critical minerals mining, processing, active material and other component production, and battery cell production. While U.S. officials have begun negotiating agreements with other countries to expand access to important needed minerals, it remains unclear which of these partnerships will succeed, or if they will be able to generate anything close to the supply of minerals and components auto manufacturers are projected to need. [EPA-HQ-OAR-2022-0829-0701, pp. 45-46]

Mining is subject to supply/demand economics. If material prices drop, U.S. mines will not be built. For example, a U.S. cobalt mine was permitted, but stopped construction claiming the minimum price of cobalt needs to be $25 per pound to continue construction.73 Such events have implications for both the availability of U.S. / FTA supplies of critical minerals and the global prices of critical minerals. [EPA-HQ-OAR-2022-0829-0701, pp. 45-46]

73 E&E News: Biden is scrambling for minerals. This U.S. cobalt mine just closed. (2023, May 12). https://subscriber.politicopro.com/article/eenews/2023/05/12/biden-is-scrambling-for-minerals-this-u-s-cobalt- mine-just-closed-00096440

EPA acknowledges that about 72% of U.S. cobalt consumption is imported,74 with nearly 70% of cobalt originating from the Democratic Republic of Congo, some significant production in Russia and Australia, and about 20% in the rest of the world.75 [EPA-HQ-OAR-2022-0829-0701, pp. 45-46]

74 NPRM at 29314.

75 NPRM at 29314.

Figure 10: China's Percent of Supply Across the Lithium Ion Battery Value Chain, 202276 [EPA-HQ-OAR-2022-0829-0701, pp. 45-46]

76 Benchmark Minerals Intelligence Q4 2022 Review at 41.

Because China controls all spherical graphite processing, the U.S. is completely dependent on its battery-grade graphite from China. This is why the U.S. government has included graphite among the 35 minerals that it deems critical to its national security and economy. A White House report on critical supply chains showed that graphite demand for clean energy applications will require 25 times more graphite by 2040 than was produced worldwide in 2020. [EPA-HQ-OAR-2022-0829-0701, pp. 46-47]

The Inflation Reduction Act requires 50% (and 100% by 2029) of the battery components to be manufactured in North America to qualify for a portion of the 30D tax credit. However, in 2030, BMI forecasts North America will only be able to domestically fulfill 3.5% and 3.4% of its domestic cathode and anode demands, respectiully (see Figure 11).77 [EPA-HQ-OAR-2022-0829-0701, pp. 46-47]

77 Benchmark Minerals Intelligence (2022, November 17). Can North America build a battery supply chain? Benchmarkminerals.com. Retrieved June 10, 2023, from htps://source.benchmarkminerals.com/article/can-north- america-build-a-battery-supply-chain.

Figure 11: Global Battery Component Supply by Source [EPA-HQ-OAR-2022-0829-0701, pp. 46-47]

While there are five cathode facilities between the U.S. (4) and Canada (1), they are not at commercial scale yet. Even with additional facilities set to come online through the decade, North America's cathode production deficit is forecast to increase 3.5 times between now and 2030.78 [EPA-HQ-OAR-2022-0829-0701, pp. 46-47]

78 "Can North America Build A Battery Supply Chain?," Benchmark Minerals Intelligence, 11/17/22

Currently, China produces approximately 78% of the world's cathodes and 91% of the world's anodes.79 China will remain the largest producing country for cathode active materials from today until 2040.80 BMI expects Chinese production to comprise 71% of the globally produced cathode material – almost seven times the amount of the world's second largest producer, South Korea. 81 [EPA-HQ-OAR-2022-0829-0701, pp. 46-47]

79 Adams, A. (2023). Report: A Global Race to the Top for Critical Minerals. SAFE. https://secureenergy.org/a-global- race-to-the-top/

80 Adams, A. (2023). Report: A Global Race to the Top for Critical Minerals. SAFE. htps://secureenergy.org/a-global- race-to-the-top/

81 Benchmark Minerals, Report, Q1 2023

A detailed analysis of global supply chains is required. In the case of lithium, for example, agencies need to consider the price of electricity where the lithium is mined, where the lithium is processed, where the lithium is used in cathode production, where the battery cells are made, and where battery packs are assembled. Electricity prices vary significantly around the world, However, EPA projects 100% of battery cells will be produced in the U.S. by 2027 and growing critical mineral production. As more of the lithium-ion battery supply chain develops in the U.S., the analysis of U.S. electricity prices on battery costs will be more straightforward. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

G. Battery Manufacturing Capacity

Despite announced investments in the U.S. and E.U. battery manufacturing capacity, China is poised to maintain its market dominance throughout the decade. By 2032, China is expected to continue to control the battery market with more than 4,800 GWh of annual battery production capacity— approximately 67% of all forecasted battery cell manufacturing capability. Elon Musk estimates a needed global battery capacity of 300 terawatt-hour by 2050.124 [EPA-HQ-OAR-2022-0829-0701, pp. 67-68]

124 How Can the World Meet Elon Musk's 300 TWh Battery Capacity Target?, BENCHMARK SOURCE (Nov. 16, 2022), htps://source.benchmarkminerals.com/article/how-can-the-world-meet-elon-musks-300-twh-batery-capacity- target.

EPA states that a recent forecast by the Department of Energy, illustrates the rapid recent growth in new plant announcements, estimating that announcements for North America to date will enable an estimated 838 GWh of annual capacity by 2025, 896 GWh by 2027, and 998 GWh by 2030, the vast majority of which is cell manufacturing capacity, enough to supply from 10 to 13 million BEVs per year.125 [EPA-HQ-OAR-2022-0829-0701, pp. 67-68]

BMI provides somewhat lower estimates for anticipated battery cell manufacturing capacity in North America, reaching 890 GWh of operating, highly probable, probable, and possible production by 2032 (Figure 20).126 BMI also notes that about 70% of the capacity will be owned by companies based outside of the U.S. [EPA-HQ-OAR-2022-0829-0701, pp. 67-68]

125 NPRM at 29317.

126 BMI Study at 47.

Figure 20: Benchmark Mineral Intelligence assessment of N. American battery cell manufacturing capacity, 2020-2032, and country of ownership. [EPA-HQ-OAR-2022-0829-0701, pp. 67-68]

While these projections and announcements demonstrate progress in expanding battery manufacturing capacity outside of China, it is important to acknowledge the time required to realize these goals. The time between announcements and a plant being at full capacity can take several years. Moreover, the auto industry faces the challenge of meeting the growing demand for batteries while balancing the complexities of establishing and scaling up manufacturing operations, which includes building a skilled workforce and securing an adequate supply chain stretching back to the raw critical minerals. [EPA-HQ-OAR-2022-0829-0701, pp. 68-69]

The battery manufacturing landscape is witnessing significant developments, with China maintaining its stronghold as the dominant player in the market. While the U.S. is making strides to expand its battery production capacity, the scale and pace of China's investments and advancements in this sector continue to position it as the frontrunner. As the demand for electric vehicles and energy storage solutions continues to grow, the need for a substantial global battery capacity becomes increasingly apparent. Scaling up North American battery manufacturing is a complex endeavor that requires significant time and effort. Simply put, China has a 10–15-year head start. Establishing a robust and competitive battery manufacturing ecosystem involves various challenges as described above. It is crucial to acknowledge that scaling up production capacity cannot happen overnight. It requires a long-term commitment and sustained support and investment from governments, industry, and other stakeholders. [EPA-HQ-OAR-2022-0829-0701, pp. 68-69]

One of the complicated factors that the agency needs to analyze is the current and projected global shortage (2027-2030) of electrical steel. This type of steel is comprised of ultra-thin sheets that transfer electricity into mechanical power. For use in an EV's electric motor, a higher-grade electrical steel is required that entails stamping and stacking steel into precise shapes that may be less than a millimeter thick. The U.S. has very limited production capability for electrical steel and has imposed tariffis on the supplies from South Korea, Japan and China. The cost-reduction factors that the agency is using for electric motors need to be modified, as they ignore the current and likely costs of electric motors. [EPA-HQ-OAR-2022-0829-0701, pp. 69-70]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 69-70]

1. James Irwin. Price Parity Points: As EV Component Costs Rise, Stalling Push for Parity. Automotive News. November 7, 2022, 10-11.

2. Daniel Sims. Electrical Steel Supply and Demand Could Impact EV Prices Later This Decade. Techspot.com. March 28, 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 69-70]

R&D efforts are looking into new alternatives that can reduce or eliminate the use of rare earths while maintaining the effciency advantages of permanent magnet synchronous motors. Some alternatives require expanded use of liners that depend on the ultra-thin electrical steel, but the cost premium for electrical steel is signiffcant and global shortages are projected in the 2027-2030 timeframe. It is possible that some innovations in motor design will penetrate luxury/premium models prior to 2032, but most of the 2032 light-duty fleet is likely to retain use of rare earth magnets. [EPA-HQ-OAR-2022-0829-0701, pp. 70-71]

While the U.S. is poised to increase domestic manufacturing and processing of battery components and critical minerals, we are currently heavily reliant on other nations. This transition will take time, and that will have a role to play in vehicle eligibility for the 30D tax credit. Figure 24 shows the portion of battery manufacturing and critical mineral processing that takes place in China (a foreign entity of concern), the U.S., FTA countries, major U.S. allies, and other countries that don't fit into the previous categories (e.g., Democratic Republic of Congo). The dearth of U.S. mining, processing, component production, and cell production is noticeable, as is the dominance of China in all these areas. [EPA-HQ-OAR-2022-0829-0701, pp. 74-75]

[See original comment for: Figure 24: Countries Manufacturing Batteries and Processing Critical Mineral131] [EPA-HQ-OAR-2022-0829-0701, pp. 74-75]

131 Adams, A. (2023). Report: A Global Race to the Top for Critical Minerals. SAFE. https://secureenergy.org/a- global-race-to-the-top/.

132 htp://waysandmeans.house.gov/wp-content/uploads/2023/06/H.R.-3938-Bill-Text.pdf. [

1. Soil and Water Contamination from the Mining and Processing of Rare Earths

Rare earths (especially neodymium and dysprosium) are standard materials used in the electric motors of BEVs. There is much effort underway to make electric motors with fewer rare earths or none at all, but most EVs produced in the 2027-2032 time frame will use rare earths. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

The mining and processing of rare earths is environmentally challenging and, if not done properly, wastes can lead to damaging soil and water contamination near the mine and/or processing facility. The process of extracting rare earths entails open pits, which leave a large ecological footprint. The dust at the mine can be radioactive because thorium is often found with rare earths. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

Until 1984, the United States accounted for most of the world's supply of rare earths. The Mountain Pass mine in California, located in the Mojave Desert near the Nevada line, was the single largest source of U.S. production. The mine closed in 2002, partly because it could not earn a profit in competition with low-cost mines in China, and in part because of radioactive wastewater leaks that triggered community and regulatory at concerns and took more than a decade to clean up. China has also experienced environmental pollution from rare earth mining, and has cracked down on illegal rare earth mining, which circumvents the country's export quotas and is difficult to regulate for environmental protection. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

The Mountain Pass mine was revived in 2012 under new ownership but the owner declared bankruptcy in 2015 in the face of low prices, debt, and a flood of low-cost material from China. Another owner, Mountain Pass (MP) Materials, has gradually expanded output at the mine from 2018 to 2020 and announced plans for a processing facility. (The company until now has been using a processing facility in China). In late 2020 the Department of Defense announced a $35 million award to help finance a processing facility. A new plant in Fort Worth, Texas, will begin processing and magnet production in 2024. General Motors has made a commitment to source its rare earths from Mountain Pass. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

An alternative to open-pit mining of rare earths is vacuuming them from the ocean floor. The technology for ocean mining does not require the blasting and digging operations that occur at open-pit land mines. However, the United Nations International Seabed Authority has not been able to develop standards and permit procedures that satisfy the environmental concerns of member countries. Thus, ocean mining of rare earths (and other materials used in EVs such as cobalt and nickel) will not happen on a large scale in the foreseeable future. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

1. John D. Graham. The Global Rise of the Modern Plug-In Electric Vehicle: Public Policy, Innovation, and Strategy. Elgar House Publishing. UK, 2021, 304-309. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

2. https://www.defense.gov/News/Releases/Release/Article/2941793/dod-awards-35- million-to-mp-materials-to-build-us-heavy-rare-earth-separation-c/. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

3. https://www.theverge.com/2021/12/9/22825948/gm-ev-motor-rare-earth-metal- magnet-mp-materials. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

4. htps://www.theverge.com/2021/12/9/22825948/gm-ev-motor-rare-earth-metal- magnet-mp-materials. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

5. Doug Newcomb. Deep Thinking: Ocean Floor Next Frontier. Automotive News. October 31, 2022, 20. [EPA-HQ-OAR-2022-0829-0701, pp. 280-281]

2. Depletion of Scarce Water Supplies from Lithium Mining in the Deserts of Chile

Lithium is a critical mineral used in all variants of the lithium ion battery, and thus will likely be used in most EVs sold in the U.S. from 2027 to 2032. The largest lithium deposits in the world are in a remote region of South America, Atacama, near the borders of Chile, Bolivia, and Argentina ("the Lithium Triangle"). As recently as 2014, Chile was the number one miner of lithium, and much of Chile's lithium was processed in Chile and then exported to North America. However, environmental concerns about ecological harm to water-stressed communities in Chile have slowed the expansion of lithium mining in Chile. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

Beginning in 2015, Chile's national government and major companies announced plans to expand lithium mining. Those plans triggered well-organized, intense opposition from indigenous groups as well as local and international environmental groups. The reasons for opposition were variable, but the most common concern was about consumption of scarce water resources. The Atacama region is one of the driest places in the world: meaningful rainfall of about 1.5 inches occurs only once per century on average. Despite the dry conditions, the region is home to protected wetlands, extraordinary wildlife, and unique microorganisms. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

Lithium mining in Chile entails withdrawing high volumes of liquid brine that are evaporated in the dry desert air to create a precursor to the desired lithium material. The brine is not potable water, but the withdrawals have been associated with measurable changes to regional hydrology and increases in local temperatures, which mean lithium mining is one of the major stressors leading to local environmental degradation. Environmental concerns were first expressed by leaders of indigenous groups. They reported anecdotal evidence of diminished productivity of desert farms near lithium mining sites. They also reported harm to desert and wetlands wildlife. Recently published scientific evidence revealed a 10% decline in flamingo populations near brine operations in Chile. Insofar as the anecdotal reports reflect a pattern of ecological disruption, the pattern may not be due entirely to lithium mining, as climate change itself can have similar disruptive effects. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

Lithium mining has become so controversial in Chile that the new leftist government has pledged stricter environmental controls and control of all lithium mining by a state-owned enterprise. Since 2015, Australia has surpassed Chile as the number one lithium miner in the world. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

1. John D. Graham. The Global Rise of the Modern Plug-In Electric Vehicle: Public Policy, Innovation, and Strategy. Elgar House Publishing, UK, 2021, 288-291. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

2. https://diplomacy21-adelphi.wilsoncenter.org/sites/default/files/media/uploads/documents/Latin%20America%E2%80%99s%20Lithium_Critical%20Minerals%20and%20the%20Global%20Energy%20Transition.pdf. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

3. Harry Dempsey, Edward White. Chile's Move to Control Lithium Alarms Industry. Financial Times. May 2, 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

4. Wenjuan Liu, Data B Agusdinata. Dynamics of Local Impacts in Low-Carbon Transition: Agent-Based Modeling of Lithium Mining-Community-Acquifer Interactions in Salar de Atacama, Chile. The Extractive Industries and Society. 8(3). September 2021, 100927. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

5. D.B. Agusdinata, W Liu. Global Sustainability of Electric Vehicles Minerals: A Critical

Review. The Extractive Industries and Society. 13. 2023, 101231. [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

6. D.B. Agusdinata et al. Evaluating Sustainability Impacts of Critical Mineral Extractions: Integration of Life Cycle Sustainability and SDGs Assessment Framework. Journal of Industrial Ecology. 2022. https://doi.org/10.111/jiec.13317 [EPA-HQ-OAR-2022-0829-0701, pp. 282-283]

3. Environmental Concerns about Hard-Rock Mining of Lithium and Other Materials

Although hard-rock mining of lithium is growing more rapidly than lithium production from brine operations, hard-rock mining is not necessarily preferable from an environmental perspective. Lifecycle studies have compared hard rock mining to brine operations. They find that hard-rock mining is more energy intensive, generates more CO_2 emissions, uses more freshwater supplies, generates more waste material, and creates more local dust and noise in nearby communities than brine operations. The ecological concerns about hard rock mining help explain why recent proposals for new hard rock lithium mines have been cancelled or delayed in Serbia, Portugal, and North Carolina. [EPA-HQ-OAR-2022-0829-0701, pp. 283-284]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 283-284]

1. https://pdfs.semanticscholar.org/c8f3/8c96f91dd1d37a18d61410b73a7bd0603271.pdf.

2. Sam Fleming, Alice Hancock. EU Eyes Output Boost for Green Energy Raw Materials. Financial Times. August 17, 2022, 2.

3. Associated Press. Serbia Moves to Defuse Protests Over Rio Tinto Lithium Mine. Climate Wire. December 9, 2021.

4. Ivana Sekularas. Serbia Revokexs Rio Tinto Lithium Project Amid Protests. Reuters.com. January 20, 2022.

5. Aime Williams. The Race to Mine Lithium in America. Financial Times. May 11, 2020, 17. [EPA-HQ-OAR-2022-0829-0701, pp. 283-284]

Organization: American Coalition for Ethanol (ACE)

It must also be pointed out that the proposal will not make the U.S. more energy secure. In fact, the opposite is true. The lithium, nickel, copper, cobalt and other critical minerals necessary to make batteries and electric vehicles in the ambitious timeframe set forth by the Agency are not found in sufficient quantities in the U.S. Instead, these precious minerals must be mined and imported from countries such as China, Russia, and the Congo. EPA's aggressive timeline will only serve to increase U.S. reliance on foreign supplies of minerals for BEVs. [EPA-HQ-OAR-2022-0829-0613, pp. 2-3]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

Moreover, EPA's feasibility analysis fails to meaningfully confront multiple serious obstacles to the widespread adoption of electric vehicles on which its proposed rule depends. Increased production of electric vehicles is constrained by the supply of certain minerals critical to manufacturing batteries. That supply is sharply limited; mining and processing operations are nowhere near the levels needed to support the expansion of electric vehicles EPA's proposed rule would require. The supply chain is subject to serious disruptions, as other fed- eral agencies have underscored. For example, nearly all existing supply of several critical minerals is controlled by a small number of foreign and unfriendly nations. The insufficiency of these essential inputs will only become more acute as worldwide demand for them increases. And developing new operations would be a decades-long process that extends far beyond the compliance period for the proposed rule. On average, it takes 16 years to move mining projects from discovery to first production, and another ten to begin producing at max- imum capacity. EPA barely addresses this problem in its proposed rule and offers no plausible solution. [EPA-HQ-OAR-2022-0829-0683, p. 4]

EPA's Analysis Fails To Confront Multiple Specific Obstacles To The Level Of Widespread Electric-Vehicle Adoption Its Proposed Rule Requires

EPA's projection of future electric-vehicle adoption is not only flawed on its own terms, but it also fails meaningfully to address several chokepoints that could severely constrain future production and utilization of electric vehicles. [EPA-HQ-OAR-2022-0829-0683, p. 31]

a. The Supply Chain For Critical Minerals Is Vulnerable To Disruption And Price Volatility

Electric-vehicle technology, and particularly production of batteries, is vi- tally dependent on certain minerals—including lithium, nickel, copper, cobalt, graphite, and manganese. See IEA, Global Supply Chains of EV Batteries, at 21 (July 2022) ("Global Supply Chains"). Because "[a] typical electric car requires six times the mineral inputs of a conventional car," manufacturers would need a steady, reliable supply of those minerals, much larger than they require today, to increase production of electric vehicles to the levels necessary to comply with the proposed standards. Role of Critical Minerals at 5. But by all available evi- dence, manufacturers will face substantial—possibly insurmountable—chal- lenges in obtaining the necessary quantities of those essential inputs. [EPA-HQ-OAR-2022-0829-0683, p. 31]

Both the production (mining) and processing (refining) of minerals critical to production of electric-vehicle batteries are highly concentrated among a small group of countries—and the

United States is not one of them. According to the Department of Energy, "[a]lmost all production of raw materials for lith- ium ion batteries, apart from some lithium extraction and refinement, occurs abroad today," and the United States "currently has virtually no domestic pro- cessing capacity." Building Resilient Supply Chains, Revitalizing American Manu- facturing, and Fostering Broad-Based Growth, The White House, at 93–94 (June 2021) ("White House Report"). For example, more than 80 percent of all lith- ium is sourced from Australia, Chile, and China; 80 percent of natural graphite is sourced from China; more than 70 percent of cobalt is sourced from the Dem- ocratic Republic of Congo; about half of copper is sourced from Chile, Peru, and China; and more than half of nickel is sourced from Indonesia, the Philip- pines, and Russia—with Russia being the world's largest producer of the "Class 1" grade needed for batteries. See Global Supply Chains at 22, 29; Role of Critical Minerals at 30. And the "project pipelines" for these minerals indicate that, "in most cases, the geographic concentration of production is unlikely to change in the near term." Role of Critical Minerals at 121. [EPA-HQ-OAR-2022-0829-0683, pp. 31-32]

Concentration levels are "even higher for processing operations, where China has a strong presence across the board." Role of Critical Minerals at 12. The Department of Defense reports that, "[e]ven in cases where other countries conduct the initial beneficiation of a strategic and critical material, China dom- inates the processing of strategic and critical minerals, giving it de facto control over the flow of material through the supply chain." White House Report at 165. China refines almost 60 percent of lithium, over 50 percent of graphite, 72 percent of cobalt, 40 percent of copper, around 35 percent of nickel, and 90 percent of manganese. See Global Supply Chains at 2,23; Role of Critical Minerals at 31–32; White House Report at 103. It also produces three-quarters of all lith- ium-ion batteries. See Global Supply Chains at 2. [EPA-HQ-OAR-2022-0829-0683, pp. 31-32]

This lack of supplier diversity greatly increases supply-chain risk. As de- tailed below, disruptions in even a single country can create supply bottlenecks; the limited number of countries producing and processing minerals may not be able to meet rapidly increasing demand; and, according to the federal govern- ment, scholars, and industry observers, the dominance of potentially uncoop- erative or hostile countries in every segment of the market threatens U.S. en- ergy security. Under these challenging and unpredictable circumstances, a widespread shift to electric vehicles in less than a decade is plainly infeasible. [EPA-HQ-OAR-2022-0829-0683, pp. 31-32]

Supply-Chain Disruption. Because the production of these critical minerals depends on one country or a few countries, "a large portion of global supply is subject to single point disruption risk." White House Report at 175–76. If a major producing country suffers a natural disaster, imposes new trade re- strictions, faces political or social unrest, or becomes involved in geopolitical conflict, the stream of minerals entering the market could dramatically slow. See Role of Critical Minerals at 32 ("supply chains can quickly be affected by reg- ulatory changes, trade restrictions or political instability in a small number of countries"); id. at 129 ("Under these circumstances, physical disruptions (e.g. earthquakes, tsunamis and flooding) or regulatory and geopolitical events in major producing countries can have large impacts on the availability of miner- als, and in turn on prices."). [EPA-HQ-OAR-2022-0829-0683, p. 32]

These concerns are not hypothetical. Independent and governmental re- ports—many of which EPA relies on in support of the proposed rule— document instances in which each of these disruptions have occurred. Natural disasters, for example, have “become one of the most frequent causes of min- eral supply disruption.” Role of Critical Minerals at 12, 129. Mining operations are also vulnerable to high water-stress levels, extreme heat, and flooding. Id. Over half of today’s lithium and 80 percent of Chile’s copper is produced in areas with high water-stress levels. Id. at 131. In 2019, “the worst drought in more than 60 years severely affected some operations” in Chile, and that na- tion’s “largest underground copper mine” had to implement water rationing. Id. “[S]imilar events hav[e] occurred in Australia, Zambia and others.” Id. [EPA-HQ-OAR-2022-0829-0683, pp. 32-33]

The federal government has expressed concern that the increased tendency of countries to engage in “unfair foreign trade practices” presents “[a]nother risk to critical material supply chains.” White House Report at 183–84. The International Energy Agency offered a similar assessment, explaining that “[r]ecent events, such as Indonesia’s ban on nickel ore export and China’s ex- port ban on [rare earth elements],” show that “regulatory and geopolitical events in major producing countries can have large impacts on the availability of minerals.” Role of Critical Minerals at 129. Moreover, news outlets have re- ported that “Chile, a major producer of lithium, has proposed nationalizing its lithium industry to better control how the resources are developed and de- ployed, as have Bolivia and Mexico.” Ana Swanson, The U.S. Needs Minerals for Electric Cars. Everyone Else Wants Them Too., N.Y. Times (May 21, 2023), https://tinyurl.com/2p8txa2h (“Minerals for Electric Cars”). And, according to the Department of Defense, China has continuously engaged in “dumping”— i.e., exporting products at low prices in the short term to drive competing pro- viders out of business and secure long-term dominance. White House Report at 184. [EPA-HQ-OAR-2022-0829-0683, pp. 32-33]

Legal, legislative, and grassroots scrutiny of the environmental and social issues surrounding the production of critical minerals also threatens supply chains. See Role of Critical Minerals at 12. “Grassroots protests and lawsuits against lithium mining are on the rise . . . amid rising concern about the socio- environmental impacts and increasingly tense geopolitics around supply.” Nina Lakhani, Revealed: How US Transition to Electric Cars Threatens Environmen-tal Havoc, Guardian (Jan. 24, 2023), https://tinyurl.com/995uawn8. Reporters have noted that, “[i]n Chile and Argentina, the world’s second- and fourth- largest lithium producers respectively, broken promises by corporations, water scarcity, land contamination and the lack of informed consent from Indigenous groups has fueled resistance and social conflicts.” Id. And, according to the Bureau of International Labor Affairs, cobalt mining operations in the Demo- cratic Republic of Congo have been under the spotlight for their use of child labor. See Exposing Exploitation in Global Supply Chains, Bureau of Int’l Lab. Affs., https://www.dol.gov/agencies/ilab/reports/child-labor/list-of- goods/supply-chains/lithium-ion-batteries. These types of events have the po- tential to depress output. Labor strikes are already a leading cause of mineral supply disruption, see Role of Critical Minerals at 129, and major protests and legal challenges “could serve as a hard brake” on production, Bentley Allan et al., Friendshoring Critical Minerals: What Could the U.S. and Its Partners Produce, Carnegie Endowment for Int’l Peace (May 3, 2023) (“Friendshoring Critical Min-erals”). Public opinion in the United States, too, “could turn sharply against any material imports associated with human rights violations or corruption,” which could require manufacturers “to identify other sources for input materials.” White House Report at 122. [EPA-HQ-OAR-2022-0829-0683, pp. 33-34]

Other forms of internal conflict can affect operations within major produc- ing countries. In the 1970s, for example, the supply of cobalt "was disrupted due to an uprising in the region." Alexandra Leader et al., The Effect of Critical Material Prices on the Competitiveness of Clean Energy Technologies, Materials for Renewable and Sustainable Energy, at 2 (2019) ("The Effect of Critical Material Prices"). "The market saw price increases of over 500%, causing severe inter- ruptions for the downstream cobalt users, such as General Electric." Id. The majority of cobalt continues to come from that region, and "such a concen- trated supply in a provenly unstable region leaves concern over the potential for another major supply disruption." Id. [EPA-HQ-OAR-2022-0829-0683, p. 34]

Geopolitical conflict could also rapidly shift the supply landscape. See White House Report at 175. The war in Ukraine, for example, has affected the availability and cost of nickel, showing "just how quickly events can change." McKinsey & Co., Could Supply-Chain Issues Derail the Energy Transition (Dec. 5, 2022) ("Supply-Chain Issues"); see also Emily Pickrell, Russia-Ukraine War Helps Drive Nickel Prices, EV Headaches, Forbes (Mar. 31, 2022), https://tinyurl.com/2p95mwfx; Global Supply Chains at 15–16. Likewise, the "military coup in Myanmar has raised concerns over supply disruption of heavy [rare earth elements], fueling a surge in prices." Role of Critical Minerals at 129. [EPA-HQ-OAR-2022-0829-0683, p. 34]

Rapidly Increasing Demand. Beyond potential supply disruptions, the world's facilities for mining and processing critical minerals will face immense challenges in meeting the increased demand required by the proposed rule. Shortages could delay electric-vehicle production—of vital importance to the proposed rule's timelines—and at a minimum will contribute to price volatility. [EPA-HQ-OAR-2022-0829-0683, pp. 34-36]

Imbalances between supply and demand have already resulted in skyrock- eting prices for critical minerals. Between the beginning of 2021 and May 2022, nickel prices "reach[ed] levels not seen for almost a decade," cobalt prices more than doubled, and lithium prices increased more than sevenfold. Global Supply Chains at 15. By September 2022, prices for lithium rose even more, ranging from 800 to 1,000 percent higher than they were in the beginning of 2021. Thea Riofrancos et al., Achieving Zero Emissions with More Mobility and Less Mining, Univ. of Cal., Davis, at 16–17 (Jan. 2023) ("Achieving Zero Emissions"). [EPA-HQ-OAR-2022-0829-0683, pp. 34-36]

These problems are likely to increase. The Department of Energy reports that "[g]lobal demand for critical materials is expected to increase by 400-600% over the next several decades" and that "[f]or certain materials, such as lithium and graphite used in electric-vehicle batteries, demand is expected to increase by as much as 4,000%." Biden-Harris Administration Launches $675 Million Bipar- tisan Infrastructure Law Program to Expand Domestic Critical Materials Supply Chains, Dep't of Energy (Aug. 9, 2022), https://www.energy.gov/arti- cles/biden-harris-administration-launches-675-million-bipartisan-infrastruc- ture-law-program. The International Energy Agency similarly reports that "[t]he exceptional rise in demand for batteries is now outstripping supply" and projects that mineral supply chains "will have to expand ten-fold to meet gov- ernment EV ambitions." Global Supply Chains at 3, 18. To avert inevitable bottlenecks, operations must "dramatically scale up." Id. at 46. Even under existing standards, at a minimum, "dozens of mining projects will have to enter the market and reach capacity on schedule and tens of new mineral processing and precursor plants will have to be commissioned." Id. at 59. Even that may be insufficient to meet demand. See Supply-Chain

Issues ("Minerals supply from open mines and those with a high probability of opening may be able to partly meet this growth. However, the supply falls short of reaching all demand, and harder measures . . . may be required."); Achieving Zero Emissions at 16 ("Despite ongoing discoveries, most forecasters predict a near- to medium-term gap be- tween market supplies and demand, resulting in a supply crunch in the next 5 to 10 years."). [EPA-HQ-OAR-2022-0829-0683, pp. 34-36]

"If history is any guide," attempts to ramp up production will be beset with "considerable time lags." Role of Critical Minerals at 117. It takes "on average over 16 years to move mining projects from discovery to first production." Id. at 12. And even once operational, "mines often require around ten years before they reach nameplate production capacity." Global supply Chains at 52. It is typ- ical for "[m]arket tightness" to "appear much more quickly than new projects." Role of Critical Minerals at 122; see also id. at 12 ("These long lead times raise questions about the ability of suppliers to ramp up output if demand were to pick up rapidly."). [EPA-HQ-OAR-2022-0829-0683, pp. 34-36]

These high lag times may be exacerbated by declining mineral quality. Some mining operations, such as those for copper, have "already peaked" or are "expected to peak in the early 2020s due to declining ore quality and reserve exhaustion." Role of Critical Minerals at 136. As a result, "developing new pro- jects has become challenging," and producers will need to offset cost escalations with "technology innovation." Id. at 137. Similarly, most of the production growth in nickel over the coming years will come from regions with large amounts of "Class 2" resources, which cannot be used for batteries without undergoing high-pressure acid leaching. Id. at 146. That process brings "several challenges," including projects that "tend to take four to five years to ramp up to 80% capacity" and have "track records of large cost overruns and delays." Id. [EPA-HQ-OAR-2022-0829-0683, pp. 34-36]

Moreover, even when raw material can be mined, major strains may arise at later points in the supply chain—such as processing. See Role of Critical Min- erals at 142. With respect to lithium, for example, "[o]nly a handful of compa- nies can produce high-quality, high-purity lithium chemical products," and "[w]hile several planned expansion projects are in the pipeline, there is a ques- tion mark over how rapidly their capacity can come online to keep up with demand growth." Id. [EPA-HQ-OAR-2022-0829-0683, pp. 34-36]

The market's inability to respond quickly to increases in demand will likely lead to high prices. The Department of Energy concludes that it is "reasonable to anticipate future spikes in prices as demand increases and supply might, at least temporarily, struggle to catch up." White House Report at 122. Others explain that "[h]igh demand, coupled with criticality, promotes the risk of ex- treme price spikes or even material unavailability in the event of a disruption in the supply chain." The Effect of Critical Material Prices at 2. And because raw materials now account for the majority of battery costs, "higher mineral prices could have a significant effect on achieving industry cost targets," Role of Critical Minerals at 107, which in turn could "lead to lower demand for, and adoption of, clean energy technologies," The Effect of Critical Material Prices at 3. [EPA-HQ-OAR-2022-0829-0683, pp. 36-37]

Energy Security. Researchers and news outlets report that the urgent need for more materials is already "stoking geopolitical tensions" and causing "a wave of resource nationalism that could intensify" as countries around the world compete for access. Achieving Zero Emissions at 11; Minerals for Electric Cars. According to the Department of Energy, American companies in partic- ular are at heightened risk because many key minerals come from countries “that are geopolitical competitors of the United States” that may block access to dominant segments of the supply chain. White House Report at 122, 138. The agency advises that China has already “shown a willingness to restrict ac- cess to resources,” such as rare earth elements, and could easily curb exports of cobalt, nickel, lithium, graphite, or other battery components next. Id. at 122. For that reason, the agency warns that “it is reasonable to expect that China could restrict exports of any or all of the battery supply chain materials it pro- duces, due to trade tensions with the United States or a simple prioritization of domestic customers for its battery materials.” Id. In addition, the agency raises the “related concern” that China could also sell American manufacturers “sub- standard or less advanced material” to gain a competitive advantage. Id. U.S. companies have already indicated “that they were supplied ‘previous genera- tion’ material as China’s cathode producers reserve their most recent, and best, material for their larger volume Chinese cell making clients.” Id. [EPA-HQ-OAR-2022-0829-0683, p. 37]

The current Administration has concluded that there is a need to build a more secure international supply chain that is less concentrated on China, but its strategy so far has been criticized as “a bit incoherent and not necessarily sufficient to achieve that goal.” Minerals for Electric Cars. A recent report by Johns Hopkins University explains that, even if the United States can relocate supply chains to countries with shared interests and values, those countries do not have enough supply to meet demand. See Friendshoring Critical Minerals at 6. Given the amount of critical minerals that will be needed for solar, wind, and electric-vehicle battery supply chains by 2030, the study concluded that “[e]ven aggressive growth in the mining sector would leave democratic coun- tries drastically short on critical minerals supply.” Id. “[I]ncreasing production to achieve clean energy targets for 2030 would require unprecedented action,” and as a result, “excluding China from supply [of] critical minerals is simply not possible in the short term.” Id. [EPA-HQ-OAR-2022-0829-0683, p. 37]

Despite all of these problems, EPA asserts that critical minerals will not pose an obstacle for compliance. Its explanation, however, comes up short. [EPA-HQ-OAR-2022-0829-0683, p. 38]

EPA principally argues that it accounted for the supply problems associated with critical minerals by assuming an upper limit on the amount of lithium-ion batteries that will be available each year for electric vehicles. 88 Fed. Reg. at 29,323; Draft RIA at 3-22. But that assumption rests on an incomplete and un- reliable analysis. [EPA-HQ-OAR-2022-0829-0683, p. 38]

In setting its assumed upper limit on lithium-ion-battery availability, EPA analyzed only one critical mineral: lithium. 88 Fed. Reg. at 29,323; Draft RIA at 3-22. But as discussed above, lithium is only one of the critical minerals needed for manufacturing batteries, and the availability of each turns on cir- cumstances unique to the location of its production and processing. EPA acknowledges that other minerals, such as “cobalt, nickel, and manganese[,] are important.” Draft RIA at 3-23. EPA attempts to justify its failure to consider critical minerals other than lithium with the blithe assurance that “opportunity will exist” to reduce or eliminate other minerals’ use in battery chemistries in the future. Id. But EPA offers no analysis of key questions that response raises—such as when those “opportunit[ies]” for replacing other minerals would arise, the availability of the alternatives that would serve as replace- ments, whether new plants or production processes would be necessary, and the lead time required to implement the changes. To assess accurately how the supply and demand problems associated with critical minerals will impact com- pliance, the agency must address each of the minerals that it expects manufac- turers to obtain. It has not done so. Instead, EPA brushes the issue away with the unfounded hope that new battery technologies might one day render these minerals less essential. But they are essential now, a reality that EPA cannot ignore. [EPA-HQ-OAR-2022-0829-0683, p. 38]

Moreover, even as to lithium, the agency's analysis focuses solely on whether global production could accommodate growing domestic demand. Draft RIA at 3-23. The agency does not appear to have considered any of the potential disruptions discussed above that could render aggregate global supply of minerals inadequate or unavailable for producing batteries for vehicles to be sold domestically, or how price volatility might affect electric-vehicle penetra- tion rates. Id. Moreover, as EPA acknowledges, the data it used to forecast sup- ply and demand do not reach beyond model year 2027—the start of the compliance period for the proposed rule. See id. at 3-25. Instead, EPA recog- nizes that projections that far out become prohibitively difficult. See id. ("Past 2027, estimates of 'excess' lithium as a difference between [rest-of-world] de- mand and a current accounting of global supply become less informative, be- cause a demand response is not built into the supply data. Therefore, uncer- tainty about the supply-demand balance . . . increases rapidly as the time hori- zon increases."). That admitted uncertainty is more reason for caution, not an excuse to regulate in the absence of adequate information. [EPA-HQ-OAR-2022-0829-0683, pp. 38-39]

PA also asserts that "widespread automotive electrification in the U.S. will not lead to a critical long-term dependence on foreign imports of minerals or components," and that "increased demand for these products will [not] be- come a vulnerability to national security." 88 Fed. Reg. at 29,313. EPA offers two justifications for that "assessment": (1) with funding and motivation, com- panies can develop a domestic supply chain; and (2) disruptions caused by sup- ply bottlenecks and volatile prices will not be significant. Neither justification withstands scrutiny. [EPA-HQ-OAR-2022-0829-0683, pp. 39-40]

As to EPA's first justification—that an adequate domestic supply chain can be developed—doing so by the time the proposed rule would take effect is vir- tually impossible. Although the United States has some (small) reserves in this area, mining operations for most minerals are limited or nonexistent. See Global Supply Chains at 28. There is no domestic production of graphite or manganese. See White House Report at 105. And there is only one active domestic mine for each of lithium, cobalt, and nickel—none of which is capable of sourcing enough material even to scratch the surface of projected U.S. demand. The lith- ium mine's annual output is enough for only 80,000 vehicles—less than the number of electric cars that a single manufacturer (Tesla) sold in the first quar- ter of 2022. See Lithium Mining in North America, Inst. for Energy R'sch (Sept. 21, 2022), https://tinyurl.com/2p89vrkv; Dustin Hawley, What Percent of US Car Sales Are Electric?, J.D. Power (Apr. 3, 2023), https://ti- nyurl.com/w6vn9rc5. The cobalt mine has not reached full production, and even when it does, the company expects to produce enough material for only "several hundred thousand electric cars." Kirk Siegler, In Idaho, America's First, and Only, Cobalt Mine in Decades Is Opening, OPB (Oct. 8, 2022), https://ti- nyurl.com/3v929nd3. And the nickel mine is set to shut down in 2025, mean- ing that it will not even be in operation by the time the proposed standards take effect. See White House Report at 99. [EPA-HQ-OAR-2022-0829-0683, pp. 39-40]

Because the baseline for domestic mineral production is close to zero, new mining operations are necessary. But although various projects have been an- nounced or are under development, whether and when they might begin oper- ations remains uncertain. In the United States, as elsewhere, establishing a min- ing operation is “an extremely lengthy process.” White House Report at 158. According to the Department of Defense, a “reasonable industry benchmark for the development . . . is not less than ten years” and can sometimes take over thirty years. Id. And that is before factoring in the time needed to obtain the necessary permits, which itself can take “years, if not decades,” even account- ing for the federal government’s efforts to “streamline” the process. Minerals for Electric Cars. Moreover, it is reportedly “quite common for most companies to fail to reach the end of this development process, simply due to the long project development time without cash flows to offset expenses and the technical chal- lenges associated with large, complex project financing for materials produc- tion.” White House Report at 158. For example, during the “peak of industry and market interest in the rare earth sector in early 2011,” the “Advanced Rare- Earths Project Index” tracked 275 projects that were under development by 180 publicly traded companies in 30 different countries. Id. By 2021, only two had entered full-scale production, with two others still in pilot-plant production and the rest having failed—representing a “combined success rate of 1.5 percent” over a decade. Id. Thus, even if EPA is right that minerals could be produced in the United States, that companies have a competitive interest in developing these operations, and that the federal government is providing helpful re- sources, there is little chance that enough mines will be up and running in time to supply manufacturers with minerals they need for any year in the proposed rule’s compliance period. [EPA-HQ-OAR-2022-0829-0683, pp. 39-40]

As to EPA’s second justification—speculation that supply disruptions and fluctuating prices will not have a material effect on the electric-vehicle industry—that conjecture is unfounded and implausible. See 88 Fed. Reg. at 29,323. Contrary to the agency’s contention, supply disruptions and fluctuating prices of critical minerals will “constrain[] the ability to travel” if manufacturers can- not offer enough vehicles for their consumer base or must raise prices beyond what many consumers can afford. Id. And even if the agency is right that manufacturers have thus far been able to avoid short-term price fluctuations by entering long-term contracts, EPA cites nothing to demonstrate that those arrangements will continue to be offered as the demand for a limited supply of critical minerals skyrockets over the coming years. EPA also cites nothing to demonstrate that substitutes will be readily available and affordable when the primary critical mineral is not. [EPA-HQ-OAR-2022-0829-0683, p. 41]

In sum, the vulnerable and volatile supply chain for critical minerals is a challenge that cannot be overcome in a matter of a few years. Rather than thrusting manufacturers into a sea of risk and uncertainty, EPA should wait until the global market stabilizes or the domestic market develops before effec- tively mandating a widespread shift to electric vehicles.4 [EPA-HQ-OAR-2022-0829-0683, p. 41]

4 Supply-chain problems are also likely to affect the manufacture of fuel-cell vehicles. Fuel-cell vehicles “rely on a platinum catalyst, which is a major downside to this technology, as platinum group elements are expensive and deposits concentrated enough for economic mining are rare.” The Effect of Critical Material Prices at 3. “According to the United States Geological Survey, platinum group elements are among the rarest elements on earth and are found in earth crust in concentrations of around 0.5 parts per billion.” Id. at 4. And just like the materials needed for batteries, production of platinum group elements is highly concentrated in South Africa, “accounting for 72% in 2017.” Id.

Organization: American Fuel & Petrochemical Manufacturers

EPA's proposal also ignores the national security implications of its proposed electric vehicle mandate. The proposal would trade our energy security for energy dependence on countries like China. Currently, China controls the vast majority the EV battery supply chain and most of the related critical mineral mining and processing. Contrast that with the fact that 85 percent of the crude that ran through U.S. refineries last year was sourced from North America. Forcing Americans to buy EVs makes us less secure, not more. [EPA-HQ-OAR-2022-0829-0733, p. 2]

The Proposed Rule requires increased reliance on imported critical minerals and metals for battery production and grid expansion that could have serious negative consequences for our energy and national security. The supply chain for key minerals needed to produce electric vehicle batteries is not assured and will require dramatic increases to meet expected demand. The extraction and processing of battery critical minerals is concentrated in politically unstable or unfriendly nations. Domestic copper and aluminum smelting capacity is insufficient to meet grid expansion needs, and new mines can take over a decade to increase domestic supply. The deployment timeline necessary to develop new resources for batteries and the grid is impracticable and presents unnecessary risks to our energy and economic security. In contrast, domestically consumed liquid fuels sourced from petroleum and bio feedstocks are largely sourced in North America, and the U.S. benefits from its position as a net exporter of petroleum and refined product exports. [EPA-HQ-OAR-2022-0829-0733, p. 3]

I. EPA's Proposal Does Not Comprehensively Address Cross-Cutting Issues

EPA's desire to remake the automotive sector creates significant energy and national security concerns and stresses an aging electrical grid subject to increasing demand. In glossing over these issues, EPA fails to adequately consider the mineral, metal, electricity generation, transmission, distribution, and charging infrastructure requirements necessary for the Proposed Rule to be feasible. This is alarming and undermines our energy security. We lack the supply of domestically sourced minerals and metals needed to build batteries and transmission lines and, contrary to the legislative intent of U.S. laws such as the Bipartisan Infrastructure Law ("BIL") and Inflation Reduction Act ("IRA"), we will have to rely on foreign countries to fulfill the Proposed Rule's mandate. [EPA-HQ-OAR-2022-0829-0733, p. 4]

Even if we could import vast quantities of mineral resources, EPA's electrification mandate is unobtainable. We face a limited supply of copper, which is a critical mineral needed to build out the transmission grid to supply electricity to charging stations. We also do not have near the vehicle charging infrastructure necessary to power the mandated number of ZEVs. Rather than conducting a clear-eyed assessment of these challenges, EPA erroneously assumes that all the necessary conditions to enable its proposal will happen on its aggressive timeline. This conclusion dismisses or outright ignores a multitude of evidence to the contrary. [EPA-HQ-OAR-2022-0829-0733, p. 4]

A. The Proposal Compromises Energy and National Security

1. Inadequate Minerals for Batteries Will Make Original Equipment Manufacturers ("OEMs") Dependent on Foreign Suppliers and Make it Difficult to Supply Electric Vehicles Required by this Proposal

The Russian invasion of Ukraine highlights the importance of assessing, planning, and mitigating risks to energy supplies. As we have seen with Europe, a strategy of supply diversification (e.g., increasing imports from a diverse pool of suppliers) is an important way to mitigate global supply disruptions.3 The key tenet of risk mitigation is not about removing the likelihood of a risk but about reducing its impact to an acceptable level—the primary justification for the U.S. holding a Strategic Petroleum Reserve. The U.S. similarly holds a national defense commodity-based stockpile meant to decrease or prevent "dependence upon foreign and single points of supply for strategic and critical materials needed in times of national emergency."4 Exposing U.S. mobility to the risk of critical mineral supply availability raises an essential energy security question: How best does the U.S. trade risks it can mitigate for risks it cannot? But EPA fails to address this question in its Proposal. Rather, EPA largely limits its analysis to energy security impacts resulting from decreased fuel consumption and ignores the riskier implications of mandating reliance on an unstable, foreign-dominated supply chain, as evidenced by China's announcement this week that it is limiting exports of two rare earth minerals.5 [EPA-HQ-OAR-2022-0829-0733, pp. 4-5]

3 "Europe's Reliance on Diverse Pool of LNG Sources Continues Year after Ukraine Invasion." Natural Gas Intelligence, 22 Feb. 2023, www.naturalgasintel.com/europes-reliance-on-diverse-pool-of-lng-sources-continues-year-after-ukraine-invasion/. Accessed 28 June 2023.

4 CONGRESSIONAL RESEARCH SERVICE, "National Stockpiles: Background and Issues for Congress" (June 15, 2020) available at https://crsreports.congress.gov/product/pdf/IF/IF11574; CONGRESSIONAL RESEARCH SERVICE, "The Strategic National Stockpile: Overview Issues for Congress" (Jan. 25, 2023) available at https://sgp.fas.org/crs/misc/R47400.pdf.

5 See, e.g., Proposed Rule at 29,345, 29,388–90; Archie Hunter & Alfred Cang, China Restricts Export of Chipmaking Metals in Clash with US, July 3, 2023. Bloomberg. Available at China to Restrict Exports of Metals Critical to Chip Production - Bloomberg.

The supply chain necessary to support new technologies contemplated by the Proposed Rule is far from assured and is likely to increase dependence on critical minerals from foreign sources. Reliance on a limited number of technologies (e.g., ZEVs) on the timeline required by the Proposed Rule will result in a non-resilient transportation sector that is vulnerable to unexpected disruptions and cost increases. For instance, both the federal government and the private sector recognized critical minerals are essential to the future of ZEVs.6 Unstable critical mineral supply chains could disrupt this future. ZEVs, as compared to ICEVs, have a much greater reliance on several critical minerals, as seen in Figure 1 below. There are six minerals critical to the production of ZEVs: cobalt, copper, graphite, lithium, manganese, and nickel.7 [EPA-HQ-OAR-2022-0829-0733, p. 5]

6 Note that the term "zero emissions vehicle" ("ZEVs"), and even near-ZEVs as used by EPA, is a misnomer. ZEVs are not actually zero emission when accounting for the vehicle lifecycle, including GHG and criteria pollutant emissions associated with electricity generation required for charging certain ZEVs and production of the ZEV vehicle and battery. We recognize that in the Proposed Rule, EPA uses "ZEV" to refer only to those vehicles with a specific meaning under California's EV program, but for ease of review, "ZEVs" is used throughout these comments and encompasses all of the EV technologies, including plug in electric vehicles ("PEVs") such as plug-in hybrid electric vehicles ("PHEVs") and battery electric vehicles ("BEVs").

7 INTERNATIONAL ENERGY ADMINISTRATION, "The Role of Critical Minerals in Clean Energy Transitions," (revised March 2022) available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy- transitions. [hereinafter IEA Report 2022].

SEE ORIGINAL COMMENT FOR EVs Require Over 4x the Critical Minerals of an ICE Figure 1: Metal intensity – ICEVs vs. EV8 [EPA-HQ-OAR-2022-0829-0733, p. 5]

8 TURNER, MASON & COMPANY. “Evaluation of EPA’s Assumptions and Analyses Used in Their Proposed Rule for Multi-Pollutant Emissions Standards” (June 7, 2023) (Research funded by AFPM and available upon request) [hereinafter “Turner Mason Report”].

Critical mineral supply, especially those essential to the manufacturing of a lithium-ion (Li-ion) battery, is dominated by three lithium producing countries as summarized in Figure 2 below. Of the foreign nations that produce cobalt, molybdenum, and other minerals needed to produce ZEVs, China has disproportionate influence. While 70 percent of global cobalt production comes from the Democratic Republic of Congo,9 most of those mines are owned/operated by China, and more than 60 percent of cobalt processing is in China. Moreover, 67 percent of the world’s graphite is also produced in China.10 The U.S. imports most of its manganese from Gabon, a less politically stable country, providing 65 percent of the United States’ supply.11 [EPA-HQ-OAR-2022-0829-0733, p. 6]

9 Id.

10 G.R. Robinson, et al., U.S. GEOLOGICAL SURVEY, “Professional Paper 1802 Critical mineral resources of the United States—Economic and environmental geology and prospects for future supply” (Dec. 19, 2017) p. J1–J24, available at https://doi.org/10.3133/pp1802J.

11 OEC, “Manganese Ore in the United States” (Mar. 2023) available at

https://oec.world/en/profile/bilateral-product/manganese-ore/reporter/usa. [EPA-HQ-OAR-2022-0829-0733, p. 6]

SEE ORIGINAL COMMENT FOR China Dominates Processing of Critical Energy Transition Minerals. Figure 2: U.S. lack of critical mineral extraction or processing capacity 12 [EPA-HQ-OAR-2022-0829-0733, p. 6]

12 Turner Mason Report.

Expected supply from existing mines and projects under construction is estimated to meet only half of projected world demand for lithium and cobalt.”13 [EPA-HQ-OAR-2022-0829-0733, p. 6]

13 Axios Generate, The supply crunch that could slow the climate fight, (May 5, 2021).

In contrast to oil, which has a lower global market concentration than the critical minerals required for ZEVs, Figure 3 shows that most critical materials for ZEVs are concentrated in less politically stable countries. Other than lithium production which is dominated by Australia (52 percent), all other critical ZEV minerals have a political stability index less than oil. As demand for these commodities grows, the market concentration (and ability to exert power over pricing) swings toward producers in less politically stable countries. If producer countries have market power, they have the potential to impact not only price, but the ability for consumer countries to influence other issues, such as sanctity of commercial contracts, labor and/or/human rights, and environmental standards in the producing jurisdictions. The significance of this issue is compounded by the fact that multiple critical minerals are needed for ZEV production, so a disruption in the supply of a single mineral can disable the entire supply chain. The operation of ICEVs, to the contrary, relies on a single natural resource for which there is an abundant domestic supply. [EPA-HQ-OAR-2022-0829-0733, pp. 7-8]

SEE ORIGINAL COMMENT FOR Resource Extraction Locations Are Concentrated in Risky Jurisdictions. Figure 3: U.S. risk exposure to critical energy resources 14 [EPA-HQ-OAR-2022-0829-0733, pp. 7-8]

14 Turner Mason Report.

The supply chain necessary to support new technologies contemplated by the Proposed Rule is far from assured and is likely to increase dependence on critical minerals from foreign sources.15 In the event of supply disruption or pricing volatility related to geopolitical pressures, the U.S. is highly exposed as it heavily relies on imports to satisfy domestic demand in each of these critical minerals.16 Figure 4 puts this import dependence in perspective. By 2032 the Proposed Rule would raise import dependence to 100 percent of U.S. demand for most minerals, and more than 50 percent for nickel and copper. Except for copper, the U.S. does not mine significant quantities of these critical minerals. And, despite the U.S. having substantial domestic copper mining, it still relies on imports to meet 45 percent of U.S. demand. [EPA-HQ-OAR-2022-0829-0733, pp. 7-8]

15 See, e.g., Shelley Challis, POST REGISTER, "Jervois shuts down Idaho Cobalt mine" (Apr. 7, 2023), available at https://www.postregister.com/messenger/news/jervois-shuts-down-idaho-cobalt-mine/article_efd97f32-d015-11ed-9424-bfb28220210c.html (describing suspension of construction at Idaho Cobalt Operations due to, in part, low cobalt prices).

16 China announced it will restrict the export of two metals (gallium and germanium) used in EV production. While these metals are not particularly rare, China could limit export of processed key EV battery minerals to maintain its supply chain dominance. See Archie Hunter & Alfred Cang, China Restricts Export of Chipmaking Metals in Clash with US, July 3, 2023. Bloomberg, available at https://www.bloomberg.com/news/articles/2023-07-03/china-to-restrict-exports-of-metals-critical-to-chip-production.

SEE ORIGINAL COMMENT FOR EPA Proposal Essentially Increases Import Reliance of Most Critical Minerals to 100% Figure 4: U.S. import reliance of several critical minerals 17 [EPA-HQ-OAR-2022-0829-0733, pp. 7-8]

17 Turner Mason Report.

China's dominance does not stop at critical mineral extraction and processing. China produces 75 percent of all Li-ion batteries and houses the production capacity for 70 percent of cathodes and 85 percent of anodes (both key battery components).18 Conversely, the United States plays a very small role in the global electric vehicle ("EV") supply chain, with only 7 percent of battery production capacity.19 [EPA-HQ-OAR-2022-0829-0733, pp. 9-10]

18 International Energy Agency, "Global Supply Chains of EV Batteries," (July 2022), https://iea.blob.core.windows.net/assets/961cfc6c-6a8c-42bb-a3ef-57f3657b7aca/GlobalSupplyChainsofEVBatteries.pdf.

19 See id. Regardless of recent funding awarded by the Department of Energy to construct three battery plants, the domestic supply of these critical minerals remains unchanged and, once these manufacturing facilities are permitted, constructed, and operable, they will rely heavily on foreign-sourced materials to maximize capacity and output, if even possible.

This new demand for foreign-sourced materials will upset the decades of progress theU.S. made in energy security, where we are currently a net exporter of crude and refined petroleum products combined, and it will undermine the domestic security provided by our refining industry. Sourcing critical minerals and building a secure, North American supply chain for

ZEVs is not guaranteed as foreign production and processing of critical minerals have an established, large market share and competitive advantage today. Because passenger vehicles have domestic manufacturing and sourcing requirements in the IRA to be eligible for the clean vehicle tax credit, compliance will be challenging.20 Yet the proposal assumes, without basis, that virtually all batteries will qualify for the full tax credits and will achieve cost parity despite a significant increase in demand. In making this assumption, EPA ignores the obvious benefits of a multi-technology approach that would reduce the risks associated with a ZEV-focused approach. For example, Toyota recently noted in a memo to its dealers that “the amount of raw materials in one long- range battery electric vehicle could instead be used to make 6 plug-in hybrid electric vehicles or 90 hybrid electric vehicles . . . the overall carbon reduction of those 90 hybrids over their lifetimes is 37 times as much as a single battery electric vehicle.”21 [EPA-HQ-OAR-2022-0829-0733, pp. 9-10]

20 IRA, Section 45W(c) (The IRA requires 50% of the value of battery components to be produced or assembled in North America to qualify for a $3,750 credit and 40% of the value of critical minerals sourced from the United States or a free trade partner also for a $3,750 credit).

21 William Johnson, TESLARATI, “Toyota releases new defense of lagging EV strategy” (May 18, 2023)

available at https://www.teslarati.com/toyota-defends-ev-strategy/. [EPA-HQ-OAR-2022-0829-0733, pp. 9-10]

B. The United States Lacks Copper and Aluminum Production Required for Grid Expansion

Beyond the ZEV itself, electricity networks need a large amount of copper and aluminum.23 The need for grid expansion that would result from this rapid increase in electricity demand underpins a doubling of annual demand for copper and aluminum.24 Most supply of these materials will come from overseas, as the United States lacks current production capacity or the ability to increase such capacity in time to meet the demands of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 11-12]

23 IEA Report 2022.

24 Id.

The United States does not supply much of the world’s aluminum. Instead, China, Russia, and India lead global production with an estimated 45 million metric tons per year. China possesses more than half of the entire world’s aluminum smelting capacity and produces by far the most aluminum of any country at over 36 million tons per year.25 The United States, by contrast, produces approximately 1 million tons per year. Similarly, countries supplying the most copper are Chile, Peru, China, and the Democratic Republic of the Congo. These countries supply ten times the amount produced domestically. [EPA-HQ-OAR-2022-0829-0733, pp. 11-12]

25 Andy Home, “Global aluminum production pendulum swings back to China” (June 21, 2022) available at https://www.mining.com/web/column-global-aluminum-production-pendulum-swings-back-to-china/.

Experts predict our demand for these materials will rise dramatically, but we lack the ability to source them domestically. The latest data concludes sourcing copper for electric infrastructure (e.g., charging stations and storage) needed to accommodate increased electrical demand will be challenging.26 Copper demand is expected to rise by 53 percent, while supply is expected to rise by only 16 percent.27 U.S. import dependency for copper has grown from 10 percent in 1995 to

40 percent in 2020, with projections of copper import dependency reaching between 55 percent and 67 percent between 2020 and 2040.28 Other estimates predict that by 2030 supply from existing mines and projects under construction is estimated to meet only 80 percent of copper needs by 203029—not considering the anticipated increase in ZEV production anticipated by EPA's Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 11-12]

26 IEA Report 2022.

27 BLOOMBERGNEF, "Copper Miners Eye M&A as Clean Energy Drives Supply" (Aug. 30, 2022), available at https://about.bnef.com/blog/coppers-miners-eye-ma-as-clean-energy-drives-supply-gap/#:~:text=Copper%20demand%20is%20set%20to,and%20difficulty%20developing%20greenfield%20mines.

28 S&P GLOBAL, "The Future of Copper Will the Looming Supply Gap Short-Circuit the Energy Transition?" (July 2022) available at https://cdn.ihsmarkit.com/www/pdf/0722/The-Future-of-Copper_Full-Report_14July2022.pdf.

29 IEA Report 2022.

Establishing new mines, particularly in the United States, is not a near-term solution. Permitting and authorizing new domestic mining and smelting capacity requires a substantial amount of time and government support. According to the National Mining Association, it can take up to 10 years to obtain a permit to commence mining operations in the U.S., while permitting takes two years in Canada and Australia.30 "[U]nless the permitting process can be improved, U.S. mining developments will continue to take longer to come online and carry more financial risks compared with the rest of the world, China's domination of battery manufacturing and critical minerals production will continue for a longer period, and the U.S. will find it increasingly difficult to acquire the metals and minerals it needs for its long-term clean-energy goals."31 Despite this Rule's unlawful push to transition to EVs, the Bureau of Land Management placed a 20-year moratorium on mining rare earth minerals, such as copper, nickel, and cobalt, from almost a quarter of a million acres of Minnesota, effectively killing the proposed Twin Metals copper-nickel mine project.32 [EPA-HQ-OAR-2022-0829-0733, p. 12]

30 National Mining Association, Delays in the U.S. Mine Permitting Process Impair and Discourage Mining at Home, May 31, 2021. Available at https://nma.org/wp-content/uploads/2021/05/Infographic_SNL_minerals_permitting_5.7_updated.pdf.

31 Jason Lindquist, Don't Pass Me By - With Many Steps Required, Mining Projects Face Trickiest Path To Approval, RBN Energy Blog (June 30, 2023) (Attachment 2).

32 88 Fed. Reg. 6308 (Jan. 31, 2023).

Globally, regulatory approval for new copper mines is at its lowest level in a decade.33 As a case in point, the Resolution copper deposit in Arizona was discovered in 1995. This world-class resource has been trying to acquire the necessary regulatory approvals for over 27 years. As recently as May 19, 2023, the U.S. Forest Service told a federal court it was suspending approval of a land swap between the project (owned by Rio Tinto and BHP) and several Native American groups.34 The land swap was approved by the U.S. Congress in 2014, but the completed environmental report was blocked in March 2021. Other copper mining projects in Alaska and Minnesota have been halted by this administration, resulting in increased import dependence.35 [EPA-HQ-OAR-2022-0829-0733, p. 12]

33 Ernest Scheyder, REUTERS, “Copper Industry Warns of Looming Supply Gap without More Mines” (Apr. 21, 2023) available at www.reuters.com/markets/commodities/copper-industry-warns-looming-supply- gap-without-more-mines-2023-04-20/.

34 Ernest Scheyder, REUTERS “U.S. Forest Service Pauses Timeline for Rio Tinto Arizona Copper Mine” (May 19, 2023) available at https://www.reuters.com/legal/us-forest-service-pauses-timeline-rio-tinto-arizona-copper-mine-2023-05-19/.

35 Jim Vinoski, FORBES, “There’s Not Enough Copper for Our Electrification Plans–and Biden Is Making It Worse” (Apr. 28, 2023) available at www.forbes.com/sites/jimvinoski/2023/04/28/theres-not-enough- copper-for-our-electrification-plansand-biden-is-making-it-worse/?sh=19ca0a5d1fbf.

2. Required battery production is not feasible within the Proposal’s time frame.

EPA severely overestimates the availability of minerals and the mining/processing infrastructure and capabilities in the U.S.54 EPA’s position in the DRIA that “PEV production in the U.S. need not be heavily reliant on foreign manufacture of battery cells or packs as PEV penetration increases and domestic mineral and cell production comes online” is unfounded.55 [EPA-HQ-OAR-2022-0829-0733, pp. 16-17]

54 AAI Comments at iv.

55 DRIA at 3-20.

The development of natural resources projects, like critical mineral mining and processing, can easily require more than a decade. Increasing supply is not merely a matter of increasing current production. “The ability for the miners to quickly ramp up production of key ores is limited by regulatory hurdles and capital investment.” Globally, it takes on average more than 16 years to move mining projects from first discovery to production.56 The ability to quickly scale minerals production is further affected by ore quality, which in recent years has been declining, and thus requires more material to be mined, more resources such as water in stressed areas for processing, and ultimately greater environmental impacts. Even with the requisite authorizations in hand, mine development and production can take years. For an open pit mine, it takes about 7 to 8 years from discovery to first ore; for a subsurface mine, the time frame is more like 10 to 12 years. [EPA-HQ-OAR-2022-0829-0733, pp. 16-17]

56 IEA Report 2022.

Extracting critical minerals is challenging because most critical mineral ores exist in relatively low concentrations and the quality of the ore grade is declining. For example, the average ore grade for copper discoveries decreased in excess of 25 percent during the last 15 years. In that same period, total energy consumption increased at a higher rate (46 percent) than production (30 percent). Extraction (i.e., mining and processing) of metal content from lower- grade ores requires removing more overburden to access the ore body, which requires more energy, exerting upward pressure on production costs, greenhouse gas and criteria pollutant emissions, and waste volumes. And once the raw material is mined, it must be qualified. This is not a mine-to-producer scenario. It is a specialty chemical that must be tested at different stages for safety, consistency of product output, and performance before it can be qualified for use in battery/ZEV manufacturing. Substantial lead time is needed to qualify battery-grade materials as they go through a very rigorous, staged approach. Careful attention to putting up projects on the scale of raw material resource extraction and gigafactories requires time, careful consideration, and intensive safety precautions. Accelerating the buildup of a domestic battery value chain should not overstep aspects of safe project development. [EPA-HQ-OAR-2022-0829-0733, p. 17]

The required critical minerals are not available at scale today. Mining capacity cannot be increased as quickly as required to meet the production rate required under the Proposed Rule, and at-scale recycling capabilities to remove these materials will not be available soon. EPA's willingness to assume that global supply shortages of critical minerals will resolve themselves without specific analysis of how that problem will be addressed is another example of EPA ignoring an issue of central relevance to this rulemaking. EPA neglects to appreciate these limitations, rendering its Proposed Rule arbitrary and factually unsupported. [EPA-HQ-OAR-2022-0829-0733, p. 17]

EPA notes that many OEMs and battery manufacturers announced plans to build gigafactories in North America due to government incentives like the IRA. But these are extraordinarily complex projects that will take many years to materialize if they progress to the point of battery production. In the DRIA, EPA states that, based on construction announcements by major automakers, "the U.S. will have more than 800 GWh of cell or battery manufacturing capacity by 2025, and ~1000 GWh by 2030, enough to supply from 10 to 13 million BEVs per year."130 By contrast, Wood Mackenzie projects U.S. capacity of less than half that level, at 422 GWh/ year in 2030,131 because many projects have failed to materialize or are delayed as market and other conditions change. [EPA-HQ-OAR-2022-0829-0733, p. 30]

130 DRIA at 3-20.

131 Wood Mackenzie, "The EPA plans to rev up US EV sales," (Apr. 14, 2023), available at https://www.woodmac.com/news/opinion/the-epa-plans-to-rev-up-us-ev-sales/.

Regardless of the purported capacity, it is unlikely these factories will operate beyond 50 percent capacity for years. Mature battery factories today rarely operate above 80 percent utilization rates. For example, in 2022, there was 1,036 GWh of global battery production capacity, but only 450 GWh of actual production. While there was approximately 7TWh of forecast battery capacity planned as of September 2022, Benchmark Minerals Intelligence (BMI) forecast total global supply of Li-ion batteries to reach only 4.5 TWh by 2031 or a 64 percent utilization rate.132 This step in the value chain could potentially create a critical bottleneck, in stark contrast to EPA's assumed 998 GWh capacity by 2030. Given the disparity in forecasts from different reputable sources, EPA's technology feasibility assessment should factor in sensitivity cases and acknowledge potential disruptions in the supply chain. Including such sensitivity cases is fully justified given EPA's experience in projecting available volumes of cellulosic biofuel for purposes of the RFS. EPA consistently overestimated production of liquid cellulosic biofuel from Cellulosic Biofuel Production 2010–2013 (RINs). [EPA-HQ-OAR-2022-0829-0733, p. 30]

132 BENCHMARK SOURCE, "Ambition versus reality: why battery production capacity does not equal supply" (Sept. 2, 2022) at Charts 5, 6, available at https://source.benchmarkminerals.com/article/ambition-versus- reality-why-battery-production-capacity-does-not-equal-supply.

EPA requests comment on their approach to determining charging time, as set forth in the DRIA, Chapter 4.155 EPA's analysis is contingent on unsupported assumptions regarding (1) U.S. consumers' adoption of and ability to purchase more expensive ZEVs (see Sections IV.B.2 and IV.E.2.ii); (2) the type of ZEV purchased (used ZEVs or PHEVs compatible with slower charging units or new ZEVs that can use DCFC) (Section IV,B.2 addresses charging times); (3) the availability of critical minerals and metals to expand the supply of reliable and renewable electricity (see Section I.B); and (4) the availability of reliable and affordable charging for all users (see Sections IV.B.4). Given the flaws in EPA's methodology that omits significant data sources and other factors and makes unsupported assumptions, EPA should revise its analysis concerning charging time and continue with promulgating a final rule for future emissions standards, that accounts for the reality of today's automotive market and not the public pronouncements of the automotive industry, a single state or group of states, or other unsupported estimates of future market growth. [EPA-HQ-OAR-2022-0829-0733, pp. 33-34]

155 88 Fed. Reg. at 29,367.

4. EPA ignores the lack of reliable ZEV charging

The Proposal's success is partially contingent on the availability of "equitable, affordable charging."169 Currently, ZEV charging is most available in metropolitan areas, with less investment occurring outside urban areas.170 EPA's evaluation of the sourcing of critical minerals and building a secure supply chain for ZEVs does not consider how challenging it will be to meet the demand for copper needed for electric infrastructure (e.g., charging stations and storage) to accommodate increased electrical demand.171 The Proposed Rule fails to even consider that copper demand is expected to rise by 53 percent when supply is expected to rise by only 16 percent by 2040.172 Indeed, by 2030, the expected supply from existing mines and projects under construction is estimated to meet only 80 percent of copper needs by 2030173—not considering the anticipated increase in ZEV production anticipated by EPA's Proposed Rule. Domestic production of critical minerals required for battery production is insufficient to meet the projected demands. According to a review of multiple sources, there is a six-fold demand growth expectation by 2030 and approximately 15 times by 2040. This growth rate outpaces the market's ability to supply such minerals. [EPA-HQ-OAR-2022-0829-0733, pp. 36-37]

169 Joann Muller, "The electric car revolution hinges on equitable, affordable charging," Axios, Feb. 8, 2023. Available at The electric vehicle revolution hinges on equitable, affordable charging (axios.com).

170 S&P GLOBAL MOBILITY, "EV Chargers: How Many Do We Need?" (Jan. 9, 2023), available at https://press.spglobal.com/2023-01-09-EV-Chargers-How-many-do-we-need.

171 IEA Report 2022.

172 BLOOMBERGNEF, Copper Miners Eye M&A as Clean Energy Drives Supply (Aug. 30, 2022), available at https://about.bnef.com/blog/coppers-miners-eye-ma-as-clean-energy-drives-supply-gap/#:~:text=Copper%20demand%20is%20set%20to,and%20difficulty%20developing%20greenfield%20mines.

173 IEA Report 2022.

5. The Proposed Rule Incorrectly Assumes that a Secure Supply Chain Will Exist for ZEV Technologies.

a. The Proposed Rule Does Not Properly Account for the Reliance on Foreign Markets for Critical Minerals.

In the DRIA, EPA states "according to analyses by Department of Energy's Li-Bridge, no shortage of cathode active material or lithium chemical supply is seen globally through 2035 under current projections of global demand." But there are many sources that contradict this point. Looking forward toward 2030, based on current and anticipated global production plans, a global supply shortfall is likely to begin toward end of the decade if planned mining and brine projects do not deliver as expected. Some critical minerals could face shortages as early as next year.178 The options for mitigating supply chain risks are increasingly limited. At current production rates, the world exhausts the minable reserves of copper, cobalt, and nickel in the 2030s. This timeline accelerates significantly with the greater production needed for EPA's envisioned energy transition. EPA's cherrypicked data on mineral availability is another example of EPA's failure to address a major aspect of the proposal, in this case obscuring real world obstacles to the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, p. 38]

178 Lilly Lee, ENERGY INTELLIGENCE, Mining the Gap to a Net-Zero Future (May 15, 2023) available at https://www.energyintel.com/00000188-1e5f-d806-ad9f-5edfeb1d0000?utm_campaign=website&utm_source=sendgrid.com&utm_medium=email.

b. The Proposed Rule Over-Estimates the Ability for the U.S. to Source Materials and Fabricate Batteries Domestically.

The Proposed Rule fails to fully account for the challenges associated with creating and sustaining a viable domestic supply chain that can deliver production-ready batteries necessary to meet the Rule's assumed pace of electrification. Notably, the Rule does not carefully consider the impediments to a viable domestic supply chain because of mineral availability, mineral processing and manufacturing, and overall costs (see Section I.A.1 and Figures 2, 3, and 4). [EPA-HQ-OAR-2022-0829-0733, p. 38]

EPA's DRIA severely overestimates both the availability of minerals and mining/processing infrastructure and capabilities in the U.S., assuming PEV production will not be dependent on foreign manufacture of battery cells.179 In April, the United States' first and only cobalt plant decided to halt construction at the Idaho Cobalt Operations mine due to low cobalt prices, inflation, and the mine's remote location despite Jervois's beneficial support from federal grants—including a not-yet-approved $15 million award from the U.S. Department of Defense—for additional drilling and to pay for studies to assess the possibility of constructing a cobalt refinery in the U.S. 180 Given the Agency's lack of expertise in this area, it is not surprising EPA neglects to properly analyze mineral availability and mining processing capabilities. [EPA-HQ-OAR-2022-0829-0733, p. 38]

Though EPA mentions that OEMs are taking steps to secure domestically sourced minerals and related commodities to supply production for these plants, the OEM's recent comments express grave concern regarding the availability of critical minerals needed to produce batteries,181 Moreover, many of those offtake agreements referred to EPA are with projects yet to be permitted, built, or commercialized at scale.182 OEMs, cathode or anode producers, and battery manufacturers are internally assessing their raw material offtake agreements and expect that some projects will not materialize to fruition. ZEVs are projected to represent approximately 90 percent of lithium demand by 2030, so, contrary to the assumption in the DRIA, switching chemistries for other uses will not reduce the burden or price on lithium. [EPA-HQ-OAR-2022-0829-0733, p. 39]

179 DRIA at 3-20.

180 See, e.g., Shelley Challis, POST REGISTER, "Jervois shuts down Idaho Cobalt mine" (Apr. 7, 2023), available at https://www.postregister.com/messenger/news/jervois-shuts-down-idaho-cobalt-mine/article_efd97f32-d015-11ed-9424-bfb28220210c.html.

181 AAI Comments at iv-v.

182 See, e.g., Shelley Challis, Post Register, "Jervois shuts down Idaho Cobalt mine" (Apr. 7, 2023), available at https://www.postregister.com/messenger/news/jervois-shuts-down-idaho-cobalt-mine/article_efd97f32-d015-11ed-9424-bfb28220210c.html (describing Jervois's decision to halt construction at the Idaho Cobalt Operations mine due to low cobalt prices, inflation, and the mine's remote location despite Jervois's beneficial support from federal grants—including a not-yet-approved $15 million award from the U.S. Department of Defense—for additional drilling and to pay for studies to assess the possibility of constructing a cobalt refinery in the U.S.)

Considering the above, the Proposed Rule creates a multi-year—and perhaps insurmountable—dependence on foreign mineral production and this, coupled with domestic limitations in battery manufacturing capabilities, will make it impossible to sustain the viable domestic supply chain that EPA envisions. While EPA acknowledges that "much of the supply chain supporting the manufacture of ZEVs is located outside of the U.S.,"183 it arbitrarily underplays this dependency by claiming that "more than half of battery cells and 84 percent of assembled packs in PEVs sold in the U.S. from 2010 to 2021 were produced in the U.S." Battery cell production, however, is just a piece of the value chain, and it cannot grow absent a stable supply of refined critical minerals and precursors. Even assuming critical minerals are available, a viable supply chain requires sufficient capacity of midstream refining operations prior to battery cell production. Such capacity does not exist. For instance, BMI foresees a 77 percent deficit in domestic available cathode active material to meet 2035 demands in North America (N.A.). And this estimate was done prior to the EPA Proposal. [EPA-HQ-OAR-2022-0829-0733, p. 39]

183 DRIA at 3-20.

While Congress and the Administration have taken steps to accelerate the supply chain, their efforts are insufficient to fully support the rate of production required by the Proposal. For example, U.S. supply of battery anode material is supported by the IRA and BIL, but the production of raw materials supply that feeds the production of battery anode material is not supported. Currently, Chinese battery firms are the most advanced and the majority of raw material mining and processing goes through Chinese entities. See Section I.A. and Figure 2. Thus, it will be difficult for many OEMs to meet the requirements for IRA credits in the near term. Without a domestic solution to this value chain, reliance on imports will only add to cost to the battery pack.184 [EPA-HQ-OAR-2022-0829-0733, pp. 39-40]

184 Benchmark Minerals Intelligence, BMI (see Chart 2, 3 & 4).

Ignoring these potential supply chain shortfalls leads to further deficiencies in EPA's analysis. Indeed, limited supplies and constrained supply chains risk production downtime and inventory backlogs—and this is just for production of the ZEVs.185 The Daimler Truck Group ("Daimler"), for example, has been and is likely to continue to be "acutely affected by an ongoing global shortage of semiconductors, which must be purchased on the global market."186 And with the "rapidly rising demand for certain new technologies, such as electrified powertrains," Daimler anticipates higher product costs, supply bottlenecks, and "long-term increases in demand for battery cells, semiconductors, and certain critical materials, such as lithium." Taken together, Daimler anticipates these supply chain concerns would limit its "ability to meet demand for its current generation of vehicles (including its vehicles with conventional combustion engines) or commercialize its new [ZEVs] profitably (or at all)."187 Daimler, of course, is not alone in these conclusions and yet EPA's Proposed Rule appears to reject outright any realistic assessment of future supply chains. [EPA-HQ-OAR-2022-0829-0733, p. 40]

185 See Daimler Truck Group, Annual Report 2022, 141 available at https://www.daimlertruck.com/fileadmin/user_upload/documents/investors/reports/annual-reports/2022/daimler-truck-ir-annual-report-2022-incl-combined-management-report-dth-ag.pdf (describing Daimler Truck Group's reliance on certain commodities, like steel, copper, and precious metals that are usually sourced from individual suppliers, meaning that a single supplier's inability to fulfill delivery obligations can have detrimental effects for an entire production line).

186 Id.

187 Id.

The mining sector will also need to grow significantly to meet ZEV demand as anticipated, and required, by the Proposed Rule. Mining is an energy- and environmental resource-intensive activity. Critical minerals for electric batteries such as lithium and copper are particularly vulnerable to water stress given their high-water usage.208 And more than 50 percent of today's lithium and copper production is concentrated in areas with high water stress levels. Several major producing regions such as Australia, China, and Africa are also subject to extreme heat or flooding, which pose greater challenges in ensuring reliable and sustainable supplies. Strong focus on environmental best practices in this sector are needed to safeguard natural lands, biodiversity, and sustainable water use. Similarly, focus on ethical best practices is needed to protect indigenous peoples' rights, and to provide better child labor protections. These challenges call for sustainable and socially responsible producers to lead the industry. The accelerated ZEV technology penetration rate required under the EPA's proposal poses significant challenges for the timely and widespread implementation of best practices to be developed, implemented, and ensure oversight mechanisms are working.209 [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

208 See EIA 2022 Report.

209 For example, the United Nations Environment Programme is advising the Global Investor Commission on Mining 2030 to identify best practice standards for responsible mining. See Mining 2030 at https://mining2030.org/new-global-commission-launched-to-raise-mining-sustainability-standards-by-2030/.

In addition, activities associated with mining produce GHG emissions, particulate matter emissions, nitrogen oxide emissions, and other air pollutant emissions from mining equipment. As shown in Figure 8, mining and processing several minerals and metals used for ZEV production are carbon intensive. [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

SEE ORIGINAL COMMENT FOR Average GHG emissions intensity for production of selected commodities. Figure 8: 210 [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

210 IEA Report 2022 at 17.

Source: INTERNATIONAL ENERGY ADMINISTRATION [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

The process for extracting and processing critical minerals can be responsible for approximately 20 percent of the lifecycle GHG emissions from battery production.211 EPA failed to weigh any of these consequences appropriately in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

211 H.C. Kim, et al., ENVIRONMENTAL SCIENCE AND TECHNOLOGY (Vol. 50) “Cradle-to-Gate Emissions from a Commercial Electric Vehicle Li-Ion Battery: A Comparative Analysis,” (2016), pp. 7715–22.

EPA’s reliance on an ICCT study to justify its estimate of falling battery costs is misplaced. ICCT ignored literature that PHEVs depreciate with certain models and makes losing greater value than others, like Tesla, especially those with long-range features. A May 2023 CBS article highlighted a statement from Kelley Blue Book, an automotive research company, that PHEVs generally depreciate faster than ICEVs.228 Kelley Blue Book said that three-year-old PEVs hold 63 percent of their value compared to 66 percent for ICEVs.229 Additionally, ICCT’s battery cost curve does not account for the potential of rising PEV-related metal prices which can cause the price of battery packs to increase, as seen in 2022 and 2023. If ICCT's estimates of PEV battery pack costs were revised to be higher, PEVs are likely to be priced at a substantial premium compared to ICEVs. [EPA-HQ-OAR-2022-0829-0733, pp. 49-50]

228 Joe D’Allegro, What to know about buying a used electric vehicle as more hit the auto sales market, CNBC (May 21, 2023), https://www.cnbc.com/2023/05/21/what-to-know-about-buying-a-used-ev-as-more-hit-the-car-market.html. See also AAA Survey Shows EV Owners Should Be Concerned About Depreciation (insideevs.com).

229 Id.

Moreover, the minerals used for EV batteries are also essential to many components of a lower-carbon energy system beyond EV batteries, such as solar photovoltaic cells, wind turbines, and hydrogen electrolyzers. In addition, these minerals have multiple traditional uses, such as military defense systems, aerospace, mobile phones, computers, fiber-optic cables, semi-conductors, medical applications, and even bank notes. Without substantial increases in new mining capacity (or massive shifts toward recycling), competition for these minerals will materially stiffen with increased electrification and the shift in underlying grid energy mix. An acceleration in demand for these key minerals could result in price volatility stemming from supply disruptions and/or geopolitical pressures. By contrast, the U.S. is much less reliant on foreign sources of petroleum energy sources. In fact, the U.S. has been a net exporter of gasoline and diesel since late 2009. And much of our petroleum imports come from friendly countries such as Canada. [EPA-HQ-OAR-2022-0829-0733, pp. 50-51]

Organization: American Highway Users Alliance

More specifically, EPA’s proposal in this docket appears to be premised on huge and rapid growth in the portion of light-duty and medium-duty vehicles that are electric powered (EVs) as well as on rapid transformation of the marketplace in a number of related areas that are not the subject of the proposed regulation. EPA seems to have made favorable assumptions on many issues bearing on the feasibility of the proposal, including as to the issues set forth below. The Highway Users, on the other hand, drawing on the expertise of its members, questions that, within the MY 2027 – 2032 timeframe of the proposed rule, all or most of the following will occur, that -- [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

[,,,]

• there will be an adequate supply of rare earth and other critical minerals, and the ability to process them, with those minerals being so essential to the manufacture of EVs and batteries, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- with a large portion of such minerals being sourced and/or processed overseas, including in China and Africa, whether the national interest in sourcing and processing such minerals in the United States can be met, and [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

Access to Critical Minerals

As EPA well knows, EVs, whether light-duty, medium-duty, or heavy-duty, require use of rare earth and other critical minerals for manufacture of batteries and to reduce the weight of EV parts other than the batteries. These minerals, such as lithium, cobalt, graphite, and nickel, currently are sourced in and must be transported from places such as China and Africa. Increasing reliance on EVs both for light/medium-duty vehicles and heavy-duty vehicles means that important industries and the nation would become increasingly reliant on components and very long-distance transportation from China, Africa and elsewhere, weakening national security and increasing trade deficits. These are reasons to do less, not more, to accelerate EV use until U.S. sources of these materials can be identified and developed. [EPA-HQ-OAR-2022-0829-0696, p. 6]

And the need for U.S. sourced minerals and processing will be major. There are reports that, globally, over 300 new, additional mines will be needed to meet raw materials needs for batteries and energy storage by 2035.7 Yet, the overall proposal by EPA does not appear to seek to do anything to accelerate or facilitate the ability to acquire and process these scarce metals in the United States, where mining would be subject to greater environmental protection. At least to that extent the vehicle emissions reduction NPRMs appear to underweight adverse environmental and social impact of less regulated mining (though outside the U.S.), emissions from very long-distance transportation of important supplies, and perhaps other aspects of EV manufacture and deployment. [EPA-HQ-OAR-2022-0829-0696, p. 6]

7 Benchmark Minerals Intelligence, September 6, 2022, “More than 300 new mines required to meet battery demand by 2035”, https://source.benchmarkminerals.com/article/more-than-300-new-mines-required-to-meet-battery-demand-by-2035

Organization: American Petroleum Institute (API)

EPA notes in the proposal various partnerships and plans to build battery manufacturing plants in the U.S., taking advantage of incentives such as the IRA, one must view these as highly complex projects – in addition to siting and construction, it will take time for these new battery manufacturing facilities to be up and running to ramp up to full production. Further, there is the probability that not all announced projects will materialize. [EPA-HQ-OAR-2022-0829-0641, p. 15]

f. Critical Minerals, Energy Security, BEV Supply Chains, Feasibility and Modeling.

i. Critical minerals.

Reliance on a limited number of technologies (e.g., ZEVs) on the timeline required by the proposed rule will likely result in a non-resilient transport sector that is vulnerable to unexpected disruptions. Both the federal government and the private sector have recognized that critical minerals are essential to the future of ZEV technology, and likewise, that unstable critical mineral supply chains could disrupt this future. [EPA-HQ-OAR-2022-0829-0641, pp. 20-21]

BEV battery supply chains, including critical minerals and precursors are controlled by a small number of countries, some with unsustainable environmental and human rights practices, and geopolitical concerns. The mining sector will need to grow exponentially to meet demand, and mining is an energy- and environmental-intensive activity. The accelerated BEV technology penetration rate required under EPA's proposal poses significant challenges for best practices to be widely and fully deployed in the timeframe anticipated by the proposed rule. [EPA-HQ-OAR-2022-0829-0641, pp. 20-21]

Regarding the availability of critical minerals, especially those essential to the manufacturing of a Li-ion battery, the supply is dominated by three lithium producing countries — Australia, Chile and China, which account for nearly 90 percent of the global market.65 While 70% of global cobalt production comes from the Democratic Republic of Congo,66 most of the mines are owned/operated by China and more than 60 percent of cobalt processing is located in China. China produces 67 percent of the world's graphite.67 The U.S. imports most of its manganese from Gabon, a less geopolitically stable country, providing 65 percent of the United States' supply.68 Electricity networks need a large amount of copper and aluminum. The need for grid expansion that would result from this rapid increase in electricity demand underpins a doubling of annual demand for copper and aluminum.69 China possesses over half of the entire world's aluminum smelting capacity. [EPA-HQ-OAR-2022-0829-0641, pp. 20-21]

65 "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report. May 2021. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

66 Ibid.

67 Robinson, G.R., Jr., Hammarstrom, J.M., and Olson, D.W., 2017, Graphite, chap. J of Schulz, K.J., DeYoung, J.H., Jr., Seal, R.R., II, and Bradley, D.C., eds., Critical mineral resources of the United States—Economic and environmental geology and prospects for future supply: U.S. Geological Survey Professional Paper 1802, p. J1–J24, https://doi.org/10.3133/pp1802J.

68 https://oec.world/en/profile/bilateral-product/manganese-ore/reporter/usa

69 "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report. May 2021. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

There are sources that indicate a shortage of critical minerals as well as volatility in critical mineral prices. U.S. energy security would also undergo a dramatic paradigm shift if vehicle technologies were shifted from ICEVs to ZEVs in the exponential rate that the proposal contemplates. Domestic production of critical minerals required for battery production is insufficient to meet the projected demands. Although Congress and the Administration have taken significant steps to accelerate this activity by funding, facilitating, and promoting the rapid growth of U.S. supply chains for these products through the IRA, BIL, and numerous Executive Branch initiatives, more will still be needed given the proposed increase in demand. Further, EPA failed to consider all the complexities, such as federal permitting, National Environmental Protection Act reviews, and the supply chains for these critical materials in their technology feasibility assessment. API requests that EPA include a thorough evaluation of the full supply chains for each critical mineral/material in their final proposal and their implications on energy security, factoring in sensitivity cases and acknowledging potential disruptions in the supply chain. Please see Appendix A for more discussion regarding our concerns on critical minerals. [EPA-HQ-OAR-2022-0829-0641, pp. 20-21]

Mineral security and energy security, defined as "the uninterrupted availability of energy sources at affordable prices"71 are essentially interchangeable concepts because the proposed rule will require affordable supplies of critical minerals, that while available within the U.S., are largely inaccessible due to permitting challenges.72 [EPA-HQ-OAR-2022-0829-0641, pp. 21-22]

71 88 Fed. Reg. 29,388 (May 5, 2023).

72 The Martec Group, "Electric vehicle growth in the U.S.: A look Into the EV Battery Supply Chain", March 2022, https://martecgroup.com/electric-vehicle-battery-supply-chain/.

According to the Congressional Research Service,73 the U.S. has a heavy dependence on imported critical minerals and for the five critical minerals used in battery production there is a "higher potential" for disruptions to the supply chain. In addition to domestic reserves of critical minerals where it may not even be economical to produce,74 there is a lack of liquidity75 in global markets that are highly concentrated. Markets for critical minerals are "small, thin, and opaque"76 and inefficient which is crippling to development and advancement of critical minerals. [EPA-HQ-OAR-2022-0829-0641, pp. 21-22]

73 Tracy, B. S. (2022). "Critical Minerals in Electric Vehicle Batteries" (CRS Report No. R47227). https://crsreports.congress.gov/product/pdf/R/R47227.

74 Ibid.

75 Hendrix, C. December 2022. "Markets for Critical Minerals Are Too Prone to Failure." Barron's. https://www.barrons.com/articles/markets-critical-minerals-lithium-cobalt-copper-51671227168.

76 Ibid.

U.S. energy security would also undergo a dramatic paradigm shift if vehicle technologies were shifted from ICEVs to ZEVs in the exponential rate that the proposal would likely entail. The U.S. would move from being energy secure to being dependent largely upon foreign sources for the minerals needed to make ZEV technologies such as batteries. [EPA-HQ-OAR-2022-0829-0641, pp. 21-22]

iii. BEV Supply Chains.

Given the market and domestic resource challenges identified above, the EPA has failed to properly address effects on energy security of the U.S. The proposed rule would make the U.S. more reliant on imported critical minerals that are subject to supply disruptions and market concentrations. As EPA mentions, disruptions in petroleum supply chains and critical mineral supply chains are not perfectly comparable; however, similarities should not be ignored. [EPA-HQ-OAR-2022-0829-0641, pp. 21-22]

i. Additional Concerns.

EPA must address several aspects of their analysis of vulnerabilities associated with critical minerals as outlined in Appendix A and related to cost, modeling, and assumptions as outlined in Appendix B. [EPA-HQ-OAR-2022-0829-0641, p. 34]

Appendix A:

Critical Minerals Assessment

There are hurdles to address in order to support the scale-up adoption of BEV. These hurdles include impacts on supply chains, energy resilience and the environment. Consideration to both the hurdles and mitigation measures should be given to inform responsible and effective implementation of vehicle standards. [EPA-HQ-OAR-2022-0829-0641, p. 36]

Reliance on a limited number of technologies (e.g., BEVs) on the timeline required by the proposed rule will likely result in a non-resilient transport sector that is vulnerable to unexpected disruptions. Both the federal government and the private sector have recognized that critical minerals are essential to the future of BEVs, and likewise, that unstable critical mineral supply chains could disrupt this future. A BEV passenger car requires six times85 more minerals than a conventional gasoline car. A PHEV requires just one-sixth the critical minerals compared to a BEV, making it a more achievable bridge while the industry scales.86 We understand that EPA's current analysis does not include PHEV in their technology penetration rates, and that EPA plans to incorporate these technologies in the final rule. API recommends the critical minerals section of the rule be revisited considering PHEV in the assumptions and analysis. Additionally, EPA needs to explain why more of the total electrical vehicle miles travelled (VMT) could not be satisfied by PHEV, which would allow supply chains to better accommodate the demand for critical minerals and hence lower potential global environmental risk. [EPA-HQ-OAR-2022-0829-0641, p. 36]

85 International Energy Agency. "The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transitions." 2022. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

86 Prat, G. "Carbon is our enemy: Let's Use Everything We've Got To Fight It." Toyota Times. September 2021. https://toyotatimes.jp/en/spotlights/172.html.

I. Mineral availability and mining.

BEV battery supply chains, including critical minerals and precursors are controlled by a small number of countries, some with unsustainable environmental and human rights practices, and geopolitical concerns. The mining sector would need to grow exponentially to meet the proposed rule's demands. According to a forecast by BMI, at least 384 combined new mines for graphite, lithium, nickel, and cobalt are required to meet the global demand by 2035.87 These numbers highlighted by the BMI report were derived prior to EPA releasing the new rule proposals, which will significantly increase the need for new mines. [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

87 More than 300 new mines required to meet battery demand by 2035: https://source.benchmarkminerals.com/article/more-than-300-new-mines-required-to-meet-battery-demand-by- 2035.

Mining is an energy- and environmental-intensive activity. Critical minerals for electric batteries such as lithium and copper are particularly vulnerable to water stress given their high-water requirements.88 Over 50 percent of today's lithium and copper production is concentrated in areas with high water stress levels. Activities associated with mining produce GHG emissions, as well as particulate matter emissions, nitrogen oxide emissions, and other air pollutant emissions from mining equipment. A strong focus on environmental and ethical best practices in this sector are needed to safeguard natural lands, biodiversity, sustainable water use, indigenous peoples' rights, and labor protections.89 [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

88 International Energy Agency. "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

89 The Global Investor Commission on Mining 2030: https://mining2030.org/.

Regarding the availability of critical minerals, especially those essential to the manufacturing of a Li-ion battery, the supply is dominated by three lithium producing countries — Australia, Chile and China, which account for nearly 90 percent of the global market. While 70% of global cobalt production comes from the Democratic Republic of Congo,90 most of the mines are owned/operated by China and more than 60 percent of cobalt processing is located in China. China produces 67 percent of the world's graphite.91 The U.S. imports most of its manganese from Gabon, a less geopolitically stable country, providing 65 percent of the United States' supply.92 Electricity networks need a large amount of copper and aluminum. The need for grid expansion that would result from this rapid increase in electricity demand underpins a doubling of annual demand for copper and aluminum.93 China possesses over half of the entire world's aluminum smelting capacity. [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

90 International Energy Agency. "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

91 "Graphite," Professional Paper 1802-J, US Geological Survey. https://pubs.er.usgs.gov/publication/pp1802J#:~:text=China%20provides%20approximately%2067%20percent%20 of%20worldwide%20output,costs%20and%20some%20mine%20production%20problems%20are%20developing.

92 Observatory of Economic Complexity: https://oec.world/en/profile/bilateral-product/manganese-ore/reporter/usa.

93 International Energy Agency. "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

II. Supply chain resilience.

Looking forward toward 2030, based on current and anticipated global production plans, a global supply shortfall is likely to begin toward the end of the decade. If planned mining projects do not deliver as expected, some critical minerals could face shortages as early as next year.94 Globally, it takes on average over 16 years to move mining projects from first discovery to production.95 The ability to quickly scale minerals production is further affected by ore quality, which in recent years has been declining and thus requires more material to be mined, more resources such as water in stressed areas for processing, and ultimately greater environmental impacts. [EPA-HQ-OAR-2022-0829-0641, pp. 37-38]

94 L. Lee, Energy Intelligence "Mining the Gap to a Net-Zero Future," May 15, 2023. https://www.energyintel.com/00000188-1e5f-d806-ad9f-5edfeb1d0000?utm_campaign=website&utm_source=sendgrid.com&utm_medium=email.

95 "International Energy Agency. "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report.

https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

EPA also fails to consider the value chain before the battery cell production. The domestic supply chain is in its early stages and to meet the proposed goals, automakers and battery manufacturers will still need to rely on foreign sources of critical materials and precursors. For instance, BMI foresees a 77 percent deficit in domestic available cathode active material to meet 2035 demands in North America. This estimate was done prior to the proposal. This step in the value chain will require import/export until it is further built out, which will add to cost to the battery pack.96 Although Congress and the Administration have taken significant steps to accelerate this activity by funding, facilitating, and promoting the rapid growth of U.S. supply chains for these products through the IRA, BIL, and numerous Executive Branch initiatives, more will still be needed given the increase in demand. [EPA-HQ-OAR-2022-0829-0641, pp. 37-38]

96 Benchmark Minerals Intelligence, BMI (see Charts 2, 3 & 4): https://source.benchmarkminerals.com/article/ambition-versus-reality-why-battery-production-capacity-does-not- equal-supply.

For any one of these minerals, this regulation, taken to its logical end, puts the U.S into a situation resembling the oil embargoes of the 1970s, where foreign actors control majorities of the critical raw material supplies used in the manufacture of fuels, battery, and motor components designed to provide transportation mobility services for the U.S. consumer. Compared with fossil fuel supply, the supply chains for clean energy technologies can be even more complex (and in many instances, less transparent).97, 98 [EPA-HQ-OAR-2022-0829-0641, pp. 37-38]

97 International Energy Agency. "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

98 SAFE. "The Commanding Heights of Global Transportation," https://secureenergy.org/wp-content/uploads/2020/09/The-Commanding-Heights-of-Global-Transportation.pdf.

EPA failed to consider all the hurdles and complexities such as federal permitting, National Environmental Policy Act reviews, and the supply chains for these critical materials in their technology feasibility assessment. API requests EPA include a thorough evaluation of the full supply chains for each critical mineral/material in their final proposal and their implications on energy security. [EPA-HQ-OAR-2022-0829-0641, pp. 37-38]

III. Operational ineffciency of battery production facilities.

While many OEMs and battery manufacturers have announced plans to build gigafactories in North America, taking advantage of incentives such as the IRA, one must view these as highly complex projects. It should also be noted that it will take time for these new battery manufacturing facilities to ramp up to full production. Capacity gives a reflection of what a plant could potentially produce; capacity reflects ambition. EPA notes in the DRIA that "the Department of Energy estimates that recent plant announcements for North America to date could enable an estimated 838 GWh of capacity by 2025, 896 GWh by 2027, and 998 GWh by 2030, the vast majority of which is cell manufacturing capacity." This assumes battery manufacturing capacity at initial opening or at mature stage at 100% scale. This is not accurate.

In their early years, battery factories will likely operate at approximately 50 percent production capacity. Mature battery factories today rarely operate above 80 percent utilization rates.99 The EPA projects a ten-fold increase in North American battery manufacturing capacity in just eight years, from 90 gigawatt hours per year in 2022, to 998 GWh/year in 2030, with the great majority of that sited in the U.S. Wood Mackenzie projects U.S. capacity of less than half that level, at 422 GWh/ year in 2030.100 Given the disparity in forecasts from different reputable sources, EPA's technology feasibility assessment should factor sensitivity cases and acknowledge potential disruptions in the supply chain. [EPA-HQ-OAR-2022-0829-0641, pp. 38-39]

99 Xiao, Maya, "Lithium-ion battery production goes global," January 26, 2022. https://www.controleng.com/articles/lithium-ion-battery-production-goes-global/.

100 Wood Mackenzie: https://identity.woodmac.com/sign-in?goto=https%3A%2F%2Fmy.woodmac.com%2Fdocument%2F150115630

IV. Raw materials are specialty chemicals, not commodities.

To meet the ambitions that OEMs have set forth in terms of percentage of BEV entering the market, they must secure adequate amounts of raw materials. With the projected supply and demand gap that many analysts foresee, as mentioned earlier, pricing of critical minerals could remain volatile as we have seen through the early 2020s. There are varying views by different analysts on the direction of critical mineral pricing scenarios. Morgan Stanley estimates BEV manufacturers will need to increase prices by 25 percent to account for rising battery prices.101 Battery raw materials are not commodities, they are classified as specialty chemicals, and pricing should be analyzed as such as they will not follow traditional commodity pricing structures, especially given where these supplies are geographically concentrated in areas with geopolitical instabilities. [EPA-HQ-OAR-2022-0829-0641, p. 39]

101 Thornhill, J. "Morgan Stanley Flags EV Demand Destruction as Lithium Soars," see Chart 7. Bloomberg. March 24, 2022. https://www.bloomberg.com/news/articles/2022-03-25/morgan-stanley-flags-ev-demand-destruction-as- lithium-soars#xj4y7vzkg.

Battery Raw Materials

Global demand for critical raw materials has been increasing with the increase in demand for automotive batteries as shown in Table 1. The key raw materials of interest for batteries are lithium, nickel, cobalt, and graphite. The production of these materials has increased by 18% to 251% over the last 10 years.119 [EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

119 USGS Global material production sourced in May 2023.

Table 1 [EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

Raw Material (1000 tons)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	% Increase
Lithium	37	35	36	32.5	35	43	96	87.1	83.2	107	130	251%
Graphite	1100	1190	1170	1190	1200	1200	930	1100	1100	1130	1300	18%

Nickel	2100	2490	2400	2530	2250	2100	2300	2610	2500	2730	3300	57%
Cobalt	110	120	112	124	123	110	140	144	140	165	190	73%

[EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

If we assume that the global production of electric light-duty vehicles grows to ~50% by 2032 and that technological improvements will be made in battery cell chemistry consistent with known publicly available technology announcements, the demand for these critical raw materials will continue to increase by 47% to 438% by 2032.120 The output of this analysis is that there will be significant pressure on the mining industry to develop and process the raw materials to meet automotive battery demand. [EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

120 Martec Group study on raw material demand from light-duty vehicles – 2022.

[See original for graph titled "Figure 4 – Global Raw Material Demand from Light-Duty Vehicles"] [EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

In Figure 4 above, the increase in global production of raw materials for just light-duty vehicles is calculated based on the assumed global demand of 50% BEVs by 2032. The global average kWh per vehicle is assumed to be 71kWh and battery chemistry is expected to be ~30% LFP and 70% NMC battery types. This analysis then calculates the amount of raw material per kWh based on these inputs.121 [EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

121 https://www.nature.com/articles/s43246-020-00095-x#Sec16 Supplementary Table 23.

What the outputs show is that lithium will need to increase the amount of mined material by more than 4 times in the next 10 years to keep up with just global light-duty automotive demand. Graphite is also expected to need ~3 times the amount currently produced globally. Nickel seems to be a low number at only a 50% increase from the 2022 production level however, nickel is already consumed in large quantities for other applications. This 50% increase represents ~1.6M tons of nickel while the 400% increase in lithium is only 400k tones. [EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

The agency must consider the global demand for these raw materials in the final regulatory impact assessment and the associated increase in costs to develop supply for these raw materials that are more in line with market forces rather than assuming the cost of these raw materials will decrease with increasing production as stated in the DRIA.122 [EPA-HQ-OAR-2022-0829-0641, pp. 46-47]

122 Draft Regulatory Impact Analysis EPA-420-D-23-003 April 2023, Figure 2-24.

Organization: Arizona State Legislature

10. The proposed rule makes erroneous estimates about energy security and critical mineral availability. The proposed rule will force American dependence on China and impose a high cost for energy security, not a benefit as EPA calculates. [EPA-HQ-OAR-2022-0829-0537, p. 3]

X. The proposed rule is arbitrary and capricious because of erroneous estimates about energy security and critical mineral availability.

EPA calculates a $4.4 billion benefit from energy security resulting from the proposed rule. 88 Fed. Reg. 29,362. In EPA's view, "widespread automotive electrification in the U.S. will not lead to a critical long-term dependence on foreign imports of minerals or components, nor that increased demand for these products will become a vulnerability to national security." Id. at 29,313. EPA believes that existing foreign production is adequate simply because of other countries' investment in supply chains, and the Bipartisan Infrastructure Law and Inflation Reduction Act combined with market forces will cause American companies to develop their own supply chains. Id. EPA also reasons that minerals imported into the United States can be reclaimed and thus increase America's supply of those minerals. Id. [EPA-HQ-OAR-2022-0829-0537, p. 30]

EPA's own statistics show that foreign production of critical minerals presents an energy security problem. According to EPA [EPA-HQ-OAR-2022-0829-0537, pp. 30-31]:

As shown in Figure 28, in 2019 about 50 percent of global nickel production occurred in Indonesia, Philippines, and Russia, with the rest distributed around the world. Nearly 70 percent of cobalt originated from the Democratic Republic of Congo, with some significant production in Russia and Australia, and about 20 percent in the rest of the world. More than 60 percent of graphite production occurred in China, with significant contribution from Mozambique and Brazil for another 20 percent. About half of lithium was mined in Australia, with Chile accounting for another 20 percent, and China about 10 percent. [EPA-HQ-OAR-2022-0829-0537, pp. 30-31]

According to the Administration's 100-day review under E.O. 14017, of the major actors in mineral refining, 60 percent of lithium refining occurred in China, with 30 percent in Chile, and 10 percent in Argentina. 72 percent of cobalt refining occurred in China, with another 17 percent distributed among Finland, Canada, and Norway. 21 percent of Class 1 nickel refining occurred in Russia, with 16 percent in China, 15 percent in Japan, and 13 percent in Canada. Similar conclusions were reached in an analysis by the International Energy Agency, shown in Figure 29. [EPA-HQ-OAR-2022-0829-0537, pp. 30-31]

Id. at 29,314.

Indeed, the United States imports most of the minerals needed for the current electric vehicle production demand, with a net import reliance of 100% for manganese, 100% for graphite, 76% for cobalt, 48% for nickel, and more than 25% for lithium.60 As the EPA recognizes, "Currently, the United States is lagging behind much of the rest of the world in critical mineral production." 88 Fed. Reg. 29,315. [EPA-HQ-OAR-2022-0829-0537, pp. 30-31]

60 Congressional Research Service, Critical Minerals in Electric Vehicle Batteries, Aug. 29, 2022, 9, available at https://crsreports.congress.gov/product/pdf/R/R47227.

EPA's electric vehicle mandate will surge demand for critical minerals that the United States will have to import. According to the International Energy Agency, in the "global energy transition like the one President Biden envisions, demand for key minerals such as lithium, graphite, nickel and rare-earth metals would explode, rising by 4,200%, 2,500%, 1,900% and 700%, respectively, by 2040."61 The American Transportation Research Institute estimates that replacing the existing American vehicle fleet with electric cars will require 6.3 to 34.9 years of current global production of critical minerals and 8.4 to 64.4 percent of global reserves, depending on the material.62 EPA does not account for the greenhouse gas emissions resulting from this dramatically expanded mining production. [EPA-HQ-OAR-2022-0829-0537, p. 31]

61 Carrie Sheffield, Hypocrite Biden blocks mineral mining his clean-energy goals require, New York Post, Mar. 22, 2023, available at https://nypost.com/2023/03/22/biden-blocks-mineral-mining-his-clean-energy-goals-require/.

62 American Transportation Research Institute, supra note 55, at 2.

EPA's electric vehicle mandate will force American dependence on China. In 2019, China accounted for 80% of the world's total production of raw materials for electric batteries.63 China's reach extends around the world. In the Democratic Republic of the Congo, for example, 15 of 19 cobalt-producing mines are owned or financed by Chinese companies.64 China also refines 95% of the world's cobalt supply.65 China controls 65% of the global lithium processing and refining capacity and is securing deals to extract lithium from mines in Latin America.66 [EPA-HQ-OAR-2022-0829-0537, p. 31]

63 Institute for Energy Research, China Dominates the Global Lithium Battery Market, Sept. 9, 2020, available at https://www.instituteforenergyresearch.org/renewable/china-dominates-the-global-lithium-battery-market/.

64 Shin Watanabe, Chinese cobalt producer to double Congo output with eye on top spot, NIKKEI ASIA, Jan. 7, 2022, available at https://asia.nikkei.com/Business/Markets/Commodities/Chinese-cobalt-producer-to-double-Congo- output-with-eye-on-top-spot.

65 Elaine Dezenski, The United States' Energy Future Needs Critical Minerals—and Latin America, NEWSWEEK, Mar. 24, 2023, available at https://www.newsweek.com/united-states-energy-future-needs-critical-minerals-latin-america- opinion-1789379.

66 Id.

"China's dominance in EV battery manufacturing is similar to its dominance in mining an extraction of the minerals used in batteries."67 China accounts for more than 70% of global electric vehicle battery cell production capacity.68 Of the 13 top battery production companies, seven have headquarters in China.69 [EPA-HQ-OAR-2022-0829-0537, p. 31]

67 Congressional Research Service, supra note 60, at Summary.

68 Id at 7.

69 Id.

In the proposed rule, EPA identifies domestic production efforts for only one mineral, lithium. 88 Fed. Reg. 29,321. The global supply of lithium needs to increase by 42 times by 2040 or 2050 to meet demand for electric vehicles.70 But "getting approval for [new mines] can still take years, if not decades."71 And the Biden Administration admits it does not even know where all critical minerals may exist: "The United States' non-fuel mineral resources are significantly under-mapped relative to those of other developed nations; only 12 percent of U.S. territory has modern high-resolution geophysical surveys of the subsurface, and only 35 percent is covered by detailed geologic mapping of the surface and near-surface."72 The Alaska governor noted that the White House's 250-page report on critical minerals mentions Australia 60 times, Canada 32 times, but Alaska only once, in a footnote.73 [EPA-HQ-OAR-2022-0829-0537, pp. 31-32]

70 Ana Swanson, The U.S. Needs Minerals for Electric Cars. Everyone Else Wants Them Too., The New York Times, May 21, 2023, available at https://www.nytimes.com/2023/05/21/business/economy/minerals-electric-cars- batteries.html.

71 Id.

72 The White House, Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad- Based Growth, June 2021, 197, available at https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day- supply-chain-review-report.pdf.

73 Carrie Sheffield, Hypocrite Biden blocks mineral mining his clean-energy goals require, New York Post, Mar. 22, 2023, available at https://nypost.com/2023/03/22/biden-blocks-mineral-mining-his-clean-energy-goals-require/.

Under the apparent strategy of "if you subsidize it, they will come," EPA brushes off these inconvenient facts by focusing on the public and private focus on manufacturing electric batteries in the United States. 88 Fed. Reg. 29,318-319. But even if America builds all of the manufacturing capacity needed to supply EPA's forced electric vehicle demand, manufacturing still requires critical minerals that China has and America does not. Other than recycling critical minerals from old batteries, EPA proposes no solutions to this grave energy security problem. [EPA-HQ-OAR-2022-0829-0537, p. 32]

Organization: BMW of North America, LLC (BMW NA)

BMW NA, together with the Alliance of Automotive Innovators, has already agreed with Biden Administrations' stated goal of reaching 40-50% sales of electric vehicles within the market by 2030. Achieving this goal will only be possible if the framework conditions allow the market to develop - i.e. charging infrastructure, availability of critical raw materials and the overall cost situation for xEVs. [EPA-HQ-OAR-2022-0829-0677, p. 2]

At this time, BMW NA does not believe that the necessary framework conditions, especially infrastructure, are advancing as necessary to achieve the targets set forth in the Proposed Rule. Therefore, we share the concerns expressed by the Alliance of Automotive Innovators that these targets cannot be met without massive and coordinated efforts of the auto industry, energy providers, mineral suppliers and the government. [EPA-HQ-OAR-2022-0829-0677, p. 2]

Further, there are an insufficient number of mining operations available from which to source critical minerals. Benchmark Minerals3 identifies the need for at least 300 additional mining operations to be developed worldwide - within the next 10 years. The creation and production from those mines cannot reasonably be accomplished within that timeframe, - as the usual development time for new mine operations is at least 10 years. - This is a significant challenge, which needs to be solved. [EPA-HQ-OAR-2022-0829-0677, p. 2]

3 https://source.benchma rkmineraIs.com/article/more-than-300-new-mInes-requ ired-to-meet-battery-demand-by-2035

Without the availability of adequate mining operations, the scarcity of available critical minerals can only be managed to a small extent by improved battery technology. The undersupply of minerals and associated high costs to acquire will mean that price parity between ICE and xEV will not be achieved in enough time to support the GHG targets. The scarcity and availability of critical materials are a material and decisive factor, as they represent approximately 70% of the total cost to manufacture a battery. [EPA-HQ-OAR-2022-0829-0677, p. 2]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Beyond savings to individual consumers, the proposed standards, to the extent manufacturers use ZEVs to comply, present economic growth opportunities for many sectors in the United States, especially auto manufacturing, electricity generation, and upstream ZEV supply chains as consumers direct more spending to ZEV technology and electricity for transportation fuel. Many manufacturers are already domestically producing ZEVs, providing tangible employment opportunities nationwide. 128 Provisions in the Inflation Reduction Act to support domestic production and materials sourcing will further shore up these benefits. [EPA-HQ-OAR-2022-0829-0780, pp. 65-66]

Even in the short time since U.S. EPA released its proposal, manufacturers have announced new investments in vehicle and battery manufacturing and assembly that will strengthen and expand the ZEV industry across the U.S. For example, Toyota announced that it will assemble its new battery electric sport utility vehicle at its Kentucky facility using batteries from a new battery plant in North Carolina. 129 General Motors and Samsung SDI are investing more than $3 billion to build a battery plan in Indiana, providing local jobs. 130 Hyundai Motor Group and LG Energy Solution announced that they will build a $4.3 billion electric battery plant in Georgia. 131 These are just a few examples of the tremendous economic opportunity this expanding industry can provide to support local jobs and build a resilient supply chain for ZEVs. [EPA-HQ-OAR-2022-0829-0780, pp. 65-66]

128 Blue Green Alliance. “The High Road to California EV Goals: Raising Ambition for High-Quality Domestic Manufacturing Jobs.“ July 2021. https://www.bluegreenalliance.org/wp-content/uploads/2021/07/Baum- Report-7121-FINAL-w-cover.pdf

129 Toyota. “Toyota Ramps Up Commitment to Electrification with U.S. BEV Production and Additional Battery Plant Investment.” Toyota Newsroom. May 31, 2023. https://pressroom.toyota.com/toyota-ramps-up- commitment-to-electrification-with-u-s-bev-production-and-additional-battery-plant-investment/. Accessed June 22, 2023.

130 Shepardson, David. “GM, SDI will build $3 billion battery manufacturing plant in Indiana.” Reuters. June 13, 2023. https://www.reuters.com/business/autos-transportation/indiana-confirms-gm-sdi-will-build-3-bilion-ev-battery-manufacturing-plant-2023-06-13/ Accessed June 22, 2023.

131 Amy, Jeff. “Hyundai and LG announce $4.3 billion plant in Georgia to build batteries for electric vehicles.” Associated Press. May 26, 2023. https://apnews.com/article/hyundai-lg-electric-vehicles-batteries-georgia-db44d911b3dae0fbf454cb53503ce84c. Accessed June 22, 2023.

Organization: California Attorney General's Office, et al.

D. Sales of Zero-Emission Vehicles Are Projected to Continue Growing at a Dramatic Rate

Zero-emission-vehicle technologies107 are the most effective tailpipe emission control technologies available to date, and demand for zero-emission vehicles specifically has exploded in recent years. In response to this demand, significant public and private investments across the country continue to be made to build sufficient charging infrastructure and develop the domestic battery supply chain, and these investments are projected to keep pace with the dramatic growth of the zero-emission vehicle market. There is every reason to expect this growth to continue. [EPA-HQ-OAR-2022-0829-0746, p. 18]

107 The term “zero-emission-vehicle technologies” includes batteries with on-board chargers and hydrogen stored in a fuel cell stack that transforms chemical energy into electrical energy to propel a vehicle.

Recent congressional actions demonstrate the federal commitment to substantial electrification of the transportation sector. In 2021, Congress passed the Bipartisan Infrastructure Law, which allocates $7.5 billion to building out a national network of electric vehicle chargers, $7 billion to ensure domestic manufacturers have the critical minerals and other components necessary to make electric vehicle batteries, and $10 billion for clean transit and school buses.110 In 2022, Congress passed the CHIPS and Science Act, which invests $52.7 billion in America’s manufacturing capacity for the semiconductors used in electric vehicles and chargers.111 Later in 2022, Congress passed the Inflation Reduction Act, which provides $7,500 to buyers of new electric vehicles and $4,000 to purchasers of pre-owned electric vehicles.112 Additionally, the Inflation Reduction Act provides billions of dollars to support vehicle manufacturers’ expansion of their domestic production of clean vehicles,113 and billions to support battery production in the United States and mining and processing of critical minerals needed for battery cells and electric motors.114 The Inflation Reduction Act also allocates billions to upgrade the nation’s power grid in order to help address the new surge in grid demand from electric vehicles.115 [EPA-HQ-OAR-2022-0829-0746, pp. 18-19]

110 White House, Building a Better America: A Guidebook to the Bipartisan Infrastructure Law for State, Local, Tribal, and Territorial Governments, and Other Parties (May 2022), at 136, available at https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf.; White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act’s Investments in Clean Energy and Climate Action (Jan. 2023) at 46, available at, https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.

111 White House, Guidebook to the Inflation Reduction Act, supra n. 110, at 46.

112 Id.

113 Id. at 47.

114 Id. at 10, 26, 47.

115 Id. at 34.

3. Significant Investments Are Being Made to Build Out and Reinforce the Domestic Battery Supply Chain

The federal and state governments, manufacturers, and others in the private sector are investing billions to develop the domestic battery supply chain in order to meet the increased demand for zero-emission vehicles. [EPA-HQ-OAR-2022-0829-0746, pp. 25-27]

Congress and the Biden Administration have taken significant steps to accelerate the growth of the domestic battery supply chain, which consists of (1) the production of raw minerals from mining and recycling operations and (2) battery component and battery manufacturing. Specifically, the Bipartisan Infrastructure Law provides $7.9 billion for battery manufacturing, battery recycling, and critical minerals production.156 The Inflation Reduction Act’s Advanced Manufacturing Production Credit may provide manufacturers $136 billion or more, and the

Advanced Energy Project Credit may provide manufacturers at least another $6.2 billion. 88 Fed. Reg. at 29,318. [EPA-HQ-OAR-2022-0829-0746, pp. 25-27]

156 Congressional Research Service, Energy and Minerals Provision in the Infrastructure Investment and Jobs Act (P.L. 117-58) (Mar. 31, 2023), available at https://crsreports.congress.gov/product/pdf/R/R47034.

These federal funds are successfully encouraging large-scale investments in domestic production of critical minerals and battery manufacturing. For example, recipients of $2.8 billion of the Bipartisan Infrastructure Law funding matched the federal investment, leveraging this portion of the funding to a total of $9 billion to expand domestic production of critical minerals and manufacturing of batteries for electric vehicles.157 This investment supports 21 new or upgraded facilities that produce battery materials, recycle batteries, or manufacture batteries.158 Additionally, by the end of March 2023, the Inflation Reduction Act had already spurred over $45 billion in announced investments across the domestic battery supply chain,159 including LG Energy Solution's $5.5 billion investment to build a new battery factory in Arizona160 and Ford's $3.5 billion investment to build a battery factory in Michigan.161 And more investments in battery plants continue to be announced.162 [EPA-HQ-OAR-2022-0829-0746, pp. 25-27]

157 U.S. Department of Energy, Biden-Harris Administration Awards $2.8 Billion to Supercharge U.S. Manufacturing of Batteries for Electric Vehicles and Electric Grid (Oct. 19, 2022), available at https://www.energy.gov/articles/biden-harris-administration-awards-28-billion-supercharge-us-manufacturing-batteries.

158 U.S. Department of Energy, Bipartisan Infrastructure Law: Battery Materials Processing and Battery Manufacturing (Nov. 1, 2022), available at https://www.energy.gov/sites/default/files/2022-11/DOE%20BIL%20Battery%20FOA-2678%20Selectee%20Fact%20Sheets.pdf.

159 The White House, Treasury Releases Guidance to Drive Investment in Critical Minerals & Battery Supply Chains in America (Mar. 31, 2023), available at https://www.whitehouse.gov/cleanenergy/clean-energy-updates/2023/03/31/treasury-releases-guidance-to-drive-investment-in-critical-minerals-battery-supply-chains-in-america/#:~:text=Since%20the%20enactment%20of%20the,the%20manufacturing%20of%20battery%20packs.

160 Niraj Chokshi, The New York Times, LG Will Spend $5.5 Billion on a Battery Factory in Arizona (Mar. 24, 2023), available at https://www.nytimes.com/2023/03/24/business/energy-environment/lg-battery-factory-arizona.html.

161 Neal E. Boudette and Keither Bradsher, The New York Times, Ford Will Build a U.S. Battery Factory With Technology From China (Feb. 13, 2023), available at https://www.nytimes.com/2023/02/13/business/energy-environment/ford-catl-electric-vehicle- battery.html.

162 David Shepardson, Reuters, GM, SDI will build $3 billion battery manufacturing plant in Indiana (Jun. 13, 2023), available at https://www.reuters.com/business/autos-transportation/indiana-confirms-gm-sdi-will-build-3-bilion-ev-battery-manufacturing-plant-2023-06-13/; Rebekah Alvey, E&E, GM to invest in La. Manganese sulfate production for EVs (Jun. 27, 2023), available at https://subscriber.politicopro.com/article/eenews/2023/06/27/gm-to-invest-in-la-manganese-sulfate-production-for-evs-00103838.

These federal funds are complemented by state and local government investments in the domestic battery supply chain. For example, California offers $25 million in grant funds for projects that will promote in-state battery manufacturing for zero-emission vehicles.163 And New York has invested more than $50 million to support the creation of Battery-NY, a technology development, manufacturing, and commercialization center in upstate New York.164 [EPA-HQ-OAR-2022-0829-0746, pp. 25-27]

163 California Energy Commission, GFO-21-606 - Zero-Emission Vehicle Battery Manufacturing Block Grant, available at https://www.energy.ca.gov/solicitations/2022-08/gfo-21-606-zero-emission-vehicle-battery-manufacturing-block-grant.

164 Governor Kathy Hochul, New York State, Governor Hochul Announces Nearly $114 Million in Federal and State Funding to Create First-In-Class Battery-NY Center at Binghamton University (Sep. 2, 2022), available at https://www.governor.ny.gov/news/governor-hochul-announces-nearly-114-million-federal-and-state-funding-create-first-class.

By the end of May 2023, over $100 billion of investments had been announced to build or expand over 160 domestic facilities to extract and refine critical minerals and manufacture batteries.165 “In total, domestic [electric vehicle] battery manufacturing capacity will increase by almost 20-fold between 2021 and 2030.”166 Especially given the growing trend toward domestic battery production,167 there is every reason to believe that these investments will build a resilient domestic battery supply chain. See 88 Fed. Reg. at 29,313 (“EPA has confidence that these efforts are effectively addressing supply chain concerns.”). [EPA-HQ-OAR-2022-0829-0746, pp. 25-27]

165 U.S. Department of Energy, Investments in American-Made Energy (May 23, 2023), available at https://www.energy.gov/investments-american-made-energy; see e.g., Ivan Penn, The New York Times, Hyundai and LG Plan $4.3 Billion Battery Plant in Georgia (May 26, 2023), available at https://www.nytimes.com/2023/05/26/business/hyundai-lg-georgia-battery-plant.html.

166 Jared Sagoff, Argonne National Laboratory, A new look at the electric vehicle supply chain as battery-powered cars hit the roads en masse (May 4, 2023), available at https://www.anl.gov/article/a-new-look- at-the-electric-vehicle-supply-chain-as-batterypowered-cars-hit-the-roads-en-masse.

167 Yan Zhou et al., Argonne National Laboratory, Lithium-Ion Battery Supply Chain for E-Drive Vehicles in the United States: 2010-2020 (Mar. 2021), at xv, available at https://publications.anl.gov/anlpubs/2021/04/167369.pdf; see id. at xv (“The batteries used in [electric vehicles] sold in the U.S. have been largely domestically sourced. This trend toward domestic production has grown over time, with 70% of battery cells and 87% of battery packs produced in the U.S. in 2020.”).

Organization: Center for American Progress (CAP)

Battery manufacturing is expected to increase even faster, with the U.S. expected to have battery manufacturing capabilities to support the production of approximately 11.2 million EVs per year by 2026. This equates to 84 percent of U.S. new vehicle sales in 2022. DOE estimates that by 2030 North American battery manufacturing capacity will be able to supply up to 13 million EVs per year.19 It is critical that EPA’s final rule accurately account for domestic EV and battery manufacturing capability as supply is expected to remain the limiting factor in EV adoption. RMI finds that battery supply may just be able to keep up with demand as demand for passenger EVs alone could exceed 1,000 GWh/year by 2030.20 Survey data from Consumer Reports finds that demand for EVs has increased 350 percent since 2020, with 45 interested buyers for every EV produced in the United States.21 [EPA-HQ-OAR-2022-0829-0658, pp. 4-5]

19 Gohlke et al. Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010-2021, Argonne National Laboratory, November 2022, available online: https://publications.anl.gov/anlpubs/2022/11/178584.pdf

20 McNamara et al. “How Policy Actions can Spur EV Adoption in the United States,” Rocky Mountain Institute, June 2023, available online: https://rmi.org/insight/how-inflation-reduction-act-will-affect-ev-adoption-in-the-united-states/#:~:text=

The%20passage%20of%20the%20Inflation,production%2C%20and%20charging%20infrastructure%20dev elopmen t

21 Harto, Chris. “Excess Demand, The Looming EV Shortage,” Consumer Reports, March 2023, available online: https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf

Organization: Charles Forsberg

Converting transportation to batteries is unaffordable because the batteries are made of non-earth abundant expensive materials and all-electric battery vehicles imply large increases in electricity costs for everyone. These two effects add trillions of dollars of cost to the EPA strategy. The primary economic cost drivers were not addressed by EPA. [EPA-HQ-OAR-2022-0829-0738, pp. 1-2]

• Earth-abundant materials. Internal combustion engine (ICE) light vehicles are inexpensive because they are made of earth abundant materials: iron, aluminum, plastic (carbon and hydrogen) and sand (glass). In contrast, all-electric vehicles are made of non-earth-abundant materials. The average battery electric vehicle (Mechanical Engineering April/May 2023) has: Copper: 53.2 kg, Lithium: 8.9 kg, Nickel: 39.9 kg, Manganese: 24.5 kg, Cobalt: 13.3 kg, Graphite: 66.3 kg, Zinc 0/1 kg and Rare Earths: 0.5 ks. Non-earth-abundant materials are expensive because they are uncommon and the ore grades are low. For example, one must process almost a 100 times as much ore to recover a pound of nickel versus a pound of iron. Technology advances do not fix the problem that these elements are expensive on planet earth. The costs of these materials will increase as will the cost of all-electric vehicles as global production increases. If our ultimate goals include moving 8 to 10 billion people into the middle class, that goal can only be done using primarily affordable earth abundant elements (see discussion in paper). Such futures may allow the use of hybrid or plug-in hybrid vehicles with much lower quantities of non-earth-abundant materials. [EPA-HQ-OAR-2022-0829-0738, pp. 1-2]

This is not a new observation. It has been well understood since the studies of Goellar and Weinberg ("The age of substitutability", Science 1976;191:4228. doi: 10.1126/science.191.4228.683) that a global middle-class standard of living requires that the civilization be built out of earth-abundant materials. [EPA-HQ-OAR-2022-0829-0738, pp. 1-2]

Separate from the costs, fast scale up of the mining of non-abundant elements is not credible. The International Energy Agency projects that the world will need to increase lithium production by 40 and nickel production 20. On the average it takes 16 years to open a new mine on earth-versus a couple of years to build a battery factory. It will take decades, assuming cost is no concern, to scale up production of these non-abundant elements. In this context, the federal government in the last two years has blocked opening nickel mines in Minnesota and copper mines in Alaska-a clear statement that the federal government will not tolerate mining at scale and that the U.S. is betting on China, Russian (Siberia) and third-world countries to supply the necessary materials. Unlike oil and natural gas, each of these less-abundant elements are found only in a few countries. As a starting point, the EPA strategy requires a reversal of current U.S. policies with Russia and China for access to some of these less-abundant elements. Simultaneously, Indonesia and other countries are enacting laws prohibiting export of these raw materials to force conversion of ore to nickel and more value-added products in their own countries. Ultimately, the battery production will move to the countries that control the required non-abundant raw materials. [EPA-HQ-OAR-2022-0829-0738, p. 2]

It is possible that new battery chemistries may enable battery systems made of only earth-abundant materials-but those do not exist today and may or may not be possible to economically construct. One can't tolerate batteries with large quantities of copper, nickel or lithium. As a side note, the numbers from the U.S. Energy Information Agency show the total installed cost of utility batteries has leveled off-in contrast to the belief in the EPA rule making that costs will continue to go down for batteries based on academic studies. The economics of scale and learning curves end when the raw materials in the manufactured product are a significant fraction of the final costs-as we are now beginning to see with battery packs. The bad news is just starting on the mining front and costs of these less-abundant elements. [EPA-HQ-OAR-2022-0829-0738, p. 2]

Recommended action for EPA. Evaluate cost of non-abundant materials required for your scenarios that accounts for (1) increased European, Chinese and Indian demand, (2) the time it takes to build real mines for copper, nickel and lithium, and (3) how to obtain the resources that are mostly in the wrong political locations. This should include analysis by the U.S. State Department on the national security implications and required changes in U.S. foreign policy. If EPA assumes significant domestic supplies, the proposed regulatory changes should simultaneously include changes in mining regulations to fast track mining permits, limit grounds for denial of permits and limit local objections to such mines. This scale of mining requires a government willing to quickly move people if in the way. Hand waving does not work when proposing an increase in hard-rock mining beyond anything seen in human history. The likely outcome of a credible analysis will be abandonment of the current regulatory strategies. [EPA-HQ-OAR-2022-0829-0738, p. 2]

Organization: Chevron

Stakeholders have expressed concern about the supply and availability of critical minerals and supply chains for battery manufacturing, many of which are sourced from China. EPA should quantitatively assess the impact this regulation will have on the nation/worldwide demand of lithium and other rare earth metals, and the emissions that will be produced as a result of mining and shipping these materials. EPA should consider environmental impacts from mining of semi-precious metals and potential mitigations. The proposal does not address the potential hazards, construction, noise, or other impacts and potential mitigations for these impacts. [EPA-HQ-OAR-2022-0829-0553, p. 6]

Organization: Clean Fuels Development Coalition et al.

III. The Proposed Rule is Not Feasible for Other Reasons.

[…] Even if consumers did want to purchase these electric vehicles in the volumes EPA projects, the proposal fails to confront several barriers to its rapid electrification plans, including limits on the supply of minerals necessary to manufacture batteries, inadequate charging infrastructure and electrical supplies, and the complex interactions between this rule and other proposed rules all of which will further hinder this development. In light of these many barriers, it is unreasonable for the agency to conclude that compliance with its proposed emission standards is feasible. [EPA-HQ-OAR-2022-0829-0712, pp. 25-26]

D. There is not enough international mining and manufacturing capacity for the global electric vehicle push.

The proposal also systematically neglects the fact that there are simply not enough minerals, particularly lithium, available to sustain global electric vehicle growth. The U.C. Davis Climate + Community Project explains that the "primary driver of lithium demand—and new lithium mines—is EVs. Global EV sales for 2022 are estimated to reach 10.6 million, a 60 percent increase from 2021 (and a 333 percent increase from 2020) that has been driven largely by China and Europe." Thea Riofrancos et al., Achieving Zero Emissions with More Mobility and Less Mining, U.C. Davis Climate + Community Project (Jan. 2023), https://subscriber.politicopro.com/eenews/f/eenews/?id=00000185-e562-de44-a7bf-ed7751a00000. In 2021, global lithium production was estimated at just over 100,000 metric tons and consumption at 93,000 metric tons. Id. But "cumulative global lithium demand" could reach "30.3 million metric tons in 2050" and "exhaust[ ] currently existing reserves by 2045." Id. Replacing "the ICE vehicles on the road with EVs on a 1:1 basis is infeasible." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 29-30]

As Gill Pratt, chief executive of the Toyota Research Institute, told reporters "[I]t's going to take decades for battery material mines, renewable power generation, transmission lines and seasonal energy-storage facilities to scale up." Daniel Leussink, Not enough resources for EVs to be only cleaner car option, Toyota says, Reuters (May 18, 2023), https://www.reuters.com/business/autos-transportation/not- enough-resources-evs-be-only-cleaner-car-option-toyota-says-2023-05-18/. This is an insuperable obstacle to EPA's proposal. [EPA-HQ-OAR-2022-0829-0712, pp. 29-30]

C. The proposed rule also gets energy security costs backwards— electric vehicles are worse for energy security, not better.

The proposed rule also gets energy security costs backwards—electric vehicles are worse for energy security, not better. See Table 6, 88 Fed. Reg. 29,200.18 In the present day, China dominates critical mineral supply chains. China controls nearly two-thirds of all lithium, four-fifths of the refined cobalt market, and nearly all processed natural graphite. The United States has nearly no control of critical mineral supply chains and produces less than a tenth of the world's battery cells, while China is the world's leading producer. China controls much of the extraction of these materials and has 90 percent of the world's rare earth element processing capacity, cornering the market for the core minerals of electric car batteries, and dominating battery and renewable supply chains. See C. Boyden Gray, American Energy, Chinese Ambition, and Climate Realism, 5 American Affairs Journal (Winter 2021), https://americanaffairsjournal.org/2021/11/american-energy-chinese-ambition-and- climate-realism/. EPA acknowledges that there are very few domestic battery manufacturing plants, but assumes, without justification, that American manufacturers will increase production to a point sufficient to eliminate the energy security costs flowing from this massive transition. [EPA-HQ-OAR-2022-0829-0712, pp. 35-36]

18 This also ignores that the United States is a net exporter of oil. "The United States is the largest producer of oil, responsible for nearly a fifth of the world's oil production. Thanks to the hydraulic fracturing revolution, the United States is a net exporter of oil. China, on the other hand, is the world's largest net importer of oil. China has few oil reserves, and its dwindling domestic supplies come from legacy fields

that require expensive enhanced-recovery methods. China's demand for oil is also rapidly increasing. This explains China's long-term bet on powering transportation with electricity: China can use its abundant coal reserves, hydropower, and growing nuclear capabilities to power battery-electric cars, vans, and trucks." C. Boyden Gray, American Energy, Chinese Ambition, and Climate Realism, 5 American Affairs Journal (Winter 2021), https://americanaffairsjour- nal.org/2021/11/american-energy-chinese-ambition-and-climate-realism/. "First, policies that restrict the domestic supply of oil and gas and mandate renewable and electric car deployment will reduce U.S. geopolitical power. The United States is the world's largest producer of oil and gas. It is a net loser from unilateral restrictions on domestic hydro-carbons, while Russia, Saudi Arabia, and Iran have the most to gain, as a decline in U.S. supply increases their power to set cartel prices. China, on the other hand, is the largest net importer of oil and gas, but the dominant producer of 'green' substitutes like solar panels, battery cells, and critical minerals. 'Greening' the U.S. economy at the scale envisioned by the Biden administration would damage U.S. growth while jeopardizing U.S. national security and even global stability. It would empower antagonistic regimes like Russia, Saudi Arabia, and Iran, while reducing U.S. leverage with China." Id.

Organization: Countymark

In April 2023, the Environmental Protection Agency (EPA) proposed new emissions standards for passenger vehicles and trucks that are significantly more stringent than previous rules. The new proposed standards would require automakers to meet a tailpipe emissions average of 82 grams of CO2/mile across a company's production by model year (MY) 2032. Your agency estimated this new regulation would result in electric vehicles (EVs) accounting for 67 percent of recent light-duty vehicle sales and 46 percent of new medium-duty vehicle sales in less than ten years. Countrymark believes that this proposal significantly increases costs for American families, undermines American energy security, and falls short of estimated environmental benefits. [EPA-HQ-OAR-2022-0829-0665, p. 1]

Mandating the US's adoption of electric vehicles (EVs) has geopolitical implications that make the country more reliant on its competitors. The US achieved historic levels of energy security by becoming a net exporter of petroleum and products in 2020. However, forcing EV adoption would reduce reliance on American petroleum and increase dependence on batteries, primarily produced in China, which controls 90% of battery anode production. The US is a global leader in exporting refined petroleum products, and its refineries heavily rely on American-sourced crude oil. Implementing a policy that promotes EVs would exclude affordable vehicles running on US-made liquid fuels, leading to the offshore relocation of millions of jobs supported by the petroleum industry. Furthermore, America's geopolitical rivals, particularly China, dominate the supply chain for crucial minerals used in EVs. China controls Africa's major lithium mining projects and 80% of refining operations. Within two years, they are expected to control half of the world's cobalt production. In summary, mandating EV adoption in the US would increase reliance on competitors for battery production, disqualify vehicles running on US-made liquid fuels, and place the supply chain for essential EV minerals under the control of geopolitical rivals like China. [EPA-HQ-OAR-2022-0829-0665, p. 2]

Organization: Dana Incorporated

Dana also proposes that EPA expand its consideration of sourcing issues related to ePropulsion systems in assessing the cost, environmental impact, and feasibility of the proposed rules. Much of the analysis in the NPRM focuses on sourcing of batteries and battery materials, which has also been the focus of federal incentives. During the ZEV transition period, however, sustainable sourcing of magnets, copper, aluminum, and electrical steel materials and local processing for ePropulsion systems will be a major challenge for automakers and component suppliers. [EPA-HQ-OAR-2022-0829-0538, pp. 2-3]

Studies by the U.S. International Trade Commission and other groups have highlighted U.S. dependence on imports of NdFeB magnets and rare earths, for example, and a S&P Global study found that demand for copper will strain global supplies due to efforts to achieve net-zero carbon emissions. A group of nine large trade associations recently wrote to President Biden expressing concern about maintaining a sustainable supply of electrical steel in light of rising demand. [EPA-HQ-OAR-2022-0829-0538, pp. 2-3]

These trends will prove a major challenge, at least during the early years of the ZEV transition. Dana proposes that EPA consider ways to incentivize the use of sustainable sources of such key materials and local processing for ePropulsion systems, similar to battery incentives available during the transition period. [EPA-HQ-OAR-2022-0829-0538, pp. 2-3]

Organization: Darius, Matthew DiPaulo

The EPA's proposal boosts an electric vehicle supply chain dominated by China, which powers its manufacturing-base through coal-fired power plants and mines minerals for EV batteries with the use of environmental practices that we would never approve of in the United States. Emissions coming out of tailpipe matter, but so do the lifecycle emissions of building a car, constructing and charging a battery, and retiring vehicles. [EPA-HQ-OAR-2022-0829-0519, p. 1]

Organization: Delek US Holdings, Inc.

Most illustrative of the future foreign reliance resulting from EPA's Proposed Rule is the lithium-ion battery supply chain controlled nearly entirely by China. China controls each step of battery production and, by 2030, is anticipated to "make more than twice as many batteries as every other county combined."13 This is because China controls 41% of the world's cobalt, 28% of the world's lithium, and 78% of the world's graphite; China also refines 95% of manganese, 74% of cobalt, 70% of graphite, 67% of lithium, and 63% of nickel.14 And even if the U.S. had sufficient resources to extract and refine independent of foreign sources, a refinery takes two to five years just to build—not accounting for the time necessary for permitting, construction, and operations, including waste disposal.15 Beyond the raw materials, China also makes the battery components—73% of NMC cathodes and 99% of LFP cathodes—compared to 1% made domestically.16 Indeed, "[e]xperts say it is next to impossible for any other country to become self-reliant in the battery supply chain, no matter if it has cheaper labor or finds other global partners. Companies anywhere in the world will look to form partnerships with Chinese manufacturers to enter or expand in the industry."17 EPA's reliance on federal funding and tax incentives—such as those under the BIL and IRA—to conclude a domestic supply chain is forthcoming is, therefore, misplaced. Regardless of these funding sources, domestic manufacturing alone is unable to meet the production goals EPA is requiring. [EPA-HQ-OAR-2022-0829-0527, p. 4]

13 Agnes Chang and Keith Bradsher, NY TIMES, "Can the World Make an Electric Car Battery Without China?" (May 17, 2023), available at https://www.nytimes.com/interactive/2023/05/16/business/china-ev-battery.html.

14 Id.

15 Id.

16 Id.

17 Id.

Although EPA has acknowledged that a "transition period must take place in which a robust supply chain develops to support production of [critical minerals]," the limited time afforded under the Proposed Rule is simply insufficient to build this supply chain.18 [EPA-HQ-OAR-2022-0829-0527, p. 4]

18 Proposed Rule at 29,313.

And as discussed above, EPA hardly pays any mind to the volatile pricing of critical minerals and how that can greatly affect battery costs. The price of lithium, for example, has consistently risen in recent years. Between January 2021 and March 2022, the cost of lithium increased by 738% and continues to rise today.36 Despite these very public findings, EPA asserts that these costs are an uncertainty and that EPA plans to "continue updating [its] estimates of battery cost for current and future years."37 Rather, future lithium-ion battery production will be heavily subsidized if the BIL and IRA remain in place, which likely serves as an impediment to actually reducing the cost of the battery. [EPA-HQ-OAR-2022-0829-0527, pp. 7-8]

36 See CANADA ENERGY REGULATOR, Market Snapshot: Critical Minerals are Key to the Global Transition (Jan. 18, 2023), available here. (Link: https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2023/market-snapshot-critical-minerals-key-global-energy-transition.html)

37 Proposed Rule at 29,301 (recognizing the "global average price for lithium-ion battery packs (volume-weighted across the passenger, commercial, bus, and stationary markets) climbed by about 7 percent in 2022"). Notably, this is in contrast to EPA's conclusion just a few weeks prior. Proposed Rule at 25,930 ("the cost to manufacture lithium-ion batteries (the single most expensive component of a BEV) has dropped significantly in the past eight years, and that cost is projected to continue to fall during this decade, all while the performance of the batteries (in terms of energy density) improves.").

Organization: Departments of Transportation of Idaho, Montana, North Dakota, South Dakota and Wyoming

Another issue is the dependence of EVs and their batteries on rare earth and other minerals that are largely sourced from and processed in China and other overseas locations. It raises implications for economic security and national security when a sector as important as car, truck and battery manufacturing becomes more dependent on foreign suppliers. [EPA-HQ-OAR-2022-0829-0525, p. 2]

Organization: Electric Drive Transportation Association (EDTA)

Across the private sector, vehicle manufacturers, materials and components suppliers, utilities, charging companies and other organizations are making investments in the EV supply chain that parallel these critical essential policy drivers. [EPA-HQ-OAR-2022-0829-0589, p. 1]

In the United States, the EV ecosystem is growing. 3.8 million plug-in electric vehicles have been sold since 2010. There are 87 plug-in electric models available today – and automakers have announced an additional 58 models to be rolled out by 2027. [EPA-HQ-OAR-2022-0829-0589, p. 1]

The U.S. supply chain is expanding too. According to a study conducted by Atlas Public Policy, more than $210 billion in EV manufacturing and battery investment has been announced in the U.S. since 2021. [EPA-HQ-OAR-2022-0829-0589, p. 2]

This rapid growth is speeding the transition to e-mobility but there is much public and private sector work to do to achieve a fully built-out system, as envisioned by the proposed rule. As the EPA develops a regulatory framework for 2027 -2032, it is important that the final rule recognizes these remaining policy and market variables. [EPA-HQ-OAR-2022-0829-0589, p. 2]

The electric drive industry is working rapidly to build a diverse and increasingly domestic value chain and grow the consumer base with expanding product offerings. This year, manufacturers are making investments in products and commitments to suppliers for 2027 vehicles. However, the eligibility of the vehicles for federal tax incentives is contingent on future determinations of eligible trade partners and disqualifying content. Meanwhile, a global race to secure materials creates pricing volatility throughout the supply chain. [EPA-HQ-OAR-2022-0829-0589, p. 2]

Organization: Elizabeth Boynton

Also, the EPA is to be concerned about the environment as a whole, not just the air quality. As that is the case, EPA needs to realize that encouraging the manufacture, purchase and use of EVs is not actually that great for the environment. You’re just cleaning the air from gas exhaust pollution by encouraging environmental destruction in the mining of rare earth minerals and creation of electricity to charge the EV batteries. [EPA-HQ-OAR-2022-0829-0568, p. 1]

And finally, one of the very biggest concerns about this is China. It is extremely short sighted and irresponsible to make this proposed rule without seriously considering and discussing China’s choke hold on the US, and indeed the world, over the rare earth minerals that are required to make EV batteries, the increased US demand of which is the logical conclusion of this proposed rule. According to a January 18, 2023 Elements article entitled “Visualizing China’s Dominance in Battery Manufacturing (2022-2027P)”, “Regardless of the growth in North America and Europe, China’s dominance is unmatched. Battery manufacturing is just one piece of the puzzle, albeit a major one. Most of the parts and metals that make up a battery—like battery-grade lithium, electrolytes, separators, cathodes, and anodes—are primarily made in China.” This same article projects a 10-fold increase in battery production in the US, but even so, China is still projected to make 69% of the world’s EV batteries in 2027. The ONLY rare earth minerals mine in the US still sells its concentrate to China for refining into usable materials. (December 14, 2022 Politico article, “China Dominates the Rare Earths Market. This U.S. Mine Is Trying to Change That”) [EPA-HQ-OAR-2022-0829-0568, pp. 1-3]

As the US industry struggles to try to catch up and provide a viable US-based rare earth minerals refining structure for our already great demand, including alloys used in our fighter jets and missiles not to mention phones and other electronics, why accelerate the burden now and further overwhelm them unnecessarily by artificially increasing demand for EVs and their batteries? [EPA-HQ-OAR-2022-0829-0568, pp. 1-3]

And, in the process, make us even more reliant on a country that just a year ago, Army Lt. Gen. Scott D. Berrier testified before the Senate Armed Services Committee remains a pacing threat and a major security challenge to the United States and its allies (US Department of Defense, Top Intelligence Chiefs Testify on Global Threats, May 10, 2022). [EPA-HQ-OAR-2022-0829-0568, pp. 1-3]

Indeed, China has proven itself to have no qualms using its rare earth minerals advantage against us. The most recent example I found was a Wall Street Journal article on July 3, 2023 titled “China Restricts Exports of Two Minerals Used in High-Performance Chips. Industry executives see export ban on gallium and germanium as retaliation over chip curbs by U.S. and others” From another Wall Street Journal article on June 22, 2023, “…It [China] accounts for 66% of lithium-ion cells, used in electric-vehicle batteries.” The article recounts how China has been aggressive with other countries as well, “Indeed, Beijing once blocked Japan’s access to rare earth elements during a 2010 dispute over Tokyo’s detention of a Chinese fishing trawler captain. Then in 2019, China threatened to include certain products using rare earths in Beijing’s technology-export restrictions, a response to the Trump administration’s pressure on telecom giant Huawei.” [EPA-HQ-OAR-2022-0829-0568, pp. 1-3]

And it isn’t just the supply of rare earth minerals they exploit to injure us with. In a March 9, 2020 Washington Examiner article, at the beginning of the Covid outbreak, “[Marco Rubio] said that the Chinese Communist Party published a thinly veiled threat in its newspaper to cut off the U.S. from many drugs needed by Americans in response to criticisms about China’s handling of the coronavirus. Rubio explained that many generic drugs the public depends on are produced in China.” This was also covered in a March 13, 2020 UK Independent story. [EPA-HQ-OAR-2022-0829-0568, pp. 1-3]

Additionally, in the Politico article cited above, Defense Secretary Lloyd Austin is quoted as saying that summer, “We’ve seen an alarming increase in the number of unsafe aerial intercepts and confrontations at sea by PLA aircraft and vessels. This should worry us all.” [EPA-HQ-OAR-2022-0829-0568, pp. 1-3]

I vehemently oppose this rule for all of the above reasons, but most strenuously because by so shackling the gas-powered vehicle industry, this proposed rule will ultimately make us more reliant on a country that is antagonistic to the US in so many ways by leaving Americans with few vehicle options but EVs. Granted, the US infrastructure for obtaining and refining rare earth minerals has begun, but it is just starting. This proposed rule recklessly runs ahead of industry and American demand of EVs, proceeding to the detriment and endangerment of US security, economic stability, and the welfare of millions of working class and financially struggling American citizens. [EPA-HQ-OAR-2022-0829-0711, p. 4]

Organization: Environmental. and Public Health Organizations

XVIII. EPA Appropriately Concludes that Critical Minerals and the Battery Supply Chain Will Be Sufficient for the Levels of BEVs Projected in the Proposal, and More Reasonable Battery-Related Modeling Assumptions Would Demonstrate the Feasibility of Even Higher Levels of BEVs. [EPA-HQ-OAR-2022-0829-0759, p. 131]

In this section, we explore how critical mineral and battery supply chain issues should not act as constraints on strong final standards, including Alternative 1 with a steeper increase in stringency after 2030. As EPA's analysis demonstrates, there will be sufficient materials and battery supply chain production to electrify light- and medium-duty vehicles consistent with the levels EPA projects for the Proposal, and for more stringent alternatives. In this section, we provide additional analysis that supports this conclusion. [EPA-HQ-OAR-2022-0829-0759, p. 131]

In addition, alternative battery-related modeling inputs would increase the feasibility and benefits of PEVs. Below, we highlight modeling inputs that we believe led EPA to overestimate battery capacity requirements for electric vehicles. We provide support for alternative input values including new technologies, specific energy, and battery design, all of which will have direct implications for cost modeling and mineral demand (underscoring EPA's conclusion that there is sufficient mineral supply to meet electric vehicle demand). [EPA-HQ-OAR-2022-0829-0759, p. 131]

As EPA notes, "with any emerging technology, a transition period must take place in which a robust supply chain develops to support production." 88 Fed. Reg. at 29313. Indeed, this is not the first time that the automotive industry has confronted critical mineral supply chain issues, and the industry has proven that it can rise to such challenges. For example, metal supply chain concerns arose during the move toward catalytic converters, and equipping all new vehicles with catalytic converters was seen at the time as a challenging "awesome prospect."356 At the time, "[c]atalyst companies were concerned about their ability to obtain adequate supplies of noble metals if they would be used extensively in automotive catalytic converters."357 Contemporaneous considerations of the "primary technical barriers" to catalytic converter adoption included "reducing the amount of precious metals used in each converter to a point where aggregate demand can be supplied without exhausting world reserves in the near future."358 The only significant reserves of the necessary platinum group metals were located in the Republic of South Africa and the former USSR, "neither of which [could] be considered secure sources of supply."359 Despite these concerns—which sound very similar to some of the rhetoric surrounding the battery minerals conversation—the automotive industry succeeded in incorporating catalytic converters in all U.S. vehicles. As detailed below, the industry can rise to the challenge again today. [EPA-HQ-OAR-2022-0829-0759, pp. 131-132]

356 J.R. Mondt, Cleaner Cars: The History and Technology of Emission Control Since the 1960s, at 105 (2000). See also EPA, Tier 2 Report to Congress, at E-13 to E-15 (1998), https://nepis.epa.gov/Exe/ZyPDF.cgi/940054QY.PDF?Dockey=940054QY.PDF (noting that in the late 1990s there were concerns regarding increasing concentrations of palladium in automotive catalyst applications, and resulting future supply and price concerns).

357 Mondt, at 99.

358 Daniel Dexter, Case Study of the Innovation Process Characterizing the Development of the Three-Way Catalytic Converter System, at S-3 to S-4 (1979) https://rosap.ntl.bts.gov/view/dot/10766.

359 Id. at S-4, 20.

A. There will be enough materials and battery supply chain production to electrify transportation.

We agree with EPA's conclusion that vehicle electrification, including the electrification of the heavy-, medium-, and light-duty fleets, will not lead to energy security risks but will instead provide the potential for a low-impact and domestic energy supply.360 This section provides comments on the assessment of battery critical materials and battery production. [EPA-HQ-OAR-2022-0829-0759, p. 132]

360 88 Fed. Reg. at 29313.

The lithium-ion batteries used to power PEVs include the following materials deemed critical by the United States Geological Survey: lithium, nickel, manganese, cobalt, graphite, and aluminum.361 Of these materials, lithium is the only one that does not have a substitute currently on the market. Nickel and cobalt are in the cathodes nickel-manganese-cobalt (NMC) and nickel-cobalt-aluminum (NCA). These are not the constraining materials because they are now substituted in a growing portion of PEVs with the lithium-iron-phosphate (LFP) cathode.362 Graphite can also be substituted; synthetic graphite is a direct substitution for mined graphite,363 and research has also demonstrated the use of silicon mixed with or to replace graphite as the anode.364 [EPA-HQ-OAR-2022-0829-0759, p. 132]

361 U.S. Geological Survey, United States Geological Survey Releases List of 2022 Critical Minerals (2022), https://www.usgs.gov/news/national-news-release/us-geological-survey-releases-2022-list-critical-minerals.

362 International Energy Agency, Global EV Outlook 2023 at 11 (2023), https://www.iea.org/reports/global-ev-outlook-2023/trends-in-batteries.

363 Jinrui Zhang, Chao Liang, and Jennifer B. Dunn, Graphite Flows in the U.S.: Insights into a Key Ingredient of Energy Transition, See 3402–3414, Environ. Sci. and Tech. (2023), https://pubs.acs.org/doi/10.1021/acs.est.2c08655.

364 Xiuxia Zuo, Jin Zhu, Peter Müller-Buschbaum, Ya-Jun Cheng, Silicon based lithium-ion battery anodes: A chronicle perspective review, See 2211–2855, Nano Energy, (2017), http://dx.doi.org/10.1016/j.nanoen.2016.11.013.

Lithium is vital to manufacturing lithium-ion batteries, which are currently the only type of PEV battery used in all PEVs purchased in the U.S. Therefore, the analysis correctly points to lithium as the constraining material for lithium-ion batteries. Yet, this is a slightly conservative estimation for future constraints because alternative battery types are beginning to be marketed globally. For example, sodium-ion batteries have recently been recognized as a potential lithium-ion battery substitute365 as Chinese automakers unveil their new technology.366 This type of innovation is likely to reduce lithium demand globally and is further discussed in the next section. [EPA-HQ-OAR-2022-0829-0759, p. 132]

365 Petrova, Here’s why sodium-ion batteries are shaping up to be a big technology breakthrough (2023), https://www.cnbc.com/2023/05/10/sodium-ion-batteries-shaping-up-to-be-big-technology-breakthrough.html.

366 Jiri Opletal, CATL’s sodium-ion batteries will debut in Chery Auto EVs, Car News China (2023), https://carnewschina.com/2023/04/16/catls-sodium-ion-batteries-will-debut-in-chery-auto-evs/.

Furthermore, we know that advocating for increased deployment of ZEVs within the light- and medium-duty fleet, which is an essential step to reducing fossil fuel emissions and addressing the climate crisis, will potentially include mining projects that impact environmental justice communities and, in particular, indigenous communities. PEVs also eliminate tailpipe emissions of harmful air pollutants that cause asthma and respiratory diseases, especially among Black, Indigenous, and other communities of color. However, without adequate protections for workers, communities, and environments near mining and processing sites, we risk replicating the harms of fossil fuel extraction. Besides the details below that discuss opportunities for PEV batteries that will not rely on lithium, there are measures that EPA can and should take to address the potential mining impacts. For example, EPA and the Administration can take action to build a robust circular economy to reduce the need for virgin material extraction and increase the supply of more responsibly sourced materials. [EPA-HQ-OAR-2022-0829-0759, p. 133]

EPA points to findings by several sources that concur with its assessment that material and production will be sufficient to meet electric vehicle uptake in the LDV, MDV, and HDV sectors. See 88 Fed. Reg. at 29312-23; DRIA Chs. 3.1.3.2., 3.1.3.3. Increased demand for minerals, as well as government investments, will continue to spur these developments. The 2023 BNEF Electric Vehicle Outlook demonstrates these effects on the continued expansion of the supply chain.367 In addition, academic sources have demonstrated that there are enough reserves and recycled content such that demand for lithium will barely exceed a quarter of the available reserve by 2050 and about half by 2100.368 [EPA-HQ-OAR-2022-0829-0759, p. 133]

367 Bloomberg New Energy Finance, Electric Vehicle Outlook 2023 (2023), https://about.bnef.com/electric-vehicle-outlook/#download.

368 Klimenko, Ratner, & Tereshin, Constraints imposed by key-material resources on renewable energy development, Renewable and Sustainable Energy Reviews, 2021, 144, 111011, 1364-0321. https://www.sciencedirect.com/science/article/pii/S1364032121003014.

1. Federal investments have spurred private investments in domestic supply.

Actions taken by the federal government have increased private investment in U.S. battery production. The impact of the BIL and the IRA on U.S.-based PEV manufacturing, repurposing, and recycling growth demonstrates the influence U.S. policy has on rapidly growing a domestically-produced supply. Within six months of the IRA’s passage, automakers and battery manufacturers had announced a total of roughly $52 billion of planned investment in North America’s PEV supply chain, with over 70% of those investments going toward battery supply chains and recycling.369 [EPA-HQ-OAR-2022-0829-0759, p. 133]

369 Cory Cantor, US Climate Law Fuels $52 Billion in New EV Investments, p 1, BloombergNEF, Mar. 13, 2023. Subscription required.

2. Recycled content can provide additional domestic mineral supply.

The current oil-dependent transportation system not only impacts the climate and the health of the U.S. population, it also requires continual drilling, production, and importing of fuel. This is in stark contrast to the use of materials needed for electrified transportation, which can be continually recycled to produce the next generation of more efficient vehicles. This results in the continued growth of U.S. material stock even when initially relying on imported minerals. As the Proposal states, in 2050, 25 to 50% of lithium demand from electric vehicles can be met with recycled content. 88 Fed. Reg. at 29323-24.370 Recycled content availability has been highly studied and documented in academic studies beyond the two listed in the Proposal (Sun et al., 2022; Ziemann et al., 2018), including in findings by Xu et al.371 and Dunn et al.372 Xu et al. demonstrates that the material demand that could be met by retiring and recycled supply is highly impacted by innovation and advancing energy density. As batteries become more advanced and energy-dense, either through innovation of chemistries used (e.g., the progress made in NMC) or through different chemistries (e.g., lithium-sulfur or lithium-air batteries), the mineral demand decreases to meet the same energy storage needs. This means that a high percentage of material demand can be met with the retiring supply of less material-efficient and lower density batteries. This is demonstrated in Figure XVIII.A-1 below; the more energy dense batteries (Li-S/Air) have higher recycled content for lithium, cobalt, and nickel in 2040-2050 (green bar).373 [EPA-HQ-OAR-2022-0829-0759, pp. 133-134]

370 The Proposal cites Sun et al., Surging lithium price will not impede the electric vehicle boom, Joule, doi:10.1016/j.joule.2022.06.028, https://dx.doi.org/10.1016/j.joule.2022.06.028, and. Ziemann et al., Modeling the potential impact of lithium recycling from EV batteries on lithium demand: a dynamic MFA approach, Resour.Conserv. Recycl. 133, 76–85. https://doi.org/10.1016/j.resconrec.

371 Xu, C., Dai, Q., Gaines, L. et al. Future material demand for automotive lithium-based batteries, Commun Materials, 2020, 1, 99, 5–8, https://doi.org/10.1038/s43246-020-00095-x [hereinafter Xu, Future material demand].

372 Jessica Dunn, Margaret Slattery, Alissa Kendall, Hanjiro Ambrose, and Shuhan Shen, Circularity of Lithium-Ion Battery Materials in Electric Vehicles, Environmental Science & Technology, 2021, 55, 5189–5198. DOI: 10.1021/acs.est.0c07030 [hereinafter Dunn, Circulatity].

373 Xu, Future material demand at 6.

Figure XVIII.A-1: Closed-loop recycling potential of battery materials in a STEP scenario.

[See original comment for Figure XVII.A-1]. [EPA-HQ-OAR-2022-0829-0759, p. 135]

(Source: Xu et al.)

Dunn et al.374 demonstrate that the choice of cathode materials can also highly increase potential circularity. Figure XVIII.A-2 below shows that a future with high lithium-iron-phosphate (LFP) market concentration, labeled as C6 in the legend, can significantly increase the amount of lithium, cobalt, manganese, and nickel demand met with recycled content, compared to a business-as-usual cathode market share, labeled as C1 in the legend. [EPA-HQ-OAR-2022-0829-0759, p. 135]

374 Dunn, Circulatity at 5194.

Figure XVIII.A-2: Circularity potential of materials as additional years are added to battery lifespan.

[See original attachment for Figure XVIII.A-2]. [EPA-HQ-OAR-2022-0829-0759, p. 136]

Source: Dunn et al.

The recycled content also varies based on the collection rate and the material recovery rate. There is potential for high material recovery due to the 95% recovery rate of lithium, nickel, cobalt, and manganese by commercial-scale hydrometallurgical recyclers in the U.S., such as Lithion, Redwood Materials, Licycle, and Cirba Solutions. In addition, direct cathode recycling, which can recover a cathode without breaking it down into separate materials, is under development by several startups as well as the National Lab research group, ReCell. As shown in Table XVIII.A-1 below, direct recycling currently has a recovery rate of 40% for lithium. But increasing the lithium recovery rate is a priority area for ongoing research.375 The Argonne National Laboratory model, BattPac, lists the following recovery rates shown in Table XVIII.A-1.376 [EPA-HQ-OAR-2022-0829-0759, p. 136]

375 See generally Kendall, A., Slattery, M., Dunn, J., Lithium-ion car battery recycling advisory group report, (Mar. 16, 2022), https://calepa.ca.gov/lithium-ion-car-battery-recycling-advisory-group/.

376 Argonne National Laboratory, "BatPaC: battery manufacturing cost estimation," (2022). https://www.anl.gov/partnerships/batpac-battery-manufacturing-cost-estimation.

Table XVIII.A-1: Recovery rates of battery materials from different recycling processes.

[See original attachment for Table XVIII.A-1].

Source: Argonne National Lab BatPac

Recycling facilities are also operational and under development in the United States.

Table XVIII.A-2 from Atlas Public Policy attempts to capture all these developments.377

[See original attachment for Table XVIII.A-2]. [EPA-HQ-OAR-2022-0829-0759, p. 137]

377 Atlas Public Policy, The EV Transition: Key Market and Supply Chain Enablers, at 42 (Nov. 2022). https://atlaspolicy.com/the-ev-transition-key-market-and-supply-chain-enablers/.

XVIII.A-2: EV battery recycling facilities in the U.S.

[See original attachment for XVIII.A-2].

Source: T. Taylor and N. Gabriel for Atlas Public Policy

SEE ORIGINAL COMMENT FOR TABLE XVIII.A-2: EV battery recycling facilities in the U.S.

Source: T. Taylor and N. Gabriel for Atlas Public Policy[EPA-HQ-OAR-2022-0829-0759, p. 138]

3. EPA appropriately concludes that there will be sufficient lithium for the Proposed Standards, and supporting analysis also indicates likelihood of IRA-qualifying sources.

As discussed above, the current primary constraining material for PEVs is lithium. EPA points to a variety of sources to support its assumptions regarding lithium availability for U.S. PEV demand. See 88 Fed. Reg. at 29312-23; DRIA Chs. 3.1.3.2, 3.1.3.3. [EPA-HQ-OAR-2022-0829-0759, p. 139]

Recent analysis by Benchmark Mineral Intelligence (BMI) on future lithium supply supports EPA's findings.378 BMI compiled a list of all currently known lithium mining projects, including those already in operation as well as those in development, totaling 330 projects globally as of December 2022. Of those, 153 are already producing lithium or have public, identified supply projections. BMI took those supply projections and assigned them probabilities—e.g., currently producing mines were weighted at 100%, while projects that have secured a significant proportion of their funding and completed certain feasibility milestones necessary for production within the next 5 years were considered "probable" and weighted at 50%. Supply from the other 177 lithium mining projects (which do not yet have supply projections) were all counted as 0. [EPA-HQ-OAR-2022-0829-0759, p. 139]

378 BMI, Lithium Mining Projects – Supply Projections, June 2023 (slide deck); BMI, Lithium Mine Projects (06.30.2023) (Excel spreadsheet), both attached to this comment letter.

BMI then compared these projections to the projected lithium demand through 2032, using forecast global demand (including for non-battery applications), as well as demand based on EPA's proposed light-, medium-, and heavy-duty vehicle emission standards. Based just on the

153 included projects, BMI's weighted projections show sufficient lithium for the EPA's Proposed Standards (on top of forecast demand for the rest of the world) through 2028 as shown below in Figure XVIII.A-3. When the 18 U.S. projects with supply projections (out of 48 total U.S. projects) are weighted at 100%, lithium supply is sufficient for the Proposed Standards through 2030. And when the 153 included projects are weighted at 100%, global supply greatly exceeds demand through 2032. [EPA-HQ-OAR-2022-0829-0759, p. 139]

SEE ORIGINAL COMMENT FOR Figure XVIII.A-3: Global Lithium Supply Based with U.S. and Global Demand [EPA-HQ-OAR-2022-0829-0759, p. 140]

Given that BMI's projections exclude 177 projects that have been announced but do not yet have supply projections, even a 100% weighting for the 153 projects that are operating or have supply projections is a conservative approach. It does not include any supply growth outside of the 153 projects identified as of December 2022, not even from the other 177 identified projects, despite increasing global demand and strong U.S. tax incentives. Moreover, it would be reasonable and expected that even BMI's supply projections would continue to increase as the identified projects get further along in the development process and market forces continue to act. [EPA-HQ-OAR-2022-0829-0759, p. 140]

In addition, BMI's analysis indicates that there will be sufficient supply for U.S. demand even after considering competing lithium battery demand from China and Europe and global non-lithium battery demand as shown below in Figure XVIII.A-4. [EPA-HQ-OAR-2022-0829-0759, p. 140]

SEE ORIGINAL COMMENT FOR Figure XVIII.A-4: Remaining Global Lithium Supply with U.S. Demand [EPA-HQ-OAR-2022-0829-0759, p. 141]

BMI also broke down the supply from the 153 included projects by country, and then grouped those countries into categories based on U.S. trade-agreement status, consistent with the terms in the IRA. This projection shown in Figure XVIII.A-5 below makes clear that there is ample lithium supply from sources that satisfy the IRA § 30D Clean Vehicles Tax Credit requirements—specifically, domestic sources, as well as countries that have free trade agreements with the U.S. ("FTA countries"). This supports EPA's modeling assumption of an average tax credit of $6,000 per electric vehicle (out of a maximum allowable credit of $7,500), as lithium from these sources would qualify a vehicle for the tax credit, provided other conditions are met (e.g., vehicle assembly in North America, purchaser income limits). [EPA-HQ-OAR-2022-0829-0759, p. 141]

SEE ORIGINAL COMMENT FOR Figure XVIII.A-5: U.S. Lithium Supply and Free Trade Agreement Country Supply with U.S. Demand [EPA-HQ-OAR-2022-0829-0759, p. 142]

Slides of BMI's analysis, as well as their full list of lithium supply projects, are attached to these comments. [EPA-HQ-OAR-2022-0829-0759, p. 142]

Finally, as has been noted elsewhere in these comments, there are alternative battery chemistries that do not use lithium (including sodium-ion batteries), and thus may end up lowering lithium demand in the future. In addition, in light of the points made in Section XVIII.B, below, we believe EPA's analysis of future lithium demand—and thus future lithium supply sufficiency—is conservative. [EPA-HQ-OAR-2022-0829-0759, p. 142]

Minerals are “an input to the construction” of vehicles and their infrastructure rather than “a fuel that is combusted on an ongoing basis,” meaning that “the near term risk is not one of ‘traditional’ energy security (short-term supply constraints or high prices).”659 Critical minerals do not pose energy security concerns because, “unlike reliance on oil (where the resource is consumed with each trip) EVs consume locally produced electricity with each trip and additional lithium is only required when the battery is replaced or a new vehicle is purchased.”660 An event squeezing or shutting off the supply of oil would have “an almost immediate deleterious effect on transportation,” but a squeeze in critical mineral supply would allow “batteries in existence [to] continue to function,” and “there [would] not be a fundamental disruption of the transportation sector.”661 Increases in oil prices and decreases in supply impact all drivers, and easing this dependence through electrification would shield drivers from daily price volatility. Moreover, whereas “fuel is burnt once,” EV battery materials “can be reused and recovered in a circular loop to produce new batteries.”662 Recyclers such as Redwood Materials and Li-Cycle can recover up to 95% of the minerals from old batteries at commercial scale today.663 [EPA-HQ-OAR-2022-0829-0759, p. 200]

659 Sara Hastings-Simon & Morgan Bazilian, Critical Minerals Don’t Burn Up – Why the Energy Security Playbook Needs a Re-Write, Global Policy (July 23, 2020), https://www.globalpolicyjournal.com/blog/23/07/2020/critical-minerals-dont-burn-why-energy-security-playbook-needs-re-write.

660 Fred Stein, Ending America’s Energy Insecurity: Why Electric Vehicles Should Drive the United States to Energy Independence, 9 Homeland Security Affairs (Feb. 2013), https://www.hsaj.org/articles/236.

661 Id.

662 Transport & Environment, From Dirty Oil to Clean Batteries 6–7, 41 (2021), https://www.transportenvironment.org/wp-content/uploads/2021/07/2021_02_Battery_raw_materials_report_final.p df.

663 Redwood Materials, Recycling, Refining, and Remanufacturing Battery Materials for a Clean Energy Future, Redwood Materials, https://www.redwoodmaterials.com/solutions/. Li-Cycle, Full-Service Solution for Recycling Lithium-ion Batteries, https://li-cycle.com/services/#closed-loop-battery-resource-recovery.

Finally, combustion vehicles will remain in production and operation for many years, diversifying the one-time and ongoing inputs needed for vehicles and allowing the U.S. battery supply chain time to stabilize through increased domestic mining and production, advances in battery design and recycling, and cooperation with allies over the next decade. [EPA-HQ-OAR-2022-0829-0759, p. 200]

XVIII. EPA Appropriately Concludes that Critical Minerals and the Battery Supply Chain Will Be Sufficient for the Levels of BEVs Projected in the Proposal, and More Reasonable Battery-Related Modeling Assumptions Would Demonstrate the Feasibility of Even Higher Levels of BEVs. [EPA-HQ-OAR-2022-0829-0759, p. 200]

Organization: Environmental Defense Fund (EDF) (1of 2)

Vehicle Manufacturer EV Commitments

Many vehicle manufacturers have made commitments to transition a significant portion of their sales to ZEVs. While many of the commitments are for a share of manufacturers’ global sales, several OEMs have made U.S. specific commitments or have committed to transition their entire fleet which would mean all of their U.S. sales would be ZEV as well. Even for global commitments, manufacturers with significant U.S. sales volumes will nonetheless need to sell meaningful ZEVs to meet their commitments. Because some sales might exceed these global commitments while others fall short, we used global commitments as a reasonable proxy for U.S. sales share. Table 4 below shows OEM commitments and includes a total using 2022 manufacturer sales shares to calculate a weighted ZEV commitment. [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

[See original attachment for Table 4: Manufacturer ZEV Commitments as Share of Total Sales] [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

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80 Luke Wilkinson, Volkswagen 'New Auto' Strategy Predicts Near 100 percent EV Sales by 2040, (July 15, 2021), https://www.carscoops.com/2023/03/bmw-expects-to-smash-50-ev-sales-goal-before-own-2030-deadline/.

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88 Reuters, Nissan Raises Global EV Targets; to Boost U.S. Input (Feb. 27, 2023), https://www.reuters.com/business/autos-transportation/nissan-plans-build-second-us-battery-plant-gupta-says-2023- 02-27/.

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96 Volvo, Volvo Cars to be Fully Electric by 2030, https://www.media.volvocars.com/global/en-gb/media/pressreleases/277409/volvo-cars-to-be-fully-electric-by-2030

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*Due to rounding, the sum of the market share may not equal the total [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

All major OEMs have set ZEV targets of at least 30% sales starting in 2030. Considering both U.S.-specific and global commitments would result in 47% of new vehicles sold in the U.S. in 2030 being ZEVs. Even unrealistically assuming only the US-specific commitments and the 100% commitments apply, at least 29% of LDV sales in 2030 would be ZEVs growing to 44% in 2035 and 48% in 2040. The 2030 value is plotted above in Figure 12. We also note that the 2035 and 2040 estimates using both approaches are perhaps significantly understated given that some manufacturers with commitments in 2030 have not made 2035 or later commitments but will nonetheless likely increase ZEV sales during that timeframe. [EPA-HQ-OAR-2022-0829-0786, pp. 31-34]

EV Manufacturing Investment Announcements

As discussed above, in their March 2023 report, WSP analyzed investment announcements for domestic EV manufacturing. Their analysis found that announced investments amount to the production of 4.4 million EVs per year by 2026 in the U.S.99 This equals roughly a third (31%) of all LDVs sold in the U.S. last year. Vehicle manufacturers have already committed to manufacturing these vehicles and it provides a lower bound for what might be expected as more manufacturers make EV investment announcements, and the industry continues to grow. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

99 U.S. Electric Vehicle Manufacturing Investments and Jobs, Characterizing the Impacts of the Inflation Reduction Act after 6 Months, WSP for EDF, (March 2023). https://blogs.edf.org/climate411/files/2023/03/State-Electric- Vehicle-Policy-Landscape.pdf.

Over the past ten years, between 60% and 70% of the LDVs sold in the U.S. were domestically manufactured with imports accounting for the remaining 30% to 40%.100,101 It is reasonable to expect that not all EVs purchased in the U.S. will be domestically produced. To scale the vehicles, we have assumed that the proportion of EVs within the pool of domestically produced vehicles will be the same as those imported. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

100 Board of Governors of the Federal Reserve System. Industrial Production and Capacity Utilization– G.17 Table 3. Originally from Ward's Communications, Chrysler, and GM. 16 Nov 2022. https://www.federalreserve.gov/releases/g17/current/table3.htm.

101 Bureau of Economic Analysis. Motor Vehicle Unit Retail Sales, Table 6. 2023, https://apps.bea.gov/national/xls/gap_hist.xlsx

If the U.S. imported 35% of its vehicles, the average of the last ten years, the EV manufacturing investments have been made already account for 48% of domestically made vehicles sold in the U.S. If the trend of more domestically produced EVs continues and only 20% of sales are imports, the U.S. produced 4.4 million EVs would result in 39% of LDV sales being EVs. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

For this analysis, we chose an assumption of 80% domestically produced EVs. While this number is higher than the current share of domestic production, it is in line with the recent trend of onshoring EV manufacturing.102 There are significant incentives and funding opportunities to make domestically producing EVs more attractive to manufacturers. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

102 David Gohlke, Zhou, Yan, Wu, Xinyi, and Courtney, Calista. 2022. "Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010 – 2021". United States. https://doi.org/10.2172/1898424. https://www.osti.gov/servlets/purl/1898424. (Attachment Z)

Manufacturers only make announcements for facilities a few years in advance of production. As such, this gives a glimpse into the near future but should the general trend in announcements continue, tremendous growth would be expected for domestic EV manufacturing. To that end, WSP's analysis is current only through March of 2023. Since that time, manufacturers have announced billions of dollars in additional investment and production capacity, which reinforces the likelihood that these trends will continue to grow and accelerate over time. [EPA-HQ-OAR-2022-0829-0786, pp. 34-35]

EV Battery Manufacturing Investment Announcements

WSP also published analysis assessing the annual capacity of lithium-ion batteries that will be produced in the U.S. based on announced investments.103 Their analysis found 37 battery and component manufacturing and recycling announcements totaling nearly $80 billion in investment and over 1,000 GWh/year of capacity by 2027. Such a large investment into the EV battery industry demonstrates a significant shift towards EV adoption and the existing market expectation that EVs will be a dominant powertrain within the decade. [EPA-HQ-OAR-2022-0829-0786, p. 35]

103 U.S. Electric Vehicle Manufacturing Investments and Jobs, Characterizing the Impacts of the Inflation Reduction Act after 6 Months, WSP for EDF, (March 2023). https://blogs.edf.org/climate411/files/2023/03/State-Electric- Vehicle-Policy-Landscape.pdf (Attachment E).

To get a sense of the scale of the battery investments, WSP calculated the number of LD EVs those batteries could support. They assumed an average LDV battery is 89 kWh, which would mean by 2027, the U.S. will be producing enough batteries to supply 84% of all domestic LDV sales if all of these batteries went exclusively to LDVs. However, it is likely there will be other demands for those batteries. The exact split between LD and HD demand for batteries will depend on how fast different vehicle classes electrify and the market demand for battery sizes. EDF used current energy consumption as a proxy for relative demand for batteries between LD and HD vehicles. According to MOVES3, in 2022, LDVs consumed 72% of the on-road energy. To calculate a more conservative value, EDF assumed that only two-thirds of batteries would go to LDVs. In this case, 56% of LDV sales could be outfitted with domestically supplied batteries that manufacturers have already invested in producing by 2027. As with manufacturing investments, additional investments have been made since WSP published its report and accordingly, these investments could only be expected to grow. [EPA-HQ-OAR-2022-0829-0786, p. 35]

Lithium Mining Announcements

Announcements of domestic lithium mines have also increased recently. Using a Benchmark Mineral Intelligence (BMI) database of proposed lithium mines and production amounts by year, EDF assessed how lithium production would translate to vehicles.104 [EPA-HQ-OAR-2022-0829-0786, pp. 36-37]

104 Benchmark Mineral Intelligence, Lithium Mine Projects (06.30.2023) (Excel spreadsheet), attached to comments submitted by Center for Biological Diversity, et al. Mining projects are current as of December 2022.

Forty-eight mines have been announced in the U.S. and are at some stage of development. Though only one is currently in operation, companies have claimed that many will start producing lithium in the next few years. Of the 48 mines, BMI has projections of potential production for 18 mines with 1 mine in operation, 7 “probable” mines and 11 considered “possible” mines.105 To understand anticipated lithium production within the U.S., we used this information from BMI to develop two scenarios. [EPA-HQ-OAR-2022-0829-0786, pp. 36-37]

105 BMI defines a “probable mine” as a project having secured a significant portion of its funding, and completed certain feasibility milestones necessary for production within the next five years. BMI defines a “possible mine” as a project in the early stages of development with only a small portion of financing secured.

Scenario A: Only production from the 18 mines with announced anticipated production were included and they were weighted based on how far along in the development process the mine is consistent with BMI’s weighting system. “Possible” mines were only weighed at 40%, “probable” mines were weighed at 50%, and mines in operation were weighed at 100%. This scenario does not include the other 30 announced mines that BMI identified. This provides a conservative estimate of U.S. lithium production. Under this scenario, domestic lithium production would supply enough material to outfit 25% of annual LDV sales with battery packs in 2035. [EPA-HQ-OAR-2022-0829-0786, pp. 36-37]

Scenario B: Production from the 18 mines described above was included and weighed at 100%. This assumes that all of the 18 mines will reach the projected production on the anticipated timeline but still does not include the other 30 announced mines that are at the beginning stages of production. Since only one-third of the announced lithium projects are included in this scenario, it remains a conservative estimate of domestic lithium production based on current announcements. Under this scenario, domestic lithium production would supply enough material to outfit 55% of annual LDV sales with battery packs in 2035. [EPA-HQ-OAR-2022-0829-0786, pp. 36-37]

EDF converted the tons of lithium production into an equivalent number of LDVs. We used BMI's projection for kg of lithium per kWh of battery for an average battery chemistry. This value falls over time as batteries are assumed to become more efficient from 0.66 to 0.56 kg LCE/kWh of battery. We assumed 89 kWh per EV to get the number of LDVs. [EPA-HQ-OAR-2022-0829-0786, pp. 36-37]

Since the IRA's Commercial Clean Vehicle Credit does not contain the same domestic source requirements for battery critical minerals that the Clean Vehicle Credit does, it is likely that domestically produced lithium will go to LDVs rather than HDVs at least through the end of the IRA credit in 2032. In this analysis, we assume none of the U.S. produced lithium goes to HDVs. [EPA-HQ-OAR-2022-0829-0786, pp. 36-37]

We plotted the results from Scenario B above as a possible representation of future U.S. lithium production from announced projects. As described more fully below, this does not fully account for all U.S. projects nor does it account for projects in countries with which the U.S. has a free trade agreement. This also does not reflect EDF's view on any particular project. Instead, based on publicly available information, it provides an indication of the degree to which U.S. lithium supply may support future EV production based solely on current announcements. [EPA-HQ-OAR-2022-0829-0786, pp. 36-37]

VI. The supply chain for electric vehicle batteries and critical minerals is capable of safely and equitably meeting the demands of strong standards. [EPA-HQ-OAR-2022-0829-0786, pp. 60-61]

The current and projected critical minerals supply chain for EV batteries is capable of meeting the demands of strong standards. It is vital that any increase in minerals mining and processing be undertaken in a safe and equitable way that does not increase pollution burdens on underserved communities, which have historically faced disproportionate harms from these processes. Any projects undertaken must be carried out in a way that affirmatively prioritizes the needs of these communities. [EPA-HQ-OAR-2022-0829-0786, pp. 60-61]

Domestic production of batteries and battery components is growing rapidly to meet the rising needs of the EV industry. Analysis by EDF and WSP found that there has been over $79.7 billion in investment in U.S. battery and battery component production announced within the past 8 years, resulting in almost 70,000 new jobs.164 In 2026, these already announced investments will be capable of producing batteries sufficient to supply the equivalent of 11.2 million new passenger vehicles per year.165 [EPA-HQ-OAR-2022-0829-0786, pp. 60-61]

164 U.S. Electric Vehicle Manufacturing Investments and Jobs, Characterizing the Impacts of the Inflation Reduction Act after 6 Months, WSP for EDF, (March 2023). https://blogs.edf.org/climate411/files/2023/03/State-Electric- Vehicle-Policy-Landscape.pdf. (Attachment E)

165 Id.

Much of this investment has occurred within the last year as a result of the IRA's incentives for domestic battery production, which will continue to spur production growth and reduce battery costs throughout the timeframe of this rule.166 The Advanced Manufacturing Production credit, for instance, provides up to $45 per kilowatt-hour for the production of battery cells and modules as well as up to 10% of the cost of critical minerals through 2032.167 Additionally, the IRA's amendments to the Clean Vehicle Credit includes provisions requiring that qualifying vehicles source an increasing percentage of their critical minerals and battery components domestically, which will further incentivize increased domestic production capacity.168 [EPA-HQ-OAR-2022-0829-0786, pp. 60-61]

166 Id.

167 Inflation Reduction Act of 2022, P.L. 117-1698 ,136 Stat. 1971-81 (2022).

168 Inflation Reduction Act of 2022, P.L. 117-1698 ,136 Stat. 1956-57 (2022).

The extraction, processing, and recycling of the critical minerals necessary to support rapid ZEV proliferation is also ramping up and supports the feasibility of protective emission standards. [EPA-HQ-OAR-2022-0829-0786, pp. 61-62]

EDF has conducted a review of announced investments in the critical minerals supply chain, including new investments and expansion of existing capacities in raw minerals extraction (mining), materials separation and processing, and recycling efforts—in both the U.S. and free-trade-agreement countries - based on publicly available information from company websites and announcements issued by investors, government agencies, and news media on the operators, materials, locations, annual capacities, and timelines of the projects.169 The compilation of projects includes the scale and date of any announced investments in the projects, including OEM investments, as well as the details of partnership agreements. We have also compiled information on specific funding levels secured under the BIL. [EPA-HQ-OAR-2022-0829-0786, pp. 61-62]

169 The compilation is attached to this comment as an Excel file titled "Domestic Critical Minerals Projects." We are expanding the review to include countries with which the U.S. has free trade agreements. (Attachment W)

The numerous projects and partnerships identified demonstrate a growing effort—that is supported by the BIL and the IRA—to develop a secure supply of critical minerals. In October 2022, the White House announced $2.8 billion in funding under the BIL for projects to support "new, retrofitted, and expanded commercial-scale domestic facilities to produce battery materials, processing, and battery recycling and manufacturing demonstrations."170 The funding is the first phase of a total $7 billion investment by the federal government to develop domestic supply chains for electric vehicle battery production.171 According to project announcements, these investments in critical minerals projects have been spurred on by downstream consumer tax benefits under the IRA.172 [EPA-HQ-OAR-2022-0829-0786, pp. 61-62]

170 U.S. DOE Office of Manufacturing and Energy Supply Chain Bipartisan Infrastructure Law: Battery Materials Processing and Battery Manufacturing Recycling Selections, available at: https://www.energy.gov/mesc/bipartisan- infrastructure-law-battery-materials-processing-and-battery-manufacturing-recycling.

171 U.S. DOE, October 19, 2022 Biden-Harris Administration Awards $2.8 Billion to Supercharge U.S. Manufacturing of Batteries for Electric Vehicles and Electric Grid, https://www.energy.gov/articles/biden-harris- administration-awards-28-billion-supercharge-us-manufacturing-batteries.

172 E.g., General Motors announced that, "[m]aterial sourced from Lithium Americas [Thacker Pass mine in Nevada] will help support EV eligibility for consumer incentives under the U.S. clean energy tax

> credits." Ford noted, in its announcement of a long-term agreement with Nemaska Lithium, that its lithium hydroxide should help qualify Ford vehicles for consumer tax benefits under the IRA. And Livent Corporation, in its announcement of the expansion of its largest lithium hydroxide production site in the U.S. said that its, "leading footprint in North America positions the company to take advantage of long-term growth opportunities and downstream incentives from the recently enacted Inflation Reduction Act (IRA), which encourages use of lithium produced or processed in North America."

In all, our review identified 74 domestic mining, processing, and recycling projects and an additional 30+ projects and agreements in countries with which the United States has a free trade agreement. Investment levels are not known for all projects but announced domestic investments total over $25 billion, including $1 billion funded under the BIL and $2.7 billion funded by automakers. Known investments in free-trade-agreement countries total over $800 million. [EPA-HQ-OAR-2022-0829-0786, p. 62]

Because less than half of the projects we identified included a projected investment amount, we can assume that the actual total investment in mining, processing, and recycling projects in the U.S. and in free-trade-agreement countries is far higher than these publicly announced figures reflect. [EPA-HQ-OAR-2022-0829-0786, p. 62]

Organization: Ford Motor Company

Ford is enthusiastic and optimistic about the ICE-to-ZEV transition, and we are already delivering electrified light- and medium-duty EVs at scale. While we remain optimistic, we are also mindful of the considerable challenges and uncertainties that lie ahead. The pace of electrification has been and may continue to be limited by many factors and forces, many of which are outside the control of vehicle manufacturers. These include the availability of critical minerals for battery manufacturing, the need to allocate finite resources between EV programs and efforts toward incremental reductions in emissions from ICE vehicles, consumer demand especially as we proceed beyond early-adopters to the majority of new vehicle purchasers, economic turbulence, geopolitical events, and, of course, electric vehicle charging infrastructure. [EPA-HQ-OAR-2022-0829-0605, pp. 2-3]

Critical minerals are essential for EV manufacturing, but demand may outstrip supply during portions of 2027 – 2032. Automakers are taking extraordinary steps to vertically integrate with their battery supply chains in order to secure supply and control costs, but in this highly dynamic market and in light of unprecedented demand from lithium-ion battery manufacturers worldwide, it is unclear whether critical minerals will be available at a price that makes the EVs sufficiently competitive in the US market to achieve the EV adoption rates needed to meet EPA's proposed standards. The production tax credit available under section 45X of the tax code provides some amount of certainty, but not enough to achieve a high-level of confidence. [EPA-HQ-OAR-2022-0829-0605, p. 7]

Organization: Fred Reitman

Leads to child labor. The metals needed for the EV batteries including lithium and cobalt are mined in third world countries particularly the Congo by child labor under deplorable conditions. This is what takes place so that people in the United States, western Europe and other countries can feel good about limiting so-called climate change. Should this proposal become a final rule it would only lead to more child labor as it would open a growing market for these batteries in the U.S. [EPA-HQ-OAR-2022-0829-0432, p. 2]

Organization: HF Sinclair Corporation

And it will have profound impacts on national security by forcing the American automotive industry to depend on critical minerals from foreign suppliers, with geopolitical challenges—most notably, China—rather than a domestically-abundant and secure resource. These issues go well beyond EPA's expertise, and the Agency is not positioned to fully grapple with the consequences that such a rapid push for PEV will have across the nation. As a result, EPA can only proceed with the Proposed Rule if Congress bestowed upon EPA clear authorization to do so. But Congress did not. [EPA-HQ-OAR-2022-0829-0579, p. 4]

d. EPA's Assumed Supply Chain is no Assured and will Increase Dependence on Foreign Sources

Today, the U.S. is virtually independent48 as a net exporter of petroleum. The U.S. has worked for decades to progress this energy security, which is especially pronounced for transportation fuels (i.e., petroleum- and ethanol-based liquid fuel products) for ICE-powered vehicles. Although EPA conducts an analysis regarding the Proposed Rule's effect on domestic "energy security," EPA limits itself to drawing broad conclusions regarding future projections for exports, imports, and consumption of crude oil and refined petroleum products—as well as relying on inflated support from potential funding mechanisms of the BIL and IRA. But this ignores the current state of the supply chain of critical materials necessary for battery and PEV production at large: "Given the current state of the global supply chain for these raw materials and the requirements to bring additional supply to market, it is likely that the mandated goals are unachievable even over several decades."49 [EPA-HQ-OAR-2022-0829-0579, pp. 12-13]

48 While "energy independence" has varying definitions, we are using the term consistent with EPA's use in the Proposed Rule—"[t]he goal of U.S. energy independence is the elimination of all U.S. imports of petroleum and other foreign sources of energy, but more broadly it is the elimination of U.S. sensitivity to the variations in the price and supply of foreign sources of energy"). Proposed Rule at 26,077.

49 CEA Study at 9.

Most illustrative of the future foreign reliance resulting from EPA's Proposed Rule is the lithium-ion battery supply chain controlled nearly entirely by China. China controls each step of battery production and, by 2030, is anticipated to "make more than twice as many batteries as every other county combined."50 This is because China controls 41% of the world's cobalt, 28% of the world's lithium, and 78% of the world's graphite; China also refines 95% of manganese, 74% of cobalt, 70% of graphite, 67% of lithium, and 63% of nickel.51 And even if the U.S. had sufficient resources to extract and refine independent of foreign sources, a refinery takes two to five years to build—not accounting for the time necessary for permitting, construction, and operations, including waste disposal.52 Beyond the raw materials, China also makes the battery components—73% of NMC cathodes and 99% of LFP cathodes—compared to 1% made domestically.53 Indeed, "[e]xperts say it is next to impossible for any other country to become self-reliant in the battery supply chain, no matter if it has cheaper labor or finds other global partners. Companies anywhere in the world will look to form partnerships with Chinese manufacturers to enter or expand in the industry."54 [EPA-HQ-OAR-2022-0829-0579, pp. 12-13]

50 Agnes Chang and Keith Bradsher, NY TIMES, "Can the World Make an Electric Car Battery Without China?" (May 17, 2023) available at https://www.nytimes.com/interactive/2023/05/16/business/china-ev-battery.html.

51 Id.

52 Id.

53 Id.

54 Id.

Looking at the lithium alone, the "U.S. Geological Survey estimates that in 2022, there was approximately 130,000 tons of lithium mined globally" and that the "quantity of lithium mined would be able to produce just under 14 million EV batteries," not accounting for "the lithium used in other products, including laptop batteries, phones, residential power packs, and utility scale storage."55 But under proposed PEV mandates, the global annual light-duty vehicle sales of over 66 million and a global fleet of over 1.3 billion vehicle alone illustrate the difficulty with practically achieving EPA's proposed mandates.56 [EPA-HQ-OAR-2022-0829-0579, pp. 12-13]

55 CEA Study at 9.

56 Id.

The volatile and increasing costs for these materials further threaten a secure and stable supply chain capable of meeting EPA's proposed demands. Indeed, EPA ignores the fact that copper demand is expected to increase by 53% while supply is expected to increase by 16%--the global copper demand will outstrip supply of copper by just 2026.57 Similarly, the price of lithium has consistently risen in recent years. Between January 2021 and March 2022, the cost of lithium increased by 738% and continues to rise today.58 Despite these very public findings, EPA asserts that these costs are an uncertainty and that EPA plans to "continue updating [its] estimates of battery cost for current and future years."59 [EPA-HQ-OAR-2022-0829-0579, pp. 13-14]

57 Id.

58 See CANADA ENERGY REGULATOR, Market Snapshot: Critical Minerals are Key to the Global Transition (Jan. 18, 2023), available here.

59 Proposed Rule at 29,301 (recognizing the "global average price for lithium-ion battery packs (volume-weighted across the passenger, commercial, bus, and stationary markets) climbed by about 7 percent in 2022"). Notably, this is in contrast to EPA's conclusion just a few weeks prior. Proposed Rule at 25,930 ("the cost to manufacture lithium-ion batteries (the single most expensive component of a BEV) has dropped significantly in the past eight years, and that cost is projected to continue to fall during this decade, all while the performance of the batteries (in terms of energy density) improves.").

Instead of comprehensively analyzing these supply chain concerns, though, EPA relies heavily on federal funding and tax incentives—such as those under the BIL and IRA—to merely conclude a domestic supply chain is forthcoming.60 This incomplete analysis fatal to the Proposed Rule. Regardless of these funding sources, domestic manufacturing alone is unable to meet the production goals EPA is requiring right now and this threatens domestic energy security. [EPA-HQ-OAR-2022-0829-0579, pp. 13-14]

60 See, e.g., DRIA at 2-86–87; Proposed Rule at 29,328.

Finally, although EPA has acknowledged that a “transition period must take place in which a robust supply chain develops to support production of [critical minerals],” the limited time afforded under the Proposed Rule is simply insufficient to build this supply chain.61

61 Proposed Rule at 29,313.

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG also has supply chain concerns, as major parts suppliers related to ICEs are also accelerating their conversion to ZEVs and likewise may not be able to meet the sudden increased demand required to comply with the Proposed Rule. [EPA-HQ-OAR-2022-0829-0554, p. 2]

The NPRM Does Not Fully Capture True Costs of the Proposed Alternative.

The Proposed Alternative’s stated cost assumptions exclude important considerations. Currently, the NPRM estimates the average upfront per-vehicle cost to the automaker to be $1200 in MY 2032. The NPRM also estimates that by MY 2032, consumers who purchase a BEV instead of an ICE vehicle will save between $400 and $4,000 at the time of purchase.23 This is predicated on significant assumed reductions in battery pack pricing, which is far from guaranteed given uncertainties in mineral availability, ability to meet IRA mineral sourcing requirements, manufacturing and supply chain limitations, and required improvements in battery energy density. [EPA-HQ-OAR-2022-0829-0599, pp. 6-7]

23 EPA NPRM, Draft Regulatory Impact Analysis, “Table 4-8: Estimated average savings over the first 8 years of vehicle life when MY 2032 BEV purchased instead of ICE (2020 dollars)”

Organization: Illinois Corn Growers Association

Enormous advances have been made in electric vehicle technology in the last two decades and there is strong auto industry commitment to eventually replace internal combustion engine powered vehicles with electric ones. There are, however, still technological and economic challenges in creating products that meet consumer expectations. In addition, there are many things that must happen to support electric vehicles, many of which are outside the control of automakers. [EPA-HQ-OAR-2022-0829-0756, p. 3]

These include: [EPA-HQ-OAR-2022-0829-0756, p. 3]

[…]

-Securing enough raw materials to build the large batery packs needed to give electric vehicles the range consumers demand. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-Upgrading the nation’s roads, bridges and parking structures to ensure they can absorb the extra weight of inherently heavier electric vehicles. [EPA-HQ-OAR-2022-0829-0756, p. 3]

Thus, even if in the next eight years automakers, suppliers and retailers can retool their businesses to supply an estimated 7.5 million new vehicles in 2032 and beyond, it is far from assured that: [EPA-HQ-OAR-2022-0829-0756, p. 3]

[…]

-The mines can extract enough raw materials to build the bateries necessary to build these vehicles, especially since it is expected that electric utilities will be buying huge bateries made of the same materials to deal with the intermit nature of wind and solar energy. [EPA-HQ-OAR-2022-0829-0756, p. 3]

Organization: Illinois Farm Bureau (IFB)

-“If thought through, individuals would realize that EVs are not environmentally efficient nor cost-effective. The mining of resources for batteries is not environmentally friendly.” [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

Organization: Institute for Policy Integrity at New York University School of Law

D. EPA Provides Rigorous Analysis of Mineral and Energy Security and Could Provide Further Support and Analysis

In the context of the Proposed Rule, mineral security refers to the uninterrupted availability at affordable prices of minerals needed to produce vehicles. Relatedly, energy security refers to the uninterrupted availability at affordable prices of gas and electricity needed to drive vehicles.100 While EPA conducts an extensive analysis of both mineral security and energy security, additional analysis would further support its findings. [EPA-HQ-OAR-2022-0829-0601, pp. 16-17]

100 In the RIA, EPA sometimes uses the term “electricity security” when referencing electricity specifically.

On mineral security, EPA concludes that increased penetration of electric vehicles resulting from the Proposed Rule will “not lead to a critical long-term dependence on foreign imports of minerals or components, nor that increased demand for these products will become a vulnerability to national security.”101 This is mainly attributable to two basic reasons. First, EPA explains that there is already substantial domestic capacity to produce critical minerals, which is likely to increase in the future due to recent policies.102 Second, EPA explains that because vehicles are durable goods that can last many years, supply disruptions of critical minerals have limited impacts because consumers can normally delay vehicle purchases.103 [EPA-HQ-OAR-2022-0829-0601, pp. 16-17]

101 Proposed Rule, 88 Fed. Reg. at 29,313.

102 Id. at 29,313–23; RIA at 3-19 to 3-29.

103 Proposed Rule, 88 Fed. Reg. at 29,323;

EPA can provide additional context for the first point. Specifically, EPA should highlight that ICE vehicles may be susceptible to similar risks as BEVs from supply shocks due to our reliance on foreign vehicles and vehicle parts. From 2017 to 2021, just 69% of U.S. consumer passenger vehicles and 84% of commercial vehicles were produced domestically.104 Moreover, an estimated one-fourth of the 15,000 to 30,000 parts making up an ICE vehicle are sourced globally as of 2011.105 In fact, ICE vehicles have far more parts and moving parts than electric vehicles.106 Thus, shortages of key inputs can cause production delays and shortages, with supply-chain shortages resulting from the 2011 Tohoku earthquake and tsunami107 and the COVID-19 pandemic.108 Moreover, like the rare earth metals in BEV batteries, there are also supply-chain risks for metal inputs into ICE vehicles.109 These various risks put EPA's analysis of mineral security into context, highlighting the mineral and supply security risks of continuing to rely on ICE vehicles under the No Action scenario. [EPA-HQ-OAR-2022-0829-0601, pp. 16-17]

104 See Annual U.S. Motor Vehicle Production and Domestic Sales, U.S. Dep't of Transp., https://www.bts.gov/content/annual-us-motor-vehicle-production-and-factory-wholesale-sales-thousands-units.

105 See CONG. RSCH. SERV., MOTOR VEHICLE SUPPLY CHAIN: EFFECTS OF THE JAPANESE EARTHQUAKE AND TSUNAMI 4 (2011).

106 Idaho Nat'l Laboratory, How Do Gasoline & Electric Vehicles Compare?, https://avt.inl.gov/sites/default/files/pdf/fsev/compare.pdf.

107 CONG. RSCH. SERV., supra note 105, at 1.

108 Neal E. Boudette, Supply Problems Hurt Auto Sales in 2022. Now Demand Is Weakening, N.Y. TIMES (Jan. 4, 2023), https://www.nytimes.com/2023/01/04/business/new-car-sales-2022.html.

109 Dengye Xun et al., Comparing Supply Chains of Platinum Group Metal Catalysts in Internal Combustion Engine and Fuel Cell Vehicles: A supply Risk Perspective, 4 CLEANER LOGISTICS AND SUPPLY CHAIN 100043 (2022).

Organization: International Council on Clean Transportation (ICCT)

Battery mineral resources and production capacity are sufficient to meet the standards. There are enough mineral resources available to support a global transition to EVs and there are substantial ongoing investments in new projects along the mineral supply chain in the U.S. and in friendly countries. Significant and growing battery recycling capacity, along with battery technology diversification and improving EV efficiency, will reduce pressure on EV mineral demand. Domestic battery production capacity is quickly ramping up, already increasing by more than one-third since the IRA was passed. With major announced public, private, and utility investment in chargers, the infrastructure is also being built to meet the BEV expansion projected by EPA. [EPA-HQ-OAR-2022-0829-0569, p. 3]

There is evidence that it should be possible to quickly scale up investments into mining and battery production with careful planning and investment. EPA's proposal lays out the much needed roadmap for the mineral mining, refining, and battery production supply chain to plan and invest around. There are more than enough minerals available for a global transition to EVs, and the amount of raw material reserves domestically and in friendly countries greatly exceeds what is needed to meet EPA's proposal.21 With the IRA's Advanced Manufacturing Production Tax Credit and the domestic content provisions in the Clean Vehicle Tax Credit, the U.S. directly incentivizes mining, recycling, and battery production on U.S. soil, and further supports establishing resilient material supply chains from friendly countries. The manufacturing subsidy of $45/kWh cuts about one third of total battery costs (global average of $151 in 2022), making battery production in the U.S. even cheaper than in China.22 This support showed an immediate effect. In response to the IRA, we saw a significant uptick by more than one-third in announced plans for battery production facilities, catching up with Europe.23 Longer-term forecasts now indicate U.S. battery production capacity at 1 TWh by 2030, approaching forecasted battery demand of 1.2 TWh taking the proposed EPA standards into account.24 A mapping compilation of U.S. EV supply chain investment from December 2022 shows that there are several dozen investments in minerals, battery production, recycling, and other electric vehicle facilities across the country.25 A separate study by the U.S. Department of Energy compiled U.S. battery supply chain announcements and found over $100 billion announced as of May 2023 with over 160 new or expanded minerals, materials processing, and manufacturing facilities, and over 70,000 new jobs.26 Specific recent examples from June 2023 include a $9.2 billion federal loan to Ford to greatly expand U.S. electric vehicle and battery production, and Hyundai's announcement to increase its EV investments to $28 billion while reducing China operations.27 [EPA-HQ-OAR-2022-0829-0569, pp. 9-10]

21 Slowik, P., Lutsey, N., and Hsu, C-W. (2020). How technology, recycling, and policy can mitigate supply risks to the long-term transition to zero-emission vehicles. International Council on Clean Transportation. https://theicct.org/publication/how-technology-recycling-and-policy-can-mitigate-supply-risks-to-the-long-term- transition-to-zero-emission-vehicles/ and Oge, M. (2023, May 16). History shows EPA's proposed vehicle emissions rule can be done – it's worth trillions! Forbes. https://www.forbes.com/sites/margooge/2023/05/16/history-shows-epas-proposed-vehicle-emissions-rule-can-be- done---its-worth-trillions/?sh=ea3150cc6275

22 Bloomberg New Energy Finance. (2022, December 6). Lithium-ion battery pack prices rise for the first time to an average of $151/kWh. https://about.bnef.com/blog/lithium-ion-battery-pack-prices-rise-for-first-time-to-an-average- of-151-kwh/

23 Benchmark Minerals. (2022, November 23). IRA lifts US battery pipeline growth in second half of the year, outpacing Europe. https://source.benchmarkminerals.com/article/ira-lifts-us-battery-pipeline-growth-in-second-half- of-the-year-outpacing-europe

24 Benchmark Minerals. (2023, April 14). US EPA emissions rules ratchet up pressure on the battery supply chain. https://source.benchmarkminerals.com/article/us-epa-emissions-rules-ratchet-up-pressure-on-the-battery-supply- chain

25 EV supply chain and investment map. (2022, December 21). Zero Emission Transportation Association. https://www.zeta2030.org/education-fund/investments

26 U.S. Department of Energy. (2023, May 23). Investments in American-Made Energy: Battery supply chain investments. https://www.energy.gov/investments-american-made-energy

27 Rathi, A., Natter, A., and Naughton, K. (2023, June 22). Ford gets $9.2 billion to help US catch up with China's EV dominance. Bloomberg. https://www.bloomberg.com/graphics/2023-ford-ev-battery-plant-funding-biden-green- technology/ and Yim, H., and Yang, H. (2023, June 20). Hyundai raises EV investment to $28 billion, to reduce China operations. Reuters. https://www.reuters.com/business/autos-transportation/hyundai-motor-invest-8541- billion-by-2032-accelerate-ev-plans-2023-06-20/

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

B. Uncertain EV Job Quality

Federal policy must ensure EV jobs are as good as or better than ICE jobs. Compliance with GHG emissions standards can never justify the offshoring of jobs, the slashing of wages, or the busting of unions. [EPA-HQ-OAR-2022-0829-0614, p. 6]

Unless and until we build a comprehensive domestic EV supply chain, the transition to EVs will risk trading dependency on fossil fuels for dependency on imported EVs, batteries, fuel cells, and materials, all while hollowing out quality union jobs in the process. Uncertainty around the build-out of the domestic EV supply chain is not recognized by the EPA and therefore does not play a significant role in altering the proposed standards' increased adoption of ZEVs.12 The

EPA must craft its standards to hold manufacturers accountable to both environmental and labor concerns. [EPA-HQ-OAR-2022-0829-0614, p. 6]

12 For example, the EPA cites to 13 announced domestic battery plants, but does not indicate how many are operational or ready to help achieve compliance with the standards. See supra note 29317.

Organization: Jeremy Michalek et al.

Global commodity supply disruptions raise prices but don't necessarily make materials impossible to acquire. Global commodity supply disruptions of either oil or critical battery materials may raise prices on the world market, but are unlikely to cut off the supply entirely. We find that a large portion of lithium, cobalt, nickel and manganese is used in products other than electric vehicle battery cathodes (Figures 2 and 3). In the event of a supply disruption, higher prices would be expected to shift demand for these materials among product applications in the short- run to medium-run. Over the long-term, the price jump will affect the U.S. economy regardless of how much supply of critical materials originates from the U.S. or its allies. However, price increases will induce product innovation and redesign, such as shifts in electric vehicle battery chemistry, which will counteract the price increases. And, applications with sufficient willingness to pay for higher price materials and products may continue to have access to materials. How particular material supply disruptions may affect individual automakers and whether they experience shortages in the short- run depends on a number of factors, including the specifics of contracts in their supply chains. However, because material markets, battery manufacturers, and automakers tend to respond to disruptions, and the proposed policy includes a number of flexibil- ities such as credit borrowing, supply disruptions may result in increased production costs but not necessarily an inability to produce EVs as a compliance pathway for the proposed GHG regulations. [EPA-HQ-OAR-2022-0829-0706, p. 2]

Recommendation: EPA could consider using a sensitivity analysis with higher ma- terial prices as an alternative to using a GWh constraint to represent the effect of potential critical material supply disruptions. [EPA-HQ-OAR-2022-0829-0706, p. 2]

The supply vulnerability for battery materials is fundamentally different from supply vulnerability for fuels. As discussed in the proposed rule, sensitivity of the U.S. economy to a supply disruption of critical battery materials is fundamen- tally different from sensitivity of the U.S. economy to a supply disruption of oil. When oil supply is disrupted, such as in the 1970s OPEC embargo that triggered the origi- nal CAFE standards, everyone in the economy is immediately affected as travel costs increase and fuel shortages reduce availability. In contrast, when critical battery mate- rials are disrupted, economic sectors that produce batteries and vehicles may be quickly disrupted, but ordinary consumers and businesses can continue operations with existing vehicles, delay purchase of new vehicles, and delay scrappage of used vehicles, buying time for responses to disruptions to come online (such as new geopolitical agreements, shifts in the mix of EVs that have battery chemistries with lower use of the critical material affected, shifts in supply paths currently used for other products, new mines, refining facilities, cathode production operations, and increased production from exist- ing facilities). Thus, while supply disruption vulnerabilities for EVs remain critically important, their impact may be far more limited than that of oil (though potentially with important second order effects). [EPA-HQ-OAR-2022-0829-0706, pp. 2-3]

Current battery material supply chains are dependent upon locations in China in processing and refining, but these supply chain stages are movable. The proposed rule finds that “widespread automotive electrification in the U.S. will not lead to a critical long-term dependence on foreign imports of minerals or components, nor that increased demand for these products will become a vulnerability to national security,” in part because the Inflation Reduction Act (IRA) incentivizes battery supply chains to shift toward the United States. We analyzed battery material supply chains based on the most recent production and trade data available and found that current supply chains are dependent on locations in China, primarily in the materials refining and battery production phases, rather than in mining (Figure 1). However, unlike raw material deposits, materials refining and battery production operations can potentially be shifted to other countries over the period of transition to electric vehicles. [EPA-HQ-OAR-2022-0829-0706, p. 3]

Material supply vulnerabilities depend on battery chemistry. Key lithium- ion battery chemistries used in electric vehicles include (1) nickel manganese cobalt (NMC) and (2) lithium iron phosphate (LFP). Of these, NMC has more potential dis- ruption pathways because it requires Li, Ni, Co and Mn, whereas LFP requires only Li (Figures 2 and 3). Today, a larger percentage of LFP cathodes than NMC cathods pass through China, largely because of its dominance in LFP cathode production (Fig- ure 2). However, the patents associated with LFP cathode production expired in 2022, opening up opportunities to open new LFP cathode production facilities worldwide (Alamalhodaei, 2021). With either chemistry, reducing disruption vulnerabilities re- quires a whole-supply-chain approach that considers how multiple stages of the supply chain interact. In the event of extended supply disruptions of Ni, Co or Mn, a shift of battery chemistry toward LFP could be one pathway to responding to a disruption. [EPA-HQ-OAR-2022-0829-0706, p. 3]

Overall, the U.S. economy’s vulnerability to supply disruption could potentially be much lower for electric vehicle batteries than for oil, given (1) the more limited number of economic sectors directly impacted, (2) longer time periods for the economy to respond to disruptions, (3) potential for circular economy strageties, such as recycling and material extraction from waste streams, and (4) a shift in supply chain diversification encouraged by policies like the IRA. We recommend that supply chain vulnerability is not a reason to avoid transitioning to electric vehicles, but it is important that the U.S. simultaneously pursue strategies to reduce supply chain vulnerabilities as the transition to electric vehicles occurs. [EPA-HQ-OAR-2022-0829-0706, p. 3]

Organization: Job Creators Network Foundation (JCNF)

EPA’s Proposed Rule Is Not Feasible [EPA-HQ-OAR-2022-0829-0709, pp. 2-3]

In addition to being illegal, the proposal is not technically feasible. Daniel Yergin, one of the world's leading energy experts, highlights how electric cars have 2.5 times more copper in them than regular vehicles.6 He cites the International Monetary Fund's warning that such environmental policies will "spur unprecedented demand for some of the most crucial metals," with price increases that "could derail or delay the energy transition itself.”7 [EPA-HQ-OAR-2022-0829-0709, pp. 2-3]

6 Daniel Yergin, "'Net Zero' Will Mean a Mining Boom," (Link: https://www.wsj.com/articles/net-zero-will-mean-a-mining-boom-electric-cars-minerals-oil-fossil-fuels-climate-change-policy-cb8d5137) Wall Street Journal (April 12, 2023).

7 Lukas Boer, Andrea Pescatori, Martin Stuermer, Nico Valckx, "Soaring Metal Prices May Delay Energy Transition," (Link: https://www.imf.org/en/Blogs/Articles/2021/11/10/soaring-metal-prices-may-delay-energy-transition) IMF Blog (Nov. 10,2021).

EPA's Proposed Rule Would Weaken America's Energy Security and Harm the Environment

Nearly half of the world's copper and 60% of lithium needed for electric cars' lithium-ion batteries are processed in China.8 Instead of using our rich oil and natural gas resources, this proposed rule would mean that America would now rely on China for its energy needs. [EPA-HQ-OAR-2022-0829-0709, p. 3]

8 Iea, "Clean energy supply chains vulnerabilities," (Link: https://www.iea.org/reports/energy-technology-perspectives-2023/clean-energy-supply-chains-vulnerabilities) Energy Technology Perspectives 2023 (Jan. 2023).

Moreover, EPA's proposed emissions regulations would hurt the environment, since mining the lithium and cobalt used in batteries is energy intensive. And what will be done with these car batteries after they have been used? Will they make up the landfills of tomorrow? [EPA-HQ-OAR-2022-0829-0709, p. 3]

Finally, there are significant concerns regarding the use of child labor to cultivate these needed minerals. Seventy percent of cobalt needed for lithium-ion batteries comes from the Democratic Republic of the Congo,9 where children hand dig in crowded, primitive mines to try to service the West's insatiable demand.10 [EPA-HQ-OAR-2022-0829-0709, p. 3]

9 Id.

10 Terry Gross, "How 'modern-day slavery' in the Congo powers the rechargeable battery economy," (Link: https://www.npr.org/sections/goatsandsoda/2023/02/01/1152893248/red-cobalt-congo-drc-mining-siddharth-kara) npr (Feb. 1, 2023)

Organization: John Graham

The most potent barriers are not physical, geological, technical, or financial; they are environmental, political, and sociological, as most communities in the world have no interest in serving as hosts to large mining operations and processing plants with large waste streams. In the last several years alone, promising proposals for large new lithium mines have been cancelled or delayed indefinitely in Serbia, Portugal, Oregon, North Carolina, Mexico, and Chile (see below for details). Since it takes 7 to 15 years to launch large new lithium mines, hybrids will be needed for the transitionary period. [EPA-HQ-OAR-2022-0829-0585, pp. 9-10]

The major reason to expect shortages of raw materials in the 2029-2035 period is that miners and processers require a "social license" to operate. Owners of mines and processing facilities require permits to operate because such operations are ecologically disruptive (at least temporarily), controversial to nearby residents, farmers, ranchers, businesses, schools, and tourists, and heavily regulated (e.g., due to their waste streams and threats to water and air quality). Local public opposition to new mines and processing facilities is often substantial, which explains why many geologically promising proposed projects never come to fruition.33 [EPA-HQ-OAR-2022-0829-0585, p. 22]

33 John D. Graham, John A Rupp, Eva Brungard. Lithium in the Green Energy Transition: The Quest for both Sustainability and Security. Sustainability. 13(20). 2021. 0.3390/su132011274.

A different problem for mining companies is that many geologically promising sites are in countries with unstable regimes or stable leftist regimes that want commercial control in the hands of state-owned enterprises and pro-government royalty policies. The state-owned approach to mining has failed for many years in Bolivia, yet Chile and Mexico are now moving in that direction. Leftist governance approaches discourage foreign investors from allocating start-up capital for mining projects, and miners are often unable to muster the necessary capital from sources inside the host country. Thus, one cannot imagine a global industry that departs more sharply from a free-market situation than the global materials sector supporting BEVs. [EPA-HQ-OAR-2022-0829-0585, pp. 22-23]

While the challenge of obtaining capital is less severe than the challenge of obtaining the social license to operate, the capital challenge for miners is not trivial; indeed, it is much more difficult than the challenge of obtaining capital for plants that make lithium ion batteries or assemble electric vehicles. A recent survey of capital announcements through 2022 found that $105.0 billion was allocated for electric vehicle assembly operations, $45.3 billion for battery manufacturing, yet only $15.7 billion was allocated for the battery materials sector. To meet the six-fold growth in global demand for battery materials, the capital in the mining sector needs to be roughly equal to the allocations provided to the battery sector.34 This is why mining specialists know that materials shortages are likely in the medium term. [EPA-HQ-OAR-2022-0829-0585, pp. 22-23]

34 Matt Fernley. Battery Materials Review: 2022 Yearbook. February 2023, 21.

Recent US Federal Efforts to Promote Mining. The Biden administration has invoked the Defense Production Act, identified critical minerals, and provided technical guidance to developers on how to access them in the United States. Congress, in the Inflation Reduction Act of 2022, also applied a new manufacturing tax credit to mining operations, which will ease somewhat the capital requirements facing a developer. DOE was also awarded roughly $7 billion in grant authority to stimulate the U.S. supply chain for electric vehicles. However, virtually none of the DOE grants have been allocated to mining projects; some have supported mine processing facilities but most of the grants have been awarded to recyclers, component producers, and battery cell/pack producers. [EPA-HQ-OAR-2022-0829-0585, p. 23]

Explanations for Recent Price Volatility. An understanding of global supply and demand helps explain why raw material prices for EVs surged in 2021-2022, collapsed in early 2023, and began to recover in mid-2023.35 Most of the action has been on the demand side because, except for output from existing mines, the global supply of raw materials does not change rapidly.36 Specifically, the unexpected shortages in raw materials in 2021 – 2022, which led to extreme price volatility for some materials, were not caused by an unexpected loss of supply. They were caused by a rapid resurgence in demand for BEVs as China’s economy recovered more quickly from the pandemic than expected.37 [EPA-HQ-OAR-2022-0829-0585, p. 23]

35 Matt Fernley. Why I Think Lithium Prices Will Bounce. Kitco.com. April 3, 2023.

36 US Geological Service. Mineral Commodity Summaries. 2022, 100 (lithium).

37 https://internationalbanker.com/brokerage/why-are-lithium-prices-collapsing/#:~:text=The%20surge%20in%20demand%20for%20lithium%20batteries%20amidst,rally%20observed%20throughout%202021%20and%20much%20of%202022.

The collapse of raw material prices in early 2023 reflected both demand and supply factors: demand growth for BEVs in China moderated as subsidies for BEVs ended while output from existing mines in Australia and Chile surged in response to the 2021-2022 price surge. Materials prices showed signs of recovery in the second quarter of 2023 as BEV demand in China resumed its strong growth rate.38 [EPA-HQ-OAR-2022-0829-0585, p. 23]

38 Eric Onstad, Siyi Liu, Mai Nguyen. Lithium Prices Bounce After Big Plunge But Surpluses Loom. Reuters.com. May 2, 2023.

Flaws in the NPRM Analysis of Materials Shortages. In the NPRM EPA (and some private forecasters) misanalyze the challenge by treating material shortages as only a near-term problem (pre-2026) that will disappear as the global supply response occurs.39 The DRIA states (page 2-50) that battery costs after 2026 "are expected to resume their decline as mineral supply and demand balance out." EPA explains further: "For the years 2022 through 2025, we suspended use of the learning factor, to reflect consensus views that elevated mineral prices are likely to cause battery costs to remain flat for a time." (2-49) Even though EPA finds that battery prices "are poised to remain somewhat elevated until about 2025 to 2026" and despite forecasting battery material demand will explode after 2025, somehow EPA finds that battery costs after 2026 "are expected to resume their decline as mineral supply and demand balance out" (2-50). [EPA-HQ-OAR-2022-0829-0585, pp. 23-24]

39 Wood Mackenzie Q3 2022 (Wood Mackenzie 2022) and EDF/ERM (MacIntosh, Tolomiczenko and Van Horn 2022). Reports referenced in DRIA, page 2-50.

The more likely scenario is virtually the opposite of what EPA predicts: adjusted output from existing mines will address short-term shortages (with less than 1 year of lag) but medium-run shortages are likely because it is so difficult – and takes so long -- to launch new mines. Mining specialist Matt Fernley explains: “Even in the hard rock (areas), the most commodity-like of all the lithium products, it’s proven exceedingly complex to get new assets into production, and even to add Brownfield capacity.”40 The new mines that start are often delayed many years compared to plan, and/or confront challenges in continuing to operate or expand due to local concerns.41 Moreover, some new mines – despite their promise – cannot produce the battery-grade material that is required for BEVs.42 The real mineral-shortages challenge is the medium run (2029-2035), after output from existing mines is exhausted but before numerous new mines are launched and before the impact of a new recycling industry kicks in.43,44 In the long run (post-2035), there is no reason to expect chronic materials shortages unless miners simply cannot obtain permits to operate – a distinct possibility given the extensive environmental harm of many mining operations – and/or the recycling industry confronts insurmountable challenges or doesn’t yet have enough scrapped BEVs to provide large amounts of materials. [EPA-HQ-OAR-2022-0829-0585, pp. 23-24]

40 Matt Fernley. Battery Materials Review: 2022 Yearbook. February 2023, 3.

41 John Dizard. Absurd Surge in Lithium Prices Poses Problems for the Energy Transition. Financial Times. February 5-6, 2022, 14.

42 Ibid. 3 (especially the new mines in China and Latin America).

43 Eric Onstad, Siyi Liu, Mai Nguyen. Lithium Prices Bounce After Big Plunge But Surpluses Loom. Reuters.com. May 2, 2023.

44 Joe Miller, Peter Campbell, Patrick McGee. Musk Joins Rivals in Warning of Supply Disruption Threat to EV Rollout. Financial Times. May 14-15, 2022, 8.

Where will materials prices settle in the long run? No one knows for sure, but a good guess is at the marginal cost of global production. The new mines that are added typically have much higher costs of production than the existing mines. [EPA-HQ-OAR-2022-0829-0585, p. 24]

However, it is possible that new modes of production (e.g., direct lithium extraction from brines) will shift the cost curve downward. On the other hand, the increasing demands for environmental, social, and governance improvements at new mines will only increase marginal costs of operation (as certain mines and suppliers are judged unacceptable). From the standpoint of long-run marginal costs, there is no valid reason to expect the steady decline in materials costs that EPA is projecting from 2026 to 2035.45 [EPA-HQ-OAR-2022-0829-0585, p. 24]

45 Matt Fernley. Battery Materials Review: 2022 Yearbook. February 2023, 7-9.

The previous section described the global markets for EV materials generally, often using lithium as the prototypical example. EPA studied only lithium, but here we review the distinctive challenges with cobalt, nickel, and neodymium as well as lithium. We urge EPA to go beyond lithium and create global supply-demand analyses for each important material. [EPA-HQ-OAR-2022-0829-0585, pp. 24-25]

Cobalt

The cathode in the lithium-ion battery requires a transition metal as a stabilizer for the chemical structure. Cobalt, though it is relatively expensive, has ideal properties: thermal stability, which reduces safety risks, and high energy density, which facilitates long driving range. The International Energy Agency estimates that 17 new cobalt mines will be needed by 2030 to meet global demand for cobalt induced by the global electric vehicle industry. [EPA-HQ-OAR-2022-0829-0585, pp. 24-25]

Most global reserves and current cobalt production are in a single country: the Democratic Republic of Congo (DRC). Labor is so cheap in DRC that it is difficult for new mines around the world to compete with cobalt from the DRC. [EPA-HQ-OAR-2022-0829-0585, pp. 24-25]

Since 97% of the mined cobalt comes as a byproduct of mined copper or nickel, the global supplies of cobalt are highly inelastic with respect to the price of cobalt. Even if cobalt prices rise substantially between now and 2030, the supplies of cobalt will not respond proportionately unless copper and nickel prices happen to rise at the same time. [EPA-HQ-OAR-2022-0829-0585, pp. 24-25]

There are three other complications with the global cobalt market that are causing global automakers to look for alternatives to cobalt. Chinese corporations have bought up a substantial share of the low-cost cobalt mines in DRC and the central government of China has fostered a working relationship with the DRC leadership. From a western perspective, the government of DRC seems unstable and unreliable, and there is a history of corruption in the DRC's mining sector. Finally, international rights groups have exposed human-rights abuses in the DRC mines, including use of child labor and both worker and community exposures to hazardous materials. It is these human-rights problems in DRC that motivated the OECD to develop responsible-sourcing guidelines. At a minimum, those guidelines expect automakers and their suppliers to know where their cobalt supplies come from and whether those mines engage in responsible practices. Several global automakers, including Tesla and GM, have pledged to go cobalt free as soon as possible. [EPA-HQ-OAR-2022-0829-0585, p. 25]

The United States does not have any operational cobalt mines. A sustained effort in Utah, supported by the US Department of Defense, led to the partial construction of a new cobalt mine. The developer suspended completion of construction in March 2023 due to inflationary cost pressures and low cobalt prices. The developer also cited the need for an affordable US cobalt refiner to assist in the commercial viability of the mine.46 [EPA-HQ-OAR-2022-0829-0585, p. 25]

46 https://www.kitco.com/news/2023-03-28/Jervois-suspends-final-construction-at-Idaho-Cobalt-Operations-due-to- low-cobalt-prices-and-inflationary-pressures.html.

The most promising substitute for cobalt is nickel because nickel has high energy density. However, nickel-rich cathode materials tend to suffer from rapid capacity fade and impedance rise due to deleterious reactions between the nickel atoms on the surface of the cathode and the cell's electrolyte. R&D projects found that a blend of nickel, manganese and aluminum can counteract the negative aspects of nickel-rich cathodes.47 Due to the growing use of nickel in cathodes, the International Energy Agency estimates that 60 new nickel mines around the world will be needed by 2030 to meet the demand induced by the electric-vehicle transition. [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

The global nickel industry is much larger than the cobalt industry, as 65% of the refined nickel in the world is used in stainless steel production.48 A higher grade of nickel is required for use in the cathodes of lithium-ion batteries. Even with rapid growth of nickel use for electric vehicles, batteries will account for a minority of refined nickel consumption, but cathode makers need access to refiners that can deliver the high-grade (Class I) nickel. [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

47 https://www.energy.gov/eere/vehicles/articles/reducing-reliance-cobalt-lithium-ion-batteries.

48 https://www.usgs.gov/centers/national-minerals-information-center/nickel-statistics-and-information.

Global reserves of nickel are plentiful and accessible. The mining and processing of nickel, however, presents their own challenges. Four countries (Indonesia, Philippines, Russia, and New Caledonia) account for about 67% of refined nickel production.49 [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

49 https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-nickel.pdf.

Indonesia is by far the largest nickel producer, and it has the largest amount of global reserves, but it has export quotas on unprocessed nickel to boost the commercial fortunes of its own nickel processing industry. Europe won a World Trade Organization ruling against Indonesia's export quotas, but the government of Indonesia is not likely to repeal them.50 Indonesia also uses export quotas to attract foreign investment in cathode plants, battery plants, and electric-vehicle assembly plants. China has already responded with $30 billion for Indonesia's refining capabilities, but it remains to be seen whether Indonesia can build out the entire supply chain for electric vehicles.51 Historically, the government of Indonesia has been suspicious of multi- national corporations based in the West, so it may not be the best place for Western companies to place their bets. Ford Motor Company decided otherwise, and recently signed a $4.5 billion nickel deal with Indonesian officials.52 [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

50 https://thediplomat.com/2022/12/indonesia-to-appeal-wto-ruling-on-nickel-export-ban/.

51 https://www.csis.org/analysis/indonesias-nickel-industrial-strategy.

52 https://www.verdict.co.uk/ford-signs-4-5bn-deal-for-new-nickel-plant-in-indonesia/:~:text=US%20motor%20company,%20Ford,%20has%20signed%20a%20$4.5bn,to%20build%20a%20ni ckel%20processing%20plant%20in%20Indonesia.

China has turned to the Philippines as an alternative supplier of nickel, but environmental concerns have restrained the country's growth of nickel production. The government of the Philippines ordered a shutdown of half of the country's nickel mines because they were contributing to water pollution and other environment damages.53 [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

53 https://www.nytimes.com/2017/04/27/world/asia/philippines-mining-environment.html#:~:text=In%20February%2C%20Gina%20Lopez%2C%20the%20acting%20secretary%20of,field s%20and%20watersheds%20stained%20red%20with%20nickel%20laterite.

Russia's invasion of the Ukraine has only underscored the liabilities of depending on Russia for nickel. Nonetheless, Russia remains a significant nickel supplier of the US and Europe.54 [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

54 https://www.reuters.com/markets/europe/exclusive-eu-us-step-up-russian-aluminium-nickel-imports-since- ukraine-war-2022-09-06/.

Tesla is trying to develop New Caledonia as a regular supplier of nickel, but mining on the island has a controversial history. There has been exploitation of indigenous people and unmanaged ecological destruction.55 [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

55 https://www.nytimes.com/2021/12/30/world/asia/tesla-batteries-nickel-new-caledonia.html.

The United States has only one active nickel mine, the Eagle Point mine in Michigan. It is nearing the end of its useful life, but there was once hope that two new nickel mines in Minnesota would take its place. However, both of those mining projects are tied up in regulatory and judicial hurdles, which means they will not be producing nickel anytime soon.

The most promising paths for the United States might be new mines in Canada, Norway, and Australia. However, other countries, including China, are also talking to miners in those countries. [EPA-HQ-OAR-2022-0829-0585, pp. 25-27]

Global demand for neodymium, one of the rare earths, is projected to grow five-fold by 2030, as it is crucial for two aspects of the clean-energy transition: electric motors and wind turbines. Finding reliable suppliers of neodymium is a major challenge for automakers and their suppliers. [EPA-HQ-OAR-2022-0829-0585, pp. 27-28]

In the 1980s, low-cost mines in China caused other rare-earth mines to close, including the Mountain Pass mine in California near the Mojave Desert on the Nevada line. In less than a decade, China captured 95% of global rare-earth production. China's competitive advantages are low-cost labor in Inner Mongolia, lack of strict environmental controls, and state support of rare-earth producers. China's largest mine produces rare earths as a byproduct of iron ore mining. [EPA-HQ-OAR-2022-0829-0585, pp. 27-28]

Due to a fishing dispute with Japan in the South China Sea, China in 2011 instituted export quotas on rare earths, leading to a temporary surge in neodymium prices from $19 per kilogram to $500 per kilogram. Japan, Europe, and the US won a WTO lawsuit against China, which claimed, without success, that its export controls were designed only to promote sustainable development and reduce the environmental damages of mining. By the time the case worked its way through the WTO appeals process, China had removed its export controls and the prices of neodymium tapered. [EPA-HQ-OAR-2022-0829-0585, pp. 27-28]

Despite this hard evidence that China is willing to use rare-earths dominance as a geopolitical weapon, Japan, Europe, and the United States have not come close to self-sufficiency in the mining and processing of neodymium. The most recent data show China responsible for 69% of rare-earth mining, 85% of rare-earth processing and 92% of rare-earth magnet production.56 [EPA-HQ-OAR-2022-0829-0585, pp. 27-28]

56 https://www.politico.com/news/magazine/2022/12/14/rare-earth-mines-00071102.

The United States, with Department of Defense subsidies, has stimulated a restart of the Mountain Pass mine, giving priority to neodymium and other rear earths needed for military applications. A new processing and separation plant is also under construction in Fort Worth, Texas. Production of rare earth magnets is scheduled to begin in 2025. But, even if all goes as planned, the United States will account for a small share of neodymium mining and processing in 2030. [EPA-HQ-OAR-2022-0829-0585, pp. 27-28]

If automakers and their suppliers do not want to be dependent on China and cannot access enough supply from Mountain Pass, where should they go? The reserves data suggest that the next most promising countries are Vietnam (with half the reserves that China has), Brazil, India, Australia, and Greenland.57 Some of those countries would likely require foreign investment to launch new mines and processing facilities. [EPA-HQ-OAR-2022-0829-0585, pp. 27-28]

57 https://investingnews.com/daily/resource-investing/critical-metals-investing/rare-earth-investing/rare-earth- reserves-country/.

In 2021, global lithium production exceeded 100,000 tons of lithium-carbonate-equivalent (LCE) for the first time in history. To satisfy the global demand forecasts for electric vehicles (which are dominated by China, Europe, and North America), lithium production will need to grow three-fold by 2025 and six-fold by 2030.58 If lithium is also required for grid-scale energy storage of electricity from wind and solar, the global demand for lithium could increase 20-fold by 2030.59 While existing mines are expected to double their production in the next few years, most of the growth in production must come from new mines. [EPA-HQ-OAR-2022-0829-0585, p. 28]

58 Govind Bhutada. This Chart Shows Which Countries Produce the Most Lithium. Wef.com. January 5, 2023.

59 Stephen Wilmot. Battery Metals Rush is Just Starting. December 3, 2021, B12.

There are vast quantities of lithium around the world and on the ocean floor, but several mines in four countries (Australia, Chile, Argentina, and China) accounted for almost 98% of global production in 2020-2021.60 Australia has had the most success expanding production at hard-rock mines, largely for export to China, as Chinese companies possess ownership stakes in large Australian mines. [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

60 USGS. Mineral Commodities Summaries. 2022, 100 (lithium).

Chile was once (2014) the #1 lithium global producer, based on brine operations in the Atacama desert. To years of royalty increases (2017-2019) hurt Chile's competitiveness. Chile's brine operations also become controversial in Chile due to ecosystem disruption in desert areas, overdraws of brine by developers, and protests from indigenous populations.61 The new leftist government in Chile started by cancelling contracts for some new mines in the Atacama desert. A Chilean appeals court also suspended a new mining contract following objections from the local Chilean governor.62 The Chilean government later proposed a new governance arrangement where all lithium mining will be supervised by a state-owned enterprise. Investors in Chile's mining operations were appalled to learn of this new governance arrangement.62 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

61 Patricia I. Vasquez (ed). Latin America's Lithium: Perspectives on Critical Minerals and the Global Energy Transition. The Wilson Center. Washington, DC. April 2023.

62 Harry Dempsey, Edward White. Chile's Move to Control Lithium Alarms Industry. Financial Times. May 2, 2023.

63 Alexander Villegas, Ernest Scheyder. Chile Bid to Boost State Control Over Lithium Spooks Investors. Reuters.com. April 21, 2023. https://www.reuters.com/markets/commodities/sqm-albemarle-shares-slide-chile- lithium-nationalization-plan-2023-04-21/#:~:text=SANTIAGO%2C%20April%2021%20%28Reuters%29%20-%20Chile%20has%20moved,white%20metal%2C%20SQM%20%28SQMA.SN%29%20and%20Albemarle%20Co rp%20%28ALB.N%29.

Argentina has a promising lithium sector governed primarily by mining-friendly provincial leaders that have kept royalty rates relatively low.64 But, the industry starts from a small base. As it grows, it will likely confront opposition from indigenous groups and environmentalists like Chile has experienced.65,66 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

64 Harry Dempsey, Edward White. Chile's Move to Control Lithium Alarms Industry. Financial Times. May 2, 2023.

65 Daniel Gutman. Lithium and Clean Energy in Argentina. Development or Mirage? Ipsnews.net. December 2019.

66 Natalie Alcobo. A Race for Lithium is Sparking Fears of Water Shortages in Northern Argentina. Climatechangenews.com. October 26, 2022.

The efforts of other countries to launch lithium mining and processing have encountered numerous obstacles. Here is a summary of reasons why other countries have not been highly successful to date. [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

1. Bolivia. Although Bolivia has enormous lithium reserves and has been striving to launch lithium mines for more than a decade, no mining has yet occurred. Bolivia's state-owned corporation controls lithium mining and has had difficulty attracting foreign capital and expertise.67 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

2. Mexico. The leftist government upset almost a decade of work at a potential large mining site when it proposed to nationalize energy assets such as lithium.68 The prospects of foreign investment are now uncertain.69 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

3. Brazil. The impoverished Jequitinhonha Valley is home to 85% of Brazil's large lithium reserves. A large new hard-rock mine is scheduled to begin production in 2024, but nearby residents are already expressing concerns about noise, dust, and water consumption from early-stage pilot activities.70 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

4. Africa. Several African countries (Namibia, Zimbabwe, and the Democratic Republic of Congo) are exploring the promise of lithium development projects with financial assistance from foreign investors, including Chinese companies. Obstacles to progress include concerns about corruption, legal battles over ownership of lithium deposits, capricious politics, lack of electric power to support local processing, and the absence of adequate roads and port infrastructure.71 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

5. Canada. Promising new lithium sites in Ontario and Quebec have been slowed due to difficulties in arranging new processing capabilities for the mined material.72 An old lithium mine in Ontario, which may be revived, changed owners four times in the last ten years and had a record of serious spills of waste. Owners twice filed for creditor protection despite $110 million in support from the Province of Ontario.73 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

6. Portugal. The national government of Portugal has proposed a massive expansion of the country's small lithium mining sector, which currently supplies lower-grade product to ceramics operations. At the local and provincial level, where the hard-rock mines would be developed, grass-roots and community-level opposition is intense. One proposed mine has already been abandoned; another is in litigation.74,75 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

7. Serbia. The leadership of Serbia announced a deal with a large multinational mining company to create what might have been the largest hard-rock lithium mine in the world. In the face of several months of grass-roots protests, including thousands of demonstrators in Belgrade, the Serbian government reversed course and revoked the company's exploratory licenses. The objections were primarily on environmental grounds.76 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

8. International Ocean Seabed Mining. There are vast quantities of accessible critical minerals, including lithium, resting on the floor of specific regions of the Pacific Ocean (e.g., between Mexico and Hawaii). With new technologies, they can be vacuumed from the ocean floor without the explosions and digging that characterize hard-rock mining on land. However, countries around the world have not developed an adequate consensus on environmental-protection standards for seabed mining, which was supposed to have been the function of the International Seabed Authority in Kingston, Jamaica. Most recently, the United Nations adopted the High Seas Treaty, which – if ratified by at least 60 countries – is likely to further complicate the regulatory environment for ocean seabed mining.77 [EPA-HQ-OAR-2022-0829-0585, pp. 28-30]

67 Richard Martin. Bolivia Vies to Join Lithium Producers Club After Years of Disappointment. Spglobal.com. July 11, 2022.

68 David Luhnow. Santiago Perez. Mexico Takes Aim at Energy Firms. Wall Street Journal. June 6, 2022, A1, A10.

69 David Agren, Michael Scott. Mexico Nationalises Lithium in Populist President's Push to Extend State Control. Financial Times. April 20, 2022.

70 Douglas Magno, Louis Genot. Lithium Boom Comes to Brazil's 'Misery Valley'. Techxplore.com. June 15, 2023.

71 Harry Dempsey, Joseph Cotterill. How China is Winning Race for Africa's Lithium. Financial Times. April 2, 2023.

72 David Kennedy. Mercedes, VW Sign Raw-Material Deal with Canada. Automotive News. August 29, 2022, 28.

73 Kate McKenna. A New Mine Could Position Quebec as a Lithium Leader, But Its Rocky Past Worries Locals. www.cbc.ca. November 15, 2022.

74 Aitor Hernandez-Morales, Sofia Diago. Portugal to Scrap Lithium Mining Project. Politico.com. April 27, 2021.

75 Catarina Demony. Portuguese Community Files Legal Action Against Lithium. Reuters.com. July 22, 2022.

76 Ivana Sekularac. Serbia Revokes Rio Tinto Lithium Project Licenses Amid Protests. Reuters.com. January 20, 2022.

77 https://www.forbes.com/sites/katherinehamilton/2023/06/19/un-adopts-first-ever-international-treaty-protecting- high-seas/?sh=8bfc2631e459.

The US has only one active lithium mine, a small brine operation in Silver Peak, Nevada. The developer is striving to double production from 5,000 to 10,000 tons LCE by 2025.78 [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

EPA, based on a memorandum from DOE, claims that 22 promising lithium development projects are under investigation in the United States. What DOE and EPA did not disclose is that only one of the projects (Thacker Pass, Nevada) has successfully acquired a permit to operate. [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

The Thacker Pass project has, however, been delayed due to determined opposition from indigenous groups, ranchers, and environmentalists.79 A first round of litigation against the BLM permit decision led to a split decision by a federal judge, weighted in favor of BLM's permit. More litigation and protests are likely; the extent of local opposition raises questions about whether the mine will be sustainable. [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

78 Bill Dentzer. Nevada's Next Boom. Las Vegas Review-Journal. Pctober 2, 2021.

79 Ernest Scheyder. Lithium America's Delays Nevada Mine Work After Environmentalist Lawsuit. Reuters.com. June 11, 2021.

Here are several lithium project locations in the US that have encountered serious obstacles. [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

1. Borox Lake, Alvard Playa, and Whitehorse Ranch, eastern Oregon. The BLM informed the developers that lithium mining is not permitted in these areas due to a year 2,000 forest-conservation law.80 Another developer continues to explore on the border of Oregon and

Nevada, but it is one of the best remaining habitats for the sage grouse.81 [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

2. Cherryville, Gaston County, North Carolina. In September 2020 a developer announced a deal with Tesla to supply up to 30,000 tons/year LCE from a new hard-rock mine on private land outside Cherryville, Gaston County, North Carolina (near Charlotte). Initial deliveries of material to Tesla were scheduled for July 2022.82 Although the developer spent $58 million and several years on the project, the Gaston County Board of Commissioners objected to a lack of consultation outreach from the developer and expressed serious environmental concerns about the project.83 The County placed a moratorium on mining activities until local zoning regulations could be revised. Faced with determined local opposition, the developer gave up on obtaining a state permit and County approval; the project was delayed indefinitely.84 [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

3. Rhylolite Ridge, Nevada. A developer, which has already spent more than $100 million in assessment and exploration, is in the BLM environmental impact assessment phase of a new lithium mine in Nevada that could produce 24,000 tons LCE per year starting 2025-2026. The project has substantial private-sector backing and a conditional $700 millon DOE loan for a nearby processing facility. A complication occurred when the US Fish and Wildlife Service, which is part of the Department of Agriculture, determined that a desert flower, Tiehm's buckwheat, is an endangered species. The flower is apparently found only near the mine site, but the developer maintains that the location of the mine, which has been altered to reduce risk, will not threaten extinction of the flower. The project has triggered intense opposition from a national environmental group, the Center for Biological Diversity. Further delays and litigation seem likely.85 [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

Salton Sea, California. Several developers plan to use a relatively new technology, direct lithium extraction (DLE), to access lithium suspended in super-hot brine at the Salton Sea, near geothermal plants that are already extracting brine for power production.86 The projects have private sector backing and financial support from the State of California. There is another dozen or so projects around the world seeking to implement DLE, but there is only one operational DLE project in the world. It is in Argentina, where the lithium content of brine is unusually high, but even there the developer makes partial use of conventional evaporation ponds. The developer has not been able to replicate commercial-scale DLE anywhere else. A recent environmental review of DLE noted that most performance testing of DLE has not been performed on real brines. Real testing at substantial scale is necessary to assess requirements for energy, fresh water, chemicals, and waste management. Real-brine testing should evaluate several performance indicators simultaneously.87 Views of the commercial feasibility of DLE vary considerably. One estimate of the direct cost of DLE puts it in the range of $4,000/ton LCE, a bit higher than the direct costs of conventional methods but not prohibitive.88,89 [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

80 Bradley W. Parks. Company Scraps Lithium Project in Oregon's Alvors Desert. Opb.org. August 3, 2022.

81 Bradley W. Parks. A New Oregon Mining Boom Could Be a Bust for the Sage Grouse. May 11, 2022.

82 Aime Williams. The Race to Mine Lithium in America. Financial Times. May 11, 2022, 17.

83 file:///C:/Users/grahamjd/Downloads/sustainability-13-11274-v2.pdf.

84 Ernest Scheyder. Piedmont Lithium Looks Abroad Amid North Carolina Uncertainty. Reuters.com. November 26, 2022.

85 Scott Sonner. Nevada Lithium Mine Gets Conditional $700 Million Government Loan. Apnews. January 13, 2023.

86 Laurence Lliff. A Sea Change: Geothermal Deposits at Toxic Lake about to Yield Vast Lithium Supplies. Automotive News. November 29, 2021, 31.

87 Maria L. Vera, Walter R. Jorres, Claudia I Galli, Alexandra Chagnes, Victoria Flexer. Environmental Impact of Direct Lithium Extraction from Brines. Nature Reviews Earth and Environment. 4, 2023, 149-165.

88 Warren, I. Techno-Economic Analysis of Lithium Extraction from Geothermal Brines. National Renewable Energy Laboratory.

89 Adam Webb. Lithium Sector: Production Costs Outlook. S&P Global Market Intelligence. Spglobal.com. 2019.

Before the final rule, EPA and DOE should assess each of the 22 lithium projects, including a realistic, itemized assessment of how likely they are to be in commercial operation by 2027-2032, given the intensity of local opposition to mining. The International Energy Agency estimates new mining projects take an average of 16.5 years to move from discovery of the resource to actual production, assuming the mine starts producing at all. . The time scales in the United States are at the high end of the range in IEA's analysis, and few projects can overcome intense public opposition.90 The track record to date in the US suggests that most of the 22 lithium projects will not produce a ton of LCE.91 It should be emphasized that DOE has no authority or special expertise in the regulatory aspects of permits for new mines; that authority and expertise is housed in the Bureau of Land Management in the Department of Interior and the Forest Service in the Department of Agriculture. [EPA-HQ-OAR-2022-0829-0585, pp. 30-32]

90 https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary.

91 John D. Graham, John A Rupp, Eva Brungard. Lithium in the Green Energy Transition: The Quest for both Sustainability and Security. Sustainability. 13(20). 2021. 0.3390/su132011274.

Flaws in Standard Market Forecasts of Lithium Supply

Prestigious management-consulting and investment firms often produce consensus reports on global markets for specific commodities. EPA relies on one such report on lithium, a proprietary forecast by Wood MacKenzie, to support the proposition that global supplies of lithium will be adequate to meet global demand in the year 2032. [EPA-HQ-OAR-2022-0829-0585, pp. 32-33]

Mining specialists have dismissed such forecasts because of systematic errors in their methods. Specifically, they (1) overestimate the ease and pace at which new supplies will be developed,(2) they overestimate the percentage of new supplies that will be of battery-grade quality for electric vehicles; (3) they underestimate the amount of material lost due to low yields in cell manufacturing; (4) they underestimate the impact of pricing of high-cost production (lepidolite); and (5) they underestimate the impact of the higher costs of capital that miners now face.92 Given how common it is for new projects to falter due to local public opposition, it is startling that Wood MacKenzie does not even include public support as a formal variable in its forecast. Daniel Morgan, a mining specialist at the investment bank Barrenjoey, insists that Western companies and governments have failed to build an adequate supply chain for lithium:

“There’s a great love of throwing out lofty targets, but where the rubber hits that road, it’s not going to happen.”93 [EPA-HQ-OAR-2022-0829-0585, pp. 32-33]

92 Matt Fernley. Battery Materials Review: 2022 Yearbook. February 2023, 9.

93 James Fernyhough. Electric Vehicle Targets “impossible” Without Changes to Lithium Pipeline. Financial Times. April 13, 2022, 6.

Organization: Kentucky Office of the Attorney General et al.

C. The Proposed Rule ignores significant hurdles to the industry transformation that the rule requires.

EPA is pushing forward with this proposal at a breakneck pace and in circumstances ill-suited to the aggressive industry transformations that the Agency demands. The electrical grids are neither stable nor safe enough to handle EPA’s proposal. The country will be more energy dependent and less secure because of it. Automakers will be left without the materials they need to comply. And all the while, consumers—our citizens—will have to deal with empty government promises about vehicle pricing, utilization, and safety. In short, the Proposed Rule ignores too many aspects of this too-important issue. [EPA-HQ-OAR-2022-0829-0649, p. 10]

2. The automotive supply chain is not ready for the Proposed Rule.

The Proposed Rule’s fast-and-furious approach to electrification will also have devastating consequences for the automotive supply chain. EPA admits that “[c]urrently, the U.S. is lagging behind much of the rest of the world in critical mineral production” to so great an extent that “it is more convenient” to import minerals like nickel that are critical to build the necessary components of EVs. 88 Fed. Reg. at 29,315. But talk of convenience masks the reality that “[t]oday’s battery and minerals supply chains revolve around China”—over “half of lithium, cobalt and graphite processing and refining capacity” is located there, and “the majority of the [key mineral] supply chain . . . [is] likely to remain in China through 2030.” Global Supply Chains of EV Batteries, International Energy Agency, https://bit.ly/3MXdM3Y. At best, finalizing a rule that requires this sort of foreign dependence will deal a significant blow to our energy independence. See WV Amicus Br. at 6-17 (explaining how “forcing a quick transition to electric vehicles . . . will make automakers unreasonably dependent on foreign-controlled supply”). At worst, it will raise real threats to our national security. See Opening Br. for State Pet’rs., Texas v. EPA, No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF 1996773, at 22-24 (discussing the “well-documented history of China using its rare-earth-minerals dominance as a geopolitical weapon”). [EPA-HQ-OAR-2022-0829-0649, pp. 12-13]

What is more, demand for these rare materials will spike outside the automotive context as quickly as the Proposed Rule will spike it within. EPA recognizes this: It acknowledges that critical minerals for EV component production “are also experiencing increasing demand across many other sectors of the global economy . . . as the world seeks to reduce carbon emissions.” 88 Fed. Reg. at 29,313. The Proposed Rule also concedes that other “uncertain issues” like “permitting, investor expectations of demand and future prices, and many others” make it “difficult to predict with precision the rate at which new capacity will be brought online in the future.” Id. Yet the proposed solution is just a short “transition period” so that “a robust supply chain” can develop for these products, including new material mining and expanded processing capacity. Id. These obstacles should slow a project with even a conservative timetable; for an overhaul as rushed as the Proposed Rule, they are reason to return to the drawing board. Proceeding without more concrete, realistic projects for expanded supply chains—and more realistic timetables—is another mark of arbitrary and capricious decision-making. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

Other concerns about the minerals' supply and their extraction processes raise still more hurdles. The Proposed Rule had to recognize that it would take an estimated "five to ten" or more years "to develop a new [lithium] mine or mineral source"—and that delay is despite "very high" industry motivation from a "very robust" demand outlook. 88 Fed. Reg. at 29,313. Yet even that estimate is likely far too rosy. Last year, one geometallurgy professor looked at what it would take to shift away from fossil fuels entirely and to these and other rare materials for a single generation. Based on 2019 mining production rates, he predicted that the necessary extraction of "battery metals like lithium, cobalt, and graphite" would take over 9,900 years, 1,700 years, and 3,200 years, respectively. Simon P. Michaux, The quantity of metals required to manufacture just one generation of renewable technology units to phase out fossil fuels, YouTube (Aug. 18, 2022), https://bit.ly/42w7Fcx; see also Simon P. Michaeux, Assessment of the Extra Capacity Required of Alternative Energy Electrical Power Systems to Completely Replace Fossil Fuels (Aug. 18, 2022), https://bit.ly/3qCU1qU. Indeed, in 2022, the global reserves of those same three metals amounted to "less than five percent of what we need [for] one generation." Id. And among those reserves, not every discovery deposit becomes a mine. Only 1 or 2 for every 1000 does, and it takes between 15 and 20 years for those few mines to become fully functional. Id. And of those, 20–30% of the mines that get up and running will eventually "go out of business because of market conditions." Id.; see also The Raw-Materials Challenge: How The Metals And Mining Sector Will Be At The Core Of Enabling The Energy Transition, McKinsey & Co. (Jan. 10, 2022), https://tinyurl.com/2ne5jt37. Throw in the fact that each of these materials has a limited life-cycle after which they must be "decommissioned and replaced," and it becomes clear that we may well need to "make batteries out of something else." Michaux, The quantity of metals required to manufacture just one generation of renewable technology units to phase out fossil fuels, supra. That whole endeavor "is not going to be easy." Id. Quite right. The Proposed Rule needs to deal with real projections for the real demand it creates. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

The view further down the supply chain is no better. The Proposed Rule can say only that supply capacity is "rapidly forming," not that it exists now or in the near-enough future. 88 Fed. Reg. at 29,323. EPA recognizes that it is still only "a goal of the U.S. manufacturing industry to create a robust supply chain for these products." Id. (emphasis added). EPA also says that, "[i]n general, the structure of the proposed standards allows an incremental phase-in to the MY 2032 level and reflects consideration of the appropriate lead time for manufacturers to take actions necessary to meet the proposed standards." Id. at 29,239. But there is nothing "incremental" about an edict for an eight-fold increase in EV sales in eight years. See id. at 29,189, 29,329, 29,346. And there is nothing simple about the amount of time and money needed to get the still-illusory supply chain running at massive new scale. According to former auto executive-turned-industry adviser Larry Burns, "[t]he transition automakers are perusing requires building totally new factories, assembly lines and supply chains, a years-long process." Puko, supra. Automakers will have to apply "major re-engineering" that "usually takes anywhere from three to five years" per model to dozens of vehicle models in under a decade. Id. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

Battery factories, in particular, take years to build. See Eli Leland, So You Want To Build A Battery Factory, Medium: Batteries are Complicated (July 16, 2021), https://tinyurl.com/mv4vhh3x. It takes longer still to create and sharpen production processes that yield quality and safe products that can satisfy consumer demand and federal regulators. Mistakes are too costly for it to be any other way. See Bradley Berman, Battery Experts Provide Deeper Explanations for Chevy Bolt Fires, Autoweek (Nov. 15, 2021), https://tinyurl.com/3r7879u6 (describing recall of 141,000 EVs following 16 reported fires). The Proposed Rule, however, will have "automakers rac[ing] to supplement material shortages," and risking far more than prudence allows, just to "scal[e] these facilities and operations quickly." Paige McKirahan, United States: EV Supply Chain Disruption To Ignite Disputes Over IP, M&As, And More, Mondaq (Dec. 9, 2022), https://bit.ly/3p6eXpI. This demand, in turn, "put[s] at risk the stability of mines and refineries with possible unskilled workers," and "[h]uman rights violations . . . run rampant if safe and proper processes are not identified." Id. None of this is acceptable. All of it can be avoided. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

The Proposed Rule should also account for the reality that too-fast and too-aggressive regulation can stifle the very innovation it relies on. Even with increased governmental subsidies toward rapid EV development, mandates like the Proposed Rule will almost certainly "prompt automakers to make bigger bets on a narrower set of options for complying, which might limit innovation and progress because technology now is changing so rapidly." Puko, supra. Programs like the Renewable Fuel Standards are whittled down, contrary to Congress's intent. See WV Amicus Br., at 24-27. And changing contexts that should command our attention end up ignored, including that EV "battery technology is still evolving," which means "the U.S. may be at risk of building mines and factories to produce batteries that wind up being obsolete in a decade." Joann Muller & Jael Holzman, Why the U.S. Can't build EVs without China, Axios (Apr. 12, 2023), https://bit.ly/42iaoWS. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

The second- and third-order consequences of choosing rushed production based on today's technologies over innovation are weighty, too. Take nickel, for example. It is possible—even likely—that later battery technologies will render it unnecessary. See 88 Fed. Reg. at 29,314 (citing battery applications that "an iron phosphate cathode which has lower energy density but does not require . . . nickel"). And that may prove to be a very good thing: "Reaching the nickel means cutting down swaths of rainforest," and "[r]efining it is a carbon-intensive process that . . . produc[es] waste slurry that's hard to dispose of." Jon Emont, EV Makers Confront the 'Nickel Pickle,' WSJ (June 4, 2023), https://bit.ly/3PdIoRH. Nickel, then, exposes "a larger contradiction within the EV industry: Though EVs are designed to be less damaging to the environment in the long term than conventional cars, the process of building them carries substantial environmental harm." Id. Rather than letting market demand and innovation explore other paths forward, the Proposed Rule locks automakers and the rest of our economy into this impossible option. EPA should slow down this endeavor and allow both safety and innovation to drive decision-making in this critically important area. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

Organization: Kia Corporation

EPA Underestimates Market and External Challenges

EPA's proposed rule highlights the very complex challenges that lie ahead for the EV market. There are an enormous number of factors that are outside the control of automakers including manufacturing capacity, battery production, charging infrastructure, critical mineral supply, and consumer acceptance. A successful transition in the timeframe proposed will require massive changes in commitments from all sectors of the economy: vehicle suppliers, labor, utilities, charging infrastructure, home builders, mining, and mineral processing. Consumer behavior and acceptance also needs to significantly change. [EPA-HQ-OAR-2022-0829-0555, p. 6]

EPA's proposal requires automakers to sell EVs but does not propose any requirements to ensure adequate charging infrastructure to homes, highways, or businesses, or mandate utilities to have adequate capacity or provide reasonably priced high-power charging, or mandate easily accessible and affordable battery critical minerals for EV batteries. Government policies need to start today to ensure there are enough critical minerals for batteries and high-power charging. Unfortunately, there is not yet a roadmap to developing these and other essential pieces to the transition. [EPA-HQ-OAR-2022-0829-0555, p. 6]

All of the above market challenges will need to have complementary policies supporting all of the sectors outside the vehicle industry including utilities, mining, charging companies and will require them to meet targets too. It is critical that EPA take these factors into consideration when setting standards. [EPA-HQ-OAR-2022-0829-0555, p. 6]

The government's ability to implement the right complementary policies and monitoring these factors will be paramount to the success of this ambitious rulemaking. EPA standards alone cannot and will not create demand or infrastructure for EVs. [EPA-HQ-OAR-2022-0829-0555, pp. 6-7]

Organization: Lisa Allee

[*From Hearing Testimony, May 9, 2023*] Second fix the problems with electrical vehicles. The batteries need to be clean, Mr. Musk wants to create a very big mess in the northern part of the center of the country with a factory so we need to encourage batteries research such that batteries are actually clean and not made from rare earth metals that have to be mined. [S]o clean batteries and the electricity for electric vehicles are from solar and wind, that needs to be part of the solution. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 1]

Organization: Mass Comment Campaign sponsored by Specialty Equipment Market Association (SEMA). (web) (1,488 signatures)

The Specialty Equipment Market Association (SEMA) submits the letters included below on behalf of over 1,480 men and women who work in the specialty automotive aftermarket outlining their concerns with the U.S. Environmental Protection Agency's proposed Multi-Pollutant Emissions Standards for Model Years 2027 to 2032 Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,184 (May 5, 2023). SEMA members manufacture, sell, and install parts and products that make motor vehicles more fuel efficient, cleaner, and safer, employing over one million Americans and contributing over $52 billion annually to the U.S. economy. Thank you for your consideration of these comments. [EPA-HQ-OAR-2022-0829-0724]

I write in opposition to the U.S. Environmental Protection Agency's proposed multipollutant standards for light-and medium-duty vehicles (Docket ID No. EPA–HQ–OAR–2022–0829). I have serious concerns with all three of the options included in the draft rulemaking, as the EPA seeks to lower carbon emissions under timelines that effectively make electric vehicles the only option for automakers to meet the pollution limits from 2027 through 2032. [EPA-HQ-OAR-2022-0829-0724]

The large-scale shift to electric vehicles, which would comprise two-thirds of all new-car sales in the U.S. by 2032 under this proposal, will hurt workers, small businesses, and consumers while doing little to help the environment. The proposed rule would lead to fewer vehicle choices for individuals and families, reducing the selection of vehicles that fit their household budgets and unique needs. [EPA-HQ-OAR-2022-0829-0724]

This proposed rulemaking will disrupt automotive industry supply chains and eliminate large numbers of jobs in vehicle manufacturing, parts production, and repair businesses. While small businesses are the lifeblood of the American economy, they will be hit the hardest by a premature rush to have electric vehicles dominate new vehicle sales. Small, internal-combustion engine-based businesses are not receiving the billions of dollars that large automakers are to make the conversion to electric. Thirty-three percent of automotive aftermarket products purchased by consumers last year were on upgrades and accessories for internal combustion engines and drive trains. That means as much as $17 billion of small business value will be wiped out by this proposal. [EPA-HQ-OAR-2022-0829-0724]

While the goal of this proposal is to reduce the U.S. automotive fleet's carbon footprint, it simply shifts how emissions are produced. The EPA is ignoring the value of technologies produced by American workers, manufacturers, and farmers that are critical to our transportation future. Specialty automotive aftermarket businesses are leading the way through alternative fuel innovations from replacing older engine technologies with newer, cleaner versions to converting older ICE vehicles to new electric, hydrogen, and other alternative fuels. Sadly, the EPA's plans to reduce greenhouse gases and criteria pollutants do not factor this in. [EPA-HQ-OAR-2022-0829-0724]

The EPA's proposal boosts an electric vehicle supply chain dominated by China, which powers its manufacturing-base through coal-fired power plants and mines minerals for EV batteries with the use of environmental practices that we would never approve of in the United States. Emissions coming out of tailpipe matter, but so do the lifecycle emissions of building a car, constructing and charging a battery, and retiring vehicles. [EPA-HQ-OAR-2022-0829-0724]

The future of automotive technology matters to consumers, millions of automotive enthusiasts, and all the men and women who work in the industry. Accordingly, I ask that the EPA does not follow through on any of the three options outlined in this proposed rulemaking and instead pursues a rulemaking for light and medium-duty vehicles that embrace a technology-neutral approach that factors in the infrastructure that exists, the innovation we are all capable of, consumer preferences, and the lifecycle emissions of the technology that powers our vehicles. [EPA-HQ-OAR-2022-0829-0724]

Organization: Mass Comment Campaign sponsoring organization unknown (web) (679 signatures)

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Organization: Mass Comment Campaign sponsoring organization unknown (118 signatures)

Secondly, by not taking any significant steps to improve permitting for the mining of critical minerals in America, we are endangering our ability to access the minerals required for EV production. This over-reliance on foreign sources of minerals could undermine our domestic energy security and jeopardize our nation's economic independence. After seeing how international supply chains can break down during the pandemic, American consumers cannot and should not be subject to increased reliance on unstable foreign supply chains, especially concerning something as vital as personal transportation. [EPA-HQ-OAR-2022-0829-1701]

Organization: Mazda North American Operations

The proposed rule is the most stringent light duty vehicle regulation that EPA has promulgated to date. The electrification and carbon reduction goals are incredibly challenging and will require not just a coordinated effort to achieve but also solutions addressing consumer demand, affordability, charging network, power grid capacity, rare earth mineral availability, and striking the right balance regarding China policy [EPA-HQ-OAR-2022-0829-0595, p. 2]

Summary

Mazda is proud of its heritage and contributions to personal mobility, and we celebrated our 100th anniversary in 2020. Mazda has also long been an engineering leader known for innovative powertrains like the rotary engine and Skyactiv technology. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

We look at EPA's NPRM and its preferred option through the lens of a company that is already working towards an electrified future. It's not a matter of if this transformation will happen, but when and how. Mazda, like the rest of the industry, faces many challenges: [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

- Will charging infrastructure be sufficient?

- Can the electric grid handle the increased demands?

- How will EV incentives on the federal and state level impact this shift?

- Will suppliers be able to develop and produce components like batteries (that currently require critical minerals, many from China) quickly enough and in enough volume?

- How might future laws or regulations in trade and re-shoring impact our ability to meet goals?

- Are consumers ready and willing to move away from "tried and true" internal combustion engines in numbers sufficient to meet these goals?

- Can OEMs remain sufficiently profitable to fuel the transition to EVs?

[EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Mazda strongly requests that EPA take these considerations into account and make necessary adjustments to the proposed rule as it works towards a Final Rule. We feel the Final Rule should have more realistic targets and associated ramp ups, include PHEVs, and adopt CARB's current LEV IV for criteria emissions. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Organization: MECA Clean Mobility

Efficient Utilization of Battery Critical Materials

MECA supports EPA's technology neutral, performance-based approach to reduce both criteria and GHG emissions from light-duty vehicles through improvements in the efficiency of today's vehicles combined with accelerated introduction of battery electric vehicles. We agree with the Agency's conclusion that projected penetration of electric vehicles will provide significant emission benefits from the light-duty fleet. However, based on current sales rates of electric vehicles, there is still considerable uncertainty in the projected pace of future electric vehicle penetration. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

Table 3 compares the fuel economy, tailpipe & upstream greenhouse gas emissions and utilized battery capacities of equivalently sized conventional, full hybrid, plug-in hybrid and battery electric vehicles using available data from the EPA/DOE fueleconomy.gov website. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

On a vehicle basis, the tailpipe & upstream greenhouse gas emissions of the battery electric vehicle (Tesla Model Y Long Range AWD) would avoid 311 g/mile of CO2 (i.e., 381conventional RAV4 – 70Tesla Model Y = 311) compared to avoiding 231 g/mile with the plug-in hybrid (Toyota RAV4 Prime) assuming that only 69.3% of its operation is all-electric. However, on an equivalent battery capacity basis, the last row of Table 3 [See original comment for Table 3. Comparison of Battery Capacities of Conventional, Full Hybrid, Plug-in Hybrid and Battery Electric Vehicles] shows that HEVs and PHEVs use the available battery materials more efficiently than BEVs avoiding considerably higher amounts of CO2 per kWh of battery capacity. This improved efficiency of hybrids is due to the higher rate of cycling their smaller battery capacities. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

Table 3 displays fueleconomy.gov data with stated battery capacities for selected vehicles. It should be noted that the amount of battery material needed to manufacture each full battery electric vehicle could be deployed to manufacture five PHEVs. One can calculate the amount of CO2 reduced each year as a function of battery capacity (kWh) and miles driven. Assuming an all-electric operation of 69.3%37 of the PHEV, a far greater cumulative amount of avoided CO2 (5 x 191 g/mile = 955 g/mile of avoided CO2) can be realized by deploying the PHEVs compared to 271 g/mile of avoided CO2 realized by the operation of the one BEV. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

37 The assumption of 69.3% electric operation for the RAV4 PHEV is found on www.fueleconomy.gov.

To fully electrify a medium-duty vehicle, a minimum of a 75 to 100kWh battery would be needed. We ran the same calculation above to compare example medium-duty vehicles with varying degrees of electrification. The result is that the latest generation full hybrid powertrain would eliminate over 700kg CO2/kWh/year, whereas a plug-in hybrid would yield 127 kgCO2/kWh/year and a BEV would yield 31 kgCO2/kWh/year. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

These analyses illustrate that strategically deploying HEV and PHEV powertrains as well as BEVs can yield significantly greater CO2 reductions on a battery capacity basis thus reducing battery critical mineral supply chain pressures and providing fleets and manufacturers greater flexibility in achieving GHG emission goals. Further reductions in the carbon intensity of liquid fuels would complement hybrid vehicle adoption by reducing the engine-based CO2 emissions from these vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 26-29]

Organization: MEMA, The Vehicle Suppliers Associated

The success of our industry is interwoven with the success of this proposal and the ability of the government to work with industry and other stakeholders to meet significant challenges. Therefore, the rule must address: [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Supply chain challenges. The proposed rule assumes that all materials advanced vehicles, which are not available today in the quantities needed to support the massive growth in vehicle construction, will become available within sufficient time. This places a significant and unnecessary risk on manufacturers and suppliers. Furthermore, once a company has converted production to new technology lines, that company cannot easily pivot its facilities and workforce back to the previous technology if EPA projections are not realized by the mid-to-late-2020s. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

MEMA members are working to accelerate the performance and availability of clean-operating vehicle technologies and are directly contributing to their realization. Besides battery electric options, effective low- and zero-carbon technologies for future and current in-use vehicles also exist and can readily be put to use to reduce nationwide emissions and help EPA meet its climate goals. The success of this rule depends on greater inclusion of all available emissions reduction technologies, significant investment in infrastructure, careful understanding and investment in the domestic and global supply chain and ensured repair access to serve the improved and enhanced domestic vehicle fleet. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

Supply Chain Challenges Will Continue Throughout Implementation

In the supporting documents of the proposed rule, EPA catalogs all public statements of investment in and projections for future availability of critical minerals. This projected sum is then cited as evidence there will be sufficient materials for construction of the future fleet. We disagree with this optimism. To assume that all materials for advanced vehicles in the quantities needed to support the exponential growth in advanced technology vehicle production and adoption will become available exposes the automotive industry – both vehicle manufacturers and suppliers and the jobs it supports to significant, unnecessary risk. While the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Recovery Act (IRA) endeavor to bring more resources to mining in the U.S. to boost supplies of critical materials, it is unclear that these provisions will resolve some of the other longstanding hurdles that inhibit mining activities in the U.S. Concerns about environmental issues often make mining projects extremely burdensome to undertake, and the associated permitting process extends the timelines past the point of practicality. EPA seems to assume in this rule that domestic mining will become more routine, but without sufficient evidence to substantiate this belief. It is our perception that in the laws passed to date will overcome of the most difficult challenges posed by trying to site mines in the U.S. [EPA-HQ-OAR-2022-0829-0644, pp. 12-13]

One way to supplement domestic mining is through increased recycling. As the EPA notes, the presence of minerals in materials and products already in the U.S., adds to the "mineral stock that is available for domestic recycling in the future." The EPA spends much of the analyses recycling discussion on battery recycling, specifically on the minerals associated with batteries. Yet, EVs will rely on many other minerals beyond those needed for batteries. Aluminum, manganese, magnesium, silicon and many other critical minerals are already located in the automotive supply chain independent of batteries, such as in the aluminum and steel in door frames and in the body in white. The domestic recycling infrastructure is not sufficiently sophisticated to recapture and return the pre- and post-consumer scrap of this material already present domestically to the automotive sector. While EPA recognizes the value that recycling can provide to stabilizing the supply of critical minerals, its assumptions about the feasibility of this recycling to supplement mined minerals is premature without more investments in infrastructure to support this work. [EPA-HQ-OAR-2022-0829-0644, pp. 12-13]

MEMA urges:

- EPA to add battery recycling and disposal costs to the analysis as part of a sustainable BEV deployment to better address scarcity of critical minerals, provide a more resilient domestic supply chain, and over time reduce the added carbon impact of battery manufacturing and associated multi-national logistics. [EPA-HQ-OAR-2022-0829-0644, pp. 12-13]

- The Biden Administration and Congress must work expeditiously secure, through trade policy, access to critical materials and expedite projects to refine critical materials in the U.S. and allied countries and encourage domestic recycling programs for other critical minerals to further expand and assure supply. [EPA-HQ-OAR-2022-0829-0644, pp. 12-13]

Additionally, EPA should consider added costs for post-warranty battery pack replacement to the RIA to capture critical mineral demands resulting from second and third owners who may have to replace/repair aged batteries after buying a used BEV. This may not factor into the cost benefit for new vehicle purchases, but it will cause further demand for critical materials. EPA should add this into the cost benefit for maintenance in Chapter 4.6.1 as well as critical mineral demands in RIA Preamble IV.C.6. While some of these retired batteries may be recycled, it will take some time for materials to build up and there will be some demand for new material that competes with production for new vehicle batteries. This is another reason EPA must forecast a more diversified, and possibly more expensive, supply chain in the RIA. [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

Organization: Minnesota Corn Growers Association (MCGA)

The proposed EPA standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. While the U.S. market share of BEVs will continue to expand, establishing regulations where success is solely contingent upon an unattainable tenfold increase in the production and sales of BEVs over the next eight years represents an avoidable mistake. The proposed rule would require huge investments and rapid growth in many industries, including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0612, p. 3]

If the economic damages are not bad enough, the impact of EPA's forced change to BEVs may compromise our national security. Who is in favor of a move that would incentivize batteries and minerals produced and mined in countries that are hostile to the U.S. and have questionable labor standards over relying on homegrown renewable liquid fuels, along with our domestic energy sources found right here in America, much of it in the Midwest? [EPA-HQ-OAR-2022-0829-0578, p. 3]

Other concerns with BEVs are related to the supply of critical minerals for batteries. A report5 by the International Energy Agency (IEA) says “mineral demand for use in EVs and battery storage is a major force, growing at least thirty times to 2040, it has taken on average over 16 years to move mining projects from discovery to first production. These long lead times raise questions about the ability of suppliers to ramp up output. The Democratic Republic of the Congo (DRC) and People’s Republic of China were responsible for some 70% and 60% of global production of cobalt and rare earth elements respectively in 2019. The level of concentration is even higher for processing operations. China’s share of refining is around 35% for nickel, 50- 70% for lithium and cobalt, and nearly 90% for rare earth elements. High levels of concentration, compounded by complex supply chains, increase the risks that could arise from physical disruption, trade restrictions or other developments in major producing countries. Production and processing of mineral resources gives rise to a variety of environmental and social issues that, if poorly managed, can harm local communities and disrupt supply.” [EPA-HQ-OAR-2022-0829-0612, p. 5]

5 International Energy Agency, "The Role of Critical Minerals in Clean Energy Transitions", 2021; https://www.iea.org/reports/the-role-of-critical-minerals- in-clean-energy-transitions.

Toyota6 and others7 have argued for a balanced approach to emissions reductions using BEVs and other technologies, saying “perfect should not be the enemy of the good”. The battery size8 for a BEV is about 6 times larger than a PHEV (~75-145kWh vs. ~12-18kWh), and about 60 times larger than a HEV (~1.3-1.9kWh). Given the limited supply of battery materials, a large number of HEVs and PHEVs can clearly achieve substantially better GHG reductions than a small number of BEVs. [EPA-HQ-OAR-2022-0829-0612, pp. 5-6]

6 Gill Pratt, Toyota Motor Corporation’s Chief Scientist, open letter posted on Medium, August 2021; https://medium.com/toyotaresearch/more-straight- talk-about-toyotas-electric-vehicle-strategy-f0aba4be40.

7 Foster, Koszewnik, Wade, and Winer, "Pathways to More Rapidly Reduce Transportation's Climate Change Impact." Issues in Science and Technology, November 17, 2022; https://issues.org/reduce-vehicle-transportation-emissions-foster-koszewnik-wade-winer/.

8 https://insideevs.com/reviews/344001/compare-evs/.

Organization: Mitsubishi Motors North America, Inc. (MMNA)

To determine a realistic maximum volume of EVs the market can support for each of the model years covered by the rule, we believe EPA should consider certain critical factors. Among these factors, we believe EPA must make a thorough and realistic year-by-year assessment of key factors like projected battery costs, projected supply of battery critical-minerals, projected residential and public charging infrastructure availability, projected electrical grid capacity, and consumer acceptance of BEV technology in the broader arena. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Organization: National Association of Manufacturers (NAM)

Unlock Domestic Critical Minerals

The growth of electric vehicle sales has led to concern about securing mineral inputs used in EV batteries.3 EV battery production depends on five critical minerals for which the domestic supply is potentially at risk of disruption: lithium, cobalt, manganese, nickel and graphite.4 The

EPA has recognized that a robust supply chain needs to be developed through multiple production routes to support the production of EVs in the United States.5 The National Mining Association reports that Australia and Canada, two countries with environmental protections that are arguably equivalent to or even more stringent than those in the U.S., have mine permitting processes that last two to three years on average, whereas in the U.S. the permitting process averages seven to 10 years.6 Many of the raw materials for the EV batteries are still mined largely outside of the U.S.7 Developing an adequate domestic supply of these minerals will require congressional and administration action to expedite permissions for developing those resources in a responsible way. [EPA-HQ-OAR-2022-0829-0633, p. 2]

3 https://crsreports.congress.gov/product/pdf/R/R47227#:~:text=These%20EV%20battery%20chemistries%20depend,manganese%2C%20nickel%2C%20and%20graphite.

4 Ibid.

5 88 Fed. Reg. 29313

6 https://nma.org/wp-content/uploads/2016/09/Fact-Sheet-Permitting-Delays-1.pdf

7 https://www.gao.gov/products/gao-22-104824#summary_recommend

Organization: National Corn Growers Association (NCGA)

Other concerns with BEVs are related to the supply of critical minerals for batteries. A report 5 by the International Energy Agency (IEA) says “mineral demand for use in EVs and battery storage is a major force, growing at least thirty times to 2040, it has taken on average over 16 years to move mining projects from discovery to first production. These long lead times raise questions about the ability of suppliers to ramp up output. The Democratic Republic of the Congo (DRC) and People’s Republic of China were responsible for some 70% and 60% of global production of cobalt and rare earth elements respectively in 2019. The level of concentration is even higher for processing operations. China’s share of refining is around 35% for nickel, 50-70% for lithium and cobalt, and nearly 90% for rare earth elements. High levels of concentration, compounded by complex supply chains, increase the risks that could arise from physical disruption, trade restrictions or other developments in major producing countries. Production and processing of mineral resources gives rise to a variety of environmental and social issues that, if poorly managed, can harm local communities and disrupt supply.” [EPA-HQ-OAR-2022-0829-0643, p. 4]

5 International Energy Agency, "The Role of Critical Minerals in Clean Energy Transitions", 2021; https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

Toyota 6 and others 7 have argued for a balanced approach to emissions reductions using BEVs and other technologies, saying “perfect should not be the enemy of the good”. The battery size 8 for a BEV is about 6 times larger than a PHEV (~75-145kWh vs. ~12-18kWh), and about 60 times larger than a HEV (~1.3-1.9kWh). Given the limited supply of battery materials, a large number of HEVs and PHEVs can clearly achieve substantially better GHG reductions than a small number of BEVs. [EPA-HQ-OAR-2022-0829-0643, p. 4]

6 Gill Pratt, Toyota Motor Corporation’s Chief Scientist, open letter posted on Medium, August 2021; https://medium.com/toyotaresearch/more-straight-talk-about-toyotas-electric-vehicle-strategy-f0aba4be40

7 Foster, Koszewnik, Wade, and Winer, "Pathways to More Rapidly Reduce Transportation's Climate Change Impact." Issues in Science and Technology, November 17, 2022; https://issues.org/reduce-vehicle-transportation-emissions-foster-koszewnik-wade-winer/

8 https://insideevs.com/reviews/344001/compare-evs/

Organization: National Farmers Union (NFU)

In addition, several concerns with BEVs relate to the need for and supply of critical minerals for batteries. As noted by the International Energy Agency (IEA) and reflected in the chart below, “[i]n climate-driven scenarios, mineral demand for use in EVs and battery storage is a major force, growing at least thirty times to 2040.”15 [EPA-HQ-OAR-2022-0829-0581, p. 9]

15 International Energy Agency, The Role of Critical Minerals in Clean Energy Transitions, World Energy Outlook Special Report, at 8-9 (2021), available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean- energy-transitions.

[See original comment for bar graph of growth of selected minerals in the SDS, 2040 relative to 2020] [EPA-HQ-OAR-2022-0829-0581, p. 9]

As one potential concern regarding supply of these critical minerals, IEA has referenced long project development lead times, finding “it has taken on average over 16 years to move mining projects from discovery to first production. These long lead times raise questions about the ability of suppliers to ramp up output if demand were to pick up rapidly.”16 [EPA-HQ-OAR-2022-0829-0581, p. 9]

16 Id. at 12.

IEA also noted concerns with high geographical concentration of production, as discussed and reflected in the chart below.17 [EPA-HQ-OAR-2022-0829-0581, p. 9]

17 Id. at 10.

The Democratic Republic of the Congo (DRC) and People’s Republic of China (China) were responsible for some 70% and 60% of global production of cobalt and rare earth elements respectively in 2019. The level of concentration is even higher for processing operations, where China has a strong presence across the board. China’s share of refining is around 35% for nickel, 50- 70% for lithium and cobalt, and nearly 90% for rare earth elements. … High levels of concentration, compounded by complex supply chains, increase the risks that could arise from physical disruption, trade restrictions or other developments in major producing countries.18 [EPA-HQ-OAR-2022-0829-0581, pp. 9-10]

18 Id. at 11-12.

[See original comment for share of top three producing countries in production of selected minerals and fossil fuels, 2019] [EPA-HQ-OAR-2022-0829-0581, p. 10]

There is also growing scrutiny of environmental and social performance related to this sector. “Production and processing of mineral resources gives rise to a variety of environmental and social issues that, if poorly managed, can harm local communities and disrupt supply.”19 [EPA-HQ-OAR-2022-0829-0581, p. 10]

19 Id. at 12.

EPA should not focus on one technology. “Multiple types of relatively climate-friendly vehicles and accelerated development of sustainable substitute fuels should all be part of the picture.”27 While BEVs are part of the solution, a balanced approach to emissions reductions using BEVs and other technologies is needed.28 [EPA-HQ-OAR-2022-0829-0581, pp. 12-13]

27 Dave Foster, et al., Pathways to More Rapidly Reduce Transportation's Climate Change Impact, Issues in Science and Technology, Nov. 17, 2022; https://issues.org/reduce-vehicle-transportation-emissions-foster-koszewnik- wade-winer/.

28 Gill Pratt, (More) Straight Talk About Toyota’s Electric Vehicle Strategy, Aug. 23, 2021, https://medium.com/toyotaresearch/more-straight-talk-about-toyotas-electric-vehicle-strategy-f0aba4be40.

BEVs are not the only solution. Comparing vehicle specifications,29 the battery size for a BEV is about 6 times larger than a PHEV (~75-145kWh vs. ~12-18kWh), and about 60 times larger than a HEV (~1.3-1.9kWh). Given the limited supply of battery materials, a large number of HEVs and PHEVs can clearly achieve substantially better GHG reductions than a small number of BEVs. [EPA-HQ-OAR-2022-0829-0581, pp. 12-13]

29 See, e.g., Mark Kane, Compare Electric Cars: EV Range, Specs, Pricing & More, Updated July 1, 2022, https://insideevs.com/reviews/344001/compare-evs/.

Organization: National Parks Conservation Association (NPCA)

Lastly, to the degree through which this proposal could increase the development and permitting of domestic critical mineral mining projects to support LDV and MDV battery production, NPCA asks that EPA and the administration as a whole take necessary steps to mitigate or entirely avoid negative impacts on overburdened populations and sensitive ecosystems. This includes promoting practices such as critical mineral recycling, as well as overseeing the responsible citing of mining projects to limit harms to environmental justice communities, indigenous communities, and ecosystems within our beloved national parks. [EPA-HQ-OAR-2022-0829-0607, pp. 4-5]

Organization: Nissan North America, Inc.

Nissan appreciates the Administration’s focus on and support for advancing electrification and carbon neutrality and shares the same long-term goal of transitioning to zero emission vehicle society. However, Nissan believes that market realities, infrastructure needs, consumer impacts, and lack of battery critical mineral availability necessitate an adjustment of the GHG standard stringency in this rulemaking timeframe. [EPA-HQ-OAR-2022-0829-0594, p. 1]

These new proposed targets lose sight of the transformational change that is needed from all sectors of the U.S. economy. Automobile manufacturers such as Nissan have made and will continue to make significant investments to push the industry forward; however, such drastic and front-loaded timelines require significant changes and investments from suppliers, energy providers, mineral extraction and processing industries, battery and charging equipment manufacturers, etc. Such drastic changes to the market are nearly impossible on such a compressed timeline, particularly given the current market constraints affecting nearly all impacted sectors, such as supply-chain complications and limited availability of raw materials. This is especially true with respect to the critical minerals that are essential to battery production for EV expansion and development; EPA has not demonstrated that the critical minerals needed to meet the extremely aggressive EV penetration rates are available to be extracted in a safe, responsible, and reliable manner. Significant cooperation and organization from federal, state, and local governments will also be required to facilitate the roll-out and adoption of EVs and related charging infrastructure. [EPA-HQ-OAR-2022-0829-0594, p. 4]

Organization: North Dakota Farmers Union (NDFU)

The proposed standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. To achieve these goals with a heavy reliance on battery electric vehicles (BEVs) will require huge investments and rapid growth in many industries including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

We are concerned that a swift and dramatic shift to BEVs will be difficult to achieve. The obstacles include geopolitics, long lead times, significant capital investments, and lagging consumer acceptance. In a state like North Dakota where drivers face cold weather and long driving distances, it is difficult to imagine a large portion of the population using BEVs in four years. [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

The proposal basically assumes that BEVs will be the dominant technology for future emissions reductions. But relying on a single technology is a risky strategy. Many factors could interfere with BEV production, including the supply and cost of critical minerals, lack of BEV recharging infrastructure, slow ramp-up of wind and solar power, poor customer acceptance, and more. EPA estimates that 67% of U.S. vehicle sales will be BEVs in 2032, but other projections are lower and the U.S. lags behind other countries that are not expected to reach similar levels of sales in that timeframe.10 [EPA-HQ-OAR-2022-0829-0586, p. 5]

> 10 Stauffer, N. W. (2021, April 29). China's transition to electric vehicles: By 2030 40 percent of vehicles sold in China will be electric; MIT research finds that despite benefits, the cost to consumers and to society will be substantial. MIT News. Retrieved from https://news.mit.edu/2021/chinas-transition-electric-vehicles-0429.

Organization: Paul Bonifas and Tim Considine

Energy Security & Air Pollutant Benefits: The EPA completely ignores the fundamental problem with critical mineral supply chain while simultaneously acknowledging that it exists. They claim it is outside the scope of their analysis. Cobalt is used in the manufacture of nearly all lithium-ion rechargeable batteries, including EV batteries, and 70% of the supply chain is controlled by China using African slave-labor. Moreover, rare-earth elements are required to make the permanent magnets used in EVs and China accounts for 63% of the world's rare earth mining, 85% of rare earth processing, and 92% of rare earth magnet production6. Because China controls the market, they can dictate the price of magnets, and therefore EVs, at their whim…not very "Energy Security" friendly. [EPA-HQ-OAR-2022-0829-0551, pp. 3-4]

> 6 https://www.politico.com/news/magazine/2022/12/14/rare-earth-mines-00071102

Energy Security Benefits

Though the US became a total petroleum net exporter in 2020, the EPA attempts to boast that their rule would increase the country's energy security by reducing the US's "dependance" on foreign oil46. In addition to their claim being questionable, they also completely ignore the critical mineral supply chain aspect of the country's energy security. The EPA states the fundamental problem with critical mineral supply chain while simultaneously choosing to ignore the issue: [EPA-HQ-OAR-2022-0829-0551, pp. 11-12]

46 https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php

"At the present time in the U.S. many of these minerals [used to create EV batteries] are commonly sourced from global suppliers and do not yet benefit from a fully developed domestic supply chain."47 [EPA-HQ-OAR-2022-0829-0551, pp. 11-12]

47 47 Page 130 of EPA's Rule - https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf

"Critical materials and the supply chains necessary for PEV production are, therefore, outside of our intended scope in this discussion of energy security." 48 [EPA-HQ-OAR-2022-0829-0551, pp. 11-12]

48 Page 600 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

The most critical minerals for battery production include nickel, cobalt, graphite, lithium, and rare earth elements. As an example of the supply chain problems, in 2021, 70% of cobalt originated from the Democratic Republic of Congo, whose Chinese-owned cobalt mines are plagued with accusations of slave labor and human rights violations49. Cobalt is used in the manufacture of nearly all lithium-ion rechargeable batteries, including EV batteries, and 70% of the supply chain is controlled by a US adversary using African slave-labor. [EPA-HQ-OAR-2022-0829-0551, pp. 11-12]

49 https://www.npr.org/sections/goatsandsoda/2023/02/01/1152893248/red-cobalt-congo-drc-mining-siddharth- kara

To make EV supply chain and energy security matters worse, rare-earth elements (specifically Neodymium and Praseodymium) are required to manufacture the permanent magnets used in EVs. China currently dominates all aspects of rare-earth mining, refining, and magnet production. As of December 2022, China accounts for 63% of the world's rare earth mining, 85% of rare earth processing, and 92% of rare earth magnet production50. This means that even if the US were to ramp up their mining efforts, virtually all the rare earths would end up in China to be processed or produced into magnets. The extreme uncertainty of the rare earth market has recently become a national security issue51 and severely limits the supply side of the equation. Because China controls the market, they can dictate the price of magnets, and therefore EVs, at their whim. [EPA-HQ-OAR-2022-0829-0551, pp. 11-12]

50 https://www.politico.com/news/magazine/2022/12/14/rare-earth-mines-00071102

51 https://www.heritage.org/defense/commentary/americas-national-security-dependent-critical-rare-earth-minerals-and-worse

The EPA's value for Energy Security Benefits is unchanged in this real analysis because it would require a thorough quantitative investigation. However, even with this likely fictitious Energy Security Benefit staying consistent, the overall cost of the EPA's rule is still overwhelmingly negative. [EPA-HQ-OAR-2022-0829-0551, pp. 11-12]

Organization: Plug In America

The danger exists if the United States doesn't commit to rigorous emissions standards. Choosing to weaken these standards would result in the United States falling behind in the global race to develop domestic supply chains, good-paying jobs, and battery and EV manufacturing. These GHG emissions standards will continue to spur investment and innovation, allowing U.S. battery and vehicle manufacturers to thrive in the global market. Delaying the shift to electric transportation through diminished regulation will result in resources wasted on fossil-fuel technologies that will rob the United States of its international status as a technological leader. Globally, 14% of light-duty vehicles sold in 2022 were electric vehicles.3 According to the same source, in the U.S., this value is about 7.5%.The proposed GHG regulations provide a pathway to transportation electrification that will enable U.S. manufacturers to remain competitive in both domestic and global vehicle markets. [EPA-HQ-OAR-2022-0829-0625, pp. 1-2]

3 https://www.iea.org/data-and-statistics/charts/electric-car-registrations-and-sales-share-in-china-united-states-and-europe-2018-2022.

Organization: POET, LLC

The Proposed Rule's feasibility assessment is also deficient, and EPA could remedy this by crediting proven, affordable renewable fuels that achieve real-world GHG emission reductions. EPA's proposed standards rely on optimistic projections showing an extraordinarily rapid rollout of battery electric vehicle ("BEV") technologies at scale. However, EPA's modeling omits any rigorous consideration of the significant supply-chain and infrastructure developments necessary to support the LDVs needed to meet EPA's proposed standards. [EPA-HQ-OAR-2022-0829-0609, p. 5]

IV. EPA's Projections for BEVs are Overly Optimistic and Largely Ignore Significant Supply Chain and Infrastructure Concerns.

The Proposed Rule is deficient in other significant ways. It relies on overly optimistic projections for BEV adoption that fail to account for several key factors that will be essential to meeting the projected targets. POET engaged Jim Lyons of Trinity Consultants ("Trinity"), an international consulting firm specializing in, among other things, environmental sustainability, to review EPA's technology assessments. In his report, Attachment 2 to this letter, Mr. Lyons explains that EPA's forecasted BEV adoption rates "rest on a series of unreasonable, unsupported, and highly optimistic assumptions" that render those forecasts unreliable.71 The Trinity report also identifies several flawed assumptions in EPA's assessment of GHG emissions reductions from BEVs resulting from the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, p. 21]

71 Attachment 2, J. Lyons, Review of U.S. EPA's Proposed Multi-Pollutant Emission Standards for 2027 and Later Light-Duty and Medium-Duty Vehicles, at 2.

A. EPA's Projected BEV Adoption Rates Are Based on Several Flawed Assumptions.

The Proposed Rule relies on overly optimistic BEV adoption rates based on several flaws. As the Trinity Report explains, EPA is assuming "nearly 70 percent BEV penetration in MY 2032 across the combined light-duty passenger car, crossover/SUV, and pickup truck categories."72 This represents an increase in BEVs by 4 to 10 times over only a 10-year period.73 EPA also assumes that “this high level of demand for BEVs will continue unchanged through MY 2055.”74 As the Trinity Report explains in greater detail, EPA’s projections are based on several flawed assumptions that render those projections unreliable. [EPA-HQ-OAR-2022-0829-0609, pp. 21-22]

72 Id. at 2 (quotations omitted).

73 Id.

74 Id at 2.

First, EPA suggests that the worldwide supply of batteries will be sufficient to meet the demand for BEVs that EPA is projecting.75 As Trinity has shown, current demand estimates for batteries without the Proposed Rule range from 500 to 2,500 GWh per year.76 Yet EPA’s demand estimates with and without the Proposed Rule are only 1,000 GWh per year and 600 GWh per year, respectively.77 Turning to supply, EPA estimates, based on existing and announced battery capacity in North America, that industry will achieve nearly but not quite 1,000 GWh per year by 2032.78 EPA does not explain the difference between its 1,000 GWh demand estimate and other estimates showing much higher demand for EV batteries.79 Nor does it explain why the Proposed Rule is feasible if its own projections for the battery supply fall short, even slightly, than its projected demand.80 EPA also assumes that announced battery capacity in North America will materialize, when it is possible that some production facilities will not come online, and EPA’s projected 1,000 GWh per year on the supply side will not be achieved.81 Importing batteries is an option, but EPA does not acknowledge that importing may be necessary nor assess whether it would be feasible.82 [EPA-HQ-OAR-2022-0829-0609, pp. 21-22]

75 Id. at 3.

76 Id.

77 Id.

78 Id.

79 Id.

80 Id.

81 Id.

82 See id.

OnLocation also identifies factual issues that call into question the robustness of EPA’s assumptions regarding future EV penetration rates. For instance, EPA’s projections of BEV sales are almost nine times higher than those of EIA.122 EPA may also be making overly optimistic assumptions regarding battery manufacturing capacity and domestic lithium production.123 [EPA-HQ-OAR-2022-0829-0609, p. 27]

122 Id. at 2.

123 Id.

Battery production is a key constraint in the EV penetration rate. Supporting material on the battery production from S&P Global and Argonne National Laboratories5 are based on battery manufacturing plant announcements rather than more definitive metrics such as plants under construction. EPA has focused on lithium as the constraining critical material for battery production, and growth in domestic lithium production is based on infrastructure that has not yet been built. None of the studies referenced directly incorporate the level of U.S. EV penetration proposed in the Proposed Rule. The assumptions underlying EPA's proposed path merit further analysis by EPA and call into question the robustness of EPA's assumptions regarding future EV penetration rates. [EPA-HQ-OAR-2022-0829-0609, p. 36]

5 "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Federal Register Vol. 88, No. 87, pg. 29317

EPA estimates the U.S. will have more than 800 GWh of cell or battery manufacturing capacity by 2025, and 1,000 GWh by 2030, enough to supply from 10 to 13 million BEVs per year.4 This production would roughly be sufficient to meet EPA's compliance requirements. However, EPA did not explicitly consider the battery cost replacement for the current 2 million electric vehicles in the EV sales projections by 2032. Furthermore, the battery lifetime will largely depend on the consumer behavior and how often they charge the battery. Public fast chargers tend to degrade lithium-ion batteries at a quicker rate than slower home charging options. With shorter battery life, a higher battery production rate and critical material supply would be required than otherwise projected over the next 8 to 10 years. [EPA-HQ-OAR-2022-0829-0609, p. 36]

4 DRIA pg. 3-24.

Given that batteries are the key component of BEVs, it is important to examine U.S. EPA's assumptions regarding the demand, supply, and cost of batteries. Figure 30 from the Proposed Rule, reproduced below, shows forecasts of worldwide demand and supply for lithium-ion batteries through 2030 compiled by U.S. EPA from various sources. The main observation taken from Figure 30, is that by 2030 worldwide demand is forecast to be between 500 and 2500 gigawatt hours (GWh) per year without the Proposed Rule. U.S. EPA's assumptions regarding battery demand for the U.S. market both with and without the Proposed Rule are shown in Figure 31 of the Proposed Rule, also reproduced below. As shown, by 2032, U.S. EPA assumes U.S. battery demand based on vehicle manufacturer's need to comply with the Proposed Rule will be on the order of 1,000 GWh per year or about 40% of the maximum worldwide demand shown in Figure 30 compared to about 600 GWh without the Proposed Rule. Shifting to supply, Figure 30 shows forecasts of worldwide battery supply that suggest it will be more than enough to satisfy worldwide battery demand. [See original attachment for Figure 30: Future global Li-ion battery demand and production capacity, 2020-2030] [EPA-HQ-OAR-2022-0829-0609, pp. 55-56]

However, Figure 31 from the Proposed Rule shows that both existing and announced North American battery production will amount a little less than 1,000 GWh by 2032 – a volume that would not be sufficient to cover U.S. EPA's forecast of demand for batteries in U.S. light- and medium-duty vehicles. [See original attachment for Figure 31: Announced capacity for battery plants in North America, as of November 2022.] While batteries imported from other countries offer another source of supply, it is far from clear that battery supply will meet worldwide demand during the 2027 to 2032 period when U.S. EPA expects light-duty automobile manufacturers to essentially transition to the production of nothing but BEVs. In addition, U.S. EPA presents no data or analysis that suggests that all of the announced North American battery capacity will actually be online as battery demand driven by the Proposed Rule increases nor a demonstration that the likely actual worldwide supply of batteries will be sufficient to meet worldwide demand. So, in summary, even all announced North American battery production capacity will be insufficient to meet U.S. EPA's estimate of battery demand of the Proposed Rule and U.S. EPA hasn't demonstrated where that supply will come from. [EPA-HQ-OAR-2022-0829-0609, pp. 55-56]

[See original attachment for Figure 32: Annual battery production (GWh) required for BEV's in the Central analysis case of the Proposal] [EPA-HQ-OAR-2022-0829-0609, pp. 55-56]

Organization: Porsche Cars North America (PCNA)

Electromobility will need continued support from public policy.

Recent legislative actions have seeded the ground with support for electric vehicles and the beginning of a robust nationwide charging network. With specifics that continue to be defined, stakeholders are working to maximize the opportunity under these new laws to support customers with valuable purchase incentives, and to help spur the development of new electric vehicle component production and material sourcing. Understandably, the complexity of these laws results in a process that requires careful deliberation with industry representatives working hard to ensure customers have a clear understanding of the support available. Nevertheless, the support within these programs will be critical to the growth rates EPA envisions in this proposal. [EPA-HQ-OAR-2022-0829-0637, p. 3]

Organization: Renewable Fuels Association (RFA)

c. Supply of critical minerals for EV batteries

Other concerns with BEVs are related to the supply of critical minerals for batteries. A report by the International Energy Agency (IEA) says "mineral demand for use in EVs and battery storage is a major force," with supplies needing to grow "at least thirty times to 2040." The report notes that "…it has taken on average over 16 years to move mining projects from discovery to first production."33 These long lead times raise serious questions about the ability of suppliers to ramp up the output of critical minerals. [EPA-HQ-OAR-2022-0829-0602, pp. 16-18]

33 International Energy Agency, "The Role of Critical Minerals in Clean Energy Transitions", 2021; https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions.

[See original comment for Growth of selected minerals in the SDS, 2040 relative to 2020] [EPA-HQ-OAR-2022-0829-0602, pp. 16-18]

In addition, there are national security and human rights concerns associated with the mining of critical minerals needed for EV batteries. According to IEA, the Democratic Republic of the Congo (DRC) and People's Republic of China were responsible for some 70% and 60% of global production of cobalt and rare earth elements, respectively, in 2019. The level of concentration is even higher for mineral processing operations. China's market share of global refining capacity is around 35% for nickel, 50-70% for lithium and cobalt, and nearly 90% for rare earth elements. [EPA-HQ-OAR-2022-0829-0602, pp. 16-18]

[See original comment for Production of many energy transition minerals today is more geographically concentrated than that of oil or natural gas] [EPA-HQ-OAR-2022-0829-0602, pp. 16-18]

According to IEA, "High levels of concentration, compounded by complex supply chains, increase the risks that could arise from physical disruption, trade restrictions or other developments in major producing countries…Production and processing of mineral resources gives rise to a variety of environmental and social issues that, if poorly managed, can harm local communities and disrupt supply."34 [EPA-HQ-OAR-2022-0829-0602, pp. 16-18]

34 Id.

Toyota35 and others36 have argued for a balanced approach to emissions reductions using BEVs and other technologies, saying "perfect should not be the enemy of the good." The battery size37 for a BEV is about 6 times larger than a PHEV (~75-145kWh vs. ~12- 18kWh), and about 60 times larger than a HEV (~1.3-1.9kWh). Given the limited supply of battery materials, a large number of HEVs and PHEVs can clearly achieve substantially better GHG reductions than a small number of BEVs. [EPA-HQ-OAR-2022-0829-0602, pp. 16-18]

35 Gill Pratt, Toyota Motor Corporation's Chief Scientist, open letter posted on Medium, August 2021; https://medium.com/toyotaresearch/more-straight-talk-about-toyotas-electric-vehicle-strategy-f0aba4be40.

36 Foster, Koszewnik, Wade, and Winer, "Pathways to More Rapidly Reduce Transportation's Climate Change Impact." Issues in Science and Technology, November 17, 2022; https://issues.org/reduce-vehicle-transportation- emissions-foster-koszewnik-wade-winer/.

37 https://insideevs.com/reviews/344001/compare-evs/.

Organization: Roy Littlefield IV

Secondly, by not taking any significant steps to improve permitting for the mining of critical minerals in America, we are endangering our ability to access the minerals required for EV production. This over-reliance on foreign sources of minerals could undermine our domestic energy security and jeopardize our nation's economic independence. After seeing how international supply chains can break down during the pandemic, American consumers cannot and should not be subject to increased reliance on unstable foreign supply chains, especially concerning something as vital as personal transportation. [EPA-HQ-OAR-2022-0829-0793, p. 1]

Organization: Senator Shelley Moore Capito et al.

These proposals are also deficient in their consideration of BEV mineral input availability and cost, and will make our nation's transportation sector reliant on foreign adversaries, including China. China currently dominates mining, extraction, and battery manufacturing for EV batteries. For example, China produces nearly 65 percent of the world's graphite, a mineral required for BEV deployment, and accounts for a third of US graphite imports.14 Yet, the US currently does not produce any natural graphite domestically. Lithium is another mineral vital to EV batteries where China dominates global production and 80 percent of yearly global lithium production is used in battery manufacturing.15 Last year, lithium prices spiked by 438 percent16 - yet EPA's proposals claim the price of these vehicles will decrease even as global demand is forecasted to grow without offsetting expansion of supply. Finally, cobalt is also essential for battery chemistry. The United States is dependent on imports for 76 percent of current domestic demand. The global leader in cobalt production is the Democratic People's Republic of Congo, with its mining sector identified as a significant violator of environmental protection and human rights, including child labor.17,18 [EPA-HQ-OAR-2022-0829-5083, p. 4]

14 Mineral Commodity Summaries 2023, USDOI and USGS (Jan. 2023).

15 Id. at 109.

16 Lithium Prices Surge on Increased Battery Demands, Foley & Lardner LLP (Apr. 28, 2022).

17 Supra, note 14.

18 Combatting Child Labor in the Democratic Republic of the Congo's Cobalt Industry, US Dept. of Labor.

Further, our country is reliant on China for more than 50 percent of our imports of between 19 and 26 critical minerals with implications for BEV production.19 Policies that expand our need for imports of critical mineral EV battery inputs, without expanding domestic mining and refining capacity, will only make the US more reliant on our adversaries. Thus, claiming these regulations will make our country more energy independent and globally secure is patently false. Moreover, claims that these proposals will meaningfully address climate change or satisfy other federal priorities, such as securing supply chains, are inherently specious given their dependence upon environmental and human rights data from - in some cases hostile - foreign competitors. [EPA-HQ-OAR-2022-0829-5083, p. 5]

19 Supra, note 14.

Organization: South Dakota Department of Agriculture and Natural Resources (DANR)

National Security

EV batteries rely on lithium to operate, and recent reports indicate China could control as much as a third of the world's lithium by 2025. South Dakota does not support any regulatory effort making the United States more reliant on China. EPA should consider the potential national security implications of implementing the proposed rules as well as consider the need to, and impact of mining lithium and other battery components domestically. [EPA-HQ-OAR-2022-0829-0523, p. 2]

Organization: Specialty Equipment Market Association (SEMA)

Critical Resource Shortages

The average cost of new and used vehicles increased 5% and 30% respectively from May 2020 to May 2021 according to Edmunds.12 These increases were the result of supply chain issues during the pandemic such as the ongoing global microchip shortage, which has upended the automotive market over the last couple of years. Sadly, this proposal will exacerbate the shortage of critical components that still exists today. The draft rulemaking also raises many unanswered questions about how the U.S. is going to end its dependence on sourcing critical minerals and resources from foreign countries, including geopolitical foes such as China, that are needed to produce a dramatic increase in the supply of electric batteries for BEVs. Expanding America’s dependance on foreign entities to achieve the goals of this proposal is problematic from both a domestic and foreign policy standpoint. Additionally, it could also undermine the lofty goal of having 67% of all new motor vehicles sold in in the U.S. be BEV by 2032. [EPA-HQ-OAR-2022-0829-0596, p. 5]

12 Here's Why Car Prices are so High, and Why That Matters (Link: https://www.cnn.com/2021/07/08/business/car-prices-inflation/index.html).

Toyota has circulated information on how the critical raw materials needed for BEVs could be better allocated to achieve similar goals of reducing GHG. The information demonstrates that the same amount of raw material needed to produce just one BEV could be used to make either 6 plug- in hybrid vehicles or 90 traditional hybrid vehicles. The agency's proposed rule aims to reduce multi-pollutant emissions, but it does not consider that those 90 hybrid vehicles reduce carbon 37 times as much as a single BEV over the lifetime of the vehicles.13 However, the proposal treats hybrids unfairly, essentially blocking them out of the marketplace and defining them as “dirty.” [EPA-HQ-OAR-2022-0829-0596, p. 5]

13 Toyota's Goal: Reduce Carbon Emissions As Much As Possible, As Soon As Possible (Link: https://jalopnik.com/toyota-focusing-on-hybrids-not-electric-vehicles-1850440908).

Organization: Stellantis

Electrification Rates Misaligned to Market and Exceed Commitments

Stellantis fully supports comments submitted through The Alliance for Automotive Innovation (AAI or the Auto Innovators) detailing the challenges associated with EPA's overly optimistic expectation for EV market growth. Stellantis remains steadfast to delivering on our commitments to achieve an electrified future, and we acknowledge EPA's efforts with this rulemaking to help support this difficult yet critical transition. However, the proposed rule significantly underestimates the actions needed to build the targeted EV market. Addressing concerns such as manufacturing capacity, battery production, charging infrastructure, and consumer acceptance of EVs will be paramount to the success of this ambitious proposed regulation. [EPA-HQ-OAR-2022-0829-0678, pp. 2-3]

Organization: Steven G. Bradbury

Harming our national security. Finally, EPA minimizes the fact that forcing a faster switchover to EVs will threaten America's national security by making us more dependent on China and other unfriendly foreign nations for the production and processing of critical inputs required for EVs. China controls nearly 70 percent of global EV battery manufacturing capacity—including 70 percent of the world's lithium supply; 80 percent of the necessary rare earth minerals; and approximately 75 percent of the magnets needed for EV motors—and it boasts 107 of the 142 lithium-ion battery mega-factories planned or under construction in the world today (with only 9 planned for the U.S.).57 [EPA-HQ-OAR-2022-0829-0647, pp. 20-21]

57 See https://secureenergy.org/safe-urges-bipartisan-coordinated-policy-to-lead-new-tech-in-auto-industry-and-protect-against-chinese-supply-chain-dominance-in-new-report/.

The average EV battery uses about 8-10 kilograms of lithium (even more for higher performance batteries), and the world today mines a total of about 130,000 tons of lithium per year. That means if the EPA succeeds in converting 60 percent of annual U.S. car sales to EVs (about 7.8 million vehicles), those EVs (just for the U.S. market) would require 60 percent of the entire world's current production of lithium.58 [EPA-HQ-OAR-2022-0829-0647, pp. 20-21]

58 See https://pubs.usgs.gov/periodicals/mcs2023/mcs2023-lithium.pdf.

Similarly, each EV battery requires about 10 kilograms of cobalt, which translates into one metric ton for each 100 EVs and 10,000 tons of cobalt for one million new EVs. There are only between 150,000 and 190,000 tons of cobalt mined every year worldwide (the lion's share from the Democratic Republic of the Congo). Here again, if 60 percent of annual U.S. auto sales were EVs by 2030 (7.8 million vehicles), those EVs (just in the U.S.) would consume about 78,000 tons of cobalt— half the world's supply.59 [EPA-HQ-OAR-2022-0829-0647, pp. 20-21]

59 See https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-cobalt.pdf.

To put these percentages in perspective, according to the International Energy Agency (IEA), "In 2022, about 60% of lithium, 30% of cobalt and 10% of nickel demand was for EV batteries" worldwide.60 Because the U.S. market accounts for less than 20 percent of new vehicle sales globally,61 and other governments, particularly China and the EU, are pushing for similar rapid transitions to EVs, the overall worldwide supply of the critical minerals needed to produce EV batteries will have to increase at a truly astounding rate in the next several years to meet the EPA's assumptions.62 [EPA-HQ-OAR-2022-0829-0647, pp. 20-21]

60 IEA, Global EV Outlook 2023: Trends in batteries, https://www.iea.org/reports/global-ev-outlook-2023/trends-in-batteries.

61 See Alex Kopestinsky, "20 In-Depth Global and US Auto Sales Statistics for 2023," Policy Advice, March 23, 2023, https://policyadvice.net/insurance/insights/us-auto-sales-statistics/.

62 See Doomberg, "Separation Anxiety," June 27, 2023, https://doomberg.substack.com/p/separation-anxiety (explaining why it is doubtful "the world can mine a sufficient amount of the necessary battery materials to meet anticipated demand").

EPA predicts all of our strategic dependencies for these inputs will vanish quickly over time, with the assist of government subsidies, as new mines open up in the U.S. and Canada and new factories are built here and production capacity is brought to our shores.63 The reality, of course, is that there is little prospect that the Biden administration or local permitting authorities will fast-track the environmental approvals needed for all of these new mining operations and production facilities, even if the projects were otherwise shovel ready. [EPA-HQ-OAR-2022-0829-0647, pp. 20-21]

63 See 88 FR at 29318-24.

On each of these points, EPA blithely asserts that the current problems, challenges, supply constraints, security risks, and limitations will all miraculously resolve themselves as the United States collectively marches forward into a happy future of EVs. Taken together, the EPA's long string of sunny assumptions, each one designed to minimize the costs and challenges of the new rules, adds up to a wholly arbitrary set of regulatory analyses. [EPA-HQ-OAR-2022-0829-0647, pp. 20-21]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

The chart below for light-duty PHEVs and BEVs show the benefit of PHEVs in reducing the use of critical minerals and accounts for the difference in electric miles between BEVs and different types of PHEVs. Strong PHEV battery utilization maximizes the value of battery manufacturing and materials capacities and helps address the need for fast scale up of battery manufacturing and mineral extraction by better utilizing resources. PHEV cars and trucks, especially, Strong PHEV cars and trucks, can electrify most daily commuting miles while occasionally using some gasoline, while BEVs have a lot of battery capacity that only gets "used" on very long trips. We assert that this could be considered wasted or underutilized lithium and other battery minerals. Thus, because PHEVs use their batteries more, the USA gets more EV miles per tonne of lithium by driving PHEVs and Strong PHEVs as shown in the chart below. PHEV's smaller batteries reduce the lifecycle environmental burdens associated with battery materials, production, and end-of-life.16 [EPA-HQ-OAR-2022-0829-0646, pp. 20-21]

16 Two studies. 1) Dunn, J.B., Gaines, L., Kelly, J.C., Gallagher, K.G. (2016). Life cycle analysis summary for automotive lithium-ion battery production and recycling. In: REWAS 2016: Towards Materials Resource Sustainability, R.E. Kirchain, B. Blanpain, C. Meskers, E. Olivetti, D. Apelian, J. Howarter, A. Kvithyld, B. Mishra, N.R. Neelameggham, and J. Spangenberger, eds. (Springer) pp. 73-79, https://doi.org/10.1007/978-3-319-48768- 7_11 2) International Energy Agency (IEA) (2022). Global Electric Vehicle Outlook 2022, https://www.iea.org/reports/global-ev-outlook-2022

[See original for graph titled "1 Million BEVs or 4-6.7 Million PHEVs?"] [EPA-HQ-OAR-2022-0829-0646, pp. 20-21]

[See original for graph titled "EV Miles per Year per Tonne of Lithium"] [EPA-HQ-OAR-2022-0829-0646, pp. 20-21]

Organization: Tesla, Inc.

The Critical Mineral Supply Chain and the Battery Supply Chain Are Not Limiting Factors in Light-Duty BEV Deployment

Similar to infrastructure, Clean Air Act Section 202 does not direct EPA to consider upstream resource availability in promulgating standards, and so this is a factor that need not be given undue weight. More importantly, Tesla does not believe that the critical minerals and battery supply chains will constrain future U.S. manufacturing and deployment of BEVs in any vehicle class.211 There are no fundamental materials constraints when evaluating against 2023 USGS estimated resources.212 Such assertions assume (wrongly) that reserves are fixed and declining. In fact, mineral resources and reserves have historically increased – that is, when a mineral is in demand, there is more incentive to look for it and more is discovered. In comparison, to the extent that current critical minerals reserves are viewed as limiting, the agency should point to the long history of "Peak Oil" and how such predictions have never in themselves limited deployment of ICE vehicles.213 [EPA-HQ-OAR-2022-0829-0792, pp. 33-34]

211 See, 88 Fed. Reg. at 29312.

212 See, Tesla, 2023 Investor Day Presentation (March 1, 2023) at 28.

213 See e.g., Forbes, Peak Oil: The Perennial Prophecy That Went Wrong (Nov. 30, 2022) available at h ttps://www.forbes.com/sites/arielcohen/2022/11/30/peak-oil-the-perennial-prophecy-that-went- w rong/?sh=c64aabb2bbe5.

While appropriately assessing the critical minerals supply chain associated with BEVs, EPA should also note it has never undertaken the same assessment related to ICE vehicles. A sustainable energy economy actually involves a lower level of mineral extraction than a fossil fuel-based economy.214 For example, the U.S. oil and gas sector has long been dependent on critical minerals from China for use in oil and gas exploration and development drilling.215 The petroleum industry's reliance on barite has even been used as a case study on U.S. critical minerals dependence.216 Indeed, the American Petroleum Institute has been so concerned about dwindling global reserves that it altered the specifications for the type of barite used in oil and gas drilling.217 At no point has the EPA found that this supply chain constraint has impacted the fuel supply for ICE light-duty vehicles or impacted such vehicles' viability for deployment.218 Accordingly, to the extent such conditions are found in the battery supply chain, it should be anticipated that they neither diminish the viability of light-duty BEV technology nor will limit BEV deployment volumes to meet a stringent emission standard that exceeds Alternative 1. [EPA-HQ-OAR-2022-0829-0792, p. 34]

214 Tesla, Master Plan Part 3 at 31-36 available at h ttps://www.tesla.com/blog/master-plan-part- 3 https://www.tesla.com/blog/master-plan-part-3.

215 See, U.S. House of Representatives, Committee on Resources, Subcommittee on Energy and Mineral Resources, Oversight Hearing on ``U.S. Energy and Mineral Needs, Security and Policy: Impacts of Sustained Increases in Global Energy and Mineral Consumption by Emerging Economies Such as China And India" (March 16, 2005), Statement of W. David Menzie, Geologist, U.S. Geological Survey ("There are a significant source of a number of mineral commodities for which the U.S. is dependent for imports of its supplies, and these include things like antimony, barite, fluorspar, magnesium and there are things that are used in batteries, ceramics, electronic components, flame retardants, metallurgical processing and petroleum drilling.") available at h ttps://www.govinfo.gov/content/pkg/CHRG-109hhrg20126/html/CHRG-1 09hhrg20126.htm.

216 U.S. Geological Survey, "Barite—A Case Study of Import Reliance on an Essential Material for Oil and Gas Exploration and Development Drilling" available at h ttps://pubs.usgs.gov/sir/2014/5230/pdf/sir2014-5230.pdf; See also, U.S. Government Accountability Office, Hardrock Mining: Trends in U.S. Reliance on Imports for Selected Minerals (Apr. 30, 2019) at 3, available at h ttps://www.gao.gov/products/gao-19-434rhttps://www.gao.gov/products/gao-19-434r.

217 U.S. Geological Survey, Mineral Commodity Summaries 2020 at 29 ("In response to concerns about dwindling global reserves of 4.2-specific-gravity barite used by the oil and gas drilling industry, the American Petroleum Institute issued an alternate specification for 4.1-specific-gravity barite in 2010.) available at h ttps://pubs.usgs.gov/periodicals/mcs2020/mcs2020.pdf.

218 It should be noted that the oil and gas industry's supply chain reliance and constraints have been exemplified by its continued lobbying for exemptions from the Section 301 tariffs for steel and other inputs said to be key to the industry. See e.g., Independent Petroleum Association of America, Steel and Aluminum Tariffs & Quotas available at h ttps://www.ipaa.org/tariffs/https://www.ipaa.org/tariffs/ (highlighting supply chain dependence); Daily Energy Insider, API calls for oil, gas industry exemptions from steel tariffs (may 22, 2018) available at h ttps://dailyenergyinsider.com/news/12579-api-calls-oil-gas-industry-exemptions-steel-tariffs/.

Regardless, the significant and growing investment in the battery supply chain and manufacturing capacity and Tesla's own significant responsible sourcing efforts ensure that BEV deployment will not be limited during the proposed standard's MY 2027-2032 period. As the IEA recently found, the strong investment in BEV and energy storage will double in 2023 to $30 billion (from 2022) and has already led to a wave of new lithium-ion battery manufacturing projects around the world totaling an estimated 5.2 TWh of new capacity that could be available by 2030.219 This has already led overall investment in critical mineral development to increase 30% in 2022, including a 50% increase in lithium resource development followed by similar focuses on copper and nickel development.220 This expansion is occurring and is expanding so fast that battery manufacturing capacity is now on track to meet the 2030 milestones set out in the IEA's scenario to achieve net zero CO2 emissions by 2050.221 [EPA-HQ-OAR-2022-0829-0792, pp. 34-35]

219 IEA, World Energy Investment 2023 (May 25, 2023) available at h ttps://www.iea.org/reports/world-energy-investment-2023

220 Id., at 104

221 Bloomberg, Solar, Battery Boom Puts Net Zero Path in Reach: Sparklines (May 25, 2023) available at h ttps://www.bgov.com/next/news/RV7L4BT0G1KWhttps://www.bgov.com/next/news/RV7L4BT0G1KW

Similarly, the IRA's domestic critical mineral processing and battery manufacturing incentives have led to exponential levels of investment in the battery supply chain.222 In early 2023, it was already estimated that there were $210 billion of announced domestic BEV manufacturing investments.223 This expansion is also happening globally with over $300 billion of announced investment in new battery gigafactories since 2019.224 The U.S. expansion is occurring so rapidly it is already exceeding official government forecasts.225 An ongoing tally of this investment shows that these investments are happening throughout the U.S.226 [EPA-HQ-OAR-2022-0829-0792, p. 35]

222 Infrastructure Investment and Jobs Act, P.L 117-58 (Nov. 15, 2021), Section 13502.

223 Atlas EV Hub, $210 Billion of Announced Investments in Electric Vehicle Manufacturing Headed for the U.S. (Jan. 12, 2023) available at h ttps://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-m anufacturing-headed-for-the-u-s /?utm_source=Center+for+Climate+and+Energy+Solutions+newsletter+list&utm_campaign=7093a6e673-E MAIL_CAMPAIGN_2022_04_29_03_23_COPY_01&utm_medium=email&utm_term=0_36e5120ca4-7093a6e673- 3 03640237

224 Charged, Billions of bucks for US battery plants announced in 2022 (Jan. 12, 2023) available at h ttps://chargedevs.com/newswire/billions-of-bucks-for-us-battery-plants-announced-in-2022/

225 See generally, Bloomberg, Goldman Sees Biden's Clean-Energy Law Costing US $1.2 Trillion (March 23, 2023) available at h ttps://www.bloomberg.com/news/articles/2023-03-23/goldman-sees-biden-s-clean-energy-law-costing-us-1-2-t rillion#xj4y7vzkg; See also, Semafor, How Washington underestimated Biden's big climate law (May 4, 2023) available at h ttps://www.semafor.com/article/05/04/2023/biden-climate-ira-cost-inflation-reduction-act

226 See, Charged, Update: U.S. Electric Vehicle Supply Chain IRA + 288 Days available at h ttps://www.charged-the-b ook.com/na-ev-supply-chain-maphttps://www.charged-the-book.com/na-ev-supply-chain-map (last visited May 31, 2023)

Tesla Development of a Robust, Secure Critical Minerals Supply Chain

As extensively detailed in Tesla's Impact Report 2022, Tesla's efforts to expand this supply chain are also accompanied with a commitment to ensuring that companies in our supply chain respect human rights and protect the environment.227 In every location touched by Tesla's supply chain, the company seeks to ensure local conditions for stakeholders are continuously improving as a result of the company's investment and sourcing decisions. This commitment is further detailed in our publicly available Responsible Sourcing Policy, Human Rights Policy, and Supplier Code of Conduct.228 These policies and our supply chain due diligence efforts are aligned with the United Nations Guiding Principles on Business and Human Rights229 and the Organization for Economic Cooperation and Development (OECD)'s Due Diligence Guidance for Responsible Business Conduct.230 [EPA-HQ-OAR-2022-0829-0792, pp. 35-36]

227 Tesla, Impact Reports 2022: A Sustainable Future Is Within Reach at 139 -185 (describing Tesla's extensive responsible sourcing efforts) available at h ttps://www.tesla.com/impact

228 Tesla, Responsible Sourcing Policies available at h ttps://www.tesla.com/legal/additional-resources#responsible- s ourcing-policies

229 United Nations, Office of the High Commissioner, Human Rights (2011) available at h ttps://www.ohchr.org/sites/default/files/documents/publications/guidingprinciplesbusinesshr_en.pdf

230 OECD, Due Diligence Guidance for Responsible Business Conduct available at h ttps://www.oecd.org/investment/due-diligence-guidance-for-responsible-business-conduct.htm

To that end, Tesla has taken significant steps to establish and develop a robust supply chain that will support its future deployment of its light-duty vehicles consistent with the production and deployment estimates Tesla has previously shared with the agency. More specifically, this has included developing and expanding its vertical integration up the supply chain to include expanded cell production, build out of a new cathode production facility at Gigafactory Texas, and breaking ground on the most technologically advanced lithium processing facility in Corpus Christi.231 The blueprint for this activity was originally unveiled during Tesla's Battery Day announcement.232 [EPA-HQ-OAR-2022-0829-0792, pp. 35-36]

231 Tesla, Tesla Lithium Refinery Groundbreaking (May 8, 2023) available at h ttps://www.tesla.com/blog/tesla-lithium- r efinery-groundbreaking

232 Tesla, Battery Day Presentation (Sept. 22, 2020) available at h ttps://www.tesla.com/2020shareholdermeeting

Consistent with the Administration's focus on critical minerals, Tesla has continued to focus on creating a secure and sustainable supply chain anchored with domestic sources.233 To that end, following its Battery Day announcement, Tesla established an off-take agreement for a domestic source of lithium with plans to process the lithium hydroxide and manufacture cathode material in the U.S. – creating a first-ever wholly North American upstream advanced battery supply chain. 234 Additionally, Tesla continues to support partnerships for domestic mineral production, establishing supply agreements for North America production from Free Trade Agreement countries.235 Similarly, Tesla has worked to develop commercial relationships with companies onshoring critical mineral processing.236 [EPA-HQ-OAR-2022-0829-0792, pp. 35-36]

233 Tesla Impact Report 2022 at 139 -185.

234 Piedmont Lithium, Piedmont Lithium Amends Agreement with Tesla (Jan. 3, 2023) available at h ttps://piedmontlithium.com/piedmont-lithium-amends-agreement-with-tesla/

235 See, Bloomberg, Tesla Strikes Battery-Metal Deal in Push to Ensure Supply (Jan. 10, 2022) available at h ttps://www.bloomberg.com/news/articles/2022-01-10/tesla-talon-enter-into-nickel-concentrate-supply-a greement#xj4y7vzkg; See e.g., BHP enters into nickel supply agreement with Tesla Inc (July 28. 2021) available at h ttps://www.bhp.com/news/media-centre/releases/2021/07/bhp-enters-into-nickel-supply-agreement-with-tesla-inc; Reuters, Australia's Liontown signs 5-year lithium supply deal with Tesla (Feb. 15., 2022) available at h ttps://www.reuters.com/business/australias-liontown-signs-5-year-lithium-supply-deal-with-tesla-2022-02-15/

236 See, Magnis, Magnis Signs Offtake Agreement for North American Anode Active Material Production (Feb. 20, 2023) available at h ttps://magnis.com.au/asx-announcements/https://magnis.com.au/asx-announcements/; Canary Media, DOE backs US battery materials production with $107M loan (April 18, 2022) (describing Tesla's agreement with Syrah for domestic graphite production) available at h ttps://www.canarymedia.com/articles/batteries/doe-backs-us-battery-m aterials-production-with-107m-loan

EPA should also consider that recycling of battery material will play a vital role in alleviating some pressure on the need to develop new critical mineral resources. To that end, Tesla seeks to reduce its reliance on primary mined materials and contribute to a more positive environmental footprint through battery and cell recycling – including ensuring that none of our batteries (manufacturing scrap or fleet returns) go to landfills and deploying equipment to recycle 100% of on-site generated manufacturing scrap across manufacturing facilities. In comparison to BEV batteries, it should also be noted the energy source for ICE vehicles – fossil fuels used in combustion – is not recyclable. [EPA-HQ-OAR-2022-0829-0792, p. 36]

Finally, in furtherance of this effort, Tesla is also supporting other emerging domestic suppliers in the advanced battery supply chain as they seek developmental support through various DOE programs, including the Critical Minerals Mining Research and Development Program237 and the Advanced Technology Vehicle Manufacturing program.238 [EPA-HQ-OAR-2022-0829-0792, p. 36]

237 See generally, White House, FACT SHEET: Biden-Harris Administration Driving U.S. Battery Manufacturing and Good- Paying Jobs (Oct. 19, 2022) available at h ttps://www.whitehouse.gov/briefing-room/statements-releases/2022/10/19/fact- s heet-biden-harris-administration-driving-u-s-battery-manufacturing-and-good-paying-jobs/

238 See 85 Fed Reg 77202 (Dec. 1, 2020) (providing notice, inter alia, that the ATVM Program broadly to encourages applications from potential projects involving the production, manufacture, recycling, processing, recovery, or reuse of Critical Minerals and other minerals.).

Organization: Texas Public Policy Foundation (TPPF)

The LMD Tailpipe Rule and the market change it would engender will also make the federal government complicit in the often exploitative practices associated with rare-earth metal mining. The production and acquisition of rare-earth metals used in electric vehicle batteries is a dirty business. The extraction and processing of rare-earth metals can have serious environmental impacts, including soil and water contamination, deforestation, and habitat destruction, negatively affecting ecosystems and biodiversity. In certain areas, rare-earth metal mining has also been linked to labor rights violations, poor working conditions, low wages, child labor, and inadequate safety measures. The batteries that will power the green future the EPA seeks to create through the LMD Tailpipe Rule bear the stain of these violations of human dignity. [EPA-HQ-OAR-2022-0829-0510, p. 6]

Overarching Issues Applicable to the HD and LMD Tailpipe Rules [EPA-HQ-OAR-2022-0829-0510, p. 7]

A transition to zero emission vehicles ("ZEVs") would expose Americans to supply chain vulnerabilities that are certainly beyond EPA's authority. Wells Fargo projects a risk of shortages across virtually all of the key components of electric vehicle ("EV") batteries,1 and many of these rely on geopolitical rivals who control those supply chains.2 Accordingly, there is a sharp mismatch between the proposed rule and the availability of critical minerals essential to realizing its goals.3 Indeed, "mass electrification of the heavy-duty segment on top of the light-duty segment would substantially increase the lithium demand and impose further strain on the global lithium supply." 4 Specifically, "[t]he results suggest that global lithium resources will not be able to sustain simultaneous mass electrification of both the light duty vehicle ("LDV") and HDV segments."5 It is therefore "recommended that both the government and vehicle manufacturers should carefully consider the ambitious promotion of vehicle electrification in the heavy-duty segment."6 [EPA-HQ-OAR-2022-0829-0510, p. 7]

1 Colin M. Langan, et al., BEV Teardown Series: The Untold Electric Vehicle Crisis, Part 1: Tesla Model Y–The Pace Car, WELLS FARGO (May 11, 2022).

2 IEA 2022 Global EV Outlook, at 154-58, 179, https:www.iea.org/reports/global-ev-outlook-2022.

3 IEA, World Energy Outlook Special Report - The Role of Critical Minerals in Clean Energy Transitions (Revised March 2022), https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMinerasinCleanEnergyTransisions.pdf.]

4 Hao, H., Geng, Y., Tate, J.E. et al., Impact of transport electrification on critical metal sustainability with a focus on the heavy-duty segment, NAT COMMUN 10, 5398 (2019) https://www.nature.com/articles/s41467-019-13400-1

5 Id.

6 Id.

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

Minerals such as lithium and cobalt are essential for batteries. EPA does not account for the difficulty of getting these minerals. Mining for these minerals is energy-intensive, and the Chinese Communist Party (CCP) has facilitated access to domestic and foreign minerals for battery production. Lithium is mined in western China's Qinghai Province, aided by government funding, and China purchases cobalt for electric batteries from Kisanfu, in the Democratic Republic of Congo.18 The United States makes opening new mines virtually impossible, even though the jobs generated would help all Americans, particularly the poor and middle class. [EPA-HQ-OAR-2022-0829-0674, pp. 4-5]

Thus, the rule will result in a massive increase in mining in countries that have no respect for the environment or human welfare. The sorts of mining that will be conducted as a result of the rule will be bad for the environment and are frequently performed by child workers. EPA does not mention potential human rights violations. [EPA-HQ-OAR-2022-0829-0674, pp. 4-5]

18 Dionne Searcey, Michael Forsythe, and Eric Lipton, "A Power Struggle Over Cobalt Rattles the Clean Energy Revolution," New York Times, December 7, 2021, https://www.nytimes.com/2021/11/20/world/china-congo- cobalt.html (accessed April 28, 2023).

III. The Proposed Rule Would Strengthen China

The EPA rule will strengthen China's economy, because China makes nearly 80% of the world's electric batteries,28 EPA does not sufficiently examine the ramifications of this geopolitical shift. This is especially troubling because the Chinese Communist Party (CCP) is a totalitarian regime which has a poor record both on the environment and on human rights. [EPA-HQ-OAR-2022-0829-0674, pp. 6-7]

Beijing is engaged in genocide against the minority Uyghur people of Xinjiang and has imposed draconian restrictions on political freedoms in Hong Kong.29 The CCP has reduced or eliminated religious liberties for Christians and Buddhist worshippers of the Dalai Lama throughout Tibet.30 Empowering the Chinese government is fundamentally at odds with "good corporate governance." [EPA-HQ-OAR-2022-0829-0674, pp. 6-7]

28 Veronika Henze, “China’s Battery Supply Chain Tops BNEF Ranking for Third Consecutive Time, with Canada a Close Second,” BloombergNEF, November 12, 2022, https://about.bnef.com/blog/chinas-battery-supply-chain-tops- bnef-ranking-for-third-consecutive-time-with-canada-a-close-second/ (accessed April 28, 2023).

29 James J. Carafano et al., “Winning the New Cold War,” p. 24.

30 Ibid., p. 3.

Rather than using its own oil and natural gas resources, America will depend on batteries from China to run its fleet of cars. Countless other renewable energy components and technologies also depend to a large extent on Chinese supply chains. For instance, many of the components of batteries will either be sourced, processed, or manufactured in China for the foreseeable future. Middle-class Americans are losing jobs at Stellantis, Ford, and GM due to the forced switch to electric vehicles. Recent efforts to require battery manufacturing in the U.S. mask the source of the components. In contrast, none of the gasoline or diesel fuels for transportation are from China. [EPA-HQ-OAR-2022-0829-0674, pp. 6-7]

Security benefits are overstated

The study purports to find small energy security benefits by having less imported oil. See Table 200. The analysis ignores that United States can well be an oil-exporting, rather than an oil-importing country. For that reason alone, the stated energy security benefits are likely costs rather than benefits. [EPA-HQ-OAR-2022-0829-0674, p. 14]

Moreover, the United States is certainly an importer of rare-earth minerals, and products such as car batteries that depend on rare-earth minerals. Consequently, while the proposed rule may have little effect from an oil security perspective, it is likely to have a substantial and negative effect on security for imports of rare earth minerals, particularly as the control of much rare earth mineral production is in China. [EPA-HQ-OAR-2022-0829-0674, p. 14]

No analysis is provided for child labor, which almost certainly would increase with greater exploitation of rare earth minerals in developing countries and in China, and battery production in China. [EPA-HQ-OAR-2022-0829-0674, p. 14]

Organization: Toyota Motor North America, Inc.

The Proposed Rule also for the first time imposes standards on automakers for which compliance requires significant actions by third parties over which we (or EPA) have no control. First, achieving the level of BEVs required by the Proposed Rule will require massive new supplies of critical minerals, the mines to extract them, and the refining facilities to turn ore into battery-grade material. Currently, virtually the entire mineral and battery supply chain is outside the U.S. Second, it requires massive investments in home and public charging infrastructure, as well as upgrades to the electrical grid throughout the U.S. and an accelerated shift to renewable power generation. Various provisions of the IIJA and IRA directionally support some of these areas but fall significantly short of what will be needed for the expected level of electrification. And finally, the ultimate impact of these factors on vehicle costs and consumer demand are unclear, at best. The are few contingencies for automakers and our customers in the event any or all these factors stand in the way of complying with the Proposed Rule. Our comments below address these and other issues. [EPA-HQ-OAR-2022-0829-0620, pp. 8-9]

We are prepared to follow up with additional information beyond these comments. We look forward to collaborating toward a more workable Final Rule. [EPA-HQ-OAR-2022-0829-0620, pp. 8-9]

2. Critical Material Supply

Batteries account for largest cost associated with an electric vehicle. The global supply of battery critical minerals and the refining of those minerals will ultimately determine PEV costs as global demand increases nearly five-fold over the next decade1. Hundreds of new mines are needed globally to produce the critical minerals needed to support this demand. Currently, virtually all critical mineral extraction and processing are conducted outside the U.S. [EPA-HQ-OAR-2022-0829-0620, p. 9]

1 BMI Lithium Forecast, Q1 2023.

The proposal outlines various incentives, tax credits, and other mechanisms in the Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Law (BIL) aimed at speeding the development of a domestic supply chain, as well as efforts the Administration and private sector are taking to aid the electrification transition. The IIJA and IRA serve as a necessary down payment on what will be needed to achieve shared electrification goals but fall far short of what is needed to achieve the proposed standards. Further, the proposal lacks an actionable plan for translating funding and goals into specific projects in a manner that will enable automakers to sell the share of BEVs required to meet the preferred alternative standards. [EPA-HQ-OAR-2022-0829-0620, p. 9]

Below is a summary of Toyota's understanding of the critical mineral landscape and supply-demand challenges over the period of the Proposed Rule, based on extensive collaboration with experts in the field. Please see Appendix A for a more detailed assessment and accompanying data. [EPA-HQ-OAR-2022-0829-0620, p. 9]

2.1. Lithium

The proposal identifies lithium as most likely to first constrain PEV production due to limited availability. EPA contends there will be ample supply of the other critical minerals through 2035 and/or there are known substitute minerals that make their availability less critical2. Therefore, the proposal's assessment of critical mineral availably is limited to a single mineral - lithium. [EPA-HQ-OAR-2022-0829-0620, pp. 10-11]

2 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, Draft Regulatory Impact Analysis (DRIA), April 2023, page 3-23.

EPA's analysis concludes there will be sufficient lithium supply to support the 67 percent BEV share required by the Proposed Rule and that prices will stabilize mid-decade. However, it appears this conclusion is based on a global lithium supply that in many cases may not qualify for the 30D IRA tax credits that EPA applied to most every vehicle in the supporting analyses. The proposal notes "the Inflation Reduction Act incentivizes use of domestically sourced and processed mineral products, it only ties these products to availability of the related tax incentives (primarily the Clean Vehicle Credit under 30D) and does not prohibit use of imported mineral products by manufacturers that cannot secure domestic sources. Thus, it is the global supply for lithium, not only domestically sourced supply, that potentially constrains battery production."3 [EPA-HQ-OAR-2022-0829-0620, pp. 10-11]

3 Id. at 3-24.

As described in more detail in Appendix A, the global supply of lithium is highly unlikely to satisfy the U.S. demand driven by the preferred alternative standards. Further, the supply-demand gap grows significantly when lithium sources are limited to U.S. and FTA countries that qualify for the IRA tax credits. Benchmark Mineral Intelligence (BMI) with partner RhoMotion conducted a forecast of global lithium supply versus demand through 2035. [EPA-HQ-OAR-2022-0829-0620, pp. 10-11]

The BMI study concludes 41% PEV penetration in 2030 is possible globally without consideration of available lithium under a business-as-usual base case scenario. When available global lithium supply is considered, the projected supply-demand gap constrains PEV penetration to 36% of new vehicles sold globally in 2030. A high-demand scenario incorporates the announced PEV targets for 41 leading OEMs and additional government policy aspirations which results in supply-demand deficit starting today that would require U.S. manufacturers to compete on a global scale for limited lithium - creating many unknown supply bottlenecks. [EPA-HQ-OAR-2022-0829-0620, pp. 10-11]

The BMI/RhoMotion study included a PEV mix of 88 percent BEVs and 12 percent PHEVs for 2030 in contrast to EPA's assumption of 100 percent BEVs for the proposal. The supply-demand analysis would have concluded larger shortfalls that would have occurred sooner if BMI had assumed 100 percent BEVs. The data in these supply-demand figures is for calendar year rather than vehicle model year. For the sake of this evaluation, the calendar year will be used and assumed equivalent to the previous model year (ex. 2030 calendar year is the same as 2029 model year). [EPA-HQ-OAR-2022-0829-0620, pp. 10-11]

Projected U.S. refined lithium supply (larger than U.S. mined lithium supply) is far short of the demand needed to comply with the Proposed Rule -allowing for only a 15% PEV penetration in 2030 assuming a 100 kWh average battery size. Expanding the lithium supply to FTA countries that qualify for the IRA tax credits enables higher PEV penetrations. However, the study finds that the U.S. would need to consume an implausible 99% of U.S. and FTA lithium supply to attain a 60% PEV (80% BEV/20% PHEV) share in 2030 for an assumed battery size of 100 kWh. In the more realistic case where the aggregate demand from other FTA countries in addition to the U.S. is considered, a deficit occurs after 2028 in the base case demand scenario (41% PEV in 2030) and would occur sooner and grow faster if U.S. demand is increased to attain the 60% PEV penetration in 2030 being proposed. Supply from IRA-compliant U.S. and FTA countries would support only a 25% U.S. PEV penetration in 2030 for a 100 kWh average battery size if FTA countries meet their lithium demand first before providing excess refined lithium supply to existing U.S. domestic supply. [EPA-HQ-OAR-2022-0829-0620, pp. 10-11]

Mined lithium supply from Australia, an FTA country, could potentially satisfy U.S. demand driven by the proposed standards and make the proposal's assumptions about IRA cost savings more realistic. However, 96% of Australian supply is currently sold to and refined in China, a foreign entity of concern. Quickly relocating Australian supply to a US+FTA country faces significant hurdles given existing business partnerships and the effort to establish new partnerships with capital- and operational-intensive infrastructure. [EPA-HQ-OAR-2022-0829-0620, pp. 10-11]

2.2. Graphite and Nickel

As described in Appendix A, data indicate graphite will be more constraining than lithium. The U.S. currently does not produce any natural graphite and relies on imports mainly from China. The U.S. is projected to have a combined 22k tonnes of graphite refining capacity per year by 2030. USA+FTA countries are projected to reach 203k tonnes per year.4 For an average BEV battery size of 70 kWh, the graphite produced from US+FTA countries would support 2.9 million BEVs per year in 2030 which would satisfy only 18% of the projected new vehicle sales in 2030. To comply with the 60% BEV share driven by the proposed standard in 2030, 66% of refined graphite would need to be procured from global supplies that are outside of US+FTA control and may not qualify for important IRA benefits to incentivize vehicle purchases. [EPA-HQ-OAR-2022-0829-0620, p. 12]

4 Cite BNEF "Metals Data Hub" online database, last updated Oct. 2022.

Nickel is also experiencing tight supply with a focus on mining in a single country, Indonesia, which is projected to comprise over 50% of global mined nickel battery material in 2030. Growing geopolitical and environment concerns surrounding Ni mining in Indonesia are causing instability, and it is still not known whether Treasury Department guidance will consider Indonesia as an FTA country, although Indonesia has proposed such status recently.5 [EPA-HQ-OAR-2022-0829-0620, p. 12]

5 Citation: https://www.reuters.com/world/asia-pacific/violence-indonesia-nickel-smelter-protest-kills-2-dozens- detained-2023-01-16/.

2.3. Mining

Over the next decade, projected critical mineral demand will require the development of over 300 new mines.6 EPA's projections for new mines do not account for the significant risk of announced mines failing to reach the operational stage and the extensive lead times for the successful ventures to reach efficient operation. The proposal claims significant deposits of nickel, cobalt, lithium, and graphite in the U.S. remain undeveloped. The proposal notes DOE has identified 19 mines in addition to three mines from a December 2022 study and concludes these sources could likely advance lithium sufficiency well beyond 2028. When inherent risk factors are considered, only 18 out of 50 proposed or announced lithium mining projects in the U.S. are expected to be operational by 2035, according to BMI. For those mines that do reach the production stage, lead times can take 4-7 years without delays for lithium mining and 13-19 years for new nickel mining, according to IEA. Permitting and related environmental concerns add to lead time and are more extensive in the U.S. due to strict regulations and oversight - unlike mining operations in many parts of the world. Over 70% of mineral reserves are within 35 miles of tribal lands, which can further complicate the approval process with government authorities. [EPA-HQ-OAR-2022-0829-0620, pp. 12-13]

6 Benchmark Source, More than 300 new mines required to meet battery demand by 2035 (Sep. 6, 2022); https://source.benchmarkminerals.com/article/more-than-300-new-mines-required-to-meet-batery-demand-by-2035.

2.4 Price Volatility

The economics behind the forecasted tight global lithium supply are at odds with EPA's claim that "the price for Lithium is likely to stabilize at or near its historical levels by the mid-2020s".7 In this fragile condition of tight supply, every step of complex and intertwined global operations must fall perfectly into place as planned to avoid price spikes. BMI suggests that lithium prices will stabilize, but there is ongoing risk of underestimating potential volatility resulting from future shocks to the system. [EPA-HQ-OAR-2022-0829-0620, p. 13]

7 88 Fed. Reg. at 29313.

Clearly higher mineral prices affect PEV manufacturing costs and then have a commensurate effect on sales volumes. Mining operations have an incentive to minimize risk and thus err on the side of undersupply because excess supply causes prices to drop and profits to decline. According to numerous analysts, such a situation unfolded when a temporary “excess” of global supply spurred by an increase in lithium mining projects occurred at the same time PEV sales slowed in China because of expiring subsidies. These combined events resulted in the current lower lithium prices which are expected to remain through the 2026 timeframe but are not expected to hold, as mining and refining companies will adjust supply to avoid that less profitable scenario.8 [EPA-HQ-OAR-2022-0829-0620, p. 13]

8 https://internationalbanker.com/brokerage/why-are-lithium-prices-collapsing.

3. Battery and Component Production

Toyota’s assessment of production capacity aligns with DOE’s projections referenced in the proposal where expected growth based on new plant announcements in North America is estimated to reach 838 GWh annual capacity by 2025 and 998 GWh by 2030. Just as with mining operations, there is lead time to establish a battery factory and then ramp up production. Constructing new facilities, scaling up operations, and training a new workforce is challenging and takes time. According to e-Source, it takes about 4 years to reach full scale battery production. [EPA-HQ-OAR-2022-0829-0620, pp. 14-15]

- Year 1: 75% for full year’s production

- Year 2: 85% for full year’s production

- Year 3: 87% (89.5% by end of the year) [EPA-HQ-OAR-2022-0829-0620, pp. 14-15]

3.1. Midstream Constraints

Battery manufacturing capacity is less a constraint to achieving future BEV adoption than the upstream supply chain steps for sourcing the minerals. The proposal notes preliminary projections prepared by Li-Bridge for DOE in November 2022 indicate that global supplies of cathode active material (CAM) and lithium chemical product are expected to be sufficient through 2035. 10 However, more recent assessments project shortfalls for upstream mining and the midstream processing and cathode/anode production capacity to supply the new battery factories with the necessary battery minerals. 11 Leveraging data from BMI, BNEF (Bloomberg New Energy Finance), e-Source and IHS Markit, we find that with U.S. battery manufacturing at 100 percent capacity is sufficient to meet EPA’s proposed requirements at 70 kWh average battery size. However, the production of US cathode manufacturing is in severe deficit, even to achieve the previously discussed base case of 41% PEV penetration in 2030 (Figure 1). [EPA-HQ-OAR-2022-0829-0620, pp. 15-17]

10 88 Fed. Reg. at 29319.

11 Benchmark Minerals, Report, Q1 2023.

[See original for graph, “Figure 1 U.S. Cathode Supply-Demand Forecast] [EPA-HQ-OAR-2022-0829-0620, pp. 15-17]

For this important mid-stream step of cathode manufacturing, a similar deficit of US+FTA sourced cathode material also occurs for a base case 41% BEV penetration rate in 2030. Again, production is not constrained by battery manufacturing capacity but rather by US+FTA cathode manufacturing capacity as illustrated in Figure 2. China makes up 83% of cathode manufacturing with Japan and S Korea at 15%, and the rest of the world at 2%. Because Japan and S. Korea are already included in US+FTA supply, a significant ramp up of new cathode manufacturing in IRA-compliant countries is needed to meet US base case demand and EPA proposed requirements. [EPA-HQ-OAR-2022-0829-0620, pp. 15-17]

[See original for graph, Figure 2 U.S. FTA Cathode Supply-Demand Forecast] [EPA-HQ-OAR-2022-0829-0620, pp. 15-17]

3.2. Conclusion

Battery production is less of a constraint than the materials and midstream production that feed into that process. In addition to cell manufacturing, the assessment supporting the Final Rule needs include the capacity of cathode and anode active material manufacturing and the resulting impact on battery and ultimately PEV costs. The Final Rule needs to account for the lead time associated with establishing new facilities and ramping up production operations to full scale capacity. Finally, cost assessments supporting the Final Rule need to account for the share of production that will not qualify for the IRA benefits which could affect the modeled BEV penetrations. [EPA-HQ-OAR-2022-0829-0620, p. 17]

4. Battery Costs Projections

EPA’s assessment of future battery costs is highly optimistic and inconsistent with available sources. The assessment starts with an inaccurate baseline cost for 2022 and then uses an incomplete set of forecasts to develop two trajectories which rely on assumed mid-decade price stabilization of lithium. The assessment appears to ignore the risk for price spikes arising in a tight and geopolitically sensitive market for critical minerals. Please see Appendix A on mineral supply and potential price implications. Lastly, EPA applies tax credits from the IRA 45X provision in a confusing way that could go beyond the intent of the legislation. [EPA-HQ-OAR-2022-0829-0620, p. 18]

According to Benchmark Minerals Intelligence (BMI), battery demand in North America is forecast to grow nearly five-fold between 2022 and 2030 and with that the demand for the finite supply of critical minerals such as lithium, cobalt, nickel, and graphite that go into producing batteries. [EPA-HQ-OAR-2022-0829-0620, p. 50]

The proposed rule identifies lithium as the material most likely to first constrain PEV production due to limited availability. EPA believes there will be ample supply of the other critical minerals through 2035 and/or there are known substitute minerals that make their availability less critical.1 Therefore, the proposal’s assessment of critical mineral availably is limited to a single mineral - lithium. [EPA-HQ-OAR-2022-0829-0620, p. 50]

1 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, Draft Regulatory Impact Analysis (DRIA), April 2023, page 3-23.

Toyota agrees lithium availability is likely to constrain global PEV production and put upward pressure on lithium pricing, but is also concerned about graphite supplies. Both minerals will be in tight supply sooner and for longer than projected by EPA's outdated sources2, which do not reflect the current market dynamics for battery demand and material supply in a rapidly changing market landscape. At a minimum, the final rule must use updated data to reflect current battery and non-battery demand, mined supply, and battery plant announcements with pragmatic supply forecasts which show that not every announcement will lead to production. [EPA-HQ-OAR-2022-0829-0620, p. 50]

2 Ibid pages 29319 to 29323 for examples.

Further, the analyses of critical material supply must distinguish the country of origin because it determines whether the IRA benefits used to justify aggressive BEV cost reductions apply. The IRA-qualifying supply of lithium, graphite, nickel, and cobalt and deserve a deeper evaluation to support the final rule. For example, nickel is also experiencing tight supply with a focus on mining in a single country, Indonesia, which is projected to comprise over 50% of global mined nickel battery material in 2030. Growing geopolitical and environment concerns surrounding Ni mining in Indonesia are causing instability, and it is still unknown whether Treasury will consider Indonesia as an FTA country as it requested.3 [EPA-HQ-OAR-2022-0829-0620, p. 50]

3 Citation: https://www.reuters.com/world/asia-pacific/violence-indonesia-nickel-smelter-protest-kills-2-dozens- detained-2023-01-16/.

1. Lithium Constrained PEV Penetration – Global

Toyota's assessment of global lithium supply and demand is more aligned with the projections of IEA and BNEF studies that project lithium mine production may not meet end-use demand after 20284. Benchmark Mineral Intelligence (BMI), leveraging transportation demand-side market data from their partner RhoMotion, forecasts global lithium supply versus demand through 2035. Figure 1 below forecasts a business-as-usual base case5 global PEV penetration at 41% in 2030 with an average battery size of 68 kWh. This assumes an unconstrained lithium supply. Taking forecast global lithium supply into account results in supply-demand a gap emerging around 2028. This widening deficit in supply leads to a constrained PEV penetration of 36% new sales in 2030. [EPA-HQ-OAR-2022-0829-0620, pp. 51-53]

4 88 Fed. Reg 29184 (May 5, 2023) at 29321.

5 For the base case, BMI "subsegments each demand market by end application, [and] considers government intervention that can impact adoption/use of application, OEM strategies and technology roadmaps, historical trends to understand consumer behaviour, economics and material availability/capacity build out to determine forecasted adoption of each application. This then amalgamates into [an] overall demand for each market by chemistry and region." The BMI analysis considers lithium demand for battery and non-battery sources (including heavy duty vehicles).

It is important to acknowledge two things. One, the supply shown in these comments utilizes the original source's (e.g. BMI, BNEF) de-risked supply scenario, meaning not 100% capacity, unless otherwise stated. Second, increased demand will motivate an increase in future supply project announcements. The challenge is how quickly the announced sources become operational and produce the quantities needed for compliance with the proposed standards. These operational challenges are discussed later in this section of our comments. Figure 1 shows the global PEV penetration rates in the base case as provided by BMI/RhoMotion, which includes incentives stemming from the Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0620, pp. 51-53]

[See original for graphs, Figure 1 Global Lithium Supply-Demand Forecast] [EPA-HQ-OAR-2022-0829-0620, pp. 51-53]

With the proposed rule essentially forcing ~60% BEVs in 2030, the global lithium gap would increase with heterogenous effects of supply-demand balance in the US and different countries, which is described further for the U.S. [EPA-HQ-OAR-2022-0829-0620, pp. 51-53]

The BMI study included a PEV mix of 88 percent BEVs and 12 percent PHEVs for 2030 in contrast to EPA's assumption of 100 percent BEVs for the proposal. The supply-demand analysis would have concluded larger shortfalls that would have occurred sooner if BMI had assumed 100 percent BEVs. The data in these supply-demand figures is for calendar year rather than vehicle model year. For the sake of this evaluation, the calendar year will be used and assumed equivalent to the previous model year (ex. 2030 calendar year is the same as 2029 model year). [EPA-HQ-OAR-2022-0829-0620, pp. 51-53]

BMI and RhoMotion have also developed a global forecast for a high-demand scenario shown in 1 which incorporates the announced PEV targets for 41 leading OEMs and additional government policy aspirations. In this scenario, the lithium supply-demand balance immediately goes into deficit. This materiality limitation demonstrates how the attainment of ambitious OEM PEV targets and government policy aspirations in aggregate, which are insufficiently considered in the proposed standards, would require US manufacturers to compete on a global scale for limited lithium creating many unknown supply bottlenecks. Lithium supply constraints are next discussed in terms of domestic US supply and then US and Free Trade Agreement (FTA) country supply. [EPA-HQ-OAR-2022-0829-0620, pp. 51-53]

2. Lithium Constrained PEV Penetration – IRA Compliant

2.1. US Domestic Supply

First and not surprisingly, the forecast clearly shows that the U.S.-based lithium mined capacity and refined capacity (de-risked supply) is able to supply only 33% and 51%, respectively, of the lithium needed for base case U.S. demand at 41% PEV penetration in 2030, with an average pack size of 70 kWh. [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

[See original for graph, Figure 2 U.S. Domestic Lithium Supply-Demand Forecast] [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

Thus, to meet base case demand requires sourcing the remaining lithium from outside of the U.S. both for mining and refining purposes. Figure 2 shows this in more detail. Domestic supply shrinks to only 32% of required lithium supply needed to satisfy a 60% PEV share for an assumed average battery size of 70 kWk (red dashed line) and only 23% the required lithium for an average 100 kWh battery (red dotted line) that is referenced in the proposal. This means for a 100 kWh battery, U.S. lithium supply could meet demand for approximately 15% PEV penetration in 2030, 45% less than 60% BEV penetration EPA is seeking through the proposal. [EPA-HQ-OAR-2022-0829-0620, pp. 53-54]

2.2. US +FTA Supply

The lithium supply-demand gap narrows but continues when sourcing is extended to the Free Trade Agreement (FTA) countries that qualify for IRA tax credits. Data from BMI, RhoMotion, e-Source and IHS Markit show (see Figure 3) that 45% of USA+FTA refined lithium supply would be needed to meet US demand for the 41% PEV base case penetration in 2030. Compliance with EPA's proposed requirements in 2030, would consume 71% of USA+FTA refined lithium supply for an average pack size of 70 kWh and 99% of USA+FTA supply for the EPA-referenced average 100 kWh battery. [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

[See original for graph, Figure 3 U.S.+FTA Lithium Supply Required to Meet Proposed 60% PEV Share] [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

When we consider the lithium demand of Free Trade Agreement countries in addition to the U.S. (i.e. US+FTA lithium), the aggregate increased demand results in a deficit after 2028 in the base case demand scenario as seen in Figure 4. If US demand is increased to attain a 60% PEV penetration in 2030, the deficit will move early relative to 2028 depending on the PEV ramp-up required to meet EPA requirements. If the FTA countries are allowed to meet their Li demand first before providing excess to U.S. domestic supply, the U.S. PEV penetration rate is constrained to 36% in 2030 with an average pack size of 70 kWh. Supply from IRA-compliant U.S. and FTA countries would support only a 25% U.S. PEV penetration in 2030 for a 100 kWh size battery if FTA countries meet their lithium demand first before providing excess refined lithium supply to existing U.S. domestic supply. [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

[See original for graphs, Figure 4 U.S.+FTA Lithium Supply-Demand Forecast]

It should be noted that FTA mined supply includes Australia, which is the largest current source of lithium (over 50% of global supply) in the world through its spodumene supply and would qualify under the IRA provisions. However, today 96% of Australian supply is currently sold to and refined in China, a foreign entity of concern.6 If the refining of Australian supply could relocate to a US+FTA country, the expanded source of lithium supply could potentially satisfy U.S. demand driven by the proposed standards and make the proposal's assumptions about IRA cost savings more realistic as illustrated in Figure 5. [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

6 https://www.globaltimes.cn/page/202207/1270447.shtml.

Quickly shifting significant amounts of the Australian mined supply would be extremely challenging. While refineries are faster to build than mines, such an undertaking could be impractical considering existing business partnerships and the effort to establish new partnerships with capital- and operational-intensive infrastructure. It would be most efficient for Australia to establish local refining; however, BMI forecasts Australian refining capacity to be about 15% of China's capacity in 2030. The Australian government has reported that it could provide 20% of the world's needed refining capacity in 2027.7 However, delays are already occurring for current refining projects and there is uncertainty as to whether Australia will be able to compete with China on prices. [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

7 https://www.power-technology.com/news/australia-to-end-dependence-on-china-for-lithium.

[See original for graph, Figure 5 U.S.+FTA Lithium Supply-Demand: Australia Supply Included] [EPA-HQ-OAR-2022-0829-0620, pp. 54-57]

3. Graphite Constraints

The proposal categorizes graphite as a substitutable material noting “the role of natural graphite in many cases can be served by artificial graphite or highly refined hard or amorphous carbon. However, lithium has no substitute in commercially produced automotive applications at this time.”8 [EPA-HQ-OAR-2022-0829-0620, pp. 57-59]

8 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, Draft Regulatory Impact Analysis (DRIA), April 2023, page 3-23.

Toyota understands that IRA-qualifying graphite could restrict US battery production and constrain PEV sales more so than lithium. The U.S. currently does not produce any natural graphite and must rely on imports where most originates from China. Despite growth of natural graphite mining in Africa, which is projected to take over China as the major source of graphite in the mid- 2020s9, the majority of graphite processing called spheroidization which is necessary to improve battery performance takes place in China (see Figure 6). [EPA-HQ-OAR-2022-0829-0620, pp. 57-59]

9 https://www.greencarcongress.com/2022/08/20220807-benchmark.html.

[See original for graphic, Figure 6 Countries of Origin for Graphite] [EPA-HQ-OAR-2022-0829-0620, pp. 57-59]

China controls every stage of the graphite supply chain and was responsible for almost 60 % of the world’s mined production last year and approximately nearly 99% of graphite processing because of its scale of operations, established supply, weak environmental requirements, and low resulting costs. If any portion of a battery’s raw material originates from a foreign entity of concern (including refining), the battery would not qualify for part of the consumer tax credit. [EPA-HQ-OAR-2022-0829-0620, pp. 57-59]

For synthetic graphite, there are three US companies planning to produce a combined 12k tonnes per year by 2026, up from 2k in 2022.10 Only one company is expected to process natural graphite in the US (Vidalia) with operations announced to come online in 2023 at 2.5k tonnes per year and ramp to 10k by 2026. Combined the US is projected to have 22k tonnes of graphite refining capacity per year by 2030. USA+FTA countries are projected to reach 203k tonnes per year.11 [EPA-HQ-OAR-2022-0829-0620, pp. 57-59]

10 [FN: PUREgraphite, SGL Carbon, and Amsted Graphite]

11 Cite BNEF “Metals Data Hub” online database, last updated Oct. 2022

As reference, approximately 1 kg of graphite is needed per kWh of battery capacity. For an average BEV pack size of 70 kWh, the graphite produced from US+FTA countries would support 2.9 million BEVs per year in 2030 which would satisfy only 18% of the 15,814,296 annual new vehicle sales projected in 2030.12 To comply with the 60% BEV share driven by the proposed standard in 2030, 66% of refined graphite would need to be procured from global supplies that are outside of US+FTA control and may not qualify for important IRA benefits to incentivize vehicle purchases. [EPA-HQ-OAR-2022-0829-0620, pp. 57-59]

12 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, Draft Regulatory Impact Analysis (DRIA), April 2023, page 4-44.

4. Mining/Processing Limitations

The proposal claims significant deposits of nickel, cobalt, lithium and graphite in the U.S. remain undeveloped primarily because of economic considerations. It also recites Biden Administration and industry efforts toward building a sustainable domestic supply chain and how the Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Law (BIL) will accelerate that development. [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

However, the proposal provides no specific roadmap as to how the billions of dollars in available federal and private funds will translate into a schedule of quantified increases in domestic material supplies that will enable compliance with the proposed standards. Instead, EPA relies on anecdotal evidence such as the March 2023 DOE assessment which identified 19 additional lithium production projects in the U.S. in addition to the three BNEF had identified in a December 2022 study. With this information, EPA concluded that there will be sufficient lithium supply to meet end-use demand well beyond 2028.13 [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

13 88 Fed. Reg at 29321.

DOE's assessment of the 19 mines appears to ignore the significant uncertainty associated with starting mining operations. The prospect for a mine to reach the production stage and time that takes hinges on exploration and feasibility studies, approval and permitting processes, potential for project abandonment and delays, learning rates for new companies, and production ramp up. When these risk factors are considered, only 18 out of 50 proposed or announced lithium mining projects in the US are expected to be operational by 2035, according to BMI (see Figure 7). [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

[See original for graph, Figure 7 US Probable Lithium Mines] [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

Further, the 18 mines are expected to produce less than 14,000 tonnes lithium per year which fills only 19% of the lithium needed to attain a 60% PEV share in 2030 assuming an average battery size of 70 kWh. These relatively small and young mining operations will not be able to add a meaningful amount of IRA-qualifying minerals, much less relieve expected tight global supply. The U.S. will have more refining capacity than mining capacity, meaning it can absorb and use supply from FTA countries for US production as shown below (Figure 8). However, like the mining capacity, the refining capacity is insufficient for US demand, accounting for only 28% of US demand driven by a 60% PEV share in 2030, assuming an average battery size of 70 kWh. As refineries can come online faster than mining operations, an increasing in US or US+FTA refining capacity could reduce this gap. New mining operations are more complicated. [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

[See original for graph, Figure 8 US Probable Lithium Refineries] [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

As seen in Figure 9, reaching the operational stage of a mine entails long lead times. As provided by the IEA below, lead times for lithium mining can take 4-7 years without delays. New nickel mining operations can take 13-19 years. [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

[See original for graphic, Figure 9 Mining Project Development Lead Times] [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

In the U.S, the time to establish an operating mine can take even longer because of regulatory requirements that are stricter than many other countries in the world. Recently, the largest proposed lithium mine at Thacker Pass was approved to start operations but after years of delay.14 Repeat examples of multi-year delays in mine production and the growing number of small and young companies means there is large uncertainty in the ability of supply to ramp up to meet ambitious demand targets on shorter time scales. [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

14 cite: https://www.reuters.com/legal/us-judge-rule-thacker-pass-lithium-mine-case-within-months-2023-01-05/.

Approvals become more complex and time consuming because the reserves of critical minerals in the U.S. are tied closely with tribal lands, where over 70% of these reserves are within 35 miles of tribal lands as seen in Figure 10. Mining at Thacker Pass mentioned above also carries controversy with its overlap with sacred tribal land.15 [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

15 https://www.npr.org/2023/06/28/1184812267/western-tribes-last-ditch-effort-to-stall-a-large-lithium-mine-in- nevada.

While an increase in mining operations is necessary to meet supply, a reasonable timeline should be applied to the availability of such supply to meet demand both in terms of time-to-production and time-to-full production capacity. Data from BMI suggests it can take 1-4 years to ramp up to full operating capacity. [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

[See original for bar chart, Figure 10 Proximity of U.S. Mining Resources[[EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

Finally, the resolution of environmental concerns can delay the development and opening of new mines. Environmental Sustainability and Governance issues surrounding mining are gaining increased attention. For example, particulate emissions may prove a challenge for natural graphite mines in the U.S. [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

In summary, establishing mining and processing operations and reaching full, efficient operational entails significant risk and a decade-long process if successful. It is extremely unlikely the U.S. can attain significant mining capacity in the period of the proposed standards. However, increasing refining capacity could be a means to alleviating supply deficits. [EPA-HQ-OAR-2022-0829-0620, pp. 59-63]

5 Price Volatility

Forecasts for ongoing tight global lithium supply are at odds with EPA's claim that "the price for Lithium is likely to stabilize at or near its historical levels by the mid-2020s."16 The forecast of strong demand coupled with tight supply over the next decade creates an economic recipe for price volatility. In this fragile condition, every step of complex and intertwined global operations must fall perfectly into place as planned to avoid price spikes. [EPA-HQ-OAR-2022-0829-0620, pp. 63-65]

16 Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, EPA- 420-D-23-003, Draft Regulatory Impact Analysis (DRIA), April 2023, page 3-21.

BMI suggests that lithium prices will stabilize (see Figure 11), but there is risk of underestimating potential volatility resulting from future shocks to the system. Historic price volatility has been primarily caused by localized shocks which are impossible to forecast but can have large consequences. For example, the lithium price shock below, driven by the covid-19 pandemic created supply restrictions, which increased prices and spurred supply growth, which has in turn depressed prices again. We will not know if such a spike will occur again until it happens. [EPA-HQ-OAR-2022-0829-0620, pp. 63-65]

[See original for chart, Figure 11 Historic Lithium Price Trends] [EPA-HQ-OAR-2022-0829-0620, pp. 63-65]

Price fluctuations are expected to be a by-product of transitioning the vehicle fleet to PEVs while simultaneously establishing the supply base. Demand for PEVs will be determined by prices remaining in a range consumers can afford which requires sufficient supply so only modest supply- demand gaps occur. Otherwise, demand will contract due to price spikes/volatility. Figure 12 is an image of how a too much demand relative to available supply results in price spikes that suppress demand as part of a feedback loop making it more difficult to meet any government's PEV targets. Mines and refineries seek to avoid excess supply because it results in lower prices and profits which is occurring now and expected to persist for the next few years. Thus, mines and refineries seek conditions that favor high demand and prices, erring on the side of tight or under supply. [EPA-HQ-OAR-2022-0829-0620, pp. 63-65]

[See original for graph, Figure 12 Supply-Demand Impacts on Pricing] [EPA-HQ-OAR-2022-0829-0620, pp. 63-65]

According to numerous analysts, a temporary "excess" of global supply spurred by more lithium mining projects in conjunction with slower PEV sales in China because of expiring subsidies has resulted in the current lower lithium prices which are expected to remain through the 2026 timeframe but are not expected to hold, as mining and refining companies will adjust supply to avoid that less profitable scenario.17 [EPA-HQ-OAR-2022-0829-0620, pp. 63-65]

17 https://internationalbanker.com/brokerage/why-are-lithium-prices-collapsing.

Mining economics are at odds with EPA's conclusion that "rapid growth in lithium demand has driven new development of resources and robust growth in supply, which is likely a factor in recently observed reductions in lithium price, with strong profit margins remaining - even afterward."18 [EPA-HQ-OAR-2022-0829-0620, pp. 63-65]

18 88 Fed. Reg at 29313.

6 Conclusion

A deeper analysis of global and IRA-compliant critical material supply and demand is needed to support the final rule. The proposal's high-level assessment results in overly optimistic observations that "critical battery mineral supply is likely to be adequate to meet anticipated demand, in some cases by a significant margin".19 The proposal lacks the evidence to support this finding. Demand for critical minerals today is now higher than the years referenced in the proposal due to new policy and OEM targets. Future demand growth for PEVs is unclear given the uncertain geo-political considerations and supply chain operations beyond the control manufacturers and EPA. It is highly plausible the tight supply-demand for lithium and graphite will lead to volatile prices and the proposal fails to consider how this could suppress demand and annual EV market share. The Final Rule must encompass a significantly deeper analysis based on a boarder array of sources for assessing global supply-demand by country of origin to support the use of IRA tax credits. [EPA-HQ-OAR-2022-0829-0620, pp. 65-66]

19 Id.

Organization: Transfer Flow, Inc

Electric vehicle technologies are the opposite of energy independence. [EPA-HQ-OAR-2022-0829-0496, pp. 2-3]

Electric vehicle battery chemistry differs significantly from traditional internal combustion engine batteries. A conventional internal combustion engine uses a typical lead-acid battery. The most common battery chemistry used in an electric vehicle is nickel manganese cobalt. The mining of the raw minerals needed to manufacture the battery packs for electric vehicles has been linked to many horrific human rights abuses.2’3’4’5’6’7’8’9 There are a limited number of locations around the world where the minerals needed to manufacture electric vehicle batteries are found. 70% of the cobalt used in electric vehicle batteries comes from a single country, the Democratic Republic of the Congo.10 80% of the battery supply chain is owned by China. [EPA-HQ-OAR-2022-0829-0496, pp. 2-3]

2 https://www.euronews.com/green/2022/10/28/south-americas-lithium-triangle-communities-are-being-sacrificed-to-save-the-planet

3 https://www.amnesty.org/en/latest/news/2019/03/amnesty-challenges-industry-leaders-to-clean-up-their-batteries/

4 https://www.ft.com/content/c6909812-9ce4-11e9-9c06-a4640c9feebb

5 https://www.theguardian.com/environment/2021/jan/03/child-labour-toxic-leaks-the-price-we-could-pay-for-a- greener-future

6 https://www.nytimes.com/2021/05/06/business/lithium-mining-race.html

7 https://www.washingtonpost.com/graphics/business/batteries/congo-cobalt-mining-for-lithium-ion-battery/

8 https://therevelator.org/ev-batteries-seabed-mining/

9 https://earthworks.org/resources/responsible-minerals-sourcing-for-renewable-energy/

10 https://www.nytimes.com/2023/01/23/books/review/cobalt-red-siddharth-kara.html

The United States not owning the electric vehicle battery supply chain is especially concerning when we consider the possibility of a natural disaster or, heaven forbid, an international conflict. As we have seen recently in several local domestic terrorist attacks, 11’12’13’14 an attack on the power grid could render electric vehicles located in affected regions useless. According to the United States Geological Survey, a major earthquake (M>=6.7) will likely strike California by 2032.15 We have recently seen in the wake of Hurricane Ian in Florida that electric vehicles are dangerous and ineffective in situations of natural disaster.16 [EPA-HQ-OAR-2022-0829-0496, pp. 2-3]

11 https://www.cnn.com/2023/02/04/us/us-power-grid-attacks/index.html

12 https://lasvegassun.com/news/2023/feb/12/call-attacks-on-the-us-power-grid-what-they-are-do/

13 https://www.cbsnews.com/news/physical-attacks-on-power-grid-rose-by-71-last-year-compared-to-2021/

14 https://www.justice.gov/opa/pr/three-men-plead-guilty-conspiring-provide-material-support-plot-attack-power-grids-united

15 https://earthquake.usgs.gov/earthquakes/events/1906calif/18april/whenagain.php

16 https://abc7.com/hurricane-ian-ev-car-fires-electric-cars-damaged-florida-flood-damage/12356326/

Many consumers disapprove of the government dictating which near-zero technologies they're allowed to utilize. Unfortunately, the EPA has not provided for a battery directive such as the UN has required setting sustainability requirements for batteries placed on the market, including responsible sourcing of raw materials, hazardous substances, carbon footprint, and measures to improve the collection, treatment, and recycling of these waste batteries ensuring materials recovery. Many concerned citizens do not support the human rights violations associated with mining cobalt, lithium, and other minerals required for battery manufacturing. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

Organization: U.S. Chamber of Commerce

- Underdeveloped and unsecure supply chains for electric vehicle batteries and other components. Electric vehicles need approximately six times more minerals than a conventional vehicle, and the International Energy Agency estimates that EV- related demand for these minerals will increase almost 30-fold through 2050. The auto industry and other sectors facing growing supply chain concerns are working with the mining sector to address projected shortfalls of these critical minerals and associated refining and processing needs, but the challenge is immense. [EPA-HQ-OAR-2022-0829-0604, p. 2]

Successfully ramping up these efforts will take several years under even the most optimistic scenarios. This is a major reason why the proposed rule's aggressive and front-loaded "ramp rate" is not realistically achievable, and could in fact exacerbate energy security issues associated with China's current dominance of global critical mineral supply chains. While recently enacted R&D programs and tax incentives are certain to help attract battery manufacturing and assembly investments necessary for the downstream end of the supply chain, a more comprehensive approach including faster permitting is needed. In particular, the Chamber urges the Administration to reverse course on its opposition to domestic mining projects required to source the raw materials necessary for manufacturing EV batteries on the scale envisioned by this proposal. [EPA-HQ-OAR-2022-0829-0604, p. 2]

Organization: United Steelworkers (USW)

As our union represents the majority of unionized workers in the auto supply chain and workers in the oil sector, we have grave concerns regarding this proposed rule's impact on their livelihoods, and the negative impact that the rapid implementation of ZEVs will have on our electric grid and domestic supply chain. [EPA-HQ-OAR-2022-0829-0587, p. 1]

EPA should coordinate with the Department of Energy (DOE), the Department of Transportation (DOT), and the Department of Commerce (DOC) to better understand how its regulatory timelines correspond with the investments that will support regulatory compliance. More to this point, the Administration continues to delay rollout of the Build America, Buy

America provisions in the IIJA, which is hindering domestic manufacturing investments for a variety of products, including products contributing to the transition to low-emissions vehicles. [EPA-HQ-OAR-2022-0829-0587, p. 4]

Further, the domestic supply chain for components and the charging infrastructure isn't close to being readily available.10 This proposed rule does not strike a balance between the ambition to reduce emissions and the practicality of the disruption in the supply chain. If EPA requires automakers to achieve far-reaching standards in an unreasonable time frame, they will rely on cheap, readily available components from countries, like the People's Republic of China (PRC), where a large amount of the current ZEV supply chain is located.11 Encouraging sourcing products from the PRC and similar countries does not advance best practices to reduce our environmental footprint as the use of coal to power manufacturing facilities is still prevalent there.12 The potential offshoring of the automotive supply chain not only harms manufacturing workers and communities in the U.S., it also allows automakers to cut their costs in pursuit of lower environmental and labor standards abroad. [EPA-HQ-OAR-2022-0829-0587, p. 5]

10 Alliance for Automotive Innovation, (Link: https://www.autosinnovate.org/posts/blog/epas-ev-rules-what-it-means-for-china-and-the-us-auto-market)"EPA's EV Rules: What it Means for China and the U.S. Auto Market", June 12, 2023.

11 Foley & Lardner LLP, (Link: https://www.foley.com/en/insights/publications/2023/04/epa-passenger-heavy-duty-emissions-standards)"EPA Moves to Tighten Passenger and Heavy-Duty Vehicle Emissions Standards; Seeks to Drive Majority of New U.S. Car Sales to EVs by 2030", April 13, 2023.

12 National Public Radio, (Link: https://www.npr.org/2023/03/02/1160441919/china-is-building-six-times-more-new-coal-plants-than-other-countries-report-fin) "China is building six times more new coal plants than other countries, report finds", March 2, 2023.

Organization: Valero Energy Corporation

Moreover, in April 2023, Toyota sent its dealers a "Hybrid Memo" pointing out that "There are three major barriers to widespread battery electric vehicle adoption in the United States" – critical minerals, charging infrastructure, and affordability. Noting that the amount of raw materials in one BEV could be used to make 6 PHEV or 90 hybrid electric vehicles, the memo concludes that "An 'all of the above' electrification strategy is the bridge to get us to lower overall carbon emissions."127 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

127 https://jalopnik.com/toyota-focusing-on-hybrids-not-electric-vehicles-1850440908

EPA also cites to a July 2021 Stellantis announcement regarding its "intensified focus on electrification across all of its brands."128 Yet, EPA does not consider qualifying statements like those made by Stellantis CEO Carlos Tavares in May 2022, in which he stated that he expects a shortage of EV batteries by 2024-2025, followed by a lack of raw materials for the vehicles by 2027-2028.129 Mr. Tavares has also provided that "[y]ou'll see that the electrification path, which is a very ambitious one, in a time window that has been set by the administrations is going to bump on the supply side".130 Further, in response to EPA's proposed rule, Chrysler parent Stellantis has said it remains "committed to reducing vehicle emissions," adding "we are surprised that none of the alternatives align with the President's previously announced target of 50% EVs by 2030."131 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

128 EPA's Proposed Rule at 29191(citing to Stellantis, ''Stellantis Intensifies Electrification While Targeting Sustainable Double-Digit Adjusted Operating Income Margins in the Mid-Term,'' Press Release, July 8, 2021).

129 Reuters, "Automotive industry faces long term battery, raw material supply issues, Tavares says" (May 10, 2022) https://www.reuters.com/business/autos-transportation/automotive-industry-faces-long-term-battery-raw-material-supply-issues-tavares-2022-05-10/ (emphasis added).

130 Wayland, Michael, "Stellantis CEO warns of electric vehicle battery shortage, followed by lack of raw materials (May 24, 2022) https://www.cnbc.com/2022/05/24/stellantis-ceo-warns-of-ev-battery-shortage-lack-of-raw- materials.html.

131 Root, Al, "Car Makers Don't Love EPA's EV Plan. Here's What Ford, GM, and Others Are Saying, Barrons (April 13, 2023) https://www.barrons.com/articles/ev-epa-emissions-what-auto-makers-say-9abaedd6?ns=prod/accounts-barrons.

Further, EPA provides that "in January 2021, General Motors announced plans to become carbon neutral by 2040, including an effort to shift its light-duty vehicles entirely to zero-emissions by 2035."132 Yet GM's 10-K filed in January 2023 caveats that:133 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

132 EPA's Proposed Rule at 29190 (citing to General Motors, ''General Motors, the Largest U.S. Automaker, Plans to be Carbon Neutral by 2040,'' Press Release, January 28, 2021).

133 GM's 10-K Annual Report for the 2022 Fiscal Year, https://investor.gm.com/static-files/54bdb095-143e-4b96- b6d5-25937910b59c (emphasis added).

"[A]ny increase in the cost, or reduced availability, of critical materials for our EV propulsion systems, including lithium, nickel, cobalt and certain rare earth metals, could lead to higher production costs for our EVs and could impede our ability to successfully deliver on our EV strategy. Further, increasing global demand for, and uncertain supply of, such materials could disrupt our or our suppliers' ability to obtain such materials in a timely manner and/or could lead to increased costs. Geopolitical risk, fluctuations in supply and demand, fluctuations in interest rates, any weakening of the U.S. dollar and other economic and political factors have created and may continue to create pricing pressure for commodities, raw materials and other inputs." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

GM's 10-K further disclosed that its "business in China subjects [it] to unique operational, competitive and regulatory risks" and that "[i]ncreased competition, continued U.S.-China trade tensions or weakening economic conditions in China, among other factors, may result in cost increases, price reductions, reduced sales, profitability and margins, and challenges to gaining or holding market share." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

Other auto-manufacturers have similar views. In response to EPA's proposed rule, a Hyundai spokesperson provided that "[t]he proposed vehicle emission rules released by EPA will be challenging to meet and will require further expansion of charging infrastructure, consumer incentives and supply chains".134 Regarding Tesla, after stating that the BEV manufacturer aims to produce 20 million EVs per year before 2030,135 CEO Elon Musk clarified that Tesla's target is an "aspiration, not a promise . . . we may stumble and not reach that goal".136 In June 2022, Elon Musk further stated that "[b]oth [of Tesla's] Berlin and Austin factories are gigantic money furnaces right now. It's like a giant roaring sound, which is the sound of money on fire". 137 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

134 Root, Al, “Car Makers Don’t Love EPA’s EV Plan. Here’s What Ford, GM, and Others Are Saying, Barrons (April 13, 2023) https://www.barrons.com/articles/ev-epa-emissions-what-auto-makers-say-9abaedd6?ns=prod/accounts-barrons.

135 Dean, Grace, “Elon Musk says Tesla will ‘probably’ make 20 million electric vehicles a year by 2030 – more than 50 times what it produced last year” (Sep. 28, 2020) https://www.businessinsider.com/elon-musk-tesla- likely-20-million-electric-vehicles-year-2030-2020-9.

136 See https://www.ft.com/content/fbe8843e-1d2e-4a25-bce8-dcf77304fc37 (emphasis added).

137 Ohnsman, Alan, “Musk Calls Tesla’s Berlin, Austin Plans ‘Money Furnaces’ Amid Startup Snags” (June 22, 2022) https://www.forbes.com/sites/alanohnsman/2022/06/22/musk-calls-teslas-berlin-austin-plants-money- furnaces-amid-startup-snags/?sh=720166b56ad1.

EPA’s reliance on a September 2022 Report from the Environmental Defense Fund and ERM is also similarly inadequate. Specifically, EPA states that its “Figure 1, taken from work by the Environmental Defense Fund and ERM, illustrates how these and other announcements mean that virtually every major manufacturer of light-duty vehicles is already planning to introduce widespread electrification across their global fleets in the coming years.”138 But EPA does not sufficiently consider the entirety the EDF and ERM report it relies on, which also states as follows:139 [EPA-HQ-OAR-2022-0829-0707, pp. 27-28]

138 EPA’s Proposed Rule at 29191 (citing to Environmental Defense Fund and ERM, ‘‘Electric Vehicle Market Update: Manufacturer Commitments and Public Policy Initiatives Supporting Electric Mobility in the U.S. and Worldwide,’’ September 2022).

139 EPA’s Proposed Rule at 29191 (citing to Environmental Defense Fund and ERM, ‘‘Electric Vehicle Market Update: Manufacturer Commitments and Public Policy Initiatives Supporting Electric Mobility in the U.S. and Worldwide’’ at 31, September 2022) (internal citations omitted).

“Prices of key minerals and metals, like lithium, cobalt, nickel, copper, and aluminum that are required components for battery manufacturing, increased in 2021 with this price trend predicated to continue through 2022. In recent research from IEA, cathode materials (lithium, nickel, cobalt, and manganese), essential for lithium-ion batteries, accounted for less than five percent of battery pack costs in the middle of the last decade. However, this share has risen to over 20 percent in recent years. The price of lithium and cobalt more than doubled in 2021, with lithium increasing two and a half times since the start of 2022. [EPA-HQ-OAR-2022-0829-0707, pp. 27-28]

IEA also expects that with ongoing geopolitical conflicts like the Russian invasion of Ukraine and supply being cut in China, lithium-ion battery pack prices will continue to rise. Russia is a major producer of minerals like aluminum, accounting for nearly six percent of global production, ten percent of nickel, and two percent for Class-1 nickel, the only grade used in lithium-ion batteries. According to IEA, on March 8, 2022, nickel prices soared from $25,000 per metric ton to over $100,000 per metric ton which caused the London Metal Exchange to suspend the trading of nickel for a week. [EPA-HQ-OAR-2022-0829-0707, pp. 27-28]

According to the U.S. State Department, over 80 percent of the global supply chain of rare earth elements (important components of lithium-ion batteries and other EV components) is controlled by China, and Bloomberg NEF found that China holds 77 percent of the world’s battery cell manufacturing capacity and 60 percent of the world’s component manufacturing.” [EPA-HQ-OAR-2022-0829-0707, pp. 27-28]

B. EPA fails to adequately address critical minerals supply, availability, and geopolitics.

The IEA states that "[t]his World Energy Outlook special report on The Role of Critical Minerals in Clean Energy Transitions identifies risks to key minerals and metals that – left unaddressed – could make global progress towards a clean energy future slower or more costly, and therefore hamper international efforts to tackle climate change."147 The IEA Report further provides that EVs require significant mineral inputs compared with ICE vehicles.148 For example, the typical electric car contains six times the mineral resources of a kind susceptible to supply chain disruptions and volatility. Additionally, demand for EV minerals is growing rapidly and expected to outpace production in the coming years. Further, the long lead time for the development of new mines constrains industry's ability to respond to rapid increases in mineral demand. [EPA-HQ-OAR-2022-0829-0707, pp. 29-30]

147 International Energy Agency, ''The Role of Critical Minerals in Clean Energy Transitions,'' World Energy Outlook Special Report, Revised version. March 2022. https://www.iea.org/reports/the-role-of-critical-minerals- in-clean-energy-transitions

148 Id.

A recent announcement of Chile's intention to nationalize its lithium production led to questions regarding lithium supply volatility and security, specifically in the context of EV supply chains. Other examples of geopolitical and national security risk inherent to EV supply chains include, but are not limited to, as follows: [EPA-HQ-OAR-2022-0829-0707, pp. 29-30]

"Amid growing demand for lithium in the race for electric vehicle batteries, Mexico last year nationalized the mineral and created the state-run LitioMx, or Litio Para Mexico." Recently, on February 18, 2023, Mexican President Andres Manuel Lopez Obrador signed a decree handing over responsibility for lithium reserves to Mexico's energy ministry, after nationalizing lithium deposits in April 2022. [EPA-HQ-OAR-2022-0829-0707, pp. 29-30]

- "Indonesia is home to 22% of the world's nickel reserves, and its ban on nickel ore exports since 2020 has caused major shifts in the supply chains of strategic products such as electric vehicles and rocket engines." Nickel is a crucial material in the production of EV battery cathodes. [EPA-HQ-OAR-2022-0829-0707, pp. 29-30]

Organization: Volvo Car Corporation (VCC)

Many uncertainties remain (supply chains, tariffs, infrastructure, incentives) so it is very important that government pursue policies that encourage auto industry investment and jobs, development of the electric vehicle market and advancement of motor vehicle safety. With the right complementary government policies, this rulemaking presents an opportunity for government and industry to pursue these shared goals. [EPA-HQ-OAR-2022-0829-0624, pp. 5-6]

Organization: Western Energy Alliance

Energy Security: EPA makes the specious assertion that the energy security benefits of the rule will include, "…reductions in energy security externalities caused by U.S. petroleum consumption and imports…" p. 29199 Given the huge supply of American oil and the fact that the United States is the number one oil producer in the world, EPA strains its credibility by justifying the proposed rule in such a way. Unlike the ICEV fleet with its majority consumption of American oil, EV batteries are sourced from minerals largely mined unsustainably in China and Africa, as are the minerals required for wind turbines and solar panels. Further, the U.S. lacks copper and aluminum smelting capacity required to expand the grid and it takes years to develop new mines. Without expansion, the grid is susceptible to reliability issues. [EPA-HQ-OAR-2022-0829-0679, p. 4]

EPA's cost-benefit analysis regarding energy security is troublesome, finding that the proposed rule delivers $21 billion to $42 billion in energy security benefits from reduced oil imports, but ignoring the security implications of the huge foreign mineral needs arising from the proposed rule. With huge domestic reserves of oil and the fact that Canada is the primary exporter to the United States, our country enjoys an energy security benefit in terms of oil. [EPA-HQ-OAR-2022-0829-0679, p. 4]

The supposed benefit EPA finds from reduced imports pales in comparison to the overwhelming security cost of the rule from forcing the country to becoming nearly 100% dependent on China and Africa for EVs and the minerals in them. Figure 28 of the proposed rule makes the case for us, as it shows the foreign sources of minerals, yet EPA does not analyze the security implications. In fact, EPA waves away the data on the lack of domestic sourcing with the statement that: [EPA-HQ-OAR-2022-0829-0679, p. 4]

"…the development of mining and processing capacity in the U.S. is a primary focus of efforts on the part of both industry and the Administration toward building a robust domestic supply chain for electrified vehicle production and will be greatly facilitated by the provisions of the BIL and the IRA as well as large private business investments that are already underway and continuing." [EPA-HQ-OAR-2022-0829-0679, p. 4]

As with the expansion of the grid required to achieve the aggressive EV targets, government policy that wishes to expand domestic capacity is unlikely to achieve its intended goal, given the track record of the country over the past several decades in permitting mines, long processing times for National Environmental Policy Act (NEPA) analysis, and other environmental laws that will continue to slow new mining projects. Further the very actions of this administration to constrain domestic supplies of minerals, such as EPA denying the water permit for the Pebble Mine in Alaska and the Interior Secretary withdrawing 225,594 acres in Cook, Lake, and Saint Louis counties of Minnesota from mineral leasing, belie EPA's sanguinity for domestic supply. Replicating anywhere near an equivalent for critical minerals as our current vast reserves of oil is nothing short of a fantasy, particularly by the year 2030 or 2032. The fact that the president and Congress wish to support domestic supply chains for critical minerals does not mean it will be so. [EPA-HQ-OAR-2022-0829-0679, pp. 4-5]

EPA attempts to wave away this dependency problem on page 29323: [EPA-HQ-OAR-2022-0829-0679, pp. 4-5]

"Finally, it is important to note that utilization of critical minerals is different from the utilization of foreign oil, in that oil is consumed as a fuel while minerals become a constituent of manufactured vehicles. That is, mineral security is not a perfect analogy to energy security." [EPA-HQ-OAR-2022-0829-0679, pp. 4-5]

EPA dismisses serious concerns on the viability of critical mineral access with hopes for long-term contracts, manufacturing flexibility in substituting one mineral for another as their availability ebbs and flows, and effective mineral recycling. EPA ignores the mineral needs of the grid expansion that would be necessary for this rule. However, even assuming that EPA has a point that mineral security is not the same as energy security, then there should be a corresponding quantification of the mineral security costs in the cost/benefits analysis of the rule. There should be an entry in Table 156 right along with the "Energy Security Benefits" itemized as "Critical Minerals Benefits." Were EPA to perform such an analysis, it would find a huge cost to national security from critical mineral insecurity that would easily dwarf EPA's finding of an energy security benefit from the proposed rule. [EPA-HQ-OAR-2022-0829-0679, pp. 4-5]

Affordability/Environmental Justice: EPA is assuming that although the retail price of EVs is typically higher than for comparable ICEVs at this time, the price difference will narrow or disappear as the cost of batteries and other components fall in the coming years. EPA is taking a huge leap of faith in the ability of EV manufacturers to innovate in time for the arbitrary deadlines imposed by the president and EPA through this rule. Market projections six months from now are difficult, much less nine years into the future. [EPA-HQ-OAR-2022-0829-0679, p. 7]

But recent evidence suggests that EPA's assumption is well off the mark. EV battery costs soared in 2022 due to rising raw material and battery component costs. As countries around the world attempt to reach similar arbitrary targets for EVs and renewable energy, the competition for limited supplies of raw materials will likewise grow.13 Prices for rare earth minerals have increased between 60% and 400% while prices for lithium have increased by over 300% since 2020.14 [EPA-HQ-OAR-2022-0829-0679, p. 7]

13
"EV battery costs have soared in 2022, hampering EV affordability," Stephen Edelstein, Green Car Reports, December 8, 2022.

14 Current Strategic Metals Prices, Strategic Metals Invest and D aily Metals Prices, both accessed July 5, 2023.

Organization: Wisconsin Automobile and Truck Dealers Association

Although the EPA argues the price of EVs will decline and affordability will increase, you also reference the cost of batteries and other components falling in coming years. Yet the agency acknowledges that the United States barely exists in the production of copper, nickel, cobalt, graphite, lithium, and platinum. The control of these products rests with other countries, many of them, our adversaries. How can the EPA predict the decline in price on products we do not control and on minerals that are precious and non-renewable? It is also irresponsible to make such predictions when we are currently experiencing conflicts with China and Russia and believing the United States can still procure adequate supplies from other countries. The EPA also acknowledges the United States produces large percentages of oil and natural gas. [EPA-HQ-OAR-2022-0829-0494, p. 1]

Organization: Zero Emission Transportation Association (ZETA)

The light- and medium-duty electric vehicle (LMDEV) markets are primed for rapid growth in the coming years. As discussed further in these comments, hundreds of thousands of vehicles have already been put on U.S. roadways, the diversity of available EV4 models are growing exponentially, and battery prices are falling rapidly. Significant investments are being made throughout the supply chain to support a smooth transition to mass consumer adoption of EVs. Robust EPA emissions standards will provide the regulatory certainty needed to not only ensure manufacturers continue to invest in LMDEV technologies but that the entire supply chain supporting the transition to electrification will have a clearer picture of how to plan capital expenditures today to meet the increased demand for its products over the coming years. [EPA-HQ-OAR-2022-0829-0638, p. 5]

4 Unless otherwise noted, ZETA refers to “EVs” in these comments to mean battery-electric vehicles.

c. Electrification Promotes American Economic Competitiveness

Governments around the world are setting more stringent emissions standards to align with recent announcements from global manufacturers. Ensuring U.S. regulations match or exceed these ambitions is vital in allowing certainty and encouraging investment in the industry. If the U.S. does not move more aggressively on LMDEV deployment, it risks ceding market share to other countries and regions who are moving faster, such as China, the European Union, and others. [EPA-HQ-OAR-2022-0829-0638, p. 24]

Complimentary incentives embedded in the IRA will facilitate onshoring of the EV supply chain while robust EPA emission standards will help ensure the United States becomes and remains a leader in EV technology development and manufacturing. While more work remains to craft supportive policies in other areas of the supply chain, EPA emissions standards are crucial drivers of domestic EV supply. [EPA-HQ-OAR-2022-0829-0638, p. 24]

Many countries have made commitments to accelerate EV development and deployment in their borders. An increase in EV sales is taking place across the world, but has been dominated by the Chinese market, which accounts for the majority of all new EV registrations. As of 2022, China had 10.7 million BEVs on the road and the U.S. had 2.1 million.114 Part of this dominance is due to China’s purchase incentives, high registration fees for ICEVs, a robust charging network, and national “new energy vehicle” targets.115 [EPA-HQ-OAR-2022-0829-0638, p. 24]

114 Id. at footnote 27

115 “An evaluation of government incentives for new energy vehicles in China focusing on vehicle purchasing restrictions,” Energy Policy, (October 2017) https://doi.org/10.1016/j.enpol.2017.07.057

With its own emissions targets, countries in Europe are sending strong signals about the continent’s future electric fleet. Europe is the second-largest market for EVs in the world, with 30% of the global share.116 With robust LMDV emissions standards, the U.S. would be encouraging quicker adoption of EV technology to ensure the country remains at the forefront of this global transition. Below is a list of regional and national goals for light- and medium-duty zero-emission vehicle deployment that further underscores the need for the U.S. via EPA to maintain pace with the rest of the world: [EPA-HQ-OAR-2022-0829-0638, p. 24]

116 Id. at footnote 27

- European Union: Target to reduce CO2 emissions from new cars and vans by 55% in 2030 and 100% in 2035 compared to 2021 emissions. 117 [EPA-HQ-OAR-2022-0829-0638, pp. 25-26]

- Norway: 100% of LDV sales to be zero-emission by 2025.118

- Switzerland: ZEV sales of 28% in 2025, 60% in 2030, and 100% from 2040.119

- Denmark: End the sale of new petrol and diesel cars from 2030, and PHEVs from 2035.120

- Netherlands: 100% ZEV sales by 2030.121

- United Kingdom: Phase out new petrol and diesel cars and vans by 2030. All new cars to be fully zero emission after 2035.122

- Canada: ZEV targets for light-duty sales of 20% by 2026, 60% by 2030 and 100% by 2035.123

- Chile: 100% of LDV sales will be zero-emissions by 2035, with an accompanying ban on ICE sales.124

- Korea: 50% of new sales to be ZEVs by 2025, and 80% by 2030.125

- China: "New energy vehicle" sales in key air pollution control regions to account for about 50% of new vehicle sales by 2030.126

- Japan: 100% of car sales to be electrified by 2035. 127

[EPA-HQ-OAR-2022-0829-0638, pp. 25-26]

117 "Fit for 55: zero CO2 emissions for new cars and vans in 2035," European Parliament, accessed June 18, 2023) https://www.europarl.europa.eu/news/en/press-room/20230210IPR74715/fit-for-55-zero-co2-emissions-for-new-cars-and-vans-in-2035

118 "Annual update on the global transition to electric vehicles: 2022," International Council on Clean Transportation, (June 2023) https://theicct.org/wp-content/uploads/2023/06/Global-EV-sales-2022_FINAL.pdf

119 "Switzerland - EV Adoption by Year," HEV-TCP, accessed June 18, 2023 https://ieahev.org/countries/switzerland/

120 "Denmark embraces electric car revolution with petrol and diesel ban plan," Reuters, (October 2, 2018) https://www.reuters.com/article/us-denmark-autos/denmark-embraces-electric-car-revolution-with-petrol-and-diesel- ban-plan-idUSKCN1MC121

121 "Supporting Governments With 100% ZEV Targets," ZEV Alliance and ICCT, (November 2021) https://zevalliance.org/wp-content/uploads/2021/11/support-governments-zev-targets-nov21.pdf

122 "Transitioning to zero emission cars and vans: 2035 delivery plan," HM Government, accessed June 30, 2023 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005301/transition ing-to-zero-emission-cars-vans-2035-delivery-plan.pdf

123 "Proposed regulated sales targets for zero-emission vehicles," Government of Canada, (January 9, 2023) https://www.canada.ca/en/environment-climate-change/news/2022/12/proposed-regulated-sales-targets-for-zero-emi ssion-vehicles.html

124 “Chile to ban sale of light and medium internal combustion engines in 2035,” Electrive, (October 18, 2021) https://www.electrive.com/2021/10/18/chila-to-ban-sale-of-internal-combustion-engines-in-2035/

125 “Zero-Emission Vehicles Factbook,” BloombergNEF, (November 2022) https://assets.bbhub.io/professional/sites/24/2022-COP27-ZEV-Transition_Factbook.pdf

126 “Global EV Outlook 2023 - Policy developments,” IEA, accessed June 20, 2023 https://www.iea.org/reports/global-ev-outlook-2023/policy-developments

127 “Japan Transition to Electric Vehicles, U.S. International Trade Administration, (July 7, 2021) https://www.trade.gov/market-intelligence/japan-transition-electric-vehicles

Stringent LMDV multipollutant and GHG emissions standards will encourage more domestic investment and innovation to position the United States as a global leader in the electric vehicle space. The regulatory certainty of these standards will enable increased investment and the continued build-out of a domestic supply chain. Without stringent LMDV emissions standards, the U.S. risks ceding this vast economic opportunity to other countries, disadvantaging American businesses and workers. [EPA-HQ-OAR-2022-0829-0638, pp. 25-26]

8. The EV Supply Chain is Preparing to Support Increased Electrification

The widespread transition to electrified transportation is involving industries and companies that have not historically had a major role in supplying products to the transportation sector. Policies like EPA’s proposed LMDV multipollutant emissions standards provide regulatory certainty for the entire supply chain supporting the transition to electrification. [EPA-HQ-OAR-2022-0829-0638, p. 31]

As discussed further in this section, the supply chain is composed of discrete, yet interconnected segments that are continuing to scale up in capacity. Complementary policies in various stages of implementation today will lead to an even more robust and resilient supply chain over the MY 2027-2032 time frame covered by EPA’s proposed standards. [EPA-HQ-OAR-2022-0829-0638, p. 31]

Finalizing strong LMDV emissions standards is not only necessary for public health, climate, and economic reasons, but they are feasible for industry to implement and align with the planned and existing investments being made throughout the EV supply chain.140,141 Through ZETA, the full scope of the U.S. EV supply chain is coalesced behind the goal of 100% EV sales. [EPA-HQ-OAR-2022-0829-0638, p. 31]

140 “US and Canada Electric Vehicle Supply Chain Map,” Charged by the Book, accessed June 30, 2023 https://www.charged-the-book.com/na-ev-supply-chain-map

141 FACT SHEET: Biden-Harris Administration Announces New Private and Public Sector Investments for Affordable Electric Vehicles (April 17, 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/17/fact-sheet-biden-harris-administration-a nnounces-new-private-and-public-sector-investments-for-affordable-electric-vehicles/

a. Critical Minerals Development

As projected demand for critical minerals (lithium, nickel, cobalt, manganese, copper, graphite, and rare earth elements) for use in EV batteries continues to grow–due in large part to policies such as EPA’s proposed multipollutant emission standards for LMDVs–the supply chain is preparing to meet that demand both through new extraction and processing and with additional support from recycling. [EPA-HQ-OAR-2022-0829-0638, pp. 31-32]

Beyond EPA emission standards, the section 30D New Clean Vehicle Tax Credit in the Inflation Reduction Act ensures that these critical minerals are sourced either in the United States or from free trade agreement countries. The credit is composed of two halves: qualifying vehicles will receive $3,750 for meeting each of the critical mineral and battery component sourcing requirements totaling up to $7,500.142 The stringent ramp-up of the domestic sourcing requirements in the IRA over the coming years will lead to a robust supply chain capable of delivering domestically-sourced raw and refined materials. [EPA-HQ-OAR-2022-0829-0638, pp. 31-32]

142 “Overview and Analysis: March Treasury Guidance for Clean Car Tax Credit (30D),” ZETA, (April 2023) https://www.zeta2030.org/insights/overview-and-analysis-march-treasury-guidance-for-clean-car-tax-credit-30d

A key element to the success of the supply chain’s ability to deliver the critical minerals necessary to support the transition to electrified transportation will be reforming the permitting processes for new extraction and processing operations. The Biden-Harris Administration has placed a much-needed focus on this area143 and ZETA has consistently supported reforms144 that ensure development projects are constructed quickly while meeting the strongest environmental standards. [EPA-HQ-OAR-2022-0829-0638, pp. 31-32]

143 “FACT SHEET: Biden-Harris Administration Outlines Priorities for Building America’s Energy Infrastructure Faster, Safer, and Cleaner,” (May 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/10/fact-sheet-biden-harris-administration-outlines-priorities-for-building-americas-energy-infrastructure-faster-safer-and-cleaner/

144 “Critical Mineral Permitting Reform Framework,” ZETA, (May 2023) https://www.zeta2030.org/insights/critical-mineral-permitting-reform-framework

The executive branch has been just as aggressive on increasing critical mineral capacity in the U.S. In March 2022, President Biden invoked the Defense Production Act (DPA). The DPA allows the Department of Defense (DOD) to fund feasibility and modernization projects for mining and processing facilities.145 With funding from the DPA, DOD invested $120 million in a rare earths separation plant in Texas with Lynas Rare Earths.146 In February 2023, President Biden further expanded this authority to allow for large, longer-term investments in critical mineral projects. [EPA-HQ-OAR-2022-0829-0638, p. 32]

145 “Defense Production Act Title III Presidential Determination for Critical Materials in Large-Capacity Batteries,” U.S. Department of Defense, (April 5, 2022) https://www.defense.gov/News/Releases/Release/Article/2989973/defense-production-act-title-iii-presidential-deter mination-for-critical-materi

146 “Australia's Lynas gets $120 mln Pentagon contract for U.S. rare earths project,” Reuters, (June 14, 2022) https://www.reuters.com/markets/us/australias-lynas-secures-120-mln-pentagon-contract-us-rare-earths-facility-2022-06-14/

In 2022, the White House announced the American Battery Material Initiative to leverage Federal investments and activities to build both a domestic and international critical minerals supply chain in coordination with our allies.147 This complements the signing of the Minerals Security Partnership (MSP) with Australia, Canada, Finland, France, Germany, Japan, the Republic of Korea, Sweden, the United Kingdom, the United States, and the European Commission.148 This agreement outlines the ethics, environmental, and safety standards expected of critical mineral mining and processing and ensures stronger trade connections between nations. The MSP also encourages investments between governments for certain projects. This partnership may explore using loans from the Export-Import Bank of the United States to on-shore and friend-shore the supply chain. [EPA-HQ-OAR-2022-0829-0638, p. 32]

147 "Biden-Harris Administration Awards $2.8 Billion to Supercharge U.S. Manufacturing of Batteries for Electric Vehicles and Electric Grid," U.S. Department of Energy, (October 19, 2022) https://www.energy.gov/articles/biden-harris-administration-awards-28-billion-supercharge-us-manufacturing-batteri es

148 "Minerals Security Partnership," U.S. Department of State, (June 14, 2022) https://www.state.gov/minerals-security-partnership/

Federal agencies are also making efforts to improve the critical mineral supply chain. Organized by the Department of Interior, the interagency working group on mining reform has gathered experts and stakeholders to discuss potential permitting reform to support a domestic industry.149 Efforts by the working groups will include proposals to reform the Mining Law of 1872, form recommendations to bolster the supply chain, and provide community engagement best practices. [EPA-HQ-OAR-2022-0829-0638, p. 33]

149 "Interior Department Launches Interagency Working Group on Mining Reform," U.S. Department of the Interior, (February 22, 2022) https://www.doi.gov/pressreleases/interior-department-launches-interagency-working-group-mining-reform

To ensure there is a trained workforce for the critical mineral industry, the DOE and Department of Labor created a workforce development strategy, funded by the BIL.150 These efforts will include retraining in fossil-fuel and automotive communities and enhancing additional training programs across the country. All together, these actions incentivize manufacturers and developers to create an American supply of critical minerals. Since their announcement, investments in the critical mineral supply chain have dramatically expanded in the country. [EPA-HQ-OAR-2022-0829-0638, p. 33]

150 "DOE Announces $5 Million to Launch Lithium-Battery Workforce Initiative," U.S. Department of Energy, (March 18, 2022) https://www.energy.gov/articles/doe-announces-5-million-launch-lithium-battery-workforce-initiative

As EPA accurately notes in the proposed rule, there is an important distinction between energy security and mineral security. Utilization of critical minerals is inherently different from the utilization of petroleum, in that petroleum is consumed as a fuel while minerals become a component of manufactured vehicles. Supply disruptions and fluctuating prices for critical minerals are felt differently and by different parties as opposed to petroleum which has an immediate impact on consumers through higher fuel prices, as discussed in section 3(b) of these comments. In contrast, supply disruptions or price fluctuations of minerals affect only the production and price of new vehicles. [EPA-HQ-OAR-2022-0829-0638, p. 33]

Moreover, critical minerals are not a single commodity but a number of distinct commodities, each having its own supply and demand dynamics, and some being capable of substitution by other minerals. Further, while petroleum is consumed as a fuel and thus requires continuous supply, minerals become part of the vehicle and have the potential to be recovered and recycled, as discussed further in section 8(b)(ii) of these comments. [EPA-HQ-OAR-2022-0829-0638, p. 33]

i. Projected Demand for Critical Minerals

Demand for critical minerals is expected to grow substantially in the coming years. Figure 5 IEA's projected demand scenarios by 2040 relative to a 2020 baseline. [EPA-HQ-OAR-2022-0829-0638, pp. 33-34]

[See original comment for Figure 5. Mineral demand growth from new EV sales by scenario, 2040 relative to 2020]151 [EPA-HQ-OAR-2022-0829-0638, pp. 33-34]

151 "Mineral demand growth from new EV sales by scenario, 2040 compared to 2020," IEA, (October 26, 2022) https://www.iea.org/data-and-statistics/charts/mineral-demand-growth-from-new-ev-sales-by-scenario-2040-compar ed-to-2020

In a scenario that meets the goals of the Paris Climate Agreement, the share of total demand for critical minerals rises significantly over the next two decades to over 40% for copper and rare earth elements, 60-70% for nickel and cobalt, and almost 90% for lithium.152 EVs and battery storage have already displaced consumer electronics to become the largest consumer of lithium and are set to displace the stainless steel industry as the largest end user of nickel by 2040. [EPA-HQ-OAR-2022-0829-0638, pp. 33-34]

152 "The Role of Critical Minerals in Clean Energy Transitions," IEA, (May 2021) https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

ii. Meeting the Forthcoming Demand for Critical Minerals

As demand for critical minerals is expected to grow rapidly, it is first necessary to evaluate the current state of global production. For most minerals, production has grown in the past decade.153 However, while much of the production for certain minerals is concentrated in a handful of countries, there is reason to believe that most critical minerals demand can be met through extraction in democratic countries. According to the Carnegie Endowment for International Peace and as shown in Figure 6 below, nearly all critical mineral demand could be met through reserves in democratic countries.154 [EPA-HQ-OAR-2022-0829-0638, pp. 34-36]

153 "bp Statistical Review of World Energy," British Petroleum, (2022) https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp- stats-review-2022-full-report.pdf

154 Democratic countries include: Argentina, Armenia, Australia, Austria, Belgium, Bhutan, Bolivia, Brazil, Bulgaria, Canada, Chile, Finland, France, Georgia, Germany, Ghana, Iceland, Indonesia, Japan, Mexico, Mongolia, Nigeria, Norway, Peru, Poland, Portugal, Senegal, Sierra Leone, South Africa, South Korea, Spain, Sri Lanka, Sweden, Ukraine, and the United States.

[See original comment for Figure 6. Critical Minerals Potential in All Democratic Countries]155 [EPA-HQ-OAR-2022-0829-0638, pp. 34-36]

The Net Zero Industrial Policy Lab at Johns Hopkins University finds that partnerships among democratic countries would be able to produce enough minerals to enable the world to limit warming to 1.5 degrees Celsius, the more ambitious target in the Paris Climate Agreement.156 However, producing enough metals to meet these targets would require extraordinary technological and financial cooperation. [EPA-HQ-OAR-2022-0829-0638, pp. 34-36]

155 "Friendshoring Critical Minerals: What Could the U.S. and Its Partners Produce?," Carnegie Endowment for International Peace (May 3, 2023) https://carnegieendowment.org/2023/05/03/friendshoring-critical-minerals-what-could-u.s.-and-its-partners-produce-pub-89659

156 Id. at footnote 155

In regards to lithium, Benchmark Mineral Intelligence found that by the end of 2023, world supply of lithium will be more than double 2021's output and more than the total produced between 2015 and 2018.157 [EPA-HQ-OAR-2022-0829-0638, pp. 34-36]

157 "Global lithium supply forecast to hit 1 million tonnes for first time," Benchmark Mineral Intelligence, (April 28, 2023) https://source.benchmarkminerals.com/article/global-lithium-supply-forecast-to-hit-1-million-tonnes-for-first-time

Given the national security implications of ensuring a stable supply of critical minerals, the Defense Advanced Research Projects Agency (DARPA) and the United States Geological Survey (USGS) have partnered to explore the potential of machine learning and artificial intelligence tools and techniques to enhance USGS critical mineral assessments.158 [EPA-HQ-OAR-2022-0829-0638, pp. 34-36]

158 "Artificial Intelligence for Critical Mineral Assessment Competition," DARPA, https://criticalminerals.darpa.mil/

iii. Critical Mineral Production

ZETA members are scaling up capacity to meet the projected demand in the coming years. For example, Ioneer's Rhyolite Ridge project–located in Esmeralda County, NV–holds the largest known lithium and boron deposit in North America.159 Ioneer recently announced a mineral resource update that found a 168% increase in estimated lithium at Rhyolite Ridge.160 [EPA-HQ-OAR-2022-0829-0638, pp. 36-37]

159 Ioneer - Rhyolite Ridge, accessed May 16, 2023 https://rhyolite-ridge.ioneer.com/

160 "New Ioneer Mineral Resource update finds 168% increase in estimated lithium at Rhyolite Ridge," BusinessWire, (April 26, 2023) https://www.businesswire.com/news/home/20230426005886/en/New-Ioneer-Mineral-Resource-update-finds-168-in crease-in-estimated-lithium-at-Rhyolite-Ridge

ZETA member Albemarle Corp. recently announced it is aiming to spend between $1.25 billion and $1.5 billion to double its lithium hydroxide output in Australia to a volume that it estimates could power more than 2 million electric cars each year.161 Albemarle plans to build two additional processing trains at its Kemerton plant south of Perth in Western Australia, which could boost its lithium hydroxide production by 50,000 tons annually. Albemarle recently announced that it achieved an IRMA 50 level of performance in an independent third-party assessment of its lithium brine extraction and concentration site in the Salar de Atacama, using the Initiative for Responsible Mining Assurance's (IRMA) comprehensive mining standard.162 [EPA-HQ-OAR-2022-0829-0638, pp. 36-37]

161 "Lithium giant Albemarle eyes $1.5B Australian expansion," E&E News, (May 4, 2023) https://subscriber.politicopro.com/article/eenews/2023/05/04/lithium-giant-albemarle-eyes-1-5b-australian-expansio n-00095141

162 "Albemarle Becomes First Lithium Producer to Complete Independent Audit and Publich IRMA Report," Albemarle Newsroom, (June 20, 2023) https://www.albemarle.com/news/albemarle-becomes-first-lithium-producer-to-complete-independent-audit-and-pub lish-irma-report

Recently, ZETA member Lithium Americas provided an update on the status of its various projects around the world.163 Lithium Americas' Cauchari-Olaroz project in Argentina is expected to begin producing lithium in June 2023. Production ramp up at the Cauchari-Olaroz project is expected to produce 40,000 tonnes per year of battery-quality lithium carbonate and is targeted to be complete in Q1 2024. Domestically, Lithium Americas recently announced the start of construction activities at Thacker Pass in Nevada following receipt of notice to proceed from the Bureau of Land Management.164 [EPA-HQ-OAR-2022-0829-0638, pp. 36-37]

163 “Lithium Americas Reports First Quarter 2023 Results,” Lithium Americas, (May 15, 2023) https://www.lithiumamericas.com/news/lithium-americas-reports-first-quarter-2023-results

164 Id. at footnote 163

[See original comment for Figure 7. ZETA members key domestic lithium production projects.]

With applications well beyond just EVs, ensuring a domestically-sourced supply of copper will be critical to ensuring a rapid transition to electrified transportation. In May 2023, the Department of Energy proposed to characterize copper as critical through its inclusion on the official DOE Critical Materials List.165 In particular, DOE is recommending a designation for copper of “near-critical” in the medium term (2025-2035). To meet the forthcoming increases in demand for copper, a pair of domestic projects are currently in various stages of development: One major project that would help the U.S. with its growing demand for copper, molybdenum, silver and critical minerals is Resolution Copper in Arizona. This project has the potential to supply up to 25% of the nation’s copper demand to power America’s clean energy transition with $1 billion annually into Arizona’s economy. The project currently employs 300 people, 80% of whom live locally in rural communities within 40 miles of the project. When the mine is fully operational, Resolution Copper expects to directly employ about 1,500 workers, paying around $134 million per year in total compensation. In total, the project is expected to support 3,700 direct and indirect jobs, many of them local building trades and U.S. Steel Workers union jobs.166 [EPA-HQ-OAR-2022-0829-0638, pp. 37-38]

165 “Critical Materials Assessment,” U.S. Department of Energy, (May 2023) https://www.energy.gov/sites/default/files/2023-05/2023-critical-materials-assessment.pdf 166 See: https://resolutioncopper.com/

NewRange Copper Nickel is a 50:50 joint venture of Teck Resources Limited and PolyMet Mining Corp., holding the NorthMet and Mesaba deposits – two large, well defined resources in the established Iron Range mining region of Minnesota. The stand- alone company is creating a path to develop one of the world’s largest and lowest cost copper-nickel-PGM producing districts, unlocking a new domestic supply of critical minerals for the low-carbon transition through responsible mining, and delivering significant, multi-generational economic and other benefits to the region and beyond.167 [EPA-HQ-OAR-2022-0829-0638, pp. 37-38]

167 See: https://newrangecoppernickel.com/

Anovian, which produces synthetic graphite anodes, is investing $800 million in Georgia to build a new manufacturing facility. The company’s first large-scale facility is expected to produce 40,000 metric tons of synthetic graphite annually for lithium-ion batteries.168 [EPA-HQ-OAR-2022-0829-0638, pp. 37-38]

168 “Anovion Technologies to build $800M facility in Georgia,” Manufacturing Dive, (May 22, 2023) https://www.manufacturingdive.com/news/anovion-technologies-800m-facility-in-georgia/650808

Manganese miner Element 25 has signed a definitive agreement with automotive major General Motors to supply up to 32,500 t/y of battery-grade high-purity manganese sulfate to support GM's EV production in North America.169 [EPA-HQ-OAR-2022-0829-0638, pp. 37-38]

169 "GM signs up to Element 25's Louisiana plans," Mining Weekly, (June 26, 2023) https://www.miningweekly.com/article/gm-signs-up-to-element-25s-louisiana-plans-2023-06-26

iv. Refining and Processing

In March 2023, Albemarle announced a new lithium processing facility in South Carolina.170 Albemarle expects the facility to annually produce approximately 50,000 metric tons of battery-grade lithium hydroxide from multiple sources, with the potential to expand up to 100,000 metric tons. Production at the facility would support the manufacturing of an estimated 2.4 million electric vehicles annually. [EPA-HQ-OAR-2022-0829-0638, pp. 38-39]

170 "Albemarle Corporation Announces New U.S. Lithium Mega-Flex Processing Facility in South Carolina," Albemarle Corporation, (March 22, 2023) https://www.albemarle.com/news/-albemarle-corporation-announces-new-us-lithium-megaflex-processing-facility-in-south-carolina–

In March 2023, EVelution Energy announced a $200 million cobalt processing plant in Arizona to produce cobalt sulfate for up to 470,000 EVs per year by the time the facility is fully operational in 2026.171 [EPA-HQ-OAR-2022-0829-0638, pp. 38-39]

171 "EVelution Announces $200 Million Cobalt Production Facility in Yuma County, Arizona Commerce Authority, (March 29, 2023) https://www.azcommerce.com/news-events/news/2023/3/evelution-energy-announces-200-million-cobalt-productio n-facility-in-yuma-county

In May 2023, Tesla announced a new lithium refinery in Southwest Texas which, when completed, is expected to produce enough lithium to build about 1 million EVs by 2025.172 [EPA-HQ-OAR-2022-0829-0638, pp. 38-39]

172 "Elon Musk and Tesla break ground on massive Texas lithium refinery," Reuters, (May 8, 2023) https://www.reuters.com/business/autos-transportation/tesla-plans-produce-lithium-1-mln-vehicles-texas-refinery-el on-musk-2023-05-08/

b. Batteries

The U.S. battery manufacturing industry is quickly scaling to meet demand driven by transportation electrification. According to Argonne National Lab, between 2010 and 2021, $95 billion was invested in the U.S. battery manufacturing industry.173 This number represents 160 new or expanded critical materials processing and manufacturing facilities, with enough capacity to provide batteries for 10 million EVs each year and create 70,000 new jobs. [EPA-HQ-OAR-2022-0829-0638, pp. 39-40]

The Bipartisan Infrastructure Law allocated $1.6 billion to the Department of Energy for the funding of "new commercial-scale domestic facilities to extract and process lithium, manufacture battery components, recycle batteries, and develop new technologies to increase U.S. lithium reserves."174 In 2022, the Inflation Reduction Act 45X Advanced Manufacturing Production and Advanced Energy Project Tax Credit provided $35 per kWh in each battery cell, $10 per kWh in each battery module, 10% of the costs of production of the applicable critical materials incurred by the taxpayer. The Advanced Energy Project Tax Credit also appropriated a $10,000,000 fund for tax credits to build clean technology manufacturing facilities, including those that process, refine, and recycle critical minerals.175 Through the 45X credit, the IRA cuts nearly one third of the cost of producing batteries in the United States.176 Together, these historic provisions will drive American battery innovation, ensuring that the sector is equipped to electrify all vehicle classes as EV deployments accelerate over the coming years. [EPA-HQ-OAR-2022-0829-0638, pp. 39-40]

173 “A new look at the electric vehicle supply chain as battery-powered cars hit the roads en masse,” Argonne National Laboratory, (May 4, 2023) https://www.anl.gov/article/a-new-look-at-the-electric-vehicle-supply-chain-as-batterypowered-cars-hit-the-roads-en-masse

174 See Public Law 117-58

175 “Inflation Reduction Act: What it Is and What it Means for EV Adoption,” ZETA, (2022) https://www.zeta2030.org/insights/the-inflation-reduction-act-what-it-is-and-what-it-means-for-ev-adoption

176 “U.S.-Made EVs Could Get Massively Cheaper, Thanks to Battery Provisions in New Law,” Car and Driver, (February 3, 2023) https://www.caranddriver.com/news/a42749754/us-electric-cars-could-get-cheaper-inflation-reduction-act-section-4 5x/

i. Manufacturing

There is historic momentum around battery manufacturing as it ramps up to support transportation electrification. Over the past year, battery producers have rapidly invested in new battery capacity in anticipation of strong electric vehicle sales growth. A total of 1.4 terawatt hours (TWhs) of new battery capacity was announced in just the last six months, according to Benchmark’s Gigafactory Assessment.177 The number of plants being tracked more than doubled to 379 in April from 174 plants in November 2020, according to Benchmark. Since January 2021, the U.S. private sector has announced nearly $82 billion in battery manufacturing investments, translating to 96 new or expanded processing and manufacturing plants.178 [EPA-HQ-OAR-2022-0829-0638, pp. 40-41]

177 “Battery gigafactory plans slow down in April after record 2022,” Benchmark Minerals Intelligence, (April 26, 2023) https://source.benchmarkminerals.com/article/battery-gigafactory-plans-slow-down-in-april-after-record-2022?mc_c id=f82a9ac7a8&mc_eid=be723945d8

178 New US Battery Manufacturing and Supply Chain Investments Announced Under President Biden, US Department of Energy, (February 13, 2023) https://www.energy.gov/sites/default/files/2023-02/Battery%20Supply%20Chains%20Investments%20Map.pdf

Below is a list of recently-announced investments in EV battery manufacturing, all of which will help support the transition to an electrified transportation sector: [EPA-HQ-OAR-2022-0829-0638, pp. 40-41]

- In March 2023, ZETA member LG announced a $5.5 billion investment to construct a battery manufacturing complex in Queen Creek, Arizona. The complex will consist of two manufacturing facilities – one for cylindrical batteries for EVs and another for lithium iron phosphate (LFP) pouch-type batteries for energy storage systems (ESS). LG plans to invest $3.2 billion in building a cylindrical battery manufacturing facility with a capacity of 27GWh, and $2.3 billion in LFP pouch-type battery facility with the capacity of 16GWh. Both facilities, totaling 43 GWh, plan to break ground this year and will begin production in 2025 and 2026, respectively.179 A more comprehensive list of LG’s investments in domestic battery manufacturing can be found in Appendix figure A.1. [EPA-HQ-OAR-2022-0829-0638, pp. 40-41]

- In April 2023, Hyundai Motor Co. announced it had finalized a $5 billion EV battery joint venture with SK On, a battery unit of SK Innovation Co Ltd. The plant will be located in Georgia and is expected to start manufacturing battery cells in the second half of 2025 with an annual production capacity of 35 GWh.180 [EPA-HQ-OAR-2022-0829-0638, pp. 40-41]

- In April 2023, General Motors and Samsung announced they will invest over $3 billion to build a joint venture EV battery manufacturing plant in the U.S. Expected to start production in 2026, the plant aims to have an annual production capacity of 30 GWh.181 [EPA-HQ-OAR-2022-0829-0638, pp. 40-41]

- In May 2023, ZETA member Panasonic announced that it would expand its U.S. manufacturing capacity from 38 GWh today to 200 GWh by 2030, including Panasonic's $4 billion under-construction investment in Kansas.182 [EPA-HQ-OAR-2022-0829-0638, pp. 40-41]

- In June 2023, the Ford/SK On joint venture BlueOval SK was awarded a $9.2 billion conditional loan from the Department of Energy's Loan Programs Office–the largest in the office's history. The loan will help the joint venture build two gigafactories in Kentucky and one in Tennessee. Together, the plants will enable more than 120 GWh of U.S. battery production annually and displace more than 455 million gallons of gasoline per year for the lifetime of the vehicles powered by these batteries. The project is expected to create a total of approximately 5,000 construction jobs in Tennessee and Kentucky, and 7,500 operations jobs once the plants are up and running.183 [EPA-HQ-OAR-2022-0829-0638, pp. 40-41]

179 "LG Energy Solution to Invest KRW 7.2 Trillion to Build Battery Manufacturing Complex in Arizona, Step Up EV and ESS Battery Production in North America," LG, (March 24, 2023) https://news.lgensol.com/company-news/press-releases/1613/

180 "Hyundai Motor bolsters US presence with $5 bln EV battery venture," Reuters, (April 25, 2023) https://www.reuters.com/business/autos-transportation/hyundai-motors-q1-net-profit-jumps-109-beating-expectation s-2023-04-25/

181 "GM, Samsung SDI to invest more than $3 bln to build joint EV battery plant in US," Reuters, (April 25, 2023) accessed May 17, 2023 https://www.reuters.com/business/autos-transportation/gm-samsung-sdi-plan-build-new-us-battery-plant-sources-20 23-04-24/

182 "Group Strategy Briefing," Panasonic Holdings Corporation, (May 18, 2023) https://holdings.panasonic/global/corporate/investors/pdf/20230518_groupstrategy_e.pdf

183 "LPO Announces Conditional Commitment for Loan to BlueOval SK to Further Expand U.S. EV Battery Manufacturing Capacity," U.S. Department of Energy, (June 22, 2023) https://www.energy.gov/lpo/articles/lpo-announces-conditional-commitment-loan-blueoval-sk-further-expand-us-ev-battery

iii. Alternative Chemistries

As battery manufacturing and recycling capacity ramps up, so too does the development of innovative alternative battery chemistries that will transform the range, durability, and cost of EVs. Lithium Iron Phosphate (LFP) batteries do not require nickel or cobalt, leading to reduced costs.196 Another potentially promising technology is sodium-ion batteries. Because they substitute lithium for sodium, sodium-ion batteries tend to be cheaper, and may have significant applications in lower-range EVs.197 [EPA-HQ-OAR-2022-0829-0638, p. 44]

196 “Lithium iron phosphate comes to America,” Chemical and Engineering News, (January 29, 2023) https://cen.acs.org/energy/energy-storage-/Lithium-iron-phosphate-comes-to-America/101/i4

197 “What If Your Tesla Could Run on Sodium?” The Wall Street Journal, (April 19, 2023) https://www.wsj.com/articles/what-if-your-tesla-could-run-on-sodium-3c18df30

Recent advancements in solid-state batteries have also recently been announced, most notably by Toyota which aims to commercialize the technology as soon as 2027, consistent with the MY 2027-2032 time frame covered by EPA’s proposed LMDV emissions standards.198 While there remain substantial challenges to mass adoption, solid-state batteries offer some promise in that they are more energy dense, highly stable, offer potentially faster charging times, and can be produced faster than lithium-ion batteries.199 Benchmark Mineral Intelligence forecasts that solid-state battery production will exceed 30 GWh in 2026.200 [EPA-HQ-OAR-2022-0829-0638, p. 44]

198 “Japan’s Toyota announces initiative for all-solid state battery as part of electric vehicles plan,” AP News, (June 13, 2023) https://apnews.com/article/toyota-evs-hydrogen-battery-climate-cd7730dbb9c157cf1663d39a3b39778e

199 “Solid State Battery Tech For EV Cars: Challenges Lie Ahead,” MotorTrend, (March 10, 2023) https://www.motortrend.com/features/solid-state-ev-car-batteries-challenges/

200 Benchmark Mineral Intelligence on LinkedIn, accessed June 21, 2023 https://www.linkedin.com/posts/benchmark-mineral-intelligence_solidstatebattery-solidstate-lithiummetal-activity-7 075019101990989825-0DAG

As research and commercialization of alternative battery chemistries and technologies continues in the private sector, the Department of Energy’s SLAC National Accelerator Laboratory201 and Stanford University recently announced the launch of a new joint battery center at SLAC.202 It will bring together the resources and expertise of the national lab, the university, and Silicon Valley to accelerate the deployment of batteries and other energy storage solutions. Argonne National Laboratory is also researching emerging new battery technologies including lithium-air, which could offer much longer driving range compared with the lithium-ion battery,203 and lithium-sulfur, which can hold more energy than traditional ion-based batteries.204 [EPA-HQ-OAR-2022-0829-0638, pp. 44-45]

201 “SLAC National Accelerator Laboratory,” DOE Office of Enterprise Assessments, accessed May 17, 2023 https://www.energy.gov/ea/slac-national-accelerator-laboratory

202 “New Battery Center Launches In USA,” CleanTechnica, (April 13, 2023) https://cleantechnica.com/2023/04/13/new-battery-center-launches-in-usa/

203 “New design for lithium-air battery could offer much longer driving range compared with the lithium-ion battery,” Argonne National Laboratory, (February 22, 2023) https://www.anl.gov/article/new-design-for-lithiumair-battery-could-offer-much-longer-driving-range-compared-wit h-the-lithiumion

204 “Lithium-sulfur batteries are one step closer to powering the future,” Argonne National Laboratory, (January 6, 2023) https://www.anl.gov/article/lithiumsulfur-batteries-are-one-step-closer-to-powering-the-future

i. Impacts to EV Production from BIL and IRA Programs

Policies in the BIL and IRA are driving demand for EVs both for personal and commercial use. As discussed previously in these comments, customers are increasingly choosing to electrify and OEMs are better incentivized to meet this demand through the build out of additional domestic manufacturing capacity. As a result, EV production and model availability is rapidly expanding. [EPA-HQ-OAR-2022-0829-0638, pp. 70-71]

Analysis by the Environmental Defense Fund found that announced EV manufacturing investments from 2015 to 2023 total $31.4 billion and would lead to at least 55,800 new jobs and result in automakers being capable of producing more than 4.3 million EVs per year in 2026.254 Figure 10 below illustrates the ramp up in EV manufacturing capacity through 2026, with major manufacturing capacity additions following BIL and IRA passage. As additional announcements are made, domestic EV manufacturing capacity will continue to grow, leading to a secure domestic supply chain and thousands of new jobs. [EPA-HQ-OAR-2022-0829-0638, pp. 70-71]

254 "U.S. Electric Vehicle Manufacturing Investments and Jobs Characterizing the Impacts of the Inflation Reduction Act After 6 Months," Environmental Defense Fund, (June 2023) https://blogs.edf.org/climate411/files/2023/03/State-Electric-Vehicle-Policy-Landscape.pdf

[See original comment for Figure 10. Estimated EV manufacturing capacity following passage of the IRA and BIL, 2020-2026.]255 [EPA-HQ-OAR-2022-0829-0638, pp. 70-71]

255 Id. at footnote 253

ii. OEM Investments in EV Manufacturing

With ambitious electrification goals, OEMs are investing heavily in domestic EV manufacturing. By 2026, announced facilities alone will be able to produce about 4.3 million new electric cars and passenger trucks each year. For reference, that equals about one-third of all new vehicles sold in the U.S. in 2022.256 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

256 "Report Finds Investments in U.S. Electric Vehicle Manufacturing Reach $120 Billion, Create 143,000 New Jobs," Environmental Defense Fund, (March 14, 2023) https://www.edf.org/media/report-finds-investments-us-electric-vehicle-manufacturing-reach-120-billion-create-143000

Here are just a few of the recent major investments that have been announced in 2023: [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- ZETA member Tesla announced a second manufacturing plant in Nevada. The $3.6 billion facility will be focused on building their electric semi truck as well as 100GWh of battery manufacturing.257 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- Tesla also plans to spend upward of $770 million to expand its manufacturing facilities in Austin, Texas. The expansion will include for battery cell testing and manufacturingon-site.258 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- Ford plans to build 500,000 electric pickup trucks at its new $5.6 billion BlueOval City facility in Tennessee.259 The complex will also produce 40 GWh of battery cells–capable of supplying 500,000 vehicles. [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- Ford plans to invest $1.3 billion in its Ontario plant to transition the facility to build their next-generation EVs. The facility will also assemble battery packs using cells from Ford's Kentucky battery plant.260 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- Toyota is investing $7.4 billion in EVs through the end of the decade.261 This includes a $2.1 billion battery plant expansion in North Carolina and an expansion of its EV assembly facility in Kentucky.262 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- Stellantis is planning a $155 million expansion of its three Indiana plants to produce EV drive-trains.263 This is in addition to the previously announced $3 billion in EV investment by Stellantis in the state. [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- ZETA member Rivian is undergoing a $10 million expansion to its existing manufacturing facility in Kentucky.264 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- Volkswagen's Scout EV manufacturing facility in South Carolina will undergo a $2 billion investment and will be capable of producing up to 200,000 EVs each year.265 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

- Hyundai raised its total EV investment to $28 billion over the next decade in an effort to meet its 2 million EV per year sales goal by 2030.266 [EPA-HQ-OAR-2022-0829-0638, pp. 71-72]

257 "Tesla to build $3.6 billion battery, electric semi truck manufacturing facility in Northern Nevada," Reno Gazette Journal, (January 25, 2023) https://www.rgj.com/story/news/money/business/2023/01/24/tesla-to-build-3-6b-battery-electric-nevada-semi-truck- manufacturing-facility/69837346007/

258 "Tesla plans to spend more than $770 million on Texas factory expansion," CNBC, (January 10, 2023) https://www.cnbc.com/2023/01/10/tesla-plans-to-spend-more-than-770-million-on-texas-factory-expansion.html

259 "Ford's new Tennessee plant aims to build 500,000 electric trucks a year," Reuters, (March 24, 2023) https://www.reuters.com/business/autos-transportation/fords-new-tennessee-plant-aims-build-500000-electric-trucks-year-2023-03-24/

260 "Ford to invest $1.3 billion to build EV manufacturing hub in Canada," CNBC, (April 11, 2023) https://www.cnbc.com/2023/04/11/ford-to-build-ev-manufacturing-hub-in-canada.html

261 "Toyota Accelerates Its EV Changes With Extra $7 Billion Investment," The Wall Street Journal, (May 10, 2023) https://www.wsj.com/articles/toyota-accelerates-ev-revamp-with-extra-7-billion-investment-b323eb1c

262 "Toyota Ramps Up Commitment to Electrification with U.S. BEV Production and Additional Battery Plant Investment," Toyota Pressroom, (May 31, 2023) https://pressroom.toyota.com/toyota-ramps-up-commitment-to-electrification-with-u-s-bev-production-and-addition al-battery-plant-investment/

263 "Stellantis Announces $155 Million Investment in Three Indiana Plants to Support North American Electrification Goals," Stellantis Media, (February 28, 2023) https://www.stellantis.com/en/news/press-releases/2023/february/stellantis-announces-155-million-investment-in-thr ee-indiana-plants-to-support-north-american-electrification-goals

264 "Bullitt County welcomes $10M investment for electric vehicle manufacturing, 200+ jobs," Louisville Courier Journal, (May 1, 2023) https://www.courier-journal.com/story/money/companies/2023/05/01/rivian-ev-manufacturer-expands-in-kentucky- with-10-million-investment/70164153007/

265 "VW-backed Scout Motors to build $2B factory in South Carolina," TechCrunch, (March 3, 2023) https://techcrunch.com/2023/03/03/vw-backed-scout-motors-to-build-2b-factory-in-south-carolina/

266 “Hyundai raises EV investment to $28 billion, to reduce China operations,” Reuters, (June 20, 2023) https://www.reuters.com/business/autos-transportation/hyundai-motor-invest-8541-billion-by-2032-accelerate-ev-pla ns-2023-06-20/

- ZETA member Canoo, a start-up electric vehicle manufacturer, invested $34.27 million to purchase the former Terex plant in Oklahoma City where it plans to begin EV production later this year.267 [EPA-HQ-OAR-2022-0829-0638, p. 73]

- Scout Motors announced its $2 billion investment to establish its first EV manufacturing plant in South Carolina. At full capacity, more than 200,000 all-electric, next-generation trucks and rugged SUVs may be produced annually at the facility.268 [EPA-HQ-OAR-2022-0829-0638, p. 73]

- GM plans to install more than 1 million units of annual EV capacity in North America in 2025 and accelerate from there. This is fueled by a $3 billion investment269 for an EV battery cell plant in Indiana and a $64 million investment270 in Rochester, New York and Defiance, Ohio for castings and components to support EV production. [EPA-HQ-OAR-2022-0829-0638, p. 73]

267 “EV manufacturer Canoo to open production facility in OKC. Here's where it will be,” The Oklahoman, (November 11, 2022) https://www.oklahoman.com/story/business/2022/11/10/electric-vehicle-manufacturer-canoo-repurposing-okc-facilit y-into-plant/69636856007/

268 “Scout Motors selects South Carolina for production site; plans to create 4,000 jobs,” Governor of South Carolina, (March 3, 2023) https://governor.sc.gov/news/2023-03/scout-motors-selects-south-carolina-production-site-plans-create-4000-jobs

269 Id. at footnote 181

270 “GM Investing $918 Million in Four U.S. Facilities for V-8 Engine Production, EV Components,” GM Newsroom, accessed June 30, 2023 https://news.gm.com/newsroom.detail.html/Pages/news/us/en/2023/jan/0120-investment.html

As a result of these investments, more EVs are already being produced domestically. In the first quarter of 2023, American factories produced 39% more EVs than the same period the year before.271 Tesla led the pack, producing more than half of the nation’s EVs. [EPA-HQ-OAR-2022-0829-0638, p. 73]

271 “Five New EV Models Drive Up North American Factory Production,” Bloomberg, (May 10, 2023) https://www.bloomberg.com/news/articles/2023-05-10/five-new-ev-models-drive-up-north-american-factory-produc tion#xj4y7vzkg

EPA Summary and Response

EPA acknowledges and appreciates all of the comments relating to PEV supply chain, critical minerals, and mineral security. These topics are closely interrelated, and the comments received often cover multiple aspects of these topics in varying degrees of detail. The wide diversity and volume of comments that we received on these topics represent the complexity of these issues, which we have broken down into a number of distinct themes that we individually identify and respond to in this section. Our responses to these themes collectively respond to all of the individual comments on these topics.

In general, comments in this topic area were generally concerned with issues such as the capability of global and domestic supply chains to support manufacturing of batteries and other

PEV components, the availability of critical minerals and other inputs to PEV production, and the possibility that sourcing of these items from other countries might pose a threat to national security.

Regarding the proposal's overall assessment of the supply chain, critical minerals, and mineral security, we received a variety of comments, some of which disagreed with the conclusions of our assessment and others which supported them. At the highest level, many of the concerns stated by commenters were stated as part of a broader argument that the proposed standards were too stringent; that is, that the commenter believed that the proposed standards should be weakened or even withdrawn because of their assertion that the supply chain or the availability of critical minerals could not grow fast enough to support the amount or rate of vehicle electrification that would result from the standards, or because they believed that it would create a degree of reliance on imported products that would harm national security. In contrast, other commenters supported EPA's conclusions regarding these issues and some also encouraged EPA to finalize more stringent standards, based on their view that these considerations would not prevent higher penetrations of PEV technology than anticipated in the proposal.

One major theme of the comments consisted of generalized observations about the need to develop a domestic supply chain for the inputs to PEV production. Supportive comments included recognition of the broad attention that this issue has received in the industry, and general agreement with the proposal's position that the supply chain is developing rapidly and as expected, due to market response to anticipation of increasing demand and the effect of congressional and executive action including the BIL and IRA, among other programs. These commenters often provided detailed examples of recent developments in supply chain growth and recent examples of the effect of the BIL and IRA. Adverse comments included a general citation of risk and uncertainty associated with future development of the supply chain, and with the possibility that the timeline and/or degree of BEV penetration anticipated by the proposal could not be supported by available minerals, battery manufacturing, or other aspects of the supply chain. Some specific themes among the assertions of adverse commenters were: that the proposal did not adequately address critical minerals or battery manufacturing, or was overly optimistic about the rate at which domestic minerals or manufacturing would grow; that we looked only at light-duty battery demand and not at other transportation or product sectors that use lithium-ion batteries, such as heavy-duty vehicles, stationary storage and portable devices; that the projections of manufacturing capacity did not include sufficient ramp-up time; that we should consider active material manufacturing in addition to cell manufacturing; that the proposal did not adequately address the risk associated with uncertain availability of critical minerals in the future, and in particular, that we should have quantitatively accounted for projected availability of all critical minerals rather than lithium only. Some commenters included data in their comments; for example, the Alliance for Automotive Innovation included a bespoke report by Benchmark Minerals Intelligence that examined domestic battery and mineral manufacturing capacity, and a coalition of environmental NGOs and public health organizations ("Environmental and Public Health Organizations") presented a detailed analysis of lithium availability.

Regarding our analysis of critical minerals, some commenters disagreed with our findings and others supported them. Supportive comments often pointed to examples of rapidly increasing attention to development of mineral resources in the U.S. and in nations with which the U.S. has good trade relations. These commenters also tended to emphasize current and ongoing support of the BIL and IRA in advancing such investments. Commenters who disagreed with our findings largely expressed the position that EPA did not adequately address critical minerals, or did not adequately consider the risks posed by increased demand for such products. Because mineral security is closely related to development of the domestic supply chain, comments often included references to the state of the domestic supply chain and the commenter's views on how it either is or is not advancing at a sufficient pace to allay mineral security concerns.

Regarding mineral security, some specific themes among adverse commenters were their views that the rapid growth in demand that would result from the proposal would result in either temporary or permanent reliance on nations with which the U.S. does not have good trade relations or has a large trade deficit, or would similarly result in increased reliance on imports in general. Similarly, some commenters felt that the discussion of national security in the proposal was not sufficient, pointing again to concerns about vulnerabilities resulting from a dependence on imported minerals and materials in order to manufacture vehicles or support the infrastructure they require. Some commenters specifically highlighted the possibility of increased dependence on China, which manufactures and processes much of the critical minerals and other materials commonly used in PEV manufacturing. In contrast, other commenters stated that the proposed rule would improve national security by stimulating development of the domestic supply chain, in part by providing demand certainty necessary to support investment in these areas.

Another frequent theme across many of the adverse comments was a perception of uncertainty and risk posed by supply chain, manufacturing, and critical minerals issues. These comments focused primarily on issues such as uncertainty of mineral prices and hence battery prices, or unavailability of minerals or other inputs to PEV manufacture, and more generally, to the implications of such potential developments on the ability to comply with the standards. In this context some commenters expressed the view that EPA should adopt a stringency adjustment mechanism (based, for example, on an assessment of progress in domestic critical mineral sourcing, PEV infrastructure, or other developments the commenters deem necessary to accompany increased penetration of PEVs under the standards), or else commit to revisiting the standards if it is determined that development of the supply chain, manufacturing, or critical minerals have not progressed as expected. This suggestion was often also made in the context of uncertain future progress in other external factors such as charging infrastructure, grid readiness, and similar factors (these are discussed separately in their respective sections of this RTC).

Relatedly, some commenters cited a need for complementary government policies and incentives across the various levels and branches of government to support increased market penetration of PEVs. These included, among other areas: public charging infrastructure, supply chain development, workforce training, fleet purchase requirements, support for PEV and battery recycling and end of life issues, economic and purchase incentives, consumer education, grid infrastructure, state and local measures and federal engagement with such measures, and other measures to address the cost and risk of increased PEV presence in the fleet.

Some commenters questioned our assessment that critical mineral prices and availability are likely to stabilize in the future, stating the view that factors such as rapid demand growth, international competition for resources, and adverse trade policies may prevent prices from stabilizing in the near term or even the long term. Commenters also cited the need for permitting reform and streamlining, as permitting is a major factor in the lead time necessary to develop new mineral sources. It was also suggested that the desire to source from responsible vendors that support Environmental, Social, and Governance (ESG) goals could increase the cost of purchased minerals by encouraging use of higher-cost domestic supplies. Relatedly, some commenters cited the environmental impact of developing new mines, and environmentally or socially unsound sourcing practices sometimes employed in the production of minerals in other parts of the world. Some commenters also suggested that BEVs are not an efficient use of these limited resources, and that the goals of the standards could be more effectively met with HEVs and PHEVs, which require less critical mineral content and impose less demand on infrastructure, reducing the level of risk associated with all of these issues.

Many adverse commenters expressed the view that there will not be enough critical minerals, either in the near term or the long term or both, to supply the anticipated increase in PEV penetration resulting from the standards. Some of these comments were general in nature while others referred specifically to our assessment of future annual GWh of battery manufacturing capacity which we used as a constraint on PEV penetration in the OMEGA model. They also expressed views that the timeline and/or degree of BEV penetration cannot be supported by available minerals and/or growth in domestic supplies or battery manufacturing. Some commenters expressed the view that the supply chain will not develop rapidly enough to meet the standards with the projected penetration of PEVs. These comments included positions that U.S. battery manufacturing will not ramp up fast enough, or that there is insufficient lead time for announced plants to come to full capacity, or that mining permitting and/or development of production will be too slow to meet increased demand, either globally or domestically. More specifically, in relation to the growth of the supply chain, some commenters stated the view that U.S. mineral sourcing and processing will not grow fast enough to keep pace with increasing content requirements for IRC 30D eligibility.

Some commenters stated that HEVs and PHEVs would be a better use of critical minerals than BEVs, and so EPA should have projected a greater penetration of these vehicles, or should have modeled PHEVs explicitly, and/or have adjusted inputs to result in a greater penetration of these vehicles in the compliance analysis. These commenters also stated that PHEVs and HEVs could reduce demand for critical minerals and reduce the risk associated with an uncertain future supply.

EPA has carefully considered all of the comments received. In general response to the totality of these comments, EPA notes that throughout the rulemaking process, we have taken into consideration the importance of supply chain, critical mineral, and mineral security issues as they relate to compliance with the standards. In RIA Chapter 3 and Preamble section IV, EPA acknowledges that some uncertainty exists regarding future demand and supply of minerals and mineral processing, as with any forecast of future supply and demand. We have taken them into account by evaluating their relevance and likely impact in the context of the rulemaking, and by considering evidence available in the public literature, in analyst forecasts and analyses, and through our own analyses. We have closely examined the available public literature, consulted forecasts of mineral supply, mineral cost, and future development of the supply chain as described by leading analyst firms, and assessed the general state of the industry in preparing for the demand that is already growing across the industry as well as resulting from the standards. For this final rule, we have also considered the public comments, and have also continued our consideration of the mentioned sources, as well as our ongoing consultation with industry and government agency sources (including the Department of Energy (DOE) and national labs, the

State Department, the U.S. Geological Survey (USGS), and several analysis firms). Through these latter means we have continued to collect information on production capacity forecasts, price forecasts, global mineral markets, and related topics. Importantly, we also coordinated with DOE and the National Labs, as well as with NHTSA, in their assessment of the outlook for supply chain development and critical mineral availability. The Department of Energy is well qualified for such research, as it routinely studies issues related to electric vehicles, development of the supply chain, and broad-scale issues relating to energy use and infrastructure, through its network of national laboratories. DOE worked together with Argonne National Laboratory (ANL) and coordinated this work with EPA during much of 2023. In Sections IV.C.7 of the preamble we review the main findings of this work, along with the additional information we have collected since the proposal. As in the proposal, we have considered the totality of information in the public record in reaching our conclusions regarding the influence of future manufacturing capacity, critical minerals, and mineral security on the feasibility of the final standards.

EPA has carefully considered how these factors relate to the feasibility of producing the incremental penetrations of PEVs that manufacturers may choose to produce to comply with the final standards, and to national security concerns related to critical minerals and other manufacturing inputs. The introductory text under section IV.C.7 of the preamble provides discussion of several key themes that in the proposal led us to conclude that the proposed standards were appropriate with respect to these issues, and section IV.C.7 in general explains and provides evidence for our continued assessment that the final standards, which are less stringent than the proposal in the early years of the program from MYs 2027-2031 and provide additional lead time, are also appropriate. Section IV.C.7.i of the preamble provides a general review of how we considered battery and battery component manufacturing considerations in the updated analysis, the sources we considered, and how we used this information in the analysis. Section IV.C.7.ii of the preamble examines the issues surrounding availability of critical mineral inputs. Section IV.C.7.iii of the preamble provides a discussion of the security implications of increased demand for critical minerals and other materials used to manufacture electrified vehicles. Section IV.C.7.iv of the preamble considers recycling as a source of minerals in the future. Additional details on these aspects of the analysis may be found in RIA Chapter 3.1, including 3.1.5 where we describe how we used this information to develop modeling constraints on PEV penetration for the compliance analysis.

Our updated assessment continues to support our conclusion that the stringency of the final standards is appropriate. The final standards implement a number of changes to the proposed standards and are accompanied by an updated compliance analysis, and together these developments provide additional support for EPA's assessment that the final standards are appropriate with respect to supply chain, critical minerals, and mineral security.

First, neither EPA's continued study of these issues nor the information provided in the public comments have revealed specific new information that undermines our assessment of the feasibility of the proposal. As we will discuss in the detailed responses later in this section, in general we do not find evidence in the public comments that would change our previous assessment that the observed level of investment and other activity across the global and domestic industry suggests that the industry will be well positioned to support automakers in meeting the standards. Much of the information provided by adverse commenters is of a similar nature to the information that EPA has already presented and considered in the proposal, in that they describe the same class of uncertainties associated with the future impact of mineral demand and mineral security that EPA has already considered in the proposal. Similarly, much of the information provided by supportive commenters also builds on the evidence EPA presented in the proposal about the pace of activity and overall outlook for buildout of the critical mineral supply chain. While contributing to the record, the information provided by both groups of commenters largely serves to reinforce the trends that were already identified and considered by EPA in the proposal, and largely do not identify new, specific risks or uncertainties that are not within the general scope of issues considered in the proposal. In particular, adverse comments fail to definitively identify and quantify specific and unavoidable constraints that would reasonably lead us to conclude that they cannot be addressed by the private investments, government development programs, and other industry activity that the proposal and the updated analysis shows are already underway and are continuing.[487,488] They also do not provide a specific basis for reducing the battery manufacturing GWh constraint we apply in OMEGA. Taken together, the totality of information in the public record continues to indicate that development of the critical mineral and manufacturing supply chain is proceeding both domestically and globally in a robust manner that supports the industry's compliance with the final standards, and that the likely rate of development of the domestic and global supply chain and forecast availability of critical minerals on the global market are consistent with the final standards being met at a reasonable cost and with national security goals being maintained.

Second, the central case of our updated analysis shows that the final standards can be met with significantly less demand for critical minerals than under the central case of the proposal, which is a result of several factors, including the final standards being less stringent than the proposal in the early years of the program from MYs 2027-2031, the inclusion of PHEVs which reduce the number of BEVs which have larger batteries and therefore greater minerals requirements, and updated BEV efficiency estimates. We also provide sensitivity cases and other examples that show that the standards can even be met with much lower levels of BEV penetration well below our battery manufacturing GWh constraint in OMEGA, including with no additional BEV penetration beyond that which exists today (see Sections I.B.1, IV.F and IV.G of the preamble and Chapter 12 of the RIA). Accordingly the compliance analysis indicates a reduced demand for battery production, implying reduced demand for critical minerals and supply chain development in all scenarios as compared to the proposal. Combined with our observation that private and public effort and investment in the supply chain is continuing as noted in the proposal, we find no evidence that compliance with the standards will be prevented by issues such as critical unavailability of necessary manufacturing inputs, nor that it will adversely impact national security by creating a long-term dependence on imports from adversarial countries or foreign entities of concern (FEOC) sources associated with covered nations.

Finally, although as noted previously we do not find that the public comments have identified definitive and hard constraints on the ability to meet the standards, we do note that they frequently refer more generally to uncertainty and risk associated with the possibility that such

[487] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
[488] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials," ANL-24/06, February 2024.

constraints could nonetheless develop. In addition to our response to concerns about uncertainty and risk found below, we also note that, as a normal part of our ongoing research activities, EPA will continue to study the impact of critical material cost and availability, development of the supply chain, and mineral security. As with any rulemaking, the Administrator has the discretion to propose modifications to the program through the public notice and comment process, in the case that modifications are found to be appropriate in the future to address any concrete constraints that might have developed.

In the remainder of this section we provide additional detailed responses to specific themes found in the comments.

Regarding comments that we should consider availability of critical minerals other than lithium, we have included in section IV.C.7 of the preamble and Chapter 3 of the RIA additional analysis and discussion of additional minerals such as graphite, cobalt, nickel, graphite, and manganese as well as coverage of cell components and materials, and additional coverage of lithium. Regarding comments that EPA should consider mineral demand in sectors other than light-duty automotive, the updated analysis identifies battery cell manufacturing capacity specifically for light-duty vehicles, and other aspects of the two 2024 ANL reports on battery manufacturing and critical minerals that are cited in our analysis, as well as other sources such as the BMI study on global lithium capacity, largely include consideration of the EPA heavy-duty rule and/or minerals demanded for other uses in the economy.

EPA disagrees with the Alliance comment that EPA "just assumed that lithium was the bottleneck and biggest concern." In the proposal, EPA clearly explained the reasoning for focusing particularly on lithium, which included considerations such as other minerals potentially having substitutes and the lack of a substitute for lithium. Based on its updated consideration of battery minerals and cell materials and components, including the characterizations of projected FTA, MSP, and economic ally mineral production provided in the 2024 ANL critical mineral study, EPA continues to consider lithium demand to be an appropriate basis for a GWh constraint in OMEGA modeling.

In response to comments about the need for development of the supply chain supporting the manufacture of PEVs, and about the uncertainties and risks associated with the same, EPA appreciates the additional information provided by commenters citing recent growth in the global and domestic supply chain. This information is consistent with our continued observation that development of the supply chain for PEV manufacturing inputs is receiving broad attention in the industry and is progressing in response to market forces and governmental incentives. EPA also acknowledges the arguments relating to risk and uncertainty cited by adverse commenters. Regarding these comments, EPA notes that the presence of uncertainty and risk is a common element in virtually any forward-looking analysis or plan of action. In general, in establishing appropriateness of standards, the Clean Air Act does not require that EPA must prove that every potential uncertainty associated with compliance with the standards must be eliminated a priori. It is well-established in case law that "[i]n the absence of theoretical objections to the technology, the agency need only identify the major steps necessary for development of the device, and give plausible reasons for its belief that the industry will be able to solve those problems in the time remaining. Thus, EPA is not required to rebut all speculation that unspecified factors may hinder 'real world' emission control." *NRDC v. EPA*, 655 F.2d 318, 333–34 (D.C. Cir. 1981). Thus, it is not required, nor would it be reasonable to expect, that EPA prove sufficient production capacity already exists today for technologies or inputs that are likely to be required to comply with standards in the future, nor that all potential uncertainties that can be identified regarding the development of that capacity must be eliminated. In fact, past EPA rulemakings have been technology-forcing, and so have required industry to develop and increase production of technologies for which critical inputs and production capacity were not fully developed and proven at the time. In any forward-looking analysis, uncertainty is typically approached as a matter of risk assessment, including sensitivity analysis conducted around costs, compliance paths, or other key factors. Taken as a whole, the robust set of sensitivity cases that we include in the updated analysis explore the most significant risks and uncertainties surrounding the future development of these and other issues, and show that compliance with the final standards is possible under a broad range of reasonable scenarios. Included in these scenarios are examples of pathways that would rely on fewer BEVs and more vehicles with ICE across a range of electrification (ICE vehicles, mild HEVs, HEVs and PHEVs), which would significantly reduce the demand for battery production and critical minerals.

Relatedly, in response to comments that highlight the risks associated with sourcing of minerals and processed materials from other countries, EPA understands that some inputs necessary to the production of electrified vehicle components are currently sourced from other countries. EPA notes, as discussed at length in section IV.C.7 of the preamble, that the Administration has identified a goal to advance domestic production capacity and secure supply chains for these minerals and components among FTA partners, MSP partners, and other economic allies. EPA also notes ongoing work by the Department of Energy to ensure that these materials can be recycled efficiently. We also note that use of imported materials and minerals is not unique to PEVs, but also is true for conventional vehicles, which use an array of imported and strategic materials, such as platinum and palladium for catalysts, computer chips for engine control and entertainment systems, and other parts and materials that are sourced from other countries. Materials like these were imported for use in other industries long before the recent growth in their use in electrification. While some battery chemistries include cobalt which carries environmental and other impacts depending on how it is sourced, cobalt content is being rapidly reduced and battery chemistries that do not use cobalt are already gaining market acceptance. While increased demand for critical minerals can cause costs to increase, at the same time the increased value of these materials favors their recycling, and there is little evidence to suggest that minerals that have significant market value will not provide similar incentives for recycling as other materials in the automotive sector, thus reducing demand on production from mining operations. See also our response to comments on energy security and electrified vehicles in RTC Section 21.

In response to comments that suggest that global battery production may not keep pace with demand, we continue to see evidence that global lithium-ion battery and cell production is growing rapidly and is likely to keep pace with increasing global demand. In the proposal we first noted a 2021 report from Argonne National Laboratory (ANL)[489] that examined the state of the global supply chain for electrified vehicles and included a comparison of projections of future global battery manufacturing capacity and projections of future global battery demand from various analysis firms out to 2030. The three most recent projections of capacity (from BNEF, Roland Berger, and S&P Global in 2020-2021) that were collected by ANL at that time

[489] Argonne National Laboratory, "Lithium-Ion Battery Supply Chain for E-Drive Vehicles in the United States: 2010-2020," ANL/ESD-21/3, March 2021.

exceeded the corresponding projections of demand by a significant margin in every year for which they were projected. Since the proposal, we have only seen evidence that this trend is accelerating. For example, as described in section IV.C.7.i of the preamble, more recent projections of supply have greatly exceeded the projections in the 2021 report cited above. See the discussion in Preamble IV.C.7.i after the figure titled "Future global Li-ion battery demand and production capacity, 2020-2030."

In response to comments that more time is needed for scale up of supply chains and PEV production to meet the standards, EPA disagrees. EPA notes that the final standards are less stringent than the proposal in the early years of the program from MYs 2027-2031 resulting in fewer BEVs in the central case than in the proposal, particularly in those years. We also note again the sensitivities and other examples that show that alternative compliance paths are possible that indicate lower BEV penetration and hence less demand for batteries and critical minerals (see Sections I.B.1, IV.F and IV.G of the preamble and Chapter 12 of the RIA). See also the responses to similar comments related to supply chain development throughout this section.

In response to comments that we overestimated future North American battery manufacturing capacity, or did not account for ramp up time of these facilities, or did not account for the specific use of the cells produced by manufacturing plants, EPA disagrees. Our estimates in the proposal were based on work by ANL as cited in the proposal. We note that ANL has since performed an updated study of North American battery cell manufacturing capacity[490] and we are using this study in the updated analysis. The updated study accounts for a 3-year period from beginning of production to full scale operation, based on their assessment of typical time periods experienced in new plant construction and production plans as stated by manufacturers. ANL also accounted for the intended use of the cells produced in these plants, finding that the vast majority are expected to be used in light-duty automotive applications rather than heavy-duty, stationary or consumer product applications. The updated ANL study further reinforces our assessment that automotive battery production capacity in North America is rapidly growing and is likely to meet demand in the central case of the analysis. This is consistent with the assessment provided by Benchmark Minerals for the Alliance (the "Alliance/BMI Study"), which foresees similar growth in plant manufacturing capacity, and states, "Benchmark foresees US self-sufficiency on the basis the current trend is maintained, new capacity is commissioned, and significant manufacturing credits are realized." EPA considers ANL's assessment through December 2023 to be thorough and up to date and notes that the Alliance/BMI Study was performed prior to July 2023 when it was submitted to the docket. While AFPM and API assert that "mature battery factories today rarely operate above 80 percent utilization rates," there is no indication in the cited reference[491] that this is a matter of ramp-up time or some limitation on the ability to reach full capacity, but instead appears to refer to historical rates of utilization that could just as likely reflect planning for future demand, mentioning specifically "optimism about market growth." In contrast, comments by Toyota indicate that "it takes about 4 years to reach full scale battery production," reaching 75 percent after the first year and almost 90 percent after

[490] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
[491] Xiao, M., "Lithium-ion battery production goes global," Control Engineering, January 26, 2022. Accessed on March 9, 2024 at https://www.controleng.com/articles/lithium-ion-battery-production-goes-global/

the third year.[492] While the 4-year period cited by Toyota is longer than the 3 years cited by ANL, ANL uses a linear ramp that adds capacity more slowly than the ramp shape implied by Toyota, and Toyota cites only a proprietary study by e-Source. EPA sees no reason to question the ramp rate that was determined by ANL as a result of its study and notes that due to its linear shape it is generally more conservative.

According to ANL's analysis of publicly announced cell factories in North America, as of January 2024, manufacturers in the United States could supply about 10 million new light-duty electric vehicles each year by 2030, assuming an average pack size of 80 to 100 kWh.[493] In addition, the central case of our updated compliance analysis projects a substantially lower demand for battery production than in the proposal. This is largely due to the effect of higher battery cost inputs, which reduce the penetration of BEVs in the central case, the inclusion of PHEVs which use smaller batteries than BEVs, and updated BEV efficiency inputs. After including all of these updates, projected North American automotive battery production capacity continues to meet projected demand. In the case that a shortfall were to occur, our higher battery cost sensitivity accounts for higher battery costs that might result, and as previously noted, examples of pathways that include lower BEV penetration in favor of HEVs and PHEVs would continue to exist and would place even less demand on battery production (see Sections I.B.1, IV.F and IV.G of the preamble and Chapter 12 of the RIA).

In response to comments that we should include consideration of active material manufacturing, we did consider global cathode active material manufacturing capacity in the proposal, and in the updated analysis we consider additional information regarding global and domestic manufacturing for active materials and other cell components in Preamble IV.C.7 and RIA Chapter 3. In addition to other sources, we cite the North American battery manufacturing report from ANL[494] that considered domestic manufacturing capacity for electrode active materials and other cell materials and components.

In response to comments that generally suggest that batteries and/or cells will largely be imported from other countries, we have not found evidence since the proposal that would change our observation that U.S. PEV production to date has not been particularly reliant on foreign manufacture of batteries and cells, nor that increased PEV penetration must imply such a reliance. In the proposal we noted that about 57 percent of cells and 84 percent of assembled packs sold in the U.S. from 2010 to 2021 were made in the U.S.[495,496] Continued growth in U.S. BEV sales is dominated by manufacturers such as Tesla who largely use U.S. made batteries, suggesting that this trend has continued since the cited sources were published. Considering the influence of the 45X production tax credits on the decisions of manufacturers to produce in the U.S., and our assessment that planned domestic automotive battery manufacturing capacity is

[492] EPA-HQ-OAR-2022-0829-0620, pp. 14-15.
[493] Argonne National Laboratory, "Light Duty Electric Drive Vehicles Monthly Sales Updates," January 30, 2024. Accessed on February 2, 2024 at https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates
[494] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
[495] Argonne National Laboratory, "Lithium-Ion Battery Supply Chain for E-Drive Vehicles in the United States: 2010-2020," ANL/ESD-21/3, March 2021.
[496] U.S. Department of Energy, "Vehicle Technologies Office Transportation Analysis Fact of the Week #1278, Most Battery Cells and Battery Packs in Plug-in Vehicles Sold in the United States From 2010 to 2021 Were Domestically Produced," February 20, 2023.

likely to meet demand under the central case, it appears likely that this trend will continue even as PEV production increases. ANL analysis suggests that North American cell production can meet projected demand through 2032.[497]

In response to comments on the potential impact of increased or highly volatile critical mineral costs on future battery costs, EPA agrees that mineral costs can pose uncertainties for predicting future battery manufacturing costs as demand for these commodities grows. This kind of potential cost impact is not unique to batteries; the same is true for critical minerals used in ICE vehicle emissions control systems, as well as other materials or components used in vehicle manufacturing generally, like semiconductors.[498] EPA acknowledges that price volatility of critical minerals and products made from them has recently affected the cost of batteries and other electrification components, as indicated, for example, by the December 2022 BNEF battery price survey that indicated battery costs had increased from 2021 to 2022. However, we also note that the most recent December 2023 BNEF survey indicates that battery costs have resumed their downward trajectory from 2022 to 2023, due in part to reduced mineral costs. In light of the most recent analyst consensus on future battery mineral prices through approximately 2029 which indicate a long period of falling and relatively stable prices, our central case battery costs appear conservative in that they are based on somewhat earlier forecasts of mineral prices that did not include this declining outlook, and omit any cost reductions through 2025 despite indications from these sources that mineral costs will be falling during that period and beyond. Therefore we consider the higher battery costs and the high and low battery cost sensitivity cases that we have included in the updated analysis as addressing these uncertainties. Further, EPA recognizes and supports efforts by the Department of Energy and the Administration to pursue initiatives that can reduce the risk associated with these materials by promoting development of the domestic supply chain and developing domestic sources for critical minerals and related technology. Many of these approaches, initiatives and programs are outlined in detail in ANL's February 2024 report on critical materials.[499] During the time frame of this rule, our assumptions for future battery costs in this final rule are consistent with projections by the Department of Energy and Argonne National Laboratory, leading analysis firms and general industry consensus. Where future costs beyond the time frame of the rule are used to determine annualized costs, we have remained conservative with respect to some projections due to these uncertainties.

In response to comments the EPA should consider the Mauler et al. study on the potential impact of mineral prices on battery costs, EPA has reviewed this study and has considered its findings in characterizing future battery costs and battery cost sensitivities within and beyond the time frame of the rule, as discussed in Preamble IV.C.2 and RIA Chapter 2. More discussion of our reference to the Mauler work and generally on battery costs and development of battery cost sensitivities can be found in those sections, and responses to comments on battery costs may be found in section 12 of this RTC.

[497] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
[498] See, e.g., J.D. Power, "Why Is There A Global Chip Shortage For Cars?," July 5, 2023. Accessed on March 3, 2024 at https://www.jdpower.com/cars/shopping-guides/why-is-there-a-global-chip-shortage-for-cars
[499] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials," ANL-24/06, February 2024.

In response to comments on the representation of increased mineral costs in BatPaC, and that the default costs of manufacturing inputs in BatPaC do not account for recent volatility or increases in mineral prices, EPA understands that prices seen in the industry have experienced a period of volatility and that price swings are difficult to represent as a set of default costs. However, our battery costs in the updated analysis do not employ the default input costs in BatPaC but instead are based on costs developed by ANL from forecasts of mineral costs provided by Benchmark Minerals Intelligence (BMI) from 2023 to 2035. According to comments from the Alliance, BMI is "a well-known, respected consultant in the area of Li-ion battery supply chains from the materials extraction to cell production stage."

In response to comments relating to the environmental impacts of increased mining for critical minerals, EPA notes that this concern applies not only to critical minerals used for PEV technology but also to all extractive activities, including oil and gas extraction which is used to provide fuel for ICE vehicles, and mining of virgin materials for numerous other products across the economy. Commenters have not established that the potential impact of incremental increases in mining activity to support PEV technology either domestically or worldwide is meaningfully different in scope or significance than other mining activities that have similar impacts. As discussed in Preamble IV.C.7 and RIA Chapter 3, EPA assesses that over the long term, recycling could significantly reduce environmental impacts that may accompany mining of virgin materials used in electrified vehicles. Additionally, EPA considered possible approaches to lessen environmental impacts from mining that may be implemented for future mining projects, including those for materials used in PEVs, including the approaches, initiatives and programs outlined in ANL's February 2024 report on critical materials.[500]

In response to comments that environmental, social and governance (ESG) considerations could impact critical mineral prices and hence battery costs, EPA agrees that some manufacturers may choose to represent these considerations in their material acquisition policies, but notes that there is little to no data to quantify the extent of this practice in the future or how it would affect material prices collectively across the industry, and the commenter did not provide such data. As noted elsewhere, our battery costs in the central case of the updated analysis are on average about 25 percent higher than in the proposal, and our high battery cost sensitivity models a 25 percent increase on top of that. The high battery cost sensitivity is meant to address the uncertain possibility of additional costs of this sort which at present are too uncertain to precisely quantify.

In response to comments that a commitment to a broad array of complementary government policies is necessary to achieve the PEV penetrations anticipated by the compliance analysis, EPA has identified a broad array of complementary policies that are oriented to this purpose. EPA notes that agency action on many of the specific policies and incentives suggested by commenters are outside the scope of this rulemaking, but we continue to monitor developments in each of these areas. It is our assessment that these areas continue to receive a large degree of attention consistent with the action of market forces and government actions necessary to address commenters' concerns. EPA notes the ongoing work of the Administration and Congress to address these areas individually and as part of an all-of-government approach, including Congressional passage of the Infrastructure Investment and Jobs Act, the CHIPS and Science

[500] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials," ANL-24/06, February 2024.

Act, and the Inflation Reduction Act. Some relevant programs include the Battery Manufacturing and Recycling Grants, Battery Material Processing Grants, Domestic Manufacturing Conversion Grants, and Advanced Technology Vehicle Manufacturing Loan Program (DOE), the 48C Advanced Manufacturing Tax Credit (DOE/DOC), and DOT's National Electric Vehicle Infrastructure (NEVI) Program and Charging and Fueling Infrastructure Grant Program. These programs are providing an unprecedented amount of federal resources and guidance to support both supply and demand for zero- and near-zero emission vehicles. EPA has also reviewed the programs, initiatives and approaches outlined in ANL's recent work on domestic battery manufacturing and critical materials and these sources provide an excellent reference for complementary policies focused both domestically and internationally.[501,502] Some commenters described the investments the auto industry and other segments of the transportation and utility sectors have made and continue to make in these areas. EPA appreciates the significance of these efforts and believes that efforts like these will continue to contribute to the advancement of clean transportation over time.

In general, although some commenters have asserted, for example, the need for "massive and coordinated" efforts on the part of "the auto industry, energy providers, mineral suppliers and the government," they do not state specifically why they feel that efforts of the sort described above either are not appropriate or fall short of what they feel is needed. For example, API states, "although Congress and the Administration have taken significant steps to accelerate this activity by funding, facilitating, and promoting the rapid growth of U.S. supply chains for these products through the IRA, BIL, and numerous Executive Branch initiatives, more will still be needed given the increase in demand." However, API does not specify what more it feels will be needed. Similarly, Toyota states that "the proposal lacks an actionable plan for translating funding and goals into specific projects" but does not state what it believes to be the elements of such a plan. Some commenters go on to suggest that the standards should therefore include an adjusting mechanism that would monitor progress in development of the supply chain, critical mineral sourcing, and other efforts and automatically adjust the stringency of the standards accordingly. EPA responds to these and similar requests for a stringency adjustment mechanism in RTC 3.3.1.

Based on the available evidence, EPA assesses that the projected level of PEV penetration indicated under the central case of the compliance analysis is consistent with trends already underway, such as the current level of sales and sales growth that is taking place, the current ramp up of charging infrastructure buildout, incentives, and other complementary policies, and the measures currently underway and planned by the industry as mentioned above and by other commenters. EPA also assesses that a wide range of actions, including investments and partnerships by the automotive industry and investments and initiatives by the federal government (for example, the Infrastructure Investment and Jobs Act that provides significant funding to the Department of Energy to promote supply chain development), indicate that (a) the automotive industry has recognized the need to establish a supply chain for electrified vehicles and is taking appropriate action to address this business need, and (b) the abovementioned federal investments and initiatives indicate that the federal government is taking appropriate

[501] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
[502] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials," ANL-24/06, February 2024.

actions to support its development. The evidence indicates that automakers are already demonstrating that they are taking appropriate steps, and that the standards adopted in this rule will encourage continued investment in supply chains by providing regulatory and market certainty.

In response to comments that EPA should implement a stringency adjustment mechanism to account for uncertainties in development of the supply chain, critical minerals, manufacturing and mineral security, comments related to a stringency adjustment mechanism are discussed in RTC 3.4.

In response to comments that HEVs and PHEVs would be a better use of critical minerals than BEVs, and that EPA should therefore have projected a greater penetration of these vehicles in the compliance analysis, EPA notes that the central case and other scenarios assessed in the compliance analysis are only projections of potential pathways for complying with the standards. Manufacturers remain free to use any combination of technologies that they find to be most effective. If, as commenters suggest, HEV and PHEV technologies are more effective and available at lower cost in the future than projected in our central analysis, or represent a more efficient use of resources that are available to a given manufacturer, the manufacturer is free to realize those benefits by doing so. Our sensitivity cases and other examples that include greater penetration of HEVs and PHEVs indicate that in such cases, compliance with the standards would remain possible.

In response to comments that the standards would cause harm to national security (including comments on the energy security and mineral security impacts of an increased penetration of PEVs), EPA disagrees. EPA first notes that we define energy security differently from mineral security, where energy security focuses on security implications of energy sourcing and mineral security focuses on security implications of critical mineral sourcing. To this end, EPA notes that the use of imported materials or minerals to build vehicles is not a direct analogy to the issue of energy security associated with use of imported petroleum, because the minerals used in production of batteries, motors, and other components are not an energy source that is consumed to power the vehicle, but rather, once supplied, remain with the manufactured vehicle for its useful life. Further, once imported, over time these materials can be recycled and thereby become a domestic source when vehicles have reached end of life. We respond to comments pertaining to energy security in RTC Section 21. Regarding mineral security, EPA finds no evidence that compliance with the standards will adversely impact national security by creating a long-term dependence on imports of critical minerals or components from unfriendly nations, or creating a vulnerability to disruption of necessary manufacturing inputs. The economic and other factors that are contributing to continued development of the supply chain today, as described previously, indicate that the industry is acting rapidly and robustly in response to anticipated demand and government development incentives to build a secure supply chain that includes both domestic sources and sources among preferred trading partners, in tandem with increasing mineral demand. Importantly, the updated analysis also projects significantly reduced battery demand in the central case and even lower demand in the more prevalent P/HEV penetration cases and other illustrative examples (see Sections I.B.1, IV.F and IV.G of the preamble and Chapter 12 of the RIA), further reducing potential exposure to these risks compared to the proposal. In fact, we assess that the final standards are likely to promote long-term national security benefits by reducing demand for petroleum, reducing the nation’s economic exposure to global price volatility of petroleum, and by providing regulatory and market certainty for the continued development of a domestic supply chain for critical minerals and clean energy technologies (as mentioned in Section IV.C.7of the preamble).

While section 202(a) does not require EPA to evaluate national security, the Administrator has nonetheless considered national security in promulgating this rule, consistent with past rulemakings.[503] Commenters raise the issue of national security implications of an increasing share of PEVs that may be driven by the standards. In response, EPA disagrees that the standards undermine national security. In fact, it is important to examine the alternative that commenters appear to be advocating, that is, that the U.S. should weaken or withdraw the standards in order to avoid an increased need for critical minerals. Under this path, business as usual would prevail, as U.S. industry would no longer be additionally motivated to meet the standards by investing in and building a secure supply chain for these products. Instead, the current prevailing industry practice of conveniently acquiring these products from the very sources that commenters identify as threats to national security would have greater incentive to continue for a longer time if not indefinitely. Indeed, as another commenter pointed out, "choosing to weaken these standards would result in the United States falling behind in the global race to develop domestic supply chains, good-paying jobs, and battery and EV manufacturing."[504] While the increased demand directly attributable to the rule would be eliminated, over the long term this may not place national security in a better position. Demand for critical minerals in the U.S. and globally is poised to grow rapidly in the coming years regardless of the existence of the standards, and failure of U.S. industry to take immediate and sustained steps to improve its position in producing and acquiring these products to address U.S. needs and to improve its competitiveness in the global market can negatively impact national security over the long run.

Regarding the comment from Western Energy Alliance that "there should be a corresponding quantification of the mineral security costs in the cost/benefits analysis of the rule," and that it would show a "huge cost to national security," EPA disagrees. EPA has separated mineral security from the traditional concept of energy security in order to relate the concept to the projections of mineral supply and demand considered in the rulemaking analysis. As discussed in section IV.C.7 of the preamble, our assessment of the available evidence indicates that the increase in PEV production projected to result from the proposed standards can be accommodated without causing harm to national security and may bring about a net benefit to national security. Commenter has not provided evidence or data to support their assertion that the rule would result in a net cost to national security or that it would exceed the projected energy security benefit of the rule.

As several commenters have noted, the domestic supply chain for critical minerals and various clean energy technologies largely lags well behind that of other countries, including China which has invested heavily in these technologies and maintains a leadership position in many of them; however, ANL analysis demonstrates that investment in the supply chain for critical minerals and batteries has expanded rapidly and is expected to continue, putting the U.S. in a better position to meet minerals and materials demand for PEVs from domestic and friendly

[503] For example, EPA has evaluated national security impacts associated with petroleum oil imports in all of our motor vehicle GHG rulemakings.
[504] Comments from Plug-In America, EPA-HQ-OAR-2022-0829-0625, pp. 1-2.

sources.[505,506] Even in the absence of the standards, development of a domestic supply chain for critical minerals and clean energy technology, which is already underway as demonstrated by the ANL reports, will be critical to maintaining national security, by maintaining competitiveness of U.S. industry as the world increasingly moves to these technologies, not just in the transportation sector but across much of the global economy. The presence of the standards therefore provides additional regulatory certainty that supports achieving this goal more rapidly than would otherwise occur, thus benefiting national security.

In response to comments that the standards should be weakened or postponed as a response to uncertainty about precise availability of minerals in the future, or the sourcing of these products, or other uncertainties related to minerals, the supply chain, or mineral security, EPA disagrees. See the discussion in section IV.C.7 of the preamble. This position is also consistent with that of leading research firms and industry analysts which regularly acknowledge the value of regulatory certainty in driving investment in their production.[507,508,509] Some commenters such as the "Environmental and Public Health Organizations" echoed this principle, stating for example, "clear regulatory signals – like EPA's vehicle emissions regulations – can create further confidence in the private sector to accelerate and expand investments." Similarly, ZETA stated, "robust EPA emissions standards will provide the regulatory certainty needed to not only ensure manufacturers continue to invest in LMDEV technologies but that the entire supply chain supporting the transition to electrification will have a clearer picture of how to plan capital expenditures today to meet the increased demand for its products over the coming years." If commenters citing concerns about national security are correct that development of a domestic supply chain for these products will be important to national security and global competitiveness of the U.S., it should also be acknowledged that it was in the absence of (i.e., prior to) this rule that U.S. domestic production capacity has lagged far behind that of China and other countries. While the domestic supply chain has already begun to develop in part as a result of rapidly growing industry attention to vehicle electrification as well as the influence of the IRA and BIL, the need to comply with the standards provides additional market certainty to improve confidence in investment in this area and is likely to lead to even faster development of the supply chain. In fact, many of the same critical minerals and the same types of production capacity are necessary not only for complying with the standards, but also for the general competitiveness of the U.S. on a global stage, at a time when the need to reduce greenhouse gases, reduce other pollutants, and produce clean energy is being recognized across the world.

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505 Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
506 Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials," ANL-24/06, February 2024.
507 Allen & Overy, "U.S. Inflation Reduction Act takes climate change out of political cycle," November 3, 2022. Accessed on February 16, 2024 at https://www.allenovery.com/en-gb/global/news-and-insights/publications/us-inflation-reduction-act-takes-climate-change-out-of-political-cycle
508 Union of Concerned Scientists, "Production Tax Credit for Renewable Energy," February 9, 2015. Accessed on February 16, 2024 at https://www.ucsusa.org/resources/production-tax-credit-renewable-energy
509 Bistline, J. et al., "Economic Implications of the Climate Provisions of the Inflation Reduction Act," Brookings Papers on Economic Activity, BPEA Conference Draft, March 30-31, 2023. Accessed on February 16, 2024 at https://www.brookings.edu/wp-content/uploads/2023/03/BPEA_Spring2023_Bistline-et-al_unembargoedUpdated.pdf

The standards are thus consistent with and are likely to strongly promote the competitiveness of U.S. industry, as well as the national security benefits that accompany such an outcome.

EPA notes that the beneficial impact of CAA standards on US global competitiveness has a long pedigree. We summarized these impacts in a retrospective study of the economic impacts of the CAA mandated by Congress.[510] We generally found that peer-reviewed studies show that the Act has been a good economic investment for America. Since 1970, cleaner air and a growing economy have gone hand in hand. The CAA has created market opportunities that have helped to inspire innovation in cleaner technologies – technologies in which the United States has become a global market leader. For example, in 2018, the US environmental technologies and services industry generated approximately $345 billion in revenues and exported goods and services worth $47.8 billion, larger than exports of sectors such as plastics and rubber products. Environmental technology exports help the U.S. balance of trade, generating a $26.9 billion surplus in 2015. Air pollution control equipment alone generated revenues of $18 billion in 2008, including exports of approximately $3 billion. The size of the world market for environmental goods and services - $1.12 trillion—is comparable to the aerospace and pharmaceutical industries and presents important opportunities for U.S. industry. The final rule continues this history of EPA's environmental regulations supporting US industry and global competitiveness.

In response to comments that the standards would result in greater dependence on imports, and/or bring about geopolitical or economic disadvantages associated with such dependency (such as for example increased trade deficits), EPA disagrees. EPA acknowledges that China, and to a significant degree other countries (such as South Korea, Japan, and Indonesia), have a strong market presence or hold a leadership position with respect to the supply chain for various battery component products and various mining and processing functions related to critical minerals. EPA notes that mineral resources of all types are unevenly distributed around the world, with some countries having more naturally occurring resources of some minerals than exist in others. Similarly, some countries have invested more heavily than others in developing the resources available to them and in other countries, while others have resources but either have not invested as heavily in developing them or have discontinued production, for economic or other reasons. Accordingly, a large portion of everyday international trade is represented by trade in minerals and related products, and in some cases these minerals must be traded among countries that differ politically or economically. The U.S. has long relied on critical minerals obtained from other countries through routine international trade. For example, ICE vehicles have long relied on imported mineral products, most notably crude oil or refined crude oil products such as gasoline or diesel, and critical minerals used in catalysts. Historically, supply and cost of crude oil products have periodically created significant uncertainty for the U.S. economy and national security. The critical minerals used in emission control catalysts of ICE products, such as cerium, palladium, platinum, and rhodium, historically have also posed uncertainty and risk regarding their reliable supply. Well in advance of emission control standards of the 1970s that were premised on use of those minerals for catalyst control of pollutants, these minerals were understood to be potentially scarce and costly and to rely largely on sourcing from countries with whom the U.S. had tenuous trade relations, such as Russia and

[510] See EPA, The Clean Air Act and the Economy, https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy; EPA, Benefits and Costs of the Clean Air Act 1990-2020, the Second Prospective Study, https://www.epa.gov/clean-air-act-overview/benefits-and-costs-clean-air-act-1990-2020-second-prospective-study.

South Africa.[511] In response, over time manufacturers have engineered emission control systems to reduce the amount of these minerals that are needed, but they continue to be scarce and costly today. In this sense, the need for building a reliable supply chain for the inputs required for PEV production is similar to the need already experienced by the ICE supply chain, although for a different set of inputs. While demand for critical minerals used in PEV batteries would likely increase as a result of the standards, not all of these minerals will be imported and many can increasingly be produced domestically or secured from FTA partners and economic allies over time. EPA has reviewed and agrees with the findings of the two 2024 ANL reports that consider the current state and future outlook for the supply chain with respect to cell manufacturing and critical minerals, materials and components.[512,513] Minerals that are in fact imported also become domestic products when the vehicles that use them are recycled and the minerals reclaimed. We also note that the amount and value of critical minerals residing in a PEV for its lifetime is significantly less than the amount and value of crude oil-based fuel consumed by an ICE vehicle during its lifetime. Although some commenters have noted that the U.S. is currently a net exporter of oil, the U.S. is still a large consumer of oil. Since the price of oil is set globally, the U.S. remains largely vulnerable to events such as price shocks that affect the global oil market. Regarding comments alleging that an increased trade deficit will result from increased PEV production, EPA disagrees. Commenter did not cite specific evidence or data to show that the economic value of imports associated with PEV manufacture would necessarily increase trade deficits. Further and as noted elsewhere, EPA notes that the rule provides regulatory and market certainty for production of PEVs and related products such as batteries, battery components, and critical minerals, thereby promoting the ability of the U.S. to export these products now and in the future, offsetting the effect the commenters claim.

In response to comments that EPA should consider the costs and risks to OEMs and technology suppliers in adapting supply chains to meet the standards, particularly with respect to PEVs, EPA does in fact consider the impact of its rulemakings on various segments of the industry, including suppliers. EPA has considered the significant activity, investment, and progress that is occurring in public and private contexts to prepare the manufacturing base for PEV production at the levels of penetration anticipated during the time frame of this rule. For example, among numerous other sources as described in section IV.C.7 of the preamble and Chapter 3 of the RIA, EPA has reviewed and considered the progress and investments outlined in the March 2024 ANL reports on battery manufacturing and critical materials.[514,515] EPA considers the broad and ongoing activities outlined there and in the preamble and RIA to represent an appropriate market response to the anticipated need to meet the standards.

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[511] U.S. Geological Survey, “Platinum Group Metals.” Accessed on January 27, 2024 at https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-platinum.pdf

[512] Argonne National Laboratory, “Quantification of Commercially Planned Battery Component Supply in North America through 2035,” ANL-24/14, March 2024.

[513] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials,” ANL-24/06, February 2024.

[514] Argonne National Laboratory, “Quantification of Commercially Planned Battery Component Supply in North America through 2035,” ANL-24/14, March 2024.

[515] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials,” ANL-24/06, February 2024.

In response to comments relating to potential for instability in future supply, future volatility in pricing, or resiliency of the supply chain to disruption, EPA has noted elsewhere that minerals and mining have a cyclical nature and are often characterized by changes in pricing and supply as with any other cyclical market. EPA has also noted that manufacturers typically are insulated to a significant degree from volatility in spot market prices by entering into long term supply contracts, and sees no reason to doubt, as AmFree asserts, that such contracts "will continue to be offered as the demand for a limited supply of critical minerals skyrockets over the coming years." Indeed, as AFPM has noted in their public comments (see RTC section 12), "most lithium contracts are written as long-term agreements," and also makes the claim that "spot markets for battery materials are virtually non-existent," which if true would suggest that contract arrangements are standard in the industry. Further, Jeremy Michalek et al. notes that the effect of material supply disruptions on "individual automakers, and whether they experience shortages in the short-run depends on a number of factors, including the specifics of contracts in their supply chains," going on to note that "material markets, battery manufacturers, and automakers tend to respond to disruptions," and also that the rule includes "a number of flexibilities such as credit borrowing" that can help address the potential for supply disruptions rather than result in an inability to produce PEVs to comply. EPA also notes comments from Institute for Policy Integrity noting that "ICE vehicles may be susceptible to similar risks as BEVs from supply shocks due to our reliance on foreign vehicles and vehicle parts," further noting that "one-fourth of the 15,000 to 30,000 parts making up an ICE vehicle are sourced globally," and that because "ICE vehicles have far more parts and moving parts than electric vehicles […] shortages of key inputs can cause production delays and shortages."

In response to comments that permitting reform and streamlining is needed to accelerate mining development in the U.S., EPA notes that efforts are continuing across the Administration and the Department of the Interior to investigate where permitting and mining development timelines can be improved.[516,517,518] The US also has tools available, including the FAST-41 program, to improve permitting timelines and transparency. The first critical minerals project to receive FAST-41 Coverage was announced in 2023.[519] See also the discussion in section IV.C.7.ii of the preamble.

In response to comments that assert that there will not be enough critical minerals for manufacturers to comply with the standards, EPA disagrees. EPA acknowledges and appreciates the extensive report on IRA-compliant mineral and active material production conducted by

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[516] Department of the Interior, "Recommendations to Improve Mining on Public Lands / Developed by the Biden-Harris Administration's Interagency Working Group on Mining Laws, Regulations, and Permitting," Final Report, September 2023. https://www.doi.gov/sites/doi.gov/files/mriwg-report-final-508.pdf

[517] The White House, "FACT SHEET: Biden-Harris Administration Releases Permitting Action Plan to Accelerate and Deliver Infrastructure Projects On Time, On Task, and On Budget," May 11, 2022. Accessed on March 5, 2024 at https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/11/fact-sheet-biden-harris-administration-releases-permitting-action-plan-to-accelerate-and-deliver-infrastructure-projects-on-time-on-task-and-on-budget/

[518] U.S. Department of the Interior, "Biden-Harris Administration Report Outlines Reforms Needed to Promote Responsible Mining on Public Lands," September 12, 2023. https://www.doi.gov/pressreleases/biden-harris-administration-report-outlines-reforms-needed-promote-responsible-mining

[519] Department of Transportation, Permitting Dashboard Office, "Permitting Council Moves to Designate the Critical Minerals Supply Chain as a FAST-41 Sector," Press Release, September 21, 2023. https://www.permits.performance.gov/fpisc-content/permitting-council-moves-designate-critical-minerals-supply-chain-fast-41-sector

Benchmark Minerals Intelligence at the request of the Alliance (the “Alliance/BMI Study”). EPA notes that the Alliance/BMI Study’s second scenario of 100 percent BEV penetration in 2035 is beyond the rulemaking time frame of 2032 and is in excess of projected penetrations for both the proposal and the final rulemaking. EPA also notes that the Alliance describes the Alliance/BMI Study as being concerned with two questions: “(1) What is the feasibility of achieving the two demand scenarios with global supply chains; and (2) What is the feasibility of achieving these two scenarios in a manner that is compliant with the IRA 30D sourcing requirements?” However, the Alliance/BMI Study appears to only provide contextual information for the first question, and quantitatively examines feasibility only for the second question, and thus the relevance of the quantitatively derived outlooks offered by BMI in this study pertain primarily to the limited context of 30D eligibility and not to production of PEVs in general. For example, EPA does not see evidence in the Alliance/BMI Study that, as the Alliance comment asserts, “There is some risk to meeting base case demand (about half of EPA’s projected demand) even with global supply chains,” which as stated implies that BMI has concluded that global supply from all sources would not be sufficient to meet US demand alone, whereas at the same time BMI does not appear to have quantified global supply but has focused only on IRA-compliant supply. Similarly and as a further example, EPA does not find evidence in the Alliance/BMI Study for commenter’s statement that “BMI forecasts lack of upstream mining and midstream processing and cathode/anode production capacity to supply the new battery factories with the necessary battery materials,” which inaccurately suggests that BMI is identifying a hard constraint that would prevent new battery plants from operating at capacity, when the statement clearly applies only to operation using only IRA compliant inputs. Given that the Alliance/BMI Study focuses on the outlook for IRA-compliant production and not total production potentially available to the U.S. market, like much of the other mineral forecast analyses EPA has examined, it fails to definitively identify and quantify specific and unavoidable constraints that would reasonably lead us to conclude that a lack of mineral availability will prevent manufacturers from meeting the standards. First, the study focuses on IRA-compliant production, and the conclusions thus reached apply only to production of PEVs that qualify for IRC 30D and should not be misunderstood as suggesting a similar limit on production of PEVs that can contribute to compliance with the standards. That is, while domestically or FTA-sourced, non-FEOC[520] mineral content is relevant to eligibility for the 30D clean vehicle tax credit, 30D eligibility is not required for a vehicle to enter the domestic fleet and contribute to compliance with the standards. EPA thus disagrees with and finds potentially misleading the commenter’s assertion that “U.S. battery cell manufacturing and ZEV objectives are potentially limited to 15% passenger EV penetration by 2030 vs. a policy driven target of 50% for the same year,” because this statement fails to note that the cited percentage, if correct, would relate only to the fleet penetration of PEVs that are eligible for the 30D tax incentive and not to the total penetration of PEVs that can be produced and enter the fleet. To the degree that the commenter implies that 30D eligibility is an important factor in helping vehicles enter the fleet, the commenter has not considered the role of the 45W commercial clean vehicle credit in providing a similar advantage to lessees of vehicles whether or not they qualify for 30D. Second, EPA has elsewhere noted the robust rate of private investments, mining exploration, recent announcements of lithium and other mineral resource discoveries, government development programs, and other industry activity that the proposal and the updated analysis shows are already underway and are continuing. For example,

[520] FTA = free trade agreement. FEOC = foreign entity of concern, a designation used in the IRA to disqualify certain sources of content from qualifying for some tax credits.

see the discussion in preamble IV.C.7 where we review numerous sources including the February and March 2024 ANL reports that examine these issues.[521,522] EPA also notes the 45X tax credit under the IRA which provides an incentive equal to 10 percent of the production cost of critical minerals and electrode active materials in the U.S. Taken together, the totality of information in the public record continues to indicate that development of the critical mineral supply chain is proceeding both domestically and globally in a manner that supports the industry's compliance with the final standards, and that the likely rate of development of the domestic and global supply chain and forecast availability of critical minerals on the global market are consistent with the final standards being met at a reasonable cost. Further, as we have noted elsewhere, the central case of our updated analysis shows that the final standards can be met with significantly less demand for critical minerals than under the central case of the proposal, and we also provide sensitivity cases and other examples that show that the standards can be met with lower levels of BEV technology and thus lower mineral demand (see Sections I.B.1, IV.F and IV.G of the preamble and Chapter 12 of the RIA).

Regarding the Alliance's claim that "BMI forecasts North America will only be able to domestically fulfill 3.5% and 3.4% of its domestic cathode and anode demands," EPA does not find that the cited reference supports this claim. The percentages shown in the cited Figure 11 of the comment do not appear to agree with the percentages of 3.5% and 3.4% in the text, and the caption of the cited Figure appears to indicate that it depicts the percentage of global battery component supply that is provided by the U.S., and not the percentage of U.S. domestic demand that U.S. production can supply, as suggested by commenter.

In response to comments that allude to copper and aluminum posing issues similar to other critical minerals, particularly with regard to a potential shortage or that acquiring the amount of copper or aluminum needed to comply with the standards will expose the U.S. to national security risks, EPA disagrees with this view. A number of commenters suggested that demand for copper from grid development and expansion, the electric vehicle industry, charging stations, and the like would expose the U.S. to the possibility of shortages and the need to import increasing amounts of copper from hostile countries. Presently however, the majority of copper for domestic use is imported from Chile and Peru.[523] Neither country is a covered nation for purposes of the IRA, and so EPA does not regard either country as an insecure source of supply. Moreover, as documented for example in the comments of ZETA, the U.S. is developing significant copper resources; for example, cited are the currently operating Resolution Copper, Arizona project which has potential to supply up to 25 percent of the nation's copper demand, and the NewRange Copper Nickel project which commenter indicates could become one of the world's largest and lowest cost producing districts for copper, nickel, and platinum group metals. Similarly, a number of commenters suggested a potential shortage or risk exposure for aluminum due to rising demand from the sectors listed above. However, commenters have offered few specifics or references to support an impending shortage or show that demand cannot be met, and EPA sees no evidence of such a shortage; in fact, the price of aluminum has been in more or less

[521] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
[522] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials," ANL-24/06, February 2024.
[523] See Preamble to EPA Heavy-Duty Phase 3 rule, section II, Figure II-6.

continual decline since it reached its peak in April of 2022. According to one analyst, “The reason for this is simple: The available supply of primary aluminum is shrinking, but the demand for that aluminum is shrinking faster, leading to a relative oversupply in the market.”[524] The closing price of aluminum at the end of February 2024 continued this trend of trading in a narrow range.[525] The U.S. produces aluminum from both primary and secondary sources, and Canada, which is an FTA partner, is one of the largest aluminum exporters to the U.S.; about 90 percent of the aluminum produced in Canada is exported to the U.S.[526] EPA does not see evidence that availability of aluminum or copper will prevent the standards from being met or pose a risk to economic or national security. For discussion and responses to comments relating to the power sector and electrical grid, see section IV.C.5 of the preamble and RTC section 18.

In response to comments related to rare earths used on magnets for electric machines, EPA does not anticipate shortages or high prices in rare earth metals that would prevent compliance with the standards, as indicated by evidence of a gradually increasing but apparently stable price outlook for rare earths used in magnets, and a generally declining outlook for other rare earths, during the time frame of the rule.[527] EPA has reached similar conclusions regarding electrical steel, and we discuss the outlook for electrical steel in detail in section 12.2.3 of this Response to Comments document.

In response to comments expressing the view that IRC 30D-compliant critical mineral sourcing and processing will not grow fast enough to keep pace with increasing content thresholds for 30D eligibility, EPA agrees that the near term outlook for most critical minerals, except for lithium, does not suggest that IRA-compliant mineral content will be sufficient for every U.S. PEV to qualify for the full 30D credit, particularly in the near term.[528] However, this does not mean that there will not be a substantial portion of vehicles that do qualify. Further, EPA notes that 30D eligibility is only one factor that can contribute to facilitating manufacturers’ adoption of PEV technology, and that other factors are also influential. In particular, 45W is not subject to mineral sourcing requirements and can provide many manufacturers similar utility to 30D in terms of making their vehicles financially attractive to consumers, for example, when vehicles are purchased for commercial use including leasing to consumers. EPA also notes that the Department of Energy has performed an analysis that indicates a substantial amount of credit can be captured on average through vehicles that qualify for 30D and others that qualify for 45W.[529] We discuss this study in section IV.C.2 of the Preamble where we discuss our assumptions for IRA credits. It is also important to note that the 45X production tax credits for U.S. production of cells and modules are not subject to mineral sourcing requirements. 45X also includes a tax credit for 10 percent of the production cost of U.S.-made critical minerals and

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[524] Industrial Metal Service, “Aluminum Shortage 2023: Major Impacts and Alternative Options,” May 16, 2023. Accessed on March 10, 2024 at https://industrialmetalservice.com/metal-university/aluminum-shortage-2023/

[525] https://markets.businessinsider.com/commodities/aluminum-price. Accessed March 10, 2024.

[526] Government of Canada, “Steel and aluminum,” web page. Accessed on March 10, 2024 at https://www.international.gc.ca/trade-commerce/controls-controles/steel_alum-acier_alum.aspx?lang=eng

[527] Wood Mackenzie, “Global rare earths investment horizon outlook,” December 2023, p. 15 and 16 (filename: global-rare-earths-investment-horizon-outlook-q4-2023.pdf). Available to subscribers.

[528] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials,” ANL-24/06, February 2024.

[529] Department of Energy, "Estimating Federal Tax Incentives for Heavy Duty Electric Vehicle Infrastructure and for Acquiring Electric Vehicle Weighing Less than 14,000 pounds,” Memorandum, March 11, 2024..

electrode active materials. Thus 30D is only one component of an array of incentives that collectively facilitate manufacturers' ability to adopt PEV technology to comply with the standards.

Regarding comments that suggest that EPA has not considered the benefits of domestic production and the value of facilitating and accelerating such production, EPA disagrees. We have clearly acknowledged the importance of other government programs such as BIL, IRA, and the various funding mechanisms through DOE, among many others. These programs and mechanisms are discussed at length in RIA Chapter 3 and in IV.C.7 of the Preamble. For example, results thus far of many of these programs can be found in the March 2024 ANL reports[530,531] which are reviewed there.

In response to a comment about emission impacts of long distance transportation of minerals and components, the commenter has not offered evidence or data as to how the supplies needed for PEV production are any different from the supplies already transported for ICE vehicle production, or the products and merchandise that are already transported long distances for other purposes or for use in other products. It is no less likely that over time, the growth in domestic production capacity resulting from the increased demand and market certainty created by the standards will serve to reduce emissions from long-distance imports of such materials. EPA also notes that our mobile source emissions standards under Clean Air Act 202(a) are not based on life-cycle analysis. For response to comments relating to life-cycle analysis and emissions in other parts of the economy or the world, refer to RTC 19 where we discuss life cycle analysis.

Regarding comments alluding to child labor or other abuses said to take place in the supply chain for batteries, which appear to primarily refer to cobalt production in the Democratic Republic of Congo (DRC), EPA reiterates that manufacturers are continuing to reduce cobalt content, and proven battery chemistries that do not use cobalt such as lithium-iron phosphate are already in widespread use globally and are increasing their market share in the U.S. Further, although the DRC supplies about 70 percent of global cobalt production, only a relatively small portion of cobalt produced in the DRC (estimated variously at between 10 to 30 percent) is produced in artisanal and small-scale mines (ASM) that are associated with use of child labor.[532,533,534,535] Overall, the global share of cobalt believed to come from ASM sources is

[530] Argonne National Laboratory, "Quantification of Commercially Planned Battery Component Supply in North America through 2035," ANL-24/14, March 2024.
[531] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials," ANL-24/06, February 2024.
[532] Council on Foreign Relations, "Why Cobalt Mining in the DRC Needs Urgent Attention," October 29, 2020. Accessed on March 10, 2024 at https://www.cfr.org/blog/why-cobalt-mining-drc-needs-urgent-attention
[533] Cobalt Institute, "Cobalt Sourcing Responsibility," web page. Accessed on March 10, 2024 at https://www.cobaltinstitute.org/cobalt-sourcing-responsability/
[534] Umicore, "Responsible sourcing of cobalt," web page. Accessed on March 10, 2024 at https://www.umicore.com/en/newsroom/topics-of-interest/cobalt-sourcing/
[535] BMW Group, "Greater Transparency in Cobalt Mining," January 20, 2020. Accessed on March 10, 2024 at https://www.bmwgroup.com/en/news/general/2020/cobalt-mining.html

approximately 10 percent and is largely exported to China.[536,537] According to BMI, the share of ASM supply increases when prices are high, and in a May 2023 report stated that recent declines in cobalt prices had caused ASM supply to fall by "more than 50% from the peak."[538] Although business practices and standards for ethical conduct of suppliers in other countries are out of scope for this rulemaking, EPA notes that the Department of Labor operates the COTECCO project[539] which "works to address child labor in the Democratic Republic of the Congo's (DRC) cobalt supply chain, with a focus on artisanal and small-scale mining," supporting the development and implementation of "strategies to reduce child labor and improve working conditions in artisanal and small-scale mines, as well as in the broader cobalt supply chain."

Regarding comments from AFPM and AmFree related to declining mineral quality or ore quality, commenters have cited concepts that are well understood in the mining industry and have not provided data or evidence to indicate that declining quality will be a major factor in future mineral prices that is not already taken into account by forecasts of leading analyst firms. EPA's updated analysis uses estimates of future battery costs that incorporate mineral price forecasts from BMI, a respected analysis firm cited by many other commenters. Such forecasts are based on expert knowledge of the mining industry and consider a wide range of factors that are commonly expected to drive mineral prices in the future. Regarding the comment from John Graham that "mining specialists have dismissed such forecasts because of systematic errors in their methods," the cited reference[540] appears only to describe one analyst's opinion regarding the market consensus on lithium pricing specifically, and gives no indication that it represents the analyst's opinion about all analyst forecasts in general nor that such a position would be a commonly held view.

Regarding a comment from MEMA that EPA should "consider added costs for post-warranty battery pack replacement to the RIA to capture critical mineral demands resulting from second and third owners who may have to replace/repair aged batteries after buying a used BEV," EPA disagrees. See the responses to comments on battery replacement in RTC 12.2.5.

By means of our updated analysis and additional discussions and responses found in section IV.C.7 of the preamble, RIA Chapter 3 and elsewhere, we have addressed other topics raised by commenters, including but not limited to: the time necessary to permit and approve new mines, the need for investment to increase production of batteries and minerals, the role of China as a dominant player in the supply chain, the uneven distribution of minerals and processing facilities around the world, the availability of minerals and components from FTA nations and economic allies, the effect of lower mineral prices on future investment in mining, mineral quality, claims that government efforts and/or industry effort to build the supply chain or support PEVs are

[536] Gulley, A.L., "China, the Democratic Republic of the Congo, and artisanal cobalt mining from 2000 through 2020," PNAS Sustainability Science, v120 n6, June 20, 2023. https://doi.org/10.1073/pnas.2212037120.

[537] Id. "Artisanal production's share of world and DRC cobalt mine production peaked around 2008 at 18 to 23% and 40 to 53%, respectively, before trending down to 6 to 8% and 9 to 11% in 2020, respectively. Artisanal production was chiefly exported to China or processed within the DRC by Chinese firms."

[538] Cobalt Institute, "Cobalt Market Report 2022," p. 24, May 2023. Accessed on March 10, 2024 at https://www.cobaltinstitute.org/wp-content/uploads/2023/05/Cobalt-Market-Report-2022_final.pdf

[539] U.S. Department of Labor, "Combatting Child Labor in the Democratic Republic of the Congo's Cobalt Industry (COTECCO)," web page. Accessed on March 10, 2024 at https://www.dol.gov/agencies/ilab/combatting-child-labor-democratic-republic-congos-cobalt-industry-cotecco

[540] Fernley, M., "Battery Materials Review: 2022 Yearbook," February 2023, p. 21.

insufficient, growth in battery manufacturing, sensitivity of the supply chain to disruption, and mineral security, in addition to other specific topics addressed there and/or in this section.

For response to comments that battery recycling will not come online fast enough to help with critical mineral demand, or other topics relating to battery recycling, please see the next section. Comments related to the cost of electricity to manufacture batteries are addressed in RTC 12.2.1. Additional responses to topics relating to the supply chain, critical minerals, and mineral security may be found in section IV.C.7 of the preamble.

For response to portions of the cited comments that include references to the following topics, see the indicated RTC sections or related discussion in the preamble: inclusion of PHEVs in the analysis, RTC 12.2.4; critical minerals and IRA assumptions, RTC 12.4; electrical steel, RTC 12.2.3; life-cycle analysis and/or upstream or manufacturing emissions, RTC 3.1.5 and RTC 19; employment impacts, RTC 20; energy security, RTC 21; consumer choice, affordability, or aspects of EV utility, RTC 13; battery replacement, RTC 12.2.5; or other sections that correspond to a specific topic.

15.2 - Battery recycling

Comments by Organizations

Organization: Alliance for Automotive Innovation

Additionally, recycling will not be able to satisfy society's rising demand in the near term. The current small EV market share coupled with EV batteries' long lifespan (on average between 10- 20 years59) suggests that society will not likely be able to meet the rising demand for critical minerals through recycling. [EPA-HQ-OAR-2022-0829-0701, p. 42]

59 Moscaritolo, A. (2022, June 29). EV Batteries 101: Degradation, Lifespan, Warranties, and More. PCMAG. https://www.pcmag.com/news/ev-batteries-101-degradation-lifespan-warranties-and-more

F. Other Costs of Electric Vehicles

1. Battery Recycling

It is reassuring that the Biden administration has allocated $125 million for a DOE program to advance lithium-ion battery recycling.454 Without such a program, China may be the country best positioned globally to capture the lithium recycling business, as it already has one battery recycling plant in operation and plans to build several more overseas. In summary, for the next decade or so, the shift from recycling of engines and transmissions to the recycling of lithium ion batteries is expected to impose a net cost on the U.S. economy. That cost should be included in the final regulatory impact analysis in conjunction with estimates of how the cost of battery recycling might decline with appropriate supporting policies (e.g., R&D support). [EPA-HQ-OAR-2022-0829-0701, p. 292]

454 hsps://www.energy.gov/articles/biden-harris-administration-announces-192-million-advance-battery-recycling- technology

Organization: American Free Enterprise Chamber of Commerce (AmFree)

EPA asserts that the United States will be able to bolster supply significantly by recycling minerals from spent batteries that enter the domestic market. See 88 Fed. Reg. at 29,323–24. That hope is also misplaced, especially given the proposed rule's compressed timeline. Electric-vehicle batteries cannot be recy- cled until they are retired. According to the International Energy Agency, based on "the dates of expected retirement of EV fleets and their battery chemistry compositions," recycled minerals will be able to supply less than 1 percent of projected global demand for lithium, less than 1 percent of global projected de- mand for nickel, and only 2 percent of global projected demand for cobalt by 2030. Global Supply Chains at 60. And even if those numbers increase over time, many steps will need to be taken before American companies can effectively enter the recycling space. That includes establishing "protocol or industry best practices" on how to collect and transport spent batteries to a recycling center, navigating the "increasingly complex disassembly" process, and entering ear- lier phases of the manufacturing cycle where the recycled materials can actually be used. White House Report at 106, 109–11. "[W]ithout critical material re- fining and processing and battery manufacturing capacity, the captured mate- rials from recycling end-of-life batteries will be exported for processing at for- eign facilities and re-imported in the form of processed or manufactured prod- ucts." Id. at 111. [EPA-HQ-OAR-2022-0829-0683, pp. 40-41]

Organization: American Fuel & Petrochemical Manufacturers

EPA suggests that improvements in recycling rates and enhancing recovery technologies at mines will reduce the need to develop new critical mineral sources. But this statement is misplaced. Recycling technologies for EV batteries remain nascent and cannot scale at a rate fast enough to alleviate supply shortages in the timeframe of the Proposed Rule. Moreover, even if those technologies develop at a faster than expected pace and commercial scale facilities are constructed, there will not be enough batteries to recycle to make the slightest dent in the quantity of critical minerals needed to build out EPA's projected battery demand (see Section I.A.1 for discussion of lack of critical minerals for batteries). [EPA-HQ-OAR-2022-0829-0733, p. 39]

Another critical aspect of the Proposed Rule not comprehensively considered is that recycling of the battery and related electrical components of ZEVs is in a state of infancy and poses unique materials handling and safety challenges. EPA should consider the environmental profiles of both ZEVs and ICEVs in light of the production, operation, and disposal of the vehicle (its useful life). The following list provides just some of the electric battery disposal-related issues that are likely to impact the environment and need to be addressed by EPA in the Proposed Rule:

- Battery packs could contribute 250,000 metric tons of waste to landfills for every 1 million retired ZEVs.212 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

212 Kelleher Environmental, "Research Study on Reuse and Recycling of Batteries Employed in Electric Vehicles: The Technical, Environmental, Economic, Energy and Cost Implications of Reusing and Recycling EV Batteries", (September 2019) available at https://www.api.org/oil-and-natural-gas/wells-toconsumer/fuels-and-refining/fuels/vehicle-technology-studies.

- Less than five percent of Li-ion batteries, the most common batteries used in ZEVs, are currently being recycled "due in part to the complex technology of the batteries and cost of such recycling."213 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

213 Gavin Harper, Roberto Sommerville, et al., NATURE, "Recycling lithium-ion batteries from electric vehicles" (Jan. 21, 2020) available at https://www.nature.com/articles/s41586-019-1682-5.

- Economies of scale will play a major role in improving the economic viability of recycling, for which currently cost is the main bottleneck. Increasing collection and sorting rates is a critical starting point.214 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

214 IEA Report 2022

- The cathode is where most of the material value in a Li-ion battery is concentrated. Currently, there are numerous cathode chemistries being deployed. Each of these chemistries needs to be known, and then the appropriate method of recycling identified, which poses a challenge, as batteries pass through a global supply chain and all materials are not well tracked. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

- Lithium can be recovered from existing Li-ion recycling practices but is not economical at current lithium prices. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

- BMI forecasts that near-term recyclers are likely to use scrap material from the increasing number of gigafactories coming online versus used electric vehicle batteries. Scrap is anticipated to account for 78 percent of recyclable materials in 2025.215 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

215 Benchmark Minerals Intelligence, "Battery production scrap to be main source of recyclable material this decade" (Sept. 5, 2022) available at https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable-material-this-decade.

- In 2022, BMI expected over 30 gigawatt hours of process scrap to be available for recycling, growing ten-fold across the next decade. Loss rates vary by region and tend to be higher in earlier years of a gigafactory.216 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

216 Id.

- Many 'spent' EV batteries still have 70-80 percent of their capacity left, which is more than enough to be repurposed into other uses such as energy storage and other lower- cycle applications for approximately another 10 years.217 This will extend the time that batteries and raw materials remain in use and therefore increase the demand for virgin critical minerals. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

217 Pagliaro, M. and Meneguzzo, F., "Review Article: Lithium battery reusing and recycling: A circular economy insight," Heilyon 5: E01866 (June 15, 2019) available at https://doi.org/10.1016/j.heliyon.2019.e01866

- Clear guidance on repackaging, certification, standardization, and warranty liability of spent ZEV batteries would be needed to overcome safety and regulatory challenges reuse poses at scale.218 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

218 IEA Report 2022.

- Recycling ZEV batteries to recover high-value metals has not been proven to a commercial scale. The majority of analysts are aligned that recycling will not become an integral supplier of raw materials until the 2030s, and at that point, only will provide approximately 20 percent of demand.219 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

219 Benchmark Minerals Intelligence, supra at n. 105.

- Unlike ICEVs, EPA has recently stated that ZEV batteries may need to be handled as hazardous waste, further driving up the cost of such recycling efforts.220 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

220 Letter from Carolyn Hoskinson, Director, EPA Office of Resource Conservation and Recovery, "Lithium Battery Recycling Regulatory Status and Frequently Asked Questions," (May 24, 2023).

- Whether sufficient recycling capacity can be permitted and constructed to facilitate the Proposal. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

EPA must, therefore, conduct a full LCA to compare all environmental impacts to reasonably conclude that the Proposal will decrease environmental impacts rather than merely shift them. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

Organization: American Petroleum Institute (API)

V. Recycling of batteries and related electrical components is in its infancy.

Another critical aspect to be considered with this proposal is that recycling of the battery and related electrical components of BEVs are in a state of infancy and poses unique materials handling and safety challenges. The environmental profiles of both BEVs and ICEVs should be considered in light of the production, operation, and disposal of the vehicle (its useful life). Electric battery disposal-related issues are likely to impact the environment and need to be addressed in EPA's proposal: [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

- Battery packs could contribute 250,000 metric tons of waste to landfills for every 1 million retired BEVs.102 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

102 Kelleher Environmental. "Research Study on Reuse and Recycling of Batteries Employed in Electric Vehicles: The Technical, Environmental, Economic, Energy and Cost Implications of Reusing and Recycling EV Batteries." September 2019. https://www.api.org/oil-and-natural-gas/wells-toconsumer/fuels-and-refining/fuels/vehicle- technology-studies.

- Less than five percent of lithium-ion batteries, the most common batteries used in BEVs, are currently being recycled "due in part to the complex technology of the batteries and cost of such recycling."103 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

103 Harper, G., Sommerville, R., Kendrick, E. et al. Publisher Correction: "Recycling lithium-ion batteries from electric vehicles." Nature 578, E20 (2020). https://doi.org/10.1038/s41586-019-1862-3.

- Economies of scale will play a major role in improving the economic viability of recycling, which currently cost is the main bottleneck. Increasing collection and sorting rates is a critical starting point.104 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

104 International Energy Agency. "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report.

https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

- The cathode is where much of the material value in a Lithium-ion battery is concentrated. Currently, there are numerous cathode chemistries being deployed. Each of these chemistries needs to be known, and then the appropriate method of recycling identified, which poses a challenge, as batteries pass through a global supply chain and all materials are not well tracked. [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

- Lithium can be recovered from existing Lithium-ion recycling practices, but it is not economical at current lithium prices. Cobalt, one of the highest supply risk materials for BEV in the short- and medium-term, is currently being profitably recovered. [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

- Benchmark forecasts near-term recyclers are likely to use scrap material from the increasing number of gigafactories coming online versus used electric vehicle batteries. Scrap material is anticipated to account for 78 percent of recyclable materials in 2025.105 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

105 BMI (see Chart 8): https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source- of-recyclable-material-this-decade.

- In 2022, Benchmark expected over 30 gigawatt hours of process scrap to be available for recycling, growing ten-fold across the next decade. Loss rates vary by region and tend to be higher in earlier years of a gigafactory.106 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

106 BMI: https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable- material-this-decade.

- EV batteries are high-cycle batteries and are made to function for approximately 10 years, shorter time for a medium-duty vehicle. Many ‘spent’ EV batteries still have 70-80 percent of their capacity left, which is more than enough to be repurposed into other uses such as energy storage and other lower-cycle applications.107 This will extend the time that batteries and raw materials remain in use. [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

107 Engel, H., Hertzke, P., & Siccardo, G. (2019, April). Second-life EV batteries: The newest value pool in Energy Storage. McKinsey Center for Future Mobility.
https://www.mckinsey.com/~/media/McKinsey/Industries/Automotive%20and%20Assembly/Our%20Insights/Seco
nd%20life%20EV%20batteries%20The%20newest%20value%20pool%20in%20energy%20storage/Second-life-EV- batteries-The-newest-value-pool-in-energy-storage.pdf.

- Repurposing used EV batteries could generate significant value and help bring down the cost of residential and utility-scale energy storage to bring forth further penetration of renewable power to electricity grids. Initial trials are underway.108 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

108 “The Role of Critical Minerals in Clean Energy Transitions”, International Energy Agency World Energy Outlook Special Report. https://iea.blob.core.windows.net/assets/?d2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

- Clear guidance on repackaging, certification, standardization, and warranty liability of spent EV batteries would be needed to overcome safety and regulatory challenges reuse poses at scale.109 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

109 Ibid.

• Recycling BEV batteries to recover high-value metals has not been proven at commercial scale. Many analysts are aligned that recycling will not become an integral supplier of raw materials until the 2030s, and at that point, only will provide approximately 20 percent of demand.110 [EPA-HQ-OAR-2022-0829-0641, pp. 39-41]

110 BMI: https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable- material-this-decade.

Organization: Charles Gordon

The proposed rule is intended to lead to the more rapid electrification of automobiles. Five hundred million cars, each with 1000 pounds of batteries will result in 500 billion pounds of batteries. What unexpected consequences will be caused by the manufacture, use and disposal of 500 billion pounds of batteries. [EPA-HQ-OAR-2022-0829-0747, p. 7]

Organization: Delek US Holdings, Inc.

In reality, only five percent of lithium-ion batteries for BEVs are currently recycled.48 In contrast, 99% of lead-acid batteries are currently recycled.49 Despite recognizing the novel nature of lithium-ion battery recycling (as well as other critical minerals used for ZEVs), EPA's analysis falls short in examining the broader impacts of its proposal—on energy independence, national security, and emissions of criteria pollutants.50 [EPA-HQ-OAR-2022-0829-0527, p. 10]

48 Robert Rapier, FORBES, "Environmental Implications of Lead-Acid and Lithium-Ion Batteries" (Jan. 19, 2020), available at https://www.forbes.com/sites/rrapier/2020/01/19/environmental-implications-of-lead- acid-and-lithium-ion-batteries/?sh=67ec3fe57bf5.

49 Id.

50 Proposed Rule at 29,319, 29,323–24.

d. BEVs cannot be recycled at the same level of ICE-powered vehicles.

EPA asserts that "minerals become part of the vehicle and have the potential to be recovered and recycled."46 This not only ignores the recycling capabilities of lead-acid batteries used in ICE vehicles, but also the limited capabilities to recycle lithium-ion batteries. The Proposed Rule once again relies on vague predictions of the future to support its unrealistic standards. For example, EPA asserts that a "growing number of private companies are entering the battery recycling market," "manufacturers are already reaching agreements to use these recycled materials for domestic battery manufacturing."47 But this is hardly sufficient to support EPA's proposal to entirely overhaul the ICE vehicle market in as few as four to seven years. [EPA-HQ-OAR-2022-0829-0527, p. 10]

46 Proposed Rule at 29,323.

47 Id.

Organization: Environmental. and Public Health Organizations

3. Design for disassembly holds promise for battery recycling.

The battery design parameters listed in the Proposal, which EPA used to develop battery cost estimates, see 88 Fed. Reg. at 29299, do not include design for disassembly (Dfd), also referred to as design for recycling or design for reuse. Dfd involves factoring end-of-life into the design of the vehicle, meaning that the battery is designed to be taken apart so that cells and modules can be refurbished, reused, or replaced, or so that the battery can be more efficiently and safely disassembled for recycling. This disassembly is typically a difficult, lengthy, and therefore expensive process because Dfd is not included in the design phase.409 [EPA-HQ-OAR-2022-0829-0759, p. 151]

409 CalEPA, Lithium-ion car battery recycling advisory group report (2022), https://calepa.ca.gov/lithium-ion-car-battery-recycling-advisory-group/ (last accessed June 29, 2023).

As reuse and recycling becomes more prevalent and policies begin to require it, we expect that Dfd will also be more common. If Dfd occurs, more reuse, refurbishment and replacement will occur and batteries will have a longer lifespan, therefore reducing the amount of new batteries necessary for electrification.410 The disassembly of a battery from a vehicle and down to the cell level currently represents approximately a third of light-duty vehicle recycling costs in the United States.411 If Dfd occurs, this recycling cost will also decline, therefore leading to more prevalent recycling and greater availability of recycled supply. [EPA-HQ-OAR-2022-0829-0759, p. 151]

410 Michael S. Koroma, et al., Life cycle assessment of battery electric vehicles: Implications of future electricity mix and different battery end-of-life management, Sci Total Env. 20;831:154859 (2022), available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9171403/ (last accessed June 29, 2023).

411 See Jessica Dunn, et al., Electric vehicle lithium-ion battery recycled content standards for the US – targets, costs, and environmental impacts, Resources, Conservation and Recycling, 185, 106488, 0921-3449 (2022), at 6, Fig. 3, available at https://doi.org/10.1016/j.resconrec.2022.106488

Organization: International Council on Clean Transportation (ICCT)

Battery re-use and recycling will be important to limit unnecessary mining and domestically maintain critical materials needed for new batteries.28 Several automakers – BMW, Ford, Geely, General Motors, Honda, Hyundai-Kia, Stellantis, Tesla, and Toyota – have announced one or more battery recycling or repurposing project in the United States.29 Figure 2 shows draft ICCT estimates of how the installed U.S. recycling capacity as of 2022 and the announced 2030 capacity compares with the projections for end-of-life batteries that could become available for recycling in the U.S. It shows that the installed capacity in 2022 (76,000 tons) is sufficient to process end-of-life batteries up to the year 2035. When also considering the recycling plants announced as of 2022, bringing the total recycling capacity to 325,000 tons, sufficient capacity is available to recycle end-of-life batteries until 2039. After which, much more recycling capacity is needed as the mass of end-of-life batteries becoming available for recycling increases swiftly between 2030-2050. Not shown in this figure are the additional tons of material from battery production scrap that become available for recycling. [EPA-HQ-OAR-2022-0829-0569, pp. 10-11]

28 Tankou, A., Bieker, G., and Hall, D. (2023). Scaling up reuse and recycling of electric vehicle batteries: assessing challenges and policy approaches. International Council on Clean Transportation. https://theicct.org/publication/recycling-electric-vehicle-batteries-feb-23/

29 Shen, C., Fadhil, I., Yang, Z., Searle, S. (2023). The global automaker rating 2022: who is leading the transition to electric vehicles? International Council on Clean Transportation. https://theicct.org/publication/the-global-automaker-rating-2022-may23/

SEE ORIGNIAL COMMENT FOR Bar graph Figure 2. Estimates of installed battery recycling capacity (data circles) and mass of end-of-life electric vehicle batteries (bars) [EPA-HQ-OAR-2022-0829-0569, pp. 10-11]

Organization: MECA Clean Mobility

EPA should harmonize battery labeling requirements with ACC II to facilitate recycling.

MECA believes that mandated standardized battery labeling requirements to identify the chemistry and technology in the battery pack will facilitate in-use vehicle service and end-of-life battery recycling. Towards this goal, EPA should align battery labeling requirements with those required under California's ACC II light-duty regulation. We have previously noted that some important designations to consider on the label might include: cell type, chemistry, battery ratings (V, Ah, kWh etc.), and if any internal cooling or other fluids and hazardous materials are present within the battery pack to facilitate end-of-life handling. Such labeling will protect the environment, benefit repair, maintenance and recycling personnel as well as assist second life re-applications of automotive batteries and battery recycling. EPA could also consider incentive programs that support the implementation and continuous improvement of battery re-use and recycling and sustainable use of strategic battery materials. [EPA-HQ-OAR-2022-0829-0564, pp. 33-34]

Organization: MEMA, The Vehicle Suppliers Associated

MEMA urges:

- EPA to add battery recycling and disposal costs to the analysis as part of a sustainable BEV deployment to better address scarcity of critical minerals, provide a more resilient domestic supply chain, and over time reduce the added carbon impact of battery manufacturing and associated multi-national logistics. [EPA-HQ-OAR-2022-0829-0644, pp. 12-13]

Organization: Tesla, Inc.

EPA should also consider that recycling of battery material will play a vital role in alleviating some pressure on the need to develop new critical mineral resources. To that end, Tesla seeks to reduce its reliance on primary mined materials and contribute to a more positive environmental footprint through battery and cell recycling – including ensuring that none of our batteries (manufacturing scrap or fleet returns) go to landfills and deploying equipment to recycle 100% of on-site generated manufacturing scrap across manufacturing facilities. In comparison to BEV batteries, it should also be noted the energy source for ICE vehicles – fossil fuels used in combustion – is not recyclable. [EPA-HQ-OAR-2022-0829-0792, p. 36]

Organization: The Aluminum Association

Material Circularity in Support of Domestic Supply Chains is Crucial and Goes Well Beyond Batteries [EPA-HQ-OAR-2022-0829-0704, pp. 10-11]

EPA recognizes the importance of battery recycling in the proposed rule (88 FR 29323) and according to a recent study14, aluminum accounts for over 18% of the mass in a typical vehicle electric battery. Reclamation and recycling of this aluminum at battery end of life can serve as an important and needed feedstock for future battery and other raw material supply. Beyond batteries, EPA should build on the importance of reclamation and recycling to focus on additional components of the vehicle that can help support efficient vehicle development in the future, such as aluminum. Aluminum has long been recognized as a critical mineral and material for the low carbon economy of the future by agencies as varied as the USGS15, the Department of Commerce16, the Department of Defense17, and the Department of Energy18. Given this criticality and the fact that much of the primary (virgin) aluminum supply chain lies outside of the U.S. for such operations as bauxite mining, alumina refining, and smelting, domestic recycling is becoming increasingly important for the U.S. aluminum industry and its biggest consuming market, transportation applications. In addition to its supply chain value, recycling aluminum makes good environmental sense in that recycling aluminum is 95% less carbon intensive than producing primary aluminum from mined ore. Member companies, the Association itself, and automotive OEMS currently have a variety of active initiatives to keep pre-consumer scrap aluminum in closed loops for recycling and to reclaim more post-consumer scrap aluminum back into the supply chain at vehicle end of life. For example, Ford recycles as much as 20 million pounds of aluminum stamping scrap per month. This is equivalent to enough aluminum to build 30,000 F150 bodies every month19. Although these current initiatives are predominantly focused on vehicle structure and powertrain applications such as structural extrusions, body sheet, castings, and forgings, there is increasing recognition of the value of the aluminum in BEV batteries as well and the need to recycle that material at battery end of life. [EPA-HQ-OAR-2022-0829-0704, pp. 10-11]

14 The Key Minerals in an EV Battery, https://elements.visualcapitalist.com/the-key-minerals-in-an-ev-battery/ (Accessed June 23, 2023)

15 USGS Critical Minerals List, https://www.usgs.gov/news/national-news-release/interior-releases-2018s-final-list-35-minerals-deemed-critical-us (Accessed June 29, 2023)

16 U.S. Department of Commerce Critical Minerals Strategy, https://2017-2021.commerce.gov/sites/default/files/2020-01/Critical_Minerals_Strategy_Final.pdf (Accessed June 29, 2023)

17 Defense Logistics Agency Materials of Interest, https://www.dla.mil/Strategic-Materials/Materials/ (Accessed June 29, 2023)

18 U.S. DOE Critical Materials Assessment, https://www.energy.gov/sites/default/files/2023-05/2023-critical-materials-assessment.pdf (Accessed June 29, 2023)

19 Ford Recycles Enough Aluminum to Build 30,000 F150 Bodies Every Month, https://media.ford.com/content/fordmedia/fna/us/en/news/2016/04/22/ford-recycles-enough- aluminum-to-build-30000-f150-bodies.html (Accessed June 28, 2023)

Organization: Zero Emission Transportation Association (ZETA)

ii. Recycling

A key component for meeting the coming demand for EV batteries and critical minerals will be recycling existing batteries at their end-of-life (EOL). As shown in Figure 8, North American battery recycling capacity is growing rapidly and as it increases in the coming years, so too will available EOL battery feedstocks as EVs on the road today will approach the end of their useful life. [EPA-HQ-OAR-2022-0829-0638, pp. 41-43]

[See original comment for Figure 8. Battery recycling projects in North America (as of May 2023)]184 [EPA-HQ-OAR-2022-0829-0638, pp. 41-43]

184 “Battery Recycling in North America as of May 2023,” Battery-News.de, (May 5, 2023) accessed June 26, 2023 https://battery-news.de/index.php/2023/05/05/batterie-recycling-in-nordamerika/

In recognition of the potential solutions that battery recycling can provide, Congress required EPA under the Bipartisan Infrastructure Law to develop battery recycling best practices and battery labeling guidelines. Congress allocated $10 million and $15 million respectively to the agency to complete these tasks by September 30, 2026.185 While there will likely be more work needed, potentially through voluntary consensus standards bodies, a framework is beginning to take shape to ensure increased recycling capacity is built out in the coming years. [EPA-HQ-OAR-2022-0829-0638, pp. 41-43]

185 See Public Law 117-58

The global market for EV battery recycling alone is estimated to reach $17.1 billion by 2030.186 By 2025, Benchmark Minerals Intelligence forecasts that scrap will account for 78% of the pool of recyclable materials.187 This growth is largely driven by the growing number of EVs approaching EOL. The volume of EOL batteries from EVs and large storage applications is less than 2 GWh today but could reach 100 GWh by 2030 and 1.3 TWh by 2040.188 [EPA-HQ-OAR-2022-0829-0638, pp. 41-43]

186 “Battery Recycling Market Size, Share & Trends Analysis Report By Chemistry (Lithium-ion, Lead Acid, Nickel), By Application (Transportation, Industrial), By Region (Europe, Asia Pacific, North America), And Segment Forecasts, 2023 - 2030,” Grand View Research, (April 2023) https://www.grandviewresearch.com/industry-analysis/battery-recycling-market

187 “Benchmark Minerals: Battery production scrap will be the main source of recyclable material this decade,” (September 16, 2022) https://chargedevs.com/newswire/benchmark-minerals-battery-production-scrap-will-be-the-main-source-of-recycla ble-material-this-decade/

188 “The Role of Critical Minerals in Clean Energy Transitions - Reliable supply of minerals,” IEA, (2021) https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/reliable-supply-of-minerals

Below is a list of recently-announced investments in EV battery recycling, all of which will help support the transition to an electrified transportation sector: [EPA-HQ-OAR-2022-0829-0638, pp. 43-44]

- In October 2022, ZETA member Princeton NuEnergy Inc. (PNE) opened a new 500 t/a plant capable of direct recycling lithium-ion consumer electronics and EV batteries with its strategic partner, Wistron GreenTech in McKinney, Texas.189 This end-to-end facility ingests end of life batteries fully separating copper, aluminum, plastics, electrolyte, cathode and anode materials. Cathode materials are cleaned by surface etching with low-temperature plasma (LPAS™) and reformed into new cathode materials equivalent to OEM specifications that can be directly reused in battery production. The factory will be certified and commissioned in 2023. In April 2023, Princeton NuEnergy launched a US Department of Energy $12M R&D grant to expand and enhance PNE’s battery recycling production processes through ‘up-cycling’ of legacy spent cathode chemistries into newer formulations, scaling processes for direct recycling of anode materials, and enhancing recycling/reuse of all other battery components.190 [EPA-HQ-OAR-2022-0829-0638, pp. 43-44]

- In April 2023, ZETA member Redwood Materials announced a pair of partnerships to collect EOL battery feedstocks. This announcement builds on Redwood's announcement from November 2022 to recycle Panasonic's cell scrap and supply Panasonic with recycled copper foil and cathode active material.191 Rad Power Bikes will provide Redwood with e-bike batteries when they reach the end of their lifespan.192 Redwood and Volkswagen of America expanded their partnership to collect more EOL batteries from consumer electronics.193 Both announcements come following a historic announcement from the Department of Energy of a $2 billion conditional loan to Redwood to support its McCarran, NV recycling facility.194 At full production capacity, the McCarran project's anode copper foil and cathode active material output is anticipated to support the production of more than 1 million EVs per year. [EPA-HQ-OAR-2022-0829-0638, pp. 43-44]

- In May 2023, ZETA member Li-Cycle announced a partnership with Glencore to build a battery recycling hub in Portovesme, Italy, with construction expected to commence in late 2026 to early 2027. Once completed, the Portovesme Hub is expected to have processing capacity of up to 50,000 to 70,000 tons of black mass annually, or the equivalent of up to 36 GWh of lithium-ion batteries.195 [EPA-HQ-OAR-2022-0829-0638, pp. 43-44]

189 "Update: Princeton NuEnergy launches end-to-end LIB recycling production line," RecyclingToday, (October 25, 2022) https://www.recyclingtoday.com/news/princeton-nuenergy-launching-end-to-end-lib-recycling-production-line/

190 "Princeton Nuenergy teams up with scientists to improve its LIBs recycling technology," RecyclingToday, (April 3, 2023) https://recyclingtoday.com/news/princeton-nuenergy-teams-up-with-scientists-aided-by-doe-grant/

191 https://news.panasonic.com/global/press/en221115-4

192 "Rad Power Bikes links up with Redwood Materials for e-bike battery recycling," Verge, (April 24, 2023) https://www.theverge.com/2023/4/24/23695767/rad-power-bikes-redwood-materials-ebike-battery-recycle

193 "VW and Redwood want to turn your old laptops into EV batteries," TechCrunch+, (April 4, 2023) https://techcrunch.com/2023/04/04/vw-and-redwood-want-to-turn-your-old-laptops-into-ev-batteries/

194 "LPO Offers Conditional Commitment to Redwood Materials to Produce Critical Electric Vehicle Battery Components From Recycled Materials," U.S. Department of Energy, (February 9, 2023) https://www.energy.gov/lpo/articles/lpo-offers-conditional-commitment-redwood-materials-produce-critical-electric- vehicle

195 "Li-Cycle and Glencore unveil plans for recycling hub in Italy," Reuters, (May 9, 2023) https://www.reuters.com/business/sustainable-business/li-cycle-glencore-unveil-plans-recycling-hub-italy-2023-05-0 9/

EPA Summary and Response

EPA acknowledges and appreciates all of the comments relating to issues surrounding battery recycling. In general, comments in this topic area were concerned with the potential for lithium-ion automotive PEV batteries to be recycled, the possibility that the recycling industry will provide recycled minerals to the supply chain, and the rate at which recycling of these minerals will grow.

Some commenters expressed positive views of battery recycling as a potential source of minerals that could substantially reduce the need for imported minerals or expanded mining of virgin materials. For example, ICCT stated, “Battery re-use and recycling will be important to limit unnecessary mining and domestically maintain critical materials needed for new batteries,” and went on to cite several automakers that have announced battery recycling or repurposing projects in the U.S. Similarly, Tesla stated, “recycling of battery material will play a vital role in alleviating some pressure on the need to develop new critical mineral resources.” ZETA stated, “A key component for meeting the coming demand for EV batteries and critical minerals will be recycling existing batteries at their end-of-life.” Other commenters expressed skepticism that recycling could meet the future demand for minerals or could not grow fast enough to make a meaningful impact in at least the near term.

EPA acknowledges the many challenges that exist in building battery recycling infrastructure and in recycling batteries themselves. These challenges are well known throughout the industry and are being addressed by companies who are developing business models based on battery recycling. In discussing the potential for recycling to supplement importation or mining of new materials over time, EPA has not relied upon an expectation of any specific amount of future recycling in order to justify its standards, and has already acknowledged in the proposal, and in this final rule, that it will take time for the recycling stream of used PEV batteries to reach scale as increasing numbers of PEVs reach the end of their useful life. EPA notes that to the degree that second life use of batteries for applications such as grid storage may delay these batteries from entering the recycling stream, this would also imply that demand for new grid storage batteries would decline by a similar amount and therefore is unlikely to represent a net increase in mineral demand.

In response to comments that only less than 5 percent of lithium-ion batteries are currently recycled, EPA disagrees that this statistic is relevant to the prospect for future recycling rates of automotive lithium-ion batteries, as it is based on recycling rates of small batteries used in consumer electronics and similar products, which are not systematically collected for recycling due to their extreme diversity of form and product integration and their small size. The much larger size of PEV batteries facilitates the economics of collection and recycling. Additionally, given the long life spans of PEV batteries, mass retirements of PEV batteries are not expected in the immediate near term, which provides more time for the appropriate policy and infrastructure for recycling to be implemented and scaled. See also the discussion of commercial recycling initiatives and the CIRCULAR program as described in ANL’s March 2024 report on critical materials.[541]

In response to comments on the need for battery recycling and/or the current availability of recycling, or that batteries will be disposed of in landfills, EPA disagrees with comments suggesting that PEV batteries must be disposed of in landfills, that recycling is not being considered or planned for, or that they otherwise are not of value for reuse or recycling. Many companies are actively pursuing business models on the recycling of materials in batteries or the reapplication of modules and cells for other purposes. EPA notes the comment from ZETA that indicates, “The global market for EV battery recycling alone is estimated to reach $17.1 billion

[541] Argonne National Laboratory, "Securing Critical Materials for the U.S. Electric Vehicle Industry: A Landscape Assessment of Domestic and International Supply Chains for Five Key EV Battery Materials,” ANL-24/06, February 2024.

by 2030," which clearly suggests that battery recycling is being recognized as a promising area of investment. EPA also notes the comment from Tesla which cites the company's practice of "ensuring that none of our batteries (manufacturing scrap or fleet returns) go to landfills and deploying equipment to recycle 100% of on-site generated manufacturing scrap across manufacturing facilities." Currently, the growth and visibility of battery recycling companies has been limited due to the fact that there does not yet exist a sufficient rate of used automotive traction batteries being generated by the in-use vehicle fleet because most PEVs on the road today have not yet reached the end of their useful life. Second-life applications, in which cells, modules, or batteries from old vehicles are used in other applications such as stationary energy storage, are likely to create additional market demand for decommissioned vehicle batteries. Further, the Department of Energy has active research programs on lithium-ion battery recycling, for example, the ReCell Center[542] and the Federal Consortium for Advanced Batteries (FCAB).[543] The Bipartisan Infrastructure Law provides more than $7 billion to promote the supply chain for batteries,[544] including funding for battery processing and manufacturing research, battery recycling research, and for local governments to establish or enhance battery collection, recycling, and reprocessing programs. Based on EPA's understanding of battery recycling and the research and commercial activity and investments surrounding it, EPA assesses that it is incorrect and unfounded to conclude that EV batteries will not be recycled, and also specifically disagrees with various commenter's erroneous allusions to "500 billion pounds" of batteries or similar calculations of battery disposal that are incorrectly based on the assumption that no automotive lithium-ion batteries will be recycled.

In response to the Alliance suggestion that EPA does not acknowledge the net cost to the economy from "the shift from recycling of engines and transmission to the recycling of lithium-ion batteries," EPA disagrees with this characterization of how battery recycling will evolve, and also with the presumption that it will represent a net cost. EPA believes that the projected gradual increase in PEV penetration anticipated by the compliance analysis is unlikely to cause engine recyclers to be compelled to rapidly shift their business to battery recycling and thereby experience a cost of retooling or retraining. The vast majority of the existing fleet consists of vehicles with engines and transmissions, and during the time frame of the rule, as these vehicles continue to approach end of life they will continue to generate a continuous stream of engines and transmissions to be recycled; even if fewer new engines and transmissions are produced over time, these recycled metals will be used in other products. Over a longer term, the recycling of batteries and cells could as likely generate new entrants to the recycling industry, pursuing new business opportunities and creating new jobs and thus could generate a net benefit (for discussion of employment, see RTC Section 20). As to the potential difference in the value of materials recovered, this depends on the battery chemistry; although some chemistries have more valuable mineral content than others, all contain significant quantities of copper and aluminum. For

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542 Argonne National Laboratory, "DOE launches its first lithium-ion battery recycling R&D center: ReCell," February 15, 2019. Accessed on December 6, 2021 at https://www.anl.gov/article/doe-launches-its-first-lithiumion-battery-recycling-rd-center-recell

543 Federal Advanced Battery Consortium, "National Blueprint for Lithium Batteries 2021-2030," June 2021. Accessed on December 6, 2021 at https://www.energy.gov/sites/default/files/2021-06/FCAB%20National%20Blueprint%20Lithium%20Batteries%200621_0.pdf

544 Department of Energy Fact Sheet: "The Bipartisan Infrastructure Deal Will Deliver For American Workers, Families and Usher in the Clean Energy Future," November 9, 2021. Accessed on December 6, 2021 at https://www.energy.gov/articles/doe-fact-sheet-bipartisan-infrastructure-deal-will-deliver-american-workers-families-and-0

example, the Aluminum Association stated that "aluminum accounts for over 18% of the mass in a typical vehicle electric battery." Similarly, EPA does not agree with Alliance's comment that EPA should include in its regulatory impact analysis "estimates of how the cost of battery recycling might decline with appropriate supporting policies," as costs of this nature are outside the scope of the rule's technology cost analysis.

In response to comments that battery recycling is not growing fast enough to handle future recycling streams, EPA disagrees. We note ICCT's comment that "sufficient capacity is available to recycle end-of-life batteries until 2039," which is based on work cited in the comment and supports our assessment that the battery recycling industry is receiving an appropriate level of attention to be prepared with the technology and capacity to process the future influx of end-of-life batteries.

In response to comments that battery recycling is hindered by labeling and the diversity of chemistries, or that EPA should add battery labeling requirements to facilitate recycling, or related to design for disassembly, EPA has not yet determined how such requirements might fit within the scope of our authority under the Clean Air Act. EPA also notes that the Bipartisan Infrastructure Law included funding for EPA to develop battery recycling best practices and battery labeling guidelines, which we expect will improve this aspect of battery recycling and may serve much of the purpose that the commenters describe. We also note that design for disassembly is not included in our costing of batteries largely because of the difficulty in assigning any potential cost difference for this practice which is not widely incorporated today. In response to the AFPM's comment that EPA should "conduct a full LCA" or "consider the environmental profiles of both ZEVs and ICEVs in light of the production, operation, and disposal of the vehicle," these comments relate to life-cycle analysis for which comments are responded to in RTC 19.

In response to comments that EPA should "add battery recycling and disposal costs to the analysis," EPA disagrees that this is practical or appropriate. Batteries contain a large amount of recyclable materials that have market value, and no consensus has yet emerged to indicate that battery recycling will represent a net additional cost nor that batteries will incur a cost of disposal instead of being profitably recycled, and commenter has provided no new evidence.

Regarding various comments alluding to difficulties associated with recycling, e.g. allusion to a need for "clear guidance on repackaging, certification, standardization, and warranty liability", potential classification of used batteries as hazardous waste, transportation difficulties, and similar claims, EPA notes that commenters have not thus identified any difficulties that are not already widely acknowledged in the industry and therefore are not already being taken into account by the businesses, startups, and research initiatives that are currently working to advance the battery recycling industry. EPA also notes that it is aware of and is in the process of addressing some of the common concerns regarding recycling of lithium-ion batteries, including how universal waste handling requirements, hazardous waste recycling regulations, and other RCRA Subtitle C provisions apply to this waste stream.[545]

[545] U.S. Environmental Protection Agency, "Lithium Battery Recycling Regulatory Status and Frequently Asked Questions," Memorandum from Carolyn Hoskinson, Director of Office of Resource Conservation and Recovery, Office of Law and Emergency Management, to LCRD Division Directors Regions 1–10, May 24, 2023. Accessed on March 5, 2024 at https://rcrapublic.epa.gov/files/14957.pdf

16 - Battery durability and warranty

Comments by Organizations

Organization: Alliance for Automotive Innovation

B. Battery Durability Provisions

1. Battery Durability Monitoring and Performance Requirements

As described in Section III-F,326 EPA is proposing to incorporate new battery durability monitoring and performance requirements for light-duty BEVs and PHEVs, and battery durability monitoring requirements for Class 2b and 3 BEVs and PHEVs, beginning with MY 2027. [EPA-HQ-OAR-2022-0829-0701, pp. 218-219]

326 NPRM at 29283.

As an initial mater, we wish to point out that the battery durability requirements are beyond the scope of EPA's statutory authority as applied to BEVs. According to EPA, the Proposed Rule's battery durability and testing requirements are anchored in section 206 of the Clean Air Act, which authorizes EPA to "test, or require to be tested in such manner as [EPA] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer to determine whether such vehicle or engine conforms with the regulations prescribed under" [section 202]".327 By its plain terms, this provision authorizes testing requirements in order to confirm compliance with vehicle-specific emissions standards promulgated under section 202. But there are no such vehicle-specific standards for BEVs, which by their nature do not produce any emissions. To be clear, and as expressed elsewhere in this comment, Auto Innovators supports the fleetwide averaging approach of the Proposed Rule which has long been used by EPA under section 202. But the application of fleetwide averaging to BEVs is distinct from the imposition of vehicle-specific emissions standards for BEVs, which do not exist, and which would exceed EPA's authority given that section 202(a) allows EPA only to promulgate "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engine." Because there are no "standards applicable to the emission of any air pollutant from" BEVs under section 202(a), there can be no durability testing requirements for compliance with such standards under section 206. [EPA-HQ-OAR-2022-0829-0701, pp. 218-219]

327 42 U.S.C. § 7525(a)(1) (emphasis added).

That said, we do agree that monitors in conjunction with performance requirements are important tools when it comes to ensuring proper battery operations and maintaining adequate battery health. As is laid out in both the UNECE GTR No. 22 [328] as well as this proposed NPRM, Usable Battery Energy (UBE) has been chosen as the primary metric when measuring battery durability, with a State of Certified Energy (SOCE) monitor to verify the performance and overall capacity of the battery. [EPA-HQ-OAR-2022-0829-0701, pp. 218-219]

328 UNECE EVE GTR No. 22 -https://unece.org/transport/documents/2022/04/standards/un-gtr-no22-vehicle-battery-durability-electrified-vehicles

EPA also seeks comments on the potential to include a State of Certified Range (SOCR) monitor. As stated above, EPA does not have the authority to impose battery testing and durability requirements under the CAA. specific to the SOCR monitor, Auto Innovators does not support the use of an SOCR monitor given that calculating range on a large and standardized scale can result in false readings. Should EPA move forward with battery durability requirements, we agree with EPA's proposal to use an SOCE metric as opposed to an SOCR monitor. [EPA-HQ-OAR-2022-0829-0701, pp. 218-219]

2. SOH Harmonization

Under this current NPRM, EPA is proposing new battery durability performance requirements for all light-duty PHEV and BEV, battery health monitoring and in-use accuracy for all light-and medium-duty PHEVs and BEVs, as well as warranties for PHEVs, BEVs, and FCEVs. EPA included by reference the April 2022 version of UN GTR No. 22 and has aligned durability performance that requires 70% SOCE (5ys/62k mi) and 80% (8ys/100k mi). Additionally, this will require OEMs to provide battery health (SOCE) information visible to the customer, conduct annual large data collection of this information to verify compliance to the durability requirements, as well as conduct in-use customer vehicle testing verify monitor accuracy at low, mid, and high mileage intervals for each monitor family). Finally, EPA proposes to require a minimum warranty period for batteries and certain e-propulsion components of 8years/80k miles for all PHEV, BEV, and FCEV vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

By adopting UNECE GTR No. 22 by reference, EPA is introducing an SOH monitor based on SOCE, which differs from that in CARB's ACC II regulation. This difference will cause customer confusion and frustration with two different SOH monitors. One step to avoid such confusion would be for EPA to allow the display of the SOCE value to one decimal place, as is required by CARB's ACC II regulation, instead of to an integer as is in the NPRM. This would allow for compliance with ACC II, where SOCE display resolution requirements are based on SAE J1979-DA, in addition to being based on GTR No. 22. Furthermore, CARB provides an alternative display and accuracy from MY2027. We propose a similar method of early phase-in flexibility toward SOH display and accuracy to harmonize compliance between the NPRM and ACC II. [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

EPA's proposed in-use monitor accuracy verification would significantly increase test facility resources. Additionally, the GTR No.22 statistical approach to verification can require up to 16 vehicles per monitor family to be tested at each of the 3 mileage intervals. Also, the accuracy looks at a two-sided delta but there should only be a concern for OEM overpredicting the battery health. Any underprediction puts all the burden and risk of passing the durability requirements on the manufacturer. [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

The new battery durability requirements are tied to Tier 4 phase-in percentages regardless of "default" or "early" compliance paths for vehicles less than 6000 lbs. GVWR vehicles are required to phase-in 40% of vehicles in 2027MY. This is concerning given the long lead-times to implement customer facing information on vehicle systems. [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

If battery durability is required, it is important to align with global best practices (CARB should align as well) and harmonize with battery health monitor requirements. Additionally, we agree with EPA's SOCE health monitor that excludes the battery reserve. Virtual distance is fundamental to the V2X technologies such as vehicle-to-grid, vehicle-to-load, and vehicle-to-home to avoid concerns with meeting durability and warranty requirements. This will provide transparency to customers who use their vehicles for purposes other than propulsion and will help reduce OEM concerns over excessive V2X use. We recommend that the virtual distance be used in both the calculation of the durability mileage as well as the warranty mileage (i.e., durability/warranty miles = virtual miles + vehicle odometer miles). [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

We request that EPA align regulatory text in § 86.1815 (Battery-related requirements) to the preamble and replace the term “electric vehicles” with BEVs and PHEVs to ensure that durability and monitoring requirements apply to BEVs and PHEVS and not FCEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

Lastly, we are still unclear when it comes to a number of factors related to this proposal. As a result, we respectfully request clarification on the following: [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

-Are proposed durability and monitoring requirements tied to the Tier 4 phase-in per 86.1815? Is the same true for warranty? [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

-§ 86.1815 Battery-related requirements for electric vehicles and plug-in hybrid electric vehicles. Electric vehicles and plug-in hybrid electric vehicles must meet requirements related to batteries serving as a Rechargeable Energy Storage System from GTR No. 22 (incorporated by reference, see § 86.1). The requirements of this section apply starting in model year 2027 for vehicles at or below 6,000 pounds GVWR. These requirements apply vehicles above 6,000 pounds GVWR if they are certified to Tier 4 NMOG+NOX standards under § 86.1811–27, not later than model year 2030 [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

-If UNECE GTR No. 22 on-vehicle data parameters are required, how will this be harmonized with CARB ACC II? [EPA-HQ-OAR-2022-0829-0701, pp. 219-220]

3. Reserve Capacity Declaration Requirement

In the NPRM, EPA proposes requirements for battery durability that are applicable to BEVs and PHEVs. The requirements and general framework of the proposed battery durability program are largely identical to those outlined in GTR No. 22 [329] and broadly parallel the GTR in terms of the minimum performance requirements, as well as the hardware, monitoring and compliance requirements, the associated statistical methods and metrics that apply to determination of compliance, and criteria for establishing battery durability and monitor families. Our concerns regarding EPA’s authority for battery durability and warranty for BEVs are discussed elsewhere in these comments. [EPA-HQ-OAR-2022-0829-0701, pp. 220-221]

329 Id.

Automakers are committed to achieving full electrification and producing vehicles with a robust battery life. Strategies to achieve these battery durability standards may vary per automaker; however, one way to achieve them is to include a reserve battery capacity to be released throughout the course of a battery’s lifetime to supplement normal battery degradation. While EPA is not proposing a similar requirement, EPA requests comment on including a reserve capacity declaration requirement and use of reserve capacity information in calculating an SOCE or SOCR metric. We agree with EPA's decision to not include reserve capacity when determining battery durability and warranty. While there is additional battery capacity included in the vehicle, the energy itself is not accessible to the customer until the batteries hit a certain degradation. Therefore, we believe that a reserve capacity declaration requirement and the use of the reserve capacity information in calculating an SOCE or SOCR metric should not be required in this NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 220-221]

As a general principle, Auto Innovators supports the harmonization between EPA's Multipollutant NPRM and the UNECE GTR No. 22 as it pertains to battery durability minimum performance requirements. [EPA-HQ-OAR-2022-0829-0701, pp. 221-222]

7. IUVP Accuracy Check

We also have concerns over the In-Use Verification Program (IUVP) accuracy check that is outlined in the NPRM. EPA is proposing to implement an accuracy check for low, medium, and high mileage vehicles. Implementing and performing three different checks creates a large burden for manufacturers. Finding and locating acceptable vehicles poses a challenge in itself, let alone adding a third check point. Due to the unnecessary increase in test burden, we propose that EPA allow for a single IUVP accuracy check. [EPA-HQ-OAR-2022-0829-0701, pp. 223-224]

Under the NPRM, EPA is also requesting comment on the SOH calculation used as it pertains to measuring battery durability. Overall, we support the harmonization of CARB's ACCII standards when it comes to SOH calculations. For model years 2027 through 2028, we propose that EPA adopt CARB's standard of an 8% threshold. We agree with CARB that it is unnecessary to include a two-sided threshold. Protection from vehicle overestimation of SOH is all that is necessary under these circumstances. From model year 2029 and on, we also propose that EPA lower the threshold to 5%. This gives manufacturers the flexibility to be conservative on their estimations, while allowing the ability to adjust the threshold at a later time, if need be. We believe this is in the best interest of all parties involved. Underestimation puts the burden on OEMs by posing a risk of not hitting the 70% SOCE MPR. Therefore, we propose including this added flexibility. Furthermore, as the verification procedure for this is new, manufacturers need time to build up the knowledge to design and calibrate the monitoring function. This will require SOH data from vehicles that have been in use long enough to have significant battery degradation. A lower limit for model years 2027 and 2028, again, supports this requirement. [EPA-HQ-OAR-2022-0829-0701, pp. 223-224]

We do not believe an accuracy check should be required where there is no MPR to align with; therefore, we request that EPA not require an accuracy check for Medium Duty Vehicles and Class 2b and 3 vehicles due to the absence of an MPR. [EPA-HQ-OAR-2022-0829-0701, pp. 223-224]

C. III.F.3 Battery and Vehicle Component Warranty

1. BEV and PHEV Battery Warranty Requirements

In addition to the battery durability requirements outlined in this NPRM, EPA is also proposing a set of warranty requirements for both BEV and PHEV batteries, as well as associated electric powertrain components like inverters or electric machines.333 Historically, vehicle and vehicle part warranties are left to the respective OEMs to determine what is an appropriate agreement between the manufacturer and customer based on competition and vehicle durability. Therefore, it is our position that warranty requirements remain at the discretion of the individual OEMs. [EPA-HQ-OAR-2022-0829-0701, pp. 224-225]

333 NPRM at 29197.

2. Classification of Batteries as "Major Emission Control Components"

Utilizing the Administrator's authority mandated in Section 207(i)(1) of the CAA, EPA is proposing under this NPRM to designate high-voltage battery systems and associated powertrain components as "specified major emission control components," thus imposing a warranty period of eight years or 80,000 miles of use, whichever first occurs. Such a designation for BEVs, however, is entirely inconsistent with the statute. [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

Section 207(i)(2) enumerates a discrete list of items that qualify as "specified major emission control components," and authorizes the Administrator to designate "any other pollution control device or component" as such if certain conditions are met.334 But a BEV produces zero emissions from its battery and associated electric powertrain components. It follows that no device or component of a BEV could logically be a "pollution control device or component" that can be designated as a "specified major emission control component" under section 207(i)(2), because there are no emissions from the BEV to control.335 [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

334 42 U.S.C. § 7541(i)(2).

335 We acknowledge that this designation for PHEVs is more consistent with the statutory authorization, because the battery-electric power displaces use of the vehicle's ICE, controlling the PHEV's emissions.

The NPRM attempts to justify its counter-textual reasoning in the NPRM, but its reasoning cannot cure the fundamental legal flaw in its proposal. For instance, the NPRM claims that its "proposed warranty requirements would be equivalent to those that EPA has the authority to require and has historically applied to other specified major emission control-related components for ICE vehicles under EPA's light-duty vehicle regulations..."336 But this is a false equivalency, because ICE vehicles produce emissions, and a component in the vehicle designed to reduce those emissions (such as, for example, a catalytic converter or an electronic emissions control unit) can be considered a "major emission control component." The same cannot be said of any component of a BEV that produced no emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

336 NPRM at 29286.

Recognizing that BEVs do not have any emission themselves, the NPRM nonetheless argues that BEV batteries can be considered a major emissions control component to the extent that BEVs are used to displace ICE vehicles. This portion of the NPRM refers back to the battery durability requirements,337 which argues that a "loss of a large portion of the original driving range capability as the vehicle ages could reduce total lifetime mileage and the ability for electric miles to displace conventional miles traveled."338 Not only does this argument find no support in the statute, but it proves way too much. Just about any component on a BEV that helps it run or that is important to the consumer will impact the extent to which the BEV will continue to displace conventional miles traveled. For instance, a consumer may elect to not to drive their BEV if that vehicle's infotainment system fails completely, but that certainly would not make the infotainment system a "major emissions control component." Simply put, there is absolutely no basis in the CAA for EPA to impose any battery warranty requirements on BEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 225-226]

337 NPRM at 29286 – 87.

338 Id. At 29284

4. Virtual Mileage

As electric vehicles begin to account for an increasing share of new vehicles sold within the United States and globally, Vehicle to Everything (V2X) capabilities (which may include electric grid management and storage) will also grow in importance for the adoption and utilization of electric vehicles. Many BEVs and PHEVs on the road today already possess these bidirectional capabilities, and their use will only continue to become more prominent. Therefore, this technology (and other similar battery uses) needs to be accounted for in measuring a battery's usage and health. More Specifically, as these bidirectional vehicles grow in use, degradation of the battery continues as the power is extracted from the vehicle's traction batteries. As such, that particular use of the battery should be reflected in the overall measurement of the battery's usage and health. [EPA-HQ-OAR-2022-0829-0701, p. 227]

Subject to our concerns raised on EPA's authority for battery durability and warranty for BEVs, we have the following recommendations. We propose that V2X usage should be reflected on the vehicle through the inclusion of a "virtual mileage" metric, similar to a standard odometer. Additionally, we believe the respective "virtual mileage" should also be included in the battery durability standards, as it is in the GTR. In addition to the durability standard, we also propose that virtual mileage be tied to the warranty standard as it pertains to the overall mileage threshold. These provisions will give customers a more accurate understanding of their overall battery usage, as well as help ensure that these vehicles remain on the road across multiple owners. Lastly, as we understand that EPA is incorporating GTR No. 22 by reference,339 we would like to confirm that that "virtual mileage" is included in the battery durability standard with respect to the mileage threshold. In addition to the battery durability standard, we would like "virtual mileage" to be included as a part of the mileage threshold relating to the warranty standard. [EPA-HQ-OAR-2022-0829-0701, p. 227]

339 UNECE EVE GTR No. 22 -https://unece.org/transport/documents/2022/04/standards/un-gtr-no22-vehicle-battery-durability-electrified-vehiclesOrganization: American Fuel & Petrochemical Manufacturers

EPA's proposal may impose additional costs of economic risk to individuals and small business owners who will be asked to depend on increasingly expensive infrastructure necessary to provide on-the-go fuel.232 Durable and reliable EVs are therefore critical to ensuring that projected emissions reductions are achieved by this proposed program and costs of ownership are properly presented. EPA further states that it is proposing new battery durability requirements for light-duty and medium-duty ZEVs and PHEVs but this doesn't alter EPA's concession that it is relying on other programs, like California's, to implement battery durability and a suite of other customer assurance provisions to ensure customer demand.233 EPA should consider inclusion of durability requirements in this proposal as 150 miles of range for singular battery life and 24,000-mile range of use (or two years) are well below the period of use for a comparable ICEV with a full tank of fuel and will impact consumers as there is not enough data with these technologies. [EPA-HQ-OAR-2022-0829-0733, p. 51]

232 88 Fed. Reg. 4,296 (Jan. 24, 2023) (EPA Final Rule re Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards).

233 Proposed Rule at 29,284.

Organization: BMW of North America, LLC (BMW NA)

Another important topic is the deviating rule for battery durability, battery warranty and SOH monitoring of the NPRM, compared to LEV JV. BMW NA supports the general idea to give the customers trust in the battery technology via these rules. But two different rules, depending only on the place of registration in the US, will unnecessarily confuse the customers (e.g., while buying a used vehicle in another state) and present additional hurdles toward electrification. BMW NA recommends that a single national approach should be implemented, as proposed by AAI. [EPA-HQ-OAR-2022-0829-0677, p. 4]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Zero-Emission Vehicle Assurance Measures

Widespread adoption of ZEV technologies is critical to securing emission reductions for stabilizing the climate and protecting public health. In order for these vehicles to truly deliver these benefits, ZEV technologies must similarly have appropriate durability, warranty, and other assurance measures as the technologies in their conventional gasoline-fueled counterparts. Research shows that ZEVs with similar capabilities, including range, as conventional vehicles are used just as much as their conventional counterparts, and that the same factors influence the choice to use both kinds of vehicles. 50 Conversely, a lack of assurance measures for ZEVs leads to consumer uncertainty and lack of confidence. 51 U.S. EPA's rulemaking presents a key opportunity to establish approaches that can support consumers in making the choice to purchase ZEVs. Assurance measures for ZEVs and PHEVs that, in many cases, mirror requirements for conventional vehicles are integral to this process. [EPA-HQ-OAR-2022-0829-0780, pp. 38-39]

50 Debapriya Chakraborty, Scott Hardman, and Gil Tal, Integrating Plug-in Electric Vehicles (PEVs) into Household Fleets -Factors Influencing Miles Traveled by PEV Owners in California (Aug. 31, 2021) at 1–2, 33– 34, accessible at https://escholarship.org/uc/item/2214q937 (showing that electric vehicles travel a similar number of miles per year as conventional vehicles).

51 See, e.g., ACC II ISOR pp. 23, 70 and accompanying studies.

To ensure ZEVs used to comply with California's program are designed to meet consumers' needs similarly to their conventional counterparts and therefore capable of achieving and maintaining needed emission reductions, CARB adopted a suite of ZEV assurance measures. These assurance measures include: 52 [EPA-HQ-OAR-2022-0829-0780, pp. 38-39]

52 For additional detail on the ZEV Assurance Measures established under ACC II, see: ACC II ISOR pp. 69-89 and ACC II FSOR Appendix D: Summary of Comments to ZEV Assurance Measures and Agency Response.

[EPA-HQ-OAR-2022-0829-0780, pp. 38-39]

- Minimum electric range requirements for ZEVs and PHEVs.
- Durability standards based on a vehicle's certified electric range.

- Warranty requirements for batteries and propulsion-related parts.

- Data standardization and transparency, including on-board display of the battery state of health so that consumers can see the quality of their battery.

- Requirements for manufacturers to provide highly-capable convenience charging cords and equipping vehicles with standardized, direct current fast charging inlets.

- Requirements that repair information be released to independent repair shops.

- Requirements around battery labeling to ease dismantling and recycling.

[EPA-HQ-OAR-2022-0829-0780, pp. 38-39]

CARB recommends U.S. EPA adopt CARB’s suite of ZEV assurance measures. Full alignment at the national level with these standards would reduce complexity for manufacturers and consumers and help ensure a consistent ZEV ownership experience across the U.S. [EPA-HQ-OAR-2022-0829-0780, pp. 38-39]

CARB has included specific recommendations on several key assurance measures, including battery durability, warranty, and serviceability. In addition to adopting CARB’s ZEV assurance measures, CARB also recommends U.S. EPA adopt further on-vehicle charging standards and collect additional data to inform future ZEV consumer labels. [EPA-HQ-OAR-2022-0829-0780, pp. 38-39]

Durability

CARB commends U.S. EPA for proposing to establish battery durability requirements for BEVs and PHEVs. Durability requirements provide confidence that those vehicles will provide sufficient utility for consumers to use them and ensures the needed emissions reductions from ZEV technologies are fully achieved and maintained. Strong durability and warranty requirements also support a robust used ZEV market, which will help ensure all consumers can access these clean technologies. [EPA-HQ-OAR-2022-0829-0780, p. 39]

Durability Metric

As part of its ACC II rulemaking, CARB established minimum range requirements for ZEVs and PHEVs and requires vehicle range data at the time of certification using specified test procedures. For the 2026 through 2029 MYs, CARB’s durability provisions require vehicles in a test group to be designed to maintain 70 percent or more of the certified range for 10 years or 150,000 miles, whichever comes first. For 2030 and subsequent MYs, vehicles must be designed to maintain 80 percent of the certified range. The range metric captures the whole vehicle powertrain durability rather than the battery alone. [EPA-HQ-OAR-2022-0829-0780, p. 39]

U.S. EPA has proposed to establish a durability metric based solely on battery state of health (SOH). Under U.S. EPA’s approach, other powertrain-related components like drive motors or inverters could deteriorate such that they become less efficient and reduce driving range that is readily observable to the driver yet are outside the scope of a battery-only durability requirement. CARB recommends U.S. EPA instead adopt CARB’s durability provisions, including the tie to a vehicle’s certified range because it is a more meaningful and protective metric to consumers. [EPA-HQ-OAR-2022-0829-0780, p. 39]

Reserve Battery Capacity Disclosure

While CARB strongly supports the inclusion of durability and warranty provisions for ZEVs and PHEVs, CARB notes that the SOH metric as specified in U.S. EPA's proposal may be susceptible to manipulation and offers recommendations to help remedy these concerns. U.S. EPA's proposed SOH monitor requirement that estimates, monitors, and communicates the vehicle's state of certified energy (SOCE) does not provide explicit direction to manufacturers for some implementation approaches, most notably in cases where some portion of the battery capacity is held back "in reserve" early in life and gradually opened to counteract the actual degradation. Given that the SOCE would be the current usable battery energy (UBE) expressed as a percentage of the original UBE when the vehicle was new, manufacturers could potentially undermine the intent of the SOH parameter by reporting the health as 100 percent (or even a value greater than 100 percent) well into the degradation of the battery. Failing to include reserve battery capacity in the SOH calculation could limit the credibility of the SOH parameter and undermine its ability for vehicle owners to use it to validate warranty eligibility or to properly value used ZEVs based on the amount of degradation of the battery. 53 [EPA-HQ-OAR-2022-0829-0780, pp. 39-40]

53 See, e.g., ACC II ISOR, Appendix F-7, pp. 17-18. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/appf7.pdf.

As part of the ACC II ZEV assurance measures, CARB's required customer-accessible SOH monitor is used to determine if a vehicle's battery is meeting battery-specific warranty requirements. CARB requires that the SOH parameter be normalized to account for reserve UBE and ensure full transparency to consumers in degradation of the battery's ability to store energy, regardless of the manufacturer's implementation strategy. 54 To help ensure that the SOH metric is a true gauge of battery degradation, CARB urges U.S. EPA to explicitly require manufacturers to account for all the reserve UBE in the SOCE calculation. [EPA-HQ-OAR-2022-0829-0780, pp. 39-40]

54 Cal. Code. Regs., title 13, section 1962.5(c)(4)(A)4.d. For additional information on CARB's inclusion of battery state-of-health metrics in the ACC II rulemakings, see: ACC II ISOR pp. 71-72; ACC II ISOR, Appendix F-7, pp. 17-20; and Notice of Public Availability of Modified Text and Availability of Additional Documents and Information (July 12, 2022), Attachment I-1, pp. 2-3. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/atti1.pdf.

Warranty

Warranty requirements are another important element to give consumers confidence in purchasing ZEVs and PHEVs. While durability requirements have the effect of ensuring vehicles in a test group, in the aggregate, are designed to have minimal degradation or deterioration such that they will meet or exceed a performance standard over the useful life period, they do not provide assurance that each individual vehicle will be free from defects or other failures. The purpose of warranty requirements, on the other hand, is to protect against individual vehicles experiencing failures or defects early in the life of the vehicle. A test group on track to meet the durability standard does not necessarily mean that there will not be individual vehicles that experience failures or defects. Likewise, individual vehicles experiencing a failure or defect does not necessarily mean that the test group as a whole will fail to meet the durability standard. [EPA-HQ-OAR-2022-0829-0780, p. 40]

In recognition of this need, CARB established warranty requirements for ZEVs and PHEVs, which are split into two parts: 1) battery warranty, which applies to BEVs and PHEVs, and 2) propulsion-related parts warranty, which applies to BEVs and FCEVs. These provisions largely track similar requirements for conventional vehicles. CARB recommends U.S. EPA adopt CARB's warranty provisions and offers specific recommendations to strengthen U.S. EPA's proposal. [EPA-HQ-OAR-2022-0829-0780, p. 40]

Battery Warranty

In order to make the warranty useful for vehicle owners, it must be tied to a meaningful and transparent metric. Internal combustion engine vehicles today are equipped with complex on-board diagnostic systems with consumer-facing warning lights that provide a clear tell-tale to the owner when a component failure has occurred at a specified level defined by CARB's onboard diagnostic requirements. Tying battery warranty to a meaningful metric is fundamental to ensuring drivers are aware of early and unexpected battery degradation and can then pursue the necessary repair. [EPA-HQ-OAR-2022-0829-0780, pp. 40-41]

CARB established its battery warranty requirements based on battery SOH. For the 2026 through 2030 MYs, CARB established an 8-year or 100,000-mile warranty for any battery that falls below 70 percent of the SOH. Beginning with the 2031 MY, the warranted SOH increases to 75 percent. While CARB commends U.S. EPA for explicitly tying battery warranty requirements to the battery durability metric, as included in the draft regulatory language in proposed 40 CFR § 85.2103(c), CARB recommends U.S. EPA implement changes to its SOH metric as CARB recommends above so that U.S. EPA's battery warranty provision would be similar to CARB's, differing only on the timeframes. [EPA-HQ-OAR-2022-0829-0780, pp. 40-41]

Propulsion-Related Parts Warranty

Non-battery propulsion-related components, such as the on-board charger, the electric motors, inverters, and battery management system, are not expected to degrade like batteries on BEVs. However, failure of such components can have detrimental effects on the efficiency, performance, range, or drivability of the ZEV and thus the ability of ZEVs to achieve and maintain their emission reductions over time if they are not warranted like their conventional vehicle counterparts. [EPA-HQ-OAR-2022-0829-0780, pp. 41-42]

CARB requires that manufacturers provide a warranty for BEVs and FCEVs, consistent with what conventional gasoline vehicles are subject to, for a minimum of 3 years or 50,000 miles, whichever occurs first (or 7 years or 70,000 miles for high-priced parts) for all propulsion-related (powertrain) components, excluding the traction battery. Under CARB's requirements, the applicable ZEV components must be warranted to be "free from defects in materials and workmanship that would cause a propulsion-related part to fail to be identical in all material respects to the part as it was described in the vehicle manufacturer's application for certification…" 55 That requirement mirrors the defects warranty conventional vehicles are subject to and helps ensure consumer confidence in ZEV technologies. [EPA-HQ-OAR-2022-0829-0780, pp. 41-42]

55 Cal. Code Regs, title 13, section 1962.8(c)(1)(B).

While CARB commends U.S. EPA for tying its battery warranty to the battery SOH metric, U.S. EPA's proposal appears to mistakenly tie all non-battery powertrain components to this same battery durability performance requirement when defining failures that merit warranty replacement. Such a connection renders the warranty requirements meaningless for those components. For example, there are no failures or degradation of electric drive motors that would reduce the amount of energy the battery can store (which is the metric used for the battery durability performance requirement). Effectively, this means warranty coverage as proposed would apply only to the battery despite the explicit reference in draft language that includes other ZEV powertrain-related components as subject to warranty. Further, even the basic 2-year and 24,000-mile emission warranty appears to cover only failures that involve exceeding the emission limits of applicable standards. Though failures of powertrain-related components impact the ability of ZEVs to achieve and maintain their emission reductions over time, as noted above, if they are not warranted like their conventional vehicle counterparts, this provision as drafted would not trigger warranty coverage for ZEV powertrain-related components as no failure of those components can cause the vehicle to emit emissions directly. [EPA-HQ-OAR-2022-0829-0780, pp. 41-42]

Therefore, CARB recommends that U.S. EPA adopt an appropriate failure metric(s) for warranty coverage for non-battery components. Ensuring warranty coverage for ZEVs that is comparable to conventional vehicles is critical to protect consumers and achieve and maintain the emission benefits from ZEV technologies. [EPA-HQ-OAR-2022-0829-0780, pp. 41-42]

Organization: Coalition for Safe Autonomous Vehicles and Electrification (SAVE)

From the perspective of our members' unique ownership and business models, there are two areas for which we request additional consideration: (1) the proposal to require a State of Certified Energy (SOCE) monitor that communicates the SOCE of the battery via a "customer-accessible display"; and (2) the proposed sampling requirements for SOCE monitor accuracy testing. [EPA-HQ-OAR-2022-0829-0608, p. 2]

First, with respect to the SOCE monitor, we surmise that the purpose of the proposed "customer-accessible display" requirement is to provide information to the vehicle owner and any potential future owner of the vehicle. We understand this information may bolster consumer confidence in Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) generally and provide specific benefit to purchasers of used BEVs and PHEVs by providing information about the state of the battery health. Because AV-EVs are fully autonomous, not capable of operation by a human driver, and owned for their useful life by the manufacturer, providing a "customer-accessible" SOCE monitor serves no benefit to customers (e.g., users of robotaxi or delivery services). One of the goals of AV-EVs is to deliver a service to customers without the burdens that come with vehicle ownership, like maintenance. Because our members are solely responsible for the servicing of our vehicles, customers can simply focus on getting themselves or their goods from point A to point B. To support EPA's goal while not unduly burdening fleet ownership models we recommend revising proposed § 86.1815(a) to maintain the language in Global Technical Regulation 22 that the monitor be available to the owner of the vehicle rather than the customer as specified in the proposed EPA regulation. [EPA-HQ-OAR-2022-0829-0608, p. 2]

Additionally, proposed § 86.1815(a) is currently written such that the customer-accessible display must monitor, estimate, and communicate the SOCE. Typically, the parameters informing the SOCE would be monitored and estimated within the Battery Management System (BMS) or a similar electronic control unit (ECU) or combination of ECUs, which often does not have a display associated with it. The SOCE estimate would then be communicated to a customer-accessible display. To improve the clarity of this requirement, we suggest the first sentence of § 86.1815(a) should be modified to read: [EPA-HQ-OAR-2022-0829-0608, p. 2]

"Manufacturers must install a system that monitors, estimates, and communicates the vehicle's State of Certified Energy (SOCE) and include information in the application for certification as described in § 86.1844. The estimate of SOCE must be made available on an owner-accessible display." [EPA-HQ-OAR-2022-0829-0608, p. 2]

Second, with respect to the proposed requirements for battery durability monitoring and sampling, we recognize the importance of ensuring battery longevity for EVs to ensure their viability as a desirable alternative to non-EVs. The SAVE Coalition, therefore, supports the goal of the proposed regulation, i.e., to assure a sufficient useful life of an EV and a robust secondary market for used EVs to enable the realization of fleet electrification and the corresponding public health benefits. In order to prove the SOCE monitor can accurately estimate the battery durability for a given monitor group in all relevant conditions, we understand that sampling of vehicles in diverse geographic and climatological locations and operating characteristics (See § 86.1815(f)(2)) is being required. However, such sampling may be difficult, if not impossible, for AV-EVs at least in the near term. [EPA-HQ-OAR-2022-0829-0608, pp. 2-3]

Fully autonomous vehicles operating on public roads today are only capable of operation in specific geographic regions or operational design domains (ODDs). These ODDs may be limited in terms of physical location or geofence, road types, vehicle speed, meteorological conditions, and other factors. Unlike privately owned vehicles, AVs are not deployed at random across the United States and will not necessarily be exposed to the wide variety of roads, speeds, and weather. The number of AV-EVs being operated on public roads is currently limited. But even as the industry scales, these vehicles may be deployed to a single city for the duration of their life or may move between cities over their lifetime. Further, many, if not all, AV-EVs will be recycled upon completion of their useful life, and will not be offered in the secondary market. Given the unique operation of AV-EVs, we request that EPA provide more flexibility in the sampling requirements to account for vehicles that are tightly controlled and only operated in specific parts of the United States. [EPA-HQ-OAR-2022-0829-0608, pp. 2-3]

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

-We encourage EPA to coordinate its EV battery durability and warranty requirements with the maintenance and durability requirements of the ACC II program to the greatest extent possible. These provisions are critical for ensuring consumer confidence in the performance and durability of EVs in the new and used market, and alignment to the greatest extent possible can help avoid confusion for consumers, dealers, and other key stakeholders. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

Organization: Consumer Reports (CR)

7. CR Supports Strong Consumer Protections for Batteries

CR appreciates the EPA's inclusion of provisions in the rule that would require consumer protections for batteries in EVs sold beginning in model year 2027 and beyond. When a consumer goes through the process of purchasing a new vehicle for their household, there is an expectation that their vehicle will maintain condition and reliability throughout its useful life. For consumers purchasing a zero-emission vehicle, these concerns can be exacerbated based on their lack of experience with the technology and the lower general knowledge of EV technology compared to ICE vehicles, which consumers have had to deal with for decades. While existing data on EVs has found that battery failures are usually rare, it is critical that EPA maintains strong consumer protections to give customers continued peace of mind that the vehicle they purchase will operate as advertised throughout its lifespan.48 [EPA-HQ-OAR-2022-0829-0728, pp. 23-25]

48 New Study: How Long Do Electric Car Batteries Last?, Recurrent, 2023, https://www.recurrentauto.com/research/how-long-do-ev-batteries-last.

These provisions are especially important for consumers in the secondary vehicle market. Used cars make up about 70% of sales in the automotive market.49 Further, lower income consumers are especially price sensitive to transportation costs and spend a disproportionate amount of their income on transportation.50 As more EVs enter the secondary market in the coming years, it is imperative that consumers have protections against poorly designed or manufactured batteries that diminish in capacity or fail early. The most vulnerable populations at the forefront of climate and air quality hazards need consumer protections addressing the lifetime of the vehicle, its battery, and its reparability. [EPA-HQ-OAR-2022-0829-0728, pp. 23-25]

49 In 2022 there were 36.2 million used cars and 13.7 new cars sold, so 73% of vehicles sold were used cars in 2022. This number fluctuates from year to year, but tends to stay around 70% give or take a few percentage points. Sales data from AutoNews and NADA: https://www.autonews.com/used-cars/used-car-volume-hits-lowest-mark-nearly-decade and https://www.nada.org/nada/press-releases/nada-issues-analysis-2022-auto-sales-and-2023-sales-forecas t

50 High Cost of Transportation in the United States, Institute for Transportation and Development Policy, May 2019, https://www.itdp.org/2019/05/23/high-cost-transportation-united-states/.

Additionally, while the cost of producing batteries continues to drop, the battery is still the most expensive part of an electric vehicle.51 When shifting from gasoline to electricity, it is the battery that enables the electric vehicle to eliminate tailpipe pollution and reduce greenhouse gas and other pollutants. Therefore, reduced capacity or complete failure of the battery pack represent a significant risk to emissions reductions given the potentially high cost of a replacement. Strong corresponding consumer protections regarding durability, battery health and warranties are therefore critical to the emissions and economic success of EPA's multipollutant program. [EPA-HQ-OAR-2022-0829-0728, pp. 23-25]

51 Batteries For Electric Cars Speed Toward a Tipping Point, Bloomberg, December 2020, https://www.bloomberg.com/news/articles/2020-12-16/electric-cars-are-about-to-be-as-cheap-as-gas-powered-models#xj4y7vzkg.

EPA's proposal that new EVs and PHEVs maintain minimum performance requirements for vehicle's state of certified energy (SOCE) beginning at 80% SOCE for the first five years (or

62,000 miles) and 70% SOCE for eight years (or 100,000 miles) will give consumers greater trust that their batteries will maintain a reliable state of health standard for the useful life of the vehicle. CR also appreciates EPA's inclusion of warranty provisions that cover the battery, and associated electric powertrain components of the vehicle, for eight years (or 80,000 miles.) [EPA-HQ-OAR-2022-0829-0728, pp. 23-25]

With the increased requirements surrounding battery health, it is imperative that consumers have the ability to monitor their battery's individual performance levels. CR appreciates the inclusion of language requiring accessible battery state-of-health monitors for light-duty vehicles in addition to provisions for strong testing procedures to confirm the accuracy of these monitors. Easily accessible and reliable battery state-of-health data will go a long way towards supporting a thriving used EV market. [EPA-HQ-OAR-2022-0829-0728, pp. 23-25]

CR urges the EPA to consider additional standards for vehicle batteries to maintain a strong state of certified range (SOCR) aligned with the California Air Resources Board's (CARB) Advanced Clean Cars II (ACC II) rule which requires that new vehicles sold maintain up to 80% certified range for 10 years (or 150,000 miles) to ensure consistent range-durability standards across states. [EPA-HQ-OAR-2022-0829-0728, pp. 23-25]

Organization: Dana Incorporated

ePowertrain Warranty

Under CAA section 207, manufacturers are required to provide emission-related warranties. CAA section 207(i) specifies that the warranty period for light-duty vehicles is 2 years or 24,000 miles of use (whichever first occurs), except for specified major emission control components, for which the warranty period is 8 years or 80,000 miles of use (whichever first occurs). As a supplier of ePropulsion and ePowertrain systems for light- and medium-duty vehicles, Dana supports EPA's proposal to consider the high-voltage battery serving as a renewable energy storage system for light- and medium-duty EVs and PHEVs, along with related powertrain components, as specified major emissions control components subject to a warranty requirement of 8 years/ 80,000 miles. Dana would welcome the opportunity to discuss with EPA which related powertrain components are included in this proposal. [EPA-HQ-OAR-2022-0829-0538, p. 2]

Organization: Environmental. and Public Health Organizations

X. EPA Should Adopt the Proposed Durability and Warranty Requirements, But Should Also Require State-of-Certified Range Monitors.

We urge EPA to adopt the proposed PEV durability and warranty requirements. 88 Fed.

Reg. at 29283-87. As EPA explains, the calculation of emission credits for PEVs is based on attributed mileage over their useful life. 88 Fed. Reg. at 29283. In addition to helping ensure that PEVs will in fact achieve the projected emission reductions throughout their useful lives, the warranty and durability requirements will enhance consumer confidence in PEVs and promote their faster adoption among purchasers, leading to greater air quality benefits. [EPA-HQ-OAR-2022-0829-0759, p. 90]

EPA's authority to adopt the proposed durability requirements is grounded in Section 206 of the Clean Air Act, which (read in conjunction with Section 203) provides that before introducing a new motor vehicle into commerce, a manufacturer must obtain an EPA "certificate of conformity" indicating that the vehicle complies with applicable emission standards promulgated under Section 202. 42 U.S.C. § 7525(a)(1); 42 U.S.C. § 7522(a)(1). Section 202(a)(1), in turn, requires vehicles to achieve compliance with standards throughout their "useful life," "whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution." 42 U.S.C. § 7521(a)(1). Section 206 also provides that EPA may condition the certificate of conformity "upon such terms…as [it] may prescribe." 42 U.S.C. § 7525(a)(1). The statute thus confers broad authority on EPA to ensure that PEVs (like any other motor vehicle) in fact achieve the level of emission reductions attributed to them for purposes of compliance calculations throughout their useful lives. [EPA-HQ-OAR-2022-0829-0759, p. 90]

Durability is also important for PEVs to ensure that vehicles in their second or third use cases maintain their durability and strong benefits to drivers. EPA points to several studies that highlight the importance of battery durability for PEVs, and notes that auto manufacturers are already required to "account for potential battery degradation that could result in an increase in CO2 emissions." 88 Fed. Reg. at 29283. Extending these requirements to PEVs is logical and well within EPA's authority. [EPA-HQ-OAR-2022-0829-0759, p. 90]

Manufacturers are well-equipped to meet durability requirements, which are already in place in other jurisdictions. The United Nations Global Technical Regulation No. 22 (GTR No. 22) recommends durability standards for batteries in vehicles.222 EPA notes that Agency staff chaired the informal working group that developed these standards. 88 Fed. Reg. at 29284 n.536. In the United States, the California Air Resources Board has established battery durability and warranty standards in the Advanced Clean Cars II regulations. Id. at 29284 nn.537-38. Pending approval of the ACC II waiver from EPA, at least seven states (representing approximately 25% of the United States vehicle sales market) will have enforceable battery durability and warranty requirements. Therefore, EPA's consideration of battery durability and warranty standards is aligned with global trends and policies, and we support the proposed incorporation of GTR No. 22 into EPA's final rule. [EPA-HQ-OAR-2022-0829-0759, pp. 90-91]

222 See United Nations, Addendum 22: United Nations Global Technical Regulation No. 22 § 1.A, April 14, 2022.. https://unece.org/sites/default/files/2022-04/ECE_TRANS_180a22e.pdf.

However, while EPA has chosen to incorporate many parts of GTR No. 22, the Agency has chosen not to require a monitor for the vehicles' state of certified range (SOCR), without providing a sufficient justification. EPA recognizes that the state of certified energy (SOCE) is important to track minimum performance requirements, which we support. However, EPA notes that "monitoring the state of a vehicle's full-charge driving range capability… as an indicator of battery durability performance may be an attractive option because driving range is a metric that is more directly experienced and understood by the customer." 88 Fed. Reg. at 29286. The GTR No. 22 includes a requirement for SOCR, but it is not customer-facing, while California's ACC II program requires a range metric instead of a SOCE metric. Id. As EPA notes, drivers are accustomed to think about the range of their vehicles, not the energy levels of the battery. Id. [EPA-HQ-OAR-2022-0829-0759, p. 91]

Therefore, we request that EPA require both a SOCE monitor for compliance purposes as well as a SOCR monitor within the vehicle to provide confidence and transparency to drivers about the state of health of their vehicle battery. This is especially important as the vehicles transition into the secondary market, as SOCR monitors will enhance consumer confidence in used PEVs. We also request that EPA require the SCOR be readable by the customer, in addition to regulatory authorities. [EPA-HQ-OAR-2022-0829-0759, p. 91]

We also support the proposed warranty provisions, which fall well within EPA's authority under the Clean Air Act. Section 207(a)(1) provides that manufacturers of motor vehicles must warrant that the vehicle is "free from defects in materials and workmanship which cause such vehicle . . . to fail to conform with applicable regulations" for the warranty period specified by EPA through regulation. 42 U.S.C. § 7541(a)(1). And Section 207(i)(2), which applies specifically to light-duty vehicles and light-duty trucks, establishes a warranty period for "specified major emission control components," including catalytic converters, electronic emissions control units, onboard diagnostic devices, and "any other pollution control device or component" EPA designates under that section. 42 U.S.C. § 7541(i)(2). PEV batteries and associated electric powertrain components are no different from the enumerated emission control technologies—they are "pollution control device[s] or component[s]" because they enable the control (in fact, the complete elimination) of tailpipe emissions from motor vehicles. We agree with EPA's rationale for applying warranty requirements to PEV batteries and associated electric powertrain components, 88 Fed. Reg. at 29286-87, and we recommend that EPA finalize this aspect of the Proposal. [EPA-HQ-OAR-2022-0829-0759, p. 91]

Organization: Fermata Energy

III. Recommendations regarding V2G in EPA rules and EPA's Proposed Battery Durability Monitoring and Warranty Requirements for Light-and Medium-Duty Electric Vehicles

Any eventual battery durability requirements set by EPA should account for frequent bidirectional charging (e.g. such as vehicle-to-grid) activities [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

We recognize that the EPA is proposing battery durability and warranty requirements that are less than those in Advanced Clean Cars II and we appreciate that.. However, the EPA made no mention of the need for V2G technology in light-and medium-duty BEVs and PHEVs in the proposed rule. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

Battery degradation is an inherently complex topic; battery chemistry, temperature, use cases, the EV duty cycle, and other factors all impact battery degradation. Some V2X activities, especially those utilizing bidirectional charging capabilities, will require additional battery cycling that will impact long-term battery durability. While the exact level of cycling will depend on the specific V2X use case and could vary based on customer behavior, it is reasonable to expect that in the future most EVs could experience some incremental level of degradation due to V2X activities. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

Given the extensive public and private benefits that V2X can offer, as detailed above, it is paramount that any battery durability and warranty requirements EPA establishes for EVs not inadvertently foreclose V2X activities, and especially V2G opportunities. Setting overly-stringent durability requirements that limit V2X activities – whether intentionally or not – conflicts with the EPA's larger mission of reducing emissions and accelerating EV adoption. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

Final battery warranty and battery durability requirements should include a thorough understanding of the impact on V2G in light-and medium-duty vehicles so as to not discourage V2G. At a minimum, the EPA should lower the warranty requirement to account for frequent bidirectional charging and allow automakers to exclude vehicles that have done V2X from the pool of vehicles in the durability test sample. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

We do not see any consideration of frequent use of V2G in this proposal. V2G technology is emerging in light-duty and medium-duty vehicles, and attractive use cases exist (e.g. EVs that spend many hours connected to a charger or EVSE in a fleet or for personal use, such as school buses). The concern is that overly restrictive warranty or durability requirements by the EPA could place arbitrary restrictions on V2X activities. Fermata Energy appreciates the EPA's intent to ensure consumer protection and customer satisfaction with EV ownership through robust standards and to meet the useful life requirements in the Clean Air Act. However, overly stringent requirements that constrain battery cycling could also constrain the novel set of value propositions that V2X offers and that would otherwise spur EV adoption (e.g., home backup power, payment for grid services, customer bill management, etc.). Overly stringent battery durability requirements could drive OEMs to limit the range, performance, and/or state of charge of EV batteries, or take other measures to provide for sufficient degradation margin in later years. As such, Fermata Energy believes that the EPA should consider an approach to durability and warranty requirements that balances competing factors and specifically considers the GHG benefits of V2G as a storage technology which unlocks and enables a faster, more cost-effective transition to renewable energy. [EPA-HQ-OAR-2022-0829-0710, pp. 7-8]

Furthermore, we note there are ongoing efforts by the Informal Working Group on Electric Vehicles and the Environment under the United Nations Economic Commission for Europe (UN ECE) to develop minimum performance requirements for EV batteries that include V2X considerations. This Working Group is chaired by the US Environmental Protection Agency (EPA) and includes the European Commission, individual European and Asian countries, as well as industry stakeholders from around the world. In order to account for VGI activities, the Working Group is also considering a "virtual km" mechanism, in which the energy discharged by the EV battery in bidirectional mode is converted to a km-equivalent via a predetermined formula.14 The total mileage used for confirming the compliance with the performance requirements would consist of the sum of the km driven and the virtual km. While Fermata Energy is not necessarily endorsing this specific approach or methodology, we believe that the EPA should seriously consider an agreed upon method to account for V2G battery degradation such as the UN Global Technical Regulation "virtual miles" before adopting a final regulation with durability or warranty requirements. [EPA-HQ-OAR-2022-0829-0710, pp. 7-8]

14 For example, see the following presentation on V2X virtual mileage at the 50th EVE IWG meeting: https://wiki.unece.org/download/attachments/128420289/Input%20on%20V2X%20virtual%20mileage.pptx?api=v2

In the absence of an agreed upon method to account for V2G battery degradation, OEMs may choose to reach individual battery warranty agreements with V2X services providers to approve specific equipment for use with their bidirectionally-enabled vehicles. In September 2022, Nissan approved the Fermata Energy bidirectional charger as the first bidirectional charging system for use with its all-electric LEAF vehicle in the US.15 While these sorts of battery warranty approvals are a very important development for the bidirectional charging industry, OEM approval processes can be slow. It may take years for other OEMs to negotiate these sorts of agreements with V2X charger manufacturers and service providers. An agreed-upon methodology for accounting for V2G battery degradation would be the more expedient approach to ensuring battery durability, instead of relying on individual OEM to EVSE agreements, which could take years. [EPA-HQ-OAR-2022-0829-0710, pp. 7-8]

15 https://usa.nissannews.com/en-US/releases/release-5078281d19ed36853371357c4a1a8244-nissan-approves-first-bi-directional-charger-for-use-with-nissan-leaf-in-the-us

Regarding battery warranties, Fermata Energy recommends that the EPA 1) either delay adopting battery warranty requirements to a future rulemaking when more data on V2X is available or 2) reduce the battery warranty requirement in the final regulation to account for and assume frequent vehicle-to-grid charging by battery EVs and plug-in hybrid EVs. We also recommend that the EPA explicitly state that automakers may exclude those vehicles that have done vehicle-to-building or vehicle to grid charging from the pool of vehicles in the battery durability test sample. The Advanced Clean Cars II regulation took this approach, and we recommend the EPA do the same. [EPA-HQ-OAR-2022-0829-0710, p. 8]

The EPA should add in the final regulation a small multiplier credit for vehicles that have on-board AC bidirectional chargers or are integrated with multiple DC off-board chargers. [EPA-HQ-OAR-2022-0829-0710, p. 8]

Organization: Ford Motor Company

-In the NPRM’s redline of regulatory text for 40 CFR § 86.1845-04(g), EPA states that manufacturers perform Part A in-use testing related to monitor accuracy at low-mileage (1 year), intermediate mileage (3 years), and high mileage intervals (5 years). While Ford understands EPA’s desire to ensure that battery State of Certified Energy (SOCE) monitors are accurate, this new in-use testing requirement will create additional vehicle procurement, in-use testing, and reporting burdens for electric vehicles. Additionally, the NPRM requirement to perform full MCTs on these in-use vehicles for monitor validation will add significant mileage to these vehicles (>400-500 miles), which may make it more difficult to procure in-use electric test vehicles. Since battery monitor accuracy is not expected to degrade over the 1 – 5 year in-use timeframe, Ford recommends that EPA require only the intermediate testing for Part A SOCE validation. In summary, requiring Part A in-use testing at three-time intervals is excessive since we would expect that similar SOCE accuracy trends to be present at each in-use timeframe. [EPA-HQ-OAR-2022-0829-0605, pp. 15-16]

Ford also requests that virtual mileage as referenced in GTR No.22 be included in the battery durability and warranty standards. [EPA-HQ-OAR-2022-0829-0605, pp. 15-16]

Organization: Hyundai Motor America

In addition, EPA’s assumption of no cost increase resulting from the proposed battery durability and warranty requirements is not accurate. It is true the Proposed Alternative’s requirements are on par with current product in the market when measured by years and mileage comparison. However, there are other costly requirements that accompany the battery durability proposal that do not currently exist today. For example, the development and rollout of a state of health (“SOH”) monitor meeting the State of Certified Energy (“SOCE”) requirements24 will add cost. In addition, there are compliance demonstration requirements increasing costs related to the frequency of testing and reporting. These new requirements undoubtedly come with additional cost and should be considered by EPA. [EPA-HQ-OAR-2022-0829-0599, pp. 6-7]

24 The NPRM's SOH criteria specifically call for 80 percent minimum SOCE at 5 years or 62,000 miles, and a 70 percent minimum SOCE at 8 years or 100,000 miles.

Organization: International Council on Clean Transportation

Acknowledging the significant fraction of new U.S. light- duty vehicles subject to California's regulations, ICCT recommends EPA align with California's BEV and PHEV provisions on battery durability, warranty, state of health, and other measures. Such an alignment not only ensures adequate performance of plug-in vehicles for purposes of emissions reductions, but it would protect all consumers purchasing EVs and would support the development of secondary EV markets. [EPA-HQ-OAR-2022-0829-0569, pp. 7-8]

Organization: Kia Corporation

-Kia supports adoption of United National Economic Commission Europe (UNECE) Global Technical Regulations (GTR) No. 22 Phase 1 to measure Usable Battery Energy (UBE). Kia agrees that EPA's battery state of health (SOH) requirement could help support consumer acceptance and understanding of new powertrain technology. However, Kia supports the State of Certified Energy (SOCE) as the only monitor. [EPA-HQ-OAR-2022-0829-0555, p. 3]

Kia Recommendations on EV Battery Warranty and Durability

EPA proposes new battery durability and warranty requirements for BEVs and PHEVs including 8 years or 80,000 miles for the powertrain components.15 Kia agrees that EPA's battery state of health (SOH) requirement, which communicates to the vehicle's state of certified energy (SOCE), could help support consumer acceptance and understanding of new powertrain technology. [EPA-HQ-OAR-2022-0829-0555, pp. 8-9]

15 88 Fed. Reg. 29,288.

Kia supports adoption of the United Nations Economic Commission for Europe (UNECE) Global Technical Regulations (GTR) No. 22 Phase 1 to measure Usable Battery Energy (UBE) as a durability measurement. However, Kia supports the State of Certified Energy (SOCE) as the only monitor. UBE is a prudent measurement for customers to understand the life remaining in the battery that meets or exceeds the proposed warranty requirement. [EPA-HQ-OAR-2022-0829-0555, pp. 8-9]

Kia does not support the State of Certified Range (SOCR) in addition to the SOCE. Range is highly variable on the driving and cabin conditioning habits of the owner. Further, when the vehicle is sold to a second buyer, the range prediction will reflect the previous owner's habits, and potentially could display an incorrect SOCR that could inflate or underestimate the usable range of the vehicle. As plug-in vehicles (BEV and PHEVs) continue to increase in the market, general customer understanding of battery range and durability will also increase. We support SOCE as a single measurement of the health of the battery. ICE vehicles are not required to display a SOCR because the range is extremely reliant on consumer behavior. Similarly, as the EPA proposed rule aims to be performance-based and technology neutral, plug-in electric vehicles should not be required to display a SOCR. [EPA-HQ-OAR-2022-0829-0555, pp. 8-9]

Kia does not support including the reserve capacity in the SOCE metric. The additional battery reserve capacity, intended to maintain battery integrity, is not accessible to the customer until the battery reaches a certain degradation. This amount of degradation needed to trigger accessibility to reserve battery capacity will be unique between automakers and battery cell manufacturers. Including the reserve capacity in the SOCE metric would undermine the importance of having this additional capacity: maintaining a usable capacity for the rated battery for the stated time for vehicle use, not for customers to rely on the additional battery capacity. [EPA-HQ-OAR-2022-0829-0555, pp. 8-9]

Kia Supports Including Virtual Mileage in Customer Information

Leveraging bi-directional capability of EVs, especially as these vehicles compete with stationary energy sources for cathode active materials, is paramount to future EV adoption. Utilities are currently exploring vehicle to home (V2H) and vehicle to grid (V2G) projects to enhance grid reliability and reduce additional grid resources. With the correct incentives, Vehicle to Everything (V2X) could be a useful side benefit that offsets the cost of EV ownership. The potential for these daily energy discharges of the traction battery, outside of driving events, should be properly accounted for in Usable Battery Energy (UBE). [EPA-HQ-OAR-2022-0829-0555, pp. 8-9]

Because EPA is adopting most provisions of the UNECE GTR No. 22, EPA seems to be adopting “virtual mileage” from V2X events into battery requirements. Kia proposes that the EPA extend this “virtual mileage” definition to the proposed warranty standards to accurately reflect the overall measure of the battery’s usage and health. These provisions will give customers a more accurate understanding of their overall battery usage and will ensure that these vehicles remain on the road across multiple owners. [EPA-HQ-OAR-2022-0829-0555, pp. 8-9]

Organization: Lucid Group, Inc.

Battery Warranty and Durability Requirements

Lucid supports EPA's attention to battery durability and warranty. As EPA has recognized, multiple organizations and agencies have drafted rules and guidance which provide an opportunity to harmonize various requirements where appropriate. Specifically, we respectfully request EPA consider CARB's current battery warranty under ACCII, 70% state of health (SOH) for 8 years or 100,000 miles, which aligns with EPA's proposed end point warranty. This would adequately address the agency's concern of vehicle performance during its useful life. EPA's current proposal requires a midpoint state of certified energy (SOCE) of 80% at 5 years based on UN GTR No. 22. A mid-point requirement is unnecessary if an 8-year useful life is the concern. [EPA-HQ-OAR-2022-0829-0664, pp. 5-6]

Further, the data cited by UN GTR No. 22 was based on the fleet at the time and extrapolated to show that 80% of the fleet would meet the 80% SOCE at 5 years. Given battery degradation over time is nonlinear, a mid-point requirement at this time may be premature without more real-world data. Similarly, more stringent battery standards may be appropriate when more data is available as EV penetration increases and OEMs encounter a wider variety of real-world use cases. [EPA-HQ-OAR-2022-0829-0664, pp. 5-6]

Additionally, bidirectional charging and discharging technology, such as from the vehicle to the grid, is increasingly found on vehicles. This type of cycling wears on the vehicle battery and is not captured in the mileage or age of the vehicle. Lucid suggests the agency consider how this potential wear would affect the battery warranty requirement. We believe the agency should consider a mileage equivalent or similar metric for each bidirectional charge or amount of energy delivered to the grid or number of cycles the battery undergoes. [EPA-HQ-OAR-2022-0829-0664, pp. 5-6]

Lucid supports CARB's approach to SOH calculations and battery reserve capacity and encourages EPA to consider that approach. [EPA-HQ-OAR-2022-0829-0664, pp. 5-6]

Lucid supports the use SOCE because it is a more direct metric to measure the status of degradation of the battery pack itself. As the UN GTR No. 22 indicated, estimating the SOCR includes many variables such as "measurement, test to test variability and precision of range retention calculations," which leads to greater uncertainty in that value. Providing an estimated SOCR introduces additional nuances which are unlikely to contribute to the customer's understanding of the state of degradation of their battery pack. [EPA-HQ-OAR-2022-0829-0664, pp. 5-6]

Lucid supports integrating "a customer-accessible" display that conveys the battery's SOCE. This display should be broadly interpreted and allow the data to be an option in the vehicle's infotainment system or dashboard menu. [EPA-HQ-OAR-2022-0829-0664, pp. 5-6]

Lucid Supports Warranty Requirements for Specific Components Designated as "SMECC"

EPA proposes to designate the "high-voltage battery systems and associated powertrain components" as "specified major emission control components" to require manufacturers to provide a warranty period of 8 years or 80,000 miles for those parts. Lucid supports this warranty requirement, but encourages the agency to develop an explicit list of "related powertrain components" in consultation with industry or consider defining these components as the vehicle’s drive unit or motor, inverter, transmission, and differential, if so equipped. [EPA-HQ-OAR-2022-0829-0664, pp. 5-6]

Organization: MECA Clean Mobility

MECA supports alignment with UNECE Global Technical Regulations for battery durability and consideration of phase-in to match vehicle useful life in later years. [EPA-HQ-OAR-2022-0829-0564, p. 33]

MECA supports new battery durability monitoring and performance requirements for light-duty BEVs and PHEVs, and battery durability monitoring requirements for Class 2b and 3 BEVs and PHEVs, beginning with MY 2027 in alignment with UNECE GTR No. 22 and soon to be completed GTR 22b for medium-duty vehicles. These include SOH monitors and usable battery energy (UBE) measurement requirements, vehicle range and virtual miles traveled for medium-duty vehicles with power take-off (PTO) or vehicle-to-X capability of light-duty vehicles. This information will serve to generate durability data to support future EPA programs, as well as industry and consumer needs. While the EVE IWG chose not to set an MPR for Category 2 (MDV) plug-in electric vehicles at this time, MECA supports EPA aligning with a future minimum performance requirement for MDVs when the UNECE finalizes an applicable GTR. [EPA-HQ-OAR-2022-0829-0564, p. 33]

As experience with battery durability develops, MECA requests the requirements be revisited and durability requirements be extended to match the useful life of light-and medium-duty vehicles. Most consumers expect the battery to last the life of the vehicle in these classes, and alignment of the durability period with the vehicle useful life will facilitate consumer acceptance and drive innovation in battery technology. [EPA-HQ-OAR-2022-0829-0564, p. 33]

MECA supports EPA's proposed battery and vehicle component warranty requirements.

MECA supports EPA's proposed new warranty requirements for BEV and PHEV batteries and associated electric powertrain components, such as electric machines, power electronics, and similar key electric powertrain components. We agree with the concept of building on existing high value component warranty provisions, such as emission controls. We support designating the high-voltage battery and associated electric powertrain components for light-duty electric vehicles as specified high value components subject to a warranty period of 8 years or 80,000 miles. In addition, we support the same warranty periods for components in medium-duty BEVs and PHEVs. This will give consumers confidence in the reliability of any powertrain they chose for their vehicle. [EPA-HQ-OAR-2022-0829-0564, pp. 33-34]

Organization: MEMA, The Vehicle Suppliers Associated

- Extended warranty. The necessity to clearly define the applicability of the extended warranty and the need to provide repair access to service these new vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

Warranty Provisions Must Not Preclude Choice in Repair of Exclude the Aftermarket

MEMA urges EPA to not proceed with provisions mandating longer warranties for specific BEV parts, components, and systems. Vehicle warranties undergo robust regulatory oversight by the Federal Trade Commission (FTC) under authority granted by the Magnusson-Moss Warranty Act. These regulations meet the needs of consumers by providing reasonable warranty protections while protecting consumer choice. If EPA chooses to move forward with the warranty requirements outlined in the NPRM, MEMA urges the EPA to clarify that warranty repairs can be completed at dealer or authorized repair locations, and at quality independent aftermarket repair locations. This would ensure safety, affordability, and access to warranty repairs. Any EPA warranty regulations should specify that vehicle manufacturers and consumers, in line with the Magnusson-Moss Warranty Act, can employ certified or independent repair facilities of their choice for warranty repairs. Facilities must follow manufacturer repair and warranty procedures, warranty repairs can use parts and remanufactured parts that meet manufacturer specifications, and repair procedures and appropriate specifications are made available. The repair and maintenance of in-service vehicles is critical ensuring they operate as designed I and continue to meet and emissions standards. A properly operating vehicle is critical for millions of Americans as their daily transportation. In many locations throughout the country, the nearest dealer or authorized repair facility is, at best not the most convenient option or, at worst, hours away. [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

Further, EPA has not clearly defined specific vehicle parts intended to be covered by the proposed warranty requirements, particularly those related to high-voltage battery and propulsion motors. [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

MEMA urges EPA to maintain current limitations and not expand warranty coverage to parts that have a shorter life and are a routinely replaced due to wear, or are adjacent to the warrantied parts through physical, electrical, or software connections but not the targeted component; such as sensors, filters, monitoring systems, cooling systems, HVAC, braking systems, control systems, inverters, converters, charging systems, structural systems, transmissions, other drivetrain components, electrical motors not part of the forward propulsion system, and filters. In particular, it is important that components found in both an ICE and a zero emissions vehicle not carry longer warranties for ZEVS than for ICE. We urge EPA to work with industry stakeholders, including original equipment and aftermarket suppliers and remanufacturers, to develop a list of wear and non-applicable parts and components with these criteria in mind. [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

Finally, MEMA urges EPA to consider the impact longer warranties could have on choices in consumer repair. Longer warranties could lead to monopolistic repair, resulting in delays, potential safety concerns, and increased costs for businesses and consumers. To successfully implement the warranty provisions, repair access needs include appropriate repair and maintenance information (RMI) to enable safe, educated repairs. This typically includes diagnostic codes, repair procedures, drawings, and vehicle specifications to enable safe and complete repair. This has typically been provided for other vehicle systems but is often not made available for the technologies that will be covered by the new warranty provisions. In addition, access to vehicle diagnostics and state of health, including for all items under warranty and related systems, for owners, fleets, and repair professionals, need to be provided. This includes secure over-the-air (OTA) access to vehicle diagnostics and state of health on a fair, reasonable, and nondiscriminatory (FRAND) basis. [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

MEMA urges: [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

- EPA to clarify that warranty repairs can be completed at dealer or authorized repair locations, and at quality independent aftermarket repair locations.

- EPA to not proceed with provisions mandating longer warranties for specific BEV parts, components, and systems.

- EPA to consider the impact longer warranties could have on choices in consumer repair. [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

Organization: Mercedes-Benz AG

EPA has included battery-related requirements in the NPRM for BEVs and PHEVs. These OBD provisions are misaligned and in some cases conflict with CARB’s battery-related requirements, including: [EPA-HQ-OAR-2022-0829-0623, p. 13]

1. Some low-mileage hybrid vehicles do not qualify for ZEV credits under California’s ZEV program. Therefore, these vehicles are not subject to nor have development resources allocated to comply with ZEV battery monitoring and display requirements.

EPA should align with CARB and restrict monitoring and display requirements only to BEVs with minimum 200-mile range and PHEVs Bin30 or cleaner with minimum 70-mile range, i.e., vehicles that qualify for ZEV credits under California's ZEV program. [EPA-HQ-OAR-2022-0829-0623, p. 13]

2. For the battery health display provisions, CARB requires the use of State of Health ("SOH"), while EPA has proposed to harmonize with the UNECE GTR 22 and use State of Certified Energy ("SOCE"). [EPA-HQ-OAR-2022-0829-0623, p. 13]

For battery packs without a battery reserve, the SOCE is equivalent to the SOH. However, for packs with a reserve, the EPA and CARB metrics are misaligned. This misalignment is further complicated by the fact that both agencies require a display of the battery health metric visible to drivers. Display of two different metrics will be confusing to drivers who will likely find it challenging to understand what the two different measurements of battery health indicate. [EPA-HQ-OAR-2022-0829-0623, p. 13]

Mercedes-Benz requests that EPA allow manufacturers to voluntarily comply with the CARB ACCII provisions for battery health display with respect to reserve energy in lieu of the EPA display requirement, in order to reduce consumer confusion and provide consistent information to the customer. [EPA-HQ-OAR-2022-0829-0623, p. 13]

3. With respect to enforcement provisions, the EPA proposal for SOH/SOCE accuracy provisions are misaligned with CARB's ACCII requirement. First, CARB phases-in enforcement of the 5% accuracy requirement between 2026 to 2029 MYs, while the EPA requires 100% phase-in for 2027 MY. Second, the CARB requirement includes only an upper tolerance limit, while the EPA is proposing to include both an upper and lower tolerance limit. And third, CARB uses "percentage points", while EPA uses "Percent". This difference can be understood with a simple example: 5 percentage points added to 60 = 60 + 5 = 65, while 5 percent added to 60 = (60*1.05) = 63. [EPA-HQ-OAR-2022-0829-0623, p. 13]

Mercedes-Benz requests that the EPA align their regulation to the CARB regulation for battery accuracy provisions to avoid conflicting regulatory requirements and ensure manufacturers have appropriate flexibility in meeting these upcoming requirements. [EPA-HQ-OAR-2022-0829-0623, p. 13]

Section IV: Batteries

V2X applications such as vehicle-to-grid, vehicle-to-load, and vehicle-to-home are increasingly considered key features that will support the shift to electrification. For instance, the California legislature is currently considering a mandate for all new vehicles in the state to have bidirectional charging capability starting in 2030 MY. Regardless of California's law or separate OEM efforts to advance V2G, inclusion of the parameter, "virtual distance", is fundamental to the transparent deployment of V2G technology. As such, we would like EPA to add virtual distance to the regulatory language in both the durability and warranty mileage calculation. [EPA-HQ-OAR-2022-0829-0623, pp. 15-16]

Organization: Minnesota Pollution Control Agency (MPCA)

-Align battery durability and warranty provisions with Advanced Clean Cars II (ACC II) program The MPCA encourages EPA to bring its battery durability and warranty provisions into line with the Advanced Clean Cars II program. The ACC II durability and warranty program supports the development of EVs that can replace combustion engine vehicles for similar use cases. If EVs are to become the primary vehicle type in the future, they need to be durable, and the battery life needs to be transparent to the user when purchased new and in the secondary market. Bringing the EPA program into line with the ACCII program would result in improved durability and transparency for consumers, ensure emissions standards deliver expected emission reduction and needed environmental public health benefits, and set consistent expectations for manufacturers nationwide. Seven states representing roughly 20 percent of the new light-duty vehicle market have already adopted ACC II, and several others are expected to follow. More closely aligning EPA's durability and warranty provisions with those in ACC II will make it easier for consumers, used automobile dealers, and others to compare the battery state of health for EVs subject the ACC II regulations with those subject to EPA's final rule. [EPA-HQ-OAR-2022-0829-0557, p. 5]

Organization: National Association of Clean Air Agencies (NACAA)

Finally, NACAA recommends that EPA include provisions in the final rule that align with ACC II regarding data standardization, durability, warranty, minimum mileage range labeling, charging and serviceability requirements. [EPA-HQ-OAR-2022-0829-0559, p. 8]

Organization: National Tribal Air Association (NTAA)

Vehicle Durability

The proposed requirements for battery durability and warranty are exceedingly important. Many Tribal communities are distant from comprehensive vehicle maintenance and repair facilities. Alaskan Native Villages are particularly vulnerable to the high costs of vehicle operations. The NTAA supports these provisions that will improve extended battery life and vehicle reliability. [EPA-HQ-OAR-2022-0829-0504, p. 3]

Organization: Nissan North America, Inc.

V. Battery Durability Proposal

Nissan understands the critical importance of battery performance to achieving overall electrification goals. As a result, Nissan has committed to significant investments in research and development of state-of-the-art battery technology, including a focus on development and implementation of ASSBs in future EV offerings. Nissan supports EPA's proposal to largely align its battery durability requirements with the requirements set out in UENCE GTR No. 22. Nissan also supports EPA's proposal to not adopt a reserve capacity declaration requirement or State of Certified Range ("SOCR") monitor. Nissan supports the use of Usable Battery Energy ("UBE") as the primary metric for measuring battery durability. [EPA-HQ-OAR-2022-0829-0594, pp. 7-8]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

D. Proposed EV Battery Durability and Warranty Provisions

NESCAUM and the OTC support EPA's proposal to include minimum battery durability requirements and warranty provisions for BEV and plug-in hybrid electric vehicle (PHEV) batteries and associated electric powertrain components. Batteries and associated electric powertrain components are emission control devices that allow BEVs to operate with zero tailpipe emissions and reduce emissions from PHEVs. By requiring manufacturers to demonstrate that test groups of BEVs and PHEVs meet battery durability requirements throughout their useful lives, EPA will be able to assess whether BEVs and PHEVs will operate as expected over time. Warranty requirements protect consumers against individual vehicles that experience failures or defects. [EPA-HQ-OAR-2022-0829-0584, pp. 11-12]

As EPA surmises, emission control components covered by warranty are more likely to be repaired or replaced as needed. Thus, working in tandem, the durability and warranty provisions will ensure that EPA's emissions standards deliver expected emission reductions and needed environmental and public health benefits. In addition, these provisions are integral to instilling consumer confidence in the performance and durability of BEVs and PHEVs, not only when new, but also in secondary markets. [EPA-HQ-OAR-2022-0829-0584, pp. 11-12]

To the maximum extent possible, NESCAUM and the OTC encourage EPA to align the durability and warranty provisions in its final rule with those in the ACC II regulations. As mentioned above, seven states representing roughly 20 percent of the new LDV market have already adopted ACC II, and several others are expected to follow. More closely aligning EPA's durability and warranty provisions with those in ACC II will make it easier for consumers, used automobile dealers, and others to compare the battery state of health for BEVs and PHEVs subject the ACC II regulations with those subject to EPA's final rule. [EPA-HQ-OAR-2022-0829-0584, pp. 11-12]

Organization: POET, LLC

Another issue with U.S. EPA's battery cost assessment is that it appears to completely ignore the impact of the cost of the proposed battery durability and warranty provisions of the Proposed Rule. These new regulatory requirements will clearly impose costs on battery manufacturers and automakers which will ultimately be passed on to consumers and should be included in U.S. EPA's analyses. [EPA-HQ-OAR-2022-0829-0609, p. 58]

Organization: Rivian Automotive, LLC

Battery Durability and Warranty Requirements

Rivian believes reasonable battery durability standards and consumer-facing transparency in battery health will support the EV market's growth and success. EPA's proposal to include a durability requirement in the L/MDV standards evolves the regulation for a vehicle market in which EVs will dominate. Consistent with our position during the development of California's ACCII regulations, Rivian believes aligning EPA's requirements with Global Technical Regulation ("GTR") 22 will establish a practicable standard that can be harmonized on a global basis. In the NPRM, EPA sought comment on various aspects of its proposed approach to establishing and testing for durability and warranty standards. Rivian addresses several of these in turn below. [EPA-HQ-OAR-2022-0829-0653, p. 13]

Disclosing Battery Reserve Capacity

Unlike CARB's ACCII durability program, EPA does not propose to require manufacturers to disclose reserve capacity that they initially withhold from consumers.41 Disclosing reserve capacity involves tradeoffs but can serve compelling interests. While it burdens automakers with an additional compliance obligation, it supports consumers who benefit from additional product transparency—particularly in the used vehicle market. As a fundamental principle, if manufacturers elect to use larger batteries and/or withhold capacity for purposes of complying with durability requirements, consumers should be informed and aware. [EPA-HQ-OAR-2022-0829-0653, p. 14]

Asymmetric information in this regard could undermine consumer confidence and incentivize hidden battery upsizing among manufacturers. There is also the matter of regulatory harmonization across CARB and EPA programs. Ultimately, we believe there are benefits to requiring disclosure of battery reserve capacity and EPA might wish to consider establishing a requirement in this or a future rulemaking.42 [EPA-HQ-OAR-2022-0829-0653, p. 14]

41 13 C.C.R. §1962.5.

42 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 87 (May 5, 2023) (revising 40 C.F.R. Parts 85, 86, 600, 1036, 1037, and 1066, 29,286.

In the event of a failure in a durability testing group, EPA clearly provides for the removal of compliance credits attributed to the failing vehicles from a manufacturer's credit bank. Rivian supports this proposed penalty but seeks clarification on its scope. Would the credit removal apply only to GHG credits or also to NMOG and NOx? Rivian believes NMOG and NOx credits should be subject to the same penalty in the event of a durability testing failure. [EPA-HQ-OAR-2022-0829-0653, pp. 14-15]

Establishing Additional Components as Specified Major Emission Control Components ("SMECCs")

EPA proposes to define "associated powertrain components" as SMECCs under the Clean Air Act. Rivian understands the agency's rationale and does not necessarily object to this action, but additional clarity would aid our evaluation of the proposal's full implications. EPA should clearly define the components proposed to qualify as SMECCs under the new regulations: the NPRM provides only examples in the preamble.44 California regulations already define "propulsion-related parts" for purposes of the ACCII warranty requirements and could serve as the basis for identifying SMECCs.45 EPA should also clarify how anti-tampering rules would apply to components newly defined as SMECCs in scenarios where maintenance work is performed. Overall, we anticipate complexity in implementing this aspect of the proposal. The agency and affected manufacturers will likely benefit from compliance workshops following rule finalization to establish clear and practicable implementation guidance. [EPA-HQ-OAR-2022-0829-0653, pp. 14-15]

44 Id. at 29,286.

45 13 C.C.R. §1962.8.

Other Considerations

Vehicle-to-everything ("V2X") capabilities could introduce complexity, especially with respect to warranties and consumer-facing transparency regarding a battery's state of health.

Rivian did not see discussion of V2X capability or its impact on durability and warranty in EPA's rule documentation and requests clarity on the extent to which the agency considered the issue. As V2X capabilities see greater use across more EV models, EPA will likely need to evaluate the interaction of these applications with the durability and warranty standards proposed. Accounting for diverse V2X capabilities across manufacturers, not to mention varying approaches to marketing the technology, might favor a degree of regulatory flexibility. [EPA-HQ-OAR-2022-0829-0653, pp. 14-15]

One key issue to consider is whether, with EPA approval, manufacturers could account for V2X-related battery degradation in setting warranty terms and evaluating durability. [EPA-HQ-OAR-2022-0829-0653, pp. 14-15]

Organization: Sierra Club et al.

We appreciate the EPA's proposal, which moves our vehicles in the right direction. However, the final emissions standard for light-duty vehicles should: [EPA-HQ-OAR-2022-0829-0668, p. 2]

-Establish protective zero-emission vehicle durability and warranty requirements [EPA-HQ-OAR-2022-0829-0668, p. 2]

Organization: Southern Environmental Law Center (SELC)

EPA should adopt strong certification, durability, and warranty requirements.

Beyond more stringent numeric standards, EPA also proposes important improvements to vehicle certifications, durability, and warranty requirements. These changes will help to ensure light-and medium-duty vehicles run cleanly under a greater range of operating conditions across the lifetime of a vehicle—which we support. However, we urge EPA to consider ways that these provisions can be aligned with California's Clean Cars program. [EPA-HQ-OAR-2022-0829-0591, p. 10]

Organization: Stellantis

Battery Durability & Warranty Requirements are Beyond EPA's Scope

EPA has proposed new battery durability performance requirements for all light-duty PHEVs and BEVs, battery health monitoring and in-use accuracy for all light-and medium-duty PHEVs and BEVs, as well as warranties for PHEVs, BEVs, and FCEVs. [EPA-HQ-OAR-2022-0829-0678, p. 17]

Stellantis concurs with Auto Innovators' comment that battery durability requirements are beyond the scope of EPA's statutory authority for BEVs. EPA's authority covers emissions standards under CAA section 202, but there are no applicable air pollutant emissions standards for BEVs, which do not produce any such emissions. Similarly, EPA lacks the authority to prescribe warranty standards for BEV powertrain and associated components that do not emit any air pollutants. Stellantis agrees with Auto Innovators that warranty requirements are typically left to the respective OEMs to determine and should here as well be addressed by individual OEMs. EPA should not attempt to reach into the regulatory realm of consumer protection as it relates to battery durability and warranty; EPA's jurisdiction does not reach so far. Stellantis agrees with Auto Innovators that the stringent new durability, testing, and warranty provisions in the proposed rule do not comport with the CAA. [EPA-HQ-OAR-2022-0829-0678, p. 17]

Stellantis fully supports all technical AAI comments and recommendations on EPA's proposed battery durability and warranty requirements. [EPA-HQ-OAR-2022-0829-0678, p. 17]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

Regarding battery durability and battery warranties, we are concerned that bi-directional charging was not considered. We request a more reasonable proposal in the final rule that assumes frequent bi-directional charging for the warranty requirement allows automakers to exclude from the durability test sample any BEV or PHEV that has been used for vehicle-to-grid or vehicle-to-building. As described in our recommendation 4 below, vehicle-to-grid and vehicle-to-building provide substantial benefits to society and to consumers. Therefore, EPA in its final rulemaking should carefully avoid unintentionally discouraging the development of this market with warranty and durability requirements for PHEVs (and BEVs) that are too stringent. We understand that there are many factors to consider including consumer protection, useful life requirements in the Clean Air Act, but the benefits to consumers, utility ratepayers and the environmental benefits of V2G and vehicle to building should also be considered. We understand that EPA does not propose durability and warranty requirements as strict as those in Advanced Clean Cars II. Even so, bidirectional charging should be addressed in the final rule, and the most practical way to do this is to make the test sample exception that was adopted in the Advanced Clean Cars II regulation. [EPA-HQ-OAR-2022-0829-0646, pp. 8-9]

Organization: Tesla, Inc.

EPA's Proposed Durability Standards Are Reasonable

Building consumer assurance is a key factor towards achieving significantly higher levels of BEV penetration. Tesla agrees with EPA that consumers should have access to information regarding the state of battery health (SOH), especially those considering the purchase of a used BEV or when filing a warranty claim. As further noted, durability monitoring can ensure emission reduction benefits are met and provide integrity to credit trading. [EPA-HQ-OAR-2022-0829-0792, pp. 26-27]

In providing such information, Tesla has favored a SOH monitor based upon battery capacity because it is directly proportional to vehicle range, depends on the least test conditions, can easily be run with an onboard diagnostic procedure, and can be verified with simple measurement equipment. Nonetheless, Tesla recognizes and participated in proceedings developing the UN GTR 22 and agrees with EPA's general adoption of the GTR 22 and a SOH monitor communicating the battery's state of certified energy (SOCE) based upon usable battery energy (UBE).167 Tesla also supports the agency's decision to not require a state of certified range (SOCR) monitor as development of an accurate SOCR monitor is far more difficult and burdensome than developing an SOCE monitor.168 Accurate SOCR monitoring would require, among other things, customizing road load test for each vehicle that can be programmed on the dynamometer. Such a testing burden would add significant cost to BEV deployment. Consistent with implementation of an SOH monitor and accuracy testing, Tesla believes the flexibility provided in the monitoring family definition provides assurances to manufacturers that deployment of similar monitors across different vehicle lines does not create any undue or repetitive SOCE testing burdens and cost. [EPA-HQ-OAR-2022-0829-0792, pp. 26-27]

167 Id, at 29285.

168 Id., at 29288.

Imposing specific minimum durability performance requirements on BEVs provides no emissions reduction benefit. BEVs do not emit tailpipe (or evaporative) criteria pollutants and changes in battery durability and retained range do not alter this fact. Unlike emission controls in ICE vehicles, BEVs are also not vulnerable to defeat devices and tampering.169 Requiring durability standards can cause greater tailpipe emissions by harming the rate of BEV uptake through imposition of substantial new costs and designs with reserved battery capacity. Tesla respectfully submits that any speculative benefit from consumer assurance provisions such as minimum performance requirements must be balanced against increased up-front costs on BEVs, which are likely to slow consumer uptake and thereby increase emissions. Moreover, as the DOE has documented, BEV range continues to accelerate as the technology is deployed.170 As BEV range increases, the loss of incremental battery capacity over time (due to expected degradation) will matter less to consumers. [EPA-HQ-OAR-2022-0829-0792, pp. 26-27]

169 See e.g.\, Reuters, Stellantis unit to pay $5.6 million to resolve California emissions probe (Oct. 13, 2022) available at h ttps://www.reuters.com/business/autos-transportation/stellantis-unit-pay-56-million-resolve-california-emissions-probe-2 022-10-13/; Reuters, U.S. Supreme Court rejects Volkswagen appeals over emissions tampering (Nov. 15, 2021) available at https://www.reuters.com/business/autos-transportation/us-supreme-court-rejects-volkswagen-appeals-over-emissions-t ampering-2021-11-15/; Washington Post, Why Carmaker Cheating Probes Stay in High Gear: QuickTake Q&A (Jan. 10, 2018) available at h ttps://www.washingtonpost.com/business/why-carmaker-cheating-probes-stay-in-high-gear-quicktake-q anda/2018/01/10/318b6d5a-f632-11e7-9af7-a50bc3300042_story.html?utm_term=.2315e81e50b4.

170 U.S. DOE, FOTW #1290, May 15, 2023: In Model Year 2022, the Longest-Range EV Reached 520 Miles on a Single Charge (May 15, 2023) available at h ttps://www.energy.gov/eere/vehicles/articles/fotw-1290-may-15-2023-model-year-2022-l ongest-range-ev-reached-520-miles.

Tesla believes the proposed minimum performance requirement (MPR) for the SOH are set at reasonable and achievable levels.171 Further, the decision not to implement a MPR for Class 2b and 3 will facilitate greater early adoption in those segments. For testing purposes, defining the battery family definition is best served by allowing manufacturers to utilize the criteria mentioned in the proposed regulation such as maximum specified charging power, method of battery thermal management, battery (cathode) chemistry and the net power of the electrical machines.172 This is far preferred over defining the families based on battery capacity which would create multiple families for the same vehicles with the same battery types and chemistry but different battery capacity. While establishing a 90 percent pass requirement for battery family monitor exceed the passage rates set in the ACC II durability provisions, Tesla agrees with the agency’s flexible approach allowing manufacturer to use good engineering judgment in determining the statistically adequate and representative in-use vehicle data for testing.173 [EPA-HQ-OAR-2022-0829-0792, p. 27]

171 88 Fed. Reg. at 29285, Table 64.

172 Id., at 29288. Tesla notes EPA should provide further guidance of the definition of “net power of electrical machines.”

173 See 13 CCR § 1962.4 (d).

EPA should not encourage manufacturers to overcome the durability threshold by creating larger batteries with hidden capacity that can slowly be accessed as the battery degrades. Encouraging this approach is fundamentally flawed. BEV customers, just like other light-duty vehicle customers, will have guarantees of performance from the manufacturer. Hidden capacity is adding cost for more performance than what the customer sought in their vehicle, will unnecessarily raise BEV prices, and dampen deployment of the best emissions reduction technology currently available. Encouraging full access to the battery (with reliable SOCE monitoring) allows for maximum utility of deployed products over the entire life -something that is fundamental to the Tesla customer experience and should be incorporated into good public policy. Accordingly, Tesla supports the agency in not requiring over capacity declarations.174 Requiring reserve capacity declarations could have the perverse effect of communicating unwarranted battery upsizing as beneficial and incent consumers to choose less efficient vehicles-. [EPA-HQ-OAR-2022-0829-0792, p. 28]

174 88 Fed. Reg. at 29286.

Under EPA’s proposal, manufacturers would be required to warrant a battery and associated powertrain components are free from defects in materials and workmanship which cause the deterioration of the battery SOH to less than 80% UBE for eight years or 80,000 miles, whichever occurs first, starting MY 2027.175 [EPA-HQ-OAR-2022-0829-0792, p. 28]

175 Id.

Tesla supports a minimum warranty requirement as it may eliminate low-lifetime battery pack designs and deployment. Tesla notes that the proposed 80% UBE level exceeds the industry norm. If EPA chooses to exceed the current industry standard, most, if not all, OEMs would be unable to avoid significant warranty costs and liability without significant additional costs to each vehicle. These additional warranty costs will be passed on to customers and increase BEV cost, again dampening BEV uptake. [EPA-HQ-OAR-2022-0829-0792, p. 28]

Currently, Tesla warrants a Model 3 real-wheel drive vehicle for 8 years or 100,000 miles, whichever comes first, with minimum 70% retention of battery capacity over the warranty period.176 As noted, most other OEMs offer similar warranty coverage.177 Other Tesla vehicle models extend the warranty to either 120,000 or 150,000 miles.178 The proposed escalating liability to 80% of the SOH of the battery pack will be a consequential requirement and likely add significant costs. [EPA-HQ-OAR-2022-0829-0792, pp. 28-29]

176 Tesla, New Vehicle Limited Warranty available at https://www.tesla.com/support/vehicle-warranty.

177 See e.g., 2022 Ford F-150 Lightning, What is the warranty on the F-150 Lightning? (“Eight years or 100,000 miles (whichever occurs first), with retention of 70% or more of the original High Voltage Battery capacity over that period”) available at https://www.ford.com/support/how-tos/owner-resources/f-150-lightning/f-150-lightning-product-frequently-asked-questions/#5 ; 2022 Ford Mach-E (“ Battery is covered for 8 years or 100,000 ;miles, whichever comes first, retaining a minimum of 70% of its original capacity over that period.”); Chevrolet, Living Electric: A simple smart way to drive (“Certain electric propulsion components for Bolt EV and Bolt EUV are covered for 8 years or 100,000 miles*”) available at h ttps://www.ford.com/suvs/mach-e/; Volkswagen, The all-new 2021 Volkswagen ID.4 electric SUV (”The high-voltage battery is warranted for eight years or 100,000 miles, whichever occurs first, for defects in

material and workmanship and for net capacity loss below 70%, and can also be transferred to a subsequent owner throughout the remainder of its duration.") available at ; https://media.vw.com/assets/documents/original/13020-2021ID4ReleaseFINAL.pdf; Audi, E -tron "(8 year/100K miles (whichever occurs first) high-voltage battery limited warranty coverage on MY21 Audi E-tron vehicles. Battery capacity decreases with time and use. Warranty coverage may not return battery capacity to an "as new" condition with 100% net capacity. See owner's literature or dealer for limited warranty details.") available at h ttps://www.audiusa.com/us/web/en/inside-audi/sustainability/e-tron-i nnovation/layer/battery_limited_warranty_coverage.html ; See generally, MyEV.com, Evaluating Electric Vehicle Warranties (last visited Feb. 9, 2022) available at https://www.myev.com/research/buyers-sellers-advice/evaluating-e lectric-vehicle-w arranties#:~:text=Like%20other%20vehicle%20types%2C%20an,components%2C%20comprehensive%20and%20powertra i n%20coverage.&text=Importantly%2C%20federal%20regulations%20mandate%20that,eight%20years%20or%20100%2C00 0 %20miles; U.S. Department of Energy, Fact #913: February 22, 2016 The Most Common Warranty for Plug-In Vehicle Batteries is 8 Years/100,000 Miles (Feb. 22, 2016) available at h ttps://www.energy.gov/eere/vehicles/fact-913-february-2 2-2016-most-common-warranty-plug-vehicle-batteries-8-years100000.

178 Id.

Battery pack replacement is much more expensive than ICE replacement of an emissions control system or transmission. For example, estimates place battery pack replacement and labor in the range from a high end of around $16,000179 to $5,500.180 Regardless, if 35% of vehicles were to fail warranty, it represents an average added cost of between $5,600 and $1,925 per car. These figures also do not take into consideration the significant new investment manufacturers will need to make in remanufacturing facilities that seek to repurpose the exchanged battery packs. [EPA-HQ-OAR-2022-0829-0792, p. 29]

179 See, Recurrent, Costs of Electric Car Battery Replacement available at https://www.recurrentauto.com/research/costs-e v-battery-replacement

180 Consumer Report, Pay Less for Vehicle Maintenance with an EV (Sept. 26, 2020) available at https://www.consumerreports.org/car-repair-maintenance/pay-less-for-vehicle-maintenance-with-an-ev/

Accordingly, Tesla advocates warranty thresholds more consistent with the industry standard and adoption of a standard of 8-year, 80,000 miles warranty with 70% UBE. Battery technology and capacity retention may improve, and Tesla is actively pursuing ways to improve lifetime capacity while also decreasing cost, increasing range and, fast charge performance attributes necessary for the widescale adoption of BEVs.181 However, estimating the precise trajectories of this research and development and technological breakthroughs and deployment more than five years out is extremely difficult and should not serve as a basis for an overly prescriptive warranty requirement. [EPA-HQ-OAR-2022-0829-0792, p. 29]

181 Tesla also continues to make significant investments in advancing EV, solar, and battery storage technology with over $1.1B dedicated to research and development in 2021 alone. See Tesla, SEC Form 10-K (Jan. 26, 2022) at 39 available at h ttps://www.sec.gov/Archives/edgar/data/1318605/000156459021004599/tsla-10k_20201231.htm; See also, InsideEVs, Tesla Spends Least On Ads, Most On R&D: Report (Mar. 25, 2022)(reporting that Tesla spends $2,984 per car on R&D and that such spending is three times the industry average and higher than Chrysler, Ford, and GM's R&D budgets combined) available at h ttps://insideevs.com/news/575848/tesla-highest-research-development-no-a ds/?utm_source=feedburner&utm_medium=email.

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

On page 4-34, when referring to maintenance costs over the 225,000-mile life of a vehicle, EPA does not mention the need for battery replacement. [EPA-HQ-OAR-2022-0829-0674, p. 10]

While EPA does not address this issue directly in any of its cost analysis, they do open the door to scrutiny and show their hypocrisy a bit by mentioning the battery durability standards in 1-4, 1-5, and 1-6. Based on the UN standards, a battery capable of supplying its platform with a range of 300 miles when new would be considered within the standard so long as it could provide 240 miles of range after 5 years or 62,000 miles. Additionally, it would remain within that standard if it could provide 210 miles of range to its associated platform after 8 years or approximately 100,000 miles. It only continues to degrade from there. [EPA-HQ-OAR-2022-0829-0674, p. 10]

In the table below, the initial data is from the UN standard and the rest is calculated from there based on linear degradation of the battery throughout its lifecycle. The reality is that the degradation would be faster than this and fast charging used to compete with ICE vehicle refuel times will only exacerbate the degradation. I have also placed a couple helpful links below that support this claim. [EPA-HQ-OAR-2022-0829-0674, p. 10]

A potential counter argument is that the CARB standard is more stringent. However, when looking at the tables it is clear that only 70% of the vehicles must achieve the CARB standard vs 90% of vehicles with the UN standards. So, while the wages of retained usable power are higher, the allowable wage of vehicles failing to meet the standard is higher. [EPA-HQ-OAR-2022-0829-0674, pp. 10-11]

Organization: Valero Energy Corporation

EPA’s cost estimates for future battery packs also ignore the customer-readable battery state-of-health monitor proposed by EPA as a new requirement under this rulemaking.209 [EPA-HQ-OAR-2022-0829-0707, pp. 38-40]

209 EPA’s Proposed Rule at 29284.

Organization: Volkswagen Group of America, Inc.

Comments on EV Topics

VWGoA requests a single battery minimum performance requirement instead of the current two points NPRM. It is appropriate for the EPA to utilize the requirements outlined in UN GTR No. 22; it is noteworthy that the GTR also allows the discretion to enforce just one of the two minimum performance requirements. Volkswagen recommends the EPA adopt the single minimum performance requirements set point of 70% SOCE over 8 years/100k miles. Choosing the longer-term minimum performance requirements of the two proposed, the EPA simplifies compliance checks and reduces regulatory complexity without sacrificing the long-term usefulness of the battery systems of electric vehicles. CARB has implemented a single set point for 70% battery SOH at 8 years/100k miles. Aligning the EPA's minimum performance requirements with CARB's battery SOH requirement would be a step towards harmonizing standards. [EPA-HQ-OAR-2022-0829-0669, pp. 11-12]

Battery State of Health

Harmonization of Battery State of Health Calculation

Volkswagen would like to bring attention to the discrepancy in SOH calculation by the treatment of how battery reserve capacity is utilized between EPA's NPRM proposal and the requirements of CARB's LEV IV regulations. [EPA-HQ-OAR-2022-0829-0669, pp. 11-12]

EPA's NPRM adheres to the UN GTR No. 22, which excludes battery reserve capacity in the SOH calculation. CARB's LEV IV regulation requires a unique SOH calculation that includes the reserve capacity. This would require displaying two different health monitor results when a reserve capacity is used. This situation could easily lead to confusion for consumers. Volkswagen strongly encourages EPA to work with CARB to collaborate on a single solution regarding SOH calculation. [EPA-HQ-OAR-2022-0829-0669, pp. 11-12]

Harmonization of Battery State of Health (SOH) Measurement Method

Volkswagen recommends the EPA specify the state of certified energy (SOCE) display in whole numbers, rather than in decimals. This modification would enhance readability and simplify the customer experience. Volkswagen requests harmonization of the NPRM requirements with CARB's LEV IV regulations. [EPA-HQ-OAR-2022-0829-0669, pp. 11-12]

Organization: Volvo Car Corporation (VCC)

VCC supports either the battery durability requirements within this NPRM or the CARB battery durability requirements effective 2026MY and beyond. However, we strongly encourage EPA to fully harmonize these requirements with the CARB requirements. [EPA-HQ-OAR-2022-0829-0624, pp. 4-5]

Organization: Wisconsin Department of Natural Resources

In addition, EPA is proposing a wide range of program revisions and amendments, including battery durability and warranty requirements for light-duty and medium-duty plug-in vehicles. [EPA-HQ-OAR-2022-0829-0507, p. 1]

Organization: Zero Emission Transportation Association (ZETA)

The following comments relate to the proposed requirements for battery durability:

-ZETA notes that EV batteries have a variety of potential non-propulsion applications that IC engines do not. As a result, these applications may cause the battery to go through wear cycles that are unrelated to reducing on road mobile source emissions. The proposed requirements for battery durability could disincentivize those applications and we encourage EPA to consider ways to uphold the intent of the MPR without disincentivizing non-propulsionary battery applications, including the use of good engineering judgment in determining statistically relevant in-use battery degradation. [EPA-HQ-OAR-2022-0829-0638, pp. 29-30]

-ZETA recommends EPA remove the battery durability MPR of 80% at 5 years or 62,000 miles (midpoint) but retain the 70% at 8 years or 100,000 miles endpoint. Battery degradation may not be linear and depends on a large number of factors.137 An MPR that assumes linear degradation could result in vehicles needing to be recalled despite still meeting the 70% at 8 years or 100,000 miles endpoint if they were allowed to continue operating. [EPA-HQ-OAR-2022-0829-0638, pp. 29-30]

137 "Optimizing the operation of energy storage using a non-linear lithium-ion battery degradation model," Applied Energy, (March 1, 2020) https://www.sciencedirect.com/science/article/pii/S0306261919320471?via%3Dihub

-In regards to the GTR No. 22 "Part B" compliance test under the durability requirements, EPA notes in the proposed rule preamble that "In the case that a durability family fails the Part B durability performance requirement, manufacturers would have to adjust their credit balance to remove compliance credits previously earned by those vehicles."138 ZETA supports this penalty, however, we request clarification that forfeited compliance credits include all relevant credits generated by vehicles within the applicable durability family, not just GHGs. [EPA-HQ-OAR-2022-0829-0638, pp. 29-30]

138 See 88 FR 29286 (May 5, 2023)

The following comments relate to the proposed requirements for emissions control device warranties: [EPA-HQ-OAR-2022-0829-0638, p. 30]

-ZETA requests clarity on what vehicle components constitute "associated powertrain components." While the preamble to the proposed rule includes some discussion on what components may be included: "e.g., electric machines, inverters, and similar key electric powertrain components,"139 a more exhaustive list would provide additional clarity for manufacturers and support a more thorough assessment of this aspect of the proposal. [EPA-HQ-OAR-2022-0829-0638, p. 30]

139 Id. at footnote 138

-ZETA's member companies stand by the durability of their products and many of them have their own warranties. While we support EPA's proposed warranty requirements, we note that designating the electric battery and associated powertrain components as "specified major emission control components" under the Clean Air Act could subject these components to additional regulatory requirements and rules. Specifically, we are concerned about the uncertainty in how EPA's anti-tampering rules may apply to these components and request EPA clarification on how enforcement would be applied to different scenarios where work may need to be performed on these components. [EPA-HQ-OAR-2022-0829-0638, p. 30]

EPA Summary and Response

EPA acknowledges and appreciates all of the comments relating to battery durability and warranty provisions. Comments on this topic included a number of distinct themes that we individually identify and respond to in this section. Additional responses in the context of the final durability and warranty standards may be found in preamble section III.G.2 and III.G.3. Additional responses in the context of test procedures and certification requirements may be found in RTC 6.1 and 6.2.

In general, comments in this area related either to the value and relevance of EPA's proposed regulation of battery durability and/or battery warranty, or to specific aspects of the proposed durability and/or warranty provisions. Comments on the value and relevance of the provisions included statements of support for the importance of ensuring battery durability and warranty for PEVs, as well as comments expressing the position that the provisions are not within EPA's authority. Comments on specific aspects of the proposed provisions included requests to strengthen or weaken the proposed durability and/or warranty program, requests to align with the California ACC II battery durability and warranty program, and various requests to consider adding, eliminating, or modifying one or another element of either program.

A large number of commenters, including BMW, CARB, Consumer Reports, Dana, "Environmental and Public Health Organizations," Lucid, MECA, NTAA, NESCAUM/OTC, Rivian, Sierra Club, SELC, Tesla), expressed general support for the provisions and their intent of promoting battery durability. For example, Tesla agreed with EPA's general adoption of GTR No. 22 and a state of health monitor communicating the battery's state of certified energy based upon usable battery energy. Tesla also stated that durability monitoring can be useful to ensure emission reduction benefits are met, and to provide integrity to credit trading. Several environmental NGOs and supplier organizations indicated support of PEV durability and warranty requirements, and referenced statutory language supporting these measures. Tesla advocated for warranty thresholds more consistent with the industry standard, and adoption of a standard 8-year, 80,000 miles warranty with 70 percent UBE. Lucid requested that EPA consider CARB's current battery warranty under ACC II, which is 70 percent SoH for 8 years or 100,000 miles, and aligns with EPA's proposed end point durability standard.

The Alliance for Automotive Innovation ("the Alliance"), whose comments were echoed by Stellantis, questioned EPA's authority to establish battery durability and warranty requirements. The Alliance, however, also agreed that battery degradation monitors and performance requirements are important tools for battery operation and state of health, and provided recommendations for modifying the program. "Environmental and Public Health Organizations", in contrast to the Alliance, provided commentary supporting EPA's authority.

Commenters' positions varied regarding how the proposed durability and warranty program based on GTR No. 22 should exist alongside the California Air Resources Board (CARB) ACC II durability and warranty program (referred to here as the "CARB program"). Several commenters (Kia, Nissan, Rivian, Tesla) expressed general support or preference for the proposed program being based on GTR 22. Some commenters stressed the differences between the proposed durability program and the CARB program, and stated that it would be difficult for OEMs to comply with two different sets of requirements. Commenters within this group suggested a variety of solutions, including: aligning certain aspects of the proposed program the CARB program; adopting the CARB program instead of the proposed program; or accepting compliance with the CARB program in lieu of compliance with the proposed program. Colorado Energy Office et al., Consumer Reports, Mercedes-Benz, MPCA, NESCAUM/OTC, SELC, and Volvo encouraged EPA to fully harmonize with CARB, while similarly, BMW recommended adopting a single national approach. In contrast, Nissan and "Environmental and Public Health Organizations" supported adoption of GTR No. 22 as proposed. The Alliance for Automotive Innovation and the "Environmental and Public Health Organizations" both stated that EPA should align with global best practices. Mercedes recommended that EPA allow voluntary compliance with the CARB ACC II provisions in lieu of EPA requirements; similarly, several environmental NGOs and state organizations recommended that EPA should align with the CARB regulation to avoid conflicting regulatory requirements, such as for example, differences in the treatment of reserve capacity. CARB recommended that EPA also adopt the full suite of consumer assurance provisions under ACC II.[546] Some commenters noted a difference in state of health monitor display requirements between the proposed program and the CARB program. The Alliance recommended allowing the display of the SOCE value to one decimal place, as is required by the CARB program. Volkswagen preferred display in whole numbers, rather than decimals, and encouraged EPA to work with CARB to collaborate on a single solution regarding SOH calculation. Others more generally recommended that EPA work with CARB to modify aspects of the CARB program. The Alliance recommended that we require fewer than the three separate IUVP monitor accuracy checks under Part A, as the CARB program does not require that many. Commenters also recommended a phase-in for SOCE monitor accuracy tolerance, like CARB's allowance of an 8 percent tolerance in 2027 and 2028, and 5 percent thereafter. Mercedes pointed out that the CARB program would not apply to BEVs with sub-200 mile driving range or PHEVs with sub-70 mile range, as these are not considered eligible for ZEV credit under the CARB program, and suggested that EPA should likewise limit the EPA program to vehicles above these range levels.

EPA also requested comment on the inclusion of a requirement for an SOCR monitor and associated reporting requirements as specified in GTR No. 22. Automakers expressed general support for basing the MPR on a metric of usable energy, or SOCE, as specified in GTR No. 22, and not on SOCR. Several expressed specific opposition to a range-based metric or SOCR, while the “Environmental and Public Health Organizations” encouraged use of both SOCE and SOCR.

In the proposal, EPA recognized that the California Air Resources Board durability program includes a specific provision that requires manufacturers to disclose and account for any battery reserve capacity that the manufacturer has chosen to initially withhold from use for release later in the life of the vehicle to maintain driving range or usable energy capacity after degradation has occurred. This provision of the California regulation is meant to allow consumers to know the state of chemical degradation of the battery independently of apparent range or energy capacity. Although EPA did not propose a requirement to disclose reserve battery capacity, in recognition of CARB’s inclusion of this parameter, the agency requested comment on including a reserve capacity declaration requirement and use of reserve capacity information in calculating an SOCE or SOCR metric. The Alliance, Kia, Nissan, and Tesla supported not including battery reserve in the SOCE metric, while others (CARB, Lucid, Rivian) supported it; Volkswagen did not express a preference but recommended that any requirement be harmonized between EPA and CARB. Tesla recommended that EPA should not encourage manufacturers to overcome the durability threshold by creating larger batteries with hidden capacity that can slowly be accessed as the battery degrades, and supported EPA in not requiring over capacity declarations, but to encourage full access to the battery (with reliable SOCE monitoring). Lucid supported the CARB approach to SoH calculations and battery reserve capacity and encouraged EPA to consider that approach. Rivian indicated that there are benefits to requiring disclosure of battery reserve capacity and EPA might wish to consider establishing a requirement in this or a future

[546] California’s suite of assurance measures includes: a minimum electric range for BEVs and PHEVs; durability standards based on a vehicle’s certified electric range; warranty requirements for batteries and propulsion-related parts; data standardization and transparency, including on-board display of the battery state of health so that consumers can see the quality of their battery; requirements for manufacturers to provide highly-capable convenience charging cords and equipping vehicles with standardized, direct current fast charging inlets; requirements that repair information be released to independent repair shops; and, requirements around battery labeling to ease dismantling and recycling.

rulemaking. CARB felt that failing to include reserve battery capacity in the SOH calculation could limit the credibility of the SOH parameter and undermine its ability for vehicle owners to use it to validate warranty eligibility or to properly value used ZEVs based on the amount of degradation of the battery, and urged EPA to explicitly require manufacturers to account for the reserve UBE in SOCE calculation.

We also received comment relating to the virtual mileage provision of GTR No. 22, which accounts for use of the battery for purposes other than propulsion of the vehicle (e.g., vehicle-to-building (V2B) or vehicle-to-grid (V2G) applications). This provision had wide support among manufacturers. Some commenters noted that GTR No. 22 included virtual mileage provisions and expressed uncertainty over whether the EPA program proposed to include the virtual mileage provision in either the durability mileage or the warranty mileage used for compliance purposes.

EPA received a variety of comments regarding minimum performance requirements (MPR) and their enforcement. Some commenters considered the requirements to be too stringent, while others suggested that they could be more stringent. VW recommended that EPA should adopt a single performance requirement of 70 percent at 8 years/100k miles. Tesla supported the proposed MPR as reasonable and achievable, while also advocating for a flexible approach allowing the manufacturer to use good engineering judgment in determining the statistically adequate and representative use of vehicle data. Tesla also supported the decision not to implement an MPR for medium-duty vehicles (MDVs).

In response to comments that regulation of battery durability or warranty is outside of the Agency's regulatory authority, EPA disagrees.

At the outset we note that some commenters, including the Alliance for Automotive Innovation ("the Alliance") questioned EPA's authority to adopt durability and warranty requirements for batteries in BEVs. The Alliance, however, also agreed that battery degradation monitors and performance requirements are important tools for battery operation and state of health, and provided recommendations for modifying the program. Here we first address this threshold issue.

EPA disagrees that regulation of battery durability is outside of the Agency's regulatory authority. As is described in further detail in the sections below, EPA's authority to set and enforce durability requirements for emission-related components like batteries is an integral part of its title II authority. Durability requirements ensure that vehicle manufacturers and the vehicles they produce will continue to comply with emissions standards set under 202(a) over the course of those vehicles' useful lives. Such authority arises both out of section 202(a)(1) and 202(d) (relating to a vehicle's useful life) and section 206(a)(1) and 206(b)(1) (relating to certification requirements for compliance). As is described in detail in the following section, EPA has exercised its authority to set emission durability requirements across a variety of emission-related components for decades.

EPA also disagrees that it lacks the authority to set warranty standards for BEVs. EPA has already set emission warranty standards under section 207(a) in 2010 for all components that are used to obtain GHG credits that allow the manufacturer to comply with GHG standards, which includes BEV, PHEV, and hybrid batteries.[547] EPA was not challenged on those standards. To the extent the Alliance's comment challenges EPA's ability to set warranty requirements generally for any component that is used to obtain GHG credits that allow the manufacturer to comply with GHG standards, it is out of time.

The Alliance is mistaken in suggesting that there is no way for EPA to require an emission-less vehicle to warrant at time of sale that it is "designed, built, and equipped so as to conform, at time of sale with applicable regulations under [section 202(a)(1)…. and … for its useful life, as determined by [section 202(d)].") Section 207(a)(1). In fact, automakers warrant at the time of sale that each new vehicle is designed to comply with all applicable emission standards and will be free from defects that may cause noncompliance. They do so with respect to all emission-related components in the manufacturer's application for certification, which include batteries. These provisions comport entirely with section 207 of the Act.[548]

The Alliance suggests that EPA does not have authority to set durability or warranty requirements because BEV batteries are not emission-related for two reasons. First, the Alliance argues that because BEVs do not themselves emit, EPA does not have authority to set vehicle specific standards for them, and EPA's warranty and durability authorities rely on EPA's ability to set vehicle specific standards. EPA does have the authority to set vehicle-specific standards for BEVs as part of the "class" of LDVs. See Section III.G.2 of the preamble. In addition, EPA has already set vehicle-specific standards for BEVs--the in-use standards applicable to all members of the LDV class.

The Alliance argues second that a component only counts as emission-related if its failure would allow the vehicle to continue operating, but with higher emissions. In fact, EPA has set durability requirements for diesel engines (see 40 CFR 86.1823-08(c)), failure of which could cause the vehicle to stop operating. Similarly, Congress explicitly provided that electronic control modules (ECMs) (described in the statute as "electronic emissions control units) are "specified major emissions control component[s]" for warranty purposes per section 207(i)(2); failure of ECMs can also cause the vehicle to stop operating, and not necessarily increase the emissions of the vehicle.

BEV batteries are emission-related components--thus providing EPA authority to set durability and warranty requirements applicable to them--for two reasons. First, they are emission-related by their nature. Durability and warranty requirements for batteries are not, to use the Alliance's analogy, like requiring a warranty for a vehicle component like a vehicle's "infotainment system" that has no relevance to a vehicle's emissions. Integrity of a battery in a vehicle with these powertrains is vital to the vehicle's emission performance; integrity of its "infotainment system" is not. It would be wrong to say that a component that allows a vehicle that would otherwise emit to operate entirely without emissions is not inherently emission-related.

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[547] See 75 FR 25486.

[548] The Alliance's comment argues in passing that EPA does not have the authority to designate a BEV battery as a "specified major emission control component" with an 8 year or 80,000 mile warranty because it is not a "pollution control device or component." That term is not defined in the Act; for the reasons described in this section, EPA believes that BEV batteries are "pollution control device or component[s]" for the same reasons they are "emission related components."

Second, for warranty and durability purposes, EPA has consistently considered a component to be "emission related" if it relates to a manufacturer's ability to comply with emissions standards, regardless of the form of those standards. For standards to be meaningfully applicable across a vehicle's useful life, EPA's assessment of compliance with such standards necessarily includes an evaluation of the performance of the emissions control systems, which for BEVs (and PHEVs) includes the battery system both when the vehicle is new and across its useful life. This is particularly true given the averaging form of standards that EPA uses for GHG emissions (and which the Alliance continues to support), and which most manufacturers choose for demonstrating compliance. For EPA to determine the level at which to set fleet average standards, the Agency needs to have confidence that the emissions reductions—and thus credits generated —by each BEV and PHEV introduced into the fleet are reflective of the real world. Ensuring that BEVs and PHEVs contain durable batteries is important to assuring the integrity of the averaging process: vehicles will perform in fact for the useful life mileage reflected in any credits they may generate. Put another way, durable batteries are a significant factor in vindicating the averaging form of the standard: that the standard is met per vehicle, and on average, per fleet throughout the vehicles' useful life. The battery durability provisions finalized in this rulemaking allow for confidence that the batteries installed by vehicle manufacturers are durable and thus support the standard.

In addition to EPA's general authority to promulgate durability requirements under sections 202 and 206, EPA has additional separate and specific authority to require on-board monitoring systems capable of "accurately identifying for the vehicle's useful life as established under [section 202], emission-related systems deterioration or malfunction." Section 202(m)(1)(A).[549] As we discuss at length in this section, EV batteries are "emission-related systems," and thus EPA has the authority to set durability monitoring requirements for such systems over the course of a vehicle's useful life.

In response to comments that EPA should work with CARB to modify aspects of the CARB program, EPA considers modification of the CARB program to be outside the scope of this rulemaking.

The Alliance and Ford Motor Company requested that EPA require only one battery monitor accuracy check instead of requiring checks at low, medium, and high mileage to verify the SOCE monitors are accurate. The Alliance noted that the CARB program requires only a single check. Ford expressed concern that procuring vehicles will be difficult and the required testing will add an additional 400 to 500 miles on a procured vehicle. As Ford does not expect the accuracy of the state-of-certified-energy monitor to change during the first 5 years of BEV operation, Ford proposed that EPA only perform monitor accuracy testing at the 3 year interval and not also test at 1 and 5 year intervals.

In response, EPA acknowledges that the CARB program requires fewer in-use accuracy checks than the EPA program. The EPA program, however, relies explicitly on the accuracy of the monitor in determining compliance with the MPR. Therefore we do not agree that the presence of fewer IUVP accuracy checks under the CARB program is necessarily relevant to the

[549] Section 202(m)(1)(A) specifically applies to light duty vehicles and light duty trucks, but section 202(m)(1) allows EPA to "promulgate regulations requiring manufacturers to install such onboard diagnostic systems on heavy-duty vehicles and engines," which provides concurrent authority for the MDV battery monitoring requirements discussed in this section.

EPA program. Through its experience contributing to development of GTR No. 22 and continued study of battery durability and monitoring, EPA finds that the additional benefit of checks at multiple intervals for assessing and assuring compliance outweighs the marginal costs of conducting additional checks. Carryover provisions apply to monitor testing as described in 40 CFR 86.1839-01(c), making it unnecessary to continue testing for every model year within a monitor family. Further, monitor accuracy at an early point in the vehicle's life when little change in SOCE would be expected does not necessary imply similar accuracy when the battery has aged and a larger change would be expected. This indicates that at least two checks are necessary to establish longevity of accuracy. However, EPA notes commenters' concerns with having more checks than necessary. EPA has considered the needs of the program and finds that two checks, one at 2 years and 20,000 miles and another at 4 years and 40,000 miles are sufficient to establish monitor accuracy. This also aligns with existing IUVP practice which includes only two checks. EPA has therefore revised the program to include two accuracy checks. See 40 CFR 86.1811-27, 86.1845-04(g) and 86.1839-01(c).

Regarding comments recommending that there be no accuracy check for MDVs, EPA disagrees. EPA continues to consider the accuracy check to be an important component of the program for both LDVs and MDVs. Although EPA has not yet determined that including MDVs under the durability MPR is appropriate at this time, EPA considers battery durability to be relevant to MDVs for the same reasons it is relevant to LDVs, and the presence of a monitor to provide knowledge of the battery state of health is important in both cases. Further, the presence of a monitor implies that the monitor should be accurate. EPA also notes that its work contributing to further development of GTR No. 22 may include extending the GTR MPR to MDVs. Experience with the accuracy of MDV monitors in its own durability program will be important to EPA's decision of whether or not to extend EPA MPR requirements to MDVs in the case that EPA finds it appropriate to do so in a future rulemaking.

Regarding CARB's recommendation that we adopt the full suite of ACC II ZEV assurance measures, and also adopt "further on-vehicle charging standards and collect additional data to inform future ZEV consumer labels," EPA agrees that the ZEV assurance measures are likely to be supportive of ZEV adoption but has not determined whether or not these measures are appropriate at the national level.

In response to recommendations that EPA should adopt certain specific provisions of the CARB program (for example, inclusion of battery reserve in SoH calculation, phase-in of monitor accuracy tolerance, exempting shorter-range BEVs or PHEVs from requirements, OBD requirements and data parameters, basis on percentage points vs. percent, etc.), EPA believes that the CARB program and the proposed program based on GTR No. 22, in their entirety, are similarly effective, but that each program achieves that effectiveness by operating as a whole, and may become less effective if specific requirements from one program were moved into or out of the context of the other. For example, the CARB performance requirement is nominally more stringent in miles and years than the EPA MPR, but this is offset to some degree by requiring a smaller percentage of vehicles in a test group to pass. The CARB program also differs from the GTR in its test groupings in ways that are consistent with this difference, while the GTR adopts test groupings that specifically address the importance of monitor accuracy under its specific structure. To preserve the integrity of each program as designed, EPA is generally not taking an approach of adopting specific individual elements of the CARB program at this time. For example, EPA does not consider phase-in of monitor accuracy tolerance as allowed under the CARB program to be as appropriate under the EPA program because the latter has an explicit reliance on accuracy of the monitor for determination of compliance under Part B, and the development of GTR No. 22 specifically concluded that a five percent tolerance was appropriate. Similarly, mathematical features such as use of percentage points or percent derive from the statistical methods applicable to each program and were determined to be appropriate in the specific context of each program.

Regarding the number of decimal places for the monitor, EPA clarifies that for purposes of an on-board SOCE value, the on-board value shall have a resolution of at least 1 part in 100 and the value used in the compliance calculation shall be reported as the nearest whole number from 0 to 100 as specified in the GTR. The on-board value stored on the vehicle may have greater resolution as long as the value used in the calculation is as specified above. For the value displayed to the operator, GTR No. 22 anticipates that "the resolution for the customer values shall be determined in agreement with the authorities." EPA will accept a display value that is displayed with one decimal place if the on-board value satisfies the above criteria.

In response to comments that EPA should accept compliance with the CARB program in lieu of the federal program, EPA agrees that this would promote harmonization between the two programs. As described above, EPA considers the CARB durability program, when viewed in its entirety as designed, to be no less effective at achieving the intent of the EPA durability program. EPA has also assessed both programs carefully and has concluded that it is possible for manufacturers to comply with both programs simultaneously. Manufacturers who will have to comply with the CARB program will often also have to comply with GTR No. 22 in other international jurisdictions, which is very similar to the EPA program. However, EPA agrees with commenters' concerns that complying with both CARB and EPA durability programs may require more effort than complying with only one. Accordingly, EPA will accept manufacturer compliance with the entirety of the CARB ACC II durability program in lieu of the EPA durability program. To utilize this optional pathway, manufacturers must declare their intention to do so, in which case their compliance with the CARB durability program will be deemed as compliance with the EPA durability program. Regardless of whether a manufacturer chooses to follow the CARB or the EPA program, failure to comply with the chosen program will result in the same credit loss penalty as under the EPA program.

EPA considers the addition of the option to comply with the CARB durability program in lieu of the EPA durability program to be responsive to the various requests to adopt certain specific elements of the CARB program, considering the need to avoid compromising the integrity of either program.

In response to comments on inclusion of an SOCR monitor and/or enforcement of an SOCR-based performance requirement, EPA continues to assess that SOCE is sufficient at this time as a basis for the MPR. To this point, EPA notes that at this time GTR No. 22 requires only that an SOCR monitor be implemented and does not use it for enforcement of the MPR. EPA has not yet determined that requiring an SOCR monitor in addition to an SOCE monitor is necessary to achieve the intent of the durability program in the context of this rulemaking. EPA will continue to consider whether the addition of an SOCR monitor is necessary as part of a potential future rulemaking, and will continue to follow development of GTR No. 22 with respect to this issue, but at this time is electing not to include this requirement in the final standard, as proposed.

EPA also notes that its decision not to include an SOCR monitor does not imply that the agency necessarily believes that an SOCR monitor is not desirable or practical to implement. To this end, EPA notes that some commenters appeared to be confused on the nature of an SOCR monitor as described by GTR No. 22, for example, the comment from Kia that stated in support of not including SOCR that "ICE vehicles are not required to display a SOCR because the range is extremely reliant on consumer behavior." EPA disagrees with the suggestion that the SOCR metric is somehow subject to the well-known difficulty of predicting the actual range of a vehicle under variable real-world conditions and variable driver habits and behavior. Instead, SOCR is an estimate of what the certification label range would be at the current point in the vehicle's life if the vehicle were tested according to the certification range test procedure that was used when the vehicle was new. That is, just as with SOCE, SOCR is an estimate of a result of a controlled-condition test, and is in no way related to variables such as consumer behavior or on-road conditions.

Several commenters (the Alliance, Fermata Energy, Kia, Lucid, Rivian, and ZETA) expressed uncertainty as to whether virtual mileage was included in the proposed program and whether it applied to durability mileage, warranty mileage, or both. Ford and Mercedes-Benz requested that the virtual mileage provision be applied to both the battery durability requirements and warranty provisions. In response to these comments, EPA clarifies that virtual mileage as defined in GTR 22 applies to the EPA program but only for durability, that is, virtual mileage is applicable only to the mileage used for determining compliance with the durability provisions, as defined in GTR No. 22. EPA notes that the virtual mileage provision originates in EPA's adoption of GTR No. 22, and as such is applicable only to the durability provisions. GTR No. 22 does not include warranty provisions, and so the mileage used for warranty under the EPA program does not include virtual mileage. EPA retained the virtual mileage provision in the context of durability for the purpose of maintaining consistency with the GTR design and structure, and not for the purpose of potentially extending the provision to other mileage-related aspects of our regulations.

Regarding the Alliance's suggestion that virtual mileage be indicated on an odometer-like display, EPA prefers to remain aligned with the GTR requirements in which the virtual mileage is retrieved from onboard data.

EPA disagrees with comments that express the belief that, as one commenter said, the proposal did not include "consideration of frequent use of V2G." The virtual mileage provision of GTR No. 22 is clearly oriented to this purpose. EPA agrees with comments expressing the view that vehicle-to-grid and vehicle-to-building offer a potential opportunity to help serve the grid and provide additional functionality to consumers.

As an alternative to the inclusion of virtual mileage, some commenters suggested that EPA should exclude vehicles that were used for V2G or V2B from warranty coverage, or "lower the warranty requirement to account for frequent bidirectional charging." EPA continues to assess that such provisions are not necessary. We note that the warranty mileage, which does not include virtual mileage, is only 80,000 miles compared to the durability mileage of 100,000 miles. This reduced stringency largely addresses commenters' concerns regarding warranty mileage and likely levels of V2G or V2B usage.

Some commenters who may have been uncertain as to whether or not virtual mileage applied to the durability mileage went on to suggest that EPA should exclude vehicles that were used for

V2G and V2B from the durability test sample. EPA considers our clarification with respect to inclusion of virtual mileage to address this comment.

In response to comments suggesting that the minimum performance requirement (MPR) is too stringent, EPA disagrees. The MPR is derived from GTR No. 22 which was developed with extensive input, leadership, and participation from EPA and thus it reflects what EPA considers to be an appropriate framework and set of requirements for ensuring battery durability, including the choice of MPR. The MPR is very similar to warranty coverage already provided by vehicle manufacturers, indicating that the MPR described in the proposal is satisfactory and achievable. As also noted in section III.G.2 of the preamble, manufacturers are already providing warranty coverage similar to what is required by the final durability and warranty requirements.[550,551,552,553,554] EPA considers the example of current warranty coverage to be a reasonable starting position to provide consistency across the market. Regarding comments that warranty terms are not necessarily applicable to a compliance context, see the discussion of related comments in section III.G.2 of the preamble. EPA is therefore finalizing the proposed MPR.

In response to comments that the battery durability and/or warranty requirements would increase battery manufacturing cost and that EPA should account for this cost, EPA disagrees. Because the durability minimum performance requirement and the minimum battery warranty are similar to currently observed industry practices regarding durability performance and warranty terms as mentioned above, EPA continues to assess that these requirements will not result in a significant increase in battery manufacturing costs, and commenters did not provide compelling evidence or strong supporting data regarding cost increases that they believe would result from these requirements.

Regarding comments that EPA did not account for the cost of complying with battery durability and warranty requirements (e.g. from Hyundai, POET LLC, and Valero), or that it will add significant cost to the vehicle, EPA disagrees. As stated above, the MPR is very similar to existing warranty requirements and as such EPA does not assess that it will add significantly to the cost of the vehicle. EPA also assesses that the instrumentation and algorithmic requirements of the SOCE monitor are very similar to existing battery state of health monitoring features that manufacturers already implement to support needs such as, for example, informing the battery management system of battery state of health and evaluating warranty claims. As such EPA has not identified any significant additional manufacturing cost, and commenters did not provide

[550] United Nations Economic Commission for Europe Informal Working Group on Electric Vehicles and the Environment (UN ECE EVE), "Battery Durability: Review of EVE 34 discussion," May 19, 2020, p. 12. Available at https://wiki.unece.org/download/attachments/101555222/EVE-35-03e.pdf?api=v2

[551] UK Department of Transport, "Commercial electric vehicle battery warranty analysis," April 25, 2023. Available at https://wiki.unece.org/download/attachments/192840855/EVE-61-08e%20-%20UK%20warranty%20analysis.pdf?api=v2

[552] CarEdge.com, "The Best Electric Vehicle Battery Warranties in 2024," January 9, 2024. Accessed on February 16, 2024 at https://caredge.com/guides/ev-battery-warranties

[553] California Air Resources Board, "Cars and Light-Trucks are Going Zero - Frequently Asked Questions." Accessed on February 16, 2024 at https://ww2.arb.ca.gov/resources/documents/cars-and-light-trucks-are-going-zero-frequently-asked-questions

[554] Forbes, "By The Numbers: Comparing Electric Car Warranties," October 31, 2022. Accessed on February 16, 2024 at https://www.forbes.com/sites/jimgorzelany/2022/10/31/by-the-numbers-comparing-electric-car-warranties/?sh=2ed7a5243fd7

such data. As with other technologies manufacturers add to comply with standards, EPA accounts for direct manufacturing cost and does not individually account for research and development costs which are accounted for through our use of an retail price equivalent (RPE) factor of 1.5 applied to direct manufacturing costs, such as the cost of the battery. RPE is discussed in Chapter 2.5.4 of the RIA.

Several commenters (Lucid, Volkswagen, ZETA) recommended that EPA adopt only the 8 year, 100,000 mile requirement of the MPR, and not the 5 year, 62,000 mile midpoint requirement. EPA acknowledges that GTR No. 22 allows the possibility of local jurisdictions adopting either or both of the requirements. EPA agrees that requiring only the later requirement may reduce test burden. (as opposed to a battery design that degrades more rapidly in earlier years, which would tend to increase the potential impact of lost range capacity on the total mileage the vehicle can attain over its life). Also, the 5-year requirement allows for an earlier compliance decision if a vehicle is on track to fail the 8-year standard. In EPA's view, these substantial compliance benefits outweigh the added burdens of additional testing. For these reasons we are retaining the 5 year requirement in the program.

The Alliance recommended that, in 40 CFR § 86.1815 of the regulatory text, that we replace the term “electric vehicles” with “BEVs and PHEVs” to exclude FCEVs from monitoring and durability requirements. Fuel cell vehicles were not included within the technical analysis or scope of GTR No. 22 and EPA has not yet determined that the monitoring and durability requirements developed under GTR No. 22 are appropriate for FCEVs. Accordingly, EPA has made the requested change to § 86.1815.

The Alliance also requested clarification on whether or not the durability and monitoring requirements are tied to the Tier 4 phase-in per § 86.1815. EPA clarifies that there are no phase-in provisions with regard to the battery durability standards, which begin in model year 2027.

Regarding recommendations that we adopt the most recent versions of SAE J1634 (2021) and J1711 (2023), please see Section III.G of this preamble, Electric Vehicle Test Procedures.

The SAVE Coalition recommended that we revise § 86.1815(a) to specify that the monitor estimate of SOCE should be made available on an “owner-accessible” display rather than a “customer-accessible” display, to accommodate situations such as autonomous transportation services, where the customer of the autonomous service is not the owner of the vehicle. EPA agrees that "customer" may be ambiguous in this application; however, we also believe that using the term "owner" might be interpreted as excluding lessees or other parties with a legitimate interest in the state of health of the battery. EPA is clarifying the regulatory text by changing "customer-accessible" to "operator-accessible." As the customer of a fully autonomous transport service is not an operator, EPA believes that this modification addresses the commenter's concern.

The SAVE Coalition also recommended flexibility regarding geographic requirements for sampling in the case of autonomous vehicles that may be restricted to a certain geographic location. EPA understands the theoretical situation described by the commenter, however, EPA also notes that few vehicles operate in such fleets today, and even fewer if any are vehicles that only exist as a vehicle model solely for the purpose of participating in that captive fleet (i.e. are completely unique from any vehicle models sold to the general public, which would exist in far greater numbers outside of the fleet described by the commenter). Accordingly, EPA does not consider the theoretical situation described by the commenter to require specific action at this time.

Some commenters requested clarification as to whether the removal of compliance credits earned by vehicles that fail the durability requirement applies only to GHG credits earned, or also to NMOG+NOX credits earned. In the proposal, EPA stated that in the case of failure to meet the durability requirements, “manufacturers would have to adjust their credit balance to remove compliance credits previously earned by those vehicles,” and the regulatory text stated “the manufacturer must adjust all credit balances to account for the nonconformity.” EPA clarifies that for BEVs, this provision applies to both GHG credits and NMOG+NOX credits, and for PHEVs, only to GHG credits. As explained in section III.G.2.I of the preamble, given the fleet average nature of both the GHG and NMOG+NOX standards, EPA needs to have confidence that the emissions reductions (and thus credits generated by each BEV and PHEV introduced into the fleet) are reflective of actual performance for the useful life mileage reflected in any credits they may generate. Credit removal for failing the durability requirement, specifically the Minimum Performance Requirement, only applies to LD BEVs and PHEVs. In the case of BEVs, the credits affected include GHG and $NMOG+NO_X$ credits. For PHEVs, although PHEVs earn both GHG and NMOG+NOX credits, the credits affected include only GHG credits. PHEV credits for NMOG+NOx would not need to be forfeited because testing to determine compliance with NMOG+NOx standards is based on charge-sustaining mode when the engine is operating, and NMOG+NOX emissions in this mode are not generally impacted by the amount of grid energy that can be stored in the battery.

EPA notes that some commenters appeared to interpret the 5 percent tolerance for monitor accuracy under Part A as a two-sided delta, that is, that the monitor would be judged to fail if it shows a value either 5 percent over or 5 percent under the test value. For example, the Alliance indicated that a 2-sided threshold is not necessary, because protection from overestimation is all that is needed. EPA clarifies that the statistical method defined in GTR No. 22, and the way it is used to determine compliance with the MPR, only considers the monitor to fail the accuracy test if it is more than 5 percent over the test value (i.e., is overly optimistic).

EPA also clarifies that Annex 3 of GTR No. 22 applies only in jurisdictions where WLTP is used. The quantities that represent $UBE_{measured}$ and $UBE_{certified}$ for the purpose of part 6.3.2 of GTR No. 22 in the context of this rule are specified in the regulatory text.

EPA disagrees with the comment from MEMA that expresses the view that SMECC warranties are not required due to the existence of warranties under the Magnusson-Moss Warranty Act. Section 207 of the CAA expressly authorizes the Administrator to require the warranty requirements in this final rule. These requirements support the emissions reduction goals of CAA as discussed elsewhere in these responses.

Several commenters (Lucid, MEMA, Rivian, ZETA) indicated that EPA should clarify the meaning of “associated powertrain components.” ZETA specifically recommended adopting a closely related CARB definition. In response, EPA has revised 40 CFR § 85.2103(d)(1)(v) of the regulatory text which now clarifies that the provision applies to "all components needed to charge the system, store energy, and transmit power to move the vehicle."

ZETA and Rivian requested that EPA clarify how anti-tampering rules would apply to components newly defined as SMECCs in scenarios where maintenance work is performed. EPA clarifies that the statutory provisions continue to apply. Annex 1 of GTR No. 22 specifies that vehicles that have had the battery replaced or repaired, or have been used for racing, are exempted from Part A testing.

In the proposed regulatory text, EPA explicitly tied the warranty failure criteria to the durability requirement, i.e. an individual vehicle would be deemed as eligible for warranty battery repair if it retains less than 80 percent SOCE at 5 years or 62,000 miles, or less than 70 percent SOCE at 8 years or 80,000 miles (although the MPR for durability states 100,000 miles, warranty is set at 80,000 miles by statute). The Alliance stated that EPA should not specify warranty failure criteria at all, and should not tie it to the MPR failure criteria, on the grounds that they felt that warranty should be determined by the manufacturer and might legitimately vary between different types of products. In contrast, CARB and other commenters supported the warranty requirement, and CARB supported EPA's explicitly tying battery warranty failure criteria to the durability performance requirement.

In response to the comments that EPA should not specify warranty failure criteria (for example, specifying the SOCE level that would trigger a warranty repair), EPA continues to find that the proposed warranty requirements are equivalent to those that EPA has the authority to require and has historically applied to other specified major emission control-related components for ICE vehicles under EPA's light-duty vehicle regulations, and are similarly implemented and under the authority of CAA section 207. See also our extended discussion of warranty above. However, we acknowledge that for analogous warranty requirements as they have pertained to emissions related ICE powertrain components under the same statute, EPA has in the past specified only the years and mileage and not the exact failure criteria that would trigger a warranty repair. This has largely been possible because of the way OBD requirements are integrated with the emissions rules, in that a material failure of a combustion-engine emission component to perform as designed (due to any number of potential failure modes) would ultimately result in increased tailpipe emissions that would in turn activate a malfunction indicator lamp (MIL) that serves as evidence that a warranty repair is needed. In the case of a PEV high-voltage battery, current regulations and OBD specifications do not provide for a MIL to illuminate in response to a battery that has an SOCE monitor reading below the MPR minimum, and EPA has not yet determined whether it is appropriate to do so. Accordingly EPA had proposed to tie the battery warranty failure criteria to the MPR criteria to provide a clearer definition of what constitutes the need for a warranty repair. However, in light of the comments received and additional research, EPA has reconsidered the appropriateness of doing so. While EPA considers a Part A-validated SOCE monitor that is installed on all the vehicles in a durability group to be sufficiently accurate to use for determining collective compliance of a durability group based on a large sample, based on the current record, EPA finds that it is possible that on an individual vehicle basis, an individual SOCE monitor may be less definitive in establishing the true SOCE for that individual vehicle (due to variations in recent use conditions, a specific defect, etc.) At this time, EPA expects that a manufacturer would therefore legitimately prefer to evaluate the need for an individual warranty repair by performing an individual evaluation of the vehicle battery rather than relying solely on the estimate provided by the monitor. Further, although EPA has determined that the SOCE values of 70 percent and 80 percent for the respective mileages of 62,000 and 100,000 miles (respectively) under the MPR are appropriate, the warranty statute specifies a mileage of 80,000 miles which lies between the two. Based on our further review of the record, EPA is not making a final determination at this time as to whether it is appropriate to simply interpolate between the two, or if the shape of a typical degradation curve would suggest a different value as more appropriate. Finally, EPA also notes that it did not propose specific failure criteria that would be applicable to related (non-battery) powertrain components (inverters, motors, etc.) which, like the high-voltage battery, are also not tied to MIL functionality. Accordingly at this time we are not tying the battery warranty performance criterion to the durability performance requirement. Instead, we are retaining the 8-year and 80,000 mile warranty duration as specified by the statute, but are allowing the manufacturer to specify the percentage SOCE that will trigger a warranty repair at that point in the vehicle's life, and also requiring the manufacturer to (a) clearly disclose the warranted percentage SOCE to the customer in writing prior to sale, and (b) establish, describe, and disclose an evaluation method that will be used by the manufacturer to determine that percentage SOCE has fallen below the warranted percentage, and show to EPA's satisfaction that it is accurate and reliable. EPA believes that these provisions combined with manufacturers' competitive need to offer a strong warranty will provide the intended degree of protection and transparency to the customer until additional data is available allowing EPA to determine an appropriate SOCE level for the 80,000 mile point. EPA also notes that this is a minimum warranty, and many manufacturers already offer a longer battery warranty for competitive reasons and are likely to continue doing so.

This also addresses the comment from CARB which pointed out that the "proposal appears to mistakenly tie all non-battery powertrain components to this same battery durability performance requirement when defining failures that merit warranty replacement. Such a connection renders the warranty requirements meaningless for those components." CARB went on to recommend that EPA adopt "an appropriate failure metric(s) for warranty coverage for non-battery components." EPA agrees with CARB's observation that the SOCE stipulation is not applicable to associated powertrain components, and the removal of the explicit connection as described above addresses this comment. For these components EPA is specifying only the years and mileage terms and not specific failure criteria. As stated above, EPA did not propose and has not yet determined an appropriate failure criteria for these components, because just as with combustion-engine components, a variety of conceivable failure modes exist and EPA has not yet determined the most appropriate metrics for each component that could be monitored to detect a defect.

Regarding the comment from AFPM that EPA is "relying on other programs, like California's, to implement battery durability… to ensure customer demand," EPA disagrees. EPA does not rely on the CARB program to ensure customer demand, nor to implement battery durability, as evidenced by the EPA durability program which is distinct from the CARB durability program. In the context commenter may be referring to, EPA mentions the CARB program only as supporting evidence that battery durability has been identified as an important issue by other regulatory bodies. Although the final standards include an option for manufacturers to comply with the CARB durability program in lieu of the EPA durability program, this is offered as a flexibility for manufacturers and does not constitute a reliance on the CARB program since EPA also offers its own separate durability program.

Regarding the comment from AFPM that "EPA's proposal may impose additional costs of economic risk to individuals and small business owners who will be asked to depend on increasingly expensive infrastructure necessary to provide on-the-go fuel," the reference cited by commenter indicates that this comment is addressed to the heavy-duty rulemaking and is out of scope for this rulemaking. Regarding the statement by same commenter that “EPA should consider inclusion of durability requirements in this proposal as 150 miles of range for singular battery life and 24,000-mile range of use (or two years) are well below the period of use for a comparable ICEV with a full tank of fuel and will impact consumers as there is not enough data with these technologies,” EPA is unable to determine what precisely this comment means or whether the comment indicates support or opposition to durability standards. EPA is not proposing standards related to “150 miles of range for singular battery life” nor “24,000-mile range of use.”

Regarding the request by Fermata Energy to include a “small multiplier credit for vehicles that have on-board AC bidirectional chargers or are integrated with multiple DC off-board chargers,” the commenter failed to explain with reasonable specificity why such a multiplier was appropriate. EPA has not determined whether or not a credit for such purpose is appropriate or necessary at this time.

Regarding MEMA’s request to “clarify that warranty repairs can be completed at dealer or authorized repair locations, and at quality independent aftermarket repair locations,” and commenter’s views on the “impact longer warranties could have on choices in consumer repair,” and related comments related to consumer choice, this is outside the scope of the proposal. EPA notes, however, that under section 207(c)(3), each manufacturer “shall furnish with each new motor vehicle or motor vehicle engine written instructions for the proper maintenance and use of the vehicle or engine by the ultimate purchaser and such instructions shall correspond to regulations which the Administrator shall promulgate.” These instructions “shall not include any condition on the ultimate purchaser’s using, in connection with such vehicle or engine, any component or service (other than a component or service provided without charge under the terms of the purchase agreement) which is identified by brand, trade, or corporate name; or directly or indirectly distinguishing between service performed by the franchised dealers of such manufacturer or any other service establishments with which such manufacturer has a commercial relationship, and service performed by independent automotive repair facilities with which such manufacturer has no commercial relationship….”[555]

Further, EPA does not agree that longer warranties would necessarily limit choice and MEMA did not clarify exactly how or why they expect this to happen. Regarding MEMA’s comment that “it is important that components found in both an ICE and a zero emissions vehicle not carry longer warranties for ZEVS than for ICE,” and that EPA “not expand warranty coverage to parts that have a shorter life and are a routinely replaced due to wear, or are adjacent to the warrantied parts through physical, electrical, or software connections but not the targeted component,” EPA agrees that in general, ICE vehicles and BEVs should be subject to similar expectations for parts shared by both that serve a similar function in both. EPA has revised 40 CFR 85.2103(d)(1)(v) of the regulatory text to clarify that the provision applies to "all components needed to charge the system, store energy, and transmit power to move the vehicle." It is not EPA’s intention to extend warranty coverage beyond these components nor that the definition include items such as wear parts or other minor parts whose analog in an ICE vehicle serves the same function and is not covered by an analogous emissions warranty.

[555] The provision also allows the Administrator to waive the statutory requirement in certain cases.

Regarding Tesla's comments that "battery durability provides no emissions reduction benefit" and relatedly that minimum performance requirements "must be balanced against increased up-front costs," EPA disagrees with the first and agrees with the latter. EPA has described the importance of battery durability to achieving emissions reductions previously in these responses and in the preamble. EPA has balanced this need with cost by selecting performance requirements that are similar to those of GTR No. 22 and current practices in the industry. We also note Tesla's support of the MPR as being "set at reasonable and achievable levels." Regarding Tesla's view that "the proposed 80% UBE level exceeds the industry norm" for warranty, EPA disagrees, and notes that Tesla appears to have associated the 80 percent SOCE level with the 8 year/80,000 mile warranty term, when in fact the 80 percent SOCE level is associated only with the 5 years or 62,000 miles MPR; in fact, the proposed standards would have specified a 70 percent SOCE level (which EPA assesses as being common industry practice) at 8 years/80,000 miles (less stringent than common industry practice). The final standards, as noted previously, allow the manufacturer to specify the SOCE level that will apply to the 8 year/80,000 mile warranty term.

For response to comments on durability and monitor grouping requirements, and other topics related to test procedures and test groups related to the durability and warranty program, please refer to Sections 6.1 and 6.2 of the response to comments document and Section III.G.3.iii of the preamble.

For response to comments relating to battery replacement, see Section 12.2.5 of the responses to comments document.

17 - Charging infrastructure

<u>Comments by Organizations</u>

Organization: 25x'25 Alliance, et al.

The undersigned parties offer the following comments on EPA's proposed rule, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." We write these comments because we believe that the proposed rules would establish an overly aggressive, high-risk program that would be counterproductive in achieving the agency's environmental and health objectives. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

In establishing or revising Clean Air Act Section 202(a) standards, EPA must consider issues of technological feasibility, cost of compliance, and lead time. Among other things, that means the agency must look closely at the impact of its proposed standards on net emissions of air pollutants and their associated public health effects, impacts on the automotive industry, impacts on the vehicle purchasers/consumers, energy security, and safety, and how the proposed approach would compare to other possible rulemakings. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

EPA's review of relevant factors in the current proposal is seriously deficient. The chief failure comes because the agency elides two distinct types of feasibility: the technological feasibility of electric vehicles as a part of the fleet and the technological feasibility of electric vehicles as the whole of the fleet. We do not dispute the former, but overwhelming evidence disproves the latter. First, there are no established supply chains capable of supplying the raw materials to manufacture the millions of vehicles needed—just over the next decade—to supply the projected market. Second, the infrastructure necessary to support these vehicles, particularly recharging infrastructure, is not and will not be available in the necessary timescales. The high density of chargers needed in major metropolitan areas and vast web of chargers needed to span the rural areas of the Country will require tremendous planning and investment. The long lead times associated with new renewable generation means that this added marginal electric load will be powered by natural gas and coal for the foreseeable future. And current prices, lack of infrastructure, and public opinion militate strongly against the conclusion that a ten-fold increase in the annual sales of electric vehicles will occur in the next eight years. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

The failings of the proposed rule follow almost entirely from EPA's decision to "bet the farm" on electric vehicles. The agency would be far better served by taking a more holistic approach. There are 281 million internal combustion engine vehicles on the road today and 100 million more will be built in the next two decades. All of these vehicles could be improved—and for far less than what EPA's proposal would cost—with an improvement in fuel quality. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

SEE ORIGINAL COMMENT FOR PIE CHART of Role for Liquid Fuels [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

SEE ORIGINAL COMMENT FOR BAR GRAPH of EPA-Projected Cumulative U.S. Sales 2023-2032 [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

EPA is statutorily obligated to explore this approach. Section 202(a)(3)(A)(ii) requires that, "in establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors." 42 U.S.C. § 7521(a)(3)(A)(ii) (emphasis added). There are many ways EPA could consider the type of fuel as a means of settings its regulations: through the consideration of life-cycle emissions under the agency's Section 202 powers, through increased volumes of low-carbon renewable fuels under the Renewable Fuel Standard, through alternative, low-carbon certification fuels, or through Section 211(c) rulemaking—as the proposal itself suggests. These options are not beyond the scope of this rulemaking but are obvious alternatives to EPA's current all-electric approach. And "the failure of an agency to consider obvious alternatives has led uniformly to reversal." Spirit Airlines, Inc. v. DOT, 997 F.3d 1247, 1255 (D.C. Cir. 2021). [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

EPA must consider these alternatives, and would be well served to issue a new proposed multipollutant rule that: [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

1) incorporates requirements to improve fuel quality by [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

-establishing a higher federal octane standard while allowing higher blends of ethanol; and

-"incenting the reduction of carbon and aromatic compounds via reformulation or alternatively increasing ethanol blending. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

2) provides incentives for automakers to produce flex-fuel vehicles by [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

-creating alternative certification pathways for higher ethanol blends; and

-correcting the problems with R-Value and CO2 penalty that other commentors have identified and re-establishing the Volumetric Conversion Factor in the fuel economy calculation algorithm. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

3) adopts a life-cycle analysis approach to calculating and comparing emissions from different technologies. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

Embracing and enabling a pathway to improve fuel quality will increase and accelerate emission reductions, improve public health, help achieve environmental justice goals, provide greater versatility, and improve reliability all at less cost. This pathway is available to EPA and the consideration of it is demanded by the Clean Air Act. The best and most recent data suggests that the adoption of even mid-level ethanol blends would reduce pollution emissions at least as much as EPA's electrification approach, and at far less cost.i Even if EPA's electrification program could be successful—and as explained above, it cannot—a complimentary fuel improvement would double EPA's projected emissions reduction. The current rule takes this option off the table and leaves those pollutants in the air. EPA could do far better. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

1 See "Higher Ethanol Blends Support the Transition to a Low-Carbon Future," Brian West, SAE Update, February 2023, pp2-6) National adoption of mid-level ethanol blends is available, feasible, and lower cost than current gasoline. https://www.nxtbook.com/smg/sae/23UPD02/index.php#/p/2

Organization: Advanced Energy United

Digital permitting processes could also alleviate bottlenecks in EVSE infrastructure. The Department of Energy's SolarApp+ is a model program that has saved customers and contractor valuable time and money on solar installations by standardizing and streamlining permitting processes in localities across the U.S. Policymakers across the country should consider a similar approach to slash soft costs for the permitting of EV charging infrastructure. Investment alone cannot satisfy new demand. We must enable streamlined permitting processes if we are to meet the Biden Administration's goal of building 500,000 new charging stations. [EPA-HQ-OAR-2022-0829-0695, p. 5]

However, it is crucial to build the EVSE infrastructure to meet this changing automotive landscape. Simply put, consumers and businesses can only take advantage of the 30D and 45W tax credits if the infrastructure is there to satisfy demand. Ensuring this infrastructure buildout will enable effective implementation of the EPA's rule and accelerate the transition to 100% electrified transportation. Fortunately, the IRA's companion legislation – the Infrastructure Investment and Jobs Act (IIJA) -can help in this effort. IIJA included $7.5 billion in funding as a part of the National Electric Vehicle Infrastructure (NEVI) formula program, which provides states with resources to deploy charging stations. The pieces are in place to make the transition from the internal combustion engine to EVs, we just need to put them together. [EPA-HQ-OAR-2022-0829-0695, p. 6]

Organization: Alliance for Automotive Innovation

EPA underestimates battery costs; unrealistic BEV sales assumptions

The NPRM substantially underestimates the cost of batteries while overestimating the availability of consumer and manufacturing tax credits. For example, the Proposed Rule assumes that in 2029, the combination of cost reductions from installing larger batteries in BEVs and incentives from Inflation Reduction Act (IRA)5 Sections 30D, 45W, and 45X results in consumer incentives and battery production tax credits that substantially exceed the battery cost. If cost reductions and incentives eliminate the entire cost of EV batteries, it is little wonder the EPA model suggests a massive increase in sales of long-range BEVs. However, we do not believe these assumptions are realistic. Moreover, while vehicle cost and affordability are critical to success, they are just one set of factors in the transformation to electric vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 4-5]

5 H.R.5376 -117th Congress (2021-2022): Inflation Reduction Act. (2022, August 16). Available at htps://www.congress.gov/bill/117th-congress/house-bill/5376/text.

Beyond BEV affordability, success of this regulation will be determined by factors outside of the vehicle; the U.S. is sorely behind in this effort (despite over the $150 billion of private sector investment thus far) and the NPRM does little to address these factors. Current charging and fueling infrastructure is inadequate (particularly residential charging), the grid resources are at least 5 to 10 years away (without even factoring in the additional demand for grid resources from the heavy-duty vehicle sector facing similar concerns in a concurrent EPA rulemaking6), and battery critical minerals (except lithium), which primarily determine the affordability and availability of EVs, are minimally addressed in the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 4-5]

6 U.S. Environmental Protection Agency, Proposed Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 (for Model Years 2027-2032), 88 Fed. Reg. 25,926 (Ap. 27, 2023). Hereinafter "EPA HD GHG NPRM)."

No requirements to support required EVs or the drivers that must buy them

The NPRM and all the requirements set forth to date focus solely on the sale of BEVs. They propose no requirements to ensure that infrastructure will be available at homes, businesses, public event venues, highway corridors, transportation hubs, or other public locations. They contain no requirements to provide hydrogen or hydrogen fueling stations, or for utilities to quickly bring reasonably priced high-power charging (5-20 megawats (MW)) to highway service plazas, fleet locations, city centers, or transportation hubs. They do not address the need for battery critical minerals to power everything from light-, medium-, and heavy-duty vehicles, energy storage systems (ESS), lawn and garden equipment, laptops, cell phones, forklitis, and airport services—not just in the United States, but around the world. [EPA-HQ-OAR-2022-0829-0701, p. 5]

To support the vehicle requirements proposed, all these changes are necessary in under 10 years. For perspective, 10 years is the time required to obtain the necessary permits for a mine in the United States. Once permitted, another ten years could elapse before the mine produces at capacity. Ten years is also close to the time required to bring 20 MWs of power to a single location in the United States. Consequently, to the extent we need critical minerals and high-power charging, we must start today. Yet, there is no plan to do so. There is no roadmap to developing these essential pieces necessary for the transformation. Nor is there a commitment from EPA for ongoing monitoring of these factors as the EV market develops over the duration of EPA's proposed standards. [EPA-HQ-OAR-2022-0829-0701, p. 5]

Automakers are committed to electrification. The industry publicly agreed in August 2021 that BEVs, PHEVs, and FCEVs could constitute 40 to 50% of new vehicle sales by 2030 with the right combination of supportive measures. Some, but not all, of those supportive measures have started, but they are nowhere near complete and certainly not suffcient to support the even higher requirements in the proposed regulations that substantially leapfrog that target. [EPA-HQ-OAR-2022-0829-0701, p. 5]

In August of 2021, Auto Innovators and our members announced support for a goal of achieving 40-50% U.S. new light-duty vehicle market share of EVs (including BEVs, PHEVs, and FCEVs) nationally by 2030, with the right complementary policies,19 including but not limited to: [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

-Expand and scale the charging network to EV volumes required by the proposed rule.

-Update widely applicable and comprehensive Federal EV incentives and apply at point of purchase.

-Develop domestic battery supply chain (raw material mining, processing, manufacturing, and recycling).

-Implement fleet purchase requirements.

-Commitment to purchase EVs for federal fleets.

-Increase research & development to accelerate cost reduction of batteries and EV components.

-Educate consumers and increase EV awareness. [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

Though the federal government has made progress toward achieving these policy enablers, significant and crucial gaps remain. For example: [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

-The Bipartisan Infrastructure Law (BIL)20 committed $7.5B to expand public charging nationwide. This is a good down payment on the needed charging infrastructure, but only represents a fraction of what is needed to support the market projected by EPA. Moreover, thus far, almost two years after the BIL was signed, not a single electric vehicle charger has been installed with the federal funding allocated to states. [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

19 Alliance for Automotive Innovation Press Release, Auto Innovators: Aligning Policies for a Cleaner Future (Aug. 5, 2021), available at htps://www.autosinnovate.org/posts/press-release/aligning-policies-for-a-cleaner-future.

20 Infrastructure Investments and Jobs Act, Pub. L. No. 117-58 (2021), https://www.govinfo.gov/app/details/PLAW-117publ58.

-Unfortunately, the administration removed a pathway in the Renewable Fuel Standard Set Rule for Renewable Volume Obligations for 2023-2025 for EVs to generate credits by using electricity produced from biogas to charge (also known as e-RINs). This proposal would have provided a complementary approach to EPA's multipollutant rule, including supporting and encouraging both EVs and renewable sources of energy, as well as to the overall goal of decarbonizing the transportation sector. [EPA-HQ-OAR-2022-0829-0701, pp. 26-27]

2. Infrastructure

Reliable, convenient, affordable, and ubiquitous access to charging and hydrogen fueling stations is critical to EV drivers and the feasibility of the rules proposed in the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

For BEV and PHEV charging, residential charging is the single most important location. Virtually every study133 shows that 80-90% of charging occurs at home. Home charging is clearly preferred since it is 2-3x cheaper, vastly more convenient, and far more reliable than public charging. However, public charging stations are critical too -not only easing perceived "range anxiety" concerns but also substantially increasing consumer awareness of the technology. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

133 For example, see Alexander, Mat, Noel Crisostomo, Wendell Krell, Jeffrey Lu, and Raja Ramesh. July 2021. Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030 – Commission Report. California Energy Commission. Publication Number: CEC-600-2021-001-CMR. Or Eric Wood, Clément Rames, Mateo Muratori, Sesha Raghavan, and Marc Melaina. National Renewable Energy Laboratory, April 2017, National Plug-In Electric Vehicle Infrastructure Analysis

FCEVs cannot be sold until hydrogen fueling stations are in place; there is no reliable hydrogen fueling outside of California (57 of the 58 hydrogen stations in the U.S. are in California). [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

Nonetheless, FCEVs can plan an important role in electrification particularly for customers that do not have access to charging at home or the workplace, or applications that require towing, which significantly reduces BEV range, or driving longer distances where short refueling times like gasoline fueling process are important. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

The need for infrastructure (both EV charging and hydrogen) is tied not only to new vehicle sales but also to the total population of EVs on the road. We cannot afford to fall behind, which is exactly what is occurring today. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

The IIJA includes $5 billion in formula funding for states to establish a nationwide EV charging network. While this is a good first step, as of today, no chargers have been installed under the IIJA, and every day the U.S. is falling behind the needed number of chargers. While early adopters and affluent single-family homeowners might tolerate the lack of public charging, mainstream, lower-income, and rural drivers that are needed for sales to reach 30, 40, or 60%, are less likely to be so tolerant. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

[See orignal comment for: Figure 25: Number of publicly available non-proprietary Chargers (Auto Innovators)] [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

An assessment by the California Energy Commission concluded that 700,000 public and shared private chargers are needed to support 5 million EVs, amounting to a ratio of 7 EVs per public and shared private charger.134 At the end of the first quarter of 2023, there were about 134,000 public charging outlets across the country and 3.34 million EVs on the road, a ratio of 25 EVs per charger. For charging to meet the 7:1 ratio, more than 342,000 additional chargers are needed today, which is two and a half times the currently available non-proprietary chargers across the U.S. Looking to the future, based on current sales and BEV penetration rates projected in the NPRM, there could be as many as 40 million BEVs135 on the road by 2030. Using a ratio of 7:1, this would suggest that 5.8 million public and shared private chargers are needed. As shown in Figure 26, President Biden's goal of 500,000 public chargers136 hardly dents the need for more public and shared private charging. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

134 Alexander, Mat, Noel Crisostomo, Wendell Krell, Jeffrey Lu, and Raja Ramesh. July 2021. Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030 – Commission Report. California Energy Commission. Publication Number: CEC-600-2021-001-CMR.

135 Based on EPA OMEGA model output of 38M cumulative BEV sales 2022-2030MY combined with existing U.S. EV registrations and adjusted for vehicle scrappage.

136 https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/13/fact-sheet-the-biden-harris-electric-vehicle-charging-action-plan/

Figure 26: 2030 Model Year Anticipated Infrastructure Needs [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

Moreover, the U.S. is falling further behind in installing publicly available chargers for the number of EVs that are being sold. More than 305,000 new EVs were added to the roads in the first quarter of 2023, but only 7,802 new chargers were added,137 a ratio of 39 new EVs for every new public port, and more than five times higher than the recommended ratio of 7:1. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

137 htps://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023%20Q1.pdf

JD Power EV Index calculates a score on a scale of 100 points every month to demonstrate the advancement of EVs toward parity with ICE vehicles. The index is broken into six sub-categories, one being infrastructure readiness. Figure 27 below shows the April 2023 JD Power infrastructure assessment at 27 out of 100 points in their EV index as infrastructure continues to lag EV growth.138 [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

138 JD Power (n.d.). JD Power EV Index. JD Power EV Index. Retrieved June 10, 2023, from https://www.jdpower.com/business/evindex

Figure 27: Charging Infrastructure Growth. [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

Source: JD Power EV Index report, April 2023 [EPA-HQ-OAR-2022-0829-0701, pp. 76-79]

It is also important to ensure low-to moderate-income (LMI) and multi-family dwelling (MFD) residents have access to the low-cost, convenient, and reliable level 2 (L2) home charging that more affuent single-family homeowners enjoy. MFD residents, however, often face the greatest, most costly, and burdensome obstacles to installing residential EV charging. For MFD residents, the additional costs to upgrade the electrical panel, install conduit between the electrical panel and their parking space, and the logistical challenges of securing building owner approval, coordinating the billing with the building owner, and persuading an owner to make a long-term investment on a rental property, make it challenging to have convenient residential charging in an MFD. [EPA-HQ-OAR-2022-0829-0701, p. 79]

Renters, low-income, and MFD residents could be forced to charge at public chargers, which is far more expensive, less reliable, and vastly less convenient. This is unreasonable, and EPA and its federal counterparts should ensure this population has the same access to L2 home charging as affuent single-family homeowners. [EPA-HQ-OAR-2022-0829-0701, p. 79]

a) European Union Alternative Fuel Infrastructure Regulation (AFIR)

As discussed, growth of nationwide charging infrastructure is one of the most important market features needed to establish a robust and EV-dominated market. Without a widely available charging network, compliance with regulations that demand electric vehicles cannot be achieved. The European Union recognizes and addresses this with the recent passing of the Alternative Fuel Infrastructure Regulation (AFIR).139 [EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

139 htps://theicct.org/wp-content/uploads/2023/04/AFIR-EU-Policy-Update-A4-Final.pdf

The AFIR sets legally binding targets for the deployment of alternative fuel infrastructure, including EV charging availability for passenger cars, vans, trucks, and buses. The regulation assigns objective requirements for each E.U. member state specifying both the amount of combined charging output required for each registered EV, as well as the maximum distance between available charging points. As shown in Figure 28, each E.U. state must ensure a total output of at least 1.3kW for each registered BEV and 0.8kW for each registered PHEV. [EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

Figure 28: Alternative Fuel Infrastructure Regulation (AFIR) Car, Truck, Van Charging Requirements per Registered Vehicle [EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

Technology Minimum Available Charging Power Per Registered EV

BEV 1.3 kW

PHEV 0.8 kW [EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

Distance-based targets specifying the maximum kilometers between charging stations are assigned for core travel corridors (Trans-European Transport Network or TEN-T) and expand to all smaller roads included in the TEN-T in 2030. As shown in Figure 29, by 2030 300kW of fast-charging capacity will need to be available every 60 km in each direction of the entire Trans-European Transport Network. [EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

Figure 29: Alternative Fuel Infrastructure Regulation (AFIR) Car, Truck, Van Charging Distance-Based Requirements [EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

Date Scope of Requirements Minimum Power Every 60km

December 31, 2025 Core Trans-European Roads 400 kW

December 31, 2027 Core Trans-European Roads

50% of smaller roads 600 kW

300 kW

December 31, 2030	All Trans-European Roads	300kW
December 31, 2035	All Trans-European Roads	600 kW

[EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

The AFIR demonstrates that the deployment of infrastructure is required to build a successful EV market. It also demonstrates that the deployment of these enablers cannot be left to model projections, assumption, or chance. EPA should follow the E.U.'s lead and implement similar complementary mechanisms that treat market enablers as a necessity to achieving the electrification targets of the NPRM. Otherwise, consumer adoption of such technologies will lag due to the lack of reliable charging and refueling stations. [EPA-HQ-OAR-2022-0829-0701, pp. 79-80]

C. Infrastructure

Large-scale market adoption of EVs is contingent on charging/refueling infrastructure being in place to support those vehicles. We believe it is appropriate to use the ratio of one public charging point/refueling station being required per every seven EVs on the road to get EVs to usage and convenience parity with ICE vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 86-87]

A scalable target adjustment would be applied to each model year based on the deployed charging/refueling infrastructure deficit and total number of EVs on the road for any given year. There are a variety of sources for tracking this infrastructure from the Department of Energy to various 3rd party sources. There are also a variety of 3rd party sources for tracking EV registrations. Thus, EPA would have available suitable source(s) to reference each year for this data. A target adjustment would be determined, for example, using the following formula: [EPA-HQ-OAR-2022-0829-0701, pp. 86-87]

Adjustment (lnfr) = Adjustment (max) * (EV (total) / 7) – CRP) / (EV (total) / 7)

Where

Adjustment (lnfr) = Infrastructure adjustment (g/mi)

Adjustment (max) = 10 g/mi

EV (total) = Total number of EVs on the road (BEV + PHEV + FCEV)

CRP = Total number of publicly available charging/refueling points

[EPA-HQ-OAR-2022-0829-0701, pp. 86-87]

Using the example of 26 million EVs being on the road in 2030 and 2.5 million total public charging/refueling points, the target adjustment would be calculated as follows: [EPA-HQ-OAR-2022-0829-0701, pp. 86-87]

Credit (lnfr) = 10 g/mi * (26,000,000 / 7) – (25,000,000) / (26,000,000 / 7) = 3.3 g/mi [EPA-HQ-OAR-2022-0829-0701, pp. 86-87]

EPA would publish the annual result of this adjustment calculation at the same time as the other two target adjustment mechanisms. [EPA-HQ-OAR-2022-0829-0701, pp. 86-87]

Automakers are and will continue to do their part in building vehicles to support electrification goals. However, automakers should not be penalized for critical aspects in EPA's modeling projections that are outside of their control. The proposed market-based target adjustment system would allow for year-by-year adjustments to be made within the framework of a rule that would reffect a more accurate and fair way to address the recognized uncertainties of the market. If these EV market enablers develop as projected by EPA, then these adjustments will be negligible. However, if these key enablers do not develop as projected, these adjustments could be the difference between a successful rule and a failed rule. [EPA-HQ-OAR-2022-0829-0701, pp. 86-87]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

Beyond critical minerals, the United States lacks adequate infrastructure for electric vehicle charging and hydrogen refueling. Developing the necessary infrastructure would cost billions of dollars in funding and require immediate planning and coordination. Even if enough new charging stations could be built, the Nation's electricity grids could not currently supply them with sufficient power. And batteries and fuel cells present an array of documented safety risks, including spontaneous fires and explosions that have resulted in death, injuries, and extensive property damage. All of these considerations would further stifle electric-vehicle adoption. [EPA-HQ-OAR-2022-0829-0683, pp. 4-5]

b. The Nation's Charging and Hydrogen Refueling Infrastructure Is Underdeveloped

Even if manufacturers could produce light-and medium-duty electric vehi-cles in the volumes and variety necessary to make compliance possible, their deployment still would be stunted by the Nation's inadequate charging and hy-drogen refueling infrastructure. [EPA-HQ-OAR-2022-0829-0683, pp. 42-43]

Charging Infrastructure. If the proposed rule were adopted, American driv-ers would need access to a robust network of home, workplace, and public chargers. Home charging is often accomplished through Level 1 or Level 2 ports, which provide approximately 5 and 25 miles of range per hour, respec-tively. See Draft RIA at 4-21; Dep't of Energy, Alternative Fuels Data Ctr., Developing Infrastructure to Charge Electric Vehicles, https://ti-nyurl.com/3buv474m ("Developing Infrastructure"). Workplace charging is often offered in a Level 2 option. See Michael Nichols, Estimating Electric Vehicle Charging Infrastructure Costs Across Major U.S. Metropolitan Areas, ICCT, at 1 (Aug. 2019) ("Estimating Electric Vehicle Charging"). And public charging— which is critical to drivers without access to home or workplace charging, those who travel long distances, and those who use their vehicles for commercial or ride-sharing purposes—is offered at a Level 2 option or, more preferably, a "di-rect-current" or "DC" fast charging port, which provides approximately 100 to 200 or more miles of range per thirty minutes. See Draft RIA at 4-23; Dep't of Energy, Developing Infrastructure; Philipp Kampshoff et al., Building the Electric-Vehicle Charging Infrastructure America Needs, McKinsey & Co., at 8–9 (Apr. 18, 2022) ("Building Electric-Vehicle Charging Infrastructure"); Nichols, Estimating Electric Vehicle Charging at 2–3. [EPA-HQ-OAR-2022-0829-0683, pp. 42-43]

The number of charging ports currently available do not come close to meet-ing this need. According to EPA, the amount of electric vehicles projected un-der its proposed rule would require 12 million home, 400,000 workplace, and 110,000 public charging ports in 2027—the first year that the proposed rule would be in effect. Those numbers would balloon to 75 million home, 12.7 million workplace, and 1.9 million public chargers, respectively, by 2055. 88 Fed. Reg. at 29,309; Draft RIA at 5-31. Developing this infrastructure would come at a high cost to families and businesses across the country. The agency projects that the required installations will cost between $1 billion and $1.6 bil-lion by 2027, and between $96 billion and $140 billion by 2055. See Draft RIA at 5-36. Some studies suggest that the costs may be much higher. See, e.g., Gordon Bauer et al., Charging Up America: Assessing the Growing Need for U.S. Charging Infrastructure Through 2030, ICCT, at i (July 2021) (estimating that the cost of 2.4 million workplace and public chargers would alone reach $28 bil-lion). [EPA-HQ-OAR-2022-0829-0683, pp. 42-43]

EPA assumes that the extraordinary costs for developing this charging in-frastructure will be covered by federal incentives and funding, as well as private investment. See, e.g., 88 Fed. Reg. at 29,307. But these sources fall far short of establishing that the billions of dollars needed will be readily available and ef-fectively implemented by the time the proposed rule would take effect. [EPA-HQ-OAR-2022-0829-0683, p. 43]

• EPA relies on a tax credit in the IRA that it claims will cover up to 30 percent of the cost of charging equipment. Id. at 29,308. But that credit applies only when the charging equipment is located within low-income or non-urban area census tracts, and it covers only up to $1,000 for res-idential charging equipment and $100,000 for public charging equip-ment. Id. [EPA-HQ-OAR-2022-0829-0683, p. 43]

• EPA also points to $7.5 billion in federal funding that the Bipartisan Infrastructure Law provides to build out a network of public charging stations. Id. at 29,195, 29,307. But the goal of that federal funding pro-gram is to develop only 500,000 public charging stations—just over a quarter the amount EPA projects as necessary under its proposed rule in the period EPA analyzed (2027-2055)—meaning that the remainder must come from other sources. Cf. Kampshoff, Building Electric-Vehicle Charging Infrastructure at 2 (noting that "even the addition of half a mil-lion public chargers could be far from enough"). [EPA-HQ-OAR-2022-0829-0683, p. 43]

As to private investment, EPA cites investments announced by electric companies, auto manufacturers, and charging network providers. See 88 Fed. Reg. at 29,307–08. Some investments, however, are more lim- ited than the proposed rule acknowledges. For example, EPA highlights that General Motors is partnering with charging provider FLO "to de- ploy as many as 40,000 L2 ports," id. at 29,308, but the companies made clear that a portion of these ports will be located in Canada, see Emma Jarratt, FLO to Supply 40,000 Chargers to GM for Dealerships Across Canada and the United States, Elec. Autonomy Canada (Dec. 8, 2022), https://ti- nyurl.com/5xn39ju4. More importantly, EPA does not attempt to quantify the total amount of investment pledged, the number of charging ports that the investments will provide, and the overall timing of their deployment—all of which are critical to EPA's assumption that private investment will bridge the expanding gap in charging infrastruc- ture by the time the proposed rule would take effect. [EPA-HQ-OAR-2022-0829-0683, pp. 43-44]

Moreover, even if federal and private investment were adequate to deploy enough chargers in the aggregate nationwide to enable compliance with EPA's proposed rules, multiple practical issues—including chargers' location, speed, and compatibility—would remain. Those concerns must be addressed before EPA can plausibly conclude that the infrastructure will be sufficient to meet the needs of drivers. [EPA-HQ-OAR-2022-0829-0683, pp. 43-44]

To begin, there is a serious gap in home charging for drivers that do not live in single-family homes. A report released by the National Renewable Energy Laboratory shows that there are only 1,179 charging ports at multi-family resi-dences across the entire country. See Abby Brown et al., Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: Third Quarter 2022, NREL, at 21 (Mar. 2023) ("Charging Infrastructure Trends"). That number is far too low given that there are over 550,000 apartment buildings with five or more units, and over 2.2 million apartments with between two and four units in the United States. See Characteristics of Apartment Stock, Nat'l Multifamily Hous. Council, https://tinyurl.com/nhnsrsea (last accessed June 25, 2023). If EPA intends for the majority of drivers to switch to electric vehicles by 2032, sub-stantial progress will need to be made in installing home charging ports in these multi-family residential buildings. But doing so is both expensive and logisti-cally difficult. "Higher costs for home charging upgrades generally correspond to a greater number of wall and floor penetrations, total circuit distance, or ser-vice upgrades," all of which exist in "attached homes and apartments." Nich-ols, Estimating Electric Vehicle Charging at 6. Drivers living in apartment build-ings also might not plan on staying in the same residence long enough to justify the effort of persuading landlords to install enough (or any) charging units. And even when such drivers relocate, in choosing another residence they may have many other considerations to weigh besides the availability of on-site charging. [EPA-HQ-OAR-2022-0829-0683, pp. 44-45]

There is also a significant gap in public charging stations for drivers that live in poor and rural communities. "Current charger installations tend to be lo-cated in higher-income areas, following the location of early EV sales." Kampshoff, Building Electric-Vehicle Charging Infrastructure at 9. And in Califor-nia—the state with the most public charging stations in the country—only 6,000 of the nearly 80,000 stations are located in rural counties, despite the fact that those counties make up 60 percent of the state's landmass; are home to 14 percent of the state's population; and contain "sought-after destinations" like national parks, wildlife areas, lakes, trails, and campgrounds. Angel Barajas, California's Rural Areas Risk Being Left Out in EV Push, Gov't Tech. (June 1, 2022) ("California's Rural Areas"), https://tinyurl.com/4k8wb38d. In Wyoming, there are only 169 public charging ports statewide. Charette, EV Transition. The lack of available public charging stations "is endemic across rural areas" and poses a major obstacle to EPA's planned shift to electric vehicles. Id. According to one study, seven out of ten people who do not own an electric vehicle report that "the areas near their homes lack a significant number of chargers." Kampshoff, Building Electric-Vehicle Charging Infrastructure at 10. Thus, even if EPA is right about the total number of public charging stations that can be de-veloped by the compliance period, their geographic distribution is an equally important, but inadequately addressed, consideration. [EPA-HQ-OAR-2022-0829-0683, pp. 44-45]

Beyond geographic distribution of chargers, electric-vehicle drivers have re-ported that their experience with public charging is "often unsatisf[actory]" due to "speed, cost, availability (including both free and working chargers), and safety of charging locations." Kampshoff, Building Electric-Vehicle Charging In-frastructure at 14. For example, many drivers prefer DC fast charging—which as noted can provide 100-200 miles of range per 30 minutes of charging time— over Level 1 and Level 2 chargers, which provide only a small fraction of that output and thus can make charging away from home impractical. But very few public stations offer that DC fast-charging option. Nationwide, there are a mere 7,406 stations with DC fast charging ports—amounting to only 14 percent of all public chargers. See Dep’t of Energy, Alternative Fuels Data Ctr., Alternative Fueling Station Locator, https://tinyurl.com/4xjsc3x6 (last accessed June 14, 2023); Dep’t of Energy, Developing Infrastructure. And even among that limited number, there are three different types of DC fast charging connectors (the equipment that is “plugged into a vehicle”), with the “majority” being on the Tesla network. Brown, Charging Infrastructure Trends at viii. As a result, electric-vehicle drivers may “need to travel longer distances to find a station with the right connector type.” Greenhouse Gas Emissions Standards for Heavy-Duty Vehi-cles: Phase 3, Draft Regulatory Impact Analysis, EPA, at 68 (Apr. 2023) (“Heavy Duty Draft RIA”). Ensuring the availability of accessible, fast charging equip-ment at public stations across the country is therefore a critical piece of the infrastructure puzzle. See Brown, Charging Infrastructure Trends at vii (“Building out the country’s network of public DC fast chargers is critical to supporting EV adoption in the United States.”). But EPA does not explain—and likely does not know—how much of the federal funding or private investment it high-lights will be used to install fast-charging equipment. See 88 Fed. Reg. at 29,307–09. [EPA-HQ-OAR-2022-0829-0683, pp. 45-46]

In addition to speed, electric-vehicle drivers face problems with interopera-bility and consistency across public charging stations. As EPA highlighted in the parallel proposed rulemaking for heavy-duty vehicles, there are “[c]ommu-nication protocols” between chargers and vehicles that “facilitate the flow of key information important for charging and billing.” Heavy Duty Draft RIA at 69. Thus, without standardization, electric-vehicle drivers may pull up to a charging port only to realize that they cannot use it. Drivers also report that “[p]ricing systems” at public charging stations “can vary considerably.” Kampshoff, Building Electric-Vehicle Charging Infrastructure at 14. Pricing may be by the minute or by kilowatt-hour, and it may differ depending on membership. Id. This means that “[i]t isn’t always easy to tell which option offers better value, and payment is often a hassle.” Id. [EPA-HQ-OAR-2022-0829-0683, pp. 45-46]

Each of these problems must be resolved before a widespread shift to elec-tric vehicles is plausible. “[E]ven in cases where consumer appetite for ZEVs is high, a lack of adequate charging infrastructure could hold the market back and potentially stall progress.” Marie Rajon Bernard et al., Deploying Charging Infra-structure to Support an Accelerated Transition to Zero-Emission Vehicles, ZEV Tran-sition Council, at 4 (Sept. 2022). And multiple studies report that charging is a top concern among prospective electric-vehicle buyers. See, e.g., Barajas, California’s Rural Areas (“[C]oncerns remain, including hesitant consumers wary of ‘range anxiety,’ the fear of being stranded without the ability to recharge, or in some cases not having access to charging capacity at their apartment complex or work.”); Kampshoff, Building Electric-Vehicle Charging Infrastructure at 1 (“[N]early half of US consumers say that battery or charging issues are their top concerns about buying EVS.”); Nichols, Estimating Electric Vehicle Charging at 1 (“Exactly how much charging infrastructure will be needed and what it will cost are top questions for prospective electric vehicle owners.”). Until ade-quate home, workplace, and public charging infrastructure develops at the rate, in the places, and at the quality desired by consumers, consumers are unlikely to purchase anything close to the volume of electric vehicles that EPA intends to mandate that manufacturers provide. The agency has not offered a reasonable basis for assuming that the necessary expansions and improvements are possible, let alone likely, within less than a decade. [EPA-HQ-OAR-2022-0829-0683, pp. 46-47]

Hydrogen Refueling Infrastructure. Although EPA's proposed rule for light-and medium-duty vehicles assumes that manufacturers will comply primarily by integrating battery-electric vehicles into their fleets, see 88 Fed. Reg. at 29,329, 29,331, 29,343, the agency states that fuel-cell vehicles provide another compliance option, id. at 29,194, 29,252. The state of hydrogen refueling, how-ever, is even worse than that of charging infrastructure. Although EPA does not discuss hydrogen refueling in the proposed rule or draft regulatory impact analysis, it made clear in connection with the parallel heavy-duty rule that every step of this supply chain is underdeveloped. See Heavy Duty Draft RIA at 81–86. For example, today there are only 58 public hydrogen refueling stations in the entire country, 57 of which are in California. See Dep't of Energy, Alternative Fuels Data Ctr., Alternative Fueling Station Counts by State (Public), https://ti-nyurl.com/385e5nk2 (last accessed June 14, 2023).5 To provide any national refueling network, let alone a robust one, operations would need to scale up dramatically and rapidly. EPA does not explain whether, how, or when that will happen, making fuel-cell vehicles even less attractive to consumers than battery-electric ones. Emissions standards premised on the adoption of fuel-cell vehicles are not feasible. [EPA-HQ-OAR-2022-0829-0683, p. 47]

5 There are also 16 private stations. See Dep't of Energy, Alternative Fuels Data Ctr., Alternative Fueling Station Counts by State (Private), https://tinyurl.com/4xc8jfcs (last accessed June 14, 2023).

Organization: American Fuel & Petrochemical Manufacturers

I. EPA's Proposal Does Not Comprehensively Address Cross-Cutting Issues

EPA's desire to remake the automotive sector creates significant energy and national security concerns and stresses an aging electrical grid subject to increasing demand. In glossing over these issues, EPA fails to adequately consider the mineral, metal, electricity generation, transmission, distribution, and charging infrastructure requirements necessary for the Proposed Rule to be feasible. This is alarming and undermines our energy security. We lack the supply of domestically sourced minerals and metals needed to build batteries and transmission lines and, contrary to the legislative intent of U.S. laws such as the Bipartisan Infrastructure Law ("BIL") and Inflation Reduction Act ("IRA"), we will have to rely on foreign countries to fulfill the Proposed Rule's mandate. [EPA-HQ-OAR-2022-0829-0733, p. 4]

Even if we could import vast quantities of mineral resources, EPA's electrification mandate is unobtainable. We face a limited supply of copper, which is a critical mineral needed to build out the transmission grid to supply electricity to charging stations. We also do not have near the vehicle charging infrastructure necessary to power the mandated number of ZEVs. Rather than conducting a clear-eyed assessment of these challenges, EPA erroneously assumes that all the necessary conditions to enable its proposal will happen on its aggressive timeline. This conclusion dismisses or outright ignores a multitude of evidence to the contrary. [EPA-HQ-OAR-2022-0829-0733, p. 4]

EV charging infrastructure, range, and charging time remain top concerns for nearly half of U.S. customers.139 OEMs expect that ZEV penetration will not be uniform across markets, with larger impact in markets with more low carbon intensity electricity and greater electrical grid reliability.140 Toyota announced that regional energy variation is the reason Toyota will provide a diversified range of carbon neutral options to meet the needs and circumstances in every country and region.141 Toyota believes optionality facilitates the ability to adapt to change, while selecting a single option is an attempt to predict the future in uncertain times.142 [EPA-HQ-OAR-2022-0829-0733, pp. 31-32]

139 Phillipp Kampshoff, et al., McKinsey & Co., "Building the electric-vehicle charging infrastructure America needs" (Apr. 18, 2022) available at https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs; EVBox, "6 reasons why your electric car isn't charging as fast as you'd expect," Jan. 6, 2023, available at https://blog.evbox.com/6-reasons-charging-times.

140 The North American Electric Reliability Corporation (NERC's) 2022 Long-Term Reliability Assessment (Dec. 2022) projects reliability concerns for certain regional entities. Available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf

141 Toyota Motor Corporation, '"Video: Media Briefing on Battery EV Strategies,'' Press Release, December 14, 2021. available at https://global.toyota/en/newsroom/corporate/36428993.html.

142 Id.

As discussed in more detail below, consumer market demand will not, and cannot, increase to meet the Proposal's required supply. Charging capabilities, which creates range anxiety, is a key apprehension for nearly half the U.S. consumer market. EVs have less range, both technically and practically. As noted by J.D. Power, "[T]he majority of EVs provide between 200 and 300 miles of range on a full charge."147 This same article, however, also noted that EVs with less than 200-mile ranges (such as the 2022 Nissan Leaf at 149 miles or the 2022 Mazda MX-30 at 100 miles) are "either affordable or focused on performance."148 With respect to longer range vehicles, claimed vehicle ranges of up to 516 miles are available, but this range comes at considerable cost. The number 1 range-rated vehicle by Car and Driver, the 2023 Lucid Air, carries a base price of $113,650. And while three out of the ten top-rated EVs by Car and Driver were more "reasonably priced" from $44,630 to $56,630, all other models within the top 10 cost anywhere from $74,800 to $110,295.149 [EPA-HQ-OAR-2022-0829-0733, pp. 32-33]

147 See Sebastian Blanco, List of EVs Sorted by Range (Sept. 1, 2022), www.jdpower.com/cars/shopping-guides/list-of-evs-sorted-by-range.

148 Id.

149 See Nicholas Wallace, Austin Irwin, & Nick Kurczewski, Longest Range Electric Cars for 2023, Ranked (Mar. 23, 2023), https://www.caranddriver.com/features/g32634624/ev-longest-driving-range/.

Moreover, the time it takes to charge a ZEV compared to fueling an ICEV deters ZEV adoption.150 Depending on the type of vehicle (ZEV v. PHEV) and charger (Level 1, Level 2, or Direct current fast charging equipment ("DCFCs")), charging times from empty to 80 percent charged can range from 40-50 hours (Level 1 charging) to 20 minutes to one hour (DCFC), although most PHEVs on the market do not work with DCFCs.151 In early 2023, a Boston Globe survey around the Boston metropolitan area found DCFC chargers were unreliable, going offline for weeks or months at a time.152 Since close to two-thirds of U.S. households do not purchase new vehicles, lower-income people are more likely to purchase less expensive, early generation PEVs with less range and using a Level 1 or Level 2 charger requires longer charge times.153 These extended recharging times remain a barrier to EV adoption.154 [EPA-HQ-OAR-2022-0829-0733, p. 33]

150 EVBox, EV Box Mobility Monitor (June 2022). Available at evbox-mobility-monitor-2022-intl.pdf (a study of EV adoption in France, Germany, the Netherlands, and the UK revealed that excessive charging time remains a deterrent to EV adoption).

151 U.S. Department of Transportation, Charger type and speed. Available at https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds.

152 Aaron Pressman, "Inside the crazy, mixed-up world of electric-vehicle charger pricing," The Boston Globe, March 27, 2023. Available at Inside the crazy, mixed-up world of electric-vehicle charger pricing (boston.com).

153 Hardman, Scott, et al. "A Perspective on Equity in the Transition to Electric Vehicles." MIT Science Policy Review, 20 Aug. 2021, sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/.Accessed 29 June 2023.

154 Exro, Barriers to electric vehicle adoption in 2022. Available at Barriers to Electric Vehicle Adoption: The 4 Key Challenges (exro.com).

EPA requests comment on their approach to determining charging time, as set forth in the DRIA, Chapter 4.155 EPA's analysis is contingent on unsupported assumptions regarding (1) U.S. consumers' adoption of and ability to purchase more expensive ZEVs (see Sections IV.B.2 and IV.E.2.ii); (2) the type of ZEV purchased (used ZEVs or PHEVs compatible with slower charging units or new ZEVs that can use DCFC) (Section IV,B.2 addresses charging times); (3) the availability of critical minerals and metals to expand the supply of reliable and renewable electricity (see Section I.B); and (4) the availability of reliable and affordable charging for all users (see Sections IV.B.4). Given the flaws in EPA's methodology that omits significant data sources and other factors and makes unsupported assumptions, EPA should revise its analysis concerning charging time and continue with promulgating a final rule for future emissions standards, that accounts for the reality of today's automotive market and not the public pronouncements of the automotive industry, a single state or group of states, or other unsupported estimates of future market growth. [EPA-HQ-OAR-2022-0829-0733, pp. 33-34]

155 88 Fed. Reg. at 29,367.

4. EPA ignores the lack of reliable ZEV charging

The Proposal's success is partially contingent on the availability of "equitable, affordable charging."169 Currently, ZEV charging is most available in metropolitan areas, with less investment occurring outside urban areas.170

169 Joann Muller, "The electric car revolution hinges on equitable, affordable charging," Axios, Feb. 8, 2023. Available at The electric vehicle revolution hinges on equitable, affordable charging (axios.com).

170 S&P GLOBAL MOBILITY, "EV Chargers: How Many Do We Need?" (Jan. 9, 2023), available at https://press.spglobal.com/2023-01-09-EV-Chargers-How-many-do-we-need.

While a significant percentage of the charging installations deployed today are Level 2 EVSEs, dual charging installations to enable the flexibility of LD as well as MD and HDV charging will become increasingly important. DCFCs will enable broader market coverage, even for LDVs used in applications where they cannot sit for 6 hours and charge during off-peak, lower-cost electricity periods. As utility companies gear up to provide infrastructure installations, we should not minimize the impact of supply chain shortages/strains on the cost of materials necessary for installing supporting charging infrastructure in the short time ahead to 2032. [EPA-HQ-OAR-2022-0829-0733, pp. 36-37]

The DRIA admits its charging simulations to estimate charging network size excluded medium-and heavy-duty vehicles, which are also subject to EPA's EV mandate.174 While these commercial vehicles may spend most of their time charging at private depot stations, these are mobile, commercial vehicles that will need to use (and strain) the charging network. It is arbitrary and capricious for EPA to omit those vehicles from its simulations. [EPA-HQ-OAR-2022-0829-0733, p. 37]

174 DRIA at 5-39, n. 107.

Moreover, many available chargers are unreliable. A recent study on the reliability of fast chargers found that in 22.7 percent of the cases studied, chargers were nonfunctional because of "unresponsive or unavailable touchscreens, payment system failures, charge initiation failures, network failures, or broken connectors," and 4.9 percent of charging cable were too short to reach an EV's charge port.175 Similarly, in a J.D. Power study, owners in high EV volume markets like California, Texas and Washington are finding the charging infrastructure inadequate and plagued with non-functioning stations.176 This is a significant technological issue that calls into question the viability of the existing charging network as well as future deployments. Similarly, in a J.D. Power study, owners in high EV volume markets like California, Texas and Washington are finding the charging infrastructure inadequate and plagued with non-functioning stations.177 [EPA-HQ-OAR-2022-0829-0733, pp. 37-38]

175 Rempel, David and Cullen, Carleen and Bryan, Mary Matteson and Cezar, Gustavo Vianna, Reliability of Open Public Electric Vehicle Direct Current Fast Chargers. Available at SSRN: https://ssrn.com/abstract=4077554 or http://dx.doi.org/10.2139/ssrn.4077554

176 J.D. Power. Press Release, "2022 U.S. Electric Vehicle Experience (EVX) Public Charging Study." J.D. Power, 17 Aug. 2022, www.jdpower.com/business/press-releases/2022-us-electric-vehicle-experience-evx-public-charging-study. Accessed 28 June 2023.

Demand charges can be punishing, and in some cases make or break the business case for transition from ICEVs to ZEVs, particularly for fleets and vehicles that require DCFC charging. Other considerations for high-reliability use cases should include provisional back-up power system considerations, which depend upon back-up generators or expensive stationary energy storage batteries. Absent comprehensive understanding of the dynamics between increased ZEV use and charging infrastructure needs, OEMs and consumers are vulnerable. [EPA-HQ-OAR-2022-0829-0733, pp. 37-38]

v. Costs to upgrade electricity generation, transmission, and distribution

For EPA to achieve its GHG reduction aspirations in this Proposed Rule, all three of these challenges must be met: (1) sufficient materials to manufacture the required EVs, chargers, and grid upgrades, (2) consumer willingness to substitute ZEVs for ICEVs currently for sale, and (3) a low-carbon power generation grid capable of reliably supplying energy for this mode of transportation. Combined with other issues, such as a disorderly transformation of the generation base as conventional units are replaced with intermittent resources, raises questions of the grid's ability to reliably meet consumer demand on a regional basis. Despite these challenges, EPA incredibly assumes no increase in the cost of electricity to consumers (whether EV owners or others) associated with the proposed rulemaking. EPA underestimates the cost of electricity to all consumers, including EV owners, and omits the cost of grid upgrades and distributed energy resources have been excluded from these estimates.260 [EPA-HQ-OAR-2022-0829-0733, pp. 56-57]

260 U.S. Department of Energy, National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." June 2023. https://driveelectric.gov/files/2030-charging-network.pdf.

EPA incorrectly assumes that ZEV owners will pay the national average residential electricity price to charge their vehicles. EPA fails to consider that the majority of ZEVs in the U.S. are located in utility service territories with some of the highest electricity rates in the country and that the average EV owner currently pays a much higher price to charge their ZEV at home than the national average residential electricity rate. Given that EV penetration has varied widely across the U.S., it would be arbitrary to assume that EVs will, unlike in the past, penetrate uniformly across the U.S. and thus that the average electricity price would be representative of the actual cost electricity. For example, California, which has roughly 40 percent of all registered ZEVs in the U.S., has a residential electricity rate that is roughly double the national average. Considering that EPA is modeling its rule after a California-like approach to mandate ZEVs, it would be more appropriate for EPA to assume similar real-world costs (at a minimum, given California's temperate climate). Moreover, EPA fails to consider that mandating such a high ZEV sales rate will necessarily require exponential increases in commercial ZEV charging at rates that are currently three, four or five times higher than the current national average residential electricity rate, depending on location and charging speed. Those customers who are not homeowners and not able to install their own charging stations and take advantage of charging at low-cost times will be adversely impacted. Instead, EPA uses a residential rate for electricity and does not consider peak power or time of use charges. California electric prices rose 42 percent -78 percent between 2010 and 2020 and are projected to rise an additional 50 percent by 2030 as shown in Figure 9. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

SEE ORIGINAL COMMENT FOR Historic and Forecasted Residential Average Rates Based on Most Recent 5-year Average Rate Increase. Figure 9: [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Source: Michael Shellenberger, Twitter (citing California Public Advocate's Office data), April 27, 2021). [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Heaping additional demand for EV charging into this market could exacerbate already high electricity prices. This will be especially impactful to lower-income homeowners who may not be able to install dedicated charging units, forcing them to pay more out of pocket for charging during peak demand periods.265 [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

265 Hardman, Scott, et al., "A Perspective on Equity in the Transition to Electric Vehicles." MIT Science Policy Review, (Aug. 20 2021), available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/ (accessed June 29, 2023).

EPA must revise its analysis to account for realistic electricity prices. The proposed ZEV mandate will require an enormous investment in power generation and distribution, resulting in nationwide increases in electricity bills that EPA has not considered. Of course, considering the additional trillions of dollars in costs would paint a clear picture that the costs of forced electrification far exceed even the inflated benefits EPA presented in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

vi. Charging infrastructure costs

EPA vastly underestimates the cost to build the required charging infrastructure. Even as new ZEVs are ready to enter into production, auto industry representatives have acknowledged the necessary infrastructure for electric vehicles continues to lag.266 In 2020, there were a total of 103,582 publicly available non-proprietary charging outlets in U.S. (30 percent of which are located in 14 counties) for 3.04 million EVs on the road, a ratio of 29 EVs per charger.267 In 2022, 51 percent of all new chargers were added in 2 percent of U.S. counties, with California adding 25 percent of the 2022 new charging capacity and 160 counties adding only one charger.268 And the pace of installing new public chargers is not keeping up with current and projected EV sales, as the ratio of registered EVs to new chargers in 2022 was 38 to one.269 [EPA-HQ-OAR-2022-0829-0733, pp. 58-59]

266 ALLIANCE FOR AUTOMOTIVE INNOVATION, "Get Connected Electric Vehicle Quarterly Report" (Fourth Quarter 2022).

267 ALLIANCE FOR AUTOMOTIVE INNOVATION, "Get Connected Electric Vehicle Quarterly Report" (Fourth Quarter 2022).

268 Id.

269 Id.

A 2023 EV Charging Station Report based on DOE's Alternative Fuel Data Center data highlights as the number of ZEVs in the U.S. increased by 42 percent, but the growth in public charging outlets increased by only 12 percent during the same time.270 According to S&P Global's Mobility Special Report, U.S. charging infrastructure is not nearly robust enough to fully support a maturing electric vehicle market, and ZEV charging stations will need to quadruple between 2022 and 2025 and grow more than eight-fold by 2030.271 There is lower investment into charging systems outside of major metro markets.272 Of the 3,100 counties and city-counties in the U.S., 63 percent had five or fewer chargers installed; 39 percent had zero; and 53 percent of counties added no new chargers in 2022.273 [EPA-HQ-OAR-2022-0829-0733, pp. 58-59]

270 ZUTOBi, "2023 EV Charing Station Report: State-by-State Breakdown" (June 16, 2023) available at https://zutobi.com/us/driver-guides/the-us-electric-vehicle-charging-point-report.

271 S&P Global Mobility. "EV Chargers: How Many Do We Need?" News Release Archive, (Jan. 9, 2023), https://press.spglobal.com/2023-01-09-EV-Chargers-How-many-do-we-need (accessed June 28, 2023).

272 S&P Global Mobility. "EV Chargers: How Many Do We Need?" News Release Archive, (Jan. 9 2023), https://press.spglobal.com/2023-01-09-EV-Chargers-How-many-do-we-need, (accessed June 28, 2023). Currently EV charging is concentrated in high-income urban areas in California, Colorado, Massachusetts, Maryland, New Jersey, New York, and Oregon. Phillipp Kampshoff, et al., McKinsey & Co., "Building the electric-vehicle charging infrastructure America needs" (Apr. 18, 2022) available at https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs.

273 Alliance for Automotive Innovation. Get Connected Electric Vehicle Quarterly Report, Fourth Quarter 2022. See also S&P Global Mobility. "EV Chargers: How Many Do We Need?" News Release Archive, 9 Jan. 2023, https://press.spglobal.com/2023-01-09-EV-Chargers-How-many-do-we-need. Accessed 28 June 2023 (Texas currently has about 5,600 Level 2 non-Tesla and 900 Level 3 chargers, but by 2027 S&P Global Mobility forecasts the state will need about 87,500 Level 2 and 7,800 level 3 chargers – more than ten times the current number of Level 2 and 3 chargers -to support an expected the expected 1.1 million EVs at that time)

EPA also did not include any cost of power distribution upgrade needed for EVSE installation, citing large uncertainty. While uncertainty may exist, EPA cannot assume there is no cost associated with this required upgrade. The National Renewable Energy Laboratory ("NREL") published new estimates of the need for ZEV charging infrastructure investment that finds: [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

"A cumulative national capital investment of $53–$127 billion in charging infrastructure is needed by 2030 (including private residential charging) to support 33 million PEVs. The large range of potential capital costs found in this study is a result of variable and evolving equipment and installation costs observed within the industry across charging networks, locations, and site designs. The estimated cumulative capital investment includes: [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

-$22–$72 billion for privately accessible Level 1 and Level 2 charging ports

-$27–$44 billion for publicly accessible fast charging ports

-$5–$11 billion for publicly accessible Level 2 charging ports.274 [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

274 National Renewable Energy Laboratory, The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure, June 26, 2023, at vii. Available at https://www.nrel.gov/docs/fy23osti/85654.pdf.

Clearly, these cost estimates are vastly higher than the $7 billion in costs that EPA claims is needed over an even longer time frame. Given a general linear relationship between ZEV charging infrastructure costs and the number of registered ZEVs, it is reasonable to estimate (using the DOE numbers) a cost adder for charging infrastructure to each ZEV of (at least) $1,606 to $3,848. These costs are not shown by EPA and EPA's failure to account for them is arbitrary and unreasonable. Moreover, note that DOE's estimate excludes "the cost of grid upgrades and distributed energy resources."275 [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

275 Id.

The BIL provides up to $7.5 billion to install 500,000 public chargers nationwide by 2030. "However, even the addition of half a million public chargers could be far from enough. In a scenario in which half of all vehicles sold are ZEVs by 2030—in line with federal targets—McKinsey estimates that America would require 1.2 million public EV chargers and 28 million private EV chargers by that year.276 All told, the country would need almost 20 times more chargers than it has now."277 EPA must address charger investment and reliability by more than just referencing EV subsidies in recent legislation. [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

276 McKinsey, "Building the Electric Vehicle Charging Infrastructure America Needs," (Apr. 18, 2022), available at America's electric-vehicle charging infrastructure | McKinsey; see also S&P Global, "EV Chargers: How Many Chargers DO We Need?, (Jan. 9, 2023) (millions of chargers are needed).

277 Id.

Organization: American Highway Users Alliance

More specifically, EPA's proposal in this docket appears to be premised on huge and rapid growth in the portion of light-duty and medium-duty vehicles that are electric powered (EVs) as well as on rapid transformation of the marketplace in a number of related areas that are not the subject of the proposed regulation. EPA seems to have made favorable assumptions on many issues bearing on the feasibility of the proposal, including as to the issues set forth below. The Highway Users, on the other hand, drawing on the expertise of its members, questions that, within the MY 2027 – 2032 timeframe of the proposed rule, all or most of the following will occur, that -- [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- high-speed and other electric charging stations will be sufficiently available to service light-duty and medium-duty EVs in quantities and locations sufficient to encourage customers to buy EVs, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- electric utilities can timely provide connections from the electric grid to those charging stations, or hydrogen fueling stations – and provide the refueling and charging connections at reasonable cost, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- the electric grid will have the capacity to meet the demand for electricity that will be required to support increased electrification of trucks, buses, and passenger cars, even if the connections can be timely made to charging stations (both public and private) that do not yet exist in sufficient numbers, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- charging times can be reduced sufficiently to encourage customers to buy these EVs, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- major industries, including vehicle manufacturers and their suppliers, can implement major changes in vehicles as rapidly as the NPRM assumes (given the limited current market penetration of these EVs), [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- there will be an adequate supply of rare earth and other critical minerals, and the ability to process them, with those minerals being so essential to the manufacture of EVs and batteries, [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- with a large portion of such minerals being sourced and/or processed overseas, including in China and Africa, whether the national interest in sourcing and processing such minerals in the United States can be met, and [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

- potential customers of these EVs will proceed to purchase them in sufficient quantity, notwithstanding significantly higher up-front costs, uncertain availability of charging facilities, and other concerns. [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

This last consideration is highly important because if the potential customers of these EVs do not become actual customers to a sufficient extent, the manufacturers are unlikely to produce the vehicles in the quantities EPA has estimated will be required to be compliant with the regulations, in turn greatly reducing the benefits of the proposal as EPA estimated. [EPA-HQ-OAR-2022-0829-0696, pp. 2-3]

Feasibility of the proposal is highly questionable and benefits are likely overestimated

Organization: American Petroleum Institute (API)

3. Compounding concern resources will also be used for HDV, on the same timeframe.

EPA released the proposals for LMDV and HDV simultaneously – and the programs have the same proposed implementation timeline of 2027-2032. API has serious concerns about the implications of this timing. Both proposed programs are significantly flawed in that they rely on resources and infrastructure that are not yet ready. Even with EPA's projections regarding the use of BIL and IRA funding, the transportation industry will be competing for the same resources to successfully stand up both programs simultaneously. Furthermore, the availability of and process for obtaining such funding is not certain. [EPA-HQ-OAR-2022-0829-0641, p. 15]

v. Infrastructure.

1. Leadtime and deployment.

API, and many other stakeholders, are concerned about the lack of infrastructure for the LMD ZEV market.39 Even coupled with significant tax credits and incentives, consumers likely will not purchase new LMD ZEVs in the volumes that would be required by the proposal without a reliable charging infrastructure. [EPA-HQ-OAR-2022-0829-0641, p. 15]

> 39 Khan, Hafiz Anwar Ullah; Price, Sara; Avraam, Charalampos; Dvorkin, Yury. “Inequitable Access to EV Charging Infrastructure.” New York University, Tandon School of Engineering. February 2022. https://rosap.ntl.bts.gov/view/dot/61454.

A critical part of relying on an EV for transportation is the ability to charge the battery. According to J.D. Power,58 EV owners in markets with a high volume of EVs are experiencing problems with charging. Even with the high growth rate of EV chargers, satisfaction has flat-lined and a “shortage of public charging availability” is the main reason car buyers avoid EVs. [EPA-HQ-OAR-2022-0829-0641, p. 19]

> 58 J.D. Power. “Growing Electric Vehicle Market Threatens to Short-Circuit Public Charging Experience, J.D. Power Finds.” August 2022. https://www.jdpower.com/business/press-releases/2022-us-electric-vehicle-experience-evx-public-charging-study.

Organization: BlueGreen Alliance (BGA)

At the same time, EPA must consider that the manufacturing investments from the Inflation Reduction Act and Bipartisan Infrastructure Law will take time to achieve their full production capacity. EPA should coordinate with DOE, the U.S. Department of Transportation (DOT), and the U.S. Department of Commerce (DOC) to ensure that the manufacturing investments from the Inflation Reduction Act and Bipartisan Infrastructure Law will be fully leveraged to support regulatory compliance. Programs like the Battery Manufacturing and Recycling Grants (DOE), the Battery Material Processing Grants (DOE), the Domestic Manufacturing Conversion Grants (DOE), the 48C Advanced Manufacturing Tax Credit (DOE/DOC), the Advanced Technology Vehicle Manufacturing Loan Program (DOE), the National Electric Vehicle Infrastructure (NEVI) Program (DOT), and the Charging and Fueling Infrastructure Grant Program (DOT) all provide unprecedented federal resources that manufacturers and fleet owners can leverage to support both supply and demand for low-and zero-emission light-and medium-duty vehicles. However, these programs take time to bear fruit—whether that means a complete public, affordable, and interoperable EV charging network, or a robust domestic supply chain for vehicles eligible for the battery component and critical mineral requirements of the 30D Clean Vehicle Tax Credit. [EPA-HQ-OAR-2022-0829-0667, pp. 8-9]

It is essential to workers and communities that these programs be carefully designed and implemented, with robust stakeholder engagement. This helps ensure that they adhere to Justice40 requirements and new Build America, Buy America provisions that are critical to ensuring that federal programs support domestic manufacturing investments that are fully supported by their communities. [EPA-HQ-OAR-2022-0829-0667, pp. 8-9]

With that, EPA must account for the time it takes to convert federal awards and allocations into actual domestic production capacity and critical on-the-ground infrastructure. EPA should coordinate with DOT and DOE to fully assess the availability of charging and fueling infrastructure for electric vehicles, and related grants and loans. [EPA-HQ-OAR-2022-0829-0667, pp. 8-9]

Organization: BMW of North America, LLC (BMW NA)

BMW NA, together with the Alliance of Automotive Innovators, has already agreed with Biden Administrations' stated goal of reaching 40-50% sales of electric vehicles within the market by 2030. Achieving this goal will only be possible if the framework conditions allow the market to develop -i.e. charging infrastructure, availability of critical raw materials and the overall cost situation for xEVs. [EPA-HQ-OAR-2022-0829-0677, p. 2]

At this time, BMW NA does not believe that the necessary framework conditions, especially infrastructure, are advancing as necessary to achieve the targets set forth in the Proposed Rule. Therefore, we share the concerns expressed by the Alliance of Automotive Innovators that these targets cannot be met without massive and coordinated efforts of the auto industry, energy providers, mineral suppliers and the government. [EPA-HQ-OAR-2022-0829-0677, p. 2]

The charging infrastructure deployment within the United States must be accelerated even beyond the targets identified in the Infrastructure Act of 500.000 charges. In fact, BMW NA believes these figures have to increase by about five-fold (a study of the California Energy Commission projects, that a 700,000 public and shared private chargers are necessary for 5 Mio. ZEV1 . Different sources assuming 25 to 44 Mio ZEVs on the US streets in 20302). [EPA-HQ-OAR-2022-0829-0677, p. 2]

1 https://www.energy.ca.gov/data-reports/ repo rt s/ electric -vehicle-charging-infrastructure-assessment-ab-2127

2 https:/ / ww w.mckinsey.com/ industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs

Organization: BorgWarner Inc.

BorgWarner appreciates the Administration’s support for and recommends prioritization of DCFCs for EV infrastructure and coordination of hydrogen infrastructure. [EPA-HQ-OAR-2022-0829-0640, pp. 4-5]

BorgWarner applauds the Administration’s support for EV charging infrastructure. BorgWarner recommends that EPA prioritize DCFC charging capabilities in publicly-funded infrastructure projects to foster consumer adoption, futureproof site investments, and facilitate vehicle-to-grid (V2G) bidirectional charging, which becomes more critical to enable sustainable grid management, grid resilience, utilization, and national security protection. [EPA-HQ-OAR-2022-0829-0640, pp. 4-5]

In its Proposal, EPA acknowledges the additional needs and costs associated with charging infrastructure BorgWarner agrees and reiterates its support for current Build America Buy America (BABA) requirements. BorgWarner has made the capital investment to comply with the BABA requirements and should not have that competitive advantage taken away through an open-ended waiver of the BABA requirements. BorgWarner also asks EPA to require UL certification as a national certification standard to provide consistency, quality, safety, and compliance throughout the system. [EPA-HQ-OAR-2022-0829-0640, pp. 4-5]

4 Federal Register, Vol. 88, No. 87, May 5, 2023, Page 29311

Hydrogen combustion engines (H2ICE) are a cost-effective advanced technology that can make a significant positive impact to the environment, and we urge EPA to recognize H2ICE as a technology solution in the Proposal, especially for heavier MD applications. As the IRA and IIJA are providing billions of dollars for the development of a hydrogen economy, EPA should support these efforts with program incentives. [EPA-HQ-OAR-2022-0829-0640, pp. 4-5]

BorgWarner supports the proposed adjustments to compliance credits. BorgWarner agrees with EPA's proposed changes to the current compliance credits offered for BEVs, PHEVs and fuel cell electric vehicles (FCEVs). Credits can serve as a valuable tool to incentivize the development of new vehicle technologies and should be used to create new technology pathways. Once these technologies are clearly established, EPA should eliminate these credits. Offering credits once a technology is established could potentially disincentivize new innovations in efficiency-and performance-improving vehicle technologies. We also agree with EPA's decision to discontinue air conditioning credits under the new standard. [EPA-HQ-OAR-2022-0829-0640, pp. 4-5]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Charging Standards

To the extent that manufacturers comply with U.S. EPA's proposed standards with BEVs and PHEVs, the demand for charging infrastructure will increase significantly. While these vehicles offer a variety of benefits to consumers, vehicle charging is a persistent concern and barrier to electric vehicle adoption in consumer studies. To truly support increased ZEV penetration, it is important for policymakers and manufacturers to reduce barriers that could otherwise discourage consumer selection of a BEV or PHEV. In the ACC II program, CARB adopted several charging-related requirements to help increase access to home charging and standardize the charging experience. 59 CARB encourages U.S. EPA to explore opportunities to standardize charging requirements as a component of its ZEV assurance measures and offers the following specific recommendations as particularly appropriate in the national context. [EPA-HQ-OAR-2022-0829-0780, pp. 42-43]

59 Cal. Code Regs., title 13, section 1962.3; see also ACC II Final Statement of Reasons, Including Summary of Comments and Agency Response Appendix D Summary of Comments to ZEV Assurance Measures and Agency Response, pp. 69-74.

Vehicle-to-Infrastructure Integration

As the infrastructure for BEVs expands and becomes more standardized, vehicles themselves have a role in providing a reliable, consistent, and convenient charging experience for consumers. BEVs also have the unique opportunity to support grid stability in the future through "vehicle-to-grid" systems. However, to broadly realize these consumer and grid service benefits, vehicles must be able to communicate with the chargers themselves, known as electric vehicle supply equipment (EVSE), in a standardized way. [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

International Organization for Standardization (ISO) 15118 is a set of communication and charging management standards intended for use between vehicles and EVSE, including a customer convenience feature referred to as Plug & Charge. To help ensure consistent and successful use of charging infrastructure, CARB recommends that U.S. EPA require manufacturers to integrate these industry-developed standards into the design of future BEVs. CARB notes that several automakers have already introduced or will introduce U.S. vehicles that can support some portions of these standards, especially the Plug & Charge feature, including Audi, BMW, Daimler, Porsche, Lucid, Volkswagen, 60 and Ford. 61 Standardized deployment of vehicle-to-infrastructure communication across the industry will reduce barriers to BEV adoption and maximize benefits. [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

60 In a joint comment to the California Public Utilities Commission on its February 2018 Staff Report on the Vehicle-Grid Integration (VGI) Communication Protocol Working Group, Audi, BMW, Daimler, Lucid, Porsche, and VW stated their intention to implement ISO 15118 on their future vehicles, including the Plug & Charge feature. https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/o/6442457082-oems-final-comments-vgi-wg-draft-report-correction-v2.pdf

61 Ford. "Charging Your Mustang Mach-E." https://www.ford.com/mustang/ev-charging/mache/. Accessed June 15, 2023.

Specifically, CARB recommends that, for future BEVs, U.S. EPA require manufacturers to: [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

- Implement and conform to ISO 15118-3 Vehicle to grid communication interface – Part 3: physical and data link layer requirements, 62 [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

- Implement and conform to ISO 15118-2 Vehicle to grid communication interface – Part 2: Network and application protocol requirements 63 and ISO 15118-20 Vehicle to grid communication interface: Part 20: 2nd generation network layer and application layer requirements, 64 and [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

- Demonstrate successful results for each certified vehicle configuration with ISO 15118-4 Vehicle to grid communication interface – Part 4: Network and application protocol conformance test 65 and ISO 15118-5 Vehicle to grid communication interface – Part 5: Physical layer and data link layer conformance test. 66 [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

62 ISO 15118-3:2015.

63 ISO 15118-2:2014.

64 ISO 15118-20:2022.

65 ISO 15118-4:2018.

66 ISO 15118-5:2018.

CARB notes several important benefits associated with widespread deployment of harmonized communication standards between the vehicle and the charging infrastructure. First, drivers will see the benefit of a simplified public charging user experience. Plug & Charge allows drivers to establish their electric charging preferences and input payment information once, providing a more seamless charging experience. With widespread implementation of Plug & Charge, drivers charging their vehicle at a compatible public EVSE will be able to simply plug in their vehicle and walk away while the vehicle and the EVSE communicate and manage the charging session accordingly. [EPA-HQ-OAR-2022-0829-0780, pp. 44-45]

Second, vehicle-to-grid connectivity could enable BEVs to provide important grid services. Implementation of the communications protocols outlined in the suite of ISO 15118 standards is a key step to enable this functionality by ensuring that the vehicle and the EVSE are coordinated on the bi-directional flow of electricity during grid support services. CARB agrees with U.S. EPA’s findings that grid reliability is not expected to be adversely affected by the modest increase in electricity demand associated with electric vehicle charging. 67 California’s grid has historically expanded and evolved as consumer demand for electricity services has grown, including with the recent emergence of electric vehicles. This trend is reflected in the historical expansion of the national grid as noted in U.S. EPA’s proposal. However, BEVs can further support grid resilience with their unique ability to fuel on a flexible schedule depending on the driver’s and the grid’s needs. Drivers with access to residential charging could also realize greater opportunities to reduce their total cost of ownership by potentially selling electricity back to the grid or powering their homes during peak times. Furthermore, BEVs have already been demonstrated to be able to function as back-up power devices during emergencies, and standardized implementation of this protocol could make such activities even more seamless in the future. [EPA-HQ-OAR-2022-0829-0780, pp. 44-45]

67 CARB. Response to Comments on the Draft Environmental Analysis Prepared for the Advanced Clean Cars II Program. August 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/acciirtc1.pdf.

Third, requiring implementation of these communication standards on the vehicle aligns with—and maximizes the benefits from—recent infrastructure planning and funding. The federal government is making unprecedented investments in charging infrastructure through the Infrastructure Investment Jobs Act. The law set aside $5 billion to build a National Electric Vehicle Infrastructure (NEVI) network that will enable widespread travel across the nation. 68 As part of deploying the NEVI funds, the Joint Office of Transportation and Energy set minimum requirements that NEVI-funded EVSE must meet including minimum payment standards, minimum power, minimum number of ports, and collection of reliability metrics. One of these requirements is the implementation of Plug & Charge on direct current fast chargers (DCFC), utilizing the ISO 15118 suite of standards outlined above. 69 The California Energy Commission is also taking steps in this direction by requiring public chargers it partially or fully funds to install EVSE designed to be compatible with the ISO 15118 suite of standards. 70 Matching vehicle requirements with NEVI implementation will harmonize communication flow between vehicles and charging stations, reducing the number of potential points of failure to communicate in the charging ecosystem. [EPA-HQ-OAR-2022-0829-0780, pp. 44-45]

68 Public Law No. 117-58. Available at: https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf. Accessed June 15, 2023.

69 23 C.F.R. § 680.108(a). (2023).

70 California Energy Commission. TN 241955. Docket 19-AB-2127. “CEC Recommendation for Deployment of ISO 15118-Ready Chargers.” February 2022. https://efiling.energy.ca.gov/GetDocument.aspx?tn=241955&DocumentContentId=75632

Direct Current Fast Charging Standardization

CARB agrees with U.S. EPA’s findings that the increased deployment of ZEVs will require more charging infrastructure to be installed. For this infrastructure to be most effective, CARB recommends that U.S. EPA require manufacturers to standardize vehicle charging inlets. In particular, direct current fast charging (DCFC) will play a key role in charging away from home both for longer travel trips and for those without convenient access to home or workplace charging. Making sure that consumers can easily access charging and that all BEVs are DCFC capable can help increase uptake of ZEVs, better ensure they can be effectively used by second and third owners, and help fully realize emission benefits from U.S. EPA’s proposed standards. Currently, three distinct DCFC inlets exist on BEVs deployed in the U.S.: CHAdeMO, SAE Combined Charging System (CCS1) Type 1 (SAE J1772), and Tesla’s North America Charging Standard connector. Having three different DCFC inlets, standards, and communication protocols can lead to inconsistent and unnecessarily complex charging experiences for consumers, including interoperability and charging reliability concerns. [EPA-HQ-OAR-2022-0829-0780, pp. 45-46]

Most manufacturers are already utilizing the SAE J1772 CCS1 standard in current vehicle production. In 2020, the CCS1 inlet was on 13 available BEV models and only 2 BEV models came with the CHAdeMO inlet. For the 2022 MY, 45 BEV models have the CCS1 inlet, with only 2 vehicle models remaining with the CHAdeMO inlet. 71 The federal government is also already investing in CCS1 infrastructure through the NEVI program, which requires that each funded DCFC port have at least one CCS1 connector. 72 However, in Spring 2023, Ford and General Motors both announced partnership with and future implementation of Tesla’s North America Charging Standard on their vehicles. 73, 74 These moves by industry electric vehicle leaders are significant and continued lack of standardization could lead to more confusion in the market and decentralization of resources toward solving those issues that most plague reliable charging for electric vehicles. [EPA-HQ-OAR-2022-0829-0780, pp. 45-46]

71 ACC II ISOR. Chapter III, Sect C.3. ACC II ISOR (ca.gov)

72 23 CFR §680.106(c) (2023).

73 Ford. “Ford EV Customers To Gain Access To 12,000 Tesla Superchargers; Company To Add North American Charging Standard Port In Future EVs.” May 25, 2023. https://media.ford.com/content/fordmedia/fna/us/en/news/2023/05/25/ford-ev-customers-to-gain-access-to- 12-000-tesla-superchargers--.html. Accessed June 15, 2023.

74 General Motors. “General Motors Doubles Down on Commitment to a Unified Charging Standard and Expands Charging Access to Tesla Supercharger Network” June 8, 2023. https://news.gm.com/newsroom.detail.html/Pages/news/us/en/2023/jun/0608-gm.html. Accessed June 15, 2023.

Improved Charging Time Information

CARB recommends required disclosure of charging speed information at the time of certification to ensure the data exists to support an improved label-reported charge time that is more relevant than what is disclosed today. On today’s label, a single charge time is presented, representing the time it takes to fully charge a completely depleted battery at the maximum Level 2 charge rate the vehicle is designed to accept. However, in-use vehicle data suggests that this is not a charge condition relevant to typical consumer behavior as vehicle owners would rarely, if ever, fully deplete the battery. CARB recommends charging time data be required to be submitted at the time of certification to represent the full spectrum of rate of charge versus battery state of charge for typical residential charging. This could allow for a future label that, for example, determines the most meaningful value to display is the time it takes to recover to the manufacturer's default or recommended routine maximum state of charge (e.g., 80 percent) after a typical day's usage of a defined number of miles (e.g., 35 miles) on a commonly available Level 2 capable circuit. [EPA-HQ-OAR-2022-0829-0780, pp. 47-48]

Additionally, CARB recommends similar disclosure of DCFC rates such that a future label could also meaningfully disclose recharging times a driver could expect at a public charging station. Like the relevance of highway speeds for determining range, DCFC rates are most relevant for consumers stopping mid-travel on long trips or for consumers without routine access to home or workplace charging. In both cases, they may be looking for useful information relevant to charging as quickly as possible from a largely (but not fully) depleted state of charge. Disclosure of charge rate data could provide the necessary information to support a label with the most meaningful data determined through future analysis. Examples of meaningful data could include the time to recover from the most typical state of charges observed at DCFC stations for starting and ending charge events or number of miles of range recovered per 10-minute charge events. Such information, presented in a concise and consistent manner on the label, would provide valuable information for consumers to shopping for a BEV most suitable for their needs. [EPA-HQ-OAR-2022-0829-0780, pp. 47-48]

Infrastructure Costs

Level 2 Charging Infrastructure Costs

CARB recommends that U.S. EPA adjust its infrastructure cost discussion to include additional residential charging options that are currently being implemented and may help reduce overall charging infrastructure costs. In particular, CARB recommends that U.S. EPA accounts for the possibility of low power Level 2 charging, defined as a 208/240 volt 20-ampere minimum branch circuit and a receptacle that is used for charging a BEV or PHEV. 81 [EPA-HQ-OAR-2022-0829-0780, p. 50]

81 CALGreen code: 2022 California Green Building Standards (Title 24 Part 11), Chapter 2.

In California, the State's building agencies must provide a cost analysis for any building code proposal. 82 CARB supports California's building agencies in developing BEV charging provisions for newly constructed buildings and preparing the required estimates of expected costs for vehicle charging requirements. 83 California's Green Building Standards Code ("CALGreen") now requires 25 percent of spaces in multi-family housing developments to have a low power level 2 charging receptacle. 84 [EPA-HQ-OAR-2022-0829-0780, p. 50]

82 California Government Code §11346 and subsequent.

83 California Health and Safety Code §18930.5(b); Cal. Code Regs, title 24, part 1.

84 See Cal. Code Regs., title 24, pt. 11.

Based on its technical analysis in support of CALGreen, CARB finds U.S. EPA's cost analysis to be conservative as it focuses on the installation of Level 2 chargers operating on 40 amperes. CARB's cost analysis focused on the hardware costs (including labor) required to support a low power Level 2 charging receptacle, which is significantly less expensive to install than a Level 2 EVSE. CARB estimates the cost of installing a low power Level 2 charging receptacle to be $781 to $1,477 (including labor) as compared to U.S. EPA's cost estimate of $3,300 for a 240-volt AC outlet installation to $4,100 for a Level 2 EVSE port in non-single-family homes (non-SFH). While California is the only state to require the installation of low power Level 2 charging receptacles, other states could reference CALGreen as a starting point for their building codes. If other states adopt similar requirements of installing low power Level 2 charging receptacles during new construction, the cost to install charging infrastructure in non-SFHs may be significantly less when compared to installing Level 2 EVSE or an outlet that can support a Level 2 EVSE or a Level 2 EVSE in the same number of multifamily housing developments. [EPA-HQ-OAR-2022-0829-0780, p. 50]

Charger investments

CARB agrees with U.S. EPA's findings that that the increased investment in charging infrastructure will aid in the deployment of ZEVs. Although U.S. EPA mentions many important infrastructure investments to date, CARB has identified additional programs to add to the "PEV Charging Infrastructure Investments" section of the DRIA that will further the deployment of ZEVs as an economical means of complying with the emission standards. [EPA-HQ-OAR-2022-0829-0780, pp. 50-51]

CARB recognizes that U.S. EPA has included some of Electrify America's investments such as the charging partnerships the company has with auto manufacturers, the $450 million investment from Siemens and Volkswagen Group, and the partnership between TravelCenters of America and Electrify America. However, it is unclear if these investments by Electrify America are a part of the Volkswagen settlement of $1.2 billion in the U.S. 51or this reason, CARB recommends that U.S. EPA ensures its summary of public and private investments includes Electrify America's $1.2B settlement that has supported deployment of infrastructure nationwide. CARB also recommends including Walmart's plans to install chargers at locations throughout the country, 85 and 7-11's charging network called 7Charge that will be installed at select locations. 86 [EPA-HQ-OAR-2022-0829-0780, pp. 50-51]

85 Leading the Charge: Walmart Announces Plan To Expand Electric Vehicle Charging Network. April 6, 2023. Accessed May 26, 2023. https://corporate.walmart.com/newsroom/2023/04/06/leading-the-charge-walmart- announces-plan-to-expand-electric-vehicle-charging-network

86 7-Eleven Inc. Launches New Electric Vehicle Charging Network. March 16, 2023. Accessed May 26, 2023. https://franchise.7-eleven.com/franchise-press-releases/7-and-8209-eleven-inc-launches-new-electric-vehicle- charging-network-7charge

These additions would help ensure that the federal analysis account for the increasing infrastructure deployment that will support ZEV deployment in the coming years . [EPA-HQ-OAR-2022-0829-0780, pp. 50-51]

Organization: California Attorney General's Office, et al.

D. Sales of Zero-Emission Vehicles Are Projected to Continue Growing at a Dramatic Rate

Zero-emission-vehicle technologies107 are the most effective tailpipe emission control technologies available to date, and demand for zero-emission vehicles specifically has exploded in recent years. In response to this demand, significant public and private investments across the country continue to be made to build sufficient charging infrastructure and develop the domestic battery supply chain, and these investments are projected to keep pace with the dramatic growth of the zero-emission vehicle market. There is every reason to expect this growth to continue. [EPA-HQ-OAR-2022-0829-0746, p. 18]

107 The term "zero-emission-vehicle technologies" includes batteries with on-board chargers and hydrogen stored in a fuel cell stack that transforms chemical energy into electrical energy to propel a vehicle.

Recent congressional actions demonstrate the federal commitment to substantial electrification of the transportation sector. In 2021, Congress passed the Bipartisan Infrastructure Law, which allocates $7.5 billion to building out a national network of electric vehicle chargers, $7 billion to ensure domestic manufacturers have the critical minerals and other components necessary to make electric vehicle batteries, and $10 billion for clean transit and school buses.110 In 2022, Congress passed the CHIPS and Science Act, which invests $52.7 billion in America's manufacturing capacity for the semiconductors used in electric vehicles and chargers.111 Later in 2022, Congress passed the Inflation Reduction Act, which provides $7,500 to buyers of new electric vehicles and $4,000 to purchasers of pre-owned electric vehicles.112 Additionally, the Inflation Reduction Act provides billions of dollars to support vehicle manufacturers' expansion of their domestic production of clean vehicles,113 and billions to support battery production in the United States and mining and processing of critical minerals needed for battery cells and electric motors.114 The Inflation Reduction Act also allocates billions to upgrade the nation's power grid in order to help address the new surge in grid demand from electric vehicles.115 [EPA-HQ-OAR-2022-0829-0746, pp. 18-19]

110 White House, Building a Better America: A Guidebook to the Bipartisan Infrastructure Law for State, Local, Tribal, and Territorial Governments, and Other Parties (May 2022), at 136, available at https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf.; White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action (Jan. 2023) at 46, available at, https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.

111 White House, Guidebook to the Inflation Reduction Act, supra n. 110, at 46.

112 Id.

113 Id. at 47.

114 Id. at 10, 26, 47.

115 Id. at 34.

2. States and the Power Sector Are Rapidly Expanding Electric Vehicle Charging Infrastructure

State and local governments are proactively engaged in ensuring a robust electric vehicle supply equipment ("EVSE") charging infrastructure to support wider electric vehicle adoption, including, but certainly not limited to, our States and Cities. For example, the California Energy Commission's Electric Vehicle Infrastructure Project has directed over $180 million in rebates to encourage the installation of public direct-current fast charger ("DCFC") and Level 2 chargers,125 supporting a current statewide network of 1,737 public DCFC stations (comprising 8,814 DCFC ports) and 13,015 public Level 2 stations (30,099 Level 2 ports).126 California, Oregon, and Washington have adopted low-carbon fuel/clean fuel standards that support EVSE installation through the generation of tradeable credits.127 New Jersey's Department of Environmental Protection has awarded grants for 2,980 charging stations with 5,271 ports at 680 locations. Maine directed $3.15 million from the Volkswagen litigation settlement and $10 million from the New England Clean Energy Connect settlement toward expanding the state's DCFC network along key corridors,128 and has allocated a further $8 million to electric vehicle charging from American Rescue Plan funds.129 New York's EVolve program has committed $250 million to install 800 new EV fast charging stations throughout the state by 2025, including along major highway corridors.130 New York has awarded more than $13 million in grants to cover municipalities' eligible costs toward the installation of Level 2 EV charging stations, DCFC stations, and hydrogen fuel cell filling stations.131 Washington has awarded more than $10 million in Zero-Emission Vehicle Infrastructure Partnership grants and announced $30 million more for 2023-25.132 Massachusetts has required that charging stations for public use be installed at all service plazas located on the Massachusetts Turnpike by July 1, 2024.133 [EPA-HQ-OAR-2022-0829-0746, pp. 21-22]

125 CALeVIP, About CALeVIP (last accessed on June 8, 2023), available at https://calevip.org/about-calevip; CALeVIP, CALeVIP Rebate Statistics Dashboard (last accessed on June 8, 2023), available at https://calevip.org/rebate-statistics.

126 U.S. Department of Energy, Alternative Fuels Data Center, Alternative Fuels Station Locator, available at https://afdc.energy.gov/stations (last accessed June 8, 2023).

127 Cal. Code Reg., tit. 17, § 95486.2(b) (2020); Or. Admin. R. 340-253-0330 (2023); Wash. Admin. Code § 173-424-560(2) (2022).

128 Efficiency Maine, Maine's Electric Vehicle Fast-Charging Network Expands to the North and East (Jun. 3, 2021), available at https://www.efficiencymaine.com/maines-electric-vehicle-fast-charging-network-expands-to-the-north-and-east/; see also Me. Rev. Stat. Ann. tit. 35-A, § 10125; Me. Pub. Utilities Commission, Order Granting Certificate of Public Convenience and Necessity and Approving Stipulation, Docket No. 2017-00232 (May 3, 2019), at 77, 96.

129 Office of the Governor of Maine, The Maine Jobs & Recovery Plan (May 4, 2021), at 12, available at https://www.maine.gov/covid19/sites/maine.gov.covid19/files/inline-files/MaineJobs%26RecoveryPlan.pdf.

130 EVolve NY, Making New York a Leader in EV Infrastructure, available at https://evolveny.nypa.gov/en/about-evolve-new-york (last visited Jun. 27, 2023).

131 New York Department of Environmental Conservancy, Office of Climate Change, Municipal Zero-emission Vehicle Program (2021), available at https://www.dec.ny.gov/docs/administration_pdf/2021zevprogrep_(1).pdf (program outlays through FY 2021); New York Governor's Press Office, Governor Hochul Announces More Than $8.3 Million to Municipalities for Electric Vehicle Charging Infrastructure (Apr. 13, 2023), available at https://www.governor.ny.gov/news/governor-hochul-announces-more-83-million-municipalities-electric-vehicle-charging (program outlays in FY 2022).

132 Washington Department of Transportation, Zero-emission Vehicle Infrastructure Partnerships grant, available at https://wsdot.wa.gov/business-wsdot/grants/zero-emission-vehicle-grants/zero-emission-vehicle-infrastructure-partnerships-grant

133 An Act Driving Clean Energy and Offshore Wind, 2022 Mass. Acts, ch. 179, § 89. https://malegislature.gov/Laws/SessionLaws/Acts/2022/Chapter179.

In the Bipartisan Infrastructure Law, Congress directed $5 billion toward States to expand charging infrastructure under the National Electric Vehicle Infrastructure ("NEVI") Formula Program.134 To date, all 50 States have submitted and received approval for their NEVI plans.135 These plans detail the considerable resources and local expertise that state transportation, energy, and environmental agencies bring in support of Congress's vision of a "national network of electric vehicle charging infrastructure."136 Those resources include the mobilization of significant public and private nonfederal monies,137 the strategic siting of EVSE infrastructure in high-demand areas and major transportation corridors,138 designing resilience strategies to pair chargers with distributed generation and storage resources,139 and providing model ordinances for municipal governments to support EVSE expansion.140 These plans also illustrate the importance of greater EV adoption to States' climate targets.141 [EPA-HQ-OAR-2022-0829-0746, pp. 22-24]

134 Pub. L. No. 117–58, § 801 (Nov. 15, 2021), 135 Stat. 1421.

135 Federal Highway Administration, Fiscal Year 2022/2023 EV Infrastructure Deployment Plans, available at https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/index.cfm?format=list#map.

136 Pub. L. No. 117-58, §801, 135 Stat. 1422.

137 See, e.g., Colorado NEVI State Plan, at 31, available at https://www.codot.gov/programs/innovativemobility/assets/co_neviplan_2022_final-1.pdf (describing state funds available for cost sharing); New Jersey NEVI State Plan, at 23 (describing establishment of a New Jersey Green Fund with monies from the Regional Greenhouse Gas Initiative to provide low-cost financing for EVSE projects).

138 See, e.g., California NEVI State Plan, at 34-40, available at https://www.codot.gov/programs/innovativemobility/assets/co_neviplan_2022_final-1.pdf (describing phases of EVSE build-out along transport corridors).

139 See, e.g., Oklahoma NEVI State Plan, at 54, available at https://www.codot.gov/programs/innovativemobility/assets/co_neviplan_2022_final-1.pdf (proposing, e.g., preferences for EVSE paired with distributed energy resources like solar or battery storage).

140 See, e.g., Pennsylvania NEVI State Plan, at 7, available at https://www.penndot.pa.gov/ProjectAndPrograms/Planning/EVs/Documents/Final%20PA%20NEVI%20State%20Plan%20(ver%207-21-2022).pdf; Pennsylvania Department of Transportation, EV Model Ordinance Toolkit, available at https://www.penndot.pa.gov/ProjectAndPrograms/Planning/EVs/Pages/EV-Model-Ordinance-Toolkit.aspx

141 See, e.g., North Carolina NEVI State Plan, at 5, 16, 28, available at https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/nc_nevi_plan.pdf (discussing state climate and transportation policy and NEVI program); New York NEVI State Plan, at 19-26, available at https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/ny_nevi_plan.pdf (same).

Utilities and private EVSE companies have committed significant resources to expanding charging infrastructure.142 New Jersey utilities have committed $215 million for make-ready infrastructure for public, multi-unit dwelling and workplace charging stations, and residential chargers. New York utilities' EV Make-Ready Program has a budget of $701 million allocated to support the development of electric vehicle infrastructure.143 As EPA notes, an alliance of over 60 investor-owned and municipal electric companies and electric cooperatives in 48 States and D.C. have formed the National Electric Highway Coalition to deploy fast-charging infrastructure seamlessly across major transportation corridors "by the end of 2023."144 State legislatures and public utility commissions (PUCs) are actively engaged in supplementing utilities' existing efforts with additional resources and authority.145 [EPA-HQ-OAR-2022-0829-0746, pp. 22-24]

142 Yvonne Bertucci zum Tobel, Will Florida's improved electric vehicle infrastructure convince people to buy an EV?, WLRN (Jul. 20, 2022), available at https://www.wlrn.org/news/2022-07-20/will-floridas-improved-electric-vehicle-infrastructure-convince-people-to-buy-an-ev (detailing Florida Power & Light's work installing 1,000 charging ports—most of them free, public Level 2 chargers—at over 200 Florida locations); Tampa Electric Co., Pet. of Tampa Elec. Co. for Approval of Elec. Vehicle Charging Pilot Program (Sep. 25, 2020), available at https://www.floridapsc.com/pscfiles/library/filings/2020/09448-2020/09448-2020.pdf (seeking approval for pilot program to install 200 charging ports at businesses, retail, and apartment complexes).

143 Joint Utilities of New York, EV Make-Ready Program, available at https://jointutilitiesofny.org/ev/make-ready (last visited Jun. 27,2023).

144 Edison Electric Institute, National Electric Highway Coalition, available at https://www.eei.org/issues-and-policy/national-electric-highway-coalition; see 88 Fed. Reg. at 29,308.

145 Last year, for example, Indiana's legislature approved a law to empower its PUC to conduct pilot programs to expand public EVSE and study their impact on distribution grids. Indiana H.B. 1221 (signed Mar. 11, 2022), https://iga.in.gov/legislative/2022/bills/house/1221#document-7bf5903c.

EPA correctly recognizes that increased EV adoption and the build-out of EVSE infrastructure implies an increase in electricity demand, which EPA estimates at less than 0.4% in 2030 to approximately 4% in 2050. 88 Fed. Reg. at 29,311. The Regional Transmission Organizations ("RTOs") and Independent System Operators ("ISOs"), which are responsible for procuring sufficient generation and transmission capacity within their footprints, are already taking into account projected EV adoption to plan over a 10-20 year horizon. ISO New England and Texas's ERCOT, for example, both incorporate electrification forecasts into their capacity planning and conclude that grid capacity will continue to meet demand with substantial reserve margins.146, 147 These detailed planning processes apply the RTOs' and ISOs' considerable expertise, data, and analytical resources to ensure a reliable and adequate grid.148 States are likewise active in this area. For example, in 2016, Assembly Bill 2868 in California required utilities to procure 500 MW of distributed energy storage resources, above and beyond a 1,325 MW utility storage target set under Assembly Bill 2514 (2010). Hawai'i is a national leader in customer-sited distributed energy resources (such as rooftop and community solar power), with 88,000 systems in use across Hawaiian Electric's five-island service territory.149 And, in 2018, the Massachusetts legislature adopted an Energy Storage Initiative Target, which calls for 1,000MWh of energy storage by the end of 2025.150 [EPA-HQ-OAR-2022-0829-0746, pp. 25]

146 ISO New England, 2023–2032 Forecast Report of Capacity, Energy, Loads, and Transmission, sheets 1.1, 1.2, 1.7 (May 1, 2023), available at https://www.iso-ne.com/system-planning/system-plans-studies/celt (finding grid capacity will exceed peak summer and winter loads through 2032, taking into account transportation and heating electrification).

147 Texas NEVI State Plan, at 23-25, available at https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/tx_nevi_plan.pdf (discussing reserve

margins for grid capacity far outstripping the “theoretical maximum energy consumption” from proposed EVSE build-out).

148 See, e.g., California ISO, 2022-2023 Transmission Plan (Apr. 3, 2023), available at https://stakeholdercenter.caiso.com/RecurringStakeholderProcesses/2022-2023-Transmission-planning-process

149 Hawaiian Electric, Customer Energy Resources for Hawai’i (May 2021), https://www.hawaiianelectric.com/documents/products_and_services/customer_renewable_programs/20210503_customer_energy_resources_for_hawaii.pdf.

150 An Act to Advance Clean Energy, 2018 Mass. Acts., ch. 227, § 20.

Our States and Cities add three observations to EPA’s analysis of costs and lead time. First, EPA’s projected costs likely overstate the actual costs attributable to reaching the standards in the allotted lead time, due to conservative assumptions in EPA’s no-action case that omit the myriad state and local actions to promote electric vehicle adoption. See supra 18-21; CARB Comment at 16. Second, state and local agencies are implementing ambitious programs to ready power grids and charging infrastructure for the increased adoption of electric vehicles and the associated increase in electricity demand, which further supports EPA’s feasibility analysis. Third, although internal-combustion-engine vehicles will make up a smaller portion of the national fleet, it is imperative that EPA’s standards continue to encourage the application of feasible, cost-effective emission-reduction technologies to these vehicles, as they still represent a significant source of GHG, criteria, and toxic pollutant emissions. [EPA-HQ-OAR-2022-0829-0746, p. 33]

2. State and Local Actions Are Facilitating the Necessary Generation, Transmission, and Charging Infrastructure to Support the Projected Compliance Pathway

While EPA only needs to consider the costs of regulatory compliance incurred within the allotted lead time, Coalition for Responsible Regulation, 684 F.3d at 128, EPA also considers the demands on the power sector from projected compliance with the proposed and alternative standards. 88 Fed. Reg. 29,309-312. We agree with EPA’s assessment that the projected modest increase in electricity demand (0.04 to 2% over the course of the regulated model years) is more than manageable. This is especially true when compared to other historical and current examples of rapid demand increases that the power sector successfully met, see 88 Fed. Reg. at 29,311 (noting widespread adoption of air conditioning in 1960s and 1970s and 21st-century growth of data centers and server farms),188 and given Congress’s significant investments in transmission, generation, and charging infrastructure in the Bipartisan Infrastructure Law’s NEVI Formula Program and the Inflation Reduction Act. Draft RIA, at 5-14 (Tables 5-2 & 5-3); 88 Fed. Reg. at 29,307-08. Part D.2 of the Background section, supra at 21-25, provides examples of some of the actions our States and Cities are taking, including under the NEVI Formula Program, to ensure there is sufficient charging infrastructure to support the projected electric vehicle penetration rate. [EPA-HQ-OAR-2022-0829-0746, p. 35]

188 See also White House Office of Science and Technology Policy, Climate and Energy Implications of Crypto-Assets in the United States (Sep. 2022), at 14-15, available at https://www.whitehouse.gov/wp-content/uploads/2022/09/09-2022-Crypto-Assets-and-Climate-Report.pdf (estimating U.S.-based cryptocurrency mining operations for Bitcoin alone to consume “33 to 55 billion kWh per year, or 0.9% to 1.4% of total U.S. electricity usage in 2021”).

Organization: CALSTART

2. Infrastructure

Infrastructure is an acknowledged real near-term challenge. However, infrastructure is a solvable challenge, rather than a long-term barrier. Major federal, state, and private investments outline a realistic path to scale that will create the necessary infrastructure to meet demand where people live, work, and play. [EPA-HQ-OAR-2022-0829-0618, pp. 4-5]

For example, in the public charging arena, NEVI and CFI are bringing historic investments to expand availability and access to public charging. These investments are helping to achieve the goal of 500,000 EV Level 2 and DC Fast Chargers (DCFC) EV chargers by 2030. [EPA-HQ-OAR-2022-0829-0618, pp. 4-5]

The funding will more than triple the current number of EV chargers and make public charging significantly more accessible for EV owners.4 [EPA-HQ-OAR-2022-0829-0618, pp. 4-5]

4 htps://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/

Additionally, Charge@Work is a DOE-funded National Workplace Charging Program administered by CALSTART that is helping over 1,000 employers across the country provide charging solutions to their employees. The Charge@Work program will add over 100,000 ports at workplaces across the country. Even for drivers who do not have access to home charging, Charge@Work is making it easier for drivers to go electric by engaging employers to become part of the solution. [EPA-HQ-OAR-2022-0829-0618, pp. 4-5]

Additionally, the recent moves by industry participants to align with Tesla’s North American Charging Standard (NACS) offer a positive way forward for the industry as it moves towards a superior charging user experience which will further accelerate EV adoption and unlock mass market vehicle electrification. Further, a charging network that is used by all EVs has the potential for optimized, high utilization which translates to better returns to capital and faster reinvestment to expand the charging network. [EPA-HQ-OAR-2022-0829-0618, pp. 4-5]

Organization: Charles Gordon

INCONVENIENCE TO PEOPLE

The rapid elimination of new gas-powered cars creates real inconvenience for ordinary people. Those who live in apartment buildings will have to find charging stations where it will take 30 minutes to recharge. This will particularly hurt the poor and minorities. Long trips by car will require careful planning and 30-minute interruptions to recharge. Towing large trailers will be virtually impossible. This is added to the existing inconvenience of more expensive washing machines which take 60 minutes to wash a load-not 30 and dishwashers which take 2 hours to poorly wash dishes. [EPA-HQ-OAR-2022-0829-0747, p. 7]

It may be hard to put a dollar amount on this inconvenience, but it is real nonetheless. EPA needs to take that inconvenience into account when it reviews the proposed rule. [EPA-HQ-OAR-2022-0829-0747, p. 7]

Organization: Chevron

4. Feasibility and implementation.

Chevron is concerned that the rapid increases in forecasted BEV sales rate are optimistic and may overstate the benefits of the proposals. The proposals may limit choices and increase costs for consumers, including those in economically disadvantaged groups and smaller businesses. [EPA-HQ-OAR-2022-0829-0553, p. 6]

BEV sales forecasts may rely on optimistic expectations for increased electricity generation and charging infrastructure. EPA should conduct an assessment to account for the costs and timing associated with upgrades to the nation's grid infrastructure, including new and upgraded generation, transmission, and distribution, and the costs associated with the installation of public and private electric vehicle chargers. If it is not feasible to complete expansion and improvements for the current grid, it may not be possible to meet the additional demand created by the proposed regulation. [EPA-HQ-OAR-2022-0829-0553, p. 6]

Organization: Clean Fuels Development Coalition (CFDC) et al.

These aggregate costs include:

- Vehicle charging infrastructure. This includes not only the low $120 billion in EVSE costs the proposal projects, 88 Fed. Reg. 29,367, but also billions more in surrounding infrastructure. [EPA-HQ-OAR-2022-0829-0712, pp. 5-6]

III. The Proposed Rule is Not Feasible for Other Reasons.

While the proposal's gross misstatement of vehicle technology costs is the primary reason EPA's proposal is not feasible, the agency also overlooks many other important aspects of the problem. Despite EPA's hopeful projections, very few American want to buy electric vehicles and even fewer will at the prices they will inevitably command. Non-binding company commitments and (unlawful) regulations designed to enforce these commitments do little to change this. Even if consumers did want to purchase these electric vehicles in the volumes EPA projects, the proposal fails to confront several barriers to its rapid electrification plans, including limits on the supply of minerals necessary to manufacture batteries, inadequate charging infrastructure and electrical supplies, and the complex interactions between this rule and other proposed rules all of which will further hinder this development. In light of these many barriers, it is unreasonable for the agency to conclude that compliance with its proposed emission standards is feasible. [EPA-HQ-OAR-2022-0829-0712, pp. 25-26]

E. There will not be enough charging infrastructure to persuade skeptical consumers to adopt battery electric vehicles in the numbers EPA projects.

Another reason the proposal is not feasible is a dearth of charging infrastructure. Currently, electric vehicle charging infrastructure is "inadequate and plagued with non-functioning stations." Dan Zukowski, EV charging infrastructure is "inadequate and plagued with non-functioning stations": J.D. Power, SmartCitiesDive (Feb. 22, 2023), https://www.smartcitiesdive.com/news/ev-charging-infrastructure-inade-quate-non-functioning-stations/643148/. An on-going study by J.D. Power found that charge point unreliability has increased 50% from 2021 to January 2023, from 14% to 21%. Id. This unreliability has led to high rates of dissatisfaction with public charging stations among electric vehicle owners. Id. This dissatisfaction is worse in states with higher numbers of electric vehicles and in large cities with high-density housing. Id. [EPA-HQ-OAR-2022-0829-0712, pp. 30-31]

This is likely to get worse. "[T]he rate of EV adoption is" already "growing at a rate that is almost double that of charger installation growth rates" and "the construction of new charging stations is not keeping up with the demand." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 30-31]

Further, as detailed below, the electric grid is simply not ready for the massive increase in charging infrastructure necessary for the proposed rule to be feasible. "In a little over a decade … rapid EV growth alone could increase peak electricity demand by up to 25%." Mark Golden, Charging Cars at Home at Night is Not the Way to Go, Stanford Study Finds, Stanford News (Sep. 22, 2022), https://news.stanford.edu/press-releases/2022/09/22/charging-cars-honight-not-way-go/. Recent research found that "when [electric vehicle] penetration hits 30% to 40% of cars on the road, the grid will experience significant stress." Id. Without significant infrastructure improvements to support this charging, the proposal will not be feasible. [EPA-HQ-OAR-2022-0829-0712, pp. 30-31]

A. The proposal underestimates the cost for charging infrastructure.

According to EPA, its proposed rule would require 12 million home, 400,000 workplace, and 110,000 public charging ports in 2027. 88 Fed. Reg. 29,309; DRIA at 5-31. This would increase to 75 million home, 12.7 million workplace, and 1.9 million public chargers, respectively, by 2055. Id. Developing this infrastructure would come at a high cost. The proposal suggests that these installations would cost between $96 billion and $140 billion by 2055, and $21 billion just between 2027 and 2032. See DRIA at 5-36. [EPA-HQ-OAR-2022-0829-0712, pp. 33-34]

But even these costs are a dramatic underestimate. This June, the Department of Energy published new estimates of the need for electric charging infrastructure investment that found that "[a] cumulative national capital investment of $53–$127 billion in charging infrastructure is needed by 2030 (including private residential charging) to support 33 million PEVs." U.S. Department of Energy, National Renew-able Energy Laboratory, The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure (June 2023). https://driveelectric.gov/files/2030-charging-network.pdf. These estimates included between $22 and $72 billion for privately accessible Level 1 and Level 2 charging ports, $27 and $44 billion for publicly accessible fast charging ports, and $5 and $11 billion for publicly accessible Level 2 charging ports. And notably, the "cost of grid upgrades and distributed energy resources [were] excluded from these estimates." Id. [EPA-HQ-OAR-2022-0829-0712, pp. 33-34]

DOE's projected costs are for only 33 million vehicles. EPA projects that approximately 54 million electric vehicles will be on the road in 2032. Given the general linear relationship between electric vehicle charging infrastructure costs and the number of electric vehicles in the fleet, it is reasonable to estimate a cost of between $1,606 and $3,848 for charging infrastructure per electric vehicle. This means charging infrastructure would cost up to $207 billion total and $59 billion for just the 15 million additional vehicles EPA projects its proposal will require by 2032. EPA's failure to account for these costs—and the added costs of "grid upgrades and distributed energy resources"—would be arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0712, pp. 33-34]

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

In response to EPA's request for comments on specific aspects of the rule, we offer the following suggestions to ensure the rule is as successful as possible: [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

-Regarding criteria pollutants, we urge EPA to consider ways to align these proposed standards with California, and in doing so to avoid any backsliding in remaining conventional vehicles sold, while avoiding a scenario in which OEMs are forced to divert investment away from transportation electrification and towards technology advancement on conventional vehicles. We are concerned that the criteria standards in the EPA draft rule could have this unintended effect. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

-We urge EPA to consider investments in charging infrastructure as an option for manufacturers to achieve compliance credit. For years, EPA has included a broad range of crediting options to add flexibility to the program in ways that support its underlying goals. At the state and local level, one of the greatest challenges we face is completing robust and varied networks of public and private charging infrastructure so that travelers can travel where they want to go without range anxiety. We appreciate new funding in IIJA, but achieving this goal will require all the tools in the toolbox. We strongly urge EPA to utilize its credit program to incentivize companies investing in the charging networks which benefits consumers and will facilitate more public private partnership around this critical need. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

-EPA requested comment on whether to consider a future rulemaking for gasoline fuel property standards to further reduce PM emissions. Colorado supports EPA exercising its authority under CAA 211(c) to develop gasoline property standards in a future rulemaking. Cleaner fuel standards will complement the vehicle emissions standards proposed in the current rulemaking by addressing emissions from the existing ICE vehicle fleet, as well as the vehicles that will be produced during the phase-in and operative periods of the proposed vehicle emissions standards. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

Organization: Consumer Energy Alliance (CEA)

Struggling with access to affordable transportation, however, is just one of the equity impacts that has not been addressed by the U.S. EPA How will U.S. EPA address the systemic inequity and energy injustice issues embedded in this rule beyond the financial burden that will be caused? [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

For example, the practical use of EVs benefit wealthier users as well. Charging infrastructure Is a critical component for EV usage, with access to chargers (and specifically fast chargers) a major consideration in purchasing an EV. Wealthier users are far more likely to live In single family homes where installation of a fast charger costing thousands of dollars is simply a matter of fact. Lower income families who are more likely to reside in apartments or rented properties do not have the option of installing their own personal dedicated fast chargers. [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

Even the location of charging infrastructure tends to benefit the wealthier, whiter, male demographic that makes up 75% of the individuals who purchase EVs. A recent MIT study on EVs and equity noted 7: [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

"According to Hsu and Fingerman (43], Black and Hispanic neighborhoods only had 0.7 times the access to public chargers as the no-majority reference group in California. They also determined that even when income, proximity to the nearest highway, and multi-family housing were controlled for, White-majority census block groups were 1.5 times more likely to have access to public charging stations compared to Black-and Latino-majority census block groups." [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

7 sciencepolicvreview.org/2021/08/equity-transition-electric-vehicles/

They also noted that public charging, when available to lower income communities, typically costs more than home charging stating: [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

"This higher cost would disproportionately affect low-income households who already pay a higher proportion of their income towards transportation." [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

By creating disparities in access to the "fuel" through charging network realities this further exacerbates the differences in transportation equity between rich and poor. Combine that with what is sure to be higher electricity prices from the requisite generation, distribution and transmission infrastructure buildout required to meet growing electricity demand as is often the case the poor will just keep getting poorer. [EPA-HQ-OAR-2022-0829-0788, pp. 3-4]

Organization: David Manley III

Of course, while the proposed rule benefits China without significantly reducing global temperatures, American consumers are penalized because (a) while gas-powered cars take five or 10 minutes to refill, recharging an electric vehicle can take 45 minutes, and personal mobility, including road trips, will be adversely effected since EVs require longer and more frequent interruptions for charging, (b) The common American cannot afford EVs as EVs were on average $11,981 more expensive than gas-powered cars at the end of 2022, and today, for example, the electric version of the Ford F-150 pickup truck, the best-selling vehicle in America, costs an additional $26,000 over the gasoline-powered one while Tesla’s EVs start at $39,000 for a Model 3 and go up to nearly $100,000 for a Model X — prices much higher than most families can afford, and (c) American consumers will have to deal with electric power availability problems (even with bidirectional charging that has a negative aspect) as the power grids will not have the capacity to deal with the increased load. [EPA-HQ-OAR-2022-0829-0513, p. 1]

Organization: Doug Peterson

It is going to be extremely challenging to build enough public charging infrastructure to keep up with our rapidly growing fleet of BEVs. Lack of charging infrastructure is currently one of the main barriers to BEV adoption, and the problem is bound to get worse. BEV owners with no access to home charging will place much greater demands on public chargers than early adopters who tend to utilize their own charging equipment. Current BEV owners typically use their own equipment for roughly 80% of their charging needs, and automakers pair larger battery packs with faster onboard chargers to facilitate overnight home charging at 240 volts. As BEVs scale up, renters will make up a larger percentage of BEV owners and demand for Level 3 public chargers will increase dramatically. Even if Level 3 charging speeds improve significantly, there is going to be chronic congestion at public charging stations. Renters will be disproportionally impacted by the inconvenience, and inequitable access to electric fuel will compel them to stick with readily available gasoline. These challenges are surmountable, but they are made more difficult by poor BEV fuel economy. [EPA-HQ-OAR-2022-0829-0500, pp. 12-13]

An inefficient fleet of BEVs will also increase the amount of electricity that needs to be transmitted to distant locations along major transportation corridors. It is entirely feasible to generate enough additional electricity to keep up with a growing fleet of BEVs, but getting the electricity where it needs to be to facilitate long distance travel is going to be a slow endeavor, and very expensive. If an urgent transition away from gasoline is to succeed, we need a fleet of highly efficient BEVs that does not exacerbate the significant difficulties associated with the distribution of electric auto fuel. It is especially important that we maximize BEV efficiency in the near term. The electric fleet cannot grow faster than the requisite fueling infrastructure, and immediate efforts to optimize BEV fuel economy will reduce this significant limitation on their proliferation [EPA-HQ-OAR-2022-0829-0500, pp. 12-13]

Organization: Edison Electric Institute (EEI)

II. Electric Companies Are Building Infrastructure To Accommodate The Electrification Of The Transportation Sector.

EEI member companies are leading the charge to ready the market for widescale adoption of light-, medium-and heavy-duty EVs. EEI members are making investments and offering programs designed to help their customers overcome barriers to EV adoption, while also supporting existing EV users and year-over-year growth in the EV market. Many of these programs help to deploy and/or offset the cost of EV charging infrastructure in homes, workplaces, public locations, as well as for fleet operators. To date, more than 30 states and the District of Columbia have approved electric company customer programs and investments totaling more than $4.2 billion.17 Further, EEI members are leading by example with their own fleets by setting individual fleet electrification goals that put them on track to electrify more than a third of their fleet vehicles by 2030. [EPA-HQ-OAR-2022-0829-0708, pp. 6-7]

17 See EEI, Electric Transportation Biannual State Regulatory Update (Apr. 2023), https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Electric-Transportation/ET-Biannual-State-Regulatory-Update.pdf.

However, EPA notes that several stakeholders have raised concerns that “slow growth in ZEV charging and refueling infrastructure can slow the growth of heavy-duty ZEV adoption, and that this may present challenges for vehicle manufacturers ability to comply with future EPA GHG standards.” 88 Fed. Reg. 25,934. EEI member companies have addressed similar infrastructure build out issues in the past. Like those issues, these concerns can be addressed through deliberate effort and collaboration among electric companies, fleet operators, and stakeholders, including planning for increased demand, customer engagement, and fleet electrification. [EPA-HQ-OAR-2022-0829-0708, pp. 6-7]

A. Electric companies can accommodate increased energy demand.

As EPA notes, the electric power sector has a long history of accommodating growth in electricity demand from the adoption of new technologies, including electric home appliances, residential and commercial air conditioning, and data centers. See id. At 25,983. Electricity use from EVs today is modest. Argonne National Lab estimates the approximately 2.3 million EVs on the road as of the end of 2021 consumed 6.1 terawatt-hours of electricity in that year, or about 0.16 percent of the total electric sales to U.S. customers in that year.18 As EPA also notes, the increase in electricity use resulting from the Proposed Rule also will be modest, increasing electricity end-use by less than 3 percent in 2055. See id. On a macro-level, meeting the increased energy usage from electric truck adoption as contemplated in the Proposed Rule will not be a significant challenge for the electric power sector. Meeting the location-specific power needs of large electric vehicle (EV) charging facilities can be a more pressing challenge. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

However, this is a challenge that can be addressed with deliberate effort and collaboration among electric companies, fleet operators, and stakeholders. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

18 See Gohlke, et al., Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010 – 2021, https://publications.anl.gov/anlpubs/2022/11/178584.pdf and U.S. Energy Information Administration, Electric Power Monthly

Electric companies can accommodate localized power needs at the pace of customer demand, provided appropriate customer engagement and enabling policies are in place. The power required by a customer is essential when considering the infrastructure needed at the facility level, because the capacity of the local distribution circuit is sized to meet the peak power requirements of customers on that circuit. Some large EV charging facilities have power requirements in the tens of megawatts (MW). Electric companies are well accustomed to serving facilities with those types of power needs, but large fleet customers differ from traditional electric customers (e.g., commercial or industrial buildings) in several important aspects. These aspects include, but are not limited to: [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

• Construction timelines: A new, large commercial building with a multi-MW power demand, for example, will typically have a multi-year construction timeline, giving the local electric company time to plan and make appropriate upgrades to the electric distribution system serving that customer. A fleet operator, in contrast, may be able to procure vehicles and complete construction on a multi-MW charging facility in a matter of months. This creates a potential misalignment between the fleet operators' timeline to procure vehicles and charging equipment and the electric company's timeline for making the necessary system upgrades to provide power to that facility. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

• Customer familiarity with procuring electric power: Commercial and industrial electric customers are used to working with electric companies for the operation of their facilities as part of their normal course of business, including working with electric companies as part of the construction process for launching new facilities. In particular, national corporate customers often have long-standing relationships with the electric companies that serve them. Electric companies typically assign these customers an account manager, given their scale and complexity. A fleet operator, in contrast, is used to procuring diesel to operate its vehicles, and may consider procuring electricity in the same paradigm. Fleet operators may be small electricity users today and thus that division may not yet be considered a managed account for the electric company. However, EEI members have identified this issue and are expanding their working relationship with these customers. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

- Uncertain and dynamic load profiles: The power usage throughout the day, known as the “load profile,” of typical commercial and industrial buildings is well understood (e.g., large retail store, data center, or manufacturing facility). Typical load profiles for electric fleet customers are not yet well understood and often hypothetical given the early stage of electric truck commercialization. A fleet charging load profile is the product of many factors, including the routes of the vehicles, the state of charge of the EV when returning to the facility, the number of operating shifts, etc. Unlike a typical commercial building, the load profile of a fleet facility could also drastically change with a change in vehicle operations (e.g., changing from a one-shift to two-shift operation). This uncertainty adds complexity for electric companies when determining how best to serve the power requirements of a fleet customer. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

These factors could result in misalignment between expectations and reality regarding the timing, cost, and complexity of procuring electric power for fleet charging. Electric companies are taking a multi-pronged approach to remedy this potential misalignment, as discussed in the following sections. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

In New York, the Public Service Commission opened a proceeding in April to address barriers to medium-and heavy-duty electric vehicle infrastructure. In particular, the order recognizes that “proactive planning for the grid infrastructure needed to serve future electrification load must anticipate the location and magnitude of future demand” and notes an analogy to previous policies in which the commission directed the electric companies in New York to “develop proactive planning processes to anticipate the need for local transmission and distribution system upgrades to enable the renewable interconnections required to achieve the State’s renewable energy goals.”23 [EPA-HQ-OAR-2022-0829-0708, pp. 14-15]

23 State of New York Public Service Commission, Case 23-E-0070, Proceeding on Motion of the Commission to Address Barriers to Medium-and Heavy-Duty Electric Vehicle Charging Infrastructure.

EPA’s assessment that “there is sufficient time for the infrastructure, especially for depot charging, to gradually increase over the remainder of this decade to levels that support the stringency of the proposed standards for the timeframe they would apply” is accurate. 88 Fed. Reg. 25,999. As seen above, EEI members actively are planning for and deploying infrastructure today. However, the increased deployment of this infrastructure over the next decade and beyond will not happen on its own. Proactive planning processes, whether initiated by the relevant electric company or state regulatory commission, will be critical to accommodate fleet electrification to meet customer expectations and planning requirements, while also providing affordable and reliable service. [EPA-HQ-OAR-2022-0829-0708, pp. 14-15]

IV. Electric Company Policies and Programs Can Help Reduce Capital and Operational Costs for Fleet Electrification Customers.

Many EEI members over the last decade have sought regulatory approval from their state regulatory commissions to accelerate transportation electrification by reducing customer barriers to adoption. As of March 2023, and as mentioned supra, electric transportation filings from 62 electric companies in 35 states and Washington, D.C. have totaled more than $4.2 billion. The majority of these investments support the deployment of EV charging infrastructure at customer locations, and a significant portion is targeted to fleet customers. These programs can help reduce the cost that the customer would otherwise pay for the installation of EV charging infrastructure, which is a commonly cited barrier to EV charging infrastructure deployment.25 Further, electric companies can work with fleet customers to help manage their EV charging to occur at non-peak times. This can reduce operational costs for the fleet customer and improve utilization of the electric system, which puts downward pressure on rates for all customers.26 [EPA-HQ-OAR-2022-0829-0708, pp. 16-17]

25 An oft cited barrier to adoption for some customers is the low utilization of EV charging stations. Traditional electric rates for commercial customers include a demand component designed to recover the fixed costs of delivery electricity. With low utilization (such as a public EV charging station or some fleet charging use cases), the effective electric price can be higher than a customer with the same demand but higher utilization. Many electric companies offer or are exploring commercial rates or other programs that reduce some of the demand charge exposure for these low utilization customers. See Cappers, et al., A Snapshot of EV-Specific Rate Designs Among U.S. Investor-Owned Electric Utilities, https://emp.lbl.gov/publications/snapshot-ev-specific-rate-designs.

26 See, e.g., Metz, et al., Distribution System Investments to Enable Medium- and Heavy-Duty Vehicle Electrification – A Case Study of New York, https://www.edf.org/media/worth- investment-report-finds-utilities-fleet-owners-consumers-benefit-when-utilities-cover.

EPA notes that “there is considerable uncertainty associated with future distribution upgrade needs, and in many cases, some costs may be borne by utilities rather than directly incurred by BEV or fleet owners” in explaining why it models these costs as part of the infrastructure cost analysis. 88 Fed. Reg. 25,983. In general, the upgrades to the local electric system needed to bring sufficient power to the site may be known as “electric company-side make-ready” or “front-of-the-meter” infrastructure and includes but is not limited to poles, vaults, service drops, transformers, mounting pads, trenching, conduit, wire, cables, meters, other equipment as necessary, and associated engineering and civil construction work. Front-of-the-meter infrastructure is distinct from infrastructure on the customer side of the meter (“behind-the-meter”), which includes the supply infrastructure (conduit and wiring to bring power from the service connection to the charging station, and the associated installation costs, sometimes known as “customer-side make-ready”) and the charging equipment, sometimes known as Electric Vehicle Supply Equipment (EVSE). [EPA-HQ-OAR-2022-0829-0708, pp. 16-17]

Front-of-the-meter infrastructure is generally installed, owned, and operated by the electric company. However, the costs associated with front-of-the-meter infrastructure may be borne by the site host customer in full or in part if the costs exceed an allowance as determined by the electric company’s line-extension and/or service extension policy. These costs may also be known as “contributions in aid of construction.” [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Modeling these front-of-the-meter infrastructure costs is inappropriate for the following reasons. First, estimating distribution upgrade costs may be beyond the scope of EPA’s analysis, as it is not clear that a similar scope of analysis is applied to traditional liquid fuels. For example, the analogous cost comparison for internal combustion engine vehicle would include cost considerations for fleet operators either 1) installing refueling stations at their own facilities, or 2) the embedded cost of fuel retailers’ business operations in the cost of diesel or gasoline. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Second, as described above, distribution upgrades are highly location specific. The costs associated with these upgrades are also highly variable, depending on the upgrade requested by the customer and the local distribution capacity. As stated in EEI's Preparing to Plug In Your Fleet guide, "the grid can expand as needed to accommodate the needs of any customer, but the time and resources needed to make the required upgrades are highly dependent on the specific facility and the circuit that serves it."27 [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

27 See EEI, Preparing To Plug In Your Fleet – 10 Things to Consider, https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Electric-Transportation/PreparingToPlugInYourFleet.pdf.

Third, the share of any distribution costs that the customer may bear varies as a matter of policy. Some electric companies have or are seeking approval for line extension allowances to cover some or all of these costs for serving EV charging infrastructure. In California, for example, legislation required electric companies in the state to file tariffs that would authorize them to "design and deploy all electrical distribution infrastructure on the utility side of the customer's meter for all customers installing separately metered infrastructure to support charging stations, other than those in single-family residences." This policy prompted tariffs from EEI members Pacific Gas & Electric (PG&E), San Diego Gas & Electric (SDG&E), and SCE that essentially allow electric companies to invest in more of the electric company-side infrastructure costs as part of the standard distribution system investment. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Fourth, EEI expects that the majority of fleets to electrify in the next several years will be those with return-to-base operations, which enables depot charging that is owned and operated by the fleet itself. Public charging, analogous to the existing gas station model, will be needed to serve long-haul electric trucks, but that opportunity will be limited in the near-term by battery capabilities. However, there are many new refueling models emerging, including but not limited to: fleet charging facilities owned by third parties and accessed by fleet operators through a reservation or subscription system; charging-as-a-service companies that disintermediate the fleet operator from the electric company, owning and operating the charging equipment at a customer facility and assessing the fleet operator a fully-bundled, flat charging fee (e.g., $/kWh); and transportation-as-a-service companies that provide the vehicle and charging to a fleet operator, such that the fleet operator pays a fully-bunded, flat service feel (e.g., $/mile). In all of these models, the fleet operator itself is not exposed to the front-of-the-meter infrastructure costs, but rather these costs are borne by a third party that then recoups all of its costs through their charging or service fees. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

In conclusion, EPA is justified in not modeling front-of-the meter costs because doing so would result in an apples-to-oranges comparison to liquid fuels, those costs are site-specific and variable, the recovery mechanism of those costs depends upon state-specific policies, and fleet-operators may not always bear those costs. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

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Second, as described above, distribution upgrades are highly location specific. The costs associated with these upgrades are also highly variable, depending on the upgrade requested by the customer and the local distribution capacity. As stated in EEI's Preparing to Plug In Your Fleet guide, "the grid can expand as needed to accommodate the needs of any customer, but the time and resources needed to make the required upgrades are highly dependent on the specific facility and the circuit that serves it."27 [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

27 See EEI, Preparing To Plug In Your Fleet – 10 Things to Consider, https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Electric-Transportation/PreparingToPlugInYourFleet.pdf.

Third, the share of any distribution costs that the customer may bear varies as a matter of policy. Some electric companies have or are seeking approval for line extension allowances to cover some or all of these costs for serving EV charging infrastructure. In California, for example, legislation required electric companies in the state to file tariffs that would authorize them to "design and deploy all electrical distribution infrastructure on the utility side of the customer's meter for all customers installing separately metered infrastructure to support charging stations, other than those in single-family residences." This policy prompted tariffs from EEI members Pacific Gas & Electric (PG&E), San Diego Gas & Electric (SDG&E), and SCE that essentially allow electric companies to invest in more of the electric company-side infrastructure costs as part of the standard distribution system investment. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Fourth, EEI expects that the majority of fleets to electrify in the next several years will be those with return-to-base operations, which enables depot charging that is owned and operated by the fleet itself. Public charging, analogous to the existing gas station model, will be needed to serve long-haul electric trucks, but that opportunity will be limited in the near-term by battery capabilities. However, there are many new refueling models emerging, including but not limited to: fleet charging facilities owned by third parties and accessed by fleet operators through a reservation or subscription system; charging-as-a-service companies that disintermediate the fleet operator from the electric company, owning and operating the charging equipment at a customer facility and assessing the fleet operator a fully-bundled, flat charging fee (e.g., $/kWh); and transportation-as-a-service companies that provide the vehicle and charging to a fleet operator, such that the fleet operator pays a fully-bunded, flat service feel (e.g., $/mile). In all of these models, the fleet operator itself is not exposed to the front-of-the-meter infrastructure costs, but rather these costs are borne by a third party that then recoups all of its costs through their charging or service fees. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

In conclusion, EPA is justified in not modeling front-of-the meter costs because doing so would result in an apples-to-oranges comparison to liquid fuels, those costs are site-specific and variable, the recovery mechanism of those costs depends upon state-specific policies, and fleet-operators may not always bear those costs. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Organization: Electric Drive Transportation Association (EDTA)

Infrastructure is growing alongside the plug-in fleet – nearly 54,000 public stations, with more than 139,000 outlets, are in operation. Tesla has committed to making at least 3,500 of its U.S. Supercharger stations and 4,000 Level 2 charging docks available to all brands of electric vehicles by the end of next year. [EPA-HQ-OAR-2022-0829-0589, p. 1]

The build-out of direct current fast charging infrastructure (DCFCs), particularly, will require substantial public and private investment, as well as coordination between users, power and infrastructure providers and permitting authorities. DCFCs enable bidirectional V2G, future-proof site installation and provide on-demand fast charge that will enhance commercial and consumer confidence. [EPA-HQ-OAR-2022-0829-0589, p. 2]

Organization: Elizabeth Boynton

I understand that the effect of this rule would reduce the sale of gas cars from 94% of new cars sold down to just 33% in 9 years. Regardless, a policy that would artificially manufacture an increased demand for Electric Vehicles (EVs) at this time may be well-meaning but I believe is bad policy for many reasons, including those listed below: [EPA-HQ-OAR-2022-0829-0568, p. 1]

From a practical standpoint, I anticipate needing to buy a new vehicle in the next few years. I don't want to be economically coerced into buying an EV because my options were limited by the Biden administration's attempt to regulate gas-powered vehicles out of the market. As distasteful as they may be to some, gas powered vehicles are still more reliable, less expensive, have a longer travel range than EVs and the infrastructure to support demand for fuel is there. EVs are impractical for longer travel that may include crossing desert environments, which are plentiful around where I live in Phoenix, Arizona, where running out of charge could be a death sentence. [EPA-HQ-OAR-2022-0829-0568, p. 1]

Additionally, I don't want to wait the 15 minutes to several hours for my battery to charge, as is the indicated time in a March 7, 2018 CleanTechnica article. More recently, an April 19, 2023 US News and World Report article entitled, "How long does it take to charge an electric car?" states, "There's really no way to nail down exactly how long it takes to charge an electric vehicle, but there are certainly reliable estimates." Reliable estimates for multiple variables that result in a charging time still well beyond the time it takes me to fill my tank at the pump. [EPA-HQ-OAR-2022-0829-0568, p. 1]

Organization: Energy Innovation

IV. The combined impact of federal, state, and private investments on infrastructure deployment will help meet the needs of an increasingly electrified LDV/MDV fleet over the next decade. [EPA-HQ-OAR-2022-0829-0561, p. 2]

We appreciate the EPA's thorough investigation into BEV charging infrastructure to support increased electrification of the light- and medium-duty vehicle sector. We agree with the EPA's assessment that charging infrastructure deployment and investments are well underway, and likely to accelerate. [EPA-HQ-OAR-2022-0829-0561, p. 20]

Estimates vary on the level of investment needed to support widespread transportation sector electrification, depending on the timeframe and percentage of BEVs assumed. For example:

-Analysis by Atlas Public Policy shows that to achieve 100 percent passenger EV sales by 2035 and put the nation on the path to full electrification, over $87 billion in investments in charging infrastructure will be needed over the next decade, including $39 billion for public charging.54 [EPA-HQ-OAR-2022-0829-0561, p. 20]

-The 2035 2.0 study's DRIVE Clean Scenario estimates the U.S. would require approximately 270,000 public chargepoints for LDVs and 35,000 MDV/heavy-duty truck chargepoints each year for the next 30 years, which would cost approximately $6.5 billion annually between now and 2050.55 [EPA-HQ-OAR-2022-0829-0561, p. 20]

-According to the ICCT, the U.S. needs to spend roughly $30 to $35 billion on public charging infrastructure by 2030 to achieve the widespread adoption of light- and heavy-duty ZEVs as described in the ZEV Declaration and the Global Memorandum of Understanding (MOU) on Zero- Emission Medium- and Heavy-Duty Vehicles.56 [EPA-HQ-OAR-2022-0829-0561, p. 20]

54 Lucy McKenzie and Nick Nigro, "U.S. Passenger Vehicle Electrification Infrastructure Assessment: Results for Light-Duty Vehicle Charging"(Atlas Public Policy, April 28, 2021), https://atlaspolicy.com/wp-content/uploads/2021/04/2021-04-21_US_Electrification_Infrastructure_Assessment.pdf.

56 Slowik et al., "Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States."

55 "Public Charging for Electric Cars and Trucks Can Be Built Quickly and Cost Effectively," 2035 2.0, n.d., https://www.2035report.com/transportation/public-charging/.

Fortunately, a combination of federal, state, utility, and private investments and incentives are poised to fill the need for charging infrastructure. [EPA-HQ-OAR-2022-0829-0561, p. 20]

At the federal level, the BIL contains $7.5 billion to develop a nationwide EV charging network, targeting rural and underserved areas.57 To date, all 50 states are moving forward with plans to develop over 75,000 miles (as of July 2022) of EV charging corridors, via funding allocated through the National Electric Infrastructure Program. [EPA-HQ-OAR-2022-0829-0561, p. 20]

57 "Updated Fact Sheet: Bipartisan Infrastructure Investment and Jobs Act," The White House Briefing Room, August 2, 2021, https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/02/updated-fact-sheet-bipartisan-infrastructure-investmentand-jobs-act/.

The IRA also extends the 30C Alternative Fuel Refueling Infrastructure tax credit for private investments in qualified clean-vehicle infrastructure for 10 years, as follows: [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

-Individual credit of 30 percent of installed costs, up to $1,000 per charger, provided the infrastructure is installed in a qualified census tract where the poverty rate is at least 20 percent, in a non-metropolitan area where median family income is ≤ 80 percent of the statewide median family income, or a metropolitan area where median family income is ≤ 80 percent of the statewide median family income or metropolitan area median family income. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

-Commercial tax credit of 30 percent up to $100,000 per charger (up from the prior $30,000-per-location cap).58 [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

58 Sara Baldwin and Robbie Orvis, "Implementing the Inflation Reduction Act: A Roadmap for Federal and State Transportation Policy" (Energy Innovation LLC, October 2022), https://energyinnovation.org/wp-content/uploads/2022/11/Implementing-the-Inflation-Reduction-Act-A-Roadmap-For-Federal-And-State-Transportation-Policy.pdf.

These incentives for charging infrastructure will support private investments in a more robust national network, and new eligibility requirements will help expand businesses and individuals install EV charging access to better serve EV drivers, especially in currently underserved communities. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

States are also playing a leading role. According to the State of Sustainable Fleets' 2023 Market Brief, "funding commitments have increased in California and within a handful of other states, thus driving up the average annual funding that will target the clean fuel market to approximately $32 billion on average per year during the next four to five years,"59 far exceeding expectations of funding before the BIL and IRA. See Figure 16. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

59 "The State of Sustainable Fleets: 2023 Market Brief" (Gladstein, Neandross & Associates (GNA), May 2023), https://cdn.stateofsustainablefleets.com/2023/state-of-sustainable-fleets-2023-market-brief.pdf, 15-16.

[See original attachment for figure "Annual Public Incentive Funding for the Next 4-5 Years"] [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

Figure 16. Annual funding for clean fuel and vehicle technologies for the next four to five years averaged by state and nationally, which includes state, local, utility, and federal incentive programs. Source: www.stateofsustainablefleets.com. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

State-funded programs aimed at EV charging deployment, including among the largest state markets, are well on their way to meeting future charging infrastructure demand. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

[See original attachment for table of leading state-funded programs as of March 2023] [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

Figure 17. Leading state-funded programs for investment in EV charging as of March 2023. Source: Atlas Public Policy, available at: https://atlaspolicy.com/wp-content/uploads/2023/05/Investment-in-Publicly-Accessible-EV-Charging.pdf. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

The private sector and charging companies are also moving quickly to take advantage of new incentives and funding. According to Atlas Public Policy, private investment in public EV charging has increased considerably in the last five years, rising from under $200 million in 2017 to nearly $13 billion by early 2023.60 For example: [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

60 Nick Nigro, "Investment in Publicly Accessible EV Charging in the United States (2023)" (Atlas Public Policy, May 2023),

https://atlaspolicy.com/wp-content/uploads/2023/05/Investment-in-Publicly-Accessible-EV-Charging.pdf.6. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

-Pilot Company and Volvo Group signed a letter of intent to co-develop a charging network across Pilot and Flying J travel centers, catered specifically toward medium-and heavy-duty EVs. Pilot has more than 750 locations across 44 states and six Canadian provinces.61 [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

-Cumulative private investments in EV charging by different infrastructure providers, including the auto industry, totaled just over $13 billion as of March 2023.62 [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

-Companies like Electrify America, General Motors, Freightliner, Tesla, and Mercedes are rapidly expanding investments in charging infrastructure to meet increasing demand for EVs. See Figure 18. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

61 Scooter Doll, "Pilot Co. Will Expand Charging Network to Heavy-Duty EVs with Help of Volvo Group," Electrek, November 15, 2022, https://electrek.co/2022/11/15/pilot-co-expand-charging-network-heavy-duty-evs-with-volvo-group/.

62 Nigro, "Investment in Publicly Accessible EV Charging in the United States (2023)."

[See original attachment for graph described below] [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

Figure 18. Cumulative private investment in EV charging over time by company. Source: Atlas Public Policy, available at: https://atlaspolicy.com/wp-content/uploads/2023/05/Investment-in-Publicly-Accessible-EV-Charging.pdf. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

Utilities are also investing in EV charging at scale, and more states are authorizing utility investments to support widespread and equitable access to more customers. Total approved utility investments for transportation electrification totaled $5.230 billion as of December 2022. See Figure 19. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

[See original attachment for table described below] [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

Figure 19. Leading states with approved utility investments in public charging. The table also includes the number of DCFC and L2 ports per million residents as of 2021. "Other States" accounts for the remaining 42 states and the District of Columbia. Source: Atlas Public Policy, available at: https://atlaspolicy.com/wp-content/uploads/2023/05/Investment-in-Publicly-Accessible-EV-Charging.pdf, 21. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

In summary, national trends combined with historic investments are poised to fill the charging gap and meet the need for increased BEV adoption resulting from more stringent EPA tailpipe rules. In addition, the sizable investment needed will be shared across federal, state, and local governments, the private sector, and utilities, ensuring a more cost-effective charging network for future BEV drivers. [EPA-HQ-OAR-2022-0829-0561, pp. 20-24]

Organization: Energy Strategy Coalition

Members of this coalition are already engaging in long-term planning to meet the increased demand for electricity attributable to vehicle electrification, and the LMDV Proposal will provide a regulatory backstop supporting further investments in electrification and grid reliability. Demand for electricity will increase under both the LMDV Proposal and the recently-proposed Phase 3 Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles ("HDV Proposed Rule"),4 but the electricity grid is capable of planning for and accommodating such demand growth and has previously experienced periods of significant and sustained growth. Moreover, historic growth in demand and generation resources does not reflect the investments that will be made under the Infrastructure Investment and Jobs Act ("IIJA") and the Inflation Reduction Act ("IRA") to support the deployment of new renewable and zero-carbon generation resources, energy storage and charging infrastructure. Coalition members are already making investments in the resources and infrastructure needed to support transportation electrification and realize the benefits that integration of EVs can provide to the electricity grid. The Coalition encourages EPA to work closely with state and local partners and other federal agencies to ensure that deployment of this infrastructure occurs on the pace and scale needed to achieve the EV penetration-rates contemplated by these proposals, while ensuring grid reliability. [EPA-HQ-OAR-2022-0829-0610, pp. 1-2]

4 Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 88 Fed. Reg. 25,926 (published April 27, 2023).

II. The proposed rule supports long-term planning and investment

Long-term planning and investment for vehicle electrification is a business imperative for the Coalition's members and a necessary element of their efforts to provide affordable, clean, and reliable power to their customers. By setting a clear trajectory for vehicle electrification that complements existing regulatory and market forces, EPA's LMDV and HDV proposals facilitate further investment in the generation and charging infrastructure needed to meet increased demand associated with electrification of the vehicle fleet. [EPA-HQ-OAR-2022-0829-0610, pp. 1-2]

Even before the LMDV and HDV proposals, market forces and government incentives were projected to greatly increase the rate of vehicle electrification. As EPA notes, "virtually every major manufacturer of light-duty vehicles is already planning to introduce widespread electrification across their global fleets in the coming years." 5The IRA is now providing significant incentivies for automakers to accelerate these commitments through generous subsidies for EV purchases. These include up to $7,500 in tax credits for new EVs,6 $4,000 for used EVs,7 as well as incentives for the commercial purchase of light-and medium-duty vehicles.8 The IIJA also provides significant incentives to support vehicle electrification, including $7.5 billion in funding for installation of public charging and other alternative fueling infrastructure,9 and funding for the Department of Energy's ("DOE") Building a Better Grid Initiative, which allocates $2.5 billion to support the development of nationally significant transmission lines, $2.3 billion to strengthen and modernize the power grid against wildfires and other extreme weather exacerbated by climate change, and $10.5 billion to improve grid resilience and grid flexibility (including by supporting transmission and distribution infrastructure).10 [EPA-HQ-OAR-2022-0829-0610, pp. 1-2]

5 88 Fed. Reg. at 29,191.

6 26 U.S. Code § 30D.

7 26 U.S. Code § 25E.

8 See 26 U.S. Code § 45W.

9 88 Fed. Reg. at 29,195.

10 See, e.g., Building a Better Grid Initiative, GRID DEPLOYMENT OFFICE, DEPARTMENT OF ENERGY https://www.energy.gov/gdo/building-better-grid-initiative.

III. Coalition members are investing in EV charging infrastructure

Members of this Coalition have begun making significant investments in the charging infrastructure for electric passenger cars and trucks: [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-National Grid recently received approval for a $206 million initiative to enable up to 32,000 additional charging ports in Massachusetts.23 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-The New York Power Authority will have up to 400 fast chargers installed or in construction through its EVolve NY program by the end of 2025.24 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-The Pacific Gas and Electric Company ("PG&E") has successfully installed through March 2023 over 5,700 charging ports through its EV Charge Network, EV Fleet, EV Fast Charge and EV Schools programs.25 To aid with equity efforts to expand EV charging, PG&E recently launched its Empower EV program, which offers income-eligible households up to $2,500 in financial incentives for the installation of a Level-2 charger and any necessary service panel upgrades,26 as well as its Multifamily Housing and Small Business EV Charger program, which will install Level 1 and Level 2 EV chargers at multifamily housing units, not-for-profit organizations and small businesses, at no cost for sites located in a priority community.27 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-Austin Energy provides rebates of up to $1,200 and $4,000 for customers installing Level 2 charging stations at their homes and workplaces respectively.28 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-The Sacramento Municipal Utility District ("SMUD") offers up to $1,000 toward residential charging equipment and installation costs through its Charge@Home program.29 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-Constellation Energy Corporation's venture arm (Constellation Technology Ventures, or "CTV") has invested in portfolio companies focused on EV and charging infrastructure.30 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

23 NATIONAL GRID, ANNUAL REPORT AND ACCOUNTS 2022/23, at 30 (2023), https://www.nationalgrid.com/document/149701/download.

24 Leading the Way in EV Infrastructure, EVOLVE NY, https://evolveny.nypa.gov/ (last visited June 9, 2023).

25 More information on PG&E's EV charging programs can be found at: https://www.pge.com/en_US/small-medium-business/energy-alternatives/clean-vehicles/ev-charge-network/electric-vehicle-charging/electric-vehicle-programs-and-resources.page.

26 More information on PG&E's Empower EV program can be found at: https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/electric/empower-ev-program.page?WT.mc_id=Vanity_empower-ev.

27 More information on PG&E's Multifamily and Small Business EV Charger program can be found at: https://www.pge.com/en_US/small-medium-business/energy-alternatives/clean-vehicles/ev-charge-network/program-participants/multifamily-housing-smb-ev-charger-program.page?.

28 Commercial Charging, AUSTIN ENERGY (last reviewed or modified July 8, 2022), https://austinenergy.com/green-power/plug-in-austin/workplace-charging; Home Charging, AUSTIN ENERGY (last reviewed or modified July 8, 2022), https://austinenergy.com/green-power/plug-in-austin/home-charging.

29 Drive electric and save, SMUD, https://www.smud.org/en/Going-Green/Electric-Vehicles/Residential (last visited June 9, 2023).

Footntoe 30: For instance, CTV invested in Qnovo, which offers a solution suite that uses advanced computation to optimize the chemical reactions within lithium-ion batteries, resulting in faster charging, increased daily run times, and longer battery lifetimes. See Constellation Technology Ventures, https://www.constellationenergy.com/our-work/innovation-and-advancement/technology-ventures.html. [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

Coalition members are making these investments in part because of the benefits that EVs can provide to grid reliability. EVs' primary near-term grid benefits stem from their enablement of load shifting—whether from periods of higher load demand to periods of lower load demand, or from periods of more carbon-intensive power generation to periods where more renewable energy is available.31 Load shifting can involve both deferral (to avoid charging during periods of peak load) and more targeted scheduling (to take advantage of periods of excess energy supply).32 In addition to enhancing grid reliability, load shifting can also reduce customer electricity rates, increase the value of renewable energy investments (by maximizing usage of excess solar energy produced during the day), and mitigate the need for equipment upgrades (e.g., increased storage capacity to accommodate excess solar energy).33 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

31 See TIMOTHY LIPMAN ET AL., CAL. ENERGY COMM'N, TOTAL CHARGE MANAGEMENT OF ELECTRIC VEHICLES 5 (CEC-500-2021-055, Dec. 2021), https://www.energy.ca.gov/sites/default/files/2021-12/CEC-500-2021-055.pdf.

32 See id.

33 See Aligning Utilities and Electric Vehicles, for the Greater Grid, NAT'L RENEWABLE ENERGY LAB'Y (Jan. 10, 2022), https://www.nrel.gov/news/program/2022/aligning-utilities-electric-vehicles-for-greater-grid.html (citing Muhammad Bashar Anwar et al., Assessing the value of electric vehicle managed charging: a review of methodologies and results, 15 ENERGY ENV'T SCI. 466 (2022)).

For example, PG&E has partnered with the BMW Group to explore ways to incentivize EV drivers to shift their charging times to support grid reliability.34 This program—called ChargeForward— first kicked off in 2015 and moved into its third phase in 2021.35 Building on the success of the first two phases, phase three expanded the program's scope to 3,000 EV drivers (from prior pilots of 100 and 400 drivers in phases one and two).36 Phase two of ChargeForward demonstrated the ability to shift nearly 20% of charging from a particular hour to another time and to shift up to 30% of charging to a particular hour.37 SMUD is also engaged in a managed charging pilot program with BMW, Ford, and GM, and is planning to add Tesla vehicles to the pilot as well, targeting participation of around 2,000 vehicles through 2024.38 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

34 PG&E Corporate Sustainability Report 2022, PG&E CORPORATION 105 (2022), https://www.pgecorp.com/corp_responsibility/reports/2022/assets/PGE_CSR_2022.pdf.

35 CLARION ENERGY CONTENT DIRECTORS, PG&E and BMW kick off 3rd phase of ChargeForward for clean, smart EV charging, POWERGRID INTERNATIONAL (Mar. 23, 2021), https://www.power-grid.com/der-grid-edge/pge-and-bmw-kick-off-3rd-phase-of-chargeforward-for-clean-smart-ev-charging/#gref.

36 PG&E Corporate Sustainability Report 2022, PG&E CORPORATION 105 (2022), https://www.pgecorp.com/corp_responsibility/reports/2022/assets/PGE_CSR_2022.pdf.

37 See Timothy Lipman et al., Total Charge Management of Electric Vehicles, CALIFORNIA ENERGY COMMISSION iii (CEC-500-2021-055, Dec. 2021), https://www.energy.ca.gov/sites/default/files/2021-12/CEC-500-2021-055.pdf.

38 2030 Zero Carbon Plan Progress Report, SMUD 21 (Apr. 2023), https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---April-2023_FINAL.ashx.

Coalition members are also exploring Vehicle-to-Grid (“V2G”) technology, through which EVs can send power back to load sources (e.g., homes) and the grid from their batteries. While still in the early stages of development, V2G technology can offer reliability benefits by serving as a grid resource during periods of peak demand.39 PG&E and BMW recently extended their ChargeForward partnership until March 2026 and, as part of that program, will conduct a field trial of V2G-enabled vehicles in order to explore their potential to increase grid reliability.40 In addition, PG&E has announced vehicle-grid integration (“VGI”) pilot programs with Ford41 and General Motors to test the ability of EVs to provide backup power to homes.42 SMUD is also in the process of conducting an electric school bus V2G demonstration project with the Twin Rivers Unified School District.43 SMUD is planning to expand the program to additional school districts and is also pursuing other projects to explore V2G capabilities for light-duty EVs.44 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

39 See Value Assessment of DC Vehicle-to-Grid Capable Electric Vehicles: Analytical Framework and Results, EPRI (May 24, 2023), https://www.epri.com/research/programs/053122/results/3002026772.

40 More Power To You: PG&E and BMW of North America Start V2X Testing in California, PG&E CORPORATION (May 16, 2023), https://investor.pgecorp.com/news-events/press-releases/press-release-details/2023/More-Power-To-You-PGE-and-BMW-of-North-America-Start-V2X-Testing-in-California/default.aspx.

41 PG&E and Ford Collaborate on Bidirectional Electric Vehicle Charging Technology in Customers’ Homes (Mar. 11, 2022), https://investor.pgecorp.com/news-events/press-releases/press-release-details/2022/PGE-and-Ford-Collaborate-on-Bidirectional-Electric-Vehicle-Charging-Technology-in-Customers-Homes/default.aspx.

42 A. Vanrenen, PG&E and General Motors Collaborate on Pilot to Reimagine Use of Electric Vechiles as Backup Power Sources For Customers (Mar. 8, 2022), https://www.pgecurrents.com/articles/3410-pg-e-general-motors-collaborate-pilot-reimagine-use-electric-vehicles-backup-power-sources-customers.

43 2030 Zero Carbon Plan Progress Report, SMUD 22 (Apr. 2023), https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---April-2023_FINAL.ashx.

44 Id.

IV. EPA should work closely with state and local partners to ensure deployment of the resources and infrastructure needed to accelerate transportation electrification while maintaining grid reliability

EPA's LMDV Proposal will help support deployment of the charging and generation resources needed to meet anticipated demand from vehicle electrification. Yet effective and efficient deployment of these resources will require coordination among electric utilities, state public utility commissions, and local governments to factor load from EVs into long-range resource planning and to permit the distribution and transmission system upgrades and new generation and storage resources needed to serve that load. To ensure these resources are deployed on the pace and scale needed to support vehicle electrification and grid reliability, EPA should coordinate closely with federal, state and local agenices to remove deployment barriers and emphasize the benefits that vehicle electrification can provide to the electricity grid, public health, and the climate. [EPA-HQ-OAR-2022-0829-0610, pp. 13-14]

Organization: Environmental. and Public Health Organizations

XVII.Ongoing Investments in Charging Infrastructure and Efforts to Ready the Grid for Widespread EV Charging Justify Stronger Standards.

In this section, we explain in detail how charging infrastructure and the electric grid are well-positioned to support strong final standards—and in particular, Alternative 1 with a steeper increase in stringency after 2030. [EPA-HQ-OAR-2022-0829-0759, p. 108]

A.Economic theory and historical precedent show that infrastructure buildout will occur at the pace and scale needed to support vehicle electrification.

EPA should reject arguments that the buildout of charging and grid infrastructure cannot occur at the pace and scale needed to support expanded vehicle electrification, which are unreasonably pessimistic and inconsistent with both economic theory and historical precedent. These arguments rely on the classic "chicken-and-egg" scenario said to be presented by ZEV sales and charging infrastructure, where each side of the market waits for the other. But EPA need not and should not wait for infrastructure to fully mature before finalizing strong standards. EPA's standards themselves will send a strong signal to the market to undertake the infrastructure investments needed to accommodate a gradual rise in vehicle electrification,283 such that increased ZEV sales and infrastructure buildout will occur in relative tandem and reinforce each other. As one analyst sums it up: "The chicken-and-egg conundrum is being solved. Investments in the space and the adoption of EVs [a]re happening much faster than many analysts expected, and this is also accelerating the build-out of the charging network."284 [EPA-HQ-OAR-2022-0829-0759, pp. 108-109]

283 Environmental regulation itself, of course, can lead to technology innovation and market development. See generally Jaegul Lee et al., Forcing Technological Change: A Case of Automobile Emissions Control Technology Development in the US, 30 Technovation 249 (2010); Margaret R. Taylor, Edward S. Rubin, & David A. Hounshell, Regulation as the Mother of Innovation: The Case of SO2 Control, 27 Law & Policy 348 (2005); James Lents et al., Chapter II: The regulation of automobile emission: A case study, in Environmental Regulation and Technology Innovation: Controlling Mercury Emissions from Coal-Fired Boilers (Marika Tatsutani & Praveen Amar eds., 2000) https://www.nescaum.org/documents/rpt000906mercury_innovative-technology.pdf.

284 Gabriela Herculano, Chicken-and-Egg Problem: EV Adoption and Buildout of Charging Networks, Nasdaq (Apr. 18, 2022), https://www.nasdaq.com/articles/chicken-and-egg-problem%3A-ev-adoption-and-buildout-of-charging-networks.

The economic literature on indirect network effects and two-sided markets shows that an increase in BEV sales can be expected to stimulate associated infrastructure development. In a study on flex-fuel vehicles fueled by E85 (85% ethanol), Corts (2010) found that growth in sales of flex-fuel vehicles due to government fleet acquisition programs led to an increase in the number of retail E85 stations.285 That relationship held true across all six Midwestern states analyzed, despite differences in those states' E85 subsidies and tax credits.286 The author concluded that the results "confirm the basic validity" of the theory underlying government fleet purchase requirements: that increasing the "base of alternative fuel vehicles can spur the development of a retail alternative fuel distribution infrastructure."287 [EPA-HQ-OAR-2022-0829-0759, p. 109]

285 Kenneth S. Corts, Building out alternative fuel retail infrastructure: Government fleet spillovers in E85, 59 J. Env't Econ. & Mgmt. 219, 219-20 (2009).

286 Id.

287 Id at 231.

Recent economic research has confirmed this relationship in the context of ZEVs and charging infrastructure specifically. An influential study by Li et al. (2017) found that "EV demand and charging station deployment give rise to feedback loops" and that "subsidizing either side of the market will result in an increase in both EV sales and charging stations."288 Similarly, Springel (2021) found "evidence of positive feedback effects on both sides of the market, suggesting that cumulative EV sales affect charging station entry and that public charging availability has an impact on consumers' vehicle choice."289 The BIL and IRA subsidize both sides of the market, offering significant incentives for both ZEV purchases and the construction of charging infrastructure. Economic theory therefore supports the proposition that strong final standards, particularly in combination with the BIL and IRA's large financial incentives, will facilitate expansion of charging and grid infrastructure.290 [EPA-HQ-OAR-2022-0829-0759, p. 109]

288 Shanjun Li et al., The market for electric vehicles: indirect network effects and policy design, 4 J. Ass'n Env't. & Resources Econ. 89, 128 (2017).

289 Katalin Springel, Network Externality and Subsidy Structure in Two-Sided Markets: Evidence from Electric Vehicle Incentives, 13 Am. Econ. J.: Econ. Pol'y 393, 426 (2021).

290 See id. at 394 (noting that "the presence of positive feedback amplifies the impact of both types of subsidies"), 415 ("positive feedback loops between the charging station network and total all-electric vehicle sales amplify the impact of both types of subsidy").

Economic theory has in fact played out in Norway, where ZEV sales and infrastructure both expanded rapidly over the span of about a decade. There, the "path to charging point saturation started by stimulating more demand for EVs."291 In other words, Norway did not wait for infrastructure to fully mature before beginning its transition to cleaner cars. Rather, rising ZEV sales themselves "helped trigger a spike in demand for charging stations."292 [EPA-HQ-OAR-2022-0829-0759, pp. 109-110]

291 Whitney Bauck, How Norway Became the World's Electric Car Capital, Nexus Media News (Mar. 7, 2023), https://nexusmedianews.com/how-norway-became-the-worlds-electric-car-capital/.

292 McKinsey & Co, What Norway's Experience Reveals About the EV Charging Market 3 (2023), https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/what-norways-experience-reveals-abou t-the-ev-charging-market#/.

The concept that charging infrastructure will adequately scale up over time also finds support in an analogous historical example: the buildout of roads and gasoline refueling infrastructure in the early 20th century to serve the United States' growing fleet of automobiles. The country's exponential growth in automobile sales—first exceeding 1,000 in 1899 and growing to 1 million by 1916293—preceded the establishment of an extensive network of both suitable roads294 and filling stations.295 The buildout of road and refueling infrastructure unfolded over long time horizons and in a variety of ways, adapting to the needs of the automobile fleet as it changed and grew. Paving and other road improvement efforts began on a small scale in cities, where automobiles were initially concentrated; efforts to improve rural roads and construct highways happened a decade or more later, as motorists began to expand their driving beyond cities.296 Similarly, in the case of refueling infrastructure, a network of modern filling stations did not spring up until well after automobiles had grown in popularity.297 Before that, refueling needs were met through varied and dispersed "non-station" methods such as cans of gasoline sold at general stores, barrels at repair garages, mobile fuel carts, curb pumps, and home refueling pumps, which emerged at various times as the demand for gasoline increased.298 Road and refueling infrastructure therefore exhibited a "long-term, adaptive and portfolio approach"299 that, over the span of several decades, satisfied the shifting needs of the growing ranks of automobile owners. [EPA-HQ-OAR-2022-0829-0759, p. 110]

293 Roads, Encyclopedia.com (May 29, 2018), https://www.encyclopedia.com/science-and-technology/technology/technology-terms-and-concepts/roads.

294 See id. (noting that around 1904, "[o]nly a few hundred miles of roads in the entire country were suitable for motor vehicles"); see also F.W. Geels, The Dynamics of Transitions in Socio-technical Systems: A Multi-level Analysis of the Transition Pathway from Horse-drawn Carriages to Automobiles (1860–1930), 17 Tech. Analysis & Strategic Mgmt. 445, 460, 467-68 (2005) (discussing the gradual expansion and improvement of road infrastructure in the 1910s and 1920s to accommodate growth in and changes to automobile travel).

295 Marc W. Melaina, Turn of the century refueling: A review of innovations in early gasoline refueling methods and analogies for hydrogen, 35 Energy Pol'y 4919, 4922 (2007) (noting that "the takeoff period for gasoline stations occurred between 1915 and 1925, but exponential growth in vehicles began around 1910, so the rise of gasoline filling stations followed rather than preceded the rise of gasoline vehicles").

296 Geels, at 467-68.

297 Melaina, at 4922.

298 Id. at 4924-27.

299 Id. at 4932 (discussing refueling infrastructure).

That approach holds important lessons for this rulemaking. As detailed elsewhere in this comment letter, the introduction of ZEVs into the total on-road fleet will occur gradually. See Figure V.C-1 & Figure V.D-1, supra; Table XVII.G-1 (L/MD PEVs as a Share of Total On-Road-L/MD Fleet, 2026-2040), infra. Economic theory and historical precedent show that growth in ZEV sales and infrastructure buildout will occur in relative tandem, with infrastructure responding over time commensurate with the evolving needs of the ZEV fleet. And in finalizing these standards, EPA will send a strong market signal that will facilitate infrastructure development at the pace and scale needed to support compliance with the standards. EPA must reject unfounded chicken-and-egg arguments questioning whether infrastructure will respond to rising demand. [EPA-HQ-OAR-2022-0829-0759, pp. 110-111]

B. EPA neglects to account for other significant sources of federal funding for ZEVs and charging infrastructure.

The Proposed Rule states: “The Bipartisan Infrastructure Law (BIL) provides up to $7.5 billion over five years to build out a national PEV charging network.”300 However, as also noted in the Proposed Rule, there are many other programs funded by the BIL that could provide significant additional funding: “Other programs with funding authorizations under the BIL that could be used in part to support charging infrastructure installations include the Congestion Mitigation & Air Quality Improvement Program, National Highway Performance Program, and Surface Transportation Block Grant Program among others.”301 To illustrate the point, consider the two largest programs funded by the BIL, the National Highway Performance Program ($148 billion over five years) and the Surface Transportation Block Grant program ($72 billion over five years). A portion of those funds could be invested in EV charging infrastructure and other investments that reduce emissions by reducing the need to drive. The block grant program is explicitly designed to be versatile and is available for a wide range of uses. In fact, it was originally created in the 1991 transportation law to encourage states to move beyond the interstate highway-building era into investments in other improvements to our transportation system,302 and Congress has added more uses since then. If, say, 20% of the funding provided by just those two programs were directed to EV charging infrastructure, it would provide $44 billion in additional federal funding.303[EPA-HQ-OAR-2022-0829-0759, p. 111]

300 88 Fed. Reg. at 29307.

301 Id. at 29308.

302 Ellen Schweppe, Legacy of A Landmark: ISTEA After 10 Years (2001), at https://highways.dot.gov/public-roads/novemberdecember-2001/legacy-landmark-istea-after-10-years (last accessed June 30, 2023).

303 See Deron Lovaas & Max Baumhefner. What if States Turn Pavement Into Charging Stations? (May 16, 2022), at https://www.nrdc.org/bio/deron-lovaas/what-if-states-turn-pavement-charging-stations (last accessed June 30, 2023).

And even without accounting for a portion of the National Highway Performance Program and Surface Transportation Block Grant (the two largest funding allocations made by the BIL), Atlas Public Policy’s inventory reveals there is a total of over $50 billion in BIL funding for which ZEVs and charging infrastructure are eligible expenses (see Figure XVII.B-1 below).

Figure XVII.B-1: ZEV Funding in the Bipartisan Infrastructure Law304

[See original attachment for Figure XVII.B-1]. [EPA-HQ-OAR-2022-0829-0759, p. 112]

304 Atlas Public Policy, Infrastructure Investment and Jobs Act (H.R. 3684), at https://www.atlasevhub.com/materials/invest-in-america-act-h-r-3684/ (last accessed June 30, 2023).

C. The Alternative Fuel Refueling Property Tax Credit extended by the IRA is not restricted to rural areas, but instead to areas that are not urban.

The Proposed Rule states that under the IRA, “residents in low-income or rural areas would be eligible for a 30% credit for the cost of installing residential charging equipment up to a $1,000 cap.”305 However, the word “rural” does not appear in IRA § 30C, which defines “eligible census tracts” for the Alternative Fuel Vehicle Refueling Property credit “as any census tract which (I) is described in § 45D(e), or (II) is not an urban area.”306 The distinction is important because there are many areas that have not been classified as rural that cannot rightly be classified as urban. For example, if the U.S. Department of the Treasury classifies a census tract as not urban if more than 10% of the blocks within the census tract are designated as rural census blocks (to ensure those who live in rural blocks are not unduly denied access just because they happen to live next to urban blocks), tens of millions more Americans and businesses would have access to these important tax credits. This approach has been recommended to Treasury by a diverse coalition of industry associations, individual companies, environmental, consumer, and environmental justice groups, and other stakeholders.307 EPA should correct its characterization of § 30C and should convey to Treasury that adopting the broadly-supported approach described above would support strong vehicle standards. [EPA-HQ-OAR-2022-0829-0759, p. 112]

305 88 Fed. Reg. at 29308.

306 26 U.S.C. § 30C(c)(3)(B).

307 Ltr. from Max Baumhefner et al. to U.S. Dep’t of the Treasury, June 2023 (attached to this comment letter; signatories include Natural Resources Defense Council, Alliance for Automotive Innovation, American Council on Renewable Energy, Ample, CALSTART, ChargePoint, Clean Energy Works, Earthjustice, Elders Climate Action, Electrification Coalition, Environmental Defense Fund, EV Charging for All, EVBox, Forth Mobility, Green Latinos, International Brotherhood of Electrical Workers, International Parking & Mobility Institute, Itselectric, League of Conservation Voters, National Association of Convenience Stores, National Consumer Law Center, NATSO, Navistar, Plug in America, Representing America's Travel Plazas and Truck Stops, Rivian, Sierra Club, SIGMA: America's Leading Fuel Marketers, TeraWatt, Transportation for America, Union of Concerned Scientists, and Volvo Group North America).

D. A more complete inventory reveals $67 billion in announced investments in charging infrastructure, including $33 billion dedicated to light-duty vehicles and $4 billion that could support light-duty vehicles.

EPA also correctly identifies that there has been “rapid growth in the broader market for charging infrastructure serving cars or other electric vehicles.”308 New charging infrastructure announcements are occurring every week, showing the public and private sectors’ commitment to building out infrastructure to support vehicle electrification. The Proposed Rule’s description of recently announced investments in charging infrastructure underscores the fact that significant progress is being made.309 However, this narrative should be supplemented by a more comprehensive inventory of the public, private, and utility sectors. As of March 31, 2023, Atlas Public Policy (Atlas) estimates $67 billion dollars in charging infrastructure investments that have been announced by the public, private, and utility sectors but not yet installed as charging ports in the ground.310 Table XVII.D-1 provides a summary of tallied investment amounts, which include: [EPA-HQ-OAR-2022-0829-0759, p. 113]

-$33 billion in announced, unspent investments for LDV charging;

-$30 billion in announced, unspent investments for medium- and heavy-duty vehicle charging; and

-$4 billion in announced, unspent investments for use across any vehicle class. [EPA-HQ-OAR-2022-0829-0759, p. 113]

308 U.S. EPA, Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 88 Fed. Reg. 25926, 25934(Apr. 27, 2023).

309 88 Fed. Reg. at 29308-09.

310 Atlas Pub. Pol'y, Announced EV Infrastructure Funding (June 15, 2023).

Table XVII.D-1: Estimated U.S. Charging Infrastructure Investments Announced but Not Yet In the Ground, as of March 31, 2023

[See original attachment for Table XVII.D-1]. [EPA-HQ-OAR-2022-0829-0759, pp. 113-114]

These totals include public sector (e.g., Charging and Fueling Infrastructure Discretionary Grant funding, state funding commitments, and modeled estimates of 26 U.S. Code § 30C tax credit payments), private sector (e.g., automaker and charging service provider), and utility program investments.311 [EPA-HQ-OAR-2022-0829-0759, p. 114]

311 Note that these figures do not include funding for hydrogen fuel cell vehicles. Regarding the § 30C tax credit, Atlas assumes that 1) all qualifying projects receive the tax credit, 2) on average, qualifying projects will receive tax credits worth 18% of covered costs, and 3) that Treasury will classify a census tract as not urban if more than 10% of the blocks within the census tract are designated as rural census blocks, as recommended by multiple stakeholders described in Section XVII.C. The estimated Low Carbon Fuel Standard value is based on modeling from Dean Taylor Consulting for California, Oregon, and Washington and does not include capacity credits. It uses a 2023 – 2032 EV adoption trajectory for those three states that meets President Biden's LDV goal of 50% ZEV sales share by 2030 (which is lower than the trajectory modeled in the EPA's proposed vehicle emission standards), an MDHD EV adoption curves modeled on the EPA's proposed emissions regulations for MD and HD vehicles, and modeling from Atlas's INSITE tool of MWh demanded by MDHD vehicles. Utility program investments include approved investor-owned utility programs with an EV charging element. Amounts are unspent program dollars as of the most recent program report available as of March 31, 2023. If no program report was available, Atlas used the percentage of time remaining in the approved program schedule to estimate the unspent proportion of program funding.

Even Atlas's tally of private sector commitments is likely incomplete. Private sector actors often do not announce their investment plans, and are especially unlikely to do so if they are investing in home, depot, or workplace charging. Tallied private sector commitments exclude an estimated $3.0 billion in capital raised by charging companies (including ChargePoint, EVgo, Blink, and Volta), some percentage of which is expected still to be invested in charging hardware and installation. [EPA-HQ-OAR-2022-0829-0759, p. 114]

The scale of these announced investments reflects a strong and growing deployment of public and private charging infrastructure that, even in advance of the finalization of the Proposed Standards, has begun to set the stage for a robust charging network. Additional analyses have emphasized the growing momentum in infrastructure deployment; for example, an International Energy Agency report noted that "there has been a substantial upswing in investment in EV charging infrastructure, which has doubled in 2022 compared to the previous year."312 [EPA-HQ-OAR-2022-0829-0759, p. 114]

312 IEA, World Energy Investment 2023, at 50 (2023), https://iea.blob.core.windows.net/assets/54a781e5-05ab-4d43-bb7f-752c27495680/WorldEnergyInvestment2023.pdf

E. Increased access to Tesla's large and growing supercharger network will accelerate PEV adoption.

Recent announcements from Tesla, Ford, GM, Rivian, and Volvo that will allow more drivers to access Tesla's SuperCharger network bolster the case for strong vehicle standards. As shown in Figure XVII.E-1 and Figure XVII.E-2, this effectively doubles the number of public fast charging locations and connectors available to a majority of the EV market.

Figure XVII.E-1: J1772Combo and Chademo DC Fast Charging Ports313

[See original comment for Figure XVII.E-1].

313 Atlas Public Policy, EV Hub (June 27, 2023) available at https://www.atlasevhub.com/materials/ev-charging-deployment/ (subscription required).

Figure XVII.E-2: Tesla Supercharger, J1772Combo and Chademo DC Fast Charging Ports314 [EPA-HQ-OAR-2022-0829-0759, p. 115]

[See original comment for Figure XVII.E-2].

314 Id.

F. Barriers to the installation of charging infrastructure identified in the Proposal are being removed.

Barriers to the timely installation of charging infrastructure are being removed, which will allow investments at an even greater pace and scale.

Most of the challenges associated with energizing charging infrastructure in a timely manner are being faced in California, which has to date the highest percentage of electric LDVs on the road. Thankfully, a state law enacted in 2022 provides California's investor- and publicly-owned utilities with data necessary to inform grid planning to accommodate high levels of EV charging, requires those utilities to propose proactive grid investments in their General Rate Cases to comply with ZEV regulations (as well as a long list of other laws, standards, and requirements), and directs the California Public Utilities Commission (CPUC) and local utility governing boards to ensure the proposed investments are consistent with achieving the state's goals and regulations.315 In May 2023, Southern California Edison (SCE) filed its General Rate Case, which includes such proactive investments.316 [EPA-HQ-OAR-2022-0829-0759, p. 116]

315 California Assembly Bill 2700 Transportation electrification: electrical distribution grid upgrades. (2021-2022). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB2700.

316 Southern California Edison, What you should know about SCE's general rate case (May 2023), at https://energized.edison.com/stories/sce-details-investments-to-advance-electric-grid-reliability-resilience-and-readi ness (last accessed June 30, 2023).

In addition, the California Senate recently voted 32-to-8 to advance new legislation (Senate Bill 410, "Powering Up Californians Act") that builds upon existing law to accelerate short-term energization timelines for EV charging and to ensure timely grid investments needed to electrify "light-duty, medium-duty, and heavy-duty vehicles and off-road vehicles, vessels, trains, and equipment" consistent with state law requiring economy-wide carbon neutrality by 2045, and "federal, state, regional, and local air quality and decarbonization standards, plans, and regulations."317 The legislation also establishes a balancing account to recover associated costs, which would ensure that Pacific Gas & Electric (PG&E) and San Diego Gas & Electric (SDG&E) do not have to wait several years for their next General Rate Cases to propose investments like those recently proposed by SCE (and it would also allow SCE to propose subsequent investments before its next rate case that could not be predicted when its current rate case was filed). [EPA-HQ-OAR-2022-0829-0759, p. 116]

317 California Senate Bill 410. (2023). https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320240SB410.

Utilities across the country are also already planning for and deploying solutions to address increased vehicle electrification as their customers adopt PEVs to improve fleet economics and performance. Utilities and their customers will benefit from the ability to plan ahead for any significant infrastructure requirements. The regulatory certainty provided by this rulemaking can aid this planning. [EPA-HQ-OAR-2022-0829-0759, p. 116]

Regulatory certainty can also help ensure that investments not only maintain strong electric service but improve it, while at the same time lowering costs. SCE President and CEO Steve Powell noted: “if we leverage the electric vehicle load and have that work for consumers as well, that whole idea of vehicle-to-grid, there can be real value in helping alleviate a lot of the infrastructure investments that need to happen,” ultimately lowering overall energy bills for customers.318 Similarly, Seattle City Light, in its Transportation Electrification Strategic Investment Plan, stated that “[w]hile there are system costs associated with increased transportation electrification (e.g., distribution and transmission infrastructure upgrades), with proactive utility planning and intervention, the system benefits (e.g., new revenue) are estimated to outweigh the costs, spreading the economic benefits of transportation electrification to all customers.”319 This will require action from regulators as well to help shape and approve these proactive and critical investments. As RMI recommended, “regulators can fulfil [sic] their responsibility for ensuring prudent and least-cost grid investments while proactively planning by using new information.”320 [EPA-HQ-OAR-2022-0829-0759, p. 117]

318 Casey Wian, Transportation Electrification Gains Momentum: Edison International and SCE outline plans to seize the “huge opportunity” of preparing the grid for exponential EV growth, Energized, (Feb. 1, 2023), https://energized.edison.com/stories/transportation-electrification-gains-momentum.

319 Seattle City Light, Transportation Electrification Strategic Investment Plan 6 (not dated), https://www.seattle.gov/documents/Departments/CityLight/TESIP.pdf.

320 Ari Kahn et al., RMI, Preventing Electric Truck Gridlock: Meeting the Urgent Need for a Stronger Grid 16 (2023), https://rmi.org/insight/preventing-electric-truck-gridlock/.

In addition, the historic investments of the BIL and IRA are helping utilities build a stronger, cleaner grid and prepare for advanced electrification while minimizing customer costs. Duke Energy, for example, has stated that “[the BIL] provides an important down payment on the infrastructure and incentives that are needed to electrify transportation and secure the grid,” and “[the IRA] can create significant cost savings for our customers.”321 New York utilities have indicated that they will be applying for $900 million in grants from the BIL and IRA to advance grid resilience.322 National Grid in particular notes that “EV charging make-ready infrastructure is identical to electric infrastructure that serves other purposes, this is the kind of work electric utilities do every day,”323 and that “areas of the [BIL] funding are enabling increased investment.”324 [EPA-HQ-OAR-2022-0829-0759, p. 117]

321 Jennifer Loraine, Policy can have a crucial impact on our clean energy future, Duke Energy News Center (Jan. 20, 2023), https://news.duke-energy.com/our-perspective/policy-can-have-a-crucial-impact-on-our-clean-energy-future.

322 John Norris, NY Utilities to Seek $900M from DOE, RTO Insider, (Mar. 28, 2023), https://www.rtoinsider.com/articles/31898-ny-utilities-seek-900m-from-doe.

323 Comments of National Grid to USDOT/FHWA on Docket No. FHWA-2021-0022, at 11 (Jan. 26, 2022), https://downloads.regulations.gov/FHWA-2021-0022-0150/attachment_1.pdf.

324 Id. at 10.

Grid operators around the country are also beginning to incorporate EV planning into existing planning structures. For example, the Minnesota Public Utilities Commission has shifted investor-owned utility transportation electrification planning and reporting requirements to the integrated distribution planning process to account for increasing linkages between EV planning and distribution system planning.325 Incorporating robust EV planning in existing planning structures can help ensure those processes account for EV adoption, even where the utility business units responsible for those areas of planning may be distinct. Furthermore, combined planning processes can create administrative efficiencies that help expedite time-sensitive planning needs. On the transmission planning side, regional grid operators, such as the Midcontinent Independent System Operator, have already begun to think about how transportation electrification will affect total energy needs and the timing of annual peaks in electricity demand.326 Strong vehicle standards give grid operators a reliable EV forecast against which to plan in processes that are already underway. [EPA-HQ-OAR-2022-0829-0759, p. 118]

325 Minn. Public Utilities Comm’n, Order (Dec. 8, 2022). In the Matter of a Commission Inquiry into Electric Vehicle Charging and Infrastructure (Docket No. E999/CI-17-879), In the Matter of Minnesota Power’s 2021 Integrated Distribution System Plan (Docket No. M-21-390), In the matter of Distribution System Planning for Otter Tail Power Company (Docket No. 21-612), In the matter of Xcel Energy’s 2021 Integrated Distribution System Plan (Docket No. (21-694). https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={30E7F284-000 0-C433-8FFA-298183EBEB26}&documentTitle=202212-191192-02.

326 MISO Electrification Insights (April 2021), at 10, 14-15, available at https://cdn.misoenergy.org/Electrification%20Insights538860.pdf.

Finally, parties are working across sectors and industries to reduce barriers to charging deployment. Utilities, public utility commissions and other state regulators, grid operators, charging providers, and others can and have already begun to coordinate and plan for increased vehicle electrification. Examples include: [EPA-HQ-OAR-2022-0829-0759, p. 118]

-The National Charging Experience Consortium (ChargeX) is a collaborative effort between Argonne National Laboratory, Idaho National Laboratory, NREL, BEV charging industry experts, consumer advocates, and other stakeholders whose mission is “to work together as BEV industry stakeholders to measure and significantly improve public charging reliability and usability by June 2025.”327 [EPA-HQ-OAR-2022-0829-0759, p. 118]

327 Idaho Nat’l Lab’y, National Charging Experience Consortium, https://inl.gov/chargex/ (last visited June 13, 2023).

-The National EV Charging Initiative brings together automakers, power providers, PEV and charging industry leaders, labor, and public interest groups to “develop a national charging network for light, medium, and heavy-duty vehicles and inspire deeper commitments from state leaders, the administration and each other."328 [EPA-HQ-OAR-2022-0829-0759, p. 118]

328 EV Charging Initiative, https://www.evcharginginitiative.com/ (last visited June 13, 2023).

-The National Association of State Energy Officials and the American Association of State Highway and Transportation Officials partnered with the U.S. Joint Office of Energy and Transportation to hold a series of convenings to coordinate on a range of topics, including ZEV infrastructure and utility planning needs.329 These convenings brought together State Departments of Transportation officials, State Energy Offices, and other key partners. [EPA-HQ-OAR-2022-0829-0759, pp. 118-119]

329 Nat'l Ass'n State Energy Officials (NASEO) & the Am. Ass'n State Highway & Transp. Officials (AASHTO), Building a National Electric Vehicle Charging Infrastructure Network: Regional EV Meetings Key Themes, Takeaways, and Recommendations from the States (not dated), https://www.naseo.org/data/sites/1/documents/publications/NASEO_AASHTO_Regional%20EV%20Meetings%20 Summary_%20Final.pdf.

-PG&E and BMW of North America are testing a "vehicle-to-everything technology that will improve grid reliability and help EV customers lower their electric bills by exporting power back to the grid during peak demand periods." PG&E notes that "[t]he utility and automotive industries are creating a transformative clean energy future together."330 [EPA-HQ-OAR-2022-0829-0759, p. 119]

330 BMW Group, More Power To You: BMW of North America and PG&E Start V2X Testing in California (May 16, 2023), https://www.press.bmwgroup.com/usa/article/detail/T0417218EN_US/more-power-to-you:-bmw-of-north-america-a nd-pg-e-start-v2x-testing-in-california.

-NREL and Volvo collaborated on a research paper regarding challenges and opportunities of commercial ZEVs, noting:

Coordination between disparate and historically unconnected stakeholders, including state agencies, local governments, automotive manufacturers, fleets, energy infrastructure and utility companies, and research and academia will be required to ensure a smooth and timely transition to ZEVs. This paper, a joint research and industry perspective, is one such example of cross-sectoral collaboration.331 [EPA-HQ-OAR-2022-0829-0759, p. 119]

331 Matteo Muratori, et al., Road to zero: Research and industry perspectives on zero-emission commercial vehicles, iScience, May 19, 2023, https://www.cell.com/action/showPdf?pii=S2589-0042%2823%2900828-3, at 7.

These examples show that the relevant stakeholders are already stepping up to plan for and accommodate the charging and grid needs associated with greater vehicle electrification.

Fundamentally, charging infrastructure challenges are being addressed, as evidenced by the progress described above. We are not starting from scratch and do not need to replicate the gasoline and diesel refueling network to electrify vehicles. The electric grid is already nearly ubiquitous; it only needs to be extended at the fringes. These actions benefit utility shareholders and customers alike by removing barriers to investment in charging infrastructure. As explored in more detail below, America's utilities have a long history of accommodating significant growth. [EPA-HQ-OAR-2022-0829-0759, p. 119]

In sum, the private and federal infrastructure investments EPA has identified justify strong standards, and barriers to additional investment are actively being removed. Furthermore, as noted above, EPA's inventory of federal, public, and private investments that already justifies increasingly stringent vehicle standards is incomplete; and a more complete inventory justifies stronger standards. [EPA-HQ-OAR-2022-0829-0759, p. 119]

4. PEV charging is already putting downward pressure on electric rates, to the benefit of all utility customers.

Because much PEV charging can be accomplished when there is spare capacity on the grid, charging can spread the costs of maintaining the system over a greater volume of electricity sales, reducing the per-kilowatt-hour price of electricity to the benefit of all customers. This has already been demonstrated in the real world. [See original comment for XVII.G-4]. [EPA-HQ-OAR-2022-0829-0759, p. 128]

In fact, empirical data compiled by Synapse Energy Economics shows that PEV drivers are not being subsidized by other utility customers and, in fact, they are putting downward pressure on rates. Between 2011 and 2020, PEV customers across the United States contributed more than $1.7 billion in net revenue to the body of utility customers.350 [See original comment for XVII.G-4]. [EPA-HQ-OAR-2022-0829-0759, p. 128]

350 Melissa Whited, Tyler Fitch, Jason Frost, Eric Borden, Courtney Lane, Ben Havumaki, Sarah Shenstone-Harris & Elijah Sinclair, Electric Vehicles Are Driving Rates Down 1 (June 2023), https://www.synapse-energy.com/sites/default/files/Electric%20Vehicles%20Are%20Driving%20Rates%20Down%20Factsheet.pdf.

The results shown in Figure XVII.G-4 compare the new revenue the utilities collected from PEV drivers to the cost of the energy, capacity, transmission, and distribution system upgrades required to charge those vehicles, plus the costs of utility PEV infrastructure programs that are deploying charging stations for PEVs. In total, PEV drivers contributed an estimated $1.7 billion more than associated costs. That net revenue is returned to the body of utility customers in the form of electric bills that are lower than they would otherwise be. [See original comment for XVII.G-4]. [EPA-HQ-OAR-2022-0829-0759, p. 128]

Figure XVII.G-4: Total Utility Revenues vs. Total Costs Associated with PEVs (2011-2020)351

351 Id. at 3.

[See original comment for XVII.G-4]. [EPA-HQ-OAR-2022-0829-0759, p. 129]

XXIII. BEV Charging Times Are Constantly Improving and Are Not a Constraint on Strong Standards.

Taking refueling considerations into account, BEV charging times are consistent with setting strong final standards. Charging technologies have come a long way in recent years, increasing in their capability to deliver more energy to a vehicle in the same unit of time. EPA notes that its assumptions for BEV refueling times are outdated, 88 Fed. Reg. at 29200, and that is indeed the case. EPA's analysis assumes 100 miles of driving added for each hour of charging as the "charge rate" across all BEVs. DRIA at 4-29. That equates to an average power delivery of just over 30 kilowatts, using the current on-road fleet average BEV efficiency.595 While power delivery during a charging session does taper off as the vehicle battery approaches a full charge, the average power delivery for mid-trip charging events will be much higher than 30 kW. Those events are likely to be done with fast charging, where available, and the availability of high-powered, fast charging will expand greatly leading up to and through the lifetimes of vehicles sold during the period of the Proposed Standards. [EPA-HQ-OAR-2022-0829-0759, p. 182]

595 David Reichmuth, Jessica Dunn, & Don Anair, Driving Cleaner, Union of Concerned Scientists (July 2022) at 20, https://www.ucsusa.org/sites/default/files/2022-07/driving-cleaner-report_0.pdf.

Not only is consumer demand for fast charging for mid-trip fueling pushing the market in the direction of higher-powered ports, the minimum power requirements for federal programs, as well as some state programs, ensure the market will meet those consumer needs in a timely manner. For example, the minimum standards and requirements for the National EV Charging Formula Program specify that each charging location must have at least four charging ports that can deliver 150 kW (or higher) simultaneously. 88 Fed. Reg. at 12754. A 150 kW port would deliver closer to 450 miles of range in an hour, greatly reducing the disbenefit of refueling time associated with BEVs. That number of miles per hour of charging is really a theoretical construct, as the hourly output is more energy than light- and medium-duty vehicle batteries can hold. A vehicle would not spend a full hour fueling at a 150 kW charging station, even if the battery is fully depleted. [EPA-HQ-OAR-2022-0829-0759, p. 182]

The hourly charging speed of a 150 kW station is, however, a useful apples-to-apples comparison to the 100 miles/hour figure used in EPA’s analysis. It suggests that many vehicles will charge nearly four and a half times faster than the speed assumed in the analysis. Still other vehicles may use even faster charging for their mid-trip events, with chargers on the market approaching 350 kW, for vehicles that can accept that output.596 Thus, EPA’s charging rate assumption could be quadrupled (and the refueling time disbenefit for BEVs greatly reduced) and still result in a conservative assumption that leaves room for vehicles that may do some mid-trip charging at more moderate DC charging power levels. [EPA-HQ-OAR-2022-0829-0759, p. 183]

596 Andrei Nedelea, 800V EV Charging Will Drastically Reduce Waiting Times At The Charger, Inside EVs (June 5, 2020), https://insideevs.com/features/427039/800-volt-charging-to-change-industry/.

Organization: Environmental Defense Fund (EDF) (1of 2)

V. Sufficient infrastructure, electric grid capacity, and policies exist to support strong standards.

EPA reasonably considered additional factors, including ZEV infrastructure, in projecting ZEV deployment in its proposal. Recent analyses indicate that buildout of EV infrastructure and the electric grid distribution capacity are sufficient to support EPA's proposed standards. Significant federal, state, and private investments are already being made to grow EV infrastructure. And states and utilities are initiating processes to ensure adequate infrastructure to meet demand. [EPA-HQ-OAR-2022-0829-0786, pp. 51-52]

A. Federal, state, and private investments support fast-growing infrastructure.

Investment in the infrastructure required to support rapid ZEV proliferation has already begun. Federal, state, and private parties have directed substantial resources into developing widespread charging networks and driving technological innovation. Together, these investments are laying the groundwork for protective standards. [EPA-HQ-OAR-2022-0829-0786, pp. 51-52]

In 2022, President Biden publicly committed to building out a national network of 500,000 EV chargers by 2030.123 The federal government has made significant investments towards building the infrastructure necessary for a ZEV future with The Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL). Both laws are putting billions of dollars towards building out charging networks and updating the grid to support the transition to ZEVs. [EPA-HQ-OAR-2022-0829-0786, pp. 51-52]

123 Fact Sheet: Biden-Harris Administration Announces New Standards and Major Progress for a Made-in-America National Network of Electric Vehicle Chargers, https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/.

Multiple provisions of the IRA will boost the development of infrastructure to support light-duty ZEVs. The Alternative Fuel Refueling Property Credit will directly fund charging infrastructure in low-income and rural areas.124 Qualifying businesses and individuals can be reimbursed for up to 30 percent of the cost of installing charging equipment in these areas, substantially reducing the costs of this equipment.125 The Congressional Joint Committee on Taxation estimates this credit will cost almost $2 billion over its lifetime, demonstrating the sizeable impact it will make in driving additional investments from private parties.126 The Advanced Energy Project Credit allocates $10 billion for facilities manufacturing advanced energy technologies, which includes manufacturing of charging and refueling infrastructure for ZEVs as well as grid modernization components.127 Other provisions fund grants for infrastructure buildout in nonattainment areas,128 and fund improvements to electricity generation and transmission.129 [EPA-HQ-OAR-2022-0829-0786, p. 52]

124 Inflation Reduction Act of 2022, P.L. 117-169, § 13404.

125 Inflation Reduction Act of 2022, P.L. 117-169, § 13404.

126 Joint Committee on Taxation, Estimated Budget Effects of the Revenue Provisions of Tile I—Committee on Finance, of an Amendment in the Nature of a Substitute to H.R. 5376, “An Act to Provide for Reconciliation Pursuant to Tile II of S. Con. Res. 14,” as Passed by the Senate on August 7.2-22, and Scheduled for Consideration by the House of Representative on August 12, 2022, JCX-18-22, https://www.jct.gov/publications/2022/jcx-18-22/.

127 Inflation Reduction Act of 2022, P.L. 117-169, § 13501.

128 Inflation Reduction Act of 2022, P.L. 117-169, § 60101.

129 Inflation Reduction Act of 2022, P.L. 117-169, § 50144, 50145, 50151, 50152.

The BIL is another source of considerable federal investment in infrastructure development. Through its National Electric Vehicle Infrastructure (NEVI) and Charging and Fueling Infrastructure (CFI) discretionary grant programs, the law allocates $7.5 billion in funding explicitly towards building out ZEV charging and refueling infrastructure.130 The NEVI program directs the Federal Highway Administration (FHWA) to provide funding to states to deploy EV charging stations to build an interconnected and reliable charging network. The FHWA has already announced its first set of plans under the program, which includes investment in all 50 states plus the District of Columbia and Puerto Rico.131 This first round of NEVI investment is set to bring EV charging to 75,000 miles of highway across the country.132 The

CFI program provides additional funding for FHWA administered grants to state and local authorities for development of publicly accessible charging infrastructure.133 [EPA-HQ-OAR-2022-0829-0786, pp. 52-53]

130 Infrastructure, Investment and Jobs Act of 2021, P.L. 117-58, 135 Stat. 445, 1421. Infrastructure, Investment and Jobs Act of 2021, P.L. 117-58, 135 Stat. 445, 1421.

131 U.S. Department of Transportation, Historic Step: All Fifty States Plus D.C. and Puerto Rico Greenlit to Move EV Charging Networks Forward, Covering 75,000 Milles of Highway (Sep. 27, 2022), https://www.transportation.gov/briefing-room/historic-step-all-fifty-states-plus-dc-and-puerto-rico-greenlit-move-ev-charging.

132 U.S. Department of Transportation, Historic Step: All Fifty States Plus D.C. and Puerto Rico Greenlit to Move EV Charging Networks Forward, Covering 75,000 Milles of Highway (Sep. 27, 2022), https://www.transportation.gov/briefing-room/historic-step-all-fifty-states-plus-dc-and-puerto-rico-greenlit-move-ev-charging.

133 U.S. Department of Transportation, Biden-Harris Administration Opens Applications for First Round of $2.5 Billion Program to Build EV Charging in Communities & Neighborhoods Nationwide, https://www.transportation.gov/briefing-room/biden-harris-administration-opens-applications-first-round-25-billion-program-build.

On top of these programs, the BIL authorized more than $40 billion combined for the Congestion Mitigation & Air Quality Improvement Program, National Highway Performance Program, and Surface Transportation Grant Block Program.134 These programs are not dedicated exclusively to charging, but constructing and installing charging infrastructure is an eligible activity under each of them. Additional funding from the BIL provides grants to states and local governments for reducing transportation carbon pollution, which will fund additional infrastructure investments.135 [EPA-HQ-OAR-2022-0829-0786, pp. 52-53]

134 Infrastructure, Investment and Jobs Act, P.L. 117-58, § 11115.

135 Infrastructure, Investment and Jobs Act, P.L. 117-58, § 11403.

The ambition of these federal investments is being matched by infrastructure funding in many states, especially in states that have adopted, or are planning to adopt, California's Advanced Clean Cars II (ACC II) rule. For example, the California Energy Commission's (CEC) Clean Transportation Program announced it plans to invest $900 million for light-duty charging infrastructure through 2026.136 The CEC estimates the plan will result in 90,000 new EV chargers across the state, more than doubling the state's existing network and helping it meet its goal of having 250,000 chargers by 2025.137 Colorado has likewise made significant investments in preparing for a transition to ZEVs. The state's Charge Ahead Colorado Program provides grants that fund 80% of the cost of charging stations up to certain maximums based on type of charging equipment.138 [EPA-HQ-OAR-2022-0829-0786, p. 53]

136 California Energy Commission, CEC Approves $2.9 Billion Investment for Zero-Emission Transportation Infrastructure (Dec. 14, 2022), https://www.energy.ca.gov/news/2022-12/cec-approves-29-billion-investment-zeroemission-transportation-infrastructure.

137 Id.

138 Colorado Energy Office, Charge Ahead Colorado, https://energyoffice.colorado.gov/charge-ahead-colorado.

B. Independent analysis commissioned by EDF shows existing and announced public charging infrastructure is on track to support increased passenger vehicle electrification.

A new study by WSP for EDF submitted along with our comments summarizes the existing public charging infrastructure in the U.S., the future public charging infrastructure needs based on EPA's proposal, and quantifies the announced EV charger deployment and investment and how it compares to those needs.139 In this analysis, WSP conducted an extensive survey of charger deployment announcements to quantify the extent of the government and industry investment in public charging in the U.S. To the best of our knowledge, this is the first analysis that has attempted to quantify both the current state of the market and the cumulative impacts of future investments. [EPA-HQ-OAR-2022-0829-0786, pp. 53-54]

139 U.S. Public EV Charging Infrastructure Deployment: Announced investment will rapidly expand publicly available charging, WSP for EDF (June 2023), https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/WSP-US-Public-EV-Charging-Infrastrcuture-Deployment-July-2023.pdf (Attachment U).

The analysis finds that as of June 2023 there were 58,000 existing public EV charging stations in the U.S. These stations host 155,700 ports that provide electricity to vehicles – 2% are Level 1, 78% are Level 2 and 20% are DCFC chargers (Figure 17). [EPA-HQ-OAR-2022-0829-0786, pp. 53-54]

[See original attachment for Figure 17: U.S. Public EV Charging Infrastructure] [EPA-HQ-OAR-2022-0829-0786, pp. 53-54]

Source: U.S. Department of Energy, Alternative Fuel Database (June 19, 2023) [EPA-HQ-OAR-2022-0829-0786, pp. 53-54]

WSP estimates the number of public chargers that will be added to the current network over the next five years based on public announcements and commitments made by federal, state, and private organizations. Since 2021, based on a conservative estimate considering only the most concrete announcements, more than $21.5 billion in investments have been announced, which will result in over 800,000 new charger ports coming online before 2030 (Table 14). [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

[See original attachment for Table 14: Announced Public Charging Ports and Investments] [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

Source: WSP, U.S. Public EV Charging Infrastructure Deployment

The pace of charger announcements increased markedly since the passage of the Inflation Reduction Act, representing 4.5 times the number of current public chargers, and underscoring the impact of recent federal policy in spurring the expansion (Figure 17). [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

[See original attachment for Figure 17: EV Charger Announcement Timing] [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

Source: WSP, U.S. Public EV Charging Infrastructure Deployment [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

In the Draft RIA for the proposal, EPA estimates that approximately 1,075,000 new Level 2 chargers and 135,000 new DCFC public chargers will be needed by 2030 to accommodate increasing numbers of EVs on the road, as a result of BAU and the proposed standards.140 WSP's analysis finds that existing and already announced public EV charger deployments will provide at least 70% of the public chargers needed in the U.S. by 2030 under EPA's current proposed rule. For DCFC, existing and announced chargers account for more than 100% of the needed DCFC chargers past 2032. [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

140 U.S. Environmental Protection Agency (EPA) Multi-Pollutant Emissions Standards for Model Year 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis, April 2023, Figure 5-15.

When WSP further accounted for less concrete announcements, by assuming 25% of these softer announcements would materialize, along with 50% of unawarded grants resulting in previously unaccounted for charging ports, the analysis found announced investments would result in the deployment of well over 100% of the required chargers in 2030, 1.7 million ports. [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

The combination of market forces and incentives from recent federal policy have attracted a wide array of players to invest in public charger deployments. The analysis identified investments by 29 state governments, 18 charge network providers, 10 retailers, 7 vehicle manufacturers, 6 toll road operators, along with utilities, truck and service station operators, and fleet owners. [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

For example, Walmart announced it will install publicly available DCFC chargers at all of its retail locations in the U.S. by 2030 – and nearly 90% of Americans live within 10 miles of a Walmart.141 Hertz and bp announced plans to build out a national network of EV fast charging infrastructure to accelerate the adoption of electric vehicles, bringing charging infrastructure to Hertz locations across America, including major cities such as Atlanta, Austin, Boston, Chicago, Denver, Houston, Miami, New York City, Orlando, Phoenix, San Francisco, and Washington, DC.142 Hertz's goal is to make one-quarter of its fleet electric by the end of 2024 while bp aims to invest $1 billion in EV charging in the US by 2030. Pilot Company, General Motors, and EVgo have partnered to build a coast-to-coast network of 2,000 high power 350 kW fast chargers at Pilot and Flying J travel centers along American highways, with the first 200+ chargers expected to be available for use by drivers in 2023.143 And General Motors and FLO announced a collaborative effort with dealers to install up to 40,000 public Level 2 EV chargers in local communities by 2026 through GM's Dealer Community Charging Program.144 As shown in Figure 18, WSP found that these private sector deployments along with NEVI and other nationwide grant programs would dramatically expand the EV charging network nationwide. [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

141 Vishal Kapadia, Leading the Charge: Walmart Announces Plan to Expand Electric Vehicle Charging Network (Apr. 6, 2023), https://corporate.walmart.com/newsroom/2023/04/06/leading-the-charge-walmart-announces-plan-to-expand-electric-vehicle-charging-network/

142 Fact Sheet: Biden-Harris Administration Announces New Standards and Major Progress for a Made-in-America National Network of Electric Vehicle Chargers (Feb. 15, 2023), https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/.

143 Id.

144 Id.

[See original attachment for Figure 18: Geographic Distribution of Announced EV Charger Deployments and Investments] [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

Source: WSP, U.S. Public EV Charging Infrastructure Deployment [EPA-HQ-OAR-2022-0829-0786, pp. 54-57]

ii. EV charging has the potential to benefit the grid through managed charging and other programs.

Multiple studies have found that through managed charging, increases in EV adoption and charging will not meaningfully increase peak demand on the grid. In their study investigating the grid impacts of BEV adoption in Dallas and New York City, Needell, Wei, and Trancik found that "delayed home charging nearly eliminates the increase in the evening demand for electricity…even for BEV penetration levels well over 50%." Additionally, they found that "workplace charging emerges as a simple and effective solution for abating both the peak increase and the over-supply of [solar generation]."162 A 2019 article in IEEE Electrification Magazine found that through managed charging, the peak demand from EVs in California could be cut to one-eighth of the size without managed charging leaving the increases within the margins for most residential feeders.163 [EPA-HQ-OAR-2022-0829-0786, p. 60]

162 Needell et al., Strategies for beneficial electric vehicle charging to reduce peak electricity demand and store solar energy, Cell Reports Physical Science 4, 101287 March 15, 2023 https://doi.org/10.1016/j.xcrp.2023.101287 (Attachment V).

163 Jonathan Coignard et al., Will Electric Vehicles Drive Distribution Grid Upgrades?: The case of California. 2019. IEEE Electrification Magazine, 10.1109/MELE.2019.2908794.

Organization: Fermata Energy

V2X bidirectional charging is a win-win-win investment: many benefits accrue: [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

- Achieves EPA's environmental goals. Just like stationary storage, V2X bidirectional charging platforms can reduce carbon and criteria pollutant emissions from generators by shifting electricity consumption to the cleanest hours of the day and removing the need for dirty thermal peaker electricity generation. However, V2X is more cost-effective than stationary storage, as ratepayers don't have to pay for purchase of the EV battery and can accelerate the renewable transition. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

- Provides grid services. With V2X bidirectional charging, utilities gain a low-cost energy storage resource to help integrate renewable energy into the electric grid by shifting energy, providing resource adequacy, and ancillary services (Figure 3). For example, modeling by the CPUC currently projects 14,700 MW of new energy storage is needed in CA by 2032 to support the integration of renewables but only 2,185 MW is operational today.9,10 V2X, with supportive policies, can provide many thousands of MW by 2030. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

9 CPUC Approves Long Term Plans To Meet Electricity Reliability and Climate Goals, CPUC, 2022 (Link: https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-approves-long-term-plans-to-meet-electricity-reliability-and-climate-goals)

10 Infographic: Q4'21 US Battery Storage by the Numbers, S&P Global, 2022 (Link: https://www.spglobal.com/marketintelligence/en/news-insights/blog/infographic-q4-21-us-battery-storage-by-the-numbers)

[See original attachment for Figure 3 -Grid services and value from different Vehicle-Grid-Integration technologies]11 [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

11 California Energy Commission, March 2019, Distribution System Constrained Vehicle-to-Grid Services for Improved Grid Stability and Reliability, (Link: https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-027.pdf) Figure 42

- Lower vehicle ownership costs. EV owners can earn money by selling electricity back to the grid, significantly cutting the cost of vehicle ownership. Offsetting the cost of owning and maintaining an EV supports equitable access to EVs, particularly those EVs in the used car market, such as the low-income EV driving community. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

- Increased resiliency. Unidirectional charging is a grid load. V2X bidirectional charging cost-effectively supports grid resilience. During blackouts and extreme weather events, such as Public Safety Power Shutoffs (PSPS) in CA, EV owners can power their homes, businesses, and critical infrastructure. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

- Ratepayer benefits. EV adoption has already been shown to significantly benefit utility ratepayers and V2X technology can further those benefits.12 For example, a 2018 CEC study projects $1 billion in annual ratepayer benefits if 50% of chargers were V2X capable.13 V2X technology also improves driver economics which would likely drive further EV adoption and even greater ratepayer benefits. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

12 Electric Vehicles Are Driving Electric Rates Down, Synapse Economics, 2019, Electric Vehicles Benefit All Utility Ratepayers, Forbes, 2019 (Link: https://www.forbes.com/sites/jeffmcmahon/2019/02/01/electric-vehicles-benefit-all-utility-customers-as-much-as-their-owners/)

13 Distribution System Constrained Vehicle-to-Grid Services for Improved Grid Stability and Reliability, (Link: https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-027.pdf) CEC 2018, Table 8, High PEV Forecast Scenario

The promise of bidirectional charging (AC or DC) to address air pollution, GHG emissions, and challenges to the electric grid is very significant with BEVs and PHEVS in medium-and light-duty vehicles. While we understand the desire by the EPA to simplify the regulation and reduce the use of bonus multiplier credits, we believe a small bonus credit in this regulation is justified and needed to unlock this technology because of the large emissions reduction benefits and other grid services enabled by bidirectional charging as described in Section II above. The EPA has a long history of providing multiplier credits to emerging technologies and we strongly encourage the EPA to adopt in the final regulation a modest multiplier credit for light-duty and medium-duty passenger vehicles that appropriately phases out over time. This multiplier should apply to automakers with vehicles that have on-board AC inverters for bidirectional charging and for vehicles that can show they have integrated with many brands of off-board DC fast chargers. This approach will not only will help enable the emerging V2G industry, but it will also help consumers achieve lower operating costs,16 reduce GHG and traditional pollutants from fossil fueled power plants by shifting electricity use to renewable energy in the cleanest hours of the day, and reduce the need for high-emitting peaker plants. V2G also provides a zero-emission, lower cost alternative to high-emitting portable back-up generators, and saves utility ratepayers money with a low-cost resource as compared to battery stationary storage. [EPA-HQ-OAR-2022-0829-0710, p. 8]

16 See footnote 11

By implementing our recommendations, the EPA has a unique opportunity to help the emerging V2G industry, consumers, and the power generation and transportation industries. Fermata Energy appreciates the opportunity to provide these comments and welcomes a more in-depth dialogue on this and offers itself as a resource on V2X topics for EPA. [EPA-HQ-OAR-2022-0829-0710, p. 8]

Organization: Ford Motor Company

Ford is enthusiastic and optimistic about the ICE-to-ZEV transition, and we are already delivering electrified light-and medium-duty EVs at scale. While we remain optimistic, we are also mindful of the considerable challenges and uncertainties that lie ahead. The pace of electrification has been and may continue to be limited by many factors and forces, many of which are outside the control of vehicle manufacturers. These include the availability of critical minerals for battery manufacturing, the need to allocate finite resources between EV programs and efforts toward incremental reductions in emissions from ICE vehicles, consumer demand especially as we proceed beyond early-adopters to the majority of new vehicle purchasers, economic turbulence, geopolitical events, and, of course, electric vehicle charging infrastructure. [EPA-HQ-OAR-2022-0829-0605, pp. 2-3]

Charging infrastructure is not currently adequate to support even a fraction of the higher EV population that the US will have in the coming years. While federal and state programs are improving the availability of charging infrastructure, there will continue to be hesitation from many prospective EV buyers due to real (and perceived) lack of adequate infrastructure, and that will limit EV growth. [EPA-HQ-OAR-2022-0829-0605, p. 7]

Organization: Fred Reitman

No charging infrastructure. Cars and trucks run low on gasoline and need refueling. Electric batteries run down and need recharging. Here the similarities end. The infrastructure to refuel gasoline and diesel-powered engines has been in place for over half a century so locations to quickly refuel are abundant in urban areas and even in rural areas are sufficient. By contrast there are comparatively few on-road locations to recharge EV batteries. The batteries take a long time to recharge, and recharging cannot even begin until vehicles already in line have charged. Wait times can easily exceed an hour. People are busy and don’t have the time to sit and wait. They have to get to work. They have to pick up the kids. And many other things. The idea of mandating EVs before there are enough locations to recharge batteries is not acceptable. [EPA-HQ-OAR-2022-0829-0432, p. 1]

Electric grid cannot support this. The electric grid is remarkable engineering. But there is little reserve capacity and the grid is overtaxed. EV charging will stress the grid and is sure to result in brownouts and blackouts, which are dangerous during winter when power is needed for heating homes. Brownouts and Blackouts are already a problem in some states. This rule if finalized would only make the problem worse. [EPA-HQ-OAR-2022-0829-0432, p. 1]

Organization: GROWMARK, Inc.

Our system's approach to fuel and energy business is to provide the fuel and energy sources that our customers want and use. We do not prefer or advocate for one technology over the other, but we feel that the proposed rule will cause a tremendous burden on farmers and rural Americans, where the lack of charging infrastructure will make the conversion to EVs at the rates necessitated by this proposed rule extremely difficult. Furthermore, current EVs lack the capabilities that internal combustion engine (ICE) vehicles currently have, which are vital for farmers as they work to feed our nation and the world. Additionally, we feel that the prioritization this proposed rule places on EVs ignores the tremendous potential of biofuels as a low-carbon fuel source, especially given the current realities of carbon intensity for EVs and biofuels. [EPA-HQ-OAR-2022-0829-0560, p. 1]

Lack of Charging Infrastructure in Rural Areas

Rural America lacks the charging infrastructure needed to support the adoption of EVs at the level that would be required by these standards. According to the most recent trend report from the National Renewable Energy Laboratory, rural areas (which make up almost 93% of U.S. land area) have the smallest number of EV charging ports by a wide margin, and it is the smallest category in terms of growth of EV charging ports as well.2 Rural Americans would therefore be expected to travel much further distances and face much greater burdens to access public charging infrastructure for EVs. [EPA-HQ-OAR-2022-0829-0560, pp. 1-2]

2 Brown, A., Cappellucci, J., White, E., Heinrich, A., & Cost, E. (2023, May). Electric vehicle charging infrastructure trends from the alternative fueling station locator: Fourth quarter 2022. National Renewable Energy Laboratory.
https://afdc.energy.gov/files/u/publication/electric_vehicle_charging_infrastructure_trends_fourth_quarter_2022.pdf

Organization: Growth Energy

In contrast, it is not as simple to convert to EV technology. Doing so at scale requires massive investments in both charging infrastructure and the electric power sufficient to support massive new electricity demand. Developing sufficient charging infrastructure can be difficult in rural areas and in locations where there are competing land uses. And developing additional electric power faces multiple challenges—the country will need significantly more electric capacity and, for EVs to have their intended GHG reduction benefits, that additional electric generation will need to be relatively low-carbon. For example, converting vehicles used in the Appalachian region rapidly to EVs and powering them by increasing loads on existing coal-fired power plants would not have the significant benefits claimed by the proposed rule. [EPA-HQ-OAR-2022-0829-0580, p. 6]

Organization: HF Sinclair Corporation

c. The Proposed Rule Is Not Technologically Feasible Within the Required Timeframe

The Clean Air Act does not direct EPA to drive emission standards for regulated pollutants to zero as quickly as possible. Rather, under section 202(a)(2), EPA must ensure that any standards are issued with sufficient lead time "to permit the development and application of the requisite technology, given appropriate consideration to the cost of compliance within such period."40 For EPA's aggressive PEV mandates, the "requisite technology" not only includes manufacturing the vehicles themselves but also the underlying charging infrastructure necessary to power these vehicles. Here, EPA has not demonstrated that sufficient charging stations, utilities, and other infrastructure needed to support the deployment of an electrified fleet within the Proposed Rule's contemplated timeline is possible. Without the ability to charge the PEVs EPA will be requiring OEMs to produce, the Proposed Rule is nonsensical. Furthermore, according to a recent study, 23% of 657 public charging stations in the San Francisco Bay area were broken, and a big charging company, ChargePoint, had an operational success rate of just 61%.41 [EPA-HQ-OAR-2022-0829-0579, pp. 10-11]

40 42 U.S.C. § 7521(a)(2).

41 NYT, "A Frustrating Hassle Holding Electric Cars Back: Broken Chargers," (Aug 16, 2022), available at https://www.nytimes.com/2022/08/16/business/energy-environment/electric-vehicles-broken-chargers.html.

Take Virginia as a representative example highlighting the gap between the Proposed Rule's required infrastructure and that which is actually feasible. According to a report by the Consumer Energy Alliance, attached herein, Virginia currently has 7.6 million light-duty vehicles on the road. Assuming Virginia transitions to 100% PEV by 2035, the state would need an additional 35.5 billion kWh of generation – equivalent to the generation required to power almost 70% of the homes in the state. And to maximize the zero-emission benefit of PEVs, this generation would need to come from zero-emitting sources such as nuclear or renewables (ignoring, for a moment, the energy intensity required to construct these resources). But 35.5 billion kWh corresponds to either 4 new nuclear reactors in the state or over 450,000 acres of off-shore windfarms. Neither of which is remotely feasible under the Proposed Rule.42 [EPA-HQ-OAR-2022-0829-0579, pp. 11-12]

42 CONSUMER ENERGY ALLIANCE, "Freedom to Fuel: Consumer Choice in the Automotive Marketplace," August 2023 [hereinafter, "CEA Study"]. Nor has EPA shown that the electric grid itself can meet this increased demand. As highlighted by the North American Electric Reliability Corporation ("NERC"), certain high-risk areas do not today meet resource adequacy criteria, posing significant concern about adding even more demand to the grid.43 This risk is further exacerbated by EPA's new carbon dioxide standards for fossil-fuel fired power plants, proposed shortly after the Proposed Rule and not otherwise considered in the Proposed Rule, that may rapidly phase out affordable base-load generation.44 Far from what the Proposed Rule requires, the infrastructure upgrades to support a U.S. LD fleet that is only 7% PEV would require an additional $75-125 billion, which would be passed on from utilities directly to customers.45 Today, energy insecure households, defined as those that are unable to adequately meet basic household energy needs because of cost, pay 26 cents more per square foot in energy costs as compared to energy secure households.46 This disparity will only increase as infrastructure upgrades to accommodate the increased load from PEVs is passed along to ratepayers.

43 North American Electric Reliability Corporation, 2022 Long-Term Reliability Assessment (Dec. 2022), 21, available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf (indicating that increased demand projections may lead to reliability concerns for the electric grid, especially as dual-peaking or seasonal peaking times change with increased electrification).

44 See Proposed Rule, “New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule,” 88 Fed. Reg. 33,240 (May 23, 2023).

45 CEA Study at 8 (noting that the average price to consumers in New Mexico would be $117-195 per year).

46 EIA, “U.S. energy insecure households were billed more for energy than other households,” (May 30, 2023) available at https://www.eia.gov/todayinenergy/detail.php?id=56640.

Absent a comprehensive understanding of the interplay between PEV manufacturing and charging infrastructure, vehicle manufacturers are left in vulnerable position. If the underlying infrastructure cannot support the influx of PEVs, or if consumers perceive the requisite infrastructure is not available or reliable, consumers will simply not purchase PEVs in the quantities requires for OEMs to meet the proposed standards. Case in point, Toyota has publicly stated that given the three major barriers to widespread PEV adoption—1) the availability of sufficient critical minerals; 2) a sufficient nation-wide charging infrastructure; and 3) overall affordability—“the most immediate way to reduce carbon emissions is through a mix of electrified options, which includes battery electric, plug-in hybrid, and hybrid vehicles.”47 [EPA-HQ-OAR-2022-0829-0579, pp. 11-12]

47 Forbes, “Toyota Says Public Charging Not Ready for Pure EVs,” (May 20, 2023) available at https://www.forbes.com/sites/brookecrothers/2023/05/20/toyota-admits-inconvenient-truth-about-electric-vehicle-ev-charging-time-prius-prime-rav4-prime/?sh=2b7ed7ab38b1.

As mentioned above, charging capability is a key apprehension for nearly half the U.S. consumer market. 66 Importantly, successful implementation of the Proposed Rule depends on consumer choice as much as depends on technological improvements. But, in California as an example, consumer discontinuance occurs at a rate of 20% for plug-in hybrid electric and 18% for PEVs—once again based on the dissatisfaction with the convenience or availability of charging.67 [EPA-HQ-OAR-2022-0829-0579, pp. 14-16]

66 Phillipp Kampshoff, et al., McKinsey & Co., “Building the electric-vehicle charging infrastructure America needs” (Apr. 18, 2022) available at https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs.

67 See EPA-HQ-OAR-2022-0829-0077, Abstract (Content restricted for copyright), available at https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-0077.

Organization: Hyundai Motor America

We are also concerned the sheer scale of BEV penetration proposed through MY 2030 may not be supported by the current energy grid. In their 2030 National Charging Network report, the National Renewable Energy Laboratory found that 26-35 million electric charging ports will be necessary to support the estimated 30-42 million PEVs expected to be on the roads by 2030 nationwide. They found that affordable home charging will be the main energy source but that it “must be complemented by reliable public fast charging.” Assuming a mid-point of 33 million PEVs, they specifically estimate that 2.68 million private Level 1 and Level 2 charging ports will be needed at homes, workplaces, and multi-unit dwellings (“MUDs”), 1 million public Level 2 charging ports will be needed near homes and workplaces which include high-density neighborhoods, office buildings and retail outlets, and 182,000 public fast charging ports along highway corridors and in local communities.11 Per the U.S. Department of Energy Alternative Fuels Data Center, there are currently 54,078 public charging stations comprised of both Level 2 and direct current fast charging ("DCFC").12 Assuming roughly that each station has 2 ports (this varies by charging station), there are currently 108,156 charging ports showing a need for 891,844 Level 2 charging ports in 7 years. [EPA-HQ-OAR-2022-0829-0599, pp. 3-4]

11 "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicles Charging Infrastructure," Page 6, National Renewable Energy Laboratory, June 27, 2023.

12 Alternative Fuels Data Center, Electric Vehicle Charging Station Locations, Accessed June 28, 2023.

In addition, state readiness to successfully implement the ACC II ZEV Regulation remains an outstanding question. We are concerned there simply is not enough time to delivery key infrastructure to support the ACC II ZEV Regulations in Section 177 States ("S177 States"). Many of the current S177 States that have adopted the ACC II ZEV Regulation lack the necessary charging infrastructure to support even the MY 2026 ZEV requirements. Further, several states are on track to become first-time S177 States and are significantly even farther behind in terms of infrastructure and other supportive ZEV policies to ensure regulatory success. To the degree the No Action case assumes equal success of the ACC II ZEV Regulations among S177 States, it overlooks the realities on the ground. These assumptions carry forward risk into the Proposed Rule with an overly ambitious objective for BEV penetration ramp from the current starting point nationwide of under five percent BEV sales today.13 For purposes of forecasting the No Action case, we caution against equating compliance credits 1:1 with BEV penetration. Notably, the ACC II ZEV Regulation includes PHEVs and FCEVs – coincidentally consistent with Executive Order 14037. These are just a few assumptions we encourage the EPA to reconsider in its No Action case. [EPA-HQ-OAR-2022-0829-0599, pp. 3-4]

13 Experian EV Registration database, 2022 Calendar Year through Q1 2023 Calendar Year. Accessed May 10, 2023.

State Investment and Readiness is Paramount.

We appreciate the Administration's commitment to supporting EV infrastructure development through the enactment of the Infrastructure Investment and Jobs Act, Pub. L. 117-58 (enacted 2021). However, infrastructure sufficient to support the BEV penetration levels in the Proposed Alternative would have required significant funding and planning well before 2021. Long lead times to approve and build federal and state EV infrastructure represent the biggest barrier to establishing a robust national PEV charging network by 2030. A significant percentage of U.S. drivers continue to be apprehensive about BEVs citing range anxiety and charge time concerns, underscoring the urgent need to vastly expand charging infrastructure – including significant public investments in DCFC. To meet the BEV penetration rates in the Proposed Alternative, we will need to increasingly attract customers with limited or no at home charging capabilities. For these reasons, extensive national charging availability presents perhaps the most daunting consumer hurdle to PEV adoption. [EPA-HQ-OAR-2022-0829-0599, pp. 4-5]

At Hyundai we are proud to offer our customers two-year complimentary free charging through Electrify network of over 3,000 EV chargers, coast-to-coast.14 Hyundai's Electrify America partnership not only results in customer savings but also helps to ease range anxiety. Such infrastructure efforts and incentives by automakers are important to demonstrate commitment to PEV technology and to our customers but they are no substitute for the larger scale solutions that must come from federal and state acceleration of these networks to enable the bold vision of the Administration. Non-S177 States are particularly important, not only with regard to infrastructure but also for financial assistance (e.g., state incentives for vehicles and charging) and PEV consumer education. All these policies must work in lock step to achieve EPA's goal. To date there is not enough investment, planning, and coordination to achieve the BEV targets set forth in the Proposed Alternative. [EPA-HQ-OAR-2022-0829-0599, pp. 4-5]

14 Hyundai's Electrify America Program.

Organization: Illinois Corn Growers Association

Enormous advances have been made in electric vehicle technology in the last two decades and there is strong auto industry commitment to eventually replace internal combustion engine powered vehicles with electric ones. There are, however, still technological and economic challenges in creating products that meet consumer expectations. In addition, there are many things that must happen to support electric vehicles, many of which are outside the control of automakers. [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

These include: [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

-Increasing the electrical generating capacity in the U.S to provide the power to replace the energy now supplied by gasoline.

-Switching the source of energy used to generate this electricity from fossil fuels to zero-carbon sources such as wind, solar, nuclear and hydroelectric.

-Upgrading the electrical grid to move this additional power from the point of generation to the point of vehicle recharging.

-Installing recharging stations in nearly every home with an electric vehicle and enough public charging stations to give electric vehicles the same utility as the gasoline powered vehicles they are intended to replace.

-Securing enough raw materials to build the large batery packs needed to give electric vehicles the range consumers demand.

-Upgrading the nation's roads, bridges and parking structures to ensure they can absorb the extra weight of inherently heavier electric vehicles. [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

Thus, even if in the next eight years automakers, suppliers and retailers can retool their businesses to supply an estimated 7.5 million new vehicles in 2032 and beyond, it is far from assured that: [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

-The marketplace is willing to buy that many vehicles in spite of their higher purchase cost, charging requirements, limited utility and extremely high batery replacement costs.

-The mines can extract enough raw materials to build the bateries necessary to build these vehicles, especially since it is expected that electric utilities will be buying huge bateries made of the same materials to deal with the intermit nature of wind and solar energy.

-The electric utilities can provide enough electricity.

-The electric grid has been upgraded to handle the new demand, again considering that not only vehicles but residential and commercial heating systems, railroads and even ships will be converting from fossil fuels to electricity. [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

Given the uncertainty that automakers can meet the proposed Multi-Pollutant Emissions Standards through electric vehicles alone, what other new technologies are available for compliance? [EPA-HQ-OAR-2022-0829-0756, p. 3]

Organization: Illinois Farm Bureau (IFB)

These independent comments shared the following sentiments to USEPA: [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

- “Rural America does not now have any of the infrastructure to implement this proposed rule, nor will it ever have the infrastructure to support an all-electric fleet. Because of the distances we have to travel to access goods and services and the small population base, it will never be economically feasible to put the needed charging infrastructure in place.”
-“Not enough thought has gone into the negative side of EV vehicles. So many resources will have to be put into the infrastructure of new charging areas while there is already a system in place. With the unreliability of electricity in rural areas, EVs will put many in danger during times of emergency. Rural areas have many more miles that need to be driven to get anywhere. Please put extra thought into how this affects everyone, not just cities.” [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

-“If thought through, individuals would realize that EVs are not environmentally efficient nor cost-effective. The mining of resources for batteries is not environmentally friendly.” [EPA-HQ-OAR-2022-0829-0532, pp. 1-2]

Organization: International Council on Clean Transportation (ICCT)

EPA’s proposed rule, along with sustained commitments will help build out the charging infrastructure needed to support accelerated electrification.10 Norway – the world’s electric vehicle sales share leader – achieved nearly 80% EV sales in 2022 with one public charger for every 26 EVs.11 Significant resources are already being dedicated to charging in the United States, including the $7.5 billion allocation from the IIJA as well as several billions of dollars in power utility and private sector investment.12 For example, British Petroleum announced plans to invest $1 billion in EV charging in the U.S. by 2030.13 Automakers are investing too – GM, working with its dealers, aims to install up to 40,000 public charging stations across the U.S. and Canada.14 Globally, Bloomberg New Energy Finance expects $100 billion to be spent to grow charging infrastructure in the next 3 years alone.15 In parallel, state infrastructure planning is underway, with all 50 states, DC, and Puerto Rico submitting and receiving approval for their National Electric Vehicle Charging Network plans in 2022.16 New research by WSP and EDF find that the expected growth in public charging from announced deployments will provide at least 70% of the infrastructure needed by 2030 to meet the BEV projections in EPA’s proposal; for DC fast chargers, the announced investments sum up to over 100% of the amount needed by 2030.17 These announcements and investments indicate that the pace and scale of U.S. charging infrastructure deployment is on track to support the projected BEV market shares in EPA’s proposal. [EPA-HQ-OAR-2022-0829-0569, pp. 8-9]

10 Searle, S., Kodjak, D., and Slowik, P. (2023, April 26). Infrastructure and supply chains won't hold up EPA's proposed light and medium-duty vehicle standards. International Council on Clean Transportation. https://theicct.org/infrastructure-and-supepas-proposed-ldv-mdv-standards-apr23/

11 Johnson, P. (2023, January 2). This is the Norway – nation hits record EV share in 2022 on its way to ending gas car sales. Electrek. https://electrek.co/2023/01/02/norway-hits-record-ev-share-in-2022/; Kok, I., and Hall, D. (2023). Battery electric and plug-in hybrid electric vehicle uptake in European cities. International Council on Clean Transportation. https://theicct.org/publication/bev-phev-european-cities-mar23/

12 The White House. (2023a). Fact sheet: Biden-Harris administration announces new standards and major progress for Made-in-America National network of Electric vehicle chargers. https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/; Electric utility filings. Atlas EV Hub. https://www.atlasevhub.com/materials/electric-utility-filings/

13 British Petroleum (2023, February 15). BP plans to invest $1 billion in EV charging across US by 2030, helping to meet demand from Hertz's expanding EV rentals. https://www.bp.com/en_us/united-states/home/news/press-releases/bp-plans-to-invest-1-billion-in-ev-charging-across-us-by-2030-helping-to-meet-demand-from-hertzs-expanding-ev-rentals.html

14 General Motors. (2022, December 7). GM advances dealer community charging program. https://news.gm.com/newsroom.detail.html/Pages/news/us/en/2022/dec/1207-charging.html

15 Bloomberg NEF. (2023, January 20). Next $100 Billion EV-Charger spend to be super fast. https://about.bnef.com/blog/next-100-billion-ev-charger-spend-to-be-super-fast/

16 U.S. Department of Transportation. (2022, September 27). President Biden's Bipartisan Infrastructure Law provides $5 billion to help States install EV chargers along interstate highways. https://highways.dot.gov/newsroom/historic-step-all-fifty-states-plus-dc-and-puerto-rico-greenlit-move-ev-charging-networks

17 U.S. Public Electric Vehicle (EV) Charging Infrastructure Deployment, WSP for EDF (July 2023). [Link forthcoming]

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

B. Charging Infrastructure

Adequate charging infrastructure is crucial to support electrification of the auto industry. The EPA must incorporate a more realistic projection of charging infrastructure build-out in the proposed standards. We are concerned that the EPA relies too heavily on the projected federal investment that is intended to support ZEV infrastructure,22 and instead, should take the sentiment of vehicle manufacturers into greater consideration. The Alliance for Automotive Innovation has made clear that current charging infrastructure is not enough to support compliance with the proposed standards.23 According to the DOE's most recent report on EV charging infrastructure trends the rate of charging infrastructure deployment is not paced to meet the Biden Administration's goal of 500,000 charging ports by 2030.24 This uncertainty highlights the need for flexibility. [EPA-HQ-OAR-2022-0829-0614, pp. 8-9]

22 Id. at 29294 ("New legislation also has provided significant incentives for both the manufacture and purchase of PEVs, and the expansion of charging infrastructure").

23 Alliance for Auto Innovation, Auto Perspective on Coming EPA Emissions Rules (April 6, 2023), https://www.autosinnovate.org/posts/communications/Auto%20Perspective%20on%20Coming%20EPA%20Emissi ons%20Rules.pdf.

24 Brown, Abby, Jeff Cappellucci, Emily White, Alexia Heinrich, and Emma Cost. 2023. Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: Fourth Quarter 2022 at viii.. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5400-85801. https://www.nrel.gov/docs/fy23osti/85801.pdf.

The proposed standards should better reflect that federal investment and incentives will take time to reach maturity and that the market and consumer demand will lag further behind. To put it simply, customers will not purchase ZEVs unless charging infrastructure and energy costs fit their needs and lifestyles, no matter what vehicles manufacturers offer customers. Given this uncertainty, GHG standards could also incorporate flexibilities for manufacturers should national charging infrastructure and grid capacity not meet the necessary levels to support compliance. We strongly encourage the EPA to modify the standards to better reflect the availability of charging infrastructure. [EPA-HQ-OAR-2022-0829-0614, pp. 8-9]

Organization: Jack Spencer

Even should low-income Americans procure an EV, their lack of access to charging stations will likely further diminish any potential fuel savings. The proposed rule's Draft Regulatory Impact Analysis acknowledges on page 11-12 that low-income households often will not have access to residential charging stations and will therefore have higher fuel costs and "larger overall energy burden." [EPA-HQ-OAR-2022-0829-0681, p. 3]

Organization: Jaguar Land Rover NA, LLC (JLR)

Relationship to Other Regulations

The targets proposed by EPA are extremely ambitious and the projected BEV penetrations required to meet the standards exceed that of the California Air Resources Board (CARB) Advanced Clean Cars II regulation, with a trajectory to achieve 100% ZEV by 2035MY (as shown in Figure 3 below). [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

In 2022, California's ZEV market share was over three times higher than the federal US BEV share.9 It is important that EPA acknowledges the inequality between California and non-S177 states. CARB are a world leader in the pursuit of the 100% ZEV goal, with years of incentives and effort involved to get to this point. EPA cannot assume that all states will follow a similar route and the regulation must balance the various adoption curves across the country. [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

9 Office of Governor Gavin Newsom -California ZEV Sales Near 19% of All New Car Sales in 2022(Jan 2023) https://www.gov.ca.gov/2023/01/20/california-zev-sales-near-19-of-all-new-car-sales-in-2022/

[See original for graph, Figure 3, titled "EPA Predicted BEV Mix vs California BEV Requirement"] [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

10 Advanced Clean Cars II (ACC II) Regulations -Section 1962.4, Title 13, California Code of Regulations -https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/2acciifro1962.4.pdf

Targets imposed on the automotive industry must be linked to and contingent on the successful roll-out of a comprehensive and accessible charging infrastructure network. The current ratio of public chargers in the US is around 1 charger for every 24 EVs11. While we recognize progress made to date in the roll-out of charging infrastructure, it is vital that this grows proportionally with the increase in uptake of EVs to remain within the EU recommended ratio of 1 public charger per 10 vehicles12 especially as these ratios are based on countries with a much greater population density compared to the United States. With more than 131,200 public chargers across the US, half (65,300) of them are concentrated across five states. (California, New York, Florida, Texas and Massachusetts)13 [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

> 11 IEA (2023), Global EV Outlook 2023, IEA, Paris Trends in charging infrastructure - https://www.iea.org/reports/global-ev-outlook-2023/trends-in-charging-infrastructure, License: CC BY 4.0
>
> 12 Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure -https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0094
>
> 13 US Department of Energy (Alternative Fuels Data Center (Feb 2023) -U.S. Private Electric Vehicle Charging Infrastructure -https://afdc.energy.gov/data

JLR urges EPA to re-evaluate the proposed stringency of the regulation so that the required BEV share does not exceed CARB's targets. [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

Organization: John Graham

Third, building a robust national network of public charging stations for BEVs will not occur overnight. There are no good business models for public charging in rural areas and small towns; and, as yet, there is no practical solution for millions of people who live in multi-unit dwellings with no place at home to charge their BEVs. [EPA-HQ-OAR-2022-0829-0585, p. 9]

Organization: Kentucky Office of the Attorney General et al.

Furthermore, the Proposed Rule implicates "question[s] of deep economic and political significance," King v. Burwell, 576 U.S. 473, 486 (2015), due to the huge "number of people affected," United States Telecom Ass'n v. Fed. Commc'ns Comm'n, 855 F.3d 381, 423 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from the denial of rehearing en banc). Because "Americans place a high value on car ownership," almost 92% of households have at least one vehicle, and over 22% have access to at least three. Car Ownership Statistics 2023, Forbes (May 8, 2023), https://bit.ly/3NnPXnn. A regulation affecting so many people is bound to collide with "a significant portion of the American economy," West Virginia, 142 S. Ct. at 2608 (cleaned up), and require "billions of dollars in spending by private persons or entities," id. at 2621 (Gorsuch, J., concurring) (quoting King, 576 U.S. at 485). By EPA's own estimate, technology increases "through 2055 are estimated at $260 billion to $380 billion." 88 Fed. Reg. at 29,344. [EPA-HQ-OAR-2022-0829-0649, pp. 6-7]

The Proposed Rule somewhat attempts to deal with this concern by predicting that sales will increase as consumers become more familiar with EVs as they see broader "charging infrastructure" and more electric cars "on the road." 88 Fed. Reg. at 29,189. But that raises another buyer-focused concern that makes it even less likely consumers will change their purchasing habits to the extreme degree EPA predicts. For people who "rely on street parking," park in a garage over 25 feet from a power source, or own a condo where the building association is not willing to "pay for upgrading the electrical panel or service," where and how to charge a new electric car is a real concern. Rachel Kurzius, Considering an electric vehicle? Here's how to prep your home for one, Wash. Post (Sept. 26, 2022), https://bit.ly/3N4Y3zZ. Even for the slowest and most basic "Level 1" charging option, potential EV customers are out of luck; their "home probably can't accommodate" an EV. Id. And those who are able to upgrade their home parking situations may find themselves in a long line as the need for more complex and expensive charging mechanisms grows at a fast clip. See EV Chargers: How many do we need?, S&P Global (Jan. 9, 2023), https://bit.ly/3X1xFeM (predicting that the EV population uptick will require "about 700,000 Level 2 and 70,000 Level 3 chargers deployed, including both public and restricted-use facilities," 1.2 million and 109,000 nationally by 2027, and 2.13 million and 172,000 by 2030, "all in addition to the units that consumers put in their own garages"). [EPA-HQ-OAR-2022-0829-0649, pp. 15-16]

Even those who already own EVs may be in for some unpleasant surprises. A recent study concluded, for example, that "[t]he vast majority of electric vehicle owners [who] charge their cars at home in the evening or overnight" are "doing it wrong" and should instead "move to daytime charging at work or public charging stations" so as to not overwhelm the grids. Golden, supra. But standard electricity pricing "charg[es] commercial and industrial customers big fees based on their peak electricity use." Id. "This can disincentivize employers from installing chargers, especially once half or more of their employees have EVs." Id. Some of these vehicle owners may thus be left in a vehicle-charging no-man's land. [EPA-HQ-OAR-2022-0829-0649, pp. 15-16]

Organization: Kevin Murphy

I'm interested in participating in the public hearing on vehicle emissions standards. [EPA-HQ-OAR-2022-0829-0440, p. 1]

I am now driving my second hybrid, and I have an EV on order. For short drives, under 30 miles round trip, my hybrid is fully electric. For long drives the car's hybrid mode gets 10 mpg more than the all-gas mode. Charging stations are not easily available -limited in number, high percentage of them out of service, the demand for roadside recharge is high, the time required to recharge is long. Long range Hybrids are the way to go. [EPA-HQ-OAR-2022-0829-0440, p. 1]

Organization: Kia Corporation

EPA Underestimates Market and External Challenges

EPA's proposed rule highlights the very complex challenges that lie ahead for the EV market. There are an enormous number of factors that are outside the control of automakers including manufacturing capacity, battery production, charging infrastructure, critical mineral supply, and consumer acceptance. A successful transition in the timeframe proposed will require massive changes in commitments from all sectors of the economy: vehicle suppliers, labor, utilities, charging infrastructure, home builders, mining, and mineral processing. Consumer behavior and acceptance also needs to significantly change. [EPA-HQ-OAR-2022-0829-0555, p. 6]

EPA's proposal requires automakers to sell EVs but does not propose any requirements to ensure adequate charging infrastructure to homes, highways, or businesses, or mandate utilities to have adequate capacity or provide reasonably priced high-power charging, or mandate easily accessible and affordable battery critical minerals for EV batteries. Government policies need to start today to ensure there are enough critical minerals for batteries and high-power charging. Unfortunately, there is not yet a roadmap to developing these and other essential pieces to the transition. [EPA-HQ-OAR-2022-0829-0555, p. 6]

All of the above market challenges will need to have complementary policies supporting all of the sectors outside the vehicle industry including utilities, mining, charging companies and will require them to meet targets too. It is critical that EPA take these factors into consideration when setting standards. [EPA-HQ-OAR-2022-0829-0555, p. 6]

Organization: Marie Gluesenkamp Perez, and Mary Sattler Peltola, Members of Congress, Congress of the United States

We are writing to express our concerns about the impacts the Environmental Protection Agency's (EPA) new proposed rules, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 may have on rural communities. [EPA-HQ-OAR-2022-0829-0522, p. 1]

Like you, we believe climate change is a threat to communities across the country, and the federal government plays a critical role in developing a clean energy apparatus and helping our communities improve air quality. However, in making that transition, we cannot leave rural communities or working families behind. The administration's Executive Order 14037 and subsequent National Blueprint for Transportation Decarbonization set an ambitious goal for 50 percent of new passenger cars to be electric vehicles (EVs) by 2030. Last year's Inflation Reduction Act included many concrete policies promoting EV production that will drive costs down and improve affordability. We are concerned the EPA, along with the Department of Transportation (DOT) and the Department of Energy (DOE), have not done enough work to ensure rural communities will have the necessary charging infrastructure in place to make widespread EV adoption possible. The imposition of additional regulations in the auto market without key infrastructure investments will reduce consumer choice, which is a recipe for disaster in rural America. [EPA-HQ-OAR-2022-0829-0522, p. 1]

Rural communities, like ours, have more unique transportation and service options compared to cities or suburbs. Like many people who live in rural America, we spend a fair amount of time traveling, whether on or off the road system to get where we need to go. When your job, your pharmacy, or your child's daycare is over an hour away, you need to know that your car, snow machine, or ATV, will get you there and back. The ability to refuel a gas-powered vehicle quickly is valuable given the daily realities of rural life. That option is available because our country has a robust network of gas stations, and the requisite gas infrastructure, to support communities of all kinds. An equally robust infrastructure for EV charging must exist before this transition takes place to ensure working people and rural communities have consumer choices similar to cities and suburbs. And that infrastructure, especially fast-charging options, is not being built fast enough in many rural areas. EV charging programs included in the Infrastructure Investment and Jobs Act will help, but federal agencies remain focused on travel corridors along interstate highways, leaving many rural communities behind. [EPA-HQ-OAR-2022-0829-0522, pp. 1-2]

Washington's third congressional district has fewer than 100 level 2 and DC fast chargers available to the public, and they are largely concentrated in just two cities. Alaska has only 60 publicly available EV charging stations. In Congresswoman Gluesenkamp Perez' home county of Skamania, there are only two EV charging stations right now, and both are located at resorts. In Congresswoman Peltola's borough of Bethel, along with all the other boroughs of Western Alaska, there are zero EV charging stations. As DOT has acknowledged, the costs of installing EV chargers in rural areas can be higher, especially for direct current fast charging stations, because they are more likely to require expensive electrical service upgrades. Furthermore, for many working families, installing an EV charger at home remains out of reach, especially for those who don't own their homes. Bottom line: for EVs to be a meaningful and workable emissions reduction solution in rural America, we must have a ubiquitous and affordable charging infrastructure with access to abundant, cheap electricity. That simply does not exist right now. [EPA-HQ-OAR-2022-0829-0522, p. 2]

We are only four years away from model year 2027, and we are concerned the EPA's regulations are not paired with a plan to ensure adequate charging infrastructure on such a short timeline. Installing hundreds of thousands of new EV chargers and upgrading associated electrical infrastructure will also require tens of thousands of electricians. We are already experiencing a nationwide shortage of qualified electricians – anyone who's currently waiting six months for a residential electrician knows this all too well. Workforce shortages, particularly for those in the trades, are even more acute in rural communities. We want to ensure the EPA has considered the significant workforce development challenges that must be addressed to train electricians for a large-scale roll out of EV charging infrastructure. [EPA-HQ-OAR-2022-0829-0522, p. 2]

We request that the EPA, DOT, and DOE respond to the following questions: [EPA-HQ-OAR-2022-0829-0522, pp. 2-3]

1. What have the EPA, DOT, and DOE done to ensure rural communities are not left behind in the transition to electric vehicles?

2. Is there a clear and detailed deployment plan for electric vehicle charging infrastructure in rural areas?

3. How do the EPA and DOE anticipate potential shortages of trained electricians will impact the deployment of charging infrastructure? Further, have agencies evaluated the disparate impacts these shortages may have in rural communities?

4. Beyond using limited Inflation Reduction Act funding, how do the EPA, DOT, and DOE plan to address existing and future shortages of trained electricians?

5. Going forward, how do the EPA, DOT, and DOE plan to work together to ensure public charging infrastructure is abundant and accessible in rural areas? [EPA-HQ-OAR-2022-0829-0522, pp. 2-3]

We also request that you share how you plan to deploy necessary EV charging infrastructure in a timeframe that matches the implementation of the proposed rules. Building out this infrastructure will ensure that rural communities are not disproportionately impacted and left behind in a changing market. While it is critically important that we move toward a clean energy future, it must be a future that works for all Americans, including those in rural areas. [EPA-HQ-OAR-2022-0829-0522, pp. 2-3]

Organization: Mass Comment Campaign sponsoring organization unknown (118 signatures)

I am writing to express my opposition to the proposed tailpipe emissions rule outlined in EPA-HQ-OAR-2022-0829. As proposed, I believe these regulations for light-duty vehicles go too far, reduce consumer choice, and fail to include safeguards to address serious infrastructure, resource, and funding shortfalls. [EPA-HQ-OAR-2022-0829-1701]

Firstly, the country's current charging infrastructure is inadequate to support a forced shift towards electric vehicles. Charging infrastructure is not yet fully developed or accessible in many regions of the country. Forcing consumers to transition to EVs without ensuring sufficient charging infrastructure could place undue burdens on drivers across the country. [EPA-HQ-OAR-2022-0829-1701]

Organization: Mazda North American Operations

The proposed rule is the most stringent light duty vehicle regulation that EPA has promulgated to date. The electrification and carbon reduction goals are incredibly challenging and will require not just a coordinated effort to achieve but also solutions addressing consumer demand, affordability, charging network, power grid capacity, rare earth mineral availability, and striking the right balance regarding China policy [EPA-HQ-OAR-2022-0829-0595, p. 2]

Summary

Mazda is proud of its heritage and contributions to personal mobility, and we celebrated our 100th anniversary in 2020. Mazda has also long been an engineering leader known for innovative powertrains like the rotary engine and Skyactiv technology. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

We look at EPA's NPRM and its preferred option through the lens of a company that is already working towards an electrified future. It's not a matter of if this transformation will happen, but when and how. Mazda, like the rest of the industry, faces many challenges: [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

-Will charging infrastructure be sufficient?

-Can the electric grid handle the increased demands?

-How will EV incentives on the federal and state level impact this shift?

-Will suppliers be able to develop and produce components like batteries (that currently require critical minerals, many from China) quickly enough and in enough volume?

-How might future laws or regulations in trade and re-shoring impact our ability to meet goals?

-Are consumers ready and willing to move away from "tried and true" internal combustion engines in numbers sufficient to meet these goals?

-Can OEMs remain sufficiently profitable to fuel the transition to EVs? [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Mazda strongly requests that EPA take these considerations into account and make necessary adjustments to the proposed rule as it works towards a Final Rule. We feel the Final Rule should have more realistic targets and associated ramp ups, include PHEVs, and adopt CARB's current LEV IV for criteria emissions. [EPA-HQ-OAR-2022-0829-0595, pp. 3-4]

Organization: MECA Clean Mobility

EPA should work with other agencies, like the Joint Office on Energy and Transportation, in setting minimum charger efficiency standards to ensure that infrastructure funds are spent on chargers with the best utilization of electric power. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

The prioritization of building forward-looking vehicle charging infrastructure is critical to the penetration of electric vehicles. Furthermore, analogous to vehicle electronic design and material selection impacts to electric vehicle efficiency, similar approaches can be used to improve charger efficiency in delivering the maximum power to the vehicle. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

While overnight charging at lower power may be appropriate for most light-duty vehicle use and certain medium-duty vehicle applications, we recommend the EPA prioritize the planning and building of direct current fast chargers (DCFC). The planning of public DCFCs is indispensable to allow in-service electric vehicles to address unforeseen day-to-day vehicle use variables (i.e., weather, traffic conditions, needed route changes, etc.). The availability of strategically placed, publicly accessible DCFCs prevents vehicles becoming inoperable due to these use variables, allowing vehicles to be rapidly charged and quickly placed back into service while minimizing interruptions to vehicle operations, traffic disruptions from vehicle strandings and maximizing the utilization of available space for heavy-duty vehicle recharging. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

DCFC is also crucial to address long-term medium-duty vehicle charging needs. Many commercial EVs will need to achieve fast charging times to encourage fleet owners to transition to e-mobility. This is particularly true for those vehicle operators who do not have access to charging at their own facilities. EV fleet adopters with slower rate overnight charging should also diversify their charging assets with DCFCs to have more flexibility as their fleets grow and unforeseen needs arise to charge vehicles and return them to service. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

Additionally, DCFCs futureproof infrastructure investments by allowing fleet operators to immediately convert and deploy BEVs while also allowing them to remain up to date with advancements in battery technology. Vehicle batteries are quickly improving in size, chemistry, energy density, and efficiency resulting in increased vehicle range. This range improvement will, however, require faster charging capabilities. While medium-duty BEV vehicles typically require larger batteries with increasing power density than light-duty vehicles, DCFCs enable quicker and more efficient charging of these vehicles. In addition, site and infrastructure owners maximize their investment because DCFCs enable site-readiness for future DCFC expansions while allowing the best utilization of available space and higher turnover of serviced vehicles. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

DCFCs also allow for bidirectional charging which futureproofs infrastructure investment further by providing support for increasing electricity demand. Vehicle-to-Grid (“V2G”) technology can help address energy use and manage peak demand times and costs, as well as serve as backup power during an outage. As EV adoption increases, this technology becomes more critical to enable sustainable grid management, grid resilience, utilization, and national security protection. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

MECA also recommends the EPA consider national certification, such as UL Certification, for EV supply equipment to provide consistency, quality, safety, efficiency and compliance. A Certificate of Compliance will mean the product has passed a series of rigorous tests to demonstrate performance, safety, quality, and serviceability, while enhancing sustainability, strengthening security, and managing risk. National certification also supports local permitting efficiency, therefore, helps fast track deployment of charging stations. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

For these reasons, MECA urges EPA to work with other government agencies, such as the Joint Office for Transportation and Energy, and industry to develop national standards for minimum charger efficiency which will ensure the efficient energy utilization and lowest operating cost for electric vehicles. With regards to technology, several suppliers of vehicle power electronics are applying similar electric efficiency technology innovation to the development of more efficient chargers to minimize switching losses and deliver maximum power to the battery. This is important to consumers and fleets as charging losses reduce the total energy to the battery and increase operating cost. Furthermore, it is important to the environment because these losses represent electricity that is generated but never used. The difference in electric efficiency between the first generation of chargers, that are deployed in the field today, and the advanced, second-generation chargers can be as much as 10-20%. This becomes significant as electric vehicle penetration increases into the future. [EPA-HQ-OAR-2022-0829-0564, pp. 34-35]

Organization: MEMA, The Vehicle Suppliers Associated

The success of our industry is interwoven with the success of this proposal and the ability of the government to work with industry and other stakeholders to meet significant challenges. Therefore, the rule must address: [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

• The need for regulatory certainty. The final rule must contain an effective mix of feasible, demonstrated technology along with emerging technology, leaving options to improve emissions reductions in today's advanced propulsion designs. This will foster innovation in a coordinated direction, aligned with U.S. policy, but not mandate application of a narrowly defined technology path to make a positive impact on the country's urgent environmental goals. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

• The influence of other technologies -including internal combustion engines fueled by hydrogen and other renewable carbon-neutral fuels -which can impact measurable environmental improvements at scale technologies can provide immediate improvement to the environment. This is important not only for environmental improvements but for environmental justice in providing cleaner consumer vehicles immediately to communities living and working close to busy streets, highways, and other transportation networks. Inclusion of all technologies that can decarbonize the transportation sector will foster the necessary growth in manufacturing capacity, vocational performance, infrastructure improvements, and consumer acceptance. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Technology Neutrality and BEV Emissions. EPA should ensure that battery electric vehicles (BEV) are included in metrics for vehicle-to-vehicle comparison by assigning a metric that captures the pollutant emissions related to BEV operation, aligned with national electricity generation figures. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Challenges in our nation's infrastructure and power grid. MEMA appreciates the significant public investments being made to support clean transportation infrastructure. As these new investments in highways and main corridors are deployed, federal and state incentives are needed to further expand the EV charging and refueling infrastructure in areas that connect these major thoroughfares. Urban industrial centers will need focused buildout while rural areas will need thoughtful rollouts to achieve an effective EV charging infrastructure. These buildouts must include Direct Current Fast Charge (DCFC) and vehicle-to-grid (V2G) bidirectional charging. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Supply chain challenges. The proposed rule assumes that all materials advanced vehicles, which are not available today in the quantities needed to support the massive growth in vehicle construction, will become available within sufficient time. This places a significant and unnecessary risk on manufacturers and suppliers. Furthermore, once a company has converted production to new technology lines, that company cannot easily pivot its facilities and workforce back to the previous technology if EPA projections are not realized by the mid-to-late-2020s. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Workforce challenges. A significant increase in skilled workers will be needed to support the implementation of this rule and long-term success thereof [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Extended warranty. The necessity to clearly define the applicability of the extended warranty and the need to provide repair access to service these new vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

MEMA members are working to accelerate the performance and availability of clean-operating vehicle technologies and are directly contributing to their realization. Besides battery electric options, effective low-and zero-carbon technologies for future and current in-use vehicles also exist and can readily be put to use to reduce nationwide emissions and help EPA meet its climate goals. The success of this rule depends on greater inclusion of all available emissions reduction technologies, significant investment in infrastructure, careful understanding and investment in the domestic and global supply chain and ensured repair access to serve the improved and enhanced domestic vehicle fleet. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

Infrastructure

To achieve the ambitious vision for U.S. charging infrastructure needed to rapidly electrify a high proportion of new vehicles, as noted above, EPA must work closely with other U.S. government agencies to help ensure that the dozens of programs in the Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL), and others still needed to support the transition, are effectively deployed by the federal government. While it is true that agencies are -so far -

rolling out these programs expeditiously, strong coordination of these initiatives is needed to realize nationwide transportation transformation. [EPA-HQ-OAR-2022-0829-0644, p. 11]

V2G bidirectional charging technologies can provide a transformational opportunity to help address the nation's energy crisis while also decarbonizing the transportation sector. The use of bidirectional charging installations, for fleet and private vehicles, can help stabilize local grid activity and balance load versus demand.9 Besides grid load balancing, the use of vehicle batteries as energy sources can also offset local energy production demands and further improve grid resiliency and national security. [EPA-HQ-OAR-2022-0829-0644, p. 11]

9 This notice is one example of "grid services vehicles can provide" according to the US DOE https://content.govdelivery.com/accounts/USEERE/bulletins/3594aae

EPA should include deployment of Direct Current Fast Chargers (DCFCs) and bi-directional charging impacts and benefits in the RIA. While overnight charging at lower power may be appropriate for certain applications, DCFCs can better meet the long-term charging needs of consumers and fleet operators of light-duty and medium-duty vehicles. Many EVs will need to achieve fast charging times to encourage consumers, fleet owners and operators to transition to electric vehicles. Further, medium-duty vehicles often have duty cycles that require faster, higher power charging due to their on-demand jobs. DCFCs can help address these charging time and operator confidence issues. Similarly, providing a diversity of charging options to all EV adopters offers access and flexibility which facilitates consumer confidence in EVs and help futureproof infrastructure investments. [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

With respect to existing fleet and future ICE vehicles sales, we note the European Union is exploring renewable fuels as a way to reduce net emissions and decrease dependency on outside energy sources.10 The U.S. can do the same, and EPA can and should lead this initiative. [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

10 https://europe.autonews.com/environmentemissions/eu-german-deal-outlines-legal-path-e-fuel-future

The European Union Alternative Infrastructure Regulation has made significant requirements on states. making the necessary infrastructure investment. [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

As an example of how EPA might compel State and Regional infrastructure buildout, we note below how the European Union has approached this challenge: [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

As part of EU's "Fit for 55" package the EU has agreed on a direction forward March 2023 that ensures fast charging availability at distance-based intervals along the trans-European transport network (TEN-T). https://theicct.org/publication/afir-eu-april2023 [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

1) Member states will be required to ensure publicly available chargers with power output capable to support BEV deployment

2) The AFIR established targets for urban nodes for trucks and busses.

3) Member States will be required to ensure installation of a fast-charging pool every 60km in each direction along the TEN-T (Trans-European Transport Network) with milestones for completion in 2025, 2027, and 2030. [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

Additionally, in Appendix 1, MEMA has prepared a chart that reviews current CA state and federal actions to support ZEV transition. [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

MEMA urges:

• EPA to identify and address additional paths and actions within its authority to expand state and regional EV infrastructure investments, to include DC Fast Charge installations. [EPA-HQ-OAR-2022-0829-0644, pp. 11-12]

Organization: Minnesota Corn Growers Association (MCGA)

The proposed EPA standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. While the U.S. market share of BEVs will continue to expand, establishing regulations where success is solely contingent upon an unattainable tenfold increase in the production and sales of BEVs over the next eight years represents an avoidable mistake. The proposed rule would require huge investments and rapid growth in many industries, including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0612, p. 3]

Organization: Minnesota Pollution Control Agency (MPCA)

To support the rapid electrification of our transportation system, Minnesota is making significant investments to support EV adoption, including expanding infrastructure. Minnesota recently adopted an EV purchase incentive and EV-ready building codes requirement. Other examples of EV investments in Minnesota include: [EPA-HQ-OAR-2022-0829-0557, pp. 3-4]

-The Volkswagen Corporation (VW) violated air pollution standards for its diesel cars and sport utility vehicles. As part of the national legal settlement, Minnesota received $47 million to spend on projects to replace older, more polluting diesel vehicles and install electric vehicle charging infrastructure. Minnesota has invested the maximum-allowed 15% of our VW settlement funds in electric vehicle charging. Grants have funded 60 stations statewide, bringing the total miles of EV fast-charging corridors to 3,600. All stations from the first two phases of funding will be installed by early 2024. Between 2024 and 2027, there will be $1.76 million available for additional EV charging grants [EPA-HQ-OAR-2022-0829-0557, pp. 3-4]

-The federal National Electric Vehicle Infrastructure (NEVI) program provides funds for states to build electric vehicle charging infrastructure along highway corridors. The NEVI program provides $68 million to Minnesota and requires a $17 million match. The Minnesota Electric Vehicle Infrastructure Plan describes how Minnesota will spend the first year of NEVI program funds. Minnesota's plan identifies potential exits along the I-35 and I-94 Alternative Fuels Corridors for fast charger installation. The Minnesota Department of Transportation (MnDOT) will conduct site feasibility analyses and manage a competitive site selection process in 2023 to install fast chargers at 16 sites. The Minnesota Legislature established a state electric vehicle program and provided $13.6 million in one-time funding as a match to available federal funds in the 2023 session. The program allows MnDOT to grant NEVI funds to install, operate, and maintain EV charging stations outside of highway right-of-way. Minnesotans can expect to see the first round of fast chargers installed with NEVI funds by the end of 2024. [EPA-HQ-OAR-2022-0829-0557, pp. 3-4]

-In the Twin Cities metropolitan area, the Metropolitan Council is also investing in transportation electrification. The council completed an Electric Vehicle Planning Study in 2022 to understand the marketplace and charging landscape and identify strategies to accelerate EV adoption in the Twin Cities. With the opportunity to compete for funds from the Bipartisan Infrastructure Law's Charging and Fueling Infrastructure Program, Minnesota could expand EV charging further. [EPA-HQ-OAR-2022-0829-0557, pp. 3-4]

-The Minnesota Public Utilities Commission has found that EVs are both an opportunity and a challenge for the electric power sector and has therefore directed Minnesota's investor-owned utilities to take steps to encourage cost-effective integration of EVs and plan for their adoption. Minnesota's utilities have developed and begun implementing a variety of programs to support EV adoption, including home charging and rate design, as well as public charging investments.6 [EPA-HQ-OAR-2022-0829-0557, pp. 3-4]

6 Minnesota Public Utilities Commission, Electric vehicles, https://mn.gov/puc/activities/economic-analysis/electric-vehicles/ (accessed 6/15/2023).

Organization: Missouri Corn Growers Association (MCGA)

Monumental challenges in implementing this rule.

Notwithstanding the vast challenges to everyday Americans, the aggressiveness of EPA's proposal raises immediate doubt about whether such targets are feasible within the required timeframe. The rule gives a wholly unrealistic and false impression the U.S. has a robust and reliable public EV charging infrastructure ready to accommodate the vast number of BEVs. MCGA members driving Missouri's rural roads know this is not the case. In addition, most American families will find BEVs' dismal range, extended charge time, shortage of maintenance technicians, and poor performance under heavy loads and extreme temperatures both frustrating and entirely impractical for everyday personal and business needs. [EPA-HQ-OAR-2022-0829-0578, p. 2]

Organization: Missouri Farm Bureau (MOFB)

Similar to EPA's proposed HD rule, this proposal picks winners and losers by doubling-down on electric vehicle (EV) technology, while increasing in adoption in the light-duty sector, only represents 8.4 percent of light-duty production in MY 2022.2 While the proposed rule cites a reduced total cost of ownership, EPA estimates it will raise "average upfront per-vehicle costs to meet the proposed standards to be approximately $1,200 in MY 2032, as estimated using 2020 dollars."3 The proposed rule estimates that in order for automakers to comply with the emissions standards, Battery Electric Vehicles (BEVs) will comprise up to 67 percent of new passenger vehicle sales by 2032 and up to 46 percent of medium-duty vehicle sales.4 In addition to increased purchase costs for EVs, MOFB is concerned about the lack of available public charging stations to accommodate the vast number of EVs mandated by this rule, especially in rural Missouri where most of our members live and work. [EPA-HQ-OAR-2022-0829-0590, pp. 1-2]

2 U.S. EPA Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Vol. 88, Fed. Reg. 29184, p. 29189 (May 5, 2023) (to be codified at 40 CFR pts. 85, 86, 600, 1036, 1037 & 1066).

3 Ibid., 29201.

4 Ibid., 29189, 29331.

Organization: Mitsubishi Motors North America, Inc. (MMNA)

To determine a realistic maximum volume of EVs the market can support for each of the model years covered by the rule, we believe EPA should consider certain critical factors. Among these factors, we believe EPA must make a thorough and realistic year-by-year assessment of key factors like projected battery costs, projected supply of battery critical-minerals, projected residential and public charging infrastructure availability, projected electrical grid capacity, and consumer acceptance of BEV technology in the broader arena. [EPA-HQ-OAR-2022-0829-0682, p. 2]

Organization: National Association of Convenience Stores (NACS) et al.

II. Proposed Electrification Timelines are Unworkable.

The challenges associated with electrifying the light-and medium-duty fleet cannot be understated. EPA projects that the Proposed Rule will result in 67 percent of light-duty vehicles sold in 2032 being electric. That figure is an average of 78 percent electric sedans, 68 percent electric pickups and 62 percent electric crossover and SUVs.3 Conversely, EPA estimates that in the absence of any regulations, electric vehicles would make up only 39 percent of new sales in 2032.4 [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

3 Proposed Rule at 29,329 (Table 80).

4 Reputable estimates on how quickly EV sales will increase vary widely. S&P Global Mobility estimates that by 2030, EVs will be 40 percent of new vehicle sales. The Energy Information Administration, on the other hand, estimates that EVs will be 17 percent of new vehicle sales by 2030. McKinsey has the highest estimate and projects that EVs will be 48 percent of new vehicle sales by 2030. Given these varying estimates – all from highly respected sources – the Agency should exercise caution about consumers' willingness to purchase, and manufacturers' ability to deliver, EVs at the rates required by the Proposed Rule. Writing rules on its own does not mean that challenges related to supply chains for making the vehicles or consumer sentiment will change.

These timelines are entirely untethered from the market's capabilities. Most prospective EV drivers will need fast, high-powered on-the-go charging solutions before they're comfortable buying an EV.5 Although fuel retailers are very active in the National Electric Vehicle Infrastructure Program ("NEVI" Program) and other federal and state funding opportunities, it remains unacceptably difficult to identify a viable business case for installing EV charging stations. Unless those obstacles are permanently removed, these challenges will remain regardless of what the final rule demands. [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

5 Consumer Reports, "Battery Electric Vehicles and Low Carbon Fuel: Overview of Methodology," April 2022, https://article.images.consumerreports.org/prod/content/dam/surveys/Consumer_Reports_BEV%20AND%20LCF% 20SURVEY_18_FEBRUARY_2022.

Most of these impediments involve an electricity market structure that was not designed for – and is thus incompatible with – the retail fuel market. Many fuel retailers have installed EV charging stations at their outlets, utilizing any number of business models and ownership structures. Very few, if any, of these investments are profitable on a self-sustaining basis. The structural impediments to the profitability of public EV charging are too significant to overcome These existing investments should therefore be interpreted as “beta tests” by companies exploring the charging space, rather than indicators of a viable, sustainable business model. [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

We are confident that the right combination of policy incentives and signals will enable the market to overcome any barriers that exist today. We simply fail to understand the rationale for leaving emission reduction opportunities on the table while we work toward those aspirational objectives. The best way to address practical impediments to electrification is to inject flexibility into the Proposed Rule while simultaneously promoting near-term emissions reductions through the use of multiple technologies, including renewable liquid fuels. [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

No one solution will decarbonize transportation energy. What policymakers think is the best solution today may be surpassed by subsequent ingenuity and innovation. Sound policy should not stifle innovation by mandating specific solutions. Instead, policy should set performance goals and let the market – guided by consumers – innovate to find the best way to meet those goals. [EPA-HQ-OAR-2022-0829-0628, pp. 3-4]

II. Electrification Timelines Proposed Under the Rule are Divorced from Reality.

EPA projects that the Proposed Rule will result in 67 percent of light-duty vehicles sold in 2032 being electric. That figure is an average of 78 percent electric sedans, 68 percent electric pickups and 62 percent electric crossover and SUVs.5 Conversely, EPA estimates that in the absence of any regulations, electric vehicles would make up only 39 percent of new sales in 2032.6 The extraordinary pace of electrification mandated under this rulemaking is entirely divorced from the world in which consumers and the broader marketplace operate. [EPA-HQ-OAR-2022-0829-0648, p. 4]

5 Proposed Rule at 29,329 (Table 80).

6 Reputable estimates on how quickly EV sales will increase vary widely. S&P Global Mobility estimates that by 2030, EVs will be 40% of new vehicle sales. The Energy Information Administration, on the other hand, estimates that EVs will be 17% of new vehicle sales by 2030. McKinsey has the highest estimate and projects that EVs will be 48% of new vehicle sales by 2030. Given these varying estimates—all from highly respected sources—the Agency should exercise caution about consumers’ willingness to purchase, and manufacturers’ ability to deliver, EVs at the rates required by the Proposed Rule. Promulgation of this Proposed Rule, alone, does not mean that challenges related to supply chains for making the vehicles or consumer sentiment will change.

The challenges to electrification cannot be overstated and will require an unprecedented effort irrespective of regulatory mandates. Public charging deployment is a principal obstacle. In the Proposed Rule, EPA catalogs many of the federal incentives currently in place for charging infrastructure, suggesting that these policies may ameliorate many of these challenges.7 This suggestion is short-sighted and incorrect. Subsidies alone will not create a long-term, sustainable proliferation of EV charging stations. For electrification policies to succeed in the long term, there must be a competitive, public charging market to refuel electric vehicles.8 Cars will need places to refuel, and private companies need a financial justification to spend capital to install charging stations. [EPA-HQ-OAR-2022-0829-0648, p. 4]

7 Proposed Rule at 29,307.

8 EV charging policy should promote competitive market dynamics and work with consumers' existing behavior and fuel retailers' real estate and business infrastructure. In a competitive market, private dollars will make sure infrastructure is there to meet consumers' needs. Without these market-oriented policies in place as a foundation for any public investment, there is a very real risk that public dollars spent will be stranded and wasted in ways that do not serve an appreciable number of consumers and ultimately do little to combat EV range anxiety.

a. Near-to Medium-Term Charging Capabilities

At present, only 8.64 percent of the new light-duty vehicles sold in the United States are EVs (including both BEVs and PHEVs).9 Even so, EV uptake has far outpaced the development of the public charging infrastructure that is necessary to accommodate those new EVs on the road. Last year, according to data reported by the U.S. Department of Energy's Alternative Fuels Data Center, EV sales increased 65 percent nationally, while public EV charging stations grew by less than 15 percent over the same period.10 Further, the limited growth of public charging has not happened equitably. A recent report from the Alliance of Automotive Innovation warned that, in 2022, 63 percent of U.S. counties have five or fewer chargers and 39 percent of U.S. counties have zero chargers.11 In the United States, 30 percent of all EV charging infrastructure is in just 14 counties—or 0.4 percent.12 Though Congress has appropriated limited funds designed to mitigate that gap, on their own, grant programs such as the National Electric Vehicle Infrastructure Program are insufficient to catalyze a nationwide network of EV chargers. [EPA-HQ-OAR-2022-0829-0648, p. 6]

9 ALLIANCE FOR AUTOMOTIVE INNOVATION, "Get Connected Electric Vehicle Quarterly Report" (Jun. 2023) available at https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023%20Q1.pdf.

10 Abby Brown, et al., "Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: Second Quarter 2022," (2022) available at https://afdc.energy.gov/files/u/publication/electric_vehicle_charging_infrastructure_trends_second_quarter_2022.pdf.

11 ALLIANCE FOR AUTOMOTIVE INNOVATION, "Get Connected Electric Vehicle Quarterly Report » (2023) available at https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%202022%20Q4%20Electric%20Vehicle%20Report.pdf.

12 Early uptake of EVs has been inequitable, with the benefits of EV ownership disproportionately falling to wealthier Americans, those with more education, and those more likely to own a home. Access to public charging infrastructure is particularly important in facilitating EV uptake among communities that are less likely to own a single-family home, and therefore will have inconsistent access to at-home charging.

The extent to which EV penetration is outpacing public charging station deployment is changing the landscape of the EV market. A 2022 nation-wide, representative survey by Consumer Reports and the University of Chicago found that 61 percent of Americans point to "not enough public charging stations" as the primary issue preventing them from buying or leasing an EV.13 In fact, 2022 was the first year in which the study found that 'access to charging' exceeded 'upfront cost' as the greatest barrier to consumers purchasing an EV.14 Analytics firm J.D. Power and Associates also found that a lack of public charging is directly preventing EV adoption, writing "public charging infrastructure consistently scores low in satisfaction. It's the exceptional use case—like a vacation road trip—that's holding shoppers back."15 [EPA-HQ-OAR-2022-0829-0648, p. 6]

13 CONSUMER REPORTS, "Battery Electric Vehicles and Low Carbon Fuel: Overview of Methodology," (Apr.2022) available at https://article.images.consumerreports.org/prod/content/dam/surveys/Consumer_Reports_BEV%20AND%20LCF% 20SURVEY_18_FEBRUARY_2022.

14 Id.

15 J.D. POWER 2023, "U.S. Electric Vehicle Consideration (EVC) Study" (Jun. 15, 2023) available at https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-consideration-evc-study.

This trend threatens the development and durability of transportation electrification. A 2021 study from the University of California at Davis Institute for Transportation Studies found that almost 20 percent of EV owners in California switched back to a gas vehicle because of the difficulty of consistently charging their vehicle16—this is in the state with the best-developed EV charging infrastructure in the nation by an order of magnitude. [EPA-HQ-OAR-2022-0829-0648, p. 6]

16 Scott Hardman and Gil Tal, "Understanding Discontinuance among California's Electric Vehicle Owner" (Apr. 26, 2021) available at https://doi.org/10.1038/s41560-021-00814-9.

b. Refueling Challenges Unique to Electric Vehicles

The Associations' members, including many of the largest privately held companies in the United States, have invested meaningful resources into analyzing business development opportunities associated with EV charging station investments.17 These companies' respective teams include grant-writing specialists to help them access various federal and state grant opportunities,18 and electricity market and utility specialists to assess and interface with their potential "fuel suppliers" for EV charging stations. Many of the Associations' member companies have installed EV charging stations at their outlets, utilizing any number of business models and ownership structures. Very few, if any, of these investments are profitable on a self-sustaining basis where a private business consistently earns a profit on EV charging events. These existing investments, including the investments cited by EPA in the Proposal, should therefore be interpreted as "beta tests" by companies exploring the charging space rather than indicative of a viable, sustainable business model. [EPA-HQ-OAR-2022-0829-0648, pp. 6-7]

17 The Agency itself cites many of the Associations' members investments in charging infrastructure. Proposed Rule at 29,309.

18 The Associations actively supported the development of the National Electric Vehicle Infrastructure ("NEVI") and Alternative Fuel Corridor grant programs that were included in the Infrastructure Investment and Jobs Act. Our members are in the process of analyzing and applying for grant opportunities. These programs will make a meaningful difference in mitigating the upfront capital expenditures associated with installing EV charging stations. Absent additional policy incentives or market reforms, however, the grant programs will not enhance the business case for investing in charging stations as a means of generating a profit by selling electricity to EV drivers. EPA has an extraordinary opportunity to supplement these EV charging grant programs by encouraging greater investment in charging stations through eRINs.

To be successful, the on-the-go refueling experience for EVs should be as similar as possible to the conventional refueling experience to which consumers are accustomed.19 Fuel retailers are well positioned to offer fast, safe, and convenient EV charging services because they have a keen understanding of consumer preferences and tendencies. This fact is essential when it comes to adoption of EVs—the transition to EVs will require what was previously a quick stop to become a 30-minute consumer experience. Currently, it takes the driver of a passenger vehicle approximately two to three minutes to complete a refueling experience. It takes the driver of an EV, however, 20 to 40 minutes to recharge at a Direct Current Fast Charger ("DCFC"), depending upon the vehicle and the capacity of the charger available. [EPA-HQ-OAR-2022-0829-0648, pp. 6-7]

19 Placing chargers only in individual garages in private homes, apartment buildings, and parking lots cannot combat the notion of "range anxiety" as effectively as fuel retailers offering that service. Most renters across the nation do not have garages, nor do many homeowners. Even those Americans that do have garages often do not have space in their garage for the total number of vehicles their family drives, nor do they have the electrical capacity in their garage to support a charger or multiple chargers. This is also true for workplaces; many Americans, especially those working in low-income jobs, will not have the option, for a variety of reasons, to charge at work. Consumers must have viable charging options available outside of their home or workplace for widespread vehicle electrification to take place.

Consumers must also be able to trust that the charging stations they visit will be functional, an issue that has increasingly presented a significant problem. We see this playing out today throughout the country in situations where chargers are owned and operated by entities—often utilities—that do not have a financial incentive to keep them in good working order.20 If EV charging is not both available and reliable in the neighborhoods consumers want to visit, as well as along Interstates where consumers travel, many Americans simply will not purchase an EV, no matter the price.21 [EPA-HQ-OAR-2022-0829-0648, pp. 6-7]

20 One in every five consumer attempts to charge their EV failed in 2022. See Hannah Lutz, AUTOMOTIVE NEWS "EV Drivers Struggle with Declining Reliability of Charging Network," (Feb. 8, 2023) available at https://www.autonews.com/mobility-report/ev-drivers-struggle-declining-reliability-charging-network.

21 Low-income communities and communities of color are disproportionately likely to need access to regular public charging in order to own an EV. Deploying public charging infrastructure, thereby supporting the ability of all Americans to own an EV, would also help to reduce air pollution and improve air quality in low-income communities. Any light-duty vehicle electrification policy that forsakes a central focus on public charging should be amended to consider low-income Americans and the communities in which they reside.

At present, there are several impediments that make it challenging for private businesses to identify a pathway to profitability with respect to EV charging. Most of these impediments involve an electricity market structure that was not designed for—and is thus incompatible with— the retail fuel market. Importantly, these challenges have not defrayed the intent of the Associations' members in invest in public charging. They do, however, threaten to depress EV adoption by creating a market in which the industry relies on government incentives rather than being incentivized by the free market. [EPA-HQ-OAR-2022-0829-0648, pp. 6-7]

i. Electricity Pricing Schemes Are Antiquated

Foremost among these market impediments is an antiquated electricity pricing scheme that utilities are slow and reluctant to modernize. Many states are exacerbating this problem by allowing utilities to pass through the costs of EV charging stations to all of their customers on their monthly utility bill, rather than having EV drivers pay for the costs of refueling their own vehicles. Rising electricity prices, in conjunction with softer gas prices, made EVs more expensive to fuel than gas-powered cars at the end of 2022.22 [EPA-HQ-OAR-2022-0829-0648, pp. 7-8]

22 See ANDERSON ECONOMIC GROUP, "Gas-Powered Cars Cheaper to Fuel than Electric in Late 2022" (Jan. 24, 2023) available at https://www.andersoneconomicgroup.com/cars-gas-powered-cheaper-to-fuel-than-electric-in-late-2022/.

There are no purchasing options or pricing structures for retailers to provide electricity as a fuel. Retailers with EV chargers today are forced to pay retail prices for electricity with high demand charges. There is no business case for buying electricity at retail prices and selling electricity at retail prices. Regulated utilities that own and operate their own charging stations are not subject to demand charges and thus have an insurmountable competitive advantage over anyone else in that market. This situation has dramatically reduced private sector investments in EV charging stations. The Agency can best promote its electrification goals by addressing this market disparity. [EPA-HQ-OAR-2022-0829-0648, pp. 7-8]

ii. Economics of Public EV Charging

As noted above, to keep up with EV sales growth, the U.S. public fast charging network will need to grow drastically.23 The economics of vehicle charging, however, are simply insufficiently attractive to impel the charging network that a fully, or even partially, electrified fleet would need.24 [EPA-HQ-OAR-2022-0829-0648, p. 8]

23 Stephen Edelstein, GREEN CAR REPORTS "Study: Pace of US EV Adoption Requires 8X Charger Growth by 2030" (Jan. 13, 2023) available at https://www.greencarreports.com/news/1138424_study-pace-of-us-ev-adoption-requires-8x-charger-growth-by-2030.

24 Brennan Borlaug et al., TRANSPORTATION RESEARCH PART D: TRANSPORT AND ENVIRONMENT 114, "Public Electric Vehicle Charging Station Utilization in the United States" (Jan. 1, 2023) available at https://doi.org/10.1016/j.trd.2022.103564.

Internal data collected from our members mirrors what was already understood by economists: that only where utility demand charges are very low and utilization rates higher than anticipated do they expect a positive return on their investment. DC fast charger investments are capital-intensive, costing $150,000–$200,000 to install even in locations with existing utility service and sufficient open space. Unfortunately, even where support is available to defray this capital investment, the cost structure to operate and maintain these chargers on an ongoing basis makes their economics extremely challenging. [EPA-HQ-OAR-2022-0829-0648, p. 8]

Charging station owners—like most commercial electric power customers—foot the bill for energy costs per kilowatt hour (kWh). Unlike a conventional electricity consumer, however, commercial businesses that own charging stations are burdened by demand charges that reflect total maximum power demand (in kW) over a given period. [EPA-HQ-OAR-2022-0829-0648, p. 8]

Demand charges have rendered the total cost of operating a DCFC practically insurmountable for private industry. Adding just two DCFCs to a convenience store typically increases its demand charges from under $1,000 per month to almost $4,500 per month. Because demand charges are a function of peak demand, they remain fixed no matter how often a given charger is utilized. This means that the relative cost per kWh delivered is very high for chargers with low utilization. Most chargers today have very low utilization, and this is expected to continue for many years in most markets.25 [EPA-HQ-OAR-2022-0829-0648, p. 8]

25 Though not directly related to this rule, vesting the owners and operators of public charging stations with the ability to generate electric Renewable Identification Numbers (eRINs) under the Renewable Fuel Standard (RFS) is one potential way to incentivize our membership to make significant investments in EV charging. Importantly, our members have indicated that even with the expected low utilization rate, if eRINs could be generated by owners of public charging stations, installations with a projected negative rate may be shifted to a positive rate of return. Importantly, if the Agency allows charging station operators to generate eRINs, it will incentivize the installation of new state-of-the-art fast chargers. This could create a virtuous cycle in this industry, reducing the price of electricity sold, thereby increasing charging station utilization rates, and further improving the economics of charging infrastructure. New investments in charging, in turn, will support EV adoption and the Agency's broader electrification goals.

Organization: National Automobile Dealers Association (NADA)

B. EPA Must Adjust Its Infrastructure Assumptions to Reflect Reality.

Another critical factor creating uncertainty for the market adoption of EVs is the unreliability and unavailability of charging infrastructure. The infrastructure needed to support EPA's projected EV market penetration requires both an increased capacity for electricity generation and a more comprehensive transmission system than exists today. At a minimum, new and expensive conduits, transformers, and power lines will be necessary. Infrastructure installations of this magnitude will involve major construction projects subject to permitting requirements, supply chain delays, and environmental and safety mandates. Even assuming that these upgrades will be economically feasible, they will take several years and long lead times to fully develop and deploy. EPA notes that IIJA and IRA funding and incentives will help to address some of these concerns, but the agency fails to provide a sober assessment of the nature and extent of the significant infrastructure needs, buildout timelines, and costs associated with its proposal.55 EPA must revisit and adjust its assumptions to reflect these critical considerations. [EPA-HQ-OAR-2022-0829-0656, pp. 12-13]

55 88 Fed. Reg. at 29307-12.

1. Dealer Infrastructure Costs and Lead Times.

As mentioned, franchised dealerships are investing billions in the infrastructure and equipment to sell and service EVs. Household and commercial customers will require refueling infrastructure at their homes and businesses and will require expansive and reliable public refueling infrastructure networks to support the effective use of the EVs contemplated by EPA's proposed standards. With respect to franchised dealerships alone, the typical dealership will require the following facility and infrastructure upgrades to sell and service EVs: [EPA-HQ-OAR-2022-0829-0656, p. 13]

- Two EV chargers (Level 2 or DCFC) to ensure availability for sales and service;
- Service lifts with higher weight capacity;
- Service bays that can accommodate additional lift heights of approximately six feet to facilitate high-voltage battery maintenance and removal;
- Battery storage and quarantine containers;56 and

• Workplace safety and emergency response training to navigate the potential dangers associated with vehicle high-voltage systems and components. [EPA-HQ-OAR-2022-0829-0656, p. 13]

56 EV battery temperatures must remain at approximately 70 to 75 degrees, depending on the manufacturer. When an EV comes in for repair, the drive battery may be removed or disconnected from the low-voltage system (12-volt) which maintains its temperature. For example, for body work that requires painting, the drive battery may need to be removed due to high paint booth temperatures, especially during paint curing. When drive batteries are removed, they require special storage. The optimal scenario involves a separate storage building that is temperature-controlled and has a ventilation system. Industry guidelines suggest 50 feet of separation between stored drive batteries and a service facility. Ventilation is critical both around and underneath drive batteries. And when drive batteries are damaged, they can leak fluoride gas, which is heavier than air. This gas is highly flammable and can contribute to a chemical reaction in the battery cells leading to a thermal runaway or fire.

The costs involved in these investments can easily exceed $1,000,000 per dealership. The ability and timeline to make facility upgrades and install chargers will vary significantly by dealership location, the utility upgrades necessary, and permitting lead times. Some locations may need minimal to no utility upgrades for charger installation, but in most cases, electrical infrastructure (e.g., trenches, distribution transformers, switchboards, and conduit) must be upgraded or installed to accept the high-power service necessary to support several chargers. [EPA-HQ-OAR-2022-0829-0656, p. 13]

EPA notes power needs as low as 200 kW could require the installation of a distribution transformer.57 But EPA fails to acknowledge that utilities are facing significant transformer supply chain issues with an average delivery lead time of 12-18[58] months (which only is expected to increase). Dealerships requiring distribution transformer upgrades will be unable to begin selling and servicing EVs in quantity until they are completed. Further, dealerships that rent or lease their buildings or real estate may be unable to install chargers due to lease restrictions on property and building modifications. [EPA-HQ-OAR-2022-0829-0656, pp. 13-14]

57 88 Fed. Reg. at 29311.

58 Robert Walton, Utilities sound alarm over distribution transformer shortage as procurement times surpass 1 year and costs triple, Utility Drive (Dec. 19, 2022). See also Paul Ciampoli, Proposed efficiency standards for distribution transformers would worsen shortages, POWER GRID INTERNATIONAL (March 31, 2023).

Dealership investments are being made now in preparation for an anticipated future market demand. NADA urges EPA to accurately assess the cost and timing of the EV refueling infrastructure necessitated by its proposed standards. [EPA-HQ-OAR-2022-0829-0656, pp. 13-14]

2. Public Charging Shortfalls.

EPA has not adequately considered the impact of its proposal on public charging demand and potential shortfalls associated with the proposal's aggressive EV sales projections. There are about 140,000 publicly accessible charging ports in operation today,59 far less than what the Edison Electric Institute (EEI) says will be needed in 2030, let alone what will be needed to accommodate the new EV sales the proposal projects will occur between MYs 2027 and 2032. In fact, EEI estimates that 12.9 million charge ports will be needed to support the 26.4 million EVs it projects to be on U.S. roads by 2030, including more than 2.6 million charge ports in workplaces and public locations.60 EEI further concludes that, despite significant planned investments, a charging infrastructure gap61 will result in a 68 percent shortfall in publicly accessible DCFC charging ports in 2030, stating: “the number of DCFC ports needed in 2030 to meet projected demand is more than double the planned DCFC ports.”62 [EPA-HQ-OAR-2022-0829-0656, p. 14]

59 See Alternative Fuels Data Center: Alternative Fueling Station Locator (energy.gov)

60 Id. at 10, 12.

61 Charles Satterfield et al., Electric Vehicle Sales and the Charging Infrastructure Required Through 2030, EDISON ELECTRIC INSTITUTE (June 2022).

62 Id. at 15. The image above shows the planned DCFC ports and includes investments by state and federal governments, automakers, electric companies, and the National Electric Highway Coalition. See Id. at 13-15.

[See original comment for pie chart titled “2030 Estimated DC Fast Charging Port Shortfall; 140,000 Ports Needed] [EPA-HQ-OAR-2022-0829-0656, p. 14]

AAI has also found that an infrastructure gap exists, stating that “more than 342 thousand additional chargers are needed today, which is two and a half times the currently available chargers across the U.S. as of March 31, 2023.”63 [EPA-HQ-OAR-2022-0829-0656, p. 15]

63 See Get Connected EV Quarterly Report 2023 Q1.pdf (autosinnovate.org), p. 9.

A newly-issued National Renewable Energy Laboratory (NREL) report is consistent with the findings made by EEI and AAI.64 NREL concludes that the U.S. will need at least 1.2 million public charging ports, including 182,000 DCFC ports, at a cost of $31–$55 billion to meet the charging demand from a projected 33 million EVs on the road by 2030.65 NREL estimates that, as of March 2023, only some $23.7 billion has been committed through funding by the IIJA, private firms, state and local governments, and electric utilities for projects to meet this need.66 NREL submits that, “with long-term market certainty grounded in accelerating consumer demand” additional “public and private investments will put the United States on a path to meeting the [public charging] infrastructure needs” summarized in its report.67 [EPA-HQ-OAR-2022-0829-0656, p. 15]

64 See The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure (driveelectric.gov)

65 See id. at vi-vii, 35-36, 49, and 58.

66 See id. at 58.

67 Id.

These reports are concerning in that they show that significant additional public charging infrastructure, and billions more in investment dollars, are needed to meet future demand based on projected 2030 new EV market penetration levels that are considerably lower than what EPA projects, in some cases by more than 50 percent! The proposal’s discussion on this topic is woefully inadequate. Simply put, it would be unconscionable for EPA to issue standards effectively requiring that well over 60% of new light-duty vehicle sales be plug-in electric vehicles in MY 2032 when critical concerns exist regarding the deployment of public charging infrastructure necessary to support such sales.68 EPA does appear to estimate the costs for deploying the charging infrastructure it believes will be needed to support the aggressive EV rollout it projects, but provides no analysis showing how those needs can be met.69 [EPA-HQ-OAR-2022-0829-0656, p. 15]

68 88 Fed. Reg. at 23907-10; DRIA at 5-22 – 5-32. EPA's insufficient estimates regarding the number of charging ports needed to support large numbers of plug-in electric vehicles were calculated for MY 2027 and MY 2055 only.

69 88 Fed. Reg. at 29311-12.

Given that public charging infrastructures gaps have already been identified, the mere existence of public and private investments in publicly accessible charging projects alone does not negate the very likely possibility of public charging shortfalls stemming from EPA's proposal. Reliable charging infrastructure is critical to the successful mass market adoption of light-and medium-duty EVs. EPA must fully account for the projected public charging demands of its proposal and clearly demonstrate that shortfalls will not exist. [EPA-HQ-OAR-2022-0829-0656, p. 15]

Organization: National Propane Gas Association (NPGA)

Charging infrastructure has not kept pace and the EPA's projections of charging infrastructure growth are aspirational at best.4 The goals of the Proposed Rule are likely unachievable, and the EPA should suspend consideration of the proposed rule until it can evaluate the impact of the grants for charging infrastructure under the Inflation Reduction Act, and if BEV production targets can meet anticipated demand for the model years covered. [EPA-HQ-OAR-2022-0829-0634, pp. 1-2]

3 Proposed Rule at 29329.

4 Proposed Rule at 29368.

Organization: National Rural Electric Cooperative Association (NRECA)

Specifically, within the proposed rule section on PEV Charging Infrastructure Considerations, EPA states:1 "there may be additional infrastructure needs and costs beyond those associated with charging equipment itself. While planning for additional electricity demand is a standard practice for utilities and not specific to PEV charging, the buildout of public and private charging stations (particularly those with multiple high-powered DC fast charging units) could in some cases require upgrades to local distribution systems…However, there is considerable uncertainty associated with…future distribution upgrade needs, and we do not model them directly as part of our infrastructure cost analysis." [EPA-HQ-OAR-2022-0829-0575, p. 2]

1 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,311 (May 5, 2023).

Specific Costs for EPA to Consider Incorporating in the Proposed Rule's Analysis [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

Again, we urge EPA to update its analysis to account for the costs needed to make updates to the grid to support transportation electrification as envisioned in this proposal. Grid upgrade costs for EV charging will vary by region, neighborhood, cooperative, circuit, and feeder.

However, to illustrate the types and ranges of costs that EPA should account for, we provide the following costs sourced from four different cooperative regions, broken down by charge level:

- Residential (Level 1 and Level 2): One out of three households will need an expanded electric panel to accommodate 240 V Breakers. If a household purchases two electric vehicles, then four slots on a breaker will be needed to accommodate this load. The average cost will be approximately $4,000 for a Level 2 residential charger with a panel upgrade. [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

-- Upgrading panel (20% of panels must be upgraded) – can start around $600 [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

-- Transformer upgrades - $2,600 and climbing [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

-- Service wire gauge upgrades to accommodate higher amperage - $3,000 [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

- Public (Level 2 and DC Fast Charging (DCFC)): For commercial sites, transformer upgrade needs will vary. Most sites will already have three-phase power available; however, in very rural locations single-phase power will need to be upgraded to three-phase. If transformers do need to be upgraded on a three-phase line, then three transformers will need to be upgraded. [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

-- Level 2 charger including panel - approx. $4,000 on average [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

-- National EV Infrastructure Program (NEVI)-Compliant DCFC - approx. $25,000-

$150,000 [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

- Transformer - $25,000 - $40,000 (reflects current prices for three transformers) [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

- Service entrance - $3,000-$4,000 [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

- Metering package (including instrumentation, voltage transformers (PT) and current transformers (CT) - $2,000 [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

- Line extension, if required (site dependent) - $50,000 - $75,000 [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

Circumstances vary across cooperatives, but some of these costs will be borne directly by the consumer- members and others will be paid for by the cooperative. Regardless, these costs help to illustrate more accurately the investment it will take to implement on EPA's proposed rule. [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

We note that these costs reflect a snapshot estimate in time and are likely to increase, particularly due to the significant challenges and delays utilities are facing in their supply chains, which are contributing to an unprecedented shortage of the most basic machinery and components essential to ensure the continued reliability of the electric grid. Electric cooperatives are waiting a year, on average, to receive distribution transformers. Additionally, lead times for large power transformers have grown to more than three years. And orders for electrical conduit have been delayed five-fold to 20 weeks with costs ballooning by 200 percent year-over-year. As a result, new projects are being deferred or canceled, and electric cooperatives are concerned about their ability to respond to major storms due to depleted stockpiles. We expect these supply chain challenges to persist with the increased demand for electrification projects being incentivized by the U.S. federal government. All these delays will likely impact the cost and timing of charging infrastructure buildout needed to support the transportation. [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

EPA should update its analysis in the proposed rule to account for the significant grid investments that may be needed to support transportation electrification as laid out in the proposal. As detailed above, these costs may be significant and should not be shouldered by the electric cooperatives serving this new load. Again, electric cooperatives are consumer-owned and operate at cost on a not-for-profit basis. They also serve 92% of the nation's persistent poverty counties. Affordability is critical to electric cooperatives and the consumer-members they serve, and any new costs imposed on an electric cooperative are ultimately borne by the consumers at the end of the line. EPA should update its analysis to ensure it more accurately represents the costs associated with electrifying both LDVs and MDVs, which could be significant across the country. [EPA-HQ-OAR-2022-0829-0575, p. 4]

Organization: National Tribal Air Association (NTAA)

Electrified Vehicles

As noted in the announcement of the proposed standards, "EPA's proposal builds upon a proliferation of announcements by automakers that collectively signal a rapidly growing shift…toward zero-emission technologies, including electrification"5. This anticipated reliance on hybrid, plug-in hybrid, and fully electric power trains may be disproportionately burdensome and costly in Indian country. Far too many homes on many reservations lack access to an electric grid. Further, vehicle reliance on centralized or individual battery charging sites as anticipated in the proposed regulations presents a huge challenge. [EPA-HQ-OAR-2022-0829-0504, p. 3]

5 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for cars and trucks to Accelerate Transition to a Clean – Transportation Future, USEPA News Release, April 12, 2023

The NTAA is well aware of many initiatives to enhance the deployment of renewable energy technologies to support the nation's electricity demand. We actively participate in meetings, webinars, forums, etc. as programs emerge under the Bipartisan Infrastructure Law, Inflation Reduction Act, and other climate change – related initiatives. The NTAA continues to formally comment on EPA proposals that emerge which have the potential to impact Indian country. NTAA remains concerned about realistic access to funding and other resources that are essential to advance renewable energy in Tribal communities and are necessary to transition vehicle fleets as anticipated by the proposed light-duty and medium-duty vehicle emissions standards. [EPA-HQ-OAR-2022-0829-0504, p. 3]

Conclusions

The NTAA appreciates this opportunity to comment on the proposed rule regarding "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." We agree with the EPA's stated urgency to improve our air quality and to mitigate climate change5. The proposed vehicle emissions standards and related provisions can be important elements in addressing these critical needs. We support the proposed rule including Alternative 1 to the proposed greenhouse gas emissions standards. The anticipated shift to electric vehicle fleets must, however, be coincident with greatly enhanced electric infrastructure in many Tribal communities. [EPA-HQ-OAR-2022-0829-0504, p. 3]

5 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for cars and trucks to Accelerate Transition to a Clean – Transportation Future, USEPA News Release, April 12, 2023

Organization: Nissan North America, Inc.

Nissan appreciates the Administration's focus on and support for advancing electrification and carbon neutrality and shares the same long-term goal of transitioning to zero emission vehicle society. However, Nissan believes that market realities, infrastructure needs, consumer impacts, and lack of battery critical mineral availability necessitate an adjustment of the GHG standard stringency in this rulemaking timeframe. [EPA-HQ-OAR-2022-0829-0594, p. 1]

Organization: North American Subaru, Inc.

As articulated by Auto Innovators, to reach 67 percent ZEV sales by 2032 a host of supportive policies is required. Consumers will demand affordability, ease of charging, and a vehicle that meets performance needs in all-weather conditions. The Bipartisan Infrastructure law included $7.5 billion to speed the deployment of EV charging infrastructure across the United States. While this investment in public charging is an important signal to EV-wary consumers, more is needed, particularly In multifamily unit dwellings and in places where Subaru customers love to go, often outside the city limits including camping and outdoor recreational areas. And of growing concern is the reliability and maintenance of installed charging stations. This issue presents another potential inhibitor for EV adoption, including equity concerns.3 [EPA-HQ-OAR-2022-0829-0576, pp. 2-3]

3 Rempel, Cullen, Bryan, Cezar (2022). Report: Reliability of Open Public Electric Vehicle Direct Current Fast Chargers. https://papers.ssrn.com/sol3/papers.cfm?abstract_id+4077554.

Organization: North Dakota Farmers Union (NDFU)

The proposal basically assumes that BEVs will be the dominant technology for future emissions reductions. But relying on a single technology is a risky strategy. Many factors could interfere with BEV production, including the supply and cost of critical minerals, lack of BEV recharging infrastructure, slow ramp-up of wind and solar power, poor customer acceptance, and more. EPA estimates that 67% of U.S. vehicle sales will be BEVs in 2032, but other projections are lower and the U.S. lags behind other countries that are not expected to reach similar levels of sales in that timeframe.10 [EPA-HQ-OAR-2022-0829-0586, p. 5]

10 Stauffer, N. W. (2021, April 29). China's transition to electric vehicles: By 2030 40 percent of vehicles sold in China will be electric; MIT research finds that despite benefits, the cost to consumers and to society will be substantial. MIT News. Retrieved from https://news.mit.edu/2021/chinas-transition-electric-vehicles-0429.

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

D. Deployment of Federal Funding

The recently enacted Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) provide billions of dollars of funding to advance transportation electrification including substantial funding for state governments. Combined with state and federal financial incentives for ZEVs and charging and fueling infrastructure, and other market-enabling policies, the LDV and MDV market segments are primed for rapid and widespread electrification. [EPA-HQ-OAR-2022-0829-0584, p. 7]

The NESCAUM and OTC states are already beginning to deploy the $5 billion made available through the National Electric Vehicle Infrastructure program to accelerate installation of public charging and other alternative fueling infrastructure, and the $5 billion Clean School Bus grant program for zero-emission school buses and technology. Additional funding will be available soon through the $7.25 billion Low or No Emission and Grants for Buses and Bus Facilities programs, the $2.5 billion Charging and Fueling Infrastructure program, the $1 billion Clean Heavy-Duty Vehicle program, and many other new and existing federal programs for which activities that support transportation electrification are eligible. All of the NESCAUM and OTC states recently submitted applications for the $5 billion Climate Pollution Reduction Grant Planning and Implementation programs, which require states to develop and implement priority and comprehensive climate action plans to reduce economy-wide GHG emissions. [EPA-HQ-OAR-2022-0829-0584, p. 7]

Organization: Paul Bonifas and Tim Considine

Moreover, the EPA claims unrealistically low residential electricity charging rates while simultaneously admitting that low-income households won’t have access to, nor be able to afford installation of, residential charging ports. The EPA admits that low-income households will have to rely on commercial charging ports that cost 2-3 times more3, yet they don’t consider this in their net impact calculations. The EPA’s rule will have a negative impact on the entire population but will disproportionately negatively impact the poorest Americans. Correcting for these EPA oversights leads to a more realistic fuel “savings” of NEGATIVE $108 billion, a $998 billion cost increase from the EPA’s calculations. [EPA-HQ-OAR-2022-0829-0551, pp. 2-3]

3 Page 601 of EPA’s Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

Organization: POET, LLC

EPA relies on BEVs making up an astounding 67 percent of LDVs by model year (“MY”) 2032.4 EPA’s modeling largely ignores the significant infrastructure needed to support those BEVs and offers little to no concrete evidence that this infrastructure will be ready in time. [EPA-HQ-OAR-2022-0829-0609, p. 5]

4 See U.S. EPA, Proposed Rule, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29184, 29329 (May 5, 2023) (finding that under the proposal “penetration of BEVs increases by almost 30 percentage points over this 6-year period, from 36 percent in MY 2027 up to 67 percent of overall vehicle production in MY 2032”)

There are issues with U.S. EPA's assumptions regarding electric vehicle supply equipment (EVSE) which are presented in Chapter 5.3.1 of the DRIA. The most notable of these can be seen in DRIA Figures 5-16 and 5-17 which show the number of EVSE ports required under the Proposed Rule and the No Action Case. The difference in required EVSE ports in 2055 is about 20 million (90 to 70). [EPA-HQ-OAR-2022-0829-0609, p. 60]

However, as shown in Figure 9-2 of the DRIA in 2055 the difference in BEV populations under the two cases is about 80 million (160 to 80). What this means is that U.S. EPA is assuming that the doubling of BEV penetration will require only a 30% increase in the number of available ESVE ports. While it may be possible that more BEVs will share EVSE outlets if BEV populations grow, U.S. EPA has done nothing to justify the values used in the BEV assessment. Because U.S. EPA understates the likely need for EVSE, it also underestimates the cost of EVSE that will be incurred due to the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, p. 60]

Organization: Porsche Cars North America (PCNA)

Electromobility will need continued support from public policy. [EPA-HQ-OAR-2022-0829-0637, p. 3]

Recent legislative actions have seeded the ground with support for electric vehicles and the beginning of a robust nationwide charging network. With specifics that continue to be defined, stakeholders are working to maximize the opportunity under these new laws to support customers with valuable purchase incentives, and to help spur the development of new electric vehicle component production and material sourcing. Understandably, the complexity of these laws results in a process that requires careful deliberation with industry representatives working hard to ensure customers have a clear understanding of the support available. Nevertheless, the support within these programs will be critical to the growth rates EPA envisions in this proposal. [EPA-HQ-OAR-2022-0829-0637, p. 3]

Other areas important to consumer adoption can benefit from additional policy development. Further work is needed to reduce barriers to electrification such as streamlining building codes to futureproof new construction to ease the installation of charging at homes, apartments, and workplaces. The magnitude of the challenge related to a robust charging infrastructure is becoming increasingly clear with updated reports such as the Department of Energy's 2030 assessment.1 This single report indicates a total investment of $53-127 billion dollars for private and public charging which does not even include costs associated with grid upgrades to support the 26 million plus ports that are estimated to be needed. Consumers won't be satisfied with roadblocks that make owning an electric car more complicated than a gasoline model. Actions are also needed to help lower the cost of electricity as a fuel to ensure that EVs are competitive and attractive against gasoline models. Policy makers and the auto industry must also continue to find wins in other regulatory programs. EPA's recently finalized Renewable Fuel Standard for 2023-2025 regrettably was unable to finalize the innovative and robust proposal for "eRINs". This proposal that was supported by Porsche could have opened the door for continued growth in electricity derived from biogas and used transportation fuel and to further incentivize growth in the electric vehicle market. Porsche appreciates the need for EPA to consider the wide range of input they received on this proposal and will work proactively to support near-term regulatory actions to finalize this valuable, supportive policy. [EPA-HQ-OAR-2022-0829-0637, p. 3]

1 The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure, US Department of Energy, 2023

Organization: Rivian Automotive, LLC

Infrastructure Development Will Build on Strong Industry Momentum

EPA rightly identifies the importance of ubiquitous and reliable EV charging to achieve the transportation electrification goals supported by this rulemaking. Rivian is actively investing in the Rivian Adventure Network, a nationwide fast charging network, with a focus on reliability and enabling access to areas not historically serviced by existing charging networks. From the perspective of both an all-electric automaker and charging network provider, we applaud the EPA's thorough analysis and modeling of the impact of this rulemaking on charging infrastructure, energy sector emissions, and electric grid infrastructure. The Draft Regulatory Impact Analysis ("DRIA") addresses concerns around these key topic areas and contextualizes them within the many active policies, regulations, and funding opportunities that have created tangible momentum in transportation electrification nationwide. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

This momentum can be seen in domestic EV manufacturing investments and the commitments to EV-only sales by Audi, Fiat, Volvo, Mercedes-Benz, General Motors and Honda.46 With increasing confidence around the availability of EVs now and into the future, the charging infrastructure needed for those vehicles has also seen significant domestic investment from a range of industry players. Since August 2022, 11 charging manufacturers have announced additional manufacturing investments in the U.S. to meet growing demand, including Siemens, ABB E-mobility and SK Signet.47 Two of the world's largest oil and gas companies, Shell and BP, have acquired existing charging network providers, Volta and AMPLY Power, respectively—a demonstration of their intentions to increase their investment in charging infrastructure in the US.48, 49 These investments coupled with the opportunities coming out of the Bipartisan Infrastructure Law and the Inflation Reduction Act have been key forcing mechanisms for critical discussions around how to expedite and scale the roll out of charging infrastructure nationwide. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

46 BloombergNEF, Zero-Emission Vehicles Factbook: A BloombergNEF Special Report Prepared for COP27 (November 2022), available at www.assets.bbhub.io/professional/sites/24/2022-COP27-ZEV-Transition_Factbook.pdf.

47 E2, "Clean Energy Announcements," available at https://e2.org/announcements/sectors/ev/.

48 Shell USA, "Shell USA, Inc. Finalizes Acquisition of Volta Inc, Scaling Up Its U.S. Public Electric Vehicle Charging Network," March 31, 2023, available at www.shell.us/media/2023-media-releases/shell-usa-inc-finalizes-acquisition-of-volta-inc.html.

49 bp, "bp Takes First Major Step into Electrification in the U.S. by Acquiring EV Fleet Charging Provider AMPLY Power," December 7, 2021, available at www.bp.com/en/global/corporate/news-and-insights/press-releases/bp-takes-first-major-step-into-electrification-in-us-by-acquiring-ev-fleet-charging-provider-amply-power.html.

Rivian is encouraged by the efforts currently underway across state and federal agencies, private companies, national labs, and non-profits to address the key challenges and opportunities with scaling charging infrastructure. One of those challenges is the impact of widespread electrification on the electric grid infrastructure. We applaud EPA for acknowledging this challenge as it is a top concern for many industry stakeholders, but also an area where significant attention is being paid. For example, EPRI has launched its EVs2Scale 2030 initiative, which is focused on increasing collaboration between industry and utilities to increase communication around commercial fleet electrification plans and utility capacity mapping.50 Several deliverables are planned by the group, including key tools focused on helping utilities across the country receive the necessary buy-in from their decision makers to plan for the grid upgrades necessitated by transportation electrification. In addition, as noted in the DRIA, NREL recently published a quantitative needs assessment by state and city for a national charging network focused on personally owned, light-duty vehicles.51 The granularity of the analysis available on the state and city level52 will allow it to serve a similar function as the EPRI effort—increasing utilities' awareness of the forthcoming load on their systems, thus providing more time to make necessary grid upgrades. Overall, increasing transparency and information flow with the broad range of utilities operating in the US will be critical to achieving the electrification goals this rulemaking aims to help meet. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

50 Robert Walton, Utility Dive, "EPRI Launches 3-Year Initiative to Address Grid Constraints, Develop Toops to Serve Coming EV Loads," April 19, 2023, available at www.utilitydive.com/news/epri-initiative-electric-vehicle-loads-power-grid-constraints-interconnection/648024/.

51 Wood, E., B. Borlaug, M. Moniot, D.-Y. Lee, Y. Ge, F. Yang, and Z. Liu, National Renewable Energy Laboratory, The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure (2023), NREL/TP-5400-85654.

52 See data files for Wood, E., B. Borlaug, M. Moniot, D.-Y. Lee, Y. Ge, F. Yang, and Z. Liu, National Renewable Energy Laboratory, The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure (2023), NREL/TP-5400-85654, available at https://data.nrel.gov/submissions/214.

In addition to increasing collaboration with utilities, leveraging load management technologies to reduce the need for additional build out of grid capacity will be imperative. As the DRIA notes, there are many commercially available technologies able to manage charging load, from smart charging to mobile and stationary storage, to vehicle grid integration. In recent years, these technologies have demonstrated their ability to subtract years from their project energization timeframes or even enable the completion of a project that would have otherwise been unable to proceed if a full-nameplate upgrade was required. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

While we acknowledge new distribution infrastructure will be necessary, we agree with EPA that commercially available load management technology can leverage the inherent flexibility of EV charging use cases and insert much-needed efficiency into EV-related distribution grid planning and buildout processes. Per EPA's analysis in Figure 5-15 in the DRIA, the majority of charging will be needed at home and at work, which is where load management technologies are particularly impactful due to long dwell times with maximum charging flexibility. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

Overall, increased transparency around the location and scale of future charging load will enable utilities and their decision makers to make necessary investments in the electric grid infrastructure as well as increase their adoption of load management technologies. Therefore, we view the near-term finalization of Alternative 1 as a critical step to build on the existing momentum described above and continue it into 2027 and beyond. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

Organization: Roy Littlefield IV

Firstly, the country's current charging infrastructure is inadequate to support a forced shift towards electric vehicles. Charging infrastructure is not yet fully developed or accessible in many regions of the country. Forcing consumers to transition to EVs without ensuring sufficient charging infrastructure could place undue burdens on drivers across the country. [EPA-HQ-OAR-2022-0829-0793, p. 1]

Organization: Scott Wilson

You will have read also that EVs are unaffordable. Actually, there are 18 new EV models below the average new car price in the US. (see attached) You will have read there is no charging infrastructure. Not true, since any home with electricity near a parking place can support an EV. However, more long-distance highway charging is needed and is the motivation for the administration's NEVI charger program. You will have read that the grid can't support an EV fleet. Major electric utility trade groups point out that off-peak charging will become widespread. It's notable also that 124 business entrepreneurs, executives, and academics have submitted favorable comments. [EPA-HQ-OAR-2022-0829-0515, p. 1]

Organization: Senator Shelley Moore Capito et al.

In addition, there remains a lack of support infrastructure capacity to implement the sweeping transition envisioned in these proposals, particularly for the heavy-duty vehicle category. While the Infrastructure Investment and Jobs Act provides states funding for electric vehicle charging infrastructure, charging technology and deployment continues to focus on passenger and commercial vehicles, not on heavy-duty vehicles. The White House has noted that 72 percent of goods in this country are moved by truck, placing the industry and the center of our critical supply chains and economic competitiveness.5 Efficient and reliable charging infrastructure for heavy-duty vehicles is essential for the sort of transition to electric trucks that the EPA has proposed. However, the technology is nowhere near ready to meet the demand necessary to keep our supply chain moving at the same rate it is today. Charging heavy-duty vehicles requires significantly more expensive conduits and transformers, and consumes vastly more electricity, than what is necessary for charging light-and medium-duty vehicles. Heavy-duty vehicle charging takes longer and is required more frequently than liquid fueling due to electric trucks having reduced range compared to conventional diesel vehicles. This proposal will result in increased curb weight for heavy-duty vehicles due to the significant weight of batteries, leading to reduced payload capacity and ultimately more heavy-duty vehicles on our roadways to move the same amount of freight. This shift may have highway safety implications and create increased congestion on our nation's roadways. In short, the charging technology for heavy-duty vehicles is not readily available and it will take many more years to develop and deploy if it is even economically feasible, making compliance with the EPA' s proposal for heavy-duty vehicles unattainable for the foreseeable future. [EPA-HQ-OAR-2022-0829-5083, p. 2]

5 The Biden-Harris Administration Trucking Action Plan to Strengthen America's Workforce, The White House (Dec. 16, 2021).

The situation for infrastructure to support charging of light-and medium-duty vehicles is only slightly better, with your Agency touting the availability of 130,000 public chargers in its press release announcing its proposals.6 Setting aside their significant reliability issues and lack of broad geographical availability, even a rapid expansion of the number of operational chargers is unlikely to meet the demand for the electrification of two-thirds of the new vehicle fleet by 2032. For reference, 2022 was the worst year for US car sales in a decade with 13.7 to 13.9 million new vehicles sold due to inflation, economic uncertainty, and supply chain disruptions.7 Two--thirds of that depressed sales figure would still represent more than 9 million new vehicles per year being added to the cumulative demand on public charging infrastructure by 2032. [EPA-HQ-OAR-2022-0829-5083, pp. 2-3]

6 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future, US EPA (Apr. 12, 2023).

7 Wayland, Michael. Automakers are cautiously optimistic for a 2023 rebound after worst new vehicles sales in more than a decade, CNBC (Jan. 6, 2023).

Organization: South Coast Air Quality Management District

5. Prioritize infrastructure funding in regions with accelerated ZEV requirements. The proposed rule understandably devotes considerable attention to the significant funding provided by the Bipartisan Infrastructure Law and Inflation Reduction Act that can support this rule. We are encouraged by this substantial investment; however, we suggest U.S. EPA consider how funding will be allocated with priority to non-attainment regions with the highest public health need. California is arguably well ahead of the rest of the nation in deploying zero emission technologies, and our experience in these early deployments highlights key challenges where funding can help to address and accelerate the adoption of ZEVs in our region. Consideration and preferential funding allocations should be given to states, like California, with advanced requirements for ZEV adoption which are needed to attain federal clean air standards. The ZEV regulations in California will require additional costs that can inhibit the deployment of zero emission vehicles at the scale needed to meet air quality standards. Funding support and targeted investments in regions with the highest public health need can help overcome many of these barriers. [EPA-HQ-OAR-2022-0829-0659, p. 3]

Organization: Specialty Equipment Market Association (SEMA)

Government Subsidies

The Federal Government has invested billions of dollars to fund infrastructure projects to support the expansion of BEV charging infrastructure. These investments, which are outlined more below, come on the heels of the Biden Administration's 2021 Electric Vehicle Charging Action Plan to drive American leadership forward on clean cars, and by setting an ambitious target of 50% of electric vehicle (EV) sales shares in the U.S. by 2030.1 [EPA-HQ-OAR-2022-0829-0596, p. 3]

1 FACT SHEET: The Biden-Harris Electric Vehicle Charging Action Plan (Link: https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/13/fact-sheet-the-biden-harris-electric-vehicle-charging-action-plan/).

The Bipartisan Infrastructure Law made a $5 billion investment in electric vehicle charging that will put the U.S. on the path to creating a network of 500,000 chargers across the states. Even with this multi-billion-dollar investment, the nation will still be well short of the projected

1.2 million public chargers that will be needed before 2032 under this proposal. The Department of Energy Loan Program Office (LPO) has also promised roughly $17 billion in loan availability for the Advanced Technology Vehicles Manufacturing (ATVM) Loan Program to support the domestic battery supply chain.2 [EPA-HQ-OAR-2022-0829-0596, p. 3]

2 Department of Energy: Critical Materials Loans & Loan Guarantees (Link: https://www.energy.gov/sites/default/files/2021-06/DOE-LPO_Program_Handout_Critical_Materials_June2021_0.pdf).

Charging Infrastructure Issues

One of the greatest shortcomings of this proposal is that it does not recognize marketplace realities. According to a report from McKinsey about the charging infrastructure needed to implement this rulemaking, it estimates that the U.S. will need to build and deploy approximately 1.2 million more public chargers by 2032. That amounts to an estimated 400 new chargers per day. This would require an 800% increase compared to the daily average of 50 new public chargers deployed last year in this country.14 The federal government's investments in infrastructure will not meet the projected demand with the current proposal creating more uncertainty for consumers that switching to a BEV will be right for them. [EPA-HQ-OAR-2022-0829-0596, pp. 5-6]

14 McKinsey & Company: Building the electric-vehicle charging infrastructure America needs (Link: https://www.mckinsey.com/~/media/mckinsey/industries/public and social sector/our insights/building the electric vehicle charging infrastructure america needs/building the electric-vehicle-charging-infrastructure-america-needs-vf.pdf).

The unintended consequences of these regulations will be extremely far-reaching, adversely impacting both rural and urban vehicle owners. Consumers in rural areas who are forced to drive long distances for work and other necessities may struggle to meet their needs for convenient charging requirements. Urban consumers will struggle in a BEV-centric market due to the lack of charging stations accessible for people who park on the street or in parking garages that cannot meet the need for charging significant numbers of BEVs. [EPA-HQ-OAR-2022-0829-0596, pp. 5-6]

Organization: Stellantis

Electrification Rates Misaligned to Market and Exceed Commitments

Stellantis fully supports comments submitted through The Alliance for Automotive Innovation (AAI or the Auto Innovators) detailing the challenges associated with EPA's overly optimistic expectation for EV market growth. Stellantis remains steadfast to delivering on our commitments to achieve an electrified future, and we acknowledge EPA's efforts with this rulemaking to help support this difficult yet critical transition. However, the proposed rule significantly underestimates the actions needed to build the targeted EV market. Addressing concerns such as manufacturing capacity, battery production, charging infrastructure, and consumer acceptance of EVs will be paramount to the success of this ambitious proposed regulation. [EPA-HQ-OAR-2022-0829-0678, pp. 2-3]

In August of 2021, Stellantis along with the rest of industry through the Auto Innovators, announced support of the Biden administration's goal of achieving 40-50% electrification of the U.S. new light-duty vehicle market by 2030. Foundational to this commitment was the need for stakeholders outside the automotive industry to deliver and execute policies essential for such a significant technology transition: [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

-Expand and scale the charging network to the EV volumes required

-Update federal EV incentives and apply at point of purchase

-Develop domestic battery supply chain (raw materials, manufacturing, and recycling)

-Implement fleet purchase requirements for EVs (including government fleets)

-Increase research & development to accelerate cost reduction of batteries and EV components

-Increase consumer awareness of EVs [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

Although there has been progress towards delivering on these essential EV market enablers, significant gaps remain. For example: [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

The Bipartisan Infrastructure Law (BIL) makes investments in electric vehicle charging that will put us on the path to a network of 500,000 chargers3 – although this is a good down payment on the needed charging infrastructure, it only represents a fraction of what is needed to support the market projected by EPA. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

3 FACT SHEET: The Biden-Harris Electric Vehicle Charging Action Plan | The White House

-The Inflation Reduction Act (IRA) committed significant funds to incentivize the purchase of EVs [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

– however these incentives come with criteria that exclude many EV models today, and pending guidance from the IRS likely could exclude more in the future. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

-The IRA also provides an incentive to produce the needed batteries helping to offset their cost – however this only applies to the U.S., ignoring the global supply chain needed to support a 40-50% U.S. EV market. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

Despite these major gaps, the EPA in its proposed rule incorrectly assumes these policy actions represent a complete answer to achieve a 40-50% market. EPA's proposed rule extends even further by assuming a "perfect" transition to a battery electric vehicle (BEV) only market at 60% in 2030MY – exceeding the commitment made to President Biden, the Administration's National Blueprint for Transport Decarbonization, and the Stellantis Dare Forward commitment. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

These EV penetrations are greater than those of the most mature and forward leaning EV markets in the U.S. Figure 1 below summarizes the electrification rates projected by the EPA proposed rule against the penetration rates required in California's ZEV mandate as part of their recent Advanced Clean Cars II (ACC II) program. California, the most mature EV market in the U.S., will require at least 34% BEVs in 2027, increasing to 54% in 2030, and reaching 66% in 2032. EPA's proposed rule exceeds these California rates in every year from 2027-2032 and by as much as 6% in 2030. [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

SEE ORIGINAL COMMENT FOR TABLE Industry Average Electrification Rates Figure 1-EV Requirements of EPA NPRM vs. CARB ZEV Mandate and Biden Executive Order [EPA-HQ-OAR-2022-0829-0678, pp. 3-4]

Essential to note is that EPA in this rulemaking is proposing federal standards that will apply across all 50 states, including in places where infrastructure, incentives, and other market enablers for EV adoption lag significantly. For example, Figure 3 below shows the current state of national infrastructure versus what the California Energy Commission (CEC) says will be required to support an EV market at the scale projected for the 2030MY timeframe. [EPA-HQ-OAR-2022-0829-0678, pp. 4-5]

Stellantis fully supports AAI comments that predict there could be as many as 40M EVs on the road needing more than 5.8M public chargers by 2030, a threshold that 500,000 (0.5M) additional chargers targeted by the BIL does not come close to achieving. Even if the estimate of EVs on the road is significantly reduced by 35% to 26M vehicles on the road by 2030 – the conclusion does not change. Figure 3 shows that even with a much lower assumption of 26M EVs on the road, there would still need to be 3.8M public chargers compared to the 700,000 (0.7M) the BIL is scoped to deliver when combined with the 0.2M public chargers available today – less than one-fifth of what is needed. [EPA-HQ-OAR-2022-0829-0678, pp. 4-5]

Additionally, approved funding is only the first step to deployment of a new infrastructure – property needs to be purchased and chargers need to be installed and available to the public, which takes time. [EPA-HQ-OAR-2022-0829-0678, p. 5]

SEE ORIGINAL COMMENT FOR 2030MY Anticipated Infrastructure Need (Based on Estimate of 26M EVs in 2030MY) Figure 3-Estimated public chargers needed based on 26M EVs on the road (based on CEC Electric Vehicle Charging Infrastructure Assessment -AB 2127) [EPA-HQ-OAR-2022-0829-0678, p. 5]

These assessments represent estimates for light-duty vehicles. The charging needs for medium-duty vehicles – also required to grow dramatically by the EPA's proposed rule – is much larger. Per the CEC, medium and heavy-duty vehicles, due to their much larger batteries and need for faster charging times require closer to a 1 to 1 ratio of public charger availability to electric vehicles on the road. The infrastructure challenge is clear: to grow the EV market there needs to be a dramatic increase in charging infrastructure, but as of now there is only a partial commitment to achieve this essential market enabler. [EPA-HQ-OAR-2022-0829-0678, p. 5]

At a House Committee on Energy and Commerce hearing on driving affordability held on June 22, 2023, Rep. Dingell (D-MI) raised concerns with EPA Principal Deputy Administrator Goffman on what happens under the NPRM if companies cannot reach BEV as 67% of new vehicle sales in 2032, consumers cannot afford EVs, the charging stations aren't there, and the assumptions and forecasting EPA relies upon are not viable. Mr. Goffman's response included a reference to a possible market assessment review. Stellantis believes the Auto Innovators' recommended ongoing market-based target adjustment system to be the best embodiment of a direct market review. However, Stellantis could support an additional market-based review that is both objective and transparent in reaching the necessary adjustments to allow this rule to be reasonable and achievable given the large amount of uncertainty with how these key market enablers will develop over the next decade. At a minimum, Stellantis supports EPA adding modules to its annual EPA Automotive Trends Reports that capture important metrics such as the number of public EV charging stations deployed and percent of EVs purchased. [EPA-HQ-OAR-2022-0829-0678, p. 7]

Organization: Steven G. Bradbury

Requiring massive expenditures in electric charging infrastructure. If finalized as proposed, the EPA's emissions rules will hold America's automotive freedom hostage to the need for huge new investments in electric infrastructure throughout the U.S. Again, EPA largely minimizes the portion of these infrastructure costs that would appropriately be attributable to its regulatory actions and downplays the impact. [EPA-HQ-OAR-2022-0829-0647, p. 18]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

There are several other ways to look at the PHEV cost question. For example, PHEVs result in significant savings to society due to reduced infrastructure investment for both home and away- from-home infrastructure compared to BEVs. For Strong PHEVs that can match long-range BEVs in GHG reduction when battery manufacturing is included, the lower cost of infrastructure can be in the tens of billions of dollars even with modest percentages of Strong PHEVs in use. We encourage EPA to model this cost savings in a scenario. [EPA-HQ-OAR-2022-0829-0646, pp. 22-23]

Strong PHEVs do not need public charging and can rely on fleet-only or home-only charging which reduces the societal cost (e.g., grid upgrades, public incentives for charging stations). For example, this translates to less expense for and impact on the grid including new transformers, distribution feeders and substations compared to battery EVs. PHEVs reduce the need for fast charge stations and potentially for other types of away-from-home charging stations. [EPA-HQ-OAR-2022-0829-0646, pp. 27-28]

- Strong PHEVs charging in residential or fleet applications have less cost to the grid because they typically charge at home or depots at lower kW levels than battery electric vehicles. Allowing Strong PHEV cars and trucks to be eligible will help with several scale-up issues including reducing the pressure to quickly scale up away-from-home and depot DC fast chargers and facilities for battery production and mineral extraction. [EPA-HQ-OAR-2022-0829-0646, pp. 27-28]

- Strong PHEVs do not need public charging (fleet or home only charging is adequate) and use smaller batteries which means more efficient use of mineral resources especially in the near-term. See Appendix C in this letter. [EPA-HQ-OAR-2022-0829-0646, pp. 27-28]

Organization: TCW Inc.

Yet another significant consideration is our nation's ability to provide enough electricity to charge commercial BEV's. While California is "leading the way" on ZEV integration, the state doesn't generate enough power for their consumption needs today. [EPA-HQ-OAR-2022-0829-0452, p. 1]

https://truckingresearch.org/2022/12/06/new-atri-research-evaluates-charging-infrastructure-challenges-for-the-u-s-electric-vehicle-fleet/ [EPA-HQ-OAR-2022-0829-0452, p. 1]

Organization: Tesla, Inc.

The Tesla Supercharger network reliably serves quick charging needs to BEV drivers on road trips with limited time to charge, and without access to charging at home or at the workplace.27 As of April 2023, there are more than 4,900 Supercharger locations globally and more than 45,000 Supercharger stalls. In the U.S., there are approximately 2,000 Supercharger locations and more than 21,000 Supercharger stalls capable of charge rates up to 250 kW. Superchargers are located in all fifty States, the District of Columbia, and Puerto Rico, representing approximately 60% of the DCFC plugs operational today in the U.S. In February 2023, in conjunction with the White House, Tesla announced it will open at least 3,500 Superchargers in the U.S. to non-Tesla vehicles.28 Further, recently Ford announced it will be adopting the North America Charging Standard (NACS) and will partner with Tesla to allow Ford vehicles – including BEV like Mach-E and the F-150 Lightning – to utilize the Tesla Supercharger network.29 Similarly, General Motors,30 Volvo,31 Polestar32 and Rivian33 have announced that they will also be adopting the NACS standard and several electric vehicle charging manufacturers, including ABB,34 Flo,35 and BTC Power36 also announced that they would be supplying NACS capable chargers moving forward. Numerous charging providers have also followed suit.37 [EPA-HQ-OAR-2022-0829-0792, pp. 5-6]

27 Tesla, Impact Report 2022 at 70 (showing Tesla Supercharger network 2022 uptime reliability at 99.95%).

28 See, President Joe Biden (@POTUS) on Twitter (February 15, 2023) available at h ttps://twitter.com/POTUS/status/1625983221279125504?s=20https://twitter.com/POTUS/status/1625983221279125504? s=20.

29 Ford, Ford EV Customers to Gain Access To 12,000 Tesla Superchargers; Company to Add North American Charging Standard Port in Future EVs (May 25, 2023) available at h ttps://media.ford.com/content/fordmedia/fna/us/en/news/2023/05/25/ford-ev-customers-to-gain-access-to-12-000-t esla-superchargers--.html.

30 GM, General Motors Doubles Down on Commitment to a Unified Charging Standard and Expands Charging Access to Tesla Supercharger Network (June 8, 2023) available at h ttps://www.prnewswire.com/news-releases/general-motors-d oubles-down-on-commitment-to-a-unified-charging-standard-and-expands-charging-access-to-tesla-supercharger-n etwork-301846599.html.

31 Car & Driver, Volvo Is Latest Automaker to Agree to Adopt Tesla's Charge Port (June 27, 2023) available ath ttps://www.caranddriver.com/news/a44350518/volvo-electric-vehicles-tesla-charging-2025/.

32 Businesswire, Polestar will adopt North American Charging Standard to enable access to Tesla Supercharger network in USA and Canada (June 29, 2023) available at h ttps://www.businesswire.com/news/home/20230629093526/en/Polestar-w ill-adopt-North-American-Charging-Standard-to-enable-access-to-Tesla-Supercharger-network-in-USA-and-Canada.

33 Rivian, Rivian Accelerates Electrification through Adoption of North American Charging Standard and Access to Tesla’s Supercharger Network for Rivian Drivers (June 20, 2023) available at h ttps://www.businesswire.com/news/home/20230620267452/en/Rivian-Accelerates-Electrification-through-Adoption-of-N orth-American-Charging-Standard-and-Access-to-Tesla%E2%80%99s-Supercharger-Network-for-Rivian-Drivers.

34 ABB, ABB E-Mobility is Adding North American Charging Standard (NACS) as an Option to Our Products (June 9, 2023) available at h ttps://twitter.com/ABBNorthAmerica/status/1667139962830041091https://twitter.com/ABBNorthAmerica/status/16671 3 9962830041091.

35 FLO, FLO Stations to Offer North American Charging Standard (NACS); Supports Broader Use (June 8, 2023) available at h ttps://www.flo.com/news/flo-stations-to-offer-north-american-charging-standard-nacs-supports-broader-use/.

36 BTC Power, BTC POWER To Introduce North American Charging Standard (NACS) Compatibility For Enhanced EV Charger Accessibility (June 20, 2023) available at h ttps://btcpower.com/blog/btc-power-to-introduce-north-american-charging-s tandard-nacs-compatibility-for-enhanced-ev-charger-accessibility/.

37 See, EV Station, Tesla NACS Charger Adoption Tracker available at h ttps://evstation.com/tesla-nacs-charger-adoption-tracker/.

SEE ORIGINAL COMMENT FOR Figure 1: Tesla Global Delivery Volume and Job Growth [EPA-HQ-OAR-2022-0829-0792, pp. 5-6]

In any event, deployment of adequate charging infrastructure is already, and will be, available commensurate with the rate of BEV uptake supported by more stringent rules than the agency proposes. EPA's analysis of this issue should focus on when the standards come into effect: to the extent EPA has authority to consider infrastructure issues, it would be under its authority to have the regulation take effect "after such period as the Administrator finds necessary to permit the development and application of the requisite technology,"186 which necessarily entails a predictive judgment about what the infrastructure capacities would be in the future (including in response to the proposed rule), rather than being limited to the status quo. For example, in the past EPA has considered whether technology would "would be perfected early enough to allow its mass production and installation."187 [EPA-HQ-OAR-2022-0829-0792, p. 30]

186 42 U.S.C. § 7521(a)(2) (emphasis added).

187 NRDC v. EPA, 655 F.2d 318, 324 (D.C. Cir. 1981).

While the proposal focuses its attention on non-residential charging, the agency should more robustly recognize the role of residential charging.188 In the U.S. there are approximately 82 million single family homes most of which are a capable of providing Level 1 and 2 BEV charging.189 As DOE indicates 80% of EV charging is done at home due to the convenience and low cost of residential charging and strategies for addressing the increase in electricity demand are readily available.190 Further, as the EPA notes, the IRA's extension of the Alternative Fuel Refueling Property Tax Credit through Dec 31, 2032, will support individual home owners investment in significantly expanding residential charging.191 [EPA-HQ-OAR-2022-0829-0792, p. 30]

188 See, 88 Fed. Reg. at 29307; Draft RIA at 5-22 thru 5-39.

189 See, Statista, U.S. Single family homes -statistics & facts (Feb. 20, 2023) available at h ttps://www.statista.com/topics/5144/single-family-homes-in-the-us/#topicOverview

190 See e.g., NREL, Incorporating Residential Smart Electric Vehicle Charging in Home Energy Management Systems (April 7, 2021) available at h ttps://www.nrel.gov/docs/fy21osti/78540.pdf

191 See, Draft RIA at 5-26.

Additionally, the agency unduly dampens the rate of Level 3 charging deployment by utilizing cost estimates for DCFC installation that are dramatically higher than Tesla's experience. Tesla has established the lowest cost in the industry and shown the costs to be more than 50% below current industry averages.192 EPA utilizes a mid-range DCFC cost of $153,000 per charging port for a 250 kW DCFC port. In comparison, Tesla costs are under $40,000 per deployed DCFC port.193 This overestimation of the cost of deployment indicates that the agency underestimates the volume of DCFC that can be deployed based on expected investment levels. Importantly, EPA should recognize, as Tesla's figures exemplify, that non-utility ownership of BEV charging stations is associated with significantly reduced cost of installation.194 Further, charging technology, like vehicle technology, is also maturing as more suppliers and manufacturing facilities are coming online and the cost of installation will continue to decline.195 [EPA-HQ-OAR-2022-0829-0792, pp. 30-31]

192 Tesla, 2023 Investor Day Presentation (March 1, 2023) at 97 – 101.

193 Id., at 97; See also, See Grid Strategies/Electric Serving Customers Best: The Benefits of Competitive Electric Vehicle Charging Stations (May 2023) at Table 3 (showing calculations for average cost per EV charging port by company) available at h ttps://www.electricadvisorsconsulting.com/wp-content/uploads/2023/05/The-Benefits-of-Competitive-EV-Charging-S tations.pdf

194 See, Grid Strategies/Electric Serving Customers Best: The Benefits of Competitive Electric Vehicle Charging Stations (May 2023) at Table 3 (showing calculations for average cost per EV charging port by company) available at h ttps://www.electricadvisorsconsulting.com/wp-content/uploads/2023/05/The-Benefits-of-Competitive-EV-Charging-S tations.pdf

195 See, 2023 Tesla Investor Day Presentation at 99 (showing a 40% Improvement in Per kWh Costs between Q1 2021 and Q4 2022); See also, ABB, ABB expands US manufacturing footprint with investment in new EV charger facility (Sept. 14, 2023) available at h ttps://new.abb.com/news/detail/94725/abb-expands-us-manufacturing-footprint-with-investment-in-n ew-ev-charger-facility; See also, Tritium, Tritium Celebrates the Opening of Its First Global EV Fast Charger Manufacturing Facility in the United States (Aug. 23, 2022) available at h ttps://tritiumcharging.com/tritium-celebrates-the-opening-of-its-f irst-global-ev-fast-charger-manufacturing-facility-in-the-united-states/

Rapid and Expansive Investment in Charging Infrastructure Supports Stringent Multi-Pollutant Light-Duty Emission Standards

As EPA notes, investments in BEV charging infrastructure have grown rapidly in recent years and will continue to accelerate.196 Moreover, a number of new Congressionally enacted policies will also facilitate greater and rapid deployment of charging infrastructure sufficient to support more robust light-duty standards.197 The Bipartisan Infrastructure Law (IIJA) bipartisan infrastructure and investment and jobs act invests $7.5 billion to build out the first-ever national network of EV chargers. IIJA also created the Charging and Fueling Infrastructure Discretionary Grant Program to deploy publicly accessible charging and fueling infrastructure and provides for $2.5 billion over five years for the program.198 At the end of March 2023, FHWA issued a notice of funding opportunity to solicit applications for grants totaling up to $700 million to deploy charging and alternative fueling infrastructure projects. Half of the $700 million is allocated for electric vehicle and other infrastructure located on public roads or in other publicly accessible locations, while the other half is allocated for charging and alternative fueling infrastructure located along designated alternative fuel corridors. [EPA-HQ-OAR-2022-0829-0792, pp. 31-32]

196 88 Fed. Reg. at 29194.

197 88 Fed. Reg. 29195; Draft RIA at 5-25 thru 5-26.

198 Infrastructure Investment and Jobs Act, P.L 117-58 (Nov. 15, 2021), Section 11401.

In addition to the federal investments in charging facilitated by the IIJA, the IRA's Section 30C provides significant tax incentives for the deployment of private capital into charging infrastructure for both light and heavy-duty vehicles.199 It allows for up to $100,000 for each charger with no limit on how many chargers a fleet can purchase and install at one site; this will drive significant new private investment. Similarly, tax incentives for building efficiency will also benefit EV charging installations.200 PWC recently predicted that the BEV charging market will grow ten-fold by 2030.201 Another new analysis establishes BEV charger annual installed capacity will overtake distributed solar for the first time in 2023 and will reach 41 GW by 2027 and the BEV charging infrastructure market will reach US $20 billion by 2027, led by the residential Level 2 (US $6.5 billion) and public DC fast-chargers (US $5.6 billion) segments.202 Further, the International Energy Agency (IEA), in its 2022 Trends in Charging Infrastructure study, reported that already "the United States counts about 22,000 fast chargers, of which nearly 60% are Tesla superchargers."203 Notably, Tesla plans to double the size of our Supercharging network in the next 18-24 months.204 Other automakers are following in Tesla's footsteps and entering into EV charging partnerships and investments as well.205 Similarly, fossil fuel companies are reorienting investment around BEV infrastructure.206 Investment in charging infrastructure will be further enhanced by state rebates and incentive programs. Numerous incentives that will also facilitate new charging infrastructure have been established and enacted.207 [EPA-HQ-OAR-2022-0829-0792, pp. 31-32]

199 Id. at Section 13404.

200 See Credit Suisse, Treeprint: US Inflation Reduction Act -A Tipping Point in Climate Action, at (2022) available at h ttps://www.credit-suisse.com/about-us-news/en/articles/news-and-expertise/us-inflation-reduction-act-a-catalyst-for-c limate-action-202211.html.

201 PWC, The US electric vehicle charging market could grow nearly tenfold by 2030: How will we get there? (2023) available at h ttps://www.pwc.com/us/en/industries/industrial-products/library/electric-vehicle-charging-market-growth.html.

202 Wood MacKenzie US Distributed Energy Resource market to almost double by 2027 (June 20, 2023) available at h ttps://www.woodmac.com/press-releases/us-distributed-energy-resource-market-to-almost-double-by-2027/.

203 IEA, Trends in charging infrastructure (2022) available at h ttps://www.iea.org/reports/global-ev-outlook-2022/trends-in-c harging-infrastructure.

204 TechCrunch, Tesla agrees to double supercharger network, open to all EVs under Biden's $7.5B charging plan (Feb. 15, 2023) (discussing other charging investments as well) available at h ttps://techcrunch.com/2023/02/15/tesla-agrees-to-double-supercharger-network-open-to-all-evs-under-bidens-7-5b-charging-plan/.

205 See e.g., Bloomberg, Jeep Maker Stellantis Sets Up EV Charging Unit to Soothe Range Anxiety (June 27, 2023) available at https://www.bloomberg.com/news/articles/2023-06-27/jeep-maker-stellantis-sets-up-ev-charging-unit-to-soothe-range-a nxiety#xj4y7vzkg; Bloomberg, C ar-Charging Investment Soars, Driven by EV Growth and Government Funds (Aug. 16, 2022) available at h ttps://www.bloomberg.com/news/articles/2022-08-16/car-charging-investment-soars-driven-by-ev-g rowth-and-government-f unds?cmpid=BBD081622_hyperdrive&utm_medium=email&utm_source=newsletter&utm_term=220816&utm_campaign= h yperdrive#xj4y7vzkg; Charged, F LO to provide up to 40,000 public chargers for GM's Dealer Community Charging Program (Dec. 10, 2022) available at h ttps://chargedevs.com/newswire/flo-to-provide-up-to-40000-public-chargers-for-gms-dealer-community-charging-program/?utm_source=ChargedEVs.com+Email+Newsletter+Opt-in&utm_campaign=f221ea7628-

Daily+Headlines+RSS+Email+Campaign&utm_medium=email&utm_term=0_6c05923d39-f221ea7628-343935020.

206 See e.g., BP, bp leans into convenience and mobility across US, agrees to purchase leading travel center operator, TravelCenters of America (Feb. 16, 2023) available at h ttps://www.bp.com/en/global/corporate/news-and-insights/press-r eleases/bp-agrees-to-purchase-travelcenters-of-america.html.

207 See generally, N.C. Clean Energy Technology Center (NCCETC), The 50 States of Electric Vehicles: State ZEV Targets,Managed Charging, & LMI Access Prioritized in 2022 (Feb. 8, 2023) available at h ttps://nccleantech.ncsu.edu/2023/02/08/the-50-states-of-electric-vehicles-state-zev-targets-managed-charging-lmi-a ccess-prioritized-in-2022/.

Organization: Texas Public Policy Foundation (TPPF)

The HD Tailpipe Rule Will Devastate Trucking

Former Supreme Court Justice Breyer stated in Whitman v. Am. Trucking, 531 U.S. 457 (2001), that the Clean Air Act “does not require the EPA to eliminate every health risk, however slight, at any economic cost, however great, to the point of ‘hurtling’ industry over ‘the brink of ruin.’” Id. at 494. In the Whitman case the Supreme Court vacated the 1997 NAAQS because of the poor science and lack of discernable criteria underlying them. Likewise here, no scientific data requires the EPA to enact the most stringent tailpipe emission limits conceivable. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

Electric trucks typically have a higher upfront purchase price compared to traditional diesel trucks. The HD Tailpipe Rule will effectively bar diesel trucks from sale, forcing trucking companies seeking to replace their fleet to take on more costs to do so. This will strain the financial resources of some companies, especially smaller ones. Shifting from diesel trucks to electric ones will also require adapting to new technologies and training drivers to effectively operate electric vehicles. This transition period will likely lead to disruptions in the supply chain and additional costs — both temporal and monetary — for trucking companies. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

Moreover, the availability of charging stations for electric trucks is currently poor and still developing. It is certainly not as extensive as refueling stations for diesel trucks, and retrofitting existing truck stops for electric charging will place immense strain on electrical infrastructure and the national grid, especially in rural communities often frequented by truckers traveling the nation’s highways, causing prices to skyrocket for average Americans. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

The resulting chaos will limit the range and flexibility of electric trucks for long-haul journeys. Electric trucks already have limited range compared to diesel trucks, particularly when fully loaded. This will mean more frequent charging, adjustment to trucking routes, and overall shipping delays, negatively affecting operational efficiency. And even if the myriad infrastructure issues involved in getting power to truck refueling stations were solved or mitigated, the electricity used to charge electric trucks would still primarily come from America’s most reliable and abundant power source: fossil fuels. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

In effect, the HD Tailpipe Rule will force truckers to spend substantial financial and human resources to comply with ultra vires government regulations that fail to make even a marginal dent in global issue of changing climate. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

The LMD Tailpipe Rule Will Unnecessarily Harm Consumers

Similarly, the LMD Tailpipe Rule is regulatory overkill that will harm average Americans and limit innovation. To start, stricter emissions regulations will increase manufacturing costs for automakers. This will lead to higher sticker prices for vehicles, pricing low-to middle-class Americans out of the automotive market, leaving them stranded with little recourse or dependent on public transit, eventually depressing the job market. The government should not place the burden for green energy on the least fortunate Americans, adding yet another obstacle to their economic climb. [EPA-HQ-OAR-2022-0829-0510, pp. 5-6]

Automakers will rush to convert their fleets to feature either all or mostly electric vehicle models, disadvantaging new car buyers in areas without existing electric charging infrastructure. In the same vein, as mentioned above, the strain placed on the electric grid caused by millions of Americans charging their vehicles will cause electric prices to rise markedly and lead to “brown-outs.” See, e.g. Nadia Lopez, Race to zero: Can California’s power grid handle a 15-fold increase in electric cars?, CALMATTERS (Feb. 6, 2023), https://calmatters.org/environment/2023/01/california-electric-cars-grid/ (“State officials claim that the 12.5 million electric vehicles expected on California’s roads in 2035 will not strain the grid. But their confidence that the state can avoid brownouts relies on a best-case — some say unrealistic — scenario: massive and rapid construction of offshore wind and solar farms, and drivers charging their cars in off-peak hours.”). [EPA-HQ-OAR-2022-0829-0510, pp. 5-6]

Additionally, electric cars have limited range and require long recharging sessions, and the infrastructure to support the sudden transition to electric vehicles that the LMD Tailpipe Rule would cause simply does not exist. Rural and low-income communities, the people most affected by this regulation, likely will be the last to receive said recharging infrastructure. [EPA-HQ-OAR-2022-0829-0510, pp. 5-6]

Finally, EPA should assess impacts to the national economy as a result of potentially accelerating ZEV freight transport that would cease to be reliable or functional outside of a geographically confined network of charging/fueling infrastructure and support systems. [EPA-HQ-OAR-2022-0829-0510, p. 7]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

Charging will also cost more. The new power plant rules will regulate carbon dioxide and other so-called greenhouse gas emissions from both new and existing natural gas and coal-fired power plants, and require carbon capture systems or a switch to hydrogen fuels.5 These commercially unproven systems for capturing carbon are costly and will be passed on to consumers in the form of higher electricity rates. Drivers will find it more expensive to use electricity for all purposes, including charging their electric vehicles, harming poor and middle-class drivers the most. EPA does not address its new power plant rules in this rule. [EPA-HQ-OAR-2022-0829-0674, pp. 2-3]

5 Environmental Protection Agency, “Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants,” May 15, 2023, https://www.epa.gov/stationary-sources-air-pollution/greenhouse-gas-standards-and-guidelines-fossil-fuel-fired-power (accessed May 18, 2023).

Mandating electric vehicles would reduce Americans’ standard of living. Back in the early 1900s, when Henry Ford started producing cars, only rich Americans could afford them. Throughout the 20th century cars became less expensive, and many households can afford not one but two. Cars are already becoming more expensive, and the proposed rule accelerates that trend, taking America back a century, where new cars will be only for the rich. EPA does analyze declines in standards of living. [EPA-HQ-OAR-2022-0829-0674, pp. 3-4]

Recharging an electric vehicle from empty can take over an hour, compared to 5 minutes to fill up with gas.11 If there is a line to use the charging station the wait can double. Most people do not want to let their EV battery go below 20%, and the charging rate goes down when it is charged over 80%.12 Throughout America the poor rarely have access to indoor garages for overnight charging, and in most large cities, such as New York City, the middle-class also have no access to indoor charging. Using charging stations on the street, if available, risks theft of expensive charging cables. EPA does not account for this lack of convenience. [EPA-HQ-OAR-2022-0829-0674, pp. 3-4]

11 Lazar, “How Long Does It Take to Refuel a Gasoline Car? GasAnswer, https://gasanswer.com/how-long-take-refuel-gasoline-car/ (accessed April 28, 2023).

12 Sebastian Blanco, “How to Maximize EV Range,” J.D. Power, July 20, 2022, https://www.jdpower.com/cars/shopping-guides/how-to-maximize-ev-range (accessed April 28, 2023).

Organization: The Mobility House et al.

Additionally, PCS can save customers and ratepayers through avoided infrastructure investments. Pacific Gas and Electric (PG&E) of Northern California reported that sites that used Automated Load Management (ALM), a form of PCS, to dynamically modulate and reduce EV charging to meet site infrastructure needs saved $30,000 -$200,000 per site in avoided infrastructure upgrades. 1 [EPA-HQ-OAR-2022-0829-0657, p. 2]

1 Pacific Gas and Electric Company Electric Vehicle Charge 2 Prepared Testimony, pages 2-9 – 2-10, October 26, 2021.

Organization: Toyota Motor North America, Inc.

While our attached comments cover a range of issues for EPA’s consideration, the five below summarize the most critical: [EPA-HQ-OAR-2022-0829-0620, p. 2]

1. The proposed standards are expected to result in a new vehicle sales mix of 67% BEV by 32MY. Achieving such a high penetration is almost entirely dependent on factors outside our control. As discussed in more detail in our attached comments, hundreds of new mines are needed globally to produce enough critical minerals to support so many BEVs. The sources for those minerals are almost exclusively outside the U.S., as is most of the mineral processing to turn the ore into usable battery-grade material. And the charging infrastructure (both in-home and public) needed to support that level of electrification is far from where it needs to be. Recent legislation and incentives are directionally supportive but appear far short of what is needed. EPA should adjust the standards in the proposed rule to account for these major uncertainties

over which automakers have little control, but for which we face significant compliance and brand/reputation ramifications should they not come to bear. Compliance cannot be based on factors over which we have no control. [EPA-HQ-OAR-2022-0829-0620, p. 2]

The Proposed Rule also for the first time imposes standards on automakers for which compliance requires significant actions by third parties over which we (or EPA) have no control. First, achieving the level of BEVs required by the Proposed Rule will require massive new supplies of critical minerals, the mines to extract them, and the refining facilities to turn ore into battery-grade material. Currently, virtually the entire mineral and battery supply chain is outside the U.S. Second, it requires massive investments in home and public charging infrastructure, as well as upgrades to the electrical grid throughout the U.S. and an accelerated shift to renewable power generation. Various provisions of the IIJA and IRA directionally support some of these areas but fall significantly short of what will be needed for the expected level of electrification. And finally, the ultimate impact of these factors on vehicle costs and consumer demand are unclear, at best. The are few contingencies for automakers and our customers in the event any or all these factors stand in the way of complying with the Proposed Rule. Our comments below address these and other issues. [EPA-HQ-OAR-2022-0829-0620, pp. 8-9]

We are prepared to follow up with additional information beyond these comments. We look forward to collaborating toward a more workable Final Rule. [EPA-HQ-OAR-2022-0829-0620, pp. 8-9]

5. GHG Program

The Proposed Rule fails to demonstrate the penetration of BEVs assumed for compliance with the proposed standards is feasible. The proposal notes “While emission standards set by the EPA under CAA section 202(a)(1) generally do not mandate use of particular technologies, they are technology-based, as the levels chosen must be premised on a finding of technological feasibility.”17 CAA section 202(a)(1) states “Any regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.”18 [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

17 88 Fed. Reg at 29232.

18 42 U.S.C. § 7521(a)(2).

The aggressive ramp up of BEVs (see Table 1) required to comply forces a rapid transformation of how vehicles are manufactured, driven, fueled, and serviced. As such, “leadtime and requisite technology” must extend to the availability of critical minerals, the readiness of a sustainable battery supply chain and fueling infrastructure, as well as other market-related factors that will affect the price and consumer demand of BEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

[Table 1 Annual BEV Penetration Assume for Compliance w/ Proposed Standards: [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

MY 2027: BEV Share 36

MY 2028: BEV Share 45

MY 2029: BEV Share 55

MY 2030: BEV Share 60

MY 2031: BEV Share 63

MY 2032: BEV Share 67] [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Today's PEV support system clearly cannot meet the needs of the future envisioned by the proposal. Our comments explain why the proposal lacks a clear justification for how the support system will be in place over the period of the proposed standards. Neither EPA nor auto manufactures can control the timing or outcomes of these essential support measures. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Therefore, it is disappointing that EPA removed the e-RIN proposal from the RFS set rule as it is one of the few measures for which EPA has direct authority to provide at least some level of assistance in supporting the EV shares required in the GHG proposal. After a muti-year collaboration with the auto industry, a valuable policy tool for establishing PEV markets and promoting clean energy has been lost. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Finally, EPA has taken a more measured view of technology risk and uncertainty in past vehicle emissions rulemakings in which technology costs were lower and automakers had significantly more direct control over managing their technology development, deployment, and sales mix to comply. In this Proposed Rule, EPA appears to be taking a much more cavalier approach to risk, lead time, and ensuring the "requisite technology" is available, despite the high cost of BEVs, the massive uncertainty around mineral supplies, the significant investment needed in charging infrastructure and the power grid, and the uncertain market demand for BEVs. The standards in the Final Rule should be adjusted to better account for market uncertainties. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Organization: Transfer Flow, Inc

A major concern for consumers is how they would charge an electric vehicle. For citizens living in apartment buildings or utilizing on-street parking, managing an electric vehicle would be inconvenient and challenging. The image below from Deloitte's 2022 Global Automotive Consumer Study17 illustrates consumer powertrain preferences for their next vehicle, which are not aligned with the EPA's proposed Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

17 https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Consumer-Business/us-2022-global-automotive-consumer-study-global-focus-final.pdf

[See original attachment for "Consumer powertrain preferences for their next vehicle"]

Electric Vehicles require the ramp-up of many new electricity-generating power plants to provide enough power to charge all the projected electric vehicles, and then those electricity-generating power plants must rely heavily on carbon capture technologies to keep the emissions from these electricity-generating power plants out of the atmosphere. Current carbon capture technologies are experimental and may prove dangerous.22 [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

22 https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f

In many places, such as rural environments or for use in utility vehicles, electric vehicles are not a practical solution. Utility companies working on phone lines, power lines, and performing construction work all need reliable power sources that can be used for transporting people and powering equipment, as well as function when the electric power grid may be in need of repair. Electric vehicles do not have a network in remote areas or the energy density to effectively transport and power auxiliary equipment needed to, among other functions, install or perform repairs to electric power lines. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

Pacific Gas and Electric (PG&E), two years after the historical Dixie Fire, is still powering affected Californians with diesel-powered generators as the infrastructure required to bring electricity into homes has still not been rebuilt. Citizens living in these affected areas would need to charge electric vehicles using electricity created from diesel generators, and the logistics of that simply do not make sense. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

For a myriad of reasons, people may be hesitant to adopt electric vehicle technology. Near-zero technologies are going to be more agreeably adopted if consumers feel they have a choice of which near-zero technology works best for them. In Northern California, many citizens affected by various wildfires still harbor animosity towards PG&E for negligently causing various wildfires that have ruined thousands of people's lives. In 2020 PG&E pled guilty to 84 counts of manslaughter for starting the historically devastating Camp Fire.23 Many citizens affected by these wildfires don't want electric vehicles because they don't believe they can trust PG&E. Not encouraging a choice of which near-zero technology consumers choose to implement runs the risk of having the opposite intended effect. Consumers will likely choose to hold on to their old, dirtier vehicles, defeating the intended purpose. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

23 https://www.nytimes.com/2020/06/16/business/energy-environment/pge-camp-fire-california-wildfires.html

Organization: U.S. Chamber of Commerce

-Inadequate EV charging infrastructure. It is widely regarded that consumer acceptance of and interest in electric vehicles is highly dependent on the existence of a sufficient nationwide network of EV charging infrastructure. As noted in the proposed rule, the bipartisan Infrastructure Investment and Jobs Act provides $7.5 billion of Federal Highway Administration funding for charging infrastructure deployment efforts that provide an important start for this effort. However, implementation of these programs has barely begun, and there is ample evidence that even their successful and on-time execution will leave the U.S. far short of the number of charging stations necessary to support the proposal's expectation of nearly 70% EV sales in 2032. Addressing this shortcoming is fundamental to overcoming consumer reluctance to EV adoption. The Chamber encourages EPA to work with automakers, utilities, the Department of Energy, and state governments to adjust phase-in timelines of this rulemaking to correspond to realistic expectations of EV charging infrastructure buildout. [EPA-HQ-OAR-2022-0829-0604, p. 2]

Organization: U.S. Conference of Catholic Bishops (USCCB)

The greater adoption of EVs can be good for society and the environment when incentives are directed to consumers who will use EVs extensively, such as single-vehicle households, ride sharing drivers, used car buyers and middle-and lower-income households.24 In addition, some aspects of EV infrastructure subsidies, such as in the geographical distribution of charging stations, tend to reflect and perpetuate "disparities across race and income."25 A modified proposed rule should address these concerns with a strategy to allocate EV resources to middle- and low-income households, and also favor users who will be inclined to use the EV for the necessary number of miles so that it produces a net environmental benefit. [EPA-HQ-OAR-2022-0829-0540, pp. 4-5]

24 Hardman, S. et al., Aug. 30, 2021, https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/

25 "The result shows a similar overall pattern of access disparities between the race and ethnicity groups, but the access gap is larger than that found for public chargers overall… The odds of having publicly-funded charger access in Black and Hispanic majority CBGs is less than half of that in White-majority CBGs." Hsu, C. & Figerman, K. 'Public electric vehicle charger access disparities across race and income in California', https://www.sciencedirect.com/science/article/pii/S0967070X20309021.

The EPA's numerous regulations that promote human and ecological health, reduce GHG, and promote the common good are commendable. In these times of growing ecological challenges, increased inequality, and fiscal pressures, aggressive environmental standards must also respect economic and social considerations, driving our nation towards an "energy revolution" that provides "not only sustainable, efficient and clean energy, but also energy that is secure, affordable, accessible and equitable."26 For these same reasons, the light-duty vehicle standards should be improved and optimized to benefit primarily low-and middle-income Americans to reduce racial and economic disparities. [EPA-HQ-OAR-2022-0829-0540, pp. 4-5]

26 USCCB-CRS Letter to the Secretary of State, Feb. 17, 2017, https://www.usccb.org/resources/usccb-crs-letter-secretary-tillerson-care-creation-february-17-2017

Organization: Valero Energy Corporation (Valero)

1. The EVSE (charging infrastructure) installation costs adopted by EPA are unrealistic.

Table 5-14 of the Draft Regulatory Impact Analysis ("DRIA") summarizes the ranges of costs that EPA considered for EVSE hardware and installation.3 Recent estimates by EV charging station vendors and in DOT-approved state EV Infrastructure Deployment Plans project significantly higher EVSE costs than used by EPA in their cost analysis, ranging from $500,000 to $1.2 million in capital expenditures for a minimally-compliant NEVI charging station containing four simultaneously operable 150 kW CCS ports (i.e., $125,000 - $300,000 per DC-150 kW port).4,5,6,7 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

3 DRIA at 5-32 and 5-33.

4 See https://www.evgo.com/blog/building-ev-charging-stations-with-nevi/ (accessed May 13, 2023).

5 https://betterenergy.org/wp-content/uploads/2023/01/EV_CorridorRoadmap2023.pdf (accessed May 13, 2023).

6 ARDOT, “Arkansas Electric Vehicle Charging” (July 2022), https://www.ardot.gov/wp-content/uploads/2022/07/ARDOT_NEVI_FAQ.pdf.

7 U.S. DOT Fiscal Year 2022/2023 EV Infrastructure Deployment Plans (accessed May 20, 2023), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/. See plans submitted by and approved for Alabama, Alaska, Colorado, District of Columbia, Idaho, Indiana, Iowa, Kentucky, Louisiana, Minnesota, Mississippi, Nebraska, North Dakota, Ohio, Oklahoma, Rhode Island, South Dakota, Texas, and Wyoming.

Beyond the EVSE hardware and installation costs, EPA fails to consider annual operating and maintenance costs for EVSE, estimated by the District of Columbia to run $1,000 per Level 2 charger and $1,400-$2,000 per Level 3 DC fast charger.8 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

8 Government of the District of Columbia, “District’s Electric Vehicle Infrastructure Deployment Plan” at 13 (2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/dc_nevi_plan.pdf.

Although EPA acknowledges that upgrades to electricity distribution systems may be required to meet the charging loads associated with EVSE, it immediately dismisses the costs, explaining that

“EPA acknowledges that there may be additional infrastructure needs and costs beyond those associated with charging equipment itself. While planning for additional electricity demand is a standard practice for utilities and not specific to PEV charging, the buildout of public and private charging stations (particularly those with multiple high-powered DC fast charging units) could in some cases require upgrades to local distribution systems. For example, a recent study found power needs as low as 200 kW could trigger the need to install a distribution transformer while a load of 5 MW or more could require upgrades to feeder circuits or the addition of a feeder breaker.”9 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

9 DRIA at 5-34 to 5-35.

“There is considerable uncertainty associated with future distribution upgrade needs as well as with the uptake of the technologies and approaches discussed above that could reduce upgrade costs, and we do not model them directly as part of our infrastructure cost analysis.”10 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

10 DRIA at 5-36.

Regardless of who is paying, upgrades to electrical infrastructure are real impacts associated with EVSE installation and come with real costs. In their EV Infrastructure Deployment Plans, several states quantify the cost of electrical system upgrades needed to accommodate EVSE, including:

• Idaho cites that “charging stations installed with NEVI formula funds must be able to provide a power output of at least 600kW. In Idaho, most NEVI sites will require transformer upgrades. Additional improvements such as installing new feeder lines and completing substation upgrades also may be needed. At the very least, new electrical upgrades for a new transformer cost approximately $20-30,000.”11 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

11 Idaho Transportation Department, “2022 State of Idaho Electric Vehicle Infrastructure Baseline Plan” at 38 (August 1, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/id_nevi_plan.pdf.

• Indiana cites that "Utilities estimated investment between $50,000 to $125,000 to serve 600kW per station with locations requiring significant system upgrades totaling greater than $1 million. Upgrades could include new transformers, trenching, concrete/asphalt work, conduit, underground vaults, new conductor, and other miscellaneous equipment to serve the DCFC. Respondents expressed they would not deny an installation from proceeding. However, as expressed above, costs may be prohibitive for the prospective customer at certain locations."12 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

12 Indiana Department of Transportation, "Indiana Electric Vehicle Infrastructure Deployment Plan" at 37 (July 29, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/in_nevi_plan.pdf.

These utility costs may not be borne solely by individual customers; in some cases, these costs will ultimately be passed on to ratepayers. EPA fails to acknowledge these costs and fails to assess the cumulative cost burden resulting from the concurrent increase in electrical demand resulting from implementing the proposed LMD vehicle rule in the same time frame it seeks to force electrification of the heavy-duty vehicle fleet. [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

EPA should evaluate the merits of all fuels and vehicle technologies on a full lifecycle basis. For example, EPA states that "[i]n December 2022, Toyota announced plans to introduce 30 BEV models by 2030".125 But EPA's Proposed Rule should also meaningfully consider following statements from Toyota in the same announcement:126 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

125 EPA's Proposed Rule at 29191 (citing to Toyota Motor Corporation, ''Video: Media Briefing on Battery EV Strategies,'' Press Release, December 14, 2021. Accessed on December 14, 2021).

126 Toyota Motor Corporation, "Video: Media Briefing on Battery EV Strategies,'' Press Release, December 14, 2021 (emphasis added).

• "We are living in a diversified world and in an era in which it is hard to predict the future. Therefore, it is difficult to make everyone happy with a one-size-fits-all option. That is why Toyota wants to prepare as many options as possible for our customers around the world." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

• "If the energy that powers vehicles is not clean, the use of an electrified vehicle, no matter what type it might be, would not result in zero CO2 emissions." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

Moreover, in April 2023, Toyota sent its dealers a "Hybrid Memo" pointing out that "There are three major barriers to widespread battery electric vehicle adoption in the United States" – critical minerals, charging infrastructure, and affordability. Noting that the amount of raw materials in one BEV could be used to make 6 PHEV or 90 hybrid electric vehicles, the memo concludes that "An 'all of the above' electrification strategy is the bridge to get us to lower overall carbon emissions."127 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

127 https://jalopnik.com/toyota-focusing-on-hybrids-not-electric-vehicles-1850440908

EPA also cites to a July 2021 Stellantis announcement regarding its "intensified focus on electrification across all of its brands."128 Yet, EPA does not consider qualifying statements like those made by Stellantis CEO Carlos Tavares in May 2022, in which he stated that he expects a shortage of EV batteries by 2024-2025, followed by a lack of raw materials for the vehicles by 2027-2028.129 Mr. Tavares has also provided that "[y]ou'll see that the electrification path, which is a very ambitious one, in a time window that has been set by the administrations is going to bump on the supply side".130 Further, in response to EPA's proposed rule, Chrysler parent Stellantis has said it remains "committed to reducing vehicle emissions," adding "we are surprised that none of the alternatives align with the President's previously announced target of 50% EVs by 2030."131 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

128 EPA's Proposed Rule at 29191(citing to Stellantis, ''Stellantis Intensifies Electrification While Targeting Sustainable Double-Digit Adjusted Operating Income Margins in the Mid-Term,'' Press Release, July 8, 2021).

129 Reuters, "Automotive industry faces long term battery, raw material supply issues, Tavares says" (May 10, 2022) https://www.reuters.com/business/autos-transportation/automotive-industry-faces-long-term-battery-raw-material-supply-issues-tavares-2022-05-10/ (emphasis added).

130 Wayland, Michael, "Stellantis CEO warns of electric vehicle battery shortage, followed by lack of raw materials (May 24, 2022) https://www.cnbc.com/2022/05/24/stellantis-ceo-warns-of-ev-battery-shortage-lack-of-raw-materials.html.

131 Root, Al, "Car Makers Don't Love EPA's EV Plan. Here's What Ford, GM, and Others Are Saying, Barrons (April 13, 2023) https://www.barrons.com/articles/ev-epa-emissions-what-auto-makers-say-9abaedd6?ns=prod/accounts-barrons.

Further, EPA provides that "in January 2021, General Motors announced plans to become carbon neutral by 2040, including an effort to shift its light-duty vehicles entirely to zero-emissions by 2035."132 Yet GM's 10-K filed in January 2023 caveats that:133 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

132 EPA's Proposed Rule at 29190 (citing to General Motors, ''General Motors, the Largest U.S. Automaker, Plans to be Carbon Neutral by 2040,'' Press Release, January 28, 2021).

133 GM's 10-K Annual Report for the 2022 Fiscal Year, https://investor.gm.com/static-files/54bdb095-143e-4b96-b6d5-25937910b59c (emphasis added).

"[A]ny increase in the cost, or reduced availability, of critical materials for our EV propulsion systems, including lithium, nickel, cobalt and certain rare earth metals, could lead to higher production costs for our EVs and could impede our ability to successfully deliver on our EV strategy. Further, increasing global demand for, and uncertain supply of, such materials could disrupt our or our suppliers' ability to obtain such materials in a timely manner and/or could lead to increased costs. Geopolitical risk, fluctuations in supply and demand, fluctuations in interest rates, any weakening of the U.S. dollar and other economic and political factors have created and may continue to create pricing pressure for commodities, raw materials and other inputs." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

GM's 10-K further disclosed that its "business in China subjects [it] to unique operational, competitive and regulatory risks" and that "[i]ncreased competition, continued U.S.-China trade tensions or weakening economic conditions in China, among other factors, may result in cost increases, price reductions, reduced sales, profitability and margins, and challenges to gaining or holding market share." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

Other auto-manufacturers have similar views. In response to EPA's proposed rule, a Hyundai spokesperson provided that "[t]he proposed vehicle emission rules released by EPA will be challenging to meet and will require further expansion of charging infrastructure, consumer incentives and supply chains".134 Regarding Tesla, after stating that the BEV manufacturer aims to produce 20 million EVs per year before 2030,135 CEO Elon Musk clarified that Tesla's target is an "aspiration, not a promise . . . we may stumble and not reach that goal".136 In June 2022, Elon Musk further stated that "[b]oth [of Tesla's] Berlin and Austin factories are gigantic money furnaces right now. It's like a giant roaring sound, which is the sound of money on fire".137 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

134 Root, Al, "Car Makers Don't Love EPA's EV Plan. Here's What Ford, GM, and Others Are Saying, Barrons (April 13, 2023) https://www.barrons.com/articles/ev-epa-emissions-what-auto-makers-say-9abaedd6?ns=prod/accounts-barrons.

135 Dean, Grace, "Elon Musk says Tesla will 'probably' make 20 million electric vehicles a year by 2030 – more than 50 times what it produced last year" (Sep. 28, 2020) https://www.businessinsider.com/elon-musk-tesla-likely-20-million-electric-vehicles-year-2030-2020-9.

136 See https://www.ft.com/content/fbe8843e-1d2e-4a25-bce8-dcf77304fc37 (emphasis added).

137 Ohnsman, Alan, "Musk Calls Tesla's Berlin, Austin Plans 'Money Furnaces' Amid Startup Snags" (June 22, 2022) https://www.forbes.com/sites/alanohnsman/2022/06/22/musk-calls-teslas-berlin-austin-plants-money-furnaces-amid-startup-snags/?sh=720166b56ad1.

C. EPA's consideration of ZEV infrastructure is inadequate and insufficient.

As described in Valero's comments on EPA's Heavy Duty Vehicle ("HDV") Phase 3 proposal,149 EPA has not adequately assessed and accounted for ZEV infrastructure readiness. EPA's LMDV proposal similarly neglects an honest and accurate assessment of ZEV infrastructure readiness. [EPA-HQ-OAR-2022-0829-0707, pp. 30-31]

149 Comments of Valero Energy Corporation, June 16, 2023, posted at https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0985-1566

As EPA acknowledges in the preamble, auto manufacturers have pointed out that charging infrastructure must be addressed in addition to the technological feasibility of making electric vehicles.150 EPA seems to assume that the "powerful incentives" provided by IRA funding are sufficient to address this issue. However, because IRA credits are intended to expand charging access in low-income and rural communities, they are not available to incentivize charger installation in urban areas or in areas exceeding certain average-income or poverty-rate thresholds.151 Further, while the BIL provides $7.5B in funding for the National Electric Vehicle Infrastructure (NEVI) Formula Program, this level of funding is not remotely sufficient to address the cumulative $53-127B investment needed to support growth from approximately 3.1 million charging ports in 2022 to estimated 28 million charging ports needed by 2030.152 [EPA-HQ-OAR-2022-0829-0707, pp. 30-31]

150 Proposed Rule at 29341.

151 https://www.evconnect.com/blog/the-impact-of-inflation-on-ev-charging; https://www.foley.com/en/insights/publications/2022/08/ev-charging-station-tax-credits-are-back

152 National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure," June 2023, available at https://www.nrel.gov/docs/fy23osti/85654.pdf.

Further, EPA does not consider the impact of charger performance and consumer experience on consumer acceptance of electric vehicles. A report by the National Renewable Energy Laboratory (NREL) on electric vehicle charging infrastructure development notes that "This analysis envisions a future national charging network that is strategic in locating the right amount of charging, in the right locations, with appropriate charging speeds. However, this vision is irrelevant if the public concludes that charging infrastructure is ultimately unreliable. Even if a relatively small amount of infrastructure fails drivers, this could negatively impact the public's perception of electric mobility."153 There is good reason for NREL to raise this concern. A national survey of 26,500 charging attempts at Level 2 and Level 3 public stations found that 20% failed to obtain a charge.154 Common reasons for failure included software glitches, payment processing errors, and vandalism. In 75% of the failures, the charger was out of service. [EPA-HQ-OAR-2022-0829-0707, p. 31]

Footnote 153: Id.

154 Hannah Lutz, "Negative Charge: One in Five Charging Attempts Failed in 2022, JD Power Data Shows," Automotive News, February 13, 2023.

This type of consumer frustration may cause drivers who initially purchase electric vehicles to return to ICE vehicles, a phenomenon known as "discontinuance." For example, a 2021 UC Davis study found that approximately 20% of California drivers who bought a BEV between 2023 and 2018 replaced that vehicle with an ICE vehicle. Seventy percent of those drivers cited lack of access to charging infrastructure as a basis for their decision.155 [EPA-HQ-OAR-2022-0829-0707, p. 31]

155 Hardmand, S., Tal, G."Understanding discontinuance among California's electric vehicle owners." Nature Energy 6, 538-545 (2021). https://doi.org/10.1038/s41560-021-00814-9

Despite these indications that both the availability and the performance of charging stations may be a significant impact on consumers' willingness to purchase or to keep EVs, EPA does not consider the limitations of charging infrastructure in determining that the proposed rule is feasible. [EPA-HQ-OAR-2022-0829-0707, p. 31]

E. EPA does not adequately consider potential grid reliability impacts.

As part of its evaluation of potential economic impacts to the welfare of Americans and businesses, EPA must assess grid reliability impacts stemming from the proposed rule's forced electrification of the LD and MD transportation sector. Reliance on BEVs may have unintended, negative consequences, especially in relation to the electricity generation sector. In addition, EPA needs to accurately predict the number of additional chargers that will be needed to support the anticipated BEV population. At present, charging infrastructure is inadequate to meet the country's transportation needs.227 [EPA-HQ-OAR-2022-0829-0707, pp. 41-42]

227 See JD Power, "2023 U.S. Electric Vehicle Consideration (EVC) Study," June 15, 2023, and JD Power, "2023 U.S. Electric Vehicle Experience (EVX) Home Charging Study," March 16, 2023.

EPA should also consider the effects of the proposal on electricity prices, as low-income populations often spend a larger percentage of their earnings on essential utilities compared to the rest of the United States. Reliance on electric vehicles has been shown to spur increases in load and demand during peak periods, which impact electricity prices. Because EPA lacks expertise in the area of electrical grid management and economics, EPA should consult with other agencies and credible experts in these areas in order to adequately evaluate these impacts.304 EPA should ensure that the proposal meets reliability and affordability criteria and helps EJ communities make informed decisions about their own energy needs. Additionally, EPA's EJ assessment fails to acknowledge the likelihood that many owners will lack access to residential charging, which will substantially increase their operating expenses. Consistent reliance on fast charging also shortens electric vehicle battery life, resulting in a need to replace the battery and/or the vehicle more frequently. [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

304 See, West Virginia, 142 S.Ct. at 2612-13 (stating that EPA admitted that opining on trends in electricity transmission, distribution, and storage requires technical and policy expertise not traditionally needed in EPA regulatory development and finding that there is little reason to think Congress assigned such decisions to the EPA).

If EJ is truly a commitment for EPA, it should carefully consider criticisms like those leveled by The Two Hundred, which point out the disproportionate impacts to working and minority communities as a result of California's climate approach regarding electrified transport; those impacts and concerns remain true, and indeed are magnified under the proposed standards.305 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

305 See Plaintiffs' Complaint, The Two Hundred for Homeownership, et al. v. California Air Resources Board, et al., No. 1:22-CV-01474.

It is critical from the outset to design standards to minimize the potential for price shocks and supply disruptions. As written, the proposal ultimately benefits electric vehicle manufacturers at the expense of disadvantaged communities by subsidizing unaffordable transportation that is not fit for the purposes of commuting to and from EJ communities. At minimum, EPA should perform a thorough EJ assessment specific to its LDV proposal that is comprehensive of both transport challenges and impacts faced by EJ stakeholders and the government-wide Justice40 Initiative [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

The average purchase price of EV cars in 2022 was approximately $65,000, which is more than what 46 percent of American households earn in income in a year.306 While the average "used" EV sold for $42,895 in March of 2023.307 While EPA's DRIA anecdotally indicates that "emerging consensus suggests that purchase price parity is likely to occur by the mid-2020's for some vehicle segments and models"308, Ford CEO Jim Farley told attendees at its 2023 Capital Markets Days that EV cost parity may not come until after 2030.309 Moreover US auto makers are focusing their efforts on producing higher priced electric SUVs and trucks, including Fords $100,000 F150 Lightening Platinum310 and GM's announcement that its luxury brands, Cadillac and Buick, will be its first all-electric product lineups.311 While smaller EV's like the Chevy Bolt, touted by the Biden Administration as being affordable alternatives, are being discontinued.312 The reality is that most middle-and lower-income families simply cannot afford to purchase a new or used EV, even when taking into account available tax incentives and rebates. In fact, middle – and lower -income families are more likely to purchase older used vehicle, due to their lower upfront costs, and to hold onto those vehicles for longer periods.313 [EPA-HQ-OAR-2022-0829-0707, pp. 56-57]

306 Kelly Blue Book and Cox Automotive Average Transaction Prices Reports; and Average, Median, Top 1% and all United States Household Income Percentiles, DQYJD

307 What to know about buying a used electric vehicle as more hit the auto sale market, CNBC, May 21, 2023

308 EPA DRIA, 3.1.3.1, 4-15

309 Ford CEO says EV cost parity may not come until after 2030, Reuters, May 31, 2023

310 https://www.ford.com/trucks/f150/f150-lightning/models/

311 Cadillac and Buick will be GM's first all-EV brands, Automotive News, July 1, 2022

312 GM Killed the Chevy Bolt-and the dream of a small, affordable EV, The Verge, April 26, 2023

313 Supporting Lower-Income Households' Purchase of Clean Vehicles: Implications From California-wide Survey Results, UCLA Luskin Center for Innovation, 2020

Organization: Volkswagen Group of America, Inc.

Transformation to e-mobility requires a supporting ecosystem

Volkswagen is fully committed to electrification. However, there are concerns about the current market and subsequent market response. [EPA-HQ-OAR-2022-0829-0669, p. 2]

The prerequisite to achieving ambitious EV sales targets is a supporting EV ecosystem, including as a priority, a comprehensive, interoperable and integrated charging infrastructure network across the U.S. Investment is needed to make high power charging available along all interstates, provide charging solutions in metropolitan areas with limited off street parking, and provide high-speed charging at destination locations, rural areas and in the workplace. [EPA-HQ-OAR-2022-0829-0669, p. 2]

Range anxiety remains one of the prime customer concerns. To improve customer acceptance, Volkswagen suggests that EV penetration targets be linked to EV infrastructure rollout. Volkswagen recommends that the Biden Administration introduce a comparable approach to the approved EU Alternative Fuel Infrastructure Directive. Owning and using an electric vehicle must be comparable to owning an ICE vehicle, with no charging concerns and no cost of ownership concerns. [EPA-HQ-OAR-2022-0829-0669, p. 2]

Organization: Western Energy Alliance

Refueling Time: EPA makes the unfounded claim that the benefits of the rule will include, "…the value of reduced refueling time needed to refuel vehicles" (p. 29199) Assuming "…time spent refueling vehicles would be reduced due to the lower fuel consumption of new vehicles…" (p. 29200) is simply absurd. EPA seems to be willfully twisting the well-know disadvantage of long EV charging times. Whereas an ICEV takes a matter of minutes to refuel, charging times can be over an hour. Even fast charging stations, if available without a long wait due to their scarcity, require 30 minutes for 125 miles and an hour for 250 miles, well in excess of ICEV refueling times but with vastly less range.9 [EPA-HQ-OAR-2022-0829-0679, pp. 5-6]

9 "How Long Does It Take to Charge an Electric Car?", J.D. Power, March 26, 2020.

Limited charging infrastructure could drag refueling times to hours beyond what is needed by the driver. Further, were EPA's projection that 67% of new sales of light-duty and 46% of medium-duty vehicles will be EVs by 2032 attained, the strain on the grid would mean governments and utilities would likely enforce refueling times after hours, well past when a driver would need. Californians, just days after learning of the state's ban on ICEVs by 2035, were asked not to charge their EVs during the peak hours of 4 – 9pm because of the strain on the grid.10 Rather than being a benefit, EPA should consider how this rule would limit Americans mobility, as limited electricity capacity would cause drivers to run out of fuel when they need it for vital activities such as driving to work and school while making long roadtrips impractical. For example, the Wisconsin Electric Vehicle Infrastructure (WEVI) plan includes

comprehensive state strategies and actions to facilitate the electrification of Wisconsin's transportation system.2 The plan also assesses potential agency efforts to advance electrification and the deployment of electric vehicle
charging infrastructure. These actions, in concert with additional federal investments, will help support the growing demand for electrified vehicles in the state. [EPA-HQ-OAR-2022-0829-0507, p. 2]

2 Available at: https://wisconsindot.gov/Pages/projects/multimodal/electrification.aspx

Organization: Zero Emission Transportation Association (ZETA)

Recent trends suggest charging deployment is keeping pace with vehicle deployment. The Department of Energy’s Alternative Fuels Data Center has mapped over 139,000 individual charging ports across 54,100 public EV charging stations in the U.S.–and that doesn’t include at-home charging where a majority of charging occurs. Coupled with the $7.5 billion in federal IRA investments to expand our national charging network and billions of dollars in private capital means we’re well on track today to meet the EV charging needs of tomorrow. [EPA-HQ-OAR-2022-0829-0638, p. 2]

SmartCharge New York Managed Charging Case Study

In 2017, Con Edison launched SmartCharge New York program with the goal of instilling grid-beneficial charging behavior in parallel with the upswing in electric vehicle adoption. The goal was to influence driver behavior at the inflection point of transitioning from combustion-engine fueling to electric battery charging and have drivers default to grid-optimizing charging activity. Program participants received a free cellular-enabled device that plugs into the vehicle’s diagnostic port that allowed Con Edison to track time, energy, and power consumed when charging in the utility’s service territory. Incentives encourage drivers to 1) avoid charging during the system peak (2 PM to 6 PM) during summer weekdays from June to September, and 2) charge overnight from 12 AM to 8 AM. Incentives were initially paid off-bill through gift cards to the customer’s business of choice, such as Amazon, Starbucks, or Home Depot. [EPA-HQ-OAR-2022-0829-0638, p. 56]

As electric vehicle adoption continues to rise, managing charging behavior will grow increasingly important in maintaining a healthy and reliable grid. Since its inception, the SmartCharge New York program has evolved to meet customer needs and program objectives. Starting in 2023 for example, the program was overhauled to allow participation through a mobile application and payments are now issued through Venmo or Paypal, in line with participant feedback. This shift also changed the way the program collects data, favoring more cost-effective vehicle onboard telematics or networked electric vehicle supply equipment such as a Wi-Fi-enabled charger or charging cable. This enables the program to scale efficiently with the market and give a greater number of drivers insight into their behavior and how that activity translates to incentive earnings. [EPA-HQ-OAR-2022-0829-0638, p. 56]

In light of the EPA announcement of its heavy-duty and light/medium-duty proposed emissions standards, Con Edison released the following statement: [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

"Con Edison applauds the Environmental Protection Agency's efforts to rev up the market for electric vehicles, which will improve the air in the communities we serve and help in the fight against climate change. [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

A rapid shift to mass EV adoption looks more achievable all the time, with vehicle options expanding and new charging stations being built across New York City and Westchester County, including locations that serve the needs of disadvantaged communities. [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

Con Edison will continue to support the EV market's development through investment in the grid and by offering a range of programs, from incenting new chargers to managing the grid impact by rewarding drivers for charging overnight."219 [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

219 "Con Edison Supports Effort to Encourage Electric Vehicle Adoption," Con Edison Media Relations, (April 12, 2023) https://www.coned.com/en/about-us/media-center/news/2023/04-12/con-edison-supports-effort-to-encourage-electri c-vehicle-adoption

5. SRP

When EVs were still in the early stages of adoption, SRP recognized the importance of exploring ways to identify EV households and analyze their charging behavior in order to help prepare for greater EV uptake in the future. It was also important to begin engaging customers who were EV drivers in order to understand their interests and their charging patterns and assess ways to influence charging behaviors. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

In 2014, SRP launched "EV Community" (EVC)—a program that offers customers a $50 bill credit for each EV they register (up to two vehicles per household)—as a means to incentivize EV drivers to identify themselves and engage with SRP. Participants provide basic information about the electric vehicle and the type of charger they use. This provides a way for SRP to learn more about EV customers and their charging behavior and needs while offering them an incentive to help support EV growth in the region. There are currently more than 7,500 customers enrolled in the program. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

While EVC members only account for a small number of total EV households, they are a fair overall representation of the EV customer base since all price plans are included, as well as households with one vs. two EVs. The program offers SRP a good platform for analysis, including the type of cars they drive (PHEV, BEV, brand, etc.) and the charge levels they use. In addition, SRP found that EVC members are willing to share information and are eager to participate in future pilot programs. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

The EVC program also provides SRP with a method and channel to promote their Electric Vehicle Price Plan, a special time-of-use pricing plan which offers EV drivers the most opportunity to save on EV charging costs by charging during super off-peak times (between 11 PM and 5 AM). Load research has shown that this program has been highly effective at shifting EV charging loads away from peak periods. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

The EVC program has helped SRP plan and prepare the grid for widespread EV adoption by enabling them to: [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Anticipate load growth. A pilot study with EVC members that monitors their EV driving and charging behavior through data telematics devices enables SRP to estimate typical consumption and charging load profiles per EV. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Understand the impacts of EV charging on the grid. EVC data is used to model the impacts of EV charging on the electric grid, identify when transformers and wires may need to be upgraded, and understand when and how customers need to charge. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Recruit for Managed Charging pilot programs. The EVC program and channel have enabled SRP to recruit participants for additional Managed Charging pilot programs to test other active control technologies to control EV charging load on the grid. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Survey participants for insights. EVC members are surveyed regularly to get more data on their charging behaviors, including their use of home, workplace, and public charging and their satisfaction with EVs overall. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Engagement. EVC participants receive regular newsletters and other communications with EV-related information. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

In addition to fleet charging, the site will also function as an innovation hub, allowing Duke Energy to collect data around charger use, performance, management, and energy integration with various generation resources. It will also allow for the development of managed charging algorithms for fleets connected to the bulk power system or integrated with renewables and storage—which can be utilized to minimize the upgrades needed to the distribution system, easing the transition to electrifying fleets. Identifying EV charging technologies and how they may be used to power any type of fleet with vehicles (ranging from class 1) will help develop a model to show the industry a clear, integrated, and cost-effective path to fleet electrification. [EPA-HQ-OAR-2022-0829-0638, p. 59]

Duke Energy is teaming up with Daimler Truck North America and Electrada on this important work. Electrada, an electric fuel solutions company, is providing funding for research and demonstration efforts. For fleets seeking to electrify, Electrada invests all required capital “behind the meter” and delivers reliable charging to the fleet’s electric vehicles through a performance contract, eliminating the complexity and risk that fleets face in transitioning to this new source of fuel. Electrada’s investment in the depot allows Duke Energy to focus on programs that simplify adoption for electric fleet customers and distribution system performance to support the predictable addition of electric load over time. [EPA-HQ-OAR-2022-0829-0638, p. 59]

By the end of 2023, fleet operators will be able to experience a best-in-class, commercial-grade fleet depot integrated with energy storage, solar, and optimization software. Moving to zero-emission vehicles in this sector allows North Carolina to seize the large economic potential of the transition and generate billions in net benefits for the state. Projects like Duke Energy’s fleet performance center will be key for fleet owners across the state to take advantage of the cost savings of transitioning to electric vehicles. That said, fleet owners exploring electrification should engage their electricity provider early and often to identify and address site-specific considerations. As fleet electrification accelerates, it will be important for electricity providers and policymakers to identify best practices to proactively plan for fleet electrification, including readying the distribution grid. [EPA-HQ-OAR-2022-0829-0638, p. 59]

6. Duke Energy

Electric fleet commitments are increasing as companies with ambitious sustainability goals work to decarbonize operations. Fleet owners are also seeking ways to take advantage of the cost savings available by transitioning to EVs. However, programs for fleet electrification and managed charging options are still limited to date. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

When transitioning to an electric fleet, it is important that fleet managers understand the full scope of charging multiple vehicles while maintaining fleet operations and that larger MHDVs bring with them additional factors to consider. Fleet owners who have electrified fleets without consulting experts or an electric provider have likely been experiencing avoidable operational and technological issues. Long-term energy cost and performance risk are also potential issues for fleets and can hinder mainstream fleet electrification technology development if not managed correctly. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

Duke Energy's significant experience and large customer base make it well-positioned to design and implement fleet electrification and charging programs. Duke Energy is building a first-of-its-kind performance center that will model and accelerate the development, testing, and deployment of zero-emission light-, medium-, and heavy-duty commercial electric vehicle EV fleets. The site will be located in North Carolina at Duke Energy's Mount Holly Technology and Innovation Center and incorporate microgrid integration. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

The fleet electrification center will provide a commercial-grade charging experience for fleet customers evaluating or launching electrification strategies—reinforcing reliability, clean power, and optimization by integrating solar, storage, and microgrid controls software applications. The center will be connected to both the Duke Energy grid—charging from the bulk electric system—and to 100% carbon-free resources through the microgrid located at Mount Holly. This project is the first electric fleet depot to offer a microgrid charging option. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

7. Xcel Energy

Xcel Energy is committed to electrifying all of its light-duty fleet and 30% of its medium-and heavy-duty fleet by 2030, equating to over 2,500 EVs. It's part of their vision to be a net-zero energy provider by 2050 and enable one out of five vehicles to be electric in the areas they serve by 2030. This will save customers $1 billion annually on fuel by 2030 and deliver cleaner air for everyone. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

With a fleet that includes iconic bucket trucks, all-terrain service vehicles, and a host of pickup trucks and pool cars across eight states, achieving these goals will be no small feat, but an important one. There are notable hurdles, yet evolving technology presents solutions. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

Electrifying the Marquee Fleet Vehicle

Xcel Energy is the first electric provider in the nation to add an all-electric bucket truck to its fleet. The truck features two electric sources: one for the drivetrain and one for the lift mechanism. It has a 135-mile driving range and can operate the bucket for an entire workday on a single charge. Crews are collecting data from real working conditions in Minnesota and Colorado that will be used to inform further improvement to the vehicle's technology and operation. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

Optimizing Charging to Minimize Grid Impacts

To support a growing electric fleet, over 1,200 EV chargers must be brought into service by 2030, which will result in an electric load increase of 71 megawatts. Charge management techniques enable low-cost charging for this growing electric fleet. It's a sophisticated approach to optimize charging times by using time-of-day and grid demand efficiencies and builds on the expertise Xcel Energy has developed through offering managed charging programs to customers in multiple states. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

For fleets, overnight charging schedules make the most sense. Demand and rates are lower, and renewable wind sources are ample at that time. Yet, fast charging outside of these time periods may be required to help larger vehicles make it through a workday. This is when charging schedules need to be customized and highly specific. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

d. Charging Infrastructure

Although the majority of charging needs will be ultimately met through at-home or near-home charging, a fully electrified transportation system will also require a robust public charging network—one which the sector is already deploying. As of June 2023, there were 140,000 individual Level 2 and DC fast charging ports across 54,000 public EV charging stations in the U.S.224 A 2022 study by McKinsey & Company projected that the U.S. will need 1.2 million public EV charging stations to accommodate forecasted EV deployments by 2030.225 A more recent June 2023 NREL study226 analyzed U.S. progress towards building out an accessible network of public EV chargers and found that: [EPA-HQ-OAR-2022-0829-0638, pp. 62-63]

224 U.S. Department of Energy's Alternative Fuels Data Center, accessed June 23, 2023 https://afdc.energy.gov/fuels/electricity_locations.html#/analyze?fuel=ELEC

225 "Building the electric-vehicle charging infrastructure America needs," McKinsey & Company, (April 18, 2022) https://www.mckinsey.com/industries/public-and-social-sector/our-insights/building-the-electric-vehicle-charging-in frastructure-america-needs

226 "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure," National Renewable Energy Laboratory, (June 2023) https://driveelectric.gov/files/2030-charging-network.pdf

-The United States is on track to install a network of 1.2 million public chargers by 2030, keeping up with rapidly growing demand for EVs. [EPA-HQ-OAR-2022-0829-0638, pp. 62-63]

-Of the 1.2 million charging ports, about 1 million are expected to be Level 2 charging, providing convenient, low-cost charging to meet a variety of daily needs, with the remaining charging ports being DC fast chargers that are critical to driver confidence and longer distance travel. [EPA-HQ-OAR-2022-0829-0638, pp. 62-63]

-Building out a public charging network will require between $31 and $55 billion of cumulative public and private capital investment and will help unlock hundreds of billions of dollars of consumer savings from reduced fuel and maintenance costs. [EPA-HQ-OAR-2022-0829-0638, pp. 62-63]

As discussed further below, industry is continuing to rapidly build out EV charging capacity both as a result of private investment and with support from billions of dollars in federal funding. [EPA-HQ-OAR-2022-0829-0638, pp. 62-63]

Strong EPA LMDV emissions standards that encourage vehicle manufacturers to transition to EVs sends market signals to the charging industry that provide the certainty needed to make proactive infrastructure and manufacturing investments. [EPA-HQ-OAR-2022-0829-0638, pp. 62-63]

i. EVSE Manufacturer and Operator Statements on EPA Standards

As discussed, robust LMDV emissions standards encourage vehicle manufacturers to transition to EVs, which in turn sends market signals to the charging industry that provide the certainty needed to make proactive infrastructure and manufacturing investments. A clearer picture of future electric vehicle supply equipment (EVSE) demand enables manufacturers and network operators to plan and allocate capital accordingly. Below are statements by ZETA's EVSE providers in response to EPA's announcement of these proposed standards: [EPA-HQ-OAR-2022-0829-0638, pp. 63-64]

-"EVgo applauds the EPA for proposing ambitious tailpipe emissions standards. These standards would accelerate the transition to electric vehicles and result in cleaner air, healthier communities, and create jobs across the country. More EVs demands more EV charging and we will continue to expand our fast charging network to provide the infrastructure to support the growing EV market."227 [EPA-HQ-OAR-2022-0829-0638, pp. 63-64]

-ChargePoint on EPA emissions standards: "This proposal, in addition to state and federal funding programs like NEVI, will undoubtedly lead to more investment in EVs and chargers. Over our 15 year history, we have ensured charging infrastructure deployment kept pace with EV adoption, and we are well-positioned to meet the increased demand these standards will generate."228 [EPA-HQ-OAR-2022-0829-0638, pp. 63-64]

-ChargePoint on EPA emissions standards: "As EV charging infrastructure buildout continues, more EV models become available and regulatory efforts ramp up, EV adoption will continue to grow rapidly and ChargePoint will be there to support drivers who need a charge. We see ambitious regulations like these as an opportunity, not a barrier, to sustainable business growth, and we will continue working with policymakers to ensure that policy helps individuals, businesses and the environment alike."229 [EPA-HQ-OAR-2022-0829-0638, pp. 63-64]

227 EVGo on LinkedIn, accessed May 10, 2023 https://www.linkedin.com/posts/evgo_biden-administration-proposes-toughest-auto-activity-70544878136810 25024-gCc0/

228 ChargePoint on LinkedIn, accessed June 26, 2023 https://www.linkedin.com/posts/chargepoint_biden-harris-administration-proposes-strongest-ever-activity-70522887 57399441408-xX54/

229 "New EPA vehicle emissions regulations to accelerate EV production, adoption and infrastructure," ChargePoint, (May 18, 2023) https://chargepoint.com/blog/new-epa-vehicle-emissions-regulations-accelerate-ev-production-adoption-and-infrastructure

ii. Impacts to EVSE Deployment from BIL and IRA Programs

With over $7.5 billion available across multiple programs, the Bipartisan Infrastructure Law represents the nation's largest ever investment in increasing Americans' access to EV chargers. Through the BIL's $5 billion National Electric Vehicle Infrastructure (NEVI) Formula Program, the federal government is partnering with private industry to build out a national charging network along key highway corridors. As of September 2022, the Federal Highway Administration approved formal plans submitted by all 50 States, the District of Columbia, and Puerto Rico and as of June 2023, multiple states had released requests for proposals from organizations seeking access to NEVI funds. The design of these state application processes through the NEVI Formula Program will help drive EVSE standardization, which will in turn improve reliability and consistency in the consumer-facing charging experience. Separately, the BIL's Charging and Fueling Infrastructure (CFI) Discretionary Grant Program allocates another $2.5 billion towards installing EV chargers in communities where people live and work. [EPA-HQ-OAR-2022-0829-0638, pp. 64-65]

As charging deployment continues to increase, the distribution of this network, not just its size, risks limiting electrification—especially in rural areas. In response, the Biden-Harris Administration has taken a comprehensive approach to EVSE build-out, recognizing the diverse demographics, landscapes, and types of communities throughout the United States. Ubitquity and visibility are important components of a national EVSE network deployment. The Department of Transportation has put together separate toolkits to guide EVSE deployment in both urban230 and rural231 areas. Both toolkits go through an explanation of electric mobility basics, as well as the benefits and challenges that are specific to individuals, communities, and transit operators in their respective region types. Both expand on public-private partnership opportunities, as well as best practices for early planning and financing. With respect to EVSE, DOT has identified three levels of EVSE planning: community, corridor, and site. These toolkits are intended to guide private, state, and local entities as they implement federal funding and engage in other equitable, thorough EVSE deployment strategies. [EPA-HQ-OAR-2022-0829-0638, pp. 64-65]

230 "Charging Forward: A Toolkit for Planning and Funding Urban Electric Mobility Infrastructure," U.S. Department of Transportation, (June 2023) https://www.transportation.gov/urban-e-mobility-toolkit

231 "Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure," U.S. Department of Transportation, (June 2023) https://www.transportation.gov/rural/ev/toolkit

The tax credits provided in the Inflation Reduction Act , specifically the Alternative Fuel Vehicle Refueling Property Tax Credit232 are critical to helping ensure the continued availability of products necessary for a fully-electrified transportation sector. By targeting investments toward rural and lower-income residents, the credit incentivizes individuals and commercial operators to install charging stations at their homes and private entities. Retailers, local businesses, or commercial fleet operators can also utilize the credit to offset the costs of installing charging infrastructure on their property, enabling them to attract and retain customers. [EPA-HQ-OAR-2022-0829-0638, p. 65]

232 See 26 U.S.C. § 30C

Taken together, the funding in the NEVI and CFI programs under the BIL and the Alternative Fuel Vehicle Refueling Property Tax Credit in the IRA will lead to significant buildout of EV charging in communities, at homes and businesses, and along high-traffic highway corridors. [EPA-HQ-OAR-2022-0829-0638, p. 65]

iii. Recent Trends in Public EVSE Deployment

The number of chargers in the U.S.—public, private, and residential— is on track for rapid growth in the next several years. To meet the Administration's goal of deploying 500,000 chargers by 2030, the U.S. Department of Energy's Alternative Fuels Data Center (AFDC) notes that the deployment rate will have to significantly increase. As discussed, public funding is helping to spur deployments, while private investment in public EV charging has increased considerably in the last five years rising from under $200 million in 2017 to nearly $13 billion by early 2023.233 As the national EVSE network expands, growth tracked by the AFDC found that between 2015 and 2020, the number of EVSE ports in the U.S. more than doubled and in 2021 the number of ports grew 55% year-over-year.234 This is growth that occurred before the impacts of both the IRA and BIL took effect. [EPA-HQ-OAR-2022-0829-0638, pp. 65-66]

233 "Investment in Publicly Accessible EV Charging in the United States," (2023) Atlas Public Policy https://atlaspolicy.com/wp-content/uploads/2023/05/Investment-in-Publicly-Accessible-EV-Charging.pdf

234 "Electric Vehicle Charging Infrastructure Trends," Alternative Fuels Data Center, https://afdc.energy.gov/fuels/electricity_infrastructure_trends.html

Even without incentives, EV charging has generally kept pace with the rollout of EV deployment, as shown in Figure 9 below. [EPA-HQ-OAR-2022-0829-0638, pp. 65-66]

[See original comment for Figure 9. Trends in Light-Duty EV Deployment vs. Public Charging Infrastructure Deployment]235,236 [EPA-HQ-OAR-2022-0829-0638, pp. 65-66]

235 "LDV Total Sales of PEV and HEV by Month (updated through March 2023)," Argonne National Laboratory, (March 2023) https://www.anl.gov/sites/www/files/2023-04/Total%20Sales%20for%20Website_March2023_0.pdf

236 U.S. Department of Energy Alternative Fuels Data Center, accessed May 2, 2023 https://afdc.energy.gov/data/10964

Deployments of both LDEVs and charging infrastructure have followed an upward growth trajectory in recent years. Deployments of both products are well correlated with a value of 0.982 between light-duty vehicles and EVSE ports. As such, recent trends suggest that charging infrastructure should not be a limiting factor in expanded EV deployment. [EPA-HQ-OAR-2022-0829-0638, pp. 65-66]

As a national public charging network continues to take shape, there are multiple efforts underway to help EV drivers locate and access charging infrastructure. As mentioned previously, the AFDC maintains a database of public charging stations with route-planning functionality embedded in the tool.237 NREL recently announced the launch of an interactive map showing EV charging locations near national parks.238 ZETA member Rivian is incorporating EV charging locations into their vehicles' onboard display.239 Google Maps will now suggest charging stops on shorter trips, include a 'very fast' filter for charging station searches, and will show users in search results when a location has a charging station on-site.240 [EPA-HQ-OAR-2022-0829-0638, pp. 66-67]

237 U.S. Department of Energy Alternative Fuels Data Center, accessed May 2, 2023 https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC

238 “New Interactive Map Shows EV Charging Stations Near National Parks,” National Renewable Energy Laboratory, (April 2023) https://www.nrel.gov/news/program/2023/new-interactive-map-shows-ev-charging-stations-near-national-parks.html

239 Rivian on LinkedIn, accessed June 26, 2023 https://www.linkedin.com/posts/rivian_rivian-adventurousforever-careersintech-activity-7077710678597238784-Yif P

240 Google is adding some new features for EVs with built-in Google Maps,” The Verge, (February 8, 2023) https://www.theverge.com/2023/2/8/23589724/google-maps-ev-charging-built-in-features

iv. Future State of EVSE Deployment

EVSE manufacturers and operators are regularly announcing investments to build out charger manufacturing capacity to ensure customers can meet their residential charging needs as well as publicly-accessible chargers for longer-duration trips. While many are detailed in the White House EV Accelerator Challenge fact sheet,241 the ZETA members below have made the following announcements: [EPA-HQ-OAR-2022-0829-0638, pp. 67-68]

241 Fact Sheet: Biden-Harris Administration Announces New Private and Public Sector Investments for Affordable Electric Vehicles (April 17, 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/17/fact-sheet-biden-harris-administration-a nnounces-new-private-and-public-sector-investments-for-affordable-electric-vehicles/

-In January 2023, ZETA member ABB e-Mobility announced manufacturing operations in Columbia, South Carolina. This will significantly reduce delivery and lead times for DC fast-chargers in the U.S., enabling charging developers, owners, and operators to deploy reliable chargers more quickly. Since 2010, ABB has invested $14 billion in the U.S. with plant expansions, operational improvements, state-of-the-art equipment, products, and people, making it the company’s largest market. With approximately 20,000 employees in more than 40 manufacturing and distribution facilities, ABB is investing, growing, and serving across America through industries that create jobs, encourage innovation, and achieve a more productive, sustainable future.242 [EPA-HQ-OAR-2022-0829-0638, pp. 67-68]

-In April 2023, ZETA member Enel announced plans to add at least two million chargers, including home systems, in North America by 2030.243 [EPA-HQ-OAR-2022-0829-0638, pp. 67-68]

-In April 2023, ZETA member Siemens announced the opening of its latest EV charger manufacturing facility where the company will manufacture EV chargers specifically designed to serve the U.S. market. The facility is the company’s second U.S. EV charging manufacturing hub and will contribute to the company’s goal to build 1 million EV chargers for the U.S. market. The new facility will support the creation of 100 new jobs at the site and across its regional supply chain footprint. It will also be operated in part by Wyntron, an existing partner in Siemens eMobility’s manufacturing ecosystem.244 [EPA-HQ-OAR-2022-0829-0638, pp. 67-68]

-In April 2023, ZETA member FLO opened its first U.S. manufacturing facility in Auburn Hills, Michigan. Available starting in 2024, the FLO Ultra charging stations can charge most EVs to 80% in 15 minutes, depending on vehicle type, and are built to meet both NEVI and Buy America requirements. FLO’s Level 2 CoRe+ and CoRe+ MAX chargers are currently being assembled at the facility as preparations for the production of FLO Ultra chargers are underway. The chargers produced in Auburn Hills will contribute to the 250,000 chargers FLO plans to bring to the U.S. market by 2028. In that time span, FLO expects the facility to create and support 730 jobs.245 [EPA-HQ-OAR-2022-0829-0638, pp. 67-68]

-In June 2023, SK Signet launched a new $15 million facility in Texas to expand EVSE manufacturing. The factory is expected to produce ultra-fast chargers for over 10,000 EVs per year, generating up to 183 jobs by 2026.246 [EPA-HQ-OAR-2022-0829-0638, pp. 67-68]

242 “ABB E-mobility begins production of EV chargers in South Carolina,” ABB E-Mobility, (January 20, 2023) https://new.abb.com/news/detail/99073/abb-e-mobility-begins-production-of-ev-chargers-in-south-carolina

243 “Fast EV Chargers to Nearly Double on U.S. Highways Under Expansion Plan,” The Wall Street Journal, (April 13, 2023) https://www.wsj.com/articles/italian-company-plans-10-000-fast-chargers-across-u-s-to-meet-ev-demand-959fd135? mod=panda_wsj_author_alert

244 “Siemens opens newest electric vehicle charging manufacturing hub in Carrollton, Texas,” Siemens eMobility, (April 24, 2023) https://new.siemens.com/us/en/company/press/press-releases/smart-infrastructure/newest-siemens-electric-vehicle-m fg-charging-hub-carrollton-texas.html

245 “FLO, Governor Whitmer Announce New EV Charger Production at Auburn Hills Facility,” FLO Charging, (April 26, 2023) https://www.flo.com/news/flo-governor-whitmer-announce-new-ev-charger-production-at-auburn-hills-facility/

246 “SK Signet’s New EV Charger Manufacturing Facility Opens in Plano, Texas,” The EV Report, (June 8, 2023) https://theevreport.com/sk-signets-new-ev-charger-manufacturing-facility-opens-in-plano-texas

From national retailers to local businesses, organizations are announcing their intent to host charging infrastructure on their property, enabling them to attract and retain customers. In some instances, these chargers could supplant at-home or curbside charging for certain individuals where such chargers may be less accessible. The following announcements from recent months indicate the benefits retailers see in becoming an EVSE site host: [EPA-HQ-OAR-2022-0829-0638, p. 68]

-In January 2023, TravelCenters of America announced it would be purchasing 1,000 Electrify America DC fast charging stations and plans to install them at 200 travel stops over the next five years.247 [EPA-HQ-OAR-2022-0829-0638, p. 68]

-In February 2023, bp announced plans to invest $1 billion in EV charging across the U.S. by 2030, helping to meet demand from Hertz’s expanding EV rentals.248 [EPA-HQ-OAR-2022-0829-0638, p. 68]

247 “More Electrify America EV chargers are coming, this time at TravelAmerica rest stops,” The Verge, (January 30, 2023) https://www.theverge.com/2023/1/30/23577696/electrify-america-travelcenters-petro-ev-dc-fast-chargers

248 “bp plans to invest $1 billion in EV charging across US by 2030, helping to meet demand from Hertz’s expanding EV rentals,” Hertz Newsroom, (February 15, 2023) https://newsroom.hertz.com/news-releases/news-release-details/bp-plans-invest-1-billion-ev-charging-across-us-203 0-helping

-In February 2023, fast casual sandwich shop Subway announced plans to assist their franchise owners with installing multiple stand alone fast charge stations for their customers at multiple locations.249 [EPA-HQ-OAR-2022-0829-0638, p. 69]

-In March 2023, ZETA member Uber and bp Pulse announced a new global mobility agreement which will see the companies work together to help accelerate Uber’s commitment to become a zero-tailpipe emissions mobility platform in the US, Canada and Europe by 2030 and globally by 2040. Under the terms of the agreement, bp intends to offer bespoke deals to drivers on the Uber platform that are tailored to each market, including providing incentives for them to charge with bp pulse. The two companies will also explore working together on convenience and fuel offers. bp has a global network of almost 21,000 branded retail sites that offer fuel as well as food for now and for later with retail partners, and facilities such as toilets.250 [EPA-HQ-OAR-2022-0829-0638, p. 69]

-In March 2023, the convenience store 7-eleven launched its own EV fast charging network of DC chargers called 7charge. Consumers who use 7charge will pay rates based on the energy they consume or time spent charging, based on specific local regulations.251 Currently the company's chargers are in Colorado, Florida, Texas, and California. The company is also planning to launch a Maryland location soon. [EPA-HQ-OAR-2022-0829-0638, p. 69]

-In April 2023, Walmart announced plans to install new EV fast-charging stations at thousands of Walmart and Sam's Club locations across the country. This would be in addition to the almost 1,300 DC fast-charging stations already available at more than 280 [EPA-HQ-OAR-2022-0829-0638, p. 69]

U.S. facilities. With a store or club located within 10 miles of approximately 90% of Americans, the company is uniquely positioned to deliver a charging option that will help make EV ownership possible whether people live in rural, suburban or urban areas.252 [EPA-HQ-OAR-2022-0829-0638, p. 69]

-In May 2023, Boston based LNG Electric, an EV charging technology company, announced its plans to install Level 2 and DC charging stations at more than 13,000 hotels across the U.S.253 The company intends to develop this infrastructure over the next five to six years with the first chargers going in this past May. Ultimately, LNG Electric aims to create a charging network that covers 10-15% of the US hospitality market. The company's first set of chargers will be deployed at Hilton and Marriott hotels in Florida, Ohio, and Illinois. [EPA-HQ-OAR-2022-0829-0638, p. 69]

249 "The next hot fast food menu item? Electric car charging," Axios, (March 22, 2023) https://www.axios.com/2023/03/22/electric-vehicle-charging-subway-7-eleven

250 "bp pulse and Uber team up on driver charging as EV momentum builds," Uber Newsroom, (March 31, 2023) https://www.uber.com/newsroom/uber-bp-charging-ahead/

251 "Introducing 7charge," 7-Eleven, accessed June 28, 2023 https://www.7-eleven.com/7charge

252 "Leading the Charge: Walmart Announces Plan To Expand Electric Vehicle Charging Network," Walmart Newsroom, (April 6, 2023) https://corporate.walmart.com/newsroom/2023/04/06/leading-the-charge-walmart-announces-plan-to-expand-electri c-vehicle-charging-network

253 "13,000+ hotels across the US are about to get EV charging stations," Electrek, (May 16, 2023) https://electrek.co/2023/05/16/lng-electric-ev-charging-stations-hotels/

EPA Summary and Response

Summary:

EPA acknowledges and appreciates all the comments received on charging infrastructure, which include both broad comments on future infrastructure needs, availability, and deployment as well as specific suggestions on the NPRM infrastructure assessment and cost analysis.

Vehicle manufacturers, dealers, and representatives of the fuels industry, among others, raised concerns stating that charging infrastructure is inadequate today and that the pace of deployment is not on track to meet levels needed if the proposed standards are finalized. Commenters cited a variety of recent studies and other sources that project future infrastructure needs. The Alliance for Automotive Innovation (the "Alliance"), BMW, and Stellantis cited a recent California Energy Commission report that assessed infrastructure needs in California and found that to support 5 million PEVs in the state by 2030 would require about 700,000 public and shared private EVSE ports. Commenters noted that this is equivalent to a ratio of one EVSE port needed for every seven PEVs and cautioned that current public infrastructure is not keeping up. For example, the Alliance said, "Moreover, the U.S. is falling further behind in installing publicly available chargers for the number of EVs that are being sold. More than 305,000 new EVs were added to the roads in the first quarter of 2023, but only 7,802 new chargers were added, a ratio of 39 new EVs for every new public port, and more than five times higher than the recommended ratio of 7:1." Jaguar Land Rover made a similar point by noting that an EU directive recommends one public port for every 10 electric vehicles. Multiple commenters (e.g., AFPM and SEMA) cited recent work from McKinsey, which estimated that by 2030 1.2 million EVSE ports would be needed. AFPM, CFDC et al. Hyundai, NADA, Porsche, Rivian, and Valero all referenced a 2023 national charging network assessment conducted by NREL for estimates of future infrastructure needs or associated costs, with some noting that the study found that by 2030 about 1 million public L2 and 182,000 DCFC ports would be needed to support about 33 million PEVs (along with many more private EVSE ports). AFPM cited an S&P Global report that found charging will need to increase by a factor of eight by 2030 while NADA cited a report by EEI, which estimated planned investments will support fewer than half as many DCFC ports as would be needed in 2030. Multiple commenters cited reports on charging infrastructure trends from DOE's Alternative Fuels Data Center to caution that the pace of infrastructure deployment is insufficient, e.g., with NACS et al. citing a report from the second quarter of 2022, and saying that public stations increased by under 15 percent while EV sales rose by 65 percent in the same timeframe. Commenters also cited work by Atlas, ICCT, and JD Power to indicate that significantly more EVSE ports will be necessary to meet future needs.

Multiple commenters raised concerns that current public charging infrastructure is concentrated in select parts of the country, with some (e.g., GROWMARK, IFB, MCGA, MOFB, SEMA, TPPF, and Marie Gluesenkamp Perez et al.) noting particular challenges for rural areas. For example, Growmark said, "According to the most recent trend report from the National Renewable Energy Laboratory, rural areas (which make up almost 93% of U.S. land area) have the smallest number of EV charging ports by a wide margin, and it is the smallest category in terms of growth of EV charging ports as well." Other commenters (e.g., the Alliance, AmFree et al., CEA, the Heritage Foundation, Subaru, and Transfer Flow) discussed access and affordability challenges for those without residential charging capabilities or in multi-family dwellings, and for low-income consumers.

Manufacturers and others (e.g., American Highway Users Alliance, API, Chevron, Ford, Hyundai, NACS et al., Subaru, and UAW) cautioned that customers may not buy PEVs if sufficient charging infrastructure is not available. Toyota commented that infrastructure availability is largely out of the control of manufacturers but would be critical to complying with the proposed standards if finalized.

While they recognized the importance of the BIL and the IRA in supporting the buildout of charging infrastructure, multiple commenters (e.g., AmFree et al., Stellantis, and Valero) expressed concerns that far more funding would be needed with some characterizing BIL funds as a 'good downpayment'. The Alliance further noted, “Moreover, thus far, almost two years after the BIL was signed, not a single electric vehicle charger has been installed with the federal funding allocated to states.” AmFree et al. and Valero cautioned that census tract restrictions limit the applicability of the IRA tax credit applicable to charging infrastructure. Regarding private investments, the National Association of Convenience Stores et al. noted that while some members have installed charging stations as ‘beta tests’, there are challenges to overcome before such private investments become a sustainable business model.

The Alliance, Stellantis, Nissan, and U.S. Chamber of Commerce, VW, among others, recommended that EPA monitor infrastructure deployment after the final rulemaking and/or link the stringency of the standards to infrastructure buildout. For example, the Alliance recommended that EPA directly incorporate an adjustment mechanism into the stringency levels of the standards that scales with infrastructure deployment. Several commenters pointed to other regulations as positive examples of how EPA could address infrastructure availability concerns. For example, MEMA and VW noted that EU’s “Alternative Fuel Infrastructure” Regulation requires member states to deploy charging stations at designated intervals.

We also received comments from states, non-governmental organizations, electrification groups, electric vehicle manufacturers, and utilities (e.g., CARB, California Attorney General’s Office et al., CALSTART, EEI, EDTA, Energy Innovation, EDF, ICCT, MPCA, NESCAUM and OTC, Rivian, Tesla, Wisconsin Department of Natural Resources, and ZETA) highlighting the many public and private investments in charging infrastructure that have been announced or are already underway, along with a new analysis submitted by EDF. The analysis found that, taken together, these investments are putting the U.S. on track to meet charging infrastructure needed in 2030 if the proposed standards were finalized.

Some commenters (e.g., Energy Strategy Coalition, Environmental Public Health Organizations, Tesla, ZETA) noted that EPA finalizing stringent standards would provide certainty to manufacturers, EVSE providers and others and spur further investments in charging infrastructure. For example, a comment from Environmental and Public Health Organizations addressed the ‘chicken-and-egg conundrum’ (i.e., that EVSE providers will not build out infrastructure without having assurance of demand, but vehicle purchasers will not buy without initial assurance of adequate supporting charging infrastructure) saying EPA should not wait on finalizing standards. The commenter cited historical precedent in other areas (e.g., E85 stations to support flex-fuel vehicles) and economic theory to support the point that sufficient charging infrastructure will be built to meet demand.

EPA also received comments on infrastructure deployment and challenges. In particular, many commenters (e.g., AFPM, AmFree et al., CFDC et al., HF Sinclair Corporation, NACS et al., Subaru, and Valero) raised concerns about charging infrastructure reliability. Long charging times were also raised as a potential barrier to consumer adoption of PEVs. Several commenters (e.g., AFPM, BorgWarner, and MECA) suggested that DC fast charging (DCFC), which has shorter charge times, will therefore be particularly important in infrastructure buildout; some commenters also said that DCFC better facilitates managed and bidirectional charging, and is important for futureproofing infrastructure.

Manufacturers and others (e.g., Advanced Energy United, American Highway Users Alliance, HF Sinclair, Hyundai, NADA, NRECA, Stellantis and Toyota) raised concerns about the lead time for deploying charging infrastructure. Advanced Energy United suggested permitting reform to standardize and streamline the process could help reduce delays and associated soft costs. Several commenters discussed utility interconnection times and supply chain issues, particularly those connected to distribution system upgrades. For example, NADA stated that current lead times of 12 to 18 months for transformers could increase, while NRECA noted a lead time of over three years for "large power transformers." EEI and Rivian highlighted proactive steps utilities and industry can take to plan for charging stations and, in some cases, reduce the need for grid upgrades.

We also received comments on the cost analysis we conducted for the proposed rulemaking. Several commenters stated that EPA underestimated EVSE costs. For example, both AFPM and CFDC et al. pointed to what the commenters characterized as a significant discrepancy between EPA's overall estimated EVSE costs in the NPRM and those in the 2030 charging network assessment conducted by NREL. Valero stated that EPA underestimated EVSE costs per port and provided an estimated range of $125,000 to $300,000 per DC-150 kW port drawn from state NEVI plans and EVSE providers as an example of current costs. On the other hand, CARB suggested that our residential charging costs for multi-family dwellings may be too high and recommended that we account for lower-power L2 receptacles, which will be required in some new buildings in California. Tesla commented that our assumed DCFC costs are too high, noting that Tesla's costs for a 250-kW port are less than $40,000 compared to EPA's assumed $153,000. Valero stated that EPA should include the cost of EVSE maintenance in its analysis.

For the NPRM analysis, EPA estimated the EVSE port needs for light-duty PEVs but noted that it did not assess EVSE costs for medium-duty PEVs. AFPM commented, "While these commercial vehicles may spend most of their time charging at private depot stations, these are mobile, commercial vehicles that will need to use (and strain) the charging network. It is arbitrary and capricious for EPA to omit those vehicles from its simulations." POET expressed a different concern about EPA's EVSE port estimates, noting what it characterized as a relatively small difference between the port needs under proposed rule and no-action cases for 2055 considering larger differences in PEV penetration in those two scenarios.

EPA received comments both on the electricity prices we used in the NPRM analysis, and on additional costs that commenters said should be included in the FRM analysis. Several commenters (e.g., Paul Bonifas and Tim Considine, CEA, and Valero) thought EPA's use of residential electricity charging rates underestimated charging costs given that some households don't have access to lower-cost home charging. Other commenters also noted the higher costs associated with public charging, which may happen during peak hours and include higher time of use rates and demand charges among other costs. AFPM cautioned that EPA's use of national average electricity rates is inappropriate given that ZEVs could be concentrated in areas with higher electricity rates such as California. AFPM also stated that increased demand from EV charging could increase electricity prices whereas a comment from Environmental and Public Health Organizations stated that EV charging could actually reduce electricity prices for all users by taking advantage of unused grid capacity (e.g., at night) and distributing system costs that would be incurred anyway over more electricity sales. In its comments, the Heritage Foundation stated its belief that electricity prices will increase over time due to power plant regulations.

Multiple commenters (e.g., AFPM, NRECA, and Valero) said that EPA should account for the cost of distribution or other grid upgrades associated with charging infrastructure and NRECA provided cost estimates associated with panel upgrades, transformers upgrades, service wire upgrades, line extensions, and metering among other categories. However, EEI said that EPA was justified in its decision not to model costs of distribution upgrades in the NPRM. EEI stated that these costs will be site specific, who bears the costs (utilities vs. site host customers) will vary, and accounting for these costs would be inconsistent with the approach EPA has taken for liquid fuels, in which comparable upgrades are not directly accounted for in fleet costs. The Mobility House et al. noted the use of automated load management could reduce the need for upgrades.

As described in Chapter 4 of the RIA, EPA evaluates the cost associated with refueling time. The Western Energy Alliance questioned EPA's analysis, noting that charging times for EVs are significantly longer compared to refueling time for ICEs. On the other hand, a comment from Environmental and Public Health Organizations noted that the EPA's charge rate assumption of 100 miles of driving added per hour of charging is far too low given that mid-trip charging events are likely to occur using DCFCs, suggesting "EPA's charging rate assumption could be quadrupled (and the refueling time disbenefit for BEVs greatly reduced) and still result in a conservative assumption that leaves room for vehicles that may do some mid-trip charging at more moderate DC charging power levels."

Response:

As an initial matter, EPA notes that it anticipates automakers will employ a wide variety of control technologies, applied to ICE, hybrid, and electric powertrains, to meet the final standards and will continue to offer a diverse variety of vehicles for the duration of these standards and beyond. For example, under our central case modeling (which is only one estimate of a possible compliance path for the industry), in MY 2032, 29 percent of new vehicles would be non-hybrid ICE vehicles (with an additional 3 percent hybrid vehicles). We anticipate that the flexibilities offered by the final rule will enable manufacturers who choose to meet the final rule through producing more PEVs to deploy PEVs in areas and at volumes that meet consumer demand. At the same time, EPA agrees that continued expansion of reliable charging infrastructure supports higher rates of PEV adoption.

As discussed in Preamble Section IV.C.4 and RIA Chapter 5.3, public charging has been growing rapidly in the past few years with more than 160,000 public electric vehicle supply equipment (EVSE) ports available in the U.S. today.[556,557] As shown in the range of projected future infrastructure needs cited by commenters, estimates for future infrastructure needs vary widely in the literature. We note that these variations reflect different assumptions about PEV adoption, driving and charging behavior, residential charging access, and the mix of EVSE by power levels, among other factors. As described in RIA Chapter 5.3, we analyzed EVSE port needs under our final rule and a no-action case from 2027 to 2055.[558] Under an Interagency Agreement between EPA and the U.S. Department of Energy, NREL simulated PEV charging demand for eight unique charging types and locations: home L1, home L2, depot L2, work L2, public L2, and public DCFC at 150 kW, 250 kW, and 350 kW power levels. The analysis framework utilized to estimate charging demand was adapted from the framework used in the NREL study, "The 2030 National Charging Network: Estimating U.S. Light-Duty Vehicle Demand for Electric Vehicle Charging Infrastructure,"[559] which was cited by multiple commenters, though the PEV adoption scenarios developed were specific to EPA's final rulemaking analysis. We anticipate that the highest number of ports will be needed at homes across the full analysis period. For example, as seen in RIA Table 5-11, in 2030, we estimate approximately 33 million EVSE ports will be needed under the final rule, of which about 30 million are residential ports. We estimate just under one million public Level 2 ports, 780,000 workplace L2 ports, and 170,000 public DCFC ports will also be needed along with 360,000 depot L2 ports to support medium-duty vehicle charging. (See RIA Chapter 5.3.2 for a more complete discussion of our analysis.)

Regarding comments from the Alliance and Stellantis on public charging needs, EPA disagrees that one public EVSE port will be needed for every seven PEVs. NREL's national charging network assessment estimated that to support 33 million PEVs in 2030, about 1.25 million public EVSE ports (including 182,000 DC fast charging ports) would be needed,[560] along with 26.8 million private ports (most at single family homes, but also at multi-family homes and workplaces). That yields a ratio of one public EVSE port needed per 26 PEVs. This fits well within a range of other recent studies examining public infrastructure needs. An ICCT report looking across a dozen studies published between 2018 to 2021 found that two-thirds of the

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[556] U.S. DOE Alternative Fuels Data Center, "U.S. Public Electric Vehicle Charging Infrastructure." Accessed January 10, 2024, at https://afdc.energy.gov/data/10972. U.S. DOE Alternative Fuels Data Center, "Alternative Fueling Station Locator." Accessed January 10, 2024, at https://afdc.energy.gov/stations/#/analyze?country=US&fuel=ELEC.

[557] If we include EVSE ports that are temporarily unavailable for maintenance or other short-term causes, the number of ports is over 170,000. (Source: U.S. DOE Alternative Fuels Data Center, "Alternative Fueling Station Locator." Accessed March 9, 2024, at https://afdc.energy.gov/stations/#/analyze?country=US&fuel=ELEC&status=E&status=T. U.S. DOE Alternative Fuels Data Center, "Alternative Fueling Station Locator.")

[558] The final rule and no-action cases used throughout the PEV charging infrastructure cost analysis were based on a preliminary analysis compared to the final compliance modeling. While annual PEV charging demand is generally higher in the compliance scenarios relative to those in the preliminary analysis (with annual differences of between plus and minus five percent), cumulative electricity consumption associated with PEV charging from 2027 to 2055 in the final rule compliance scenario is only four percent higher for the action case (the final standards) and one percent higher in the no-action case, compared to the preliminary analysis used to assess PEV charging infrastructure needs and costs.

[559] Wood et al., "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Infrastructure," 2023. Accessed December 18, 2023, at https://driveelectric.gov/files/2030-charging-network.pdf.

[560] Ibid. (Note: See Figure ES-1 for EVSE port counts in the public network.)

estimates (including its own) fell between 20 and 40 PEVs per public EVSE port.[561] A new report conducted by ICF for the Coordinating Research Council, which assessed infrastructure needs for the level of PEV adoption in the proposed rule, found one public EVSE port would be needed for every 34 light-duty PEVs.[562] While the S&P Global article cited by some commenters[563] projected that 2.3 million public chargers would be needed to support 28 million PEVs in 2030—yielding a relatively low ratio of one port per 12 PEVs—the McKinsey article cited by commenters[564] estimated that 1.2 million public chargers would be needed to support 44 million electric passenger cars in 2030, yielding a ratio of just one public port needed for about every 37 light-duty PEVs. There was approximately one public EVSE port for every 26 PEVs on the road as of the third quarter of 2023,[565] suggesting that the overall level of public charging infrastructure deployment is generally keeping pace with PEV adoption based on comparisons with recent national assessments.

The ratio of one public EVSE port per every seven PEVs suggested by some manufacturers was based on a 2021 California assessment conducted by CEC.[566] However, as the commenters noted, this ratio was calculated from CEC's projected needs for both public and shared private EVSE ports, which includes a large number of EVSE ports at multi-unit dwellings and workplaces. In addition, we note that the infrastructure scenario in CEC's report was specific to California and may not be applicable nationally. For example, the share of PEVs with residential charging access in a given area may vary based on the mix of housing types (e.g., single-family or multi-family homes), household incomes, and other factors.[567] The CEC study assumed the number of PEVs with residential charging access in California was under 70 percent,[568] much

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[561] Bauer et al., "Charging Up America: Assessing the Growing Need for U.S. Charging Infrastructure through 2030," 2021. Accessed November 5, 2023, at https://theicct.org/wp-content/uploads/2021/12/charging-up-america-jul2021.pdf. (Note: The full range of studies spanned 12 to 129 PEVs per public charger though all but two were between 20 and 56.)

[562] Coordinating Research Council, "Assess the Battery Re-charging and Hydrogen Re-fueling Infrastructure Needs, Costs, and Timelines Required to Support Regulatory Requirements for Light-, Medium-, and Heavy-Duty Zero Emission Vehicles," September 2023. Accessed December 18, 2023, at https://crcao.org/wp-content/uploads/2023/09/CRC_Infrastructure_Assessment_Report_ICF_09282023_Final-Report. (The LD PEV and public EVSE ports discussed are from Table 3.)

[563] S&P Global, "EV Chargers: How many do we need?" January 9, 2023. Available at: https://press.spglobal.com/2023-01-09-EV-Chargers-How-many-do-we-need. (We note that public charger estimates may include chargers at restricted use facilities.)

[564] Philipp Kampshoff et al., "Building the electric-vehicle charging infrastructure America needs," April 18, 2022. Available at: https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs. (Note: In addition to 44 million electric passenger cars, the report estimates another 4 million electric buses, trucks, and other commercial vehicles would be on the road by 2030. Including these in the total would make the ratio of EVs per public port 40 instead of 37.)

[565] Brown, A. et al., "Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: Third Quarter 2023," 2024. Accessed March 9, 2024, at https://www.nrel.gov/docs/fy24osti/88223.pdf. (Note: Estimated from approximately 4.16 million EVs and 160,000 public EVSE ports.)

[566] Matt Alexander et al., "Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment," July 2021. Accessed March 10, 2024 at: https://www.energy.ca.gov/publications/2020/assembly-bill-2127-electric-vehicle-charging-infrastructure-assessment-analyzing.

[567] Ge, Y. et al., "There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure," 2021. Accessed March 11, 2024, at: https://www.nrel.gov/docs/fy22osti/81065.pdf.

[568] See Table 5 in Alexander et al. 2021.

lower than the 90 percent assumption in NREL's national assessment.[569] In general, less access to home charging will increase the need for public or other non-residential charging infrastructure. We also note that CEC released an updated version of its charging infrastructure assessment in August 2023.[570] It projects that to support 7.1 million PEVs in 2030, just over 408,000 public (L2 and DCFC) ports will be needed, at a ratio of one public port per 17 PEVs, along with just over 600,000 shared private ports at workplaces and multi-family housing.[571]

We agree with commenters that keeping up with charging needs as PEV adoption grows will require continued infrastructure investments and appreciate the many comments we received that highlight plans and commitments for charging infrastructure buildout. NREL's national charging network assessment estimated that between $31 billion and $55 billion would be needed by 2030 for public infrastructure, noting that $24 billion in investments from public and private sources had already been announced as of March 2023.[572] The White House estimates that as of January 2024 total investments to expand the U.S. charging network had grown to over $25 billion.[573] Furthermore, there are many public and private parties investing in charging infrastructure, including federal, state, and local governments, automakers, utilities, charging companies, and retailers among others. These parties are already responding to the market that is developing for infrastructure, and we see no reason to believe they won't continue to meet infrastructure demand as the PEV market grows. See RIA Chapter 5.3.1 for a summary of ongoing and planned charging infrastructure investments.

We also agree with commenters who said that finalizing strong standards will itself spur additional investments in charging infrastructure. This is not an unprecedented situation with respect to CAA section 202 standards. For example, when EPA required the removal of lead from gasoline, an entire new parallel fuel distribution system was developed to dispense the new unleaded gasoline. See Preamble section III.B. Other examples where new distribution systems arose to ensure delivery of fuels necessary to vehicular pollution control include the infrastructure to supply diesel exhaust fluid (used to support selective catalytic reduction) and ultra low sulfur diesel fuel (used to support diesel particulate filters). We thus see that there can be successful market responses to demand created by a section 202 standard, including successful responses from entities not regulated by the standard.

We acknowledge comments, e.g., from NACS et al., that in certain periods, EV sales may rise faster than public charging stations. However, as discussed in RIA Chapter 5.3, when looking at the overall trend in infrastructure deployment from DOE's Alternative Fueling Station Locator,

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569 Wood et al., "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Infrastructure," 2023. Accessed December 18, 2023, at https://driveelectric.gov/files/2030-charging-network.pdf.
570 Adam Davis et al., "Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment," August 2023. Accessed March 10, 2024, at: https://www.energy.ca.gov/publications/2023/second-assembly-bill-ab-2127-electric-vehicle-charging-infrastructure-assessment.
571 The estimate of public charger needs was taken from Figure 1 and represents the sum of "Public (at Work)", "Other Public", and "DCFC"; other port counts discussed are also from this figure.
572 Wood et al., "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Infrastructure," 2023. Accessed December 18, 2023, at https://driveelectric.gov/files/2030-charging-network.pdf.
573 The White House, "FACT SHEET: Biden-Harris Administration Announces New Actions to Cut Electric Vehicle Costs for Americans and Continue Building Out a Convenient, Reliable, Made-in-America EV Charging Network," January 19, 2024. Accessed at https://www.whitehouse.gov/briefing-room/statements-releases/2024/01/19/fact-sheet-biden-harris-administration-announces-new-actions-to-cut-electric-vehicle-costs-for-americans-and-continue-building-out-a-convenient-reliable-made-in-america-ev-charging-network/.

we see a rapid expansion over the past few years with the number of ports more than doubling from 74,000 ports at the end of 2019 to over 160,000 today.[574] And, with many public and private investments announced or underway (as described in RIA Chapter 5.3), we anticipate significant additional growth in advance of, and throughout, the timeframe of the standards. With respect to the comment citing an EEI report,[575] which estimated planned investments will support fewer than half of the 140,000 DCFC ports it estimated as being needed in 2030, we note that this assessment was released in June 2022 and, therefore, would not include planned investments announced since then. A survey by EDF and WSP (submitted as part of EDF's comments)[576] found that, as of June 2023, over $21.5 billion in commitments had been announced. The authors estimate that this will support over 800,000 new EVSE ports by 2030, including 250,000 DCFC ports—significantly higher than EEI's estimate of DCFC needs. As noted above, the White House estimates an even higher total of $25 billion in investments had been announced as of January 2024.[577] Given the increasing adoption of PEVs, the significant regulatory factors supporting that adoption—including BIL, IRA, and the regulatory certainty provided by the final rule—as well as the considerable economic incentives for EVSE suppliers and stations, we think it is reasonable to expect that additional investments will be made over the coming years in charging infrastructure to support the market's levels of PEV adoption. To put it differently, given the increasing adoption of PEVs, the deployment and operation of EVSE stations is a highly valuable business opportunity, and market participants are thus highly likely to avail themselves of this opportunity and meet demand. We do acknowledge lead time constraints associated with permitting and infrastructure, as discussed further below and in RTC 18, but our review of the evidence does not identify any hard constraints that would preclude the levels of increased infrastructure associated with the central case, particularly in light of the additional lead time provided by the final rule relative to the proposal.

As commenters noted, the U.S. government is making large investments through the BIL and the IRA. This includes extending and modifying a tax credit, through which residents in low-income or non-urban areas are eligible for a 30 percent credit for the cost of installing residential charging equipment up to a $1,000 cap and businesses are eligible for up to 30 percent of the costs associated with purchasing and installing charging equipment in these areas (subject to a $100,000 cap per item) if prevailing wage and apprenticeship requirements are met. We acknowledge the points made by some commenters that census tract restrictions limit the applicability of this tax credit. However, a map developed by DOE showing eligible census tracts

[574] U.S. DOE Alternative Fuels Data Center, "U.S. Public Electric Vehicle Charging Infrastructure." Accessed January 10, 2024, at https://afdc.energy.gov/data/10972. U.S. DOE Alternative Fuels Data Center, "Alternative Fueling Station Locator." Accessed January 10, 2024, at https://afdc.energy.gov/stations/#/analyze?country=US&fuel=ELEC.
[575] Charles Satterfield and Kellen Schefter, "Electric Vehicle Sales and the Charging Infrastructure Required through 2030," June 2022. Accessed March 20, 2024, at: https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Electric-Transportation/EV-Forecast--Infrastructure-Report.pdf.
[576] EDF and WSP, "U.S. Public Electric Vehicle (EV) Charging Infrastructure Deployment, Industry Investment Briefing," July 2023. Accessed March 10, 2024, at: https://www.edf.org/sites/default/files/2023-07/WSP%20US%20Public%20EV%20Charging%20Infrastrcuture%20Deployment%20July%202023.pdf.
[577] The White House, "FACT SHEET: Biden-Harris Administration Announces New Actions to Cut Electric Vehicle Costs for Americans and Continue Building Out a Convenient, Reliable, Made-in-America EV Charging Network," January 19, 2024. Accessed at https://www.whitehouse.gov/briefing-room/statements-releases/2024/01/19/fact-sheet-biden-harris-administration-announces-new-actions-to-cut-electric-vehicle-costs-for-americans-and-continue-building-out-a-convenient-reliable-made-in-america-ev-charging-network/.

suggests that stations installed in a large majority of the U.S. may qualify,[578] and as noted by the White House, two-thirds of Americans live in these areas.[579] We also note that this tax credit can help to expand both residential and public charging infrastructure in rural areas. We acknowledge that some areas of the country may experience higher growth in the number of charging stations and PEVs relative to other areas of the country; as noted above, we anticipate that ICE vehicles will continue to be sold throughout the timeframe of this rule.

Regarding the Alliance's comment that no NEVI-funded stations had yet been deployed, we note that it is normal for it to take time to initiate a new funding program, develop program guidance, receive and review applications, make awards, and for awardees to start projects. Initial plans for all 50 states, DC, and Puerto Rico covering FY22 and FY23 funds were approved in September 2022, and together, the $1.5 billion in funding will help deploy or expand charging infrastructure on about 75,000 miles of highway.[580] Since the publication of the proposal, NEVI-funded stations have opened in Ohio, New York, and Pennsylvania.[581] At least another 30 states are actively soliciting proposals and making awards, suggesting many more station openings will be coming soon.[582]

As discussed in RTC Section 3.4, EPA disagrees with comments from manufacturers who recommended that EPA incorporate an adjustment mechanism into the stringency levels of the standards that scales with infrastructure deployment. EPA has assessed charging infrastructure as part of our assessment of the feasibility of these standards, and as discussed above, expects that charging infrastructure will continue to rapidly grow to meet demand. Moreover, as previously noted, we agree with commenters who said that finalizing standards will send clear market signals to spur additional investments in charging infrastructure. By contrast, including an automatic stringency adjustment would eliminate the predictability and certainty of the standards, which would lessen this market signal.

EPA agrees with commenters that in addition to deploying sufficient charging infrastructure, it must be reliable. In September 2023, the Joint Office of Energy and Transportation (JOET) announced that up to $100 million in NEVI funding would be available to increase reliability of

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[578] U.S. Department of Energy, Argonne National Laboratory, "30C Tax Credit Eligibility Locator." Accessed March 11, 2024, at: https://experience.arcgis.com/experience/3f67d5e82dc64d1589714d5499196d4f/page/Page/.

[579] The White House, "FACT SHEET: Biden-Harris Administration Announces New Actions to Cut Electric Vehicle Costs for Americans and Continue Building Out a Convenient, Reliable, Made-in-America EV Charging Network," January 19, 2024. Accessed at https://www.whitehouse.gov/briefing-room/statements-releases/2024/01/19/fact-sheet-biden-harris-administration-announces-new-actions-to-cut-electric-vehicle-costs-for-americans-and-continue-building-out-a-convenient-reliable-made-in-america-ev-charging-network/.

[580] U.S. DOT, FHWA, "Historic Step: All Fifty States Plus D.C. and Puerto Rico Greenlit to Move EV Charging Networks Forward, Covering 75,000 Miles of Highway," September 27, 2022. Accessed January 10, 2023, at https://highways.dot.gov/newsroom/historic-step-all-fifty-states-plus-dc-and-puerto-rico-greenlit-move-ev-charging-networks.

[581]JOET, "First Public EV Charging Station Funded by NEVI Open in America," December 13, 2023. Accessed December 18,2023, at: https://driveelectric.gov/news/first-nevi-funded-stations-open. JOET, "New York Continues NEVI Charging Station Momentum," December 15, 2023. Accessed December 18, 2023, at: https://driveelectric.gov/news/new-york-NEVI-charging-station-momentum. JOET, "Pennsylvania Continues Shift Toward Thriving Electric Transportation Sector," January 23, 2024. Accessed February 24, 2024, at https://driveelectric.gov/news/new-pennsylvania-nevi-station.

[582] JOET, "National Electric Vehicle Infrastructure (NEVI) Progress Update," October 2023. Accessed December 18, 2023, at: https://driveelectric.gov/news/nevi-progress-update.

the existing charging infrastructure network with funds going to repair or replace EVSE ports.[583] This will complement efforts of the National Charging Experience (ChargeX) Consortium.[584] Launched in May 2023 by JOET and led by U.S. DOE labs, the ChargeX Consortium will develop solutions and identify best practices for common problems related to the consumer experience, e.g., payment processing and user interface, vehicle-charger communication, and diagnostic data sharing. See RIA Chapter 5.3 for additional efforts underway to support infrastructure reliability.

EPA also recognizes that it takes time for EVSE providers to develop charging site plans for their facility, obtain permits, purchase equipment, and have it installed. While permitting times will likely vary based on applicable state or local jurisdiction, specifics of the station site, and other factors, we note as one example that Electrify America reported that, in 2022, permitting took an average of 13 weeks for its U.S. "ultra-fast" DCFC stations.[585] We agree with Advanced Energy United that streamlining the permitting process could reduce infrastructure deployment times though we note that such policies are outside the scope of this rulemaking. As discussed by multiple commenters, infrastructure lead times will be longer if distribution upgrades are needed. We also acknowledge comments on supply chain challenges, in particular with respect to lead times for transformers. See RTC Section 18 for a discussion of the grid component supply chain and other distribution system considerations, including strategies to reduce the need for distribution system upgrades and associated lead times. With respect to EVSE manufacturing, we note that about forty companies have announced over $500 million of investments in U.S. facilities to construct charging equipment, with planned domestic production capacity of more than 1,000,000 chargers (including 60,000 DCFCs) annually.[586,587] As discussed in RTC Section 3.3, EPA is finalizing standards with a more gradual ramp-in of GHG stringency, i.e. that are less stringent than the proposed standards for each year from 2027 through 2031. This means manufacturers will be able to deploy GHG emissions reducing technology more gradually in the early years of the program, and also have more time take advantage of ongoing expansion of public charging infrastructure previously discussed.

As described in RIA Chapter 5.3.2, we estimate the costs to deploy the number of EVSE ports needed each year (2027─2055) to achieve the modeled network sizes for the final rule and a no-action case. For the proposal, we sourced hardware and installation costs for each EVSE port from several studies and we requested comments on any additional estimates we should consider. AFPM and CFDC et al. commented that EPA's overall estimated EVSE costs were significantly lower than those presented in NREL's national charging network assessment (Wood et al.

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[583] JOET, "Biden-Harris Administration to Invest $100 Million for EV Charger Reliability," September 2023. Accessed December 18, 2023, at: https://driveelectric.gov/news/ev-reliability-funding-opportunity.
[584] JOET, "Joint Office Announces National Charging Experience Consortium," May 2023. Accessed March 11, 2024, at: https://driveelectric.gov/news/chargex-consortium.
[585] Electrify America, "2022 Annual Report to U.S. Environmental Protection Agency," April 2023. Accessed March 11, 2024, at: https://media.electrifyamerica.com/assets/documents/original/1018-2022NationalAnnualReport.pdf.
[586] DOE, "Building America's Clean Energy Future," January 11, 2024. Accessed February 24, 2024, at https://www.energy.gov/invest. (Note: investment and production capacity totals include only those available in public announcements, as reported by DOE, and may not be comprehensive.)
[587] U.S. Department of Energy, Vehicle Technologies Office, "FOTW #1314, October 30, 2023: Manufacturers Have Announced Investments of Over $500 million in More Than 40 American-Made Electric Vehicle Charger Plants." Accessed March 11, 2024, at: https://www.energy.gov/eere/vehicles/articles/fotw-1314-october-30-2023-manufacturers-have-announced-investments-over-500."

2023).[588] It is important to clarify that the EVSE cost estimates presented in DRIA Chapter 5 and used in the NPRM cost benefit analysis did not reflect the total EVSE costs under the proposal, but rather the difference in EVSE costs between the proposed rule and a no-action case. Therefore, these costs are not directly comparable to the estimates of how much cumulative investment would be needed for charging infrastructure by 2030 in Wood et al. 2023. Nonetheless, it is correct that the assumed hardware and installation costs per EVSE port in Wood et. al 2023, which was published after the NPRM, are generally higher than those EPA assumed in the NPRM analysis, and we agreed with commenters that it was appropriate to update our costs. For the final rule analysis, we have updated our assumed upfront hardware and installation costs for work and public EVSE ports to align with Wood et al. 2023 in order to reflect more up-to-date information.[589] We note that the resulting updated cost for each DC-150 kW port in our FRM analysis is $154,200, which is within the range Valero provided in its comments as an example. We also acknowledge CARB's and Tesla's comments on lower L2 residential costs for multi-family housing and DCFC costs, respectively. Given these lower costs identified by CARB and Tesla, and the potential for these lower costs to be experienced more widely in future years, our EVSE cost assumptions may be conservative. See RIA Chapter 5.3 for a more complete discussion of the hardware and installation costs we assumed for each EVSE type in our FRM analysis.

We agree with AFPM that it is important to account not only for infrastructure to support light-duty PEVs, but also for medium-duty PEVs. We have updated our FRM analysis accordingly. See RIA Chapter 5.3 for a description of how we estimated depot and public charging needs for medium-duty PEVs in our EVSE cost analysis for the FRM. Regarding POET's comment on EVSE port counts in 2055, we note that EVSE port count estimates have been updated for the final rulemaking (see Table 5-23 and Table 5-24 in the RIA). We also note that port needs do not scale directly with the number of PEVs. For example, as described in RIA Chapter 5.3.2, we model more sharing of home and depot EVSE ports as PEV adoption grows. More broadly, the number and mix of EVSE ports needed will depend not only on the absolute number of PEVs, but also on the characteristics of the PEVs (e.g., energy consumption rate and battery capacity), vehicle miles traveled, and other factors (see RIA Chapters 5.1 and 5.3 for more information on how port counts are estimated in the FRM analysis.)

We agree with Valero that there will be maintenance costs associated with public L2 and DCFCs. As we discuss in RIA Chapter 5.3, while we did not directly model these costs, we assume all EVSE ports have a 15-year equipment lifetime, and after that must be replaced at full cost. This assumption likely overestimates costs as some EVSE providers may opt to upgrade existing equipment rather than incur the cost of a full replacement. Some installation costs such as trenching or electrical upgrades may also not be needed for the replacement.

For the NPRM analysis, we used AEO 2021 residential electricity rates to reflect the cost to charge. EPA agrees with commenters that it is more appropriate for the electricity price to reflect a mix of rates across consumer classes rather than just a residential electricity rate. As described in RIA Chapter 5.2, we model future electricity prices for the final rulemaking with the Retail

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[588] Wood et al., "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Infrastructure," 2023. Accessed December 18, 2023, at https://driveelectric.gov/files/2030-charging-network.pdf.
[589] As noted in RIA Chapter 5.3.2, Wood et al. drew from various data and literature sources, including the studies that were used as sources for hardware and installation costs for workplace and public L2 ports and DCFC ports in the NPRM.

Price Model associated with the Integrated Planning Model (IPM). IPM models the power sector, including changes to power generation based on future demand scenarios. We conducted IPM runs for a no-action case and a final rule policy or "action" case based upon Alternative 3 from the proposed rule with the addition of heavy-duty vehicle charge demand based on an interim scenario developed from for the Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Proposed Rule. We agree with commenters that it is appropriate to consider the geographic allocation of charge demand, and we have modeled this in our IPM runs described above.[590] The resulting impacts to power generation from IPM were then input to the Retail Price Model to estimate average electricity prices, weighted by the amount of electricity used by each consumer class (e.g., residential, commercial, and industrial) and in each region. We used this approach to estimate electricity prices in the FRM, as opposed to AEO, because we can better model demand under the final rule policy case discussed above with IPM (including geographic allocation).

In the NPRM we acknowledged that certain stations, particularly those with many high-power DCFCs, may require upgrades to the distribution system; however, we did not include the associated costs in our assessment of PEV charging infrastructure. We agree with commenters that it is appropriate to include distribution system upgrade costs in the final rulemaking analysis, and as described in RIA Chapter 5.2.4, we have incorporated these costs within the electricity prices. See RIA Chapter 5.4 and RTC Section 18 for a more detailed discussion of the distribution system considerations and a new DOE analysis we utilized to estimate the distribution upgrade costs.

In response to comments on consumer concerns related to range anxiety and the time it takes to charge, see RTC Section 13. Many refueling events for electric vehicles would be expected to occur either overnight where the vehicle is parked or during the workday, neither of which require extra time from the driver. However, some charging events will require drivers to take extra time to charge, especially when drivers are in the midst of an extended road trip. As described in RIA Chapter 4.3.5, EPA estimates the cost of time spent refueling. We agree with commenters who recommended that we update this analysis for the final rulemaking. In particular, we concur with the comment from Environmental and Public Health Organizations that our assumed charge rate of 100 miles of added driving range per hour is too low and that mid-trip charging events are likely to occur using DCFCs. We use an updated value of 400 miles of added driving range per hour of charging for our FRM analysis, which is consistent with the commenter's recommendation.

Comments on the impact of EPA's proposed powerplant rule under Section 111 of the Act are related to a separate regulatory action and thus beyond the scope of this rulemaking. If and when that rule is finalized, EPA will account for the costs of that rule in that proceeding.

18 - Power sector and grid reliability considerations

[590] See Chapters 5.1 and 5.2 for a more complete description of the power sector modeling used in the final rulemaking analysis, including the development of hourly charging load profiles to reflect the time of day that charging occurs at the regional level.

Comments by Organizations

Organization: Alliance for Automotive Innovation

B. Comparison of EPA's Projected U.S. BEV Market Share to Other Projections

EPA projects that manufacturers can reach 60% BEV U.S. market share by 2030 and 67% share by 2032. In context, for all light-duty auto sales in 2022, less than 6% were BEV (or just over 7% when including PHEVs). Effectively, EPA's proposed BEV requirements would be roughly ten times higher than 2022 levels. [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

Given the degree of electrification that EPA projects in association with its proposed standards, it is helpful to compare EPA's projections to those of industry analysts. EPA does provide some third-party projections of U.S. BEV market share, but does so only in the context of supporting its finding that demand for BEVs is rapidly increasing.22 [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

22 NPRM at 29189.

Auto Innovators compares EPA's projections23 to those of the U.S. Energy Information Agency (EIA),24 S&P Global Mobility,25 Bloomberg,26 Benchmark Minerals Intelligence (BMI),27 and the International Council on Clean Transportation (ICCT)28 in Figure 1. EPA's projections exceed those of other government agencies (EIA) and of the industry and financial analysts (S&P Global Mobility, Bloomberg, and BMI). The only projection close to EPA's is that from ICCT (a well- known non-governmental organization that advocates for stronger standards), but EPA's projections still exceed even those of ICCT. While projections can and certainly do vary based on input assumptions, EPA has not adequately explained how increasing GHG standards in and of itself would enable greater BEV-only market share than those projected by multiple other analyses that include both BEVs and PHEVs. [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

23 For this assessment, Auto Innovators used EPA's projected BEV market share from the ACC II sensitivity case for the proposed standards. (NPRM at 29335, Table 108.)

24 U.S. Energy Information Administration, Annual Energy Outlook 2023, High Uptake of the IRA side case, Table 38. (Market share calculated by Auto Innovators based on EV sales and total sales of light-duty vehicles.)

25 S&P Global Mobility, U.S. light vehicles sales forecast by propulsion system design (Jan. 2023). Obtained via personal correspondence. Used with permission.

26 Bloomberg NEF, Electric Vehicle Outlook 2023 (Jun. 2023) at 22 (Figure 30; reflects BloombergNEF economic transition scenario). Data obtained via BloombergNEF subscription.

27 Benchmark Minerals Intelligence, 1Q2023 model for Auto Innovators (proprietary).

28 The International Council on Clean Transportation, Analyzing the Impact of the Inflation Reduction Act on Electric Vehicle Uptake in the United States (Jan. 2023) at 27. (Table A5, IRA Moderate with increased state ACC II adoption scenario.)

The projection from S&P Global Mobility, a well-respected third-party analyst of the automotive industry, suggests approximately 47% EV market share (including PHEVs) in 2030 and 59% in 2032. In comparison, EPA projects a BEV-only market share of 61% by 2030 and 67% in 2032 under its proposed standards. The projection from Bloomberg is very similar to that of S&P Global Mobility, reaching 51% combined EV sales in 2030 and 60% combined EV sales by 2032. The S&P Global Mobility and Bloomberg projections are generally consistent with Auto Innovators belief that 40-50% EV market share by 2030 is an aspirational, yet achievable goal if suffcient complementary policies are in place. [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

[See original comment for Figure 1: Comparison of EPA-projected BEV market share under the proposed standards to projections from EIA, S&P Global Mobility, Bloomberg, and ICCT.] [EPA-HQ-OAR-2022-0829-0701, pp. 28-29]

4. Modeling the geographic diffusion of BEVs is important for accurately gauging the customer acceptance of the national standards.

The OMEGA least-cost compliance modeling suggests that, by model year 2032, 67% of new vehicle sales will be BEVs, a remarkably different figure than the 8% BEV share observed in the U.S. in early 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

Modeling a highly segmented and geographically dependent market as a single entity is spurious. The agency's assumption that all consumers will respond with the same elasticity of demand pegged to the same diffusion of innovation curve is simplistic and not appropriate. As we know, there are many factors outside of the relative price of powertrains that come into play when purchasing a new vehicle. These include the robustness of the charging ecosystem, inclement weather, relative price of fuels, and even political affiliation. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

It is crucial that EPA model accurately the diffusion of BEVs into different parts of the country, since the pattern of spatial diffusion influences key issues in this rulemaking: [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

-the amount of electricity required to support BEVs in different areas;

-the degree of grid investments and public-charging investments required to support BEVs;

-the amount of emissions from the electric utility sector (as some regions are more carbon intensive than others);

-and the prospects for customer acceptance of BEVs (as regions vary in attitudes toward BEVs, the pace of the public charging build out, cold weather climates, and the availability of state incentives and public outreach to facilitate BEV deployment). [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

In its analysis EPA adapts a "vehicle adopter model" (VAM) developed by the National Renewable Energy Laboratory. The model includes some plausible predictor variables such as income, housing type, housing tenure, population density, and rural vs urban location. The authors also acknowledge the model omits crucial variables relevant to predicting whether a household will purchase or lease a BEV such as environmental attitudes, interest in advanced technology, whether the household has a place at home or at work to charge their BEV, commuting distance, and long-trip frequency. The model explained little of the variation in BEV ownership in the sample (R-square = 0.04). The authors explain that the model seemed to perform better statistically at the county level, but with so many omitted variables it seems doubtful the model coefficients are useful for prediction. A deeper problem is that the data set included only 224 households that owned at least one BEV, about 6% of the sample, and it is not clear whether the sample is representative of the U.S. Since the 224 households are, as the authors note, early BEV adopters, it seems unlikely that information about them will be relevant in predicting which households adopt BEVs as the technology diffuses from 8% of new vehicle purchasers in early 2023 to 67% in 2032. For the purposes of the rulemaking, it is more important to model carefully, for example, those who are open to a BEV but have not yet purchased one. The authors were careful to state that their results have limited utility [EPA-HQ-OAR-2022-0829-0701, pp. 284-285] :

The absolute values of the estimates and the predictive capability of the model are not the priorities for this purpose—instead, we emphasize the relative scale of these coefficients (for example, how much influence housing type has on PEV adoption compared with income). [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

EPA then decided to use the absolute coefficients to forecast PEV adoption, exactly contrary to what the authors suggested. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

Auto Innovators appreciates that EPA may have been inclined to use this survey because the results can be linked to the IPM model of the electric utility sector. Unfortunately, the survey and modeling have so many weaknesses for use in this rulemaking that a different modeling strategy is required [EPA-HQ-OAR-2022-0829-0701, pp. 284-285].

In the long run, Auto Innovators suggests that EPA develop an improved BEV adopter model.

Source:

1. Ge, Yanbo, Christina Simeone, Andrew Duvall, and Eric Wood. 2021. There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5400-81065. https://www.nrel.gov/docs/fy22osti/81065.pdf. [EPA-HQ-OAR-2022-0829-0701, pp. 284-285]

Organization: American Fuel & Petrochemical Manufacturers

3. EPA Fails to Adequately Assess the Availability of Electricity Generation, Distribution, and Transmission

Despite the potential for increased demands on domestic energy generation and generation capacity,156 EPA offers little to no support that these demands will be sufficiently met.

Similarly, EPA's DRIA offers scant analysis regarding the costs associated with meeting these increased infrastructure and energy generation/capacity needs beyond the flawed reliance on various legislative actions, such as the BIL and IRA.157

Consequently, EPA is pushing a single technology at a pace that cannot be adopted within the time frame of its own proposal.158 [EPA-HQ-OAR-2022-0829-0733, p. 34]

156 See, e.g., U.S. DRIVE, "Summary Report on EVs at Scale and the U.S. Electric Power System" (Nov. 2019), available at https://www.energy.gov/eere/vehicles/articles/summary-report-evs-scale-and-us-electric-power-system-2019 (summarizing impacts of light-duty vehicles on energy generation and generation capacity alone and acknowledging several potential challenges without including analysis of medium-and heavy-duty ZEVs).

157 See, e.g., Salma Elmallah et al., Can distribution grid infrastructure accommodate residential electrification and electric vehicle adoption in Northern California? (Nov. 9, 2022), available at https://iopscience.iop.org/article/10.1088/2634-4505/ac949c (projecting that upgrades needed solely for the PG&E service area in Northern California, which serves 4.8 million electricity customers and is subject to aggressive targets for both EV adoption and electrification of residential space and water heating will add at least $1 billion and potentially $10 billion to PG&E's rate base).

158 DRIA at 5-28.

Organization: Charles Gordon

INTRODUCTION and SUMMARY

I recommend that EPA withdraw this rulemaking. The earlier rules and the subsidies of the Inflation Reduction Act will lead to a greater reduction of CO2 with less controversy.

In addition, the proposal is attempting to force faster adoption of electric cars than the infrastructure can support.

Natural gas power plants cannot be replaced by solar and wind fast enough and more importantly transmissions line cannot be built quickly enough because of local opposition. [EPA-HQ-OAR-2022-0829-0747, p. 3]

Organization: Environmental. and Public Health Organizations

G. EPA's conclusion that LDV charging will not compromise the reliability of the electric grid is supported by empirical data.

EPA observes that LDV charging is not anticipated to adversely impact electric grid reliability:

U.S. electric power utilities routinely upgrade the nation's electric power system to improve grid reliability and to meet new electric power demands. For example, when confronted with rapid adoption of air conditioners in the 1960s and 1970s, U.S. electric power utilities successfully met the new demand for electricity by planning and building upgrades to the electric power distribution system. Likewise, U.S. electric power utilities planned and built distribution system upgrades required to service the rapid growth of power-intensive data centers and server farms over the past two decades. U.S. electric power utilities have already successfully designed and built the distribution system infrastructure required for 1.4 million battery electric vehicles. Utilities have also successfully integrated 46.1 GW of new utility-scale electric generating capacity into the grid.332 [EPA-HQ-OAR-2022-0829-0759, p. 121]

332 88 Fed. Reg. at 29311 (citations omitted).

These conclusions are supported by empirical evidence from California, which already has more than 1.3 million PEVs on the road.333 While some pundits have claimed EV charging is already straining the grid, triggering service disruptions, those claims have been debunked.334 And root cause analysis from the California Independent System Operator (California ISO) showed that PEVs are not what has strained the grid.335 Indeed, empirical evidence shows that PEV charging has been accommodated with minimal required grid upgrades and that EV charging can be shifted to hours of the day when there is plenty of spare grid capacity. Since 2011, CPUC has required the utilities it regulates to report annually on costs associated with accommodating PEV charging and on the charging patterns of PEVs on different utility rates.336 As summarized by Synapse Energy Economics, utility grid upgrades required to accommodate PEV charging to this point in those service territories are essentially rounding errors compared to the costs of maintaining the electrical grid: [EPA-HQ-OAR-2022-0829-0759, p. 121]

333 Alliance for Automotive Innovation, Electric Vehicle Sales Dashboard, https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard.

334 Dustin Gardiner, No, Newsom's Push for Electric Cars Isn't the Cause of Potential Blackouts in California, San Francisco Chronicle (Sept. 7, 2022), https://www.sfchronicle.com/politics/article/No-Newsom-s-push-for-electric-cars-isn-t-the-17426102.php.

335 California ISO, Root Cause Analysis: Mid-August 2020 Extreme Heat Waive (Jan. 13, 2021), http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf.

336 S. Cal. Edison Co., San Diego Gas & Elec. Co. & Pac. Gas & Elec. Co., Joint IOU Electric Vehicle Load Research and Charging Infrastructure Cost Report 10th Report (Mar. 31, 2022), https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/transportation-electrification/1 0th-joint-iou-ev-load-report-mar-2022.pdf.

Even in the service territories with the most EVs, the observed costs have been minor. For instance, in California where EV adoption has been markedly higher than other states, EV-related distribution upgrade costs appear minor compared to total distribution costs. Despite the fact EVs are often more concentrated in many neighborhoods and distribution circuits, California utilities collectively spent less than 0.03% of their total distribution-related expenses on distribution system upgrades associated with residential EV adoption.337 [EPA-HQ-OAR-2022-0829-0759, p. 121]

337 Melissa Whited, Tyler Fitch, Jason Frost, Eric Borden, Courtney Lane, Ben Havumaki, Sarah Shenstone-Harris & Elijah Sinclair, Electric Vehicles Are Driving Rates Down (June 2023),https://www.synapseenergy.com/sites/default/files/Electric%20Vehicles%20Are%20Driving%20Rates%20Down% 20Factsheet.pdf (citations omitted).

Furthermore, as detailed below, the projected growth in electricity demand over the coming years is well within the range of past historical load growth. Additionally, the industry is already responding to and preparing for increased electrification as more fleets and individuals adopt PEVs, and it has a wide range of tools, practices, and partnerships in place to continue to maintain a strong and reliable grid. [EPA-HQ-OAR-2022-0829-0759, p. 121]

3. EVs can lower the cost of managing an increasingly dynamic electric grid.

Third-party analyses have found that PEVs, if deployed strategically, can improve grid operations. For example, PEVs can "contribute significantly to grid stability" and provide value to the grid through "deferred or avoided capital expenditure on additional stationary storage, power electronic infrastructure, transmission build-out, and more."344 Additionally, utilities can deploy proven and emerging rate designs that ensure utilities recover costs, reliably serve PEV charging load, improve PEV owner experience, and take advantage of grid strengthening services from these vehicles.345 [EPA-HQ-OAR-2022-0829-0759, pp. 126-127]

344 Chengjian Xu et al., Electric vehicle batteries alone could satisfy short-term grid storage demand by as early as 2030, Nature Commc'n, Jan. 17, 2023, at 1, https://doi.org/10.1038/s41467-022-35393-0.

345 See e.g., Brittany Blair et al., Smart Electric Power Alliance, Managed Charging Programs: Maximizing Customer Satisfaction and Grid Benefits (2023), https://sepapower.org/resource/managed-

charging-programs-maximizing-customer-satisfaction-and-grid-benefits/; Enel-X, Understanding Smart EV Load Management (Apr. 8, 2022), https://info.evcharging.enelx.com/whitepaper-download-ev-load-management-utility-dive; Zachary Needell, Wei Wei & Jessika E. Trancik, Strategies for beneficial electric vehicle charging to reduce peak electricity demand and store solar energy, CELL REPS. PHYSICAL SCI., Mar. 15, 2023, https://www.cell.com/cell-reports-physical-science/fulltext/S2666-3864(23)00046-2; Lily Paul & Maureen Marshall, CALSTART, Not Just Smart: The Importance of Managed Charging (2021), https://calstart.org/wp-content/uploads/2022/01/Managed-Charging-Paper-Final.pdf; Karen Kirk, Yes, the grid can handle EV charging, even when demand spikes, Yale Climate Connections (Mar. 23, 2023), https://yaleclimateconnections.org/2023/03/yes-the-grid-can-handle-ev-charging-even-when-demand-spikes/.

Researchers from Lawrence Berkeley National Laboratory estimate that using smart charging of light-duty PEVs as a means to comply with California's energy storage procurement mandate (designed to facilitate the integration of renewable energy) would save utility customers approximately $1.5 billion because it is cheaper to use batteries customers have already purchased on four wheels than to pay private companies to deploy standalone battery storage.346 The same study also found that enabling "vehicle-to-grid" (V2G) technology, allowing PEVs to supply power back to the grid during times of stress, could save $13-15 billion in stationary battery costs.347 "By displacing the need for construction of new stationary grid storage, EVs can provide the dual benefit of decarbonizing transportation while lowering the capital costs for widespread renewables integration," the researchers concluded.348 [EPA-HQ-OAR-2022-0829-0759, p. 127]

346 Jonathan Coignard, et al., Clean Vehicles as an Enabler for a Clean Electricity Grid. Environmental Research Letters. V. 13, No. 5. (May 2018), at 4, 5, http://iopscience.iop.org/article/10.1088/1748-9326/aabe97 (last accessed

June 30, 2023).

347 Id. at 5, 6.

348 Id. at 1.

Focusing on the Midwest to underscore the point, researchers concluded that very high levels of renewable energy penetration in the Midcontinent Independent System Operator region could result in "negative valleys" (requiring excess renewable energy to be exported or curtailed), but that "[c]ontrolled (EV) charging [both smart charging and smart discharging back onto the grid] is able to reduce these negative valleys, and with sufficient numbers of EVs can eliminate them altogether, obviating the need for either export of excess renewable generation or curtailment."349 This would provide both increased environmental benefits by facilitating the integration of high levels of renewable generation and significant customer benefits. Put simply, it is cheaper to pay individual utility customers to use batteries on wheels they have already bought and paid for than it is to pay corporations to buy big batteries and park them on the grid. [EPA-HQ-OAR-2022-0829-0759, p. 128]

349 Jeffery Greenblatt, et al., Quantifying the Potential of Electric Vehicles to Provide Electric Grid Benefits in the MISO Area: Final report to the Midcontinent Independent System Operators. Lawrence Berkeley National Laboratory, at 6, 56, at https://cdn.misoenergy.org/Quantifying%20the%20Potential%20of%20Electric%20Vehicles%20to%20Provide%20 Electric%20Grid%20Benefits%20in%20the%20MISO%20Area354192.pdf. (last accessed June 30, 2023).

4. PEV charging is already putting downward pressure on electric rates, to the benefit of all utility customers.

Because much PEV charging can be accomplished when there is spare capacity on the grid, charging can spread the costs of maintaining the system over a greater volume of electricity sales, reducing the per-kilowatt-hour price of electricity to the benefit of all customers. This has already been demonstrated in the real world. [EPA-HQ-OAR-2022-0829-0759, p. 128]

In fact, empirical data compiled by Synapse Energy Economics shows that PEV drivers are not being subsidized by other utility customers and, in fact, they are putting downward pressure on rates. Between 2011 and 2020, PEV customers across the United States contributed more than $1.7 billion in net revenue to the body of utility customers.350 [EPA-HQ-OAR-2022-0829-0759, p. 128]

350 Melissa Whited, Tyler Fitch, Jason Frost, Eric Borden, Courtney Lane, Ben Havumaki, Sarah Shenstone-Harris & Elijah Sinclair, Electric Vehicles Are Driving Rates Down 1 (June 2023), https://www.synapse-energy.com/sites/default/files/Electric%20Vehicles%20Are%20Driving%20Rates%20Down%20Factsheet.pdf.

The results shown in Figure XVII.G-4 compare the new revenue the utilities collected from PEV drivers to the cost of the energy, capacity, transmission, and distribution system upgrades required to charge those vehicles, plus the costs of utility PEV infrastructure programs that are deploying charging stations for PEVs. In total, PEV drivers contributed an estimated $1.7 billion more than associated costs. That net revenue is returned to the body of utility customers in the form of electric bills that are lower than they would otherwise be. [EPA-HQ-OAR-2022-0829-0759, p. 128]

Figure XVII.G-4: Total Utility Revenues vs. Total Costs Associated with PEVs (2011-2020)351

351 Id. at 3.

[See original comment for XVII.G-4]. [EPA-HQ-OAR-2022-0829-0759, p. 129]

Organization: John Graham

Table 1 also shows that the lifecycle emissions advantage of the BEV is larger in the states that have adopted zero-emission vehicle (ZEV) mandates than in states that have not adopted ZEV mandates. This difference reflects that fact that the average reliance on coal and oil for electricity production is much less prevalent in ZEV states (6.9%) than in non-ZEV states (31.2%).100 Since the incremental effect of the EPA rule will be felt predominantly in the non-ZEV states, the most appropriate comparison for this rulemaking is HEV emissions versus BEV emissions in non-ZEV states. [EPA-HQ-OAR-2022-0829-0585, p. 35]

100 EPA. eGRID with 2021 Data. Released January 30, 2023, https://www.epa.gov/egrid/summary-data.

The central case in the DRIA ignores this reality by assuming that no states have adopted zero emission vehicle mandates. There is a sensitivity case where state ZEV mandates are considered in an alternative baseline, but the sensitivity case does not actually assume full implementation of the state-level mandates. Instead, it uses a BEV adopter model with a state-ZEV variable that is not properly specified (this weakness is acknowledged by the authors of the model).101

As a result, even the sensitivity case assumes, incorrectly, that the EPA rule will have a large impact on BEV adoption in the ZEV states. In the final rule, EPA should fix this problem, making sure that the BEV-adoption impact of the rule is concentrated in the non-ZEV states (since the state regulations and ancillary state policies will handle BEV deployment in the ZEV states). We also recommend a specific marginal emissions comparison of BEVs versus HEVs in each of the non- ZEV states. [EPA-HQ-OAR-2022-0829-0585, p. 35]

101 https://www.nrel.gov/docs/fy22osti/81065.pdf (especially p. 18). .

Organization: National Association of Manufacturers (NAM)

Manufacturers are committed to the communities in which they live and serve. Constant innovation, investment and dedication make manufacturers leaders in environmental stewardship and sustainability as they continue to drive our economic growth and prosperity. Modern manufacturing is a clean and efficient, technology-driven industry that is dedicated to the planet and its people. The NAM's members are committed to ensuring that progress continues. [EPA-HQ-OAR-2022-0829-0633, pp. 1-2]

Auto manufacturers have been making historic investments to ensure that more zero emissions vehicles are available for American motorists. As the Environmental Protection Agency finalizes its light and medium-duty vehicle emissions standards, it should structure them to allow manufacturers in the U.S. to meet market demand and remain globally competitive. To achieve these goals, we recommend the following approaches to the proposed rulemaking. [EPA-HQ-OAR-2022-0829-0633, pp. 1-2]

Infrastructure Needed

According to the Department of Energy's draft National Transmission Needs Study released in February 2023, the national electric transmission infrastructure would need to grow 57% by 2035 to reach the Biden administration's clean energy goals for the light-, medium-and heavy-duty vehicle industries.1 Yet at the historical pace of approximately 1% annual growth for these infrastructure projects,2 the transmission system could require more than half a century for the administration to achieve its stated goals for the next decade. As such, the rulemaking must recognize the realities and limitations of current infrastructure. Manufacturers continue to urge administration officials and congressional leaders to prioritize policies, including critical permitting reforms, that would strengthen transmission systems and infrastructure and speed up their growth. [EPA-HQ-OAR-2022-0829-0633, pp. 1-2]

1 https://www.energy.gov/gdo/national-transmission-needs-study

2 https://repeatproject.org/docs/REPEAT_IRA_Transmission_2022-09-22.pdf

Organization: Paul Bonifas and Tim Considine

This rule is like the Clean Power Plan proposed by the Biden Administration. The US Energy Information Administration conducted a study of the Clean Power Plan and found that average retail electricity rates would increase upwards of 3-7%.13 Taking the mid-range of this price increase, or 5%, the proposed rule would raise the previous electric rate increase of 55% to 58% and increase electricity costs for EV charging from EPA's estimate of $460 billion to $728 billion. [EPA-HQ-OAR-2022-0829-0551, p. 5]

13 https://www.eia.gov/analysis/requests/powerplants/cleanplan/

This $728 billion in higher electricity expenditures more than offsets the savings in reduced liquid fuel spending of $620. On balance, the fuel cost savings are a NEGATIVE $108 billion in contrast to EPA's estimated pre-tax fuel savings of $890 billion. This is a nearly $1 trillion difference. So, under rather conservative but realistic assumptions and elementary economic analysis, the proposed EV rule will not save consumers money but instead will lead to higher electricity costs, especially for poor and lower to middle class households living in rental units. [EPA-HQ-OAR-2022-0829-0551, p. 5]

Organization: Travis Fisher

Specifically, the EPA's DRIA regarding the impact of the Proposed Rule on the cost and reliability of electricity in the U.S. is gravely flawed. It should be redrafted to enable the EPA Administrator to give appropriate consideration to the cost and safety factors of the Proposed Rule, as required by section 202 of the Clean Air Act.1 Further, the DRIA should address the interactions between the Proposed Rule and other EPA rules—including the recently proposed rule on greenhouse gas emissions from power plants2—as required by Executive Order 12866.3 As written, the Proposed Rule: [EPA-HQ-OAR-2022-0829-0655, p. 1]

1 42 U.S.C. § 7521, https://www.law.cornell.edu/uscode/text/42/7521.

2 New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 FR 33240; May 23, 2023. Available at: https://www.federalregister.gov/documents/2023/05/23/2023-10141/new-source- performance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed (accessed July 2, 2023).

3 Executive Order 12866, Regulatory Planning and Review, 58 FR 51735; October 4, 1993. Available at: https://www.archives.gov/files/federal-register/executive-orders/pdf/12866.pdf (accessed July 2, 2023).

1. Violates section 202 of the Clean Air Act by failing to adequately consider:

A. Impaired bulk power system reliability and [EPA-HQ-OAR-2022-0829-0655, p. 1]

B. Increased retail electricity prices; [EPA-HQ-OAR-2022-0829-0655, p. 1]

EPA Summary and Response

We received many comments from the public related to the final rule. These comments dealt with several subjects, including generation capacity, transmission capacity, distribution capacity, differences in results between various emissions models and inventories, infrastructure upgrade costs, and electricity rates. A summary of these comments as well as EPA's response appears below.

Summary

Topic: Electric Power System: Generation Capacity

We received three comments related to generation capacity from the public. Two of the comments expressed concern that the EPA did not adequately consider the generation system capacity, while one comment agreed with EPA's assessment that adequate generation system capacity currently exists and will so for the duration of this final rule. These commenters included: American Fuel & Petrochemical Manufacturers, Charles Gordon, and Environmental and Public Health Organizations.

Topic: Electric Power System: Transmission Capacity

We received four comments related to transmission capacity from the public. Three of the comments expressed concern that the EPA did not adequately consider the transmission system capacity, while one comment agreed with EPA's assessment that adequate transmission system capacity currently exists and will so for the duration of this final rule. These commenters included: American Fuel & Petrochemical Manufacturers, Charles Gordon, Environmental and Public Health Organizations, and National Association of Manufacturers (NAM).

Topic: Electric Power System: Distribution Capacity

We received two comments related to distribution system from the public. One comment expressed concern that the EPA did not adequately consider the distribution system capacity, while another comment agreed with EPA's assessment that adequate distribution system capacity currently exists and will so for the duration of this final rule. These commentors included: American Fuel & Petrochemical Manufacturers and Environmental and Public Health Organizations.

Topic: Electric Power System Reliability

We received three comments related to the electric power sector reliability from the public. Two of the comments expressed concern that the EPA did not adequately characterize possible degradation to the electric power system, while another comment agreed with EPA's assessment that this final rule will not result in significant material harm to electric power system reliability. These commenters included: American Fuel & Petrochemical Manufacturers, Environmental and Public Health Organizations, and Travis Fisher.

Topic: Emissions Modeling

We received one comment related to emissions modeling. The one comment expressed concern that EPA's emissions modeling in support of this final rule was inaccurate. This comment was from John Graham.

Topic: Infrastructure Upgrade Costs

We received two comments related to infrastructure upgrade costs from the public. These comments expressed concern that the EPA did not adequately consider the benefits and/or costs associated with infrastructure upgrade costs. These commenters included: American Fuel & Petrochemical Manufacturers and Paul Bonifas and Tim Considine.

Topic: Electricity Rates

We received two comments related to the electricity rates from the public. These comments expressed concern that the EPA did not adequately consider decreases and/or increases in electricity rates. These commenters included: Environmental and Public Health Organizations, and Travis Fisher.

Response:

EPA conducted extensive electric power sector modeling analyses in which it concluded that there is adequate generation and transmission capacity required to meet the electric load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity. Our analyses demonstrate that the impacts of both this rule alone and combined with the Heavy-Duty Phase 3 Rule do not adversely affect resource adequacy and grid reliability. These impacts result in anticipated power grid changes that 1) are consistent with key National Electric Reliability Corporation (NERC) assumptions, 2) that are consistent with historical trends and empirical data, and 3) are consistent with goals, planning efforts and Integrated Resource Plans (IRPs) of industry itself. In response to commenters that claimed the cumulative impacts of the final rule and certain EPA proposed rules relating to the electric generating sector would adversely affect resource adequacy and grid reliability, we also performed an analysis of cumulative impacts and assessed that these cumulative impacts were unlikely to adversely affect resource adequacy or grid reliability. For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

EPA also conducted extensive and first-ever, national-level distribution system modeling analyses in conjunction with the U.S. Department of Energy (DOE), the National Renewable Energy Laboratory (NREL), and the Lawrence Berkeley National Laboratory (LBNL) in support of this final rule. The study found that: the benefits of vehicle electrification to consumers outweigh the estimated cost of charging infrastructure and grid upgrades; incremental distribution grid investment needs represent approximately 3 percent of current annual utility investments in the distribution system; and incremental distribution grid investment needs decrease by 30% with basic managed charging techniques.

The study also underscored the additional benefits that managed electric vehicle charging confers to the distribution system, such as the ability to defer distribution system upgrades. With managed charging, the final standards provide significant distribution system benefits, both financially and in terms of their ability to defer necessary distribution system upgrades. By more-effectively utilizing existing electric power system assets, managed electric vehicle charging has been shown to help reduce overall electricity costs by allowing for the deferral of electric power system upgrades, with deferment potential of between 5 and 15 years over the 2021–2050 period (Kintner-Meyer et. al., 2022). While such deferrals reduce immediate capital expenditures for electric power system operators, they also extend the functional lifespan of these assets, provide electric utility planners with additional time to more-effectively schedule and coordinate needed distribution system upgrades, consider cost-effective planning options, and help mitigate supply chain shortages for electric power system components. For additional discussion, see Chapter 5: Electric Power Sector and Infrastructure Impacts and the joint DOE-NREL-LBNL-EPA Technical Report for the Transportation Electrification Infrastructure Study (TEIS).

When considering emissions from various electric vehicles, one commentor cited estimates from eGRID, a spreadsheet data source produced by EPA. eGRID is a useful, static spreadsheet-based tool for approximating electric power plant emissions. For rulemaking purposes involving the electric power sector, EPA uses the Integrated Planning Model (IPM), a multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector. It provides projections of least-cost capacity expansion, electricity dispatch, and emission control strategies for meeting energy demand and environmental, transmission, dispatch, and reliability constraints. The inherent differences between eGRID, a static dataset, and IPM, a dynamic optimization model used to develop the final rule, likely account for the emissions differences encountered by the commentor. In other words, eGRID is a list of electric power sector assets that says nothing about the conditions or times during which they may be called upon to operate, whereas IPM is a tool that determines the least-cost set of these assets, which vary with time, that achieve a policy objective. As such, EPA finds that IPM, and not eGRID, is the more suitable tool for purposes of modeling the effects of this rule.

When discussing transmission system concerns, one commentor cited a statistic from the Department of Energy (DOE) DRAFT National Transmission Needs Study. However, the DRAFT National Transmission Needs Study cited by the commentor was superseded by the FINAL National Transmission Needs Study. Further, the internet link provided by the commentor for the DRAFT report links, instead, to the FINAL report. A search for the DRAFT report was fruitless as was a search of the FINAL report for the statistic in question.

One commentor cited differences between the 2050 results of EPA's IPM emissions modeling conducted in support of this final rule and the Energy Information Administration's (EIA) Annual Energy Outlook 2023 (AEO2023).

For this final rule, we conducted extensive electric power sector generation modeling analyses using EPA's Power Sector Modeling Platform v6. To generate projections used in the Annual Energy Outlook 2023 (AEO2023), EIA uses the National Energy Modeling System (NEMS). The modeling assumptions used in EIA's NEMS differ from the modeling assumptions used in EPA's Power Sector Modeling Platform v6 and likely account for the perceived differences in 2050 results. EPA's IPM model differs and EIA's NEMS model in many ways. For instance:

- Total electric demand assumed in IPM to support the final rule is higher than that used by EIA in NEMS for AEO2023.

- Regional distribution of electricity demand assumed in IPM to support the final rule differs from that used by EIA in NEMS for AEO2023. EPA has carefully considered the regional impacts of our regulation, and we believe accounting for such regional impacts is important given regional differences between motor vehicle use as well as the electric sector.

- IPM uses additional (incremental) EV demand incorporated to the total demand compared to AEO (NEMS). Given that this rule is associated with increases in electricity demand, we believe using up-to-date total electric demand numbers reflecting those increases in IPM is appropriate.

- EPA rules are not fully reflected in AEO modeling, and AEO modeling does not capture the effects of the expiration of tax credits in later years of the IRA. We believe that reflecting existing regulations in the baseline is important in assessing the impacts of our action; this is also consistent with Circular A-4. Over the course of this rulemaking EPA has also worked closely with DOE and carefully evaluated IRS guidance in assessing the impacts of relevant IRA provisions, and our analysis fully accounts for this updated information.

- EPA updates the generation fleet information (retirements and new capacity additions) frequently, based on both EIA data, public comments, and EPA research;

- EPA incorporates and models various state-level environmental regulations in detail and updates them frequently;

When reviewing EIA's AEO, the Congressional Research Service (CRS) noted that a "challenge with AEO projections is that they tend to be less accurate as they go farther out into the future" (Lawson, A. J. et. al. 2020B). The CRS is a public policy research institute of the United States Congress that operates within the Library of Congress, works primarily and directly for members of Congress and their committees and staff on a confidential, nonpartisan basis.

The CRS also notes that "EIA's projections have been criticized for not taking into account potential changes in laws and regulations. Some critics argue that this presents a misleading reference upon which many policy and investment decisions are made. Others argue EIA insufficiently accounts for policy or technology changes in its projections" (Lawson, A. J. et. al. 2020A).

EIA announced in early 2023 that it will postpone the release of AEO 2024, because NEMS "…requires substantial updates to better model hydrogen, carbon capture, and other emerging technologies." Further, the next AEO release is scheduled for 2025 and will "…more comprehensively address existing laws and regulations in the Reference case, including up-to-date provisions in the Inflation Reduction Act and regulatory actions that could be finalized in the coming months." This is the first time in its 41-year history that the AEO will not be published.

For the above reasons, EPA believed that using IPM is appropriate for purposes of modeling this rule. In sum, EPA devoted considerable time and resources, including in consultation with DOE, in assuring that the IPM would accurately model the impacts of this rulemaking, for example, accounting for additional electricity demand due to EVs associated with this rulemaking and reflecting the latest EPA and State regulations relevant to the power sector. By contrast, AEO2023 does not accurately account for these important factors

One commentor suggested that EPA's final rule "Violates section 202 of the Clean Air Act by failing to adequately consider: A. Impaired bulk power system reliability and B. Increased retail electricity prices." EPA notes that the Clean Air Act Section 202 does not specifically list these factors. Nonetheless, EPA did in fact consider both grid reliability and retail electricity prices.

One commentor was supportive of EPA's final rule, stating that the increase in expected future electricity demands is consistent with past precedent; that electric vehicle-related distribution upgrade costs will be minor compared to total distribution costs; that electric vehicles can lower the cost of managing the electric power system; and reduce the curtailment of renewable electricity. This commenter also added that electric vehicles should provide downward pressure on electricity prices for electric vehicle users and non-users.

18.1 - Electrical distribution level and transmission level reliability

Comments by Organizations

Organization: 25x'25 Alliance, et al.

The undersigned parties offer the following comments on EPA's proposed rule, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." We write these comments because we believe that the proposed rules would establish an overly aggressive, high-risk program that would be counterproductive in achieving the agency's environmental and health objectives. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

In establishing or revising Clean Air Act Section 202(a) standards, EPA must consider issues of technological feasibility, cost of compliance, and lead time. Among other things, that means the agency must look closely at the impact of its proposed standards on net emissions of air pollutants and their associated public health effects, impacts on the automotive industry, impacts on the vehicle purchasers/consumers, energy security, and safety, and how the proposed approach would compare to other possible rulemakings. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

EPA's review of relevant factors in the current proposal is seriously deficient. The chief failure comes because the agency elides two distinct types of feasibility: the technological feasibility of electric vehicles as a part of the fleet and the technological feasibility of electric vehicles as the whole of the fleet. We do not dispute the former, but overwhelming evidence disproves the latter. First, there are no established supply chains capable of supplying the raw materials to manufacture the millions of vehicles needed—just over the next decade—to supply the projected market. Second, the infrastructure necessary to support these vehicles, particularly recharging infrastructure, is not and will not be available in the necessary timescales. The high density of chargers needed in major metropolitan areas and vast web of chargers needed to span the rural areas of the Country will require tremendous planning and investment. The long lead times associated with new renewable generation means that this added marginal electric load will be powered by natural gas and coal for the foreseeable future. And current prices, lack of infrastructure, and public opinion militate strongly against the conclusion that a ten-fold increase in the annual sales of electric vehicles will occur in the next eight years. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

Organization: Advanced Energy United

However, in order to fully realize the benefits of this new fuel source, we must consider innovative approaches that will effectively manage that electric load and mitigate potential grid impacts. In the draft regulatory impact assessment for the Phase 3 rule, the EPA rightly recognized that grid constraints will be a challenge, and the likely necessity of a variety of approaches to reduce the need or scale of upgrades.2 While some solutions to this challenge will require the engagement of state and federal policymakers, others are already being deployed by innovative companies across the advanced energy industry. [EPA-HQ-OAR-2022-0829-0695, p. 2]

2 Multi-Pollutant Emissions Standard for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles -Draft Regulatory Impact Analysis p 5-35 https://nepis.epa.gov/Exe/ZyPDF.cgi/P10175J2.PDF?Dockey=P10175J2.PDF

Building out a decarbonized electric grid with advanced energy technologies—and the infrastructure necessary to ensure its stability—will require the innovation and speed demonstrated by President Roosevelt's Arsenal of Democracy. In response to the need for tanks, weapons, and planes, American companies like Ford, GM, and Boeing ramped up manufacturing production and began making the technologies, equipment, and parts necessary to bolster Allied efforts. That is the kind of American innovation that we will need—and have begun to see—from leading automakers and new market entrants as they increase their share of EVs. For instance, Ford and Sunrun have teamed up to pair the energy storage capabilities of the all-electric F-150 Lightening with rooftop solar. In a similar vein, Rivian has indicated an interest in implementing bi-directional charging—vehicle-to-load—software into their vehicles which would alleviate grid constraints and improve resiliency. This technology turns an EV into a mobile battery. This could yield immense benefits to grid resiliency and provide helpful energy storage for commercial buildings and homes. [EPA-HQ-OAR-2022-0829-0695, p. 2]

In addition to hardware solutions to manage grid impacts from electric LDVs, software-based managed charging solutions (sometimes called automated load management or power control systems) serve a similar role to mitigate the need for electrical distribution system upgrades. [EPA-HQ-OAR-2022-0829-0695, p. 2]

II. Case Studies

Below are three brief case studies that show how these proven technologies have helped to alleviate grid constraints and benefit consumers. [EPA-HQ-OAR-2022-0829-0695, pp. 2-3]

Case Study 1:

Dedicated EVSE companies like FreeWire Technologies are mitigating stumbling blocks on the road to decarbonized transportation. Their battery-integrated charging technology "solves grid constraints by packaging charging infrastructure, grid infrastructure, and energy storage into a fully-integrated compact solution."3 These ultrafast chargers provide enhanced grid resiliency options during peak demand and can support critical facilities during outages and charge vehicles at 200kW in 15 minutes.4 [EPA-HQ-OAR-2022-0829-0695, pp. 2-3]

3 FreeWire Technologies. (27 April, 2022). FreeWire Technologies Announces $125 Million Series D Financing to Accelerate Deployment and Development of Next-Gen EV Charging Technology and Energy Management Services. https://freewiretech.com/freewire-technologies-announces-125-million-series-d-financing/

4 FreeWire Technologies. (2023). FAQ. https://freewiretech.com/faq/#:~:text=Visit%20the%20Boost%20Charger%20web,200%20miles%20in%20 15%20minutes.

Case Study 2:

Octopus Energy has employed a demand response program in the United Kingdom called Intelligent Octopus, which demonstrates the potential for managed charging to reduce grid pressures and the costs associated with overbuilding the distribution system. A customer simply sets their preferences in an app (specifying when they need the EV charged and the state of charge that is needed) and the platform will automatically charge the cars at times where there is abundant, low-cost energy, helping to balance out demand and supply on the grid while saving customers money. Intelligent Octopus enrollment has grown from 600 EVs since it was launched in January 2022 to over 45,000 EVs today, providing 250 MW in shiftable load resources. Intelligent Octopus was launched for EV drivers in Texas in February. [EPA-HQ-OAR-2022-0829-0695, p. 3]

Case Study 3:

Irish Post issued an RFP to electrify 100 parking sites across the country for its mail fleet of trucks, vans, and cars. Understanding that they were working with constrained grid conditions, Irish Post included load management capability as a requirement so as to avoid the cost and time delays of extensive local grid upgrades. [EPA-HQ-OAR-2022-0829-0695, p. 3]

A general contractor and The Mobility House (TMH) won the RFP and deployed 2800 22 kW AC chargers and 180 DC chargers ranging from 22-50 kW while avoiding an estimated 50 MW of utility upgrades across all sites. At a subset of 31 sites using exclusively 32 Amp chargers, TMH's load management technology enabled the team to safely install and operate EVSE nameplate capacity exceeding the main site panel capability by an average of 200-300%. This allowed an average of eight extra EVSEs per site to be installed without upgrading service, saving Irish Post time and money as they electrified their fleet while allowing all EVSEs access to their full nameplate capacity when needed and serving their mobility needs with no adjustments in driver behavior. [EPA-HQ-OAR-2022-0829-0695, p. 3]

Case Study 4:

Vehicle-to-grid (V2G) technology allows an electric vehicle (EV) to draw energy from the grid (typically during periods of low cost & low demand) and discharge energy back to the grid (during periods of high cost & high demand). V2G technology also helps reduce energy costs associated with owning and operating EV fleets. An increasing number of electric utilities, like National Grid in Massachusetts, support programs that pay electric fleets and other battery storage resources to discharge energy, turning them into revenue-generating assets without disrupting normal operations. In the summers of 2021 & 2022, Highland Electric Fleets piloted V2G technology in battery storage from electric school buses. 10+ MWh was discharged to the Massachusetts grid across 158 hours, generating $2,300. [EPA-HQ-OAR-2022-0829-0695, pp. 3-4]

Case Study 5:

The San Diego-based company Nuvve is a global leader in vehicle-to-grid (V2G) technology with deployments on five continents. In the US, Nuvve is focused on the school bus market. Electrified school bus fleets represent an excellent candidate for V2G given the large batteries and the long dwell times. School buses are often idle for months at a time during the summer when additional grid capacity is at a premium. The U.S. Environmental Protection Agency (EPA) acknowledges the potential of electrified school bus fleets to provide V2G services.5 [EPA-HQ-OAR-2022-0829-0695, p. 4]

5 See U.S. EPA, What if Electric School Buses Could be Used to Supply Power When Off Duty? Available at https://www.epa.gov/greenvehicles/what-if-electric-school-buses-could-be-used-supply-power-when-duty.

Nuvve is the only company, working collaboratively with San Diego Gas & Electric (SDG&E), to have successfully developed an electric school bus (ESB) V2G pilot program in California. Six 60 kW bidirectional chargers and six V2G capable Lion Electric school buses were deployed at Cajon Valley Union School District. Using Nuvve's GIVe software platform, these buses participated in 10 Emergency Load Reduction Program (ELRP) events from August 17th through September 9th through SDG&E.6 The host school district was paid $2/kWh for V2G exports helping to reduce the total cost of ownership of its ESB fleet. Nuvve has additional V2G deployments totaling over 1 MW under development in California. In addition, Nuvve has multiple projects under development in other states including Oregon, Utah, Nevada, Colorado, Texas, Illinois, Florida, and Rhode Island. [EPA-HQ-OAR-2022-0829-0695, p. 4]

6 See SDG&E and Cajon Valley Union School District Flip the Switch on Region's First Vehicle-to-Grid Project Featuring Local Electric School Buses Capable of Sending Power to the Grid available at https://www.businesswire.com/news/home/20220726006137/en/SDGE-and-Cajon-Valley-Union-School-District-Flip-the-Switch-on-Region%E2%80%99s-First-Vehicle-to-Grid-Project-Featuring-Local-Electric-School-Buses-Capable-of-Sending-Power-to-the-Grid.

III. Technology Impacts

Managed charging with both hardware-and software-based solutions is an essential strategy to reduce infrastructure costs for fleet charging depots. Depot charging is likely to account for nearly 90% of fleet operating needs, with vehicles on average having 14 hours of downtime per day.7 Managing these vehicles' charging load to avoid peak periods can substantially reduce the need to upgrade both the facility's infrastructure and the utility-side infrastructure, compared to an unmanaged charging scenario in which vehicles charge simultaneously during peak periods. A recent NREL study found that managed charging in the MHD sector can reduce distribution system investment costs by up to $1,090 per EV per year.8 [EPA-HQ-OAR-2022-0829-0695, pp. 4-5]

7 Perspectives on Charging Medium-and Heavy-Duty Electric Vehicles, NREL, December 2021. https://www.nrel.gov/docs/fy22osti/81656.pdf

8 Electric Vehicle Grid Integration, NREL. https://www.nrel.gov/transportation/project-ev-grid-integration.html

In 2021 testimony filed at the California Public Utilities Commission, Pacific Gas & Electric stated that utilizing these load management technologies could reduce the originally requested capacity by more than 50%, which resulted in cost savings ranging from $30,000 to $200,000 per project.9 [EPA-HQ-OAR-2022-0829-0695, pp. 4-5]

9 PGE testimony 2-9-210 https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A2110010/4240/417398449.pdf

A 2023 report from Synapse Energy Economics, leveraging data and tariffs from ConEd and National Grid, found that managed charging reduced site peak load by 15% and 5% respectively.10 This data reflects the more rigid charging needs and schedules of fleet vehicles, but is significant, nonetheless. The cost savings associated with managed charging are also likely to lead to faster economic return on investment for fleets in the process of electrification. [EPA-HQ-OAR-2022-0829-0695, p. 5]

10 MHDV Integration Costs Report, Synapse, April 2023. https://acrobat.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3Ab0fd0780-9882-3a25-9ef2-f8c73bd80c92&viewer%21megaVerb=group-discover

The implementation of managed charging policies are a critical factor to speed overall adoption of light-duty electric vehicles in line with the EPA's rulemaking. As emissions standards steadily increase and EVs proliferate on our roads, it is likely that demand for electricity will rise beyond what managed charging can save. This new demand will call for added transmission capacity and resiliency measures, vehicle-grid integration, smart charging, and bidirectional charging/ V2G, and other innovative solutions. Without proactive planning and buildout of charging infrastructure, the U.S. is at risk of failing to meet its ambitious, and laudable, goals for transportation emissions reductions. A 2021 study by the Brattle Group estimated that investments in transmission would have to reach $25 billion in order to charge 20 million EVs.11 To fully unlock these investments, the U.S. will need to undertake permitting reform, to streamline transmission projects and free up interconnection queues. [EPA-HQ-OAR-2022-0829-0695, p. 5]

11 Sergici, S., Hagerty, M., & Long, L. (1 June, 2020). Electric Power Sector Investments of $75-125 Billion Needed to Support Projected 20 Million EVs by 2030, According to Brattle Economists. Brattle Group. https://www.brattle.com/insights-events/publications/electric-power-sector-investments-of-75-125-billion-needed-to-support-projected-20-million-evs-by-2030-according-to-brattle-economists/

Digital permitting processes could also alleviate bottlenecks in EVSE infrastructure. The Department of Energy’s SolarApp+ is a model program that has saved customers and contractor valuable time and money on solar installations by standardizing and streamlining permitting processes in localities across the U.S. Policymakers across the country should consider a similar approach to slash soft costs for the permitting of EV charging infrastructure. Investment alone cannot satisfy new demand. We must enable streamlined permitting processes if we are to meet the Biden Administration’s goal of building 500,000 new charging stations. [EPA-HQ-OAR-2022-0829-0695, p. 5]

Organization: Alliance for Automotive Innovation

Beyond BEV affordability, success of this regulation will be determined by factors outside of the vehicle; the U.S. is sorely behind in this effort (despite over the $150 billion of private sector investment thus far) and the NPRM does little to address these factors. Current charging and fueling infrastructure is inadequate (particularly residential charging), the grid resources are at least 5 to 10 years away (without even factoring in the additional demand for grid resources from the heavy-duty vehicle sector facing similar concerns in a concurrent EPA rulemaking6), and battery critical minerals (except lithium), which primarily determine the affordability and availability of EVs, are minimally addressed in the NPRM. [EPA-HQ-OAR-2022-0829-0701, pp. 4-5]

6 U.S. Environmental Protection Agency, Proposed Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 (for Model Years 2027-2032), 88 Fed. Reg. 25,926 (Ap. 27, 2023). Hereinafter “EPA HD GHG NPRM).”

No requirements to support required EVs or the drivers that must buy them

The NPRM and all the requirements set forth to date focus solely on the sale of BEVs. They propose no requirements to ensure that infrastructure will be available at homes, businesses, public event venues, highway corridors, transportation hubs, or other public locations. They contain no requirements to provide hydrogen or hydrogen fueling stations, or for utilities to quickly bring reasonably priced high-power charging (5-20 megawats (MW)) to highway service plazas, fleet locations, city centers, or transportation hubs. They do not address the need for battery critical minerals to power everything from light-, medium-, and heavy-duty vehicles, energy storage systems (ESS), lawn and garden equipment, laptops, cell phones, forklitis, and airport services—not just in the United States, but around the world. [EPA-HQ-OAR-2022-0829-0701, p. 5]

To support the vehicle requirements proposed, all these changes are necessary in under 10 years. For perspective, 10 years is the time required to obtain the necessary permits for a mine in the United States. Once permitted, another ten years could elapse before the mine produces at capacity. Ten years is also close to the time required to bring 20 MWs of power to a single location in the United States. Consequently, to the extent we need critical minerals and high-power charging, we must start today. Yet, there is no plan to do so. There is no roadmap to developing these essential pieces necessary for the transformation. Nor is there a commitment from EPA for ongoing monitoring of these factors as the EV market develops over the duration of EPA's proposed standards. [EPA-HQ-OAR-2022-0829-0701, p. 5]

Automakers are committed to electrification. The industry publicly agreed in August 2021 that BEVs, PHEVs, and FCEVs could constitute 40 to 50% of new vehicle sales by 2030 with the right combination of supportive measures. Some, but not all, of those supportive measures have started, but they are nowhere near complete and certainly not suffcient to support the even higher requirements in the proposed regulations that substantially leapfrog that target. [EPA-HQ-OAR-2022-0829-0701, p. 5]

b) Electricity Price Impacts on Costs of Battery Production

Electricity prices have an indirect effect on the cost of producing EVs because the supply chain of an EV is much more energy-intensive than the supply chain for an ICE vehicle. At battery manufacturing facilities, for example, large furnaces are required to evaporate the solvents from the coated electrodes; since battery cells are sensitive to moisture, cell assembly must occur in a dry room, which incurs high electricity costs. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

State and national policies are shifting electricity generation from fossil fuels and nuclear power to renewables, especially wind and solar. At low levels of renewables, the effect on electricity prices may be minimal. Moreover, the cost disadvantages of renewables are declining over time, but the renewables transition may increase electricity prices at higher levels of renewables penetration and will likely raise them further when investments are made (e.g., in grid-scale energy storage solutions) to address the intermittent nature of wind and solar. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

It is difficult to estimate how much electricity prices will rise in a precise time frame (e.g., 2024-2026) because they are often determined in utility rate-setting processes in each of the 50 states, and the EIA forecasts of future electricity prices do not account for all the policy changes that are underway or will soon be adopted to promote or compel increased use of renewables. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

One way for the agencies to bound the potential magnitude of rising electricity prices is to undertake a scenario analysis where all of the U.S. – residences and businesses – face the higher electricity prices now experienced by Germany or the State of California, both jurisdictions that have made determined efforts to boost renewables and phase out coal and nuclear power. Germany has the highest household electricity prices in Europe, about $0.30 per kWh. In May 2021, the average price of residential electricity in California was $0.21 per kWh, about 7%

higher than the price in May 2020. In the U.S. as a whole, the average residential electricity price is about $0.13-0.14 per kWh. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

The electricity prices paid by businesses need to be analyzed separately, as they tend to be higher than the residential rates (in part due to demand charges). The business rate for electricity is appropriate to use when computing the energy costs in the supply chain of battery production. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

A detailed analysis of global supply chains is required. In the case of lithium, for example, agencies need to consider the price of electricity where the lithium is mined, where the lithium is processed, where the lithium is used in cathode production, where the battery cells are made, and where battery packs are assembled. Electricity prices vary significantly around the world, However, EPA projects 100% of battery cells will be produced in the U.S. by 2027 and growing critical mineral production. A detailed analysis of global supply chains is required. In the case of lithium, for example, agencies need to consider the price of electricity where the lithium is mined, where the lithium is processed, where the lithium is used in cathode production, where the battery cells are made, and where battery packs are assembled. As more of the lithium-ion battery supply chain develops in the U.S., the analysis of U.S. electricity prices on battery costs will be more straightforward. [EPA-HQ-OAR-2022-0829-0701, pp. 60-61]

Renters, low-income, and MFD residents could be forced to charge at public chargers, which is far more expensive, less reliable, and vastly less convenient. This is unreasonable, and EPA and its federal counterparts should ensure this population has the same access to L2 home charging as affuent single-family homeowners. [EPA-HQ-OAR-2022-0829-0701, p. 79]

It is also important to ensure low-to moderate-income (LMI) and multi-family dwelling (MFD) residents have access to the low-cost, convenient, and reliable level 2 (L2) home charging that more affuent single-family homeowners enjoy. MFD residents, however, often face the greatest, most costly, and burdensome obstacles to installing residential EV charging. For MFD residents, the additional costs to upgrade the electrical panel, install conduit between the electrical panel and their parking space, and the logistical challenges of securing building owner approval, coordinating the billing with the building owner, and persuading an owner to make a long-term investment on a rental property, make it challenging to have convenient residential charging in an MFD. [EPA-HQ-OAR-2022-0829-0701, pp. 80-82]

2. Statutory Authority

Auto Innovators shares EPA’s goal of addressing climate change by achieving a net-zero carbon transportation future, as part of an ambitious, comprehensive, and national strategy. The Proposed Rule, however, contemplates a rapid and transformative nationwide shift to electrification that may be well beyond what the industry or market can bear now or in the foreseeable future. Given the significant policy and economic consequences that would flow from this restructuring of the nation’s vehicle market, and the breadth and unprecedented nature of EPA’s proposed action, clear congressional authorization is required for the Proposed Rule. EPA lacks this clear authorization. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

The Proposed Rule seeks to use Clean Air Act section 202 rulemaking to force an extraordinary transformation of the nation’s vehicle fleet away from ICE-based vehicles to BEVs, and it is not at all clear that the level of consumer demand and infrastructure that exists now and is expected in the future can support the expedited, aggressive timeline in the Proposed Rule. The Proposed Rule does not include an explicit electrification target, and EPA states that “a compliant fleet under the proposed standards will include a diverse range of technologies.”152 But in practice, the stringency of the proposed standards is such that automakers will have no choice but to convert to BEV fleets on a massive scale. This is the result not only of the Proposed Rule’s GHG emissions standards, but also its criteria pollutant standards and its tightening of credit programs and other flexibilities. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

152 NPRM at 29187.

As EPA notes, BEVs accounted for 5.8% of the new U.S. light-duty passenger vehicle market in 2022.153 Moreover, EPA’s MY 2023-2026 GHG emissions standards that were finalized at the end of 2021 projected only a 17% light-duty penetration rate for both BEVs and PHEVs by MY 2026.154 Despite this low rate of consumer acceptance, the Proposed Rule projects a light-duty BEV penetration rate of 67% by MY 2032, up from 36% in MY 2027.155 Importantly, in the absence of these and other strict regulatory programs (such as California’s ZEV mandate), EPA projects a significantly lower MY 2032 BEV penetration rate of only 39%.156 It is unclear from EPA’s analysis how the regulations alone justify a 28 percentage point increase in BEV market between having regulations versus not. This is particularly concerning given that EPA’s no-action analysis presumably includes the same level of existing supportive mechanisms such as the IRA and IIJA, assumptions for infrastructure development, and other market-enabling features. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

153 Id. at 29189

154 See Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74434, 74485, Table 33 (Dec. 30, 2021).

155 NPRM at 29329, Table 80.

156 Id. at 29329, Table 81.

In other words, a staggering increase in the implementation and adoption of BEV technology underpins the Proposed Rule and is the central means by which the rule effectuates its contemplated emissions reductions. But this shift to electrification is not a simple matter of swapping one technology for another. The mass adoption of BEVs on the scale required for compliance with the Proposed Rule’s standards requires a much broader transformation in the way vehicles are manufactured, purchased, fueled, serviced, and disposed of. Indeed, the Proposed Rule would reorder much of the U.S. automobile industry—which supports roughly 10.3 million American jobs and $558 billion in annual car sales, and about 6% of the U.S.’s Gross Domestic Product (GDP).157 Consumers must be willing to purchase BEVs at mass scale; the power sector must be able to generate and deliver adequate electricity158—which itself will contribute to emissions—while maintaining grid reliability and otherwise meeting consumer and industrial demand; adequate charging infrastructure must be available; batteries and other components must be manufactured at an increasing rate, critical minerals sourced, and supply chains developed. These needs must be met not only for light-duty vehicles, but also for medium-and heavy-duty vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

157 See Economic Insights, Alliance for Automotive Innovation, https://www.autosinnovate.org/resources/insights.

158 In addition to increasing electricity capacity, utilities are also facing a transition in technology types and more renewable sources, as proposed under the "Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants" [88 FR 33240, May 23, 2023].

As expressed throughout this comment, we have serious concerns that the market will not be able to bear the requirements of the Proposed Rule and that those requirements will not be feasible given these considerations. Compliance will impose significant costs, and require extraordinary effort, on the part of regulated parties—costs which will be passed along to consumers. Setting such stringent standards has the potential to create a significant market disruption, with consequences not only for the automobile industry but for the entire U.S. economy. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

In other words, the Proposed Rule is enormously consequential for the automobile industry, and for the economy and consumers as a whole. The Proposed Rule's provisions insert EPA into crucial policy tradeoffs and debates, such as concerns about the extraction and supply of critical minerals overseas, or the need to maintain a reliable, efficient electric grid.159 These considerations range far afield from the traditional ambit of section 202 rulemaking, delving into areas that are the subject of other regulatory schemes, or within the unique purview and authority of other agencies and other branches and levels of government. In short, the dramatic shift toward electrification required by the Proposed Rule implicates issues of tremendous political, economic, and social significance. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

159 See, e.g., NPRM at 29311-24.

Nor is such a transformative rule, with such wide-ranging implications, a typical feature of section 202 rulemaking. We acknowledge that some past EPA section 202 rules, most notably the MY 2023-2026 rule, have contemplated greater deployment of EVs as one of many options for complying with emissions standards. The Proposed Rule, however, is different not merely in degree but in kind, seeking to impose what is, at bottom, a mandate toward nationwide electrification. Such a proposal amounts to an unprecedented assertion of power on the part of EPA. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

"[A]n enormous and transformative expansion in EPA's regulatory authority" such as this necessitates "clear congressional authorization," as Congress is expected to "speak clearly if it wishes to assign to an agency decision of vast 'economic and political significance.'"160 But section 202 does not confer such clear authority. Section 202 authorizes EPA to promulgate "standards applicable to the emission of any air pollutant" from vehicles; it does not empower EPA to force a historic shift in the makeup of the nation's entire vehicle fleet. In the absence of plain statutory authorization, such a decision, and the tradeoffs and consequences it entails, properly belongs to Congress. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

160 Utility Air Regulatory Group v. E.P.A., 573 U.S. 302, 324 (2014) (quoting FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 160 (2000)).

The Proposed Rule frequently cites to the IIJA, also known as the "Bipartisan Infrastructure Law,"161 and the Inflation Reduction Act.162 To the extent EPA purports to rely on either statute as providing a legal basis for the Proposed Rule,163 it should not do so. No provision of the IIJA or the IRA expands or modifies EPA's regulatory authority under section 202 or the Clean Air Act more broadly. Nor can these laws be considered to have implicitly altered EPA's authority. After all, "implied amendments require 'clear and manifest' evidence of congressional intent,"164 and "neither courts nor federal agencies can rewrite a statute's plain text to correspond to its supposed purposes."165 Those conditions are not satisfied here. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

161 Pub. L. 117-58, 135 Stat. 429 (2021).

162 Pub. L. 117-169, 136 Stat. 1818 (2022). See, e.g., NPRM at 29187-90, 29195-96, 29233, 29300, 29308, 29313, 29318, 29322-24, 29341 (referencing the IIJA and/or IRA).

163 See, e.g., NPRM at 29233 ("The recently enacted Inflation Reduction Act 'reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act'") (quoting floor statement by Rep. Pallone).

164 Sackett v. E.P.A., 598 U.S , 2023 WL 3632751, at *13 (U.S. May 25, 2023) (internal quotation omitted).

165 Landstar Exp. America, Inc. v. Fed. Maritime Comm'n, 569 F.3d 493, 498 (D.C. Cir. 2009).

We reaffirm that we are fundamentally supportive of EPA's goals of reducing GHG emissions and transitioning to a net-zero carbon transportation future. Section 202 standards have a place in this effort, as we have previously expressed. We remain concerned, however, that the extraordinary and unprecedented nature of the Proposed Rule places it outside the bounds of EPA's statutory authority. [EPA-HQ-OAR-2022-0829-0701, pp. 89-92]

3.NMOG+NOx Cold FTP Fleet Average

EPA proposes to set a cold FTP NMOG+NOx fleet average requirement of 300 mg/mile, excluding ZEVs.258 EPA requests comment on whether a 400 mg/mile vehicle cap should be used instead of a fleet average.259 [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

258 NPRM at 29262.

259 NPRM at 29262.

Auto Innovators prefers a fleet average requirement, but requests a value of 300mg/mi for LDV+LDT1 and 400mg/mi for LDT2+HLTD+MDPV for the following reasons: [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

At -7 °C, emission reduction right after engine start-up and during catalyst warm-up is the key factor. Large displacement engines (V6, V8, etc.) inevitably have substantially higher emissions at engine startup before the catalyst is warmed up. For downsized turbocharged engines, the amount of heat supplied to the catalyst decreases due to the relationship between the recovery of the exhaust energy by the turbocharger and the heat capacity of the turbocharger itself; thus, the warm-up time tends to be longer than that of an engine without a turbocharger. During this longer warm-up time when the catalyst is in a semi-active state, the heavier vehicle with a turbocharger under high running load conditions has much higher emissions than other vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

According to the DRIA, EPA developed the proposal based on the test results of three models. The results of these three models certainly meet 300 mg/mi. However, due to differences in exhaust system layout (i.e., front catalyst distance from the engine) and engine control from these models, there are some models that cannot achieve both emission reduction before catalyst warm-up and early catalyst warm-up at a high level under -7 °C condition. There are also vehicles that are heavier than the vehicles EPA tested. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

Developing technology to adapt these vehicles to 300 mg/mi would require diverting substantial resources from electrification [EPA-HQ-OAR-2022-0829-0701, pp. 147-148] :

1.For emission systems development and evaluation, update and/or increase of chassis dynamometer system testing to make it possible to reproduce cold temperature condition is necessary. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

2.Development of pistons and injectors for better combustion and designing arrangement of emission purification devices are necessary. When changing the catalyst system (increase in the amount of precious metals, increase in the number of cells), increase in costs occurs. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

Regarding the 300 mg/mile fleet average, EPA proposes that the family emission limit (FEL) be set to a resolution of 0.1 g/mile (100 mg/mile).260 An FEL set to only a single decimal place (i.e., 0.x g/mile) provides very little flexibility among different vehicles. We recommend that EPA allow an FEL resolution to three decimal places (i.e., 0.xxx g/mile). [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

260 NPRM at 29436.

We also note that although EPA describes the 300 mg/mile fleet average as excluding ZEVs in the preamble,261 the proposed 40 C.F.R. § 86.1811-27(c)(3)(i) regulatory text does not reflect that exclusion.262 Auto Innovators agrees with the exclusion and recommends updating the regulatory text accordingly. [EPA-HQ-OAR-2022-0829-0701, pp. 147-148]

261 NPRM at 29262.

262 NPRM at 29420.

Below is PM data from another round robin program from 2022 run by the same certification laboratories and EPA (Figure 49). The 2-standard deviation limit around the EPA mean is 0.56 mg/mile. The all-laboratory average 2-standard deviation is 0.48 mg/mile. The variability from laboratory to laboratory at a 95% confidence level is almost as high as the proposed FTP PM standard of 0.5 mg/mile. The offset between the initial baseline tests' average and the confirmatory tests' average is more 0.37 mg/mile, or more than 25% change within the same laboratory. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

SEE ORIGINAL COMMENT FOR Figure 49: FTP PM test results from a 2022 automaker/EPA interlaboratory correlation program. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

Results from another recent interlaboratory round robin program from 2022 are shown in Figure 50 for a vehicle with a FTP PM emission level below 1 mg/mile. The lab to lab offset is evident here, which cannot be explained. The average 2-standard deviation from all labs is 0.065 mg/mile, or about 13% of the 0.5 mg/mile standard. The offset between Laboratory 2 and Laboratory 1 confirmatory testing at the end is is 0.27 mg/mile, or 54% of a 0.5 mg/mile standard. The offset between the initial baseline tests' average and the confirmatory tests' average is about a 21% change within the same laboratory. [EPA-HQ-OAR-2022-0829-0701, pp. 160-164]

E. Comments on Estimated Social benefits of the CO2 Standards

In this section, Auto Innovators comments on the major categories of estimated social benefits for the CO2 performance standards for model years 2027-2032. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

1. Local/Regional Air Quality benefits from Control of Criteria Air Pollutants

The DRIA estimates that the present value of the quantified health benefits from criteria air pollution control range from $64 billion to $290 billion, depending on the discount rate and the dose-response study used for PM2.5 and mortality. This range is so large that it overlaps the lower agency estimate of the Proposed Rule's climate benefits ($83 billion to $1 trillion). Auto Innovators believes that the agency's estimates are not consistent with the findings in the peer-reviewed scientific literature and are exaggerated. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

The final regulatory impact analysis should acknowledge that the peer-reviewed scientific literature does not generally support the agency's claim that a shift from ICEs to BEVs in the light-duty sector will reduce criteria air pollution across the country. In 2021, Burnham et al. of Argonne National Laboratory (DOE) presented a regional U.S. lifecycle analysis of the impact of BEVs through 2050, accounting for upstream emissions of criteria air pollutants at the powerplant. The abstract of their paper concludes as follows: [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

We generated state-level emission factors using a projection from 2020 to 2050 for three light-duty vehicle types. We found that BEVs currently provide GHG benefits in nearly every state, with the median state's benefit being between approximately 50% to 60% lower than gasoline counterparts. However, gasoline vehicles currently have lower total NOx, urban NOx, total PM2.5, and urban PM2.5 in 33%; 15%; 70%; and 10% of states, respectively. BEV emissions will decrease in 2050 due to a cleaner grid, but the relative benefits when compared to gasoline vehicles do not change significantly, as gasoline vehicles are also improving over this time. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

The results of this study concerning total PM2.5 are especially concerning because the agency's quantified criteria-pollutant benefits in this rulemaking are dominated by an alleged advantage of BEVs with respect to PM2.5 control. Moreover, the lifecycle analysis by Burnham et al. (2021) is published in the peer-reviewed literature, while the agency's lifecycle inputs and analysis have not been peer reviewed by qualified experts. For the final rule, Auto Innovators believes it is unwise for the agency to rely on its lifecycle analysis of criteria air pollutant control as a primary rationale for the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Insofar as criteria air pollution control is considered a primary rationale for a rule that regulates CO2 emissions, we recommend that the agency go beyond an analysis of average ICE emissions and consider "best-in-class" vehicle emissions in the baseline. For example, in a peer-reviewed contribution, Winker et al. (2018) compared HEVs and BEVs in terms of criteria air pollution emissions. When the upstream emissions from BEVs are included, they find that BEV emissions are 0.06 grams per mile (NOx) while average HEV emissions are 0.004 grams per mile (NOx and HC). The results of Winkler et al. are consistent with an earlier paper by Michalek et al. (2011), which found that HEVs and PHEVs, with small battery packs, are environmentally and economically superior to BEVs. Thus, HEVs may be a superior technological option for criteria air pollution control than BEVs, at least in some regions of the country and until the upstream and manufacturing emissions of BEVs are controlled. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

1. Andrew Burnham, Zifeng Lu, Michael Wang, Amgad Elgowainy. Regional Emissions Analysis of Light-Duty Battery-Electric Vehicles. Atmosphere. 12(11). 2021, 1482.

2. S.L. Winkler, J.E. Anderson, L. Garza, W.C. Ruona, R. Vogt, T.J. Wellington. Vehicle Criteria Pollutant (PM, NOx, CO and HCx) Emissions: How Low Should We Go? Climate and Atmospheric Science. 1. 2018, 26.

3. Jeremy J. Michalek, Mikhail Chester, Paulina Jaramillo, Lester B. Lave. Valuation of Plug-In Vehicle Life-Cycle Air Emissions and Oil Displacement Benefits. Proceedings of the National Academy of Sciences. 108(40). 2011, 16554-16558. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

In any event, any net reductions in PM2.5 emissions (primary or PM2.5 precursors) accomplished by the revised CO2 standards will not provide public health benefits that are additive to the emissions reductions accomplished by EPA's other mobile-source and stationary-source programs for criteria air pollutants. The public health benefits are not additive, as we explain below, because of the way Congress designed the Clean Air Act, structured state implementation plans, and the way EPA defined emissions limits and nonattainment on a community-by-community basis. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Specifically, reductions in vehicle emissions do not provide additive benefits to public health because the structure of the Clean Air Act allows the states to include national changes in mobile source emissions in their state emissions inventories and implementation plans for attainment of the National Ambient Air Quality Standards. In nonattainment areas and areas close to nonattainment, states and localities are disinclined to impose any more limits on stationary source emissions than is necessary to meet EPA's air-quality standards. If state and local limits are unduly strict, new factories may be built in other states and localities where the state implementation plans are not as strict on new stationary sources. (In attainment areas, where PM2.5 health benefits might also be considered, there is the complication of the Prevention of significant Deterioration (PSD) doctrine that needs to be evaluated). Thus, the practical impact of diminished mobile source emissions, at the margin, is somewhat less pressure on stationary sources to meet the requirements described in state implementation plans. Thus, there are benefits from further reductions in mobile source emissions under the Proposed Rule, but they are likely to be realized in reduced compliance costs for stationary sources rather than as public health benefits from reduced overall exposures to PM2.5. The magnitude of the compliance cost savings is likely to be a small fraction of the estimated public health benefits that the agency has claimed, given EPA estimates that the benefits of PM control vastly exceed costs in the stationary source arena. At a minimum, Auto Innovators suggests presentation of two alternative approaches for calculating the benefits of PM2.5 control: one where the benefits are expressed as compliance-cost savings for stationary sources and one – as developed in the DRIA – where the benefits of PM2.5 control are expressed as public health gains. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Auto Innovators made a similar public comment on the DRIA supporting the 2023-2026 rules. In the final rule, Auto Innovators' comment was ignored in the agency's "Response to Comment" document. (This was unusual, as many of the other Auto Innovators comments were handled very carefully in the Response to Comment document). [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

In this rulemaking alone, new criteria pollutant controls are expected to reduce direct PM2.5 emissions from gasoline vehicles by roughly 90%, so those same PM2.5 control benefits should not also be counted as benefits of the CO2 standards and BEVs. Auto Innovators suggests the EPA focus on the potential benefits of a successful transformation to electric vehicles rather than incremental benefits of adding additional PM control beyond the California ACC II requirements. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Second, EPA is correct that, once BEVs are produced and sold in 2027-2032, they will be recharged for up to 30 years as they are used by motorists, and the grid may become cleaner over that time frame. However, Auto Innovators is concerned that the analytic baseline in the DRIA takes a highly optimistic stance regarding how fast the grid will become clean over the next several decades. Obviously, if the grid becomes less carbon intensive due to more renewables, BEVs will be environmentally cleaner, but the agency should not engage in wishful thinking. The agency assumes, without support from a peer-reviewed analysis, that the Inflation Reduction Act will reduce CO2 emissions from the electricity sector by 70% over the lifetimes of the affected vehicles. Since the average lifetime of an electric powerplant is roughly twice as long (30 vs 15 years) as a passenger vehicle, it seems highly unlikely that the electrical grid will turn over so fast that it will become dramatically cleaner during the lifetimes of model year 2027-2032 vehicles. Nor is there a good evidence-based foundation for the claim that the Inflation Reduction Act, which provides only subsidies for clean electricity, will make the electricity sector dramatically cleaner in the next decade or two. The big need is for large new transmission lines to bring renewable energy to markets where it can be used. What is holding back those transmission lines and renewables is not capital, but cumbersome permitting processes. Indeed, several recent studies suggest that the clean-electricity subsidies in the IRA, without meaningful permitting reform, will have minimal impact on the carbon-intensity of the grid for the foreseeable future (e.g., Sud and Patnaik, 2022; Sud, Patnaik, Glicksman, 2023; Rosetti, 2022; 2023). The optimistic studies which find that the IRA will make the grid dramatically cleaner simply assume that renewable energy resources, and the needed transmissions lines, will obtain permits in a timely manner. The recent debt-limit deal in Congress did include some limited permitting reform, but it did not address the transmission-line reforms that are crucial to a rapid expansion of renewable sources of electricity. [EPA-HQ-OAR-2022-0829-0701, pp. 289-290]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 289-290]

1. Rayan Sud, Sanjay Patnaik. How Does Permitting for Clean Energy Work? Brookings Institution. Washington, DC. September 28, 2022.

2. Rayan Sud, Sanjay Patnaik, Robert L. Glicksman. Federal Permitting to Accelerate Clean Energy Infrastructure: A Nonpartisan Way Forward. Brookings Institution. Washington, DC. February 14, 2023.

3. Philip Rosetti. Potential Effects of the Inflation Reduction Act on Greenhouse Gas Emissions. R Street. Washington, DC. September 27, 2022.

4. Philip Rossetti. Written Testimony for the Hearing on "Tax Incentives in the Inflation Reduction Act: Jobs and Investment in Energy Communities." Committee on Finance. United States Senate. Washington, DC. May 18, 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 289-290]

The economics of renewables versus natural gas are also not as solid as the agency suggests.

The agency is correct that the prices of wind and solar continue to decline, but the agency does not mention that natural gas prices have risen significantly due to the Russian invasion of Ukraine and Europe's campaign to reduce its dependence on Russian gas. If the conflict ends in the next 5-10 years, natural gas prices in the U.S. could return to pre-invasion levels, which would complicate the accelerated deployment of renewables that the agency is forecasting. The agency's IPM modeling ignores the possibility of a sustained decline in natural gas prices. Moreover, a dramatic expansion in wind and solar can occur only with breakthroughs in the economics of grid-scale energy storage technologies. Moreover, the only plausible pathway for rapid expansion of renewable energy sources is to couple them with new energy storage technologies that make use of lithium ion batteries. (Wind and solar are not reliable sources of electricity without energy storage). The agency makes a speculative claim that grid-scale storage could be accomplished without lithium-ion batteries, but the agency provides no evidence that those storage technologies are commercially feasible and cost effective. If the agency is serious about this optimistic claim, they should provide a modeling forecast of grid-scale storage and expose it to independent peer review. Relatedly, Auto Innovators is concerned that the agency's analysis of the adequacy of supplies of raw materials for BEVs does not assume a rapid expansion of grid-scale energy storage between now and 2035. It may not be feasible to expand BEVs rapidly if scarce lithium ion batteries are used to support energy storage in the utility sector in the pre-2035 time frame. The agency's modeling of battery prices needs to be modified if there is a rapid increase in demand from U.S. utilities for lithium ion batteries. [EPA-HQ-OAR-2022-0829-0701, pp. 290-291]

Third, as mentioned earlier, the EV deployment induced by the EPA rule will occur predominantly in non-ZEV states while the EPA rule will have little incremental effect on EV deployment in the ZEV states (which account for 30-40% of the new vehicle population). The ICCT study that EPA cites reports that, in 2019, the California grid produced only 225 g/kWh CO2 while the U.S. average grid (even accounting for a gradually cleaner grid from 2021 to 2038) produces 357 g/kWh. Thus, the grids in the non-ZEV states are associated with much larger emissions than the grids in the ZEV states. Funke et al. (2023, p. 43 and Figure B3, Appendix B) make the same point with information on the grids in all ZEV states (not just California). To avoid exaggerating the climate benefits of the rule, the agency should assume that most of the BEVs deployed due to the role will be in non-ZEV states that, today, have more carbon-intensive electricity sectors. [EPA-HQ-OAR-2022-0829-0701, pp. 291-292]

Source:

1. Christoph Funke, Joshua Linn, Sally Robson, Ethan Russell, Daniel Shawhan, Steven Witkin. What Are the Climate Air Pollution and Health benefits of Electric Vehicles? Resources for Future. Washington, DC. January 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 291-292]

Organization: Alliance for Vehicle Efficiency (AVE)

Many of the estimates for future compliance in the Proposal assume that within four years, all the following requirements will be in place: that significant quantities of critical minerals and materials will be available, that the nation's electrical grid will be reliable (and cleaner), that new supply chains will be established, and that all the necessary technology and components needed for zero-emission vehicles (ZEVs) will be mass produced. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

Electricity Grids Will Need Substantial Upgrades Before They Can Support Widespread Electrification

Even if adequate charging stations could be established in the numbers and at the locations needed across the United States, providing those stations with the massive amounts of electricity required would pose another likely insuperable obstacle on the proposed rule's timeline. [EPA-HQ-OAR-2022-0829-0683, pp. 47-48]

Compliance with EPA's rule would require chargers to power more than two-thirds of the Nation's light-duty vehicles and nearly one-half of the Na-tion's medium-duty vehicles. Powering those numbers of light-and medium-duty vehicles would require an exponential increases in electricity-generation capacity. One study found that, if half of new passenger cars and light trucks in 2030 were "zero-emission vehicles," the "annual demand for electricity to charge them would surge from 11 billion kilowatt-hours (kWh) now to 230 bil-lion kWh in 2030." Kampshoff, Building Electric-Vehicle Charging Infrastructure. [EPA-HQ-OAR-2022-0829-0683, pp. 47-48]

Meeting that more than 20-fold increase in demand for electricity to charge electric vehicles in such a short period would seriously strain the Nation's gen-eration capabilities—particularly during peak-charging periods, when demand could reach extraordinary levels. For example, under stringent state standards like those in New York and Massachusetts, more than a quarter of highway stations could require 5 megawatts to meet peak demand (the same capacity needed for an outdoor professional sports stadium) by 2030, and some could require 40 megawatts (the same capacity needed for a major industrial site) by 2045. See Gideon Katsh et al., Electric Highways: Accelerating and Optimizing Fast-Charging Deployment for Carbon Free Transportation, Nat'l Grid, at 2 ("Electric Highways") (2022). Utilities would likely struggle to address such surging de-mands. See Kampshoff, Building Electric-Vehicle Charging Infrastructure at 15 (not-ing that few utilities "can deliver large amounts of electricity to many EVs at high rates at the same time"). One report shows that, in the City of Palo Alto— an area with high rates of electric-vehicle adoption—"[a] cluster of uncoordi-nated [Level 2] charging could create an excessive peak load that would over-load or blow out a transformer." Robert N. Charette, Can Power Grids Cope with Millions of EVs?, IEEE Spectrum (Nov. 28, 2022) ("Can Power Grids Cope"), https://tinyurl.com/3ybx8st7. The Director of the Center for Distributed En-ergy at Georgia Tech similarly asserts that, in residential areas, multiple Level 2 chargers on one distribution transformer can reduce its life from an expected 30 to 40 years to only 3. See id. And Xcel Energy, an electric utility, told the Minneapolis Star Tribute "that four or five families buying EVs noticeably af-fects the transformer load in a neighborhood, with a family buying an EV 'add-ing another half of their house.'" Id. [EPA-HQ-OAR-2022-0829-0683, pp. 47-48]

The proposed rule thus would require not only a massive expansion of charging points, but also significant upgrades of electricity-grid infrastructure and distribution technologies. See Kampshoff, Building Electric-Vehicle Charging Infrastructure at 15. Those upgrades would be costly. One study found that, even if only 15 percent of light-duty vehicles were electric by 2030 and used moder-ately optimized charging patterns, a typical utility would "need to make cumu-lative transmission and distribution investments of $2.8 billion through 2030, for an estimated grid capacity upgrade cost of $2,600 per EV." Anshuman Sa-hoo et al., The Costs of Revving Up the Grid for Electric Vehicles, Bos. Consulting Grp. (Dec. 20, 2019) ("Cost of Revving Up"), https://tinyurl.com/2vrye6ua. Ac-cording to the authors, that is a "meaningful sum" given that a typical utility "tends to spend about $1 billion annually on transmission and distribution cap-ital expenditures." Id. EPA's proposal—which anticipates that 67 percent of light-duty and 46 percent of medium-duty vehicles will be electric by 2032— would necessarily entail even more substantial costs. Another study reports that "for a single public direct-current fast-charging (DCFC) station consisting of four DC 150-kW chargers, the cost of upgrading the grid and the site could be more than $150,000." Kampshoff, Building Electric-Vehicle Charging Infrastructure at 15. And recent reports note that "[s]upplies for distribution transformers are low," causing prices to "skyrocket[]" from a range of $3,000-$4,000 to $20,000 each. Charette, Can Power Grids Cope. [EPA-HQ-OAR-2022-0829-0683, pp. 48-49]

Some necessary upgrades will also take a substantial amount of time. For example, in places with highway charging, a single fast-charging station can quickly exceed the peak-load capacity of a typical feeder-circuit transformer, which in turn means establishing a transmission interconnection. Katsh, Electric Highways at 6. That project can take as long as eight years to complete—if it can be done at all. See id. at 4, 34 ("It may not be feasible to extend the trans-mission network to every site, particularly in locations where there would be impacts to local residents and the environment."). And Palo Alto, which is considering investing $150 million toward modernizing its distribution system to support electric-vehicle charging, states that it will "take two to three years of planning, as well as another three to four years or more to perform all the necessary work"—and perhaps longer if the utility cannot "get the engineering and management staff, which continues to be in short supply there and at other utilities across the country." Charette, Can Power Grids Cope. [EPA-HQ-OAR-2022-0829-0683, pp. 48-49]

EPA asserts that other measures could be taken to mitigate the problems associated with peak charging demands, such as: scheduling vehicles to charge at off-peak hours; developing new electric utility tariffs; using on-site battery storage; and implementing vehicle-to-grid technology (which allows electricity to be drawn from vehicles that are plugged in) and other vehicle-grid integration systems (which allow utilities to manage vehicle charging time). See 88 Fed. Reg. at 29,311–12; Draft RIA at 5-37–39. Those mitigating measures, however, may not be effective for a variety of reasons. For example, off-peak charging will not fully solve the peak-load problem because transformers are designed to be cooled at night; adding even a few electric-vehicles using Level 2 chargers during those hours could cause transformers to run hot when they are supposed to be cooling down. Charette, Can Power Grids Cope. Moreover, spreading peak charging loads will itself require investment in "better transformers and smart metering systems," and utilities will need to obtain "regulatory permission to change electricity-rate structures to encourage off-peak charging." Id. In addi-tion, before vehicle-to-grid technology can be implemented, “[n]umerous issues need to be addressed, such as the updating of millions of household electrical panels and smart meters,” creating “agreed-upon national technical standards for the information exchange needed between EVs and local utilities,” devel-oping “[vehicle-to-grid] regulatory policies” and “residential and commercial business models, including fair compensation for utilizing an EV’s stored en-ergy.” Id. As a result, one energy expert explained that “vehicle-to-grid is not really a thing” today, and it will not become a viable option “for quite some time” until the industry “solve[s] a lot of problems at various utility commis-sions, state by state, rate by rate.” Id. [EPA-HQ-OAR-2022-0829-0683, pp. 49-51]

EPA does not address these problems or meaningfully assess the obstacles that utilities and station operators would face in the wake of its proposed rule. Instead, although observing that grid upgrades and mitigation strategies will be necessary, the agency ultimately concludes that there is too much “uncertainty” with “future distribution upgrade needs” and the “uptake” of mitigation tech-nologies to “model them directly as part of [its] infrastructure cost analysis.” 88 Fed. Reg. at 29,311. Elsewhere, the agency noted that “there is little experience to assess the impacts of significant PEV use on U.S. electric grid reliability and resiliency” and asserted that it will be the responsibility of electric utilities and transmission system operators to plan for the increase in electric-vehicle charg-ing—and how that increase will intersect with other factors affecting the grid, such as extreme weather events and the greater use of variable supply technol-ogies. Draft RIA at 11-14. Once again, EPA’s regulate-first, confront-practical-impediments-later approach is backwards and exceedingly problematic in this context. As EPA itself notes, “[a] reliable and resilient electricity sector is cru-cial for the U.S.’s national security” and supports “many other types of critical infrastructure,” including “water systems, oil, natural gas, communications, in-formation technology, and financial services.” Id. at 11-13–11-14. It is irrational to press forward without robust analysis of the changes that are likely to be necessary; if EPA concludes that reliable analysis is impossible, it should stay its hand or pursue a different approach. At a minimum, the acknowledged un-certainty about the potentially massive burdens that grid improvements might necessitate provides further doubt on the proposed rule’s feasibility and more reason for caution. [EPA-HQ-OAR-2022-0829-0683, pp. 49-51]

Organization: American Fuel & Petrochemical Manufacturers

There is significant doubt that the U.S. electric grid can reliably support the proposal. Demand for electric vehicle charging will place significant stress on generation, transmission, distribution, and consumer charging systems, that are unlikely to meet increased demand in such a short timeframe. EPA should better assess grid impacts from a regional basis, particularly in the Southwest where the grid is already under significant stress. [EPA-HQ-OAR-2022-0829-0733, p. 3]

I. EPA’s Proposal Does Not Comprehensively Address Cross-Cutting Issues

EPA’s desire to remake the automotive sector creates significant energy and national security concerns and stresses an aging electrical grid subject to increasing demand. In glossing over these issues, EPA fails to adequately consider the mineral, metal, electricity generation, transmission, distribution, and charging infrastructure requirements necessary for the Proposed Rule to be feasible. This is alarming and undermines our energy security. We lack the supply of domestically sourced minerals and metals needed to build batteries and transmission lines and, contrary to the legislative intent of U.S. laws such as the Bipartisan Infrastructure Law (“BIL”) and Inflation Reduction Act ("IRA"), we will have to rely on foreign countries to fulfill the Proposed Rule's mandate. [EPA-HQ-OAR-2022-0829-0733, p. 4]

Even if we could import vast quantities of mineral resources, EPA's electrification mandate is unobtainable. We face a limited supply of copper, which is a critical mineral needed to build out the transmission grid to supply electricity to charging stations. We also do not have near the vehicle charging infrastructure necessary to power the mandated number of ZEVs. Rather than conducting a clear-eyed assessment of these challenges, EPA erroneously assumes that all the necessary conditions to enable its proposal will happen on its aggressive timeline. This conclusion dismisses or outright ignores a multitude of evidence to the contrary. [EPA-HQ-OAR-2022-0829-0733, p. 4]

B. The United States Lacks Copper and Aluminum Production Required for Grid Expansion

Beyond the ZEV itself, electricity networks need a large amount of copper and aluminum.23 The need for grid expansion that would result from this rapid increase in electricity demand underpins a doubling of annual demand for copper and aluminum.24 Most supply of these materials will come from overseas, as the United States lacks current production capacity or the ability to increase such capacity in time to meet the demands of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 11-12]

23 IEA Report 2022.

24 Id.

The United States does not supply much of the world's aluminum. Instead, China, Russia, and India lead global production with an estimated 45 million metric tons per year. China possesses more than half of the entire world's aluminum smelting capacity and produces by far the most aluminum of any country at over 36 million tons per year.25 The United States, by contrast, produces approximately 1 million tons per year. Similarly, countries supplying the most copper are Chile, Peru, China, and the Democratic Republic of the Congo. These countries supply ten times the amount produced domestically. [EPA-HQ-OAR-2022-0829-0733, pp. 11-12]

25 Andy Home, "Global aluminum production pendulum swings back to China" (June 21, 2022) available at https://www.mining.com/web/column-global-aluminum-production-pendulum-swings-back-to-china/.

Experts predict our demand for these materials will rise dramatically, but we lack the ability to source them domestically. The latest data concludes sourcing copper for electric infrastructure (e.g., charging stations and storage) needed to accommodate increased electrical demand will be challenging.26 Copper demand is expected to rise by 53 percent, while supply is expected to rise by only 16 percent.27 U.S. import dependency for copper has grown from 10 percent in 1995 to 40 percent in 2020, with projections of copper import dependency reaching between 55 percent and 67 percent between 2020 and 2040.28 Other estimates predict that by 2030 supply from existing mines and projects under construction is estimated to meet only 80 percent of copper needs by 203029—not considering the anticipated increase in ZEV production anticipated by EPA's Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 11-12]

26 IEA Report 2022.

27 BLOOMBERGNEF, "Copper Miners Eye M&A as Clean Energy Drives Supply" (Aug. 30, 2022), available at https://about.bnef.com/blog/coppers-miners-eye-ma-as-clean-energy-drives-supply-

gap/#:~:text=Copper%20demand%20is%20set%20to,and%20difficulty%20developing%20greenfield%20mines.

28 S&P GLOBAL, “The Future of Copper Will the Looming Supply Gap Short-Circuit the Energy Transition?” (July 2022) available at https://cdn.ihsmarkit.com/www/pdf/0722/The-Future-of-Copper_Full-Report_14July2022.pdf.

29 IEA Report 2022.

C. The Proposal’s Deployment Timeline is Impracticable

EPA’s emissions standards rely on the unsubstantiated assumption that the U.S. electricity and transmission grid and ZEV charging infrastructure will be available to charge the massive numbers of ZEVs that will enter the market. As outlined below, available data supports the Alliance for Automotive Innovation’s conclusion that the timeline for EPA’s standard is infeasible.36 [EPA-HQ-OAR-2022-0829-0733, p. 13]

36 Alliance for Automotive Innovation, Comments to the Environmental Protection Agency, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Proposed Rule, Docket No. EPA-HQ-OAR-2022-0829 (hereinafter AAI Comments) at iv.

1. There is Significant Doubt that the U.S. Electrical Grid and Transmission Grid Can Reliably Support this Proposal.

The Proposal will further strain our nation’s electricity system as global electricity demand could increase 47 percent by 2050 based on 2021 projections of population and economic growth, alone.37 In the U.S., the estimated increase in energy consumption is 15 percent by 2050, without consideration of EPA’s Proposal. Notably, this value is likely much higher considering the anticipated increase of between 900 and 2,000 percent electricity purchased for transportation by 2050 with the increased adoption of EVs.38 The Department of Energy concluded that transmission systems must expand by 60 percent by 2030 and triple that capacity by 2050 to meet the Administration’s emissions goals.39 An author of the Princeton University’s Net-Zero America Project40 said “The current power grid took 150 years to build. Now, to get to net-zero emissions by 2050, we have to build that amount of transmission again in the next 15 years and then build that much more again in the 15 years after that. It’s a huge amount of change.”41 [EPA-HQ-OAR-2022-0829-0733, p. 13]

37 Meghan Gordon and Maya Weber, S&P Global, “Global energy demands to grow 47% by 2050, with oil still top source: US EIA” (Oct. 6, 2021) available at https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/oil/100621-global-energy-demand-to-grow-47-by-2050-with-oil-still-top-source-us-eia#.

38 EIA, “U.S. energy consumption increases between 0% and 15% by 2050” (Apr. 3, 2023) available at https://www.eia.gov/todayinenergy/detail.php?id=56040#:~:text=U.S.%20energy%20consumption%20increases%20between%200%25%20and%2015%25%20by%202050.

39 Evan Halper and Timothy Puko, “Biden’s Ambitious Climate Plans for EVs Face These Big Hurdles,” The Washington Post, April 16, 2023.

40 E. Larson, et al., Net-Zero America: Potential Pathways, Infrastructure, and Impacts, Final report, Princeton University, (Oct. 29, 2021).

41 Molly Seltzer, PRINCETON, “Big but Affordable Effort Needed for America to Reach Net-Zero Emissions by 2050, Princeton Study Shows” (Dec. 15, 2020) available at www.princeton.edu/news/2020/12/15/big-affordable-effort-needed-america-reach-net-zero-emissions-2050-princeton-study. Accessed 28 June 2023.

Yet, our electricity generation and transmission system are increasingly challenged to keep up with current demand. As shown in Figure 5, the North American Electric Reliability Corporation's ("NERC") recent summer assessment shows roughly two-thirds of the U.S. faces increased resource adequacy risk in the summer of 2023.42 [EPA-HQ-OAR-2022-0829-0733, p. 13]

42 NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION, "2023 Summer Reliability Assessment" (May 2023).

SEE ORIGINAL COMMENT FOR Figure 5: NERC 2023 Summer Risk Assessment 43 [EPA-HQ-OAR-2022-0829-0733, p. 13]

43 NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION, "2023 Summer Energy Market and Electric Reliability Assessment" (May 18, 2023), available at https://www.ferc.gov/news-events/news/presentation-report-2023-summer-energy-market-and-electric-reliability-assessment

Depending on where you are, the long-term reliability assessment is not much better. NERC's 2022 Long-Term Reliability Assessment of the U.S. analyzed the electrical grid and the entities delivering power to the continental United States during 2023-2032.44 Regional operators of the power grid—Regional Transmission Organizations ("RTOs") or Independent System Operators ("ISO")—are responsible for transmission, but also balancing a regional power system to ensure that supply constantly matches demand. The grids in some RTOs are already under various degrees of stress. Several operating regions are still at-risk during periods of peak demand, including the Midcontinent ISO (which will face challenges in meeting above-normal peak demand), the SERC – Central area (where, compared to the summer of 2022, forecasted peak demand has risen by over 950 MW while growth in anticipated resources has remained flat) and the Southwest Power Pool (where reserve margins have fallen as a result of increasing peak demand and declining anticipated resources).45 [EPA-HQ-OAR-2022-0829-0733, pp. 14-15]

44 NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION, "2022 Long Term Reliability Assessment" (December 2022), available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf.

45 NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION, "2023 Summer Reliability Assessment" (May 2023) at 23, available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2023.pdf.

Future electricity demand is expected to grow due to government policies for EV adoption and energy transition programs. The California Energy Commission staff estimates that by 2030, an additional 5,500 MW of demand at midnight and 4,600 MW of demand at 10:00 a.m. on a typical weekday will be needed for plug-in EV charging.46 This is an increase of 25 and 20 percent, respectively, at those times. State and local policies for transitioning appliances and heating systems, such as banning natural gas stoves, can also affect projections of electricity demand and daily load shapes.47 Moreover, as global temperatures rise, increased use of air conditioning will draw a greater load from the grid. As recently reported, "two-thirds of North America is at risk of energy shortfalls this summer during periods of extreme demand."48 [EPA-HQ-OAR-2022-0829-0733, pp. 14-15]

46 Id.

47 Id.

48 https://www.cnn.com/2023/06/26/business/heat-wave-power-blackout/index.html

Although EPA projects ZEV sales on a national basis, the ability to charge the vehicles is driven by the ability of the RTOs and ISOs to manage regional or local power grids to supply electricity on demand. EPA's national data thus disguise important problems that increasing ZEV penetration will cause. By 2022, more than 50 percent of ZEVs were concentrated in California (WECC-CA/MX), Florida (SERC), and Texas (ERCOT).49 The distribution of the ZEV fleet across RTOs can be seen in Figure 6, in which state shares of ZEV registrations are allocated across RTOs.50 [EPA-HQ-OAR-2022-0829-0733, pp. 15-16]

49 S&P GLOBAL MOBILITY, "EV Chargers: How Many Do We Need?" (Jan. 9, 2023), available at press.spglobal.com/2023-01-09-EV-Chargers-How-many-do-we-need.

50 There are several states which are covered by more than one RTO. For this high-level assessment, the Turner Mason Report allocates state EV sales by roughly the geographic footprint of each RTO within the state.

SEE ORIGINAL COMMENT FOR EV Fleet is Heavily Concentrated in California. Figure 6: ZEV registrations by RTO51 [EPA-HQ-OAR-2022-0829-0733, pp. 15-16]

51 Turner Mason Report.

As seen in Figure 7, the greatest stress is not in California (although it is significant in California), but rather in the southwestern U.S. [EPA-HQ-OAR-2022-0829-0733, pp. 15-16]

SEE ORIGINAL COMMENT FOR Power Grid Serving Southwestern U.S. has Greatest Risk of Not Being Able to Support Growing EV Fleet. Figure 7: EV Power Requirement by RTO52 [EPA-HQ-OAR-2022-0829-0733, pp. 15-16]

In the southwestern U.S., for example, electricity demand from EV charging is expected to completely consume the 2023 reserve margin for the WECC-SW grid, leaving no reserve margin to address emergency conditions. This is based on EPA's estimate of ZEV electricity demand in 2032, allocated to RTOs, assuming no reserve capacity is added over the next eight years. For an RTO to fill incremental ZEV electricity demand and maintain its reserve margin, the required capacity investment will vary depending on the source of generation and that source's availability (i.e., expected load factor) specific to that region. For the U.S. the total investment would be significant; the Brattle Group estimated an additional $75 to $125 billion total investment across the power sector at a ZEV penetration rate lower than EPA proposes.53 [EPA-HQ-OAR-2022-0829-0733, pp. 15-16]

53 Michael Hagerty, et al., "Opportunities for the Electricity Industry in Preparing for an EV Future" (June 2020).

The "major questions doctrine" holds that Congress must "speak clearly when authorizing an agency to exercise [such] powers" of "vast economic and political significance."61 And as EPA is aware, this doctrine applies in the context of environmental regulation. Last year, in West Virginia v. EPA, the Supreme Court relied on the major questions doctrine in holding that the EPA exceeded its statutory authority in adopting its Clean Power Plan. That regulation sought to impose caps on GHG emissions by requiring utilities and other providers to shift electricity production from coal-fired power to natural gas and then to renewable energy in place of imposing source-specific requirements reflective of the application of state-of-the-art emission reduction technologies.62 [EPA-HQ-OAR-2022-0829-0733, p. 18]

61 Nat'l Fed. Of Indep. Bus. v. Dep't of Labor, 142 S. Ct. 661,665 (2022); see also Ala. Assoc. of Realtors v. Dep't of Health & Human Servs., 141 S. Ct. 2485, 2489 (2021); Utility Air Regulatory Group v. EPA, 573 U.S. 302, 324 (2014); U.S. Telecom Assoc. v. FCC, 855 F.3d 381, 419-21 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc) (explaining provenance of "major rules doctrine").

62 West Virginia v. EPA, 142 S. Ct. 2587 (2022).

As noted by the Court, EPA "announc[ed] what the market share of coal, natural gas, wind, and solar must be, and then require[d] plants to reduce operations or subsidize their competitors to get there."63 EPA's attempt to devise GHG emissions caps based on a generation-shifting approach would have had major economic and political significance impacting vast swaths of American life and substantially restructured the American energy market; however, EPA's purported authority was only based on a "vague statutory grant" within Section 111(d) of the Clean Air Act—far from the "clear authorization required by [Supreme Court] precedents."64 The need for clear congressional authorization for such sweeping regulatory programs is nothing new – just last week the Supreme Court reaffirmed the major questions doctrine "as an identifiable body of law that has developed over a series of significant cases spanning decades."65 [EPA-HQ-OAR-2022-0829-0733, p. 18]

63 Id. at 2613, n4.

64 Id. at 2614.

65 Biden v. Nebraska, No. 22-506, slip op. at 23 (June 30, 2023) (internal quotations omitted) (applying major questions doctrine to strike down student loan repayment program that will cost taxpayers approximately $500 billion and affects nearly every student loan borrower). Just as the trade-offs inherent in a mass debt cancelation program are ones that Congress would likely have reserved for itself, id., slip op. at 25, so too are those that must be considered for the mass adoption of electric vehicles.

EPA likewise assumes that the IRA and the BIL funds will be adequate to build the necessary electrification infrastructure. It is uncertain that (1) critical minerals will be available to manufacture ZEV batteries (see Section I.A.1); (2) consumers will buy EVs at the rate assumed by EPA (see Section IV.B.2); and (3) there will be ample electricity to power these vehicles (see Sections I.B and IV.B.3).127 What is certain is that the Proposal's timeline is unachievable and completely detached from reality.128 EPA also improperly relied on the general characterization of recent years of the light-duty and medium-duty market as supplemented by incentives in the BIL and IRA to support its proposition that there will be a rapid increase in ZEV market penetration. Setting aside the laws of supply and demand and the fact that the future availability of ZEVs is insufficient to meet the ZEV adoption requirements proposed by EPA (as discussed further below), EPA improperly relies on the number of models currently available on the free market as a surrogate for the number of actual units sold and in use. The underlying reality is that without federal regulation requiring vastly increased ZEV penetration, providing automakers certainty for long-term planning, automakers could not financially justify long-term investment in a technology with tepid consumer demand. The referenced electrification projections may be a function of OEMs striving to create certainty and minimize risk as they attempt to comply with forthcoming regulations. Indeed, the CEO of the Alliance for Automotive Innovation recently questioned the feasibility of the Proposed Rule – stating that the proposal was too aggressive and could benefit China: [EPA-HQ-OAR-2022-0829-0733, pp. 29-30]

127 Id.

128 Id.

I’ve said the EPA proposal wasn’t feasible without certain public policies and in light of today’s market and supply chain conditions .. . . There’s not enough charging and uncertain utility and grid capacity. Here’s the big one – and where China looms largest – essentially no domestic or allied supply of battery critical minerals, processing, and components until 2025 (and even then, nowhere near enough to supply what’s needed).129 [EPA-HQ-OAR-2022-0829-0733, pp. 29-30]

129 John Bozzella, EPA’s EV Rules: What it Means for China and the U.S Auto Market. June 12, 2023, available at https://www.autosinnovate.org/posts/blog/epas-ev-rules-what-it-means-for-china-and-the-us-auto-market (accessed June 23, 2023).

EV charging infrastructure, range, and charging time remain top concerns for nearly half of U.S. customers.139 OEMs expect that ZEV penetration will not be uniform across markets, with larger impact in markets with more low carbon intensity electricity and greater electrical grid reliability.140 Toyota announced that regional energy variation is the reason Toyota will provide a diversified range of carbon neutral options to meet the needs and circumstances in every country and region.141 Toyota believes optionality facilitates the ability to adapt to change, while selecting a single option is an attempt to predict the future in uncertain times.142 [EPA-HQ-OAR-2022-0829-0733, pp. 31-32]

139 Phillipp Kampshoff, et al., McKinsey & Co., “Building the electric-vehicle charging infrastructure America needs” (Apr. 18, 2022) available at https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs; EVBox, “6 reasons why your electric car isn't charging as fast as you'd expect,” Jan. 6, 2023, available at https://blog.evbox.com/6-reasons-charging-times.

140 The North American Electric Reliability Corporation (NERC’s) 2022 Long-Term Reliability Assessment (Dec. 2022) projects reliability concerns for certain regional entities. Available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf

141 Toyota Motor Corporation, ‘”Video: Media Briefing on Battery EV Strategies,’’ Press Release, December 14, 2021. available at https://global.toyota/en/newsroom/corporate/36428993.html.

142 Id.

Grid resiliency is at risk of further deterioration due to increasing power demand from electrification, not just in transportation. EPA overlooks this issue in another example of the agency’s failure to address a major aspect of the Proposal. Notably absent from EPA’s analysis is any demonstration that sufficient utilities and other infrastructure needed to support accelerated ZEV implementation will be available by MY27. Focusing solely on ZEV themselves, EPA has not adequately evaluated or grasped the time and resources required to permit, construct, and operate the necessary infrastructure to power these vehicles, while maintaining reliable and affordable electricity for all other power consumers. This is particularly concerning in light of the very real risk that the electric grid will not be able to meet the increased demand anticipated by the Proposed Rule.159 [EPA-HQ-OAR-2022-0829-0733, pp. 34-35]

159 North American Electric Reliability Corporation, 2022 Long-Term Reliability Assessment (Dec. 2022), 21, available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf (indicating that increased demand projections may lead to reliability concerns for the electric grid, especially as dual-peaking or seasonal peaking times change with increased electrification).

Power generation using traditional fuels has an advantage in that capacity is located near demand centers. Except for nuclear, any low-carbon power generation capacity must be located at the energy source (e.g., where the wind blows, water flows, sun shines). Supplying low-carbon electricity to charge EVs also needs to resolve the transmission of that power to the demand center. Installation of transmission capacity in a timely manner is not guaranteed, or even likely. The Bureau of Land Management recently issued its record of decision for the SunZia Southwest Transmission Project more than 15 years after the project was proposed.160 Once this incremental power is transmitted from supply location to a load center, there are potentially additional distribution constraints before the electrons reach charging stations and homes. Just to get a sense of the burden that charging will have on the electrical grid, One ZEV supercharger equals the launch of 70 air-conditioning units at once. Such an instant change in the power demand profile is a significant problem for the local distribution grid, requiring innumerable upgrades, such as replacement of nearly every distribution system transformer with a larger transformer, the costs of which are borne by all electric ratepayers. EV chargers typically used in a home (Level 2) can increase a home's peak load by 40 percent to 100 percent, which stress neighborhood transformers and compromise reliability.161 [EPA-HQ-OAR-2022-0829-0733, pp. 34-35]

160 Emma Peterson, INSIDE CLIMATE NEWS, "SunZia Southwest Transmission Project Receives Final Federal Approval" (May 29, 2023) available at https://insideclimatenews.org/news/29052023/sunzia-transmission-project-approval/.

161 Matt Egan, "Extreme heat means two-thirds of North America could suffer blackouts this summer," Jan 26, 2023 (two-thirds of North America is at risk of energy shortfalls this summer during periods of extreme demand caused by air conditioning use). See also Gilleran, Madeline & Bonnema, Eric & Woods, Jason & Mishra, Partha & Doebber, Ian & Hunter, Chad & Mitchell, Matt & Mann, Margaret. (2021). Impact of electric vehicle charging on the power demand of retail buildings. Advances in Applied Energy. 4 ("[A]n electric vehicle station has the potential to dwarf a big box building's power demand if behind the same meter, increasing monthly peak power demand at the site by over 250%. Cold-climate areas paired with rate structures incorporating high demand charges are most susceptible for significant changes to the annual electricity bill, with increases as high as 88%."). As discussed in Section IV.B.2, charging time will decrease dramatically with DCFC chargers, but the trade-off is they require vastly more electricity.

The intensity is further complicated in that the capacity factor (percentage of time a plant is likely to be available for generation) of thermal and photovoltaic solar (ranging from 7-32 percent) and wind (ranging from 23-46 percent) plants is so much lower than dispatchable (e.g., nuclear 93 percent) generation capacity.162 [EPA-HQ-OAR-2022-0829-0733, pp. 34-35]

162 ENERGY INFORMATION ADMINISTRATION "Electric Power Monthly" (June 27, 2023).

Therefore, it is not sufficient to evaluate total grid capacity; EPA must consider the ability of RTOs to supply power safely and reliably to all users during peak demand conditions and the impact of commercial charging on local grids, and work with other federal entities to ensure the growth in power demand stemming from an expanding ZEV fleet in the Proposed Rule can be safely and reliably supplied. Beyond the normal approximately four-year lead time for OEMs to make incremental changes to their production needed to meet emissions standard, the typical duration of an electricity transmission system capital project timeline is approximately ten years, meaning the additional electricity generation and distribution required by the Proposed Rule is unlikely to be available in the period covered by the Proposal. large-scale electric generation and storage projects are increasingly backlogged year-on-year due to long lead times for permitting and approvals, supply chain shortages, and shortage of skilled workers. While government programs have recently been put in place to help overcome some of these hurdles, it will take time for the grid to be upgraded quickly enough to overcome the constraints above.163 [EPA-HQ-OAR-2022-0829-0733, pp. 34-35]

163 Gracie Brown, et al., MCKINSEY AND COMPANY, "Upgrade the grid: Speed is of the essence in the energy transition" (Feb. 1, 2022) available at https://www.mckinsey.com/capabilities/operations/our-insights/global-infrastructure-initiative/voices/upgrade-the-grid-speed-is-of-the-essence-in-the-energy-transitionl; DELOITTE, "2023 power and utilities industry outlook" available https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-eri-power-utilities-outlook-2023.pdf.

Regardless of whether OEMs even could comply with the Proposed Rule, they would likely be left in a position where there is no consumer demand, and fleet turnover declines because the infrastructure necessary to support the new ZEVs is either at capacity or nonexistent. Indeed, at least one study to date has concluded that, upon ZEVs becoming the norm in California, it could push the total demand for electricity beyond the existing capacity of the state's grid—turning ZEVs into zero electricity vehicles.164 Even more important, meeting the electricity demand will require construction of new power plants, or electricity purchases from neighboring states, which require increased transmission and distribution capabilities.165 Or, in the short term, electricity may come from fossil-fuel fired generators, in which case it makes more sense to leave the ICE in the car rather than beside it. [EPA-HQ-OAR-2022-0829-0733, p. 36]

164 Beth Daley, THE CONVERSATION, "Switching to electric vehicles could save the US billions, but timing is everything" (Dec. 4, 2018), available at https://theconversation.com/switching-to-electric-vehicles-could-save-the-us-billions-but-timing-is-everything-106227.

165 Id.

EPA ignores these constraints, relying on the hope that a massive expansion of renewable electricity generation and the transmission grid will occur in time to service EVs produced during MY 2027-2032. The Agency's expectations are unrealistic. While the Lawrence Berkley National Laboratory reports strong interest in clean energy, increasing delays in studying, building, and connecting new energy projects to the grid means that "much of this proposed capacity will not ultimately be built."166 The high-rate project withdrawal is reflected in the fact that only 21 percent of the projects (representing 14 percent of capacity) seeking connection from 2000 to 2017 were constructed as of the end of 2022.167 Other challenges cited by the Berkeley National Lab that prevent timely operation of new renewable energy projects include increased interconnection wait times, reaching agreements with landowners and communities, power purchasers, supply chain constraints, and financing.168 EPA's refusal to examine the costs associated with grid updates required by the rule is another example of the agency's biased evaluation, resulting in an arbitrary and capricious regulatory decision. [EPA-HQ-OAR-2022-0829-0733, p. 36]

166 Berkeley Lab, Electricity Markets and Policy: Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection, https://emp.lbl.gov/queues (last visited June 9, 2023).

167 Id.

168 Id.

EPA assumes the power sector is expected to shift over time to using significantly more wind/solar generation and electricity storage (i.e., batteries), but ignores the environmental impacts of the overall increase in critical minerals demand for electrical grid storage and how that compounds the stress on critical minerals for the ZEVs themselves. But the expansion of electrical grids—even ignoring the Proposed Rule's increased demand—requires a large amount of earth minerals and metals. Copper and aluminum, which are both needed for ZEVs, are also the two main materials in wires and cables and, as described above, higher prices could have a major impact on future grid investments and EV costs.205 The need for expanded grid capabilities simultaneous to expanded ZEV production places a more pressing demand on materials like copper and aluminum thereby increasing extraction and refining efforts throughout the global market. [EPA-HQ-OAR-2022-0829-0733, pp. 44-45]

205 IEA Report 2022.

EPA also ignores the GHG emissions associated with manufacturing more, less dense, remotely located intermittent generation sources and battery back-up, plus the need for more natural gas peaking capacity and massive transmission, substation, and transformer investment to integrate these technologies into the power grid. Those emissions are significant and may offset or eliminate the benefits that EPA calculates. [EPA-HQ-OAR-2022-0829-0733, p. 45]

206 DRIA at 7-36.

207 EPA, "2020 National Emissions Inventory (NEI) Data," available at https://www.epa.gov/air-emissions- inventories/2020-national-emissions-inventory-nei-data.

The U.S. needs to invest an estimated $4.5 trillion to fully transition the U.S. power grid to renewables during the next 10-20 years.261 The cost of grid upgrade projects needed to support the incremental electricity demand growth from transportation is significant and can be quite variable. A particular case study of Northern California illustrated in IOP Science notes: "[T]he total cost of these upgrades will be at least $1 billion and potentially more than $10 billion" for a service area of 4.8 million electricity customers.262 These costs need to be taken into consideration with expected demand growth, within detailed rate base calculations, and in concert with appliance upgrade costs to fully understand their ultimate impact on annual ratepayer expenditures. We agree with and support the Proposed Rule's acknowledgement that "a recent study found power needs as low as 200 kW could trigger a requirement to install a distribution transformer."263 Other anecdotal evidence discussed within an RMI report highlights the expensive mistakes that can emerge from insufficient planning and engagement in details.264 [EPA-HQ-OAR-2022-0829-0733, p. 57]

261 Dan Shreve and Wade Schauer, Deep decarbonization requires deep pockets (June 2019), https://www.decarbonisation.think.woodmac.com/.

262 Salma Elmallah et al., IOP SCIENCE, "Can distribution grid infrastructure accommodate residential electrification and electric vehicle adoption in Northern California?" (Nov. 9, 2022), available at https://iopscience.iop.org/article/10.1088/2634-4505/ac949c.

263 DRIA at 5-35.

264 Alessandra R. Carreon, et al., RMI, "Increasing Equitable EV Access and Charging" (2022) available at https://rmi.org/insight/increasing-equitable-ev-access-charging/.

v. Costs to upgrade electricity generation, transmission, and distribution

For EPA to achieve its GHG reduction aspirations in this Proposed Rule, all three of these challenges must be met: (1) sufficient materials to manufacture the required EVs, chargers, and grid upgrades, (2) consumer willingness to substitute ZEVs for ICEVs currently for sale, and (3) a low-carbon power generation grid capable of reliably supplying energy for this mode of transportation. Combined with other issues, such as a disorderly transformation of the generation base as conventional units are replaced with intermittent resources, raises questions of the grid's ability to reliably meet consumer demand on a regional basis. Despite these challenges, EPA incredibly assumes no increase in the cost of electricity to consumers (whether EV owners or others) associated with the proposed rulemaking. EPA underestimates the cost of electricity to all consumers, including EV owners, and omits the cost of grid upgrades and distributed energy resources have been excluded from these estimates.260 [EPA-HQ-OAR-2022-0829-0733, pp. 56-57]

260 U.S. Department of Energy, National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." June 2023. https://driveelectric.gov/files/2030-charging-network.pdf.

EPA incorrectly assumes that ZEV owners will pay the national average residential electricity price to charge their vehicles. EPA fails to consider that the majority of ZEVs in the U.S. are located in utility service territories with some of the highest electricity rates in the country and that the average EV owner currently pays a much higher price to charge their ZEV at home than the national average residential electricity rate. Given that EV penetration has varied widely across the U.S., it would be arbitrary to assume that EVs will, unlike in the past, penetrate uniformly across the U.S. and thus that the average electricity price would be representative of the actual cost electricity. For example, California, which has roughly 40 percent of all registered ZEVs in the U.S., has a residential electricity rate that is roughly double the national average. Considering that EPA is modeling its rule after a California-like approach to mandate ZEVs, it would be more appropriate for EPA to assume similar real-world costs (at a minimum, given California's temperate climate). Moreover, EPA fails to consider that mandating such a high ZEV sales rate will necessarily require exponential increases in commercial ZEV charging at rates that are currently three, four or five times higher than the current national average residential electricity rate, depending on location and charging speed. Those customers who are not homeowners and not able to install their own charging stations and take advantage of charging at low-cost times will be adversely impacted. Instead, EPA uses a residential rate for electricity and does not consider peak power or time of use charges. California electric prices rose 42 percent -78 percent between 2010 and 2020 and are projected to rise an additional 50 percent by 2030 as shown in Figure 9. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

SEE ORIGINAL COMMENT FOR Historic and Forecasted Residential Average Rates Based on Most Recent 5-year Average Rate Increase. Figure 9: [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Source: Michael Shellenberger, Twitter (citing California Public Advocate's Office data), April 27, 2021). [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

Heaping additional demand for EV charging into this market could exacerbate already high electricity prices. This will be especially impactful to lower-income homeowners who may not be able to install dedicated charging units, forcing them to pay more out of pocket for charging during peak demand periods.265 [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

265 Hardman, Scott, et al., "A Perspective on Equity in the Transition to Electric Vehicles." MIT Science Policy Review, (Aug. 20 2021), available at https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/ (accessed June 29, 2023).

EPA must revise its analysis to account for realistic electricity prices. The proposed ZEV mandate will require an enormous investment in power generation and distribution, resulting in nationwide increases in electricity bills that EPA has not considered. Of course, considering the additional trillions of dollars in costs would paint a clear picture that the costs of forced electrification far exceed even the inflated benefits EPA presented in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 57-58]

EPA also did not include any cost of power distribution upgrade needed for EVSE installation, citing large uncertainty. While uncertainty may exist, EPA cannot assume there is no cost associated with this required upgrade. The National Renewable Energy Laboratory ("NREL") published new estimates of the need for ZEV charging infrastructure investment that finds: [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

"A cumulative national capital investment of $53–$127 billion in charging infrastructure is needed by 2030 (including private residential charging) to support 33 million PEVs. The large range of potential capital costs found in this study is a result of variable and evolving equipment and installation costs observed within the industry across charging networks, locations, and site designs. The estimated cumulative capital investment includes: [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

-$22–$72 billion for privately accessible Level 1 and Level 2 charging ports

-$27–$44 billion for publicly accessible fast charging ports

-$5–$11 billion for publicly accessible Level 2 charging ports.274 [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

274 National Renewable Energy Laboratory, The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure, June 26, 2023, at vii. Available at https://www.nrel.gov/docs/fy23osti/85654.pdf.

Clearly, these cost estimates are vastly higher than the $7 billion in costs that EPA claims is needed over an even longer time frame. Given a general linear relationship between ZEV charging infrastructure costs and the number of registered ZEVs, it is reasonable to estimate (using the DOE numbers) a cost adder for charging infrastructure to each ZEV of (at least) $1,606 to $3,848. These costs are not shown by EPA and EPA's failure to account for them is arbitrary and unreasonable. Moreover, note that DOE's estimate excludes "the cost of grid upgrades and distributed energy resources."275 [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

275 Id.

The BIL provides up to $7.5 billion to install 500,000 public chargers nationwide by 2030. "However, even the addition of half a million public chargers could be far from enough. In a scenario in which half of all vehicles sold are ZEVs by 2030—in line with federal targets—McKinsey estimates that America would require 1.2 million public EV chargers and 28 million private EV chargers by that year.276 All told, the country would need almost 20 times more chargers than it has now."277 EPA must address charger investment and reliability by more than just referencing EV subsidies in recent legislation. [EPA-HQ-OAR-2022-0829-0733, pp. 59-60]

276 McKinsey, "Building the Electric Vehicle Charging Infrastructure America Needs," (Apr. 18, 2022), available at America's electric-vehicle charging infrastructure | McKinsey; see also S&P Global, "EV Chargers: How Many Chargers DO We Need?, (Jan. 9, 2023) (millions of chargers are needed).

277 Id.

However, building more charging stations is not enough. “Electricity purchased at a public charger can cost five to ten times more than electricity at a private one.”278 Lower-income consumers cannot afford to install solar photovoltaics, which proponents claim will allow ZEVs to be charged at home with emissions-free electricity.279 Those who cannot afford private charging will end up paying vastly more for a re-charge than the wealthy. For those who simply cannot afford the upfront costs for a new EV or pay higher public charging rates, they may end up retaining older ICEVs for longer. [EPA-HQ-OAR-2022-0829-0733, p. 60]

278 Id.

279 Jonathan A. Lesser, Short Circuit: The High Cost of Electric Vehicle Subsidies 4, Manhattan Institute (May 15, 2018), available at https://media4.manhattan-institute.org/sites/default/files/R-JL-0518-v2.pdf.

Organization: American Highway Users Alliance

Moreover, a recent ATRI study found that electrification of the entire U.S. vehicle fleet would consume 40.3% of the current electricity demand, yet our aging national grid can hardly sustain its current needs.5 [EPA-HQ-OAR-2022-0829-0696, pp. 4-5]

5 Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet, American Transportation Research Institute, December 2022. https://truckingresearch.org/2022/12/charging-infrastructure-challenges-for-the-u-s-electric-vehicle-fleet/

Organization: American Petroleum Institute (API)

2. The electricity grid and charging.

In the DRIA, EPA estimates that by 2050, the proposed rule would drive annual electricity demand higher by 430 terawatt hours (TWh). This number represents 10% of today’s electricity demand. EPA makes the claim that it is relatively small in the context of total electricity demand in 2050 (4.4%). EPA does not include in its assessment a clear explanation on how this estimate was obtained and, accordingly, has not provided meaningful opportunity for the public to comment. API requests further clarification on the assessment of electricity demand projections by EPA. The past two decades have seen an annual growth in energy generation (i.e., total electricity consumption, or load, and system losses) averaging 30 TWh.40 Historically, the U.S. electric power system has evolved over time to accommodate new energy demand. However, the rapid pace at which BEVs will have to be in the market to comply with the proposed rule, in addition to the HD GHG Phase 3 rule proposed ZEV deployment, poses several potential challenges at the distribution level that warrant further analysis 41: [EPA-HQ-OAR-2022-0829-0641, pp. 15-16]

40 Energy Information Administration. “Monthly Energy Review.” Total Energy. June 2023. https://www.eia.gov/totalenergy/data/monthly/.

41 USDRIVE. “Summary Report on EVs at Scale and the U.S. Electric Power System.” November 2019. https://www.energy.gov/eere/vehicles/articles/summary-report-evs-scale-and-us-electric-power-system-2019.

• Distribution capacity expansion could present additional costs. Areas that should be assessed are: (a) high power charging of light-duty EVs (at 150kW and above), (b) high-power charging of medium-and heavy-duty vehicles (potentially at over 1 MW), (c) legacy infrastructure constraints in dense urban areas, and (d) low-power charging of light-duty EVs on distribution systems. [EPA-HQ-OAR-2022-0829-0641, pp. 15-16]

• Transmission constraints must be assessed. Transmission expansions must be deliberate as these investments in the U.S. power system are costly and time consuming. [EPA-HQ-OAR-2022-0829-0641, pp. 15-16]

• Ramping up capabilities of the generating fleet of the bulk power system should be considered for BEVs at scale. [EPA-HQ-OAR-2022-0829-0641, pp. 15-16]

• Analysis of medium-and heavy-duty EV market growth scenarios are needed to assess the impact on energy generation and generation capacity. [EPA-HQ-OAR-2022-0829-0641, pp. 15-16]

Additional factors such as utilities' readiness for the installation of new capacity, sufficient utility labor, capital, land use, other environmental regulations, reliability requirements, and the policy environment must be taken into consideration.42 [EPA-HQ-OAR-2022-0829-0641, pp. 15-16]

42 Ibid.

BEV impact on the order of 2-4% increased electricity demand may appear "modest" in an aggregate sense, but EPA has failed to include in their assessment that grid supply-demand strain is a localized phenomenon (both spatially and temporally). Add on the increased demand from electrification ambitions and the system becomes more tenuous and requires additional consideration. While the light-duty and medium-duty NPRM 43 notes "vehicle-to-grid software and systems that allow management of vehicle charging time and rate have been found to create value for electric vehicle drivers, electric grid operators, and ratepayers;" however, we submit that vehicle to grid (V2G) technology is still a topic of active research and development activity and early pilot demonstrations and will take years44 for effective widespread deployment to help with load-balancing. Depending on the time of day and the extent of renewable electricity in the grid mix for a given location, it should be noted that the carbon intensity of the electricity that gets consumed by these vehicles may also fluctuate depending upon fluctuation of renewable energy availability.45,46 [EPA-HQ-OAR-2022-0829-0641, pp. 16-17]

43 88 Fed. Reg. 25983 (April 27, 2023).

44 Deloitte. "2023 power and utilities industry outlook." https://www2.deloite.com/content/dam/Deloite/tw/Documents/energy-resources/2023-power-and-utilities-industry-outlook-en.pdf.

45 Salma Elmallah et al. December 2022. "Can Distribution Grid Infrastructure Accommodate Residential Electrification and Electric Vehicle Adoption in Northern California?" Energy Institute at Haas. WP 327R. https://haas.berkeley.edu/wp-content/uploads/WP327.pdf).

46 Davidson, F. T., D. T., Rhodes, J., & Nagasawa, K. December 4, 2018. "Switching to electric vehicles could save the US billions, but timing is everything." The Conversation. Retrieved June 30, 2023, from https://theconversation.com/switching-to-electric-vehicles-could-save-the-us-billions-but-timing-is-everything-106227.

Upgrades to the typical duration of an electricity transmission system capital project timeline would need to be accelerated from roughly 10-year timelines to have a chance to support the proposed ZEV demand, while current large-scale electric generation and storage projects are increasingly facing backlogs year-on-year due to long lead times for permitting and approvals, supply chain shortages, and shortage of skilled workers. While government programs have recently been put in place to help overcome some of these hurdles, they will take time for the benefits of those programs to be realized.47,48,49 [EPA-HQ-OAR-2022-0829-0641, pp. 16-17]

47 McKinsey. "Upgrade the grid: Speed is of the essence in the energy." 2022. www.mckinsey.com/~/media/mckinsey/business%20functions/operations/our%20insights/gii/voices/upgrade%20t he%20grid%20speed%20is%20of%20the%20essence%20in%20the%20energy%20transition/upgrade-the-grid-speed-is-of-the-essence-in-the-energy-transition.pdf.

48 Deloitte. "2023 power and utilities industry outlook." https://www2.deloite.com/content/dam/Deloite/tw/Documents/energy-resources/2023-power-and-utilities-industry-outlook-en.pdf.

49 Rocky Mountain Institute. "Increasing Equitable EV Access and Charging: A Path Forward for States." 2022. https://rmi.org/insight/increasing-equitable-ev-access-charging/.

EPA's proposal indicates that by 2035, the "power sector modeling results showed that non-hydroelectric renewables (primarily wind and solar) will be the largest source of electric generation (approximately 46 percent of total generation), and they would account for more than 70 percent of generation by 2050." This will primarily be driven by the incentives included in the IRA. If these projections become a reality, further analysis and consideration should be given to the intermittency of a grid primarily powered by these sources of energies. As indicated by a study50 conducted by the National Renewable Energy Laboratory (NREL), dramatically accelerating electrification of sectors such as transportation, may make it more difficult to decarbonize the electricity system due to the higher rate of generation and transmission capacity additions needed. Wood Mackenzie's51 forecasts for BEV sales includes the projection that charging will account for about 4% of total U.S. retail electricity sales in the early 2030s. Faster growth in BEV sales would likewise result in greater demands on the grid, and at a time when the power industry is also under pressure to cut its own greenhouse gas emissions. [EPA-HQ-OAR-2022-0829-0641, pp. 16-17]

50 Denholm, Paul, Patrick Brown, Wesley Cole, et al. 2022. "Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035." National Renewable Energy Laboratory. NREL/TP-6A40-81644. https://www.nrel.gov/docs/fy22osti/81644.pdf.

51 Crooks, E. April 13, 2023. "The EPA plans to rev up US EV sales." Wood Mackenzie. https://www.woodmac.com/news/opinion/the-epa-plans-to-rev-up-us-ev-sales/.

Another critical aspect to be considered is that normal BEV charging behavior will put extra load pressure52 on the grid, especially at peak hours. As a general practice, a passenger BEV user will charge the vehicle during the evening, which is also the time that electricity demand from the residential sector generally peaks. EV charging at peak hours is anticipated to be more expensive, as additional generation capacity may be required. Moreover, the current consumer trend toward acquiring larger vehicles, which typically have lower battery efficiency and further charging requirements, suggests increasing energy consumption per mile. We believe that electricity demand from BEVs should not cause additional burden to other electricity users, especially during emergencies. However, EPA has not provided an adequate analysis of the feasibility of the proposed regulation given the significant increase of charging infrastructure, electrical generation and transmission and distribution infrastructure that would be required to support a significant shift in the national fleet from ICEVs to BEVs. Furthermore, in its cost-benefit analysis of the proposed standards, EPA has failed to account for the full costs associated with the charging infrastructure and grid infrastructure upgrades that would be necessary. It is also important to note that increased use of high-capacity battery storage and high-voltage upgrades to the grid's electrical distribution and transmission infrastructure may lead to increased risk of wildfires in certain areas of the country, which would have an impact on fire response and other emergency services. [EPA-HQ-OAR-2022-0829-0641, p. 18]

52 United Nations Industrial Development Organization. "Best Practices in Electric Mobility." Discussion Paper. 2019. https://www.unido.org/sites/default/files/files/2019-09/EMG%20Discussion%20Paper.pdf.

EPA has failed to adequately address the major impacts of the proposed rule on the electricity grid and charging infrastructure. It would be arbitrary and capricious for EPA not to adjust its analysis to take into account these factors. [EPA-HQ-OAR-2022-0829-0641, p. 18]

e. API Supports Consumer Choice for Vehicles.

API 53 supports the concept that different vehicle technologies that reduce greenhouse gas emissions should be allowed to compete equally for consumer and market acceptance and growth. However, API has concerns with regards to the EPA's approach and its effect on consumer choice. [EPA-HQ-OAR-2022-0829-0641, pp. 18-19]

53 https://www.api.org/news-policy-and-issues/blog/2021/05/18/us-consumers-need-balance-choice-in-transportation-policy.

The stringency of the proposed standard is essentially forcing electrification of the transportation sector and is not in alignment with most Americans that, according to a Pew Center survey,54 favor "using a mix of energy sources to meet the country's needs" and a majority of survey respondents oppose phasing out gasoline powered vehicles by 2035. Concerns with charging availability55 could be relieved with vehicle technologies (e.g., PHEVs56) where the length of an average daily trip is approximately 30 miles.57 [EPA-HQ-OAR-2022-0829-0641, pp. 18-19]

54 Tyson, A. et al. "Gen Z, Millennials Stand Out for Climate Change Activism, Social Media Engagement With Issue." Pew Research Center. May 2021. https://www.pewresearch.org/science/2021/05/26/gen-z-millennials-stand-out-for-climate-change-activism-social-media-engagement-with-issue/.

55 Noblet, S. "Closing The Great EV Charging Gap." August 2021. Forbes. https://www.forbes.com/sites/stacynoblet/2021/08/10/closing-the-great-ev-charging-gap/?sh=6cf9107f73f4.

56 EPA is proposing a fleet utility factor (FUF) curve that will increase CO2 compliance values for PHEVs. 88 Fed. Reg. 292557 (May 5, 2023).

57 2019 Bureau of Transportation data indicates 49% of 2019 national trips by distance were less 25 miles.

84 Center for Strategic and International Studies. "An Electric Debate: Local Content Requirements and Trade Considerations." October 2022. https://www.csis.org/analysis/electric-debate-local-content-requirements-and-trade-considerations.

Fueling the BEVs

Section 5 of the DRIA discusses the electrical infrastructure impacts of the regulation forcing 67% BEV market share for new vehicles by 2032.128 [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

128 Draft Regulatory Impact Analysis EPA-420-D-23-003 April 2023, Table 5-13.

Table 5-13: IPM results for net export of electricity into the contiguous United States for the proposal. [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

2028 2030 2035 2040 2045 2050

Net US Exports (GWh) -28,312 -23,879 -24,877 -8,809 -4,453 -22

US Electricity Demand (GWh) 4,403,327 4,545,283 4,971,619 5,371,913 5,753,443 6,117,592

Net US Exports as a Percentage of Total Demand (%) -0.64% -0.53% -0.50% -0.16% -0.08% 0.00% [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

Table Notes: [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

Negative net exports represent imports of electricity

International dispatch to the contiguous United States occurred over the U.S.-Canada border. [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

This table shows an increase in power generation capacity of 968,586 GWh per year by 2040 due to the impact of the proposed rulemaking. However, this section does not consider the additional costs to the power generation market as a result of this regulation, merely the net increase in total power generation. The agency states: [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

- "However, as the expected increase in electricity generation associated with the proposal relative to a no-action case is relatively small – approximately 4.4 percent increase in 2050 – we do not expect the U.S. electric power distribution system to be adversely affected by the projected additional number of charging electric vehicles." [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

Since the proposed rule now requires BEVs as part of the assumed technology needed to meet the proposed standards, the agency should also now account for the additional costs borne by the power generation market to meet the requirements of the standard. Ignoring the costs is not valid since the proposed rule forces market penetrations higher than would otherwise be natural. [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

Based on publicly available information129 and the agency's assumed path of new power generation sources from wind and solar, the average cost of building the infrastructure required to support the assumed BEVs in operation by 2040 is ~$1,800/kWh. This means that there could be ~$200B of infrastructure cost that is ignored by the agency as "relatively small." The financial burden placed on the power generation industry is not small and should be accounted for accurately in the final regulatory impact analysis. [EPA-HQ-OAR-2022-0829-0641, pp. 50-51]

129 https://proest.com/construction/cost-estimates/power-plants/.

Organization: Anonymous

EPA should conduct a rigorous study on the full environmental impacts of a dramatic shift to BEV with respect to other environmental media (i.e., non-air pollutants/contaminants), since the proposed rule is designed to more or less force transition to that vehicle technology. The European Environmental Agency (EEA) issued a report in 2018 that reveals the far higher "Human Toxicity Potential" of BEVs, largely from mining the mineral requirements for EV manufacturing (https://www.eea.europa.eu/publications/electric-vehicles-from-life-cycle). Note especially Figure 6.2 on page 58 that even if BEVs are charged with 100% RE (i.e., eliminating the "In-use phase" segments of the BEV bars in the graph), human toxicity impacts are still over twice as high. Ecotoxicity is also higher even if BEVs are charged with 100% RE (Figure 6.3). This is supported by a publically-available European LCA model "carculator" (https://carculator.psi.ch/). Damages to environmental media other than air should also be taken into account when a shift to a substantially different vehicle technology is expected, even if some of that contamination currently is non-domestic. [EPA-HQ-OAR-2022-0829-0490, pp. 1-2]

A peer-reviewed study in 2018 (https://onlinelibrary.wiley.com/doi/10.1111/jiec.12862, Figure 1) also demonstrated the far higher human toxicity impacts of BEV. Even in extremely clean future electric grid scenarios (denoted by dotted lines (generally corresponding to the RCP2.6 scenario in the IPCC AR5)), "Human Toxicity" remains ~3 times higher for BEV in the same electric grid mix scenario. Note also that "Particle matter formation" is higher for BEV than ICEV in all but the cleanest future grid mix scenarios, disputing the BEV air quality benefits claims. [EPA-HQ-OAR-2022-0829-0490, pp. 1-2]

The 2023 study in California concludes that "…our results indicate that the CVRP [clean vehicle rebate project] has displaced emissions from vehicle tailpipes to electric generating units, leading to a net increase in primary PM2.5 emissions across the state of California…. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

…Of particular concern for environmental justice and public health is the finding that Disadvantaged Communities, as defined according to CalEnviroScreen 4.0, are disproportionately more likely to experience either larger net increases or smaller net reductions in primary PM2.5, NOX, and SO2 emissions as a result of the CVRP…." That's considering California's current electric grid, which is among the cleanest in the U.S. This is counter to the stated goals of the proposed regulation. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

These studies come on the heels of a 2010 study by the National Academy of Sciences (National Research Council -https://www.nationalacademies.org/news/2009/10/report-examines-hidden-costs-of-energy-production-and-use), which concluded... "Electric vehicles and grid-dependent (plug-in) hybrid vehicles showed somewhat higher nonclimate damages than many other technologies for both 2005 and 2030." According to Figure 3-7b in the full report, BEV is projected to be more damaging than most of the ICEV technologies/fuel pathways in 2030. Even if the NRC committee underestimated the pace of the decline in coal-generated electricity, some ICEV technologies/fuel pathways would still be less damaging than BEV or FCV, even in much cleaner grids, most notably diesel/biodiesel and CNG ICEV. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

Environmental regulations should be technology neutral with respect to compliance with the goals of the regulations. Forcing a transition to 100% BEV will almost certainly result in much higher contamination of toxic substances, both carcinogenic and non-carcinogenic, in ground water, surface water, and soils near mining sites. BEVs will likely play a prominent role in the future vehicle mix regardless, but categorically excluding ICE vehicle technologies via regulation is a mistake and potentially counterproductive. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

Organization: Anonymous

EPA should conduct a rigorous study on the full environmental impacts of a dramatic shift to BEV with respect to other environmental media (i.e., non-air pollutants/contaminants), since the proposed rule is designed to more or less force transition to that vehicle technology. The European Environmental Agency (EEA) issued a report in 2018 that reveals the far higher "Human Toxicity Potential" of BEVs, largely from mining the mineral requirements for EV manufacturing (https://www.eea.europa.eu/publications/electric-vehicles-from-life-cycle). Note especially Figure 6.2 on page 58 that even if BEVs are charged with 100% RE (i.e., eliminating the "In-use phase" segments of the BEV bars in the graph), human toxicity impacts are still over twice as high. Ecotoxicity is also higher even if BEVs are charged with 100% RE (Figure 6.3). This is supported by a publically-available European LCA model "carculator" (https://carculator.psi.ch/). Damages to environmental media other than air should also be taken into account when a shift to a substantially different vehicle technology is expected, even if some of that contamination currently is non-domestic. [EPA-HQ-OAR-2022-0829-0490, pp. 1-2]

A peer-reviewed study in 2018 (https://onlinelibrary.wiley.com/doi/10.1111/jiec.12862, Figure 1) also demonstrated the far higher human toxicity impacts of BEV. Even in extremely clean future electric grid scenarios (denoted by dotted lines (generally corresponding to the RCP2.6 scenario in the IPCC AR5)), "Human Toxicity" remains ~3 times higher for BEV in the same electric grid mix scenario. Note also that "Particle matter formation" is higher for BEV than ICEV in all but the cleanest future grid mix scenarios, disputing the BEV air quality benefits claims. [EPA-HQ-OAR-2022-0829-0490, pp. 1-2]

The 2023 study in California concludes that "…our results indicate that the CVRP [clean vehicle rebate project] has displaced emissions from vehicle tailpipes to electric generating units, leading to a net increase in primary PM2.5 emissions across the state of California…. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

…Of particular concern for environmental justice and public health is the finding that Disadvantaged Communities, as defined according to CalEnviroScreen 4.0, are disproportionately more likely to experience either larger net increases or smaller net reductions in primary PM2.5, NOX, and SO2 emissions as a result of the CVRP…." That's considering California's current electric grid, which is among the cleanest in the U.S. This is counter to the stated goals of the proposed regulation. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

These studies come on the heels of a 2010 study by the National Academy of Sciences (National Research Council -https://www.nationalacademies.org/news/2009/10/report-examines-hidden-costs-of-energy-production-and-use), which concluded... "Electric vehicles and grid-dependent (plug-in) hybrid vehicles showed somewhat higher nonclimate damages than many other technologies for both 2005 and 2030." According to Figure 3-7b in the full report, BEV is projected to be more damaging than most of the ICEV technologies/fuel pathways in 2030. Even if the NRC committee underestimated the pace of the decline in coal-generated electricity, some ICEV technologies/fuel pathways would still be less damaging than BEV or FCV, even in much cleaner grids, most notably diesel/biodiesel and CNG ICEV. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

Environmental regulations should be technology neutral with respect to compliance with the goals of the regulations. Forcing a transition to 100% BEV will almost certainly result in much higher contamination of toxic substances, both carcinogenic and non-carcinogenic, in ground water, surface water, and soils near mining sites. BEVs will likely play a prominent role in the future vehicle mix regardless, but categorically excluding ICE vehicle technologies via regulation is a mistake and potentially counterproductive. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

Organization: Arizona State Legislature

EPA's proposed rule for light-duty and medium-duty vehicles will cost jobs, increase the price of goods, hurt families, threaten our electric grid's reliability, and endanger our national security. We are both elected representatives of the people of Arizona, and citizens of Arizona who purchase and operate vehicles and participate in the Arizona economy on the same footing as other Arizonans. In both capacities, we have grave concerns about this reckless proposed rule. EPA should reject the proposed rule for at least the ten reasons set forth in this comment. [EPA-HQ-OAR-2022-0829-0537, p. 2]

9. The proposed rule makes erroneous estimates about grid reliability. Current grid-reliability issues and estimates of electricity needs contradict EPA's view that the proposed rule will only cause a "modest increase in electricity demand." [EPA-HQ-OAR-2022-0829-0537, p. 3]

IX. The proposed rule is arbitrary and capricious because of erroneous estimates about grid reliability.

EPA estimates that the additional electricity generation needed to meet the demand of battery electric vehicles is "relatively modest." 88 Fed. Reg. 29,311. According to EPA's estimates, "the proposal is estimated to increase electric power end use by electric vehicles by between 0.1% (2028) and 4.2% (2055)." Id. EPA argues that the electric grid supported adoption of air conditioners and data processing centers successfully. Id. EPA concludes that "the expected increase in electric power demand attributable to vehicle electrification is not expected to adversely affect grid reliability due to the modest increase in electricity demand associated with electric vehicle charging." Id. [EPA-HQ-OAR-2022-0829-0537, p. 27]

The electric grid is already stretched to the breaking point before implementing the proposed rule. According to the North American Electric Reliability Corporation's 2023 Summer Reliability Assessment, numerous sectors of the electric grid face shortfalls during peak demand this summer: [EPA-HQ-OAR-2022-0829-0537, pp. 27-28]

-Midcontinent ISO (MISO): "MISO can face challenges in meeting above-normal peak demand if wind generator energy output is lower than expected. Furthermore, the need for external (non-firm) supply assistance during more extreme demand levels will depend largely on wind energy output."39 [EPA-HQ-OAR-2022-0829-0537, pp. 27-28]

39 North American Electric Reliability Corporation, 2023 Summer Reliability Assessment, May 2023, 5, available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2023.pdf.

-NPCC-New England: “Operating procedures for obtaining emergency resources or non-firm supplies from neighboring areas are likely to be needed during more extreme demand or low resource conditions.”40 [EPA-HQ-OAR-2022-0829-0537, pp. 27-28]

40 Id.

-SERC-Central: “Compared to the summer of 2022, forecasted peak demand has risen by over 950 MW while growth in anticipated resources has been flat. The assessment area is expected to have sufficient supply for normal peak demand while demand-side management or other operating mitigations can be expected for above-normal demand or high generator-outage conditions.”41 [EPA-HQ-OAR-2022-0829-0537, pp. 27-28]

41 Id.

-Southwest Power Pool (SPP): “Reserve margins have also fallen in SPP as a result of increasing peak demand and declining anticipated resources. Like MISO, the energy output of SPP’s wind generators during periods of high demand is a key factor in determining whether there is sufficient electricity supply on the system.”42 [EPA-HQ-OAR-2022-0829-0537, pp. 27-28]

42 Id.

-Texas (ERCOT): “Resources are adequate for peak demand of the average summer; however, dispatchable generation may not be sufficient to meet reserves during an extreme heat-wave that is accompanied by low winds.”43 [EPA-HQ-OAR-2022-0829-0537, pp. 27-28]

43 Id.

-U.S. Western Interconnection: “However, wide-area heat events can expose the WECC assessment areas of California/Mexico (CA/MX), Northwest (NW), and Southwest (SW) to risk of energy supply shortfall as each area relies on regional transfers to meet demand at peak and the late afternoon to evening hours when energy output from the area’s vast solar PV resources are diminished.” [EPA-HQ-OAR-2022-0829-0537, pp. 27-28]

44 Id.

Almost all of these sectors are projected to have fewer resources than demand during extreme heat conditions.45 Power outages reached an all-time high in 2020, and the average person went seven hours without power in 2021.46 [EPA-HQ-OAR-2022-0829-0537, p. 28]

45 Id at 11 Table 1

46 Catherine Morehouse, Power grid can’t handle Biden’s climate rule, industry groups say, POLITICO, May 12, 2023, available at https://www.politico.com/news/2023/05/12/biden-power-rule-fossil-fuels-00096536.

Other observers recognize significant issues with the current electric grid’s reliability. A commissioner to the Federal Energy Regulatory Commission recently testified to a U.S. Senate committee, “The United States is heading for a reliability crisis.”47 Another commissioner echoed this warning, testifying, “We know that there is a looming resource adequacy crisis.” The commissioner predicted that “there will be, in time, a catastrophic reliability event.” [EPA-HQ-OAR-2022-0829-0537, p. 28]

47 Oversight of the Federal Energy Regulatory Commission: Hearing before the Sen. Comm. on Energy and Natural Resources, 118th Cong. 1 (May 4, 2023) (statement of FERC Commissioner Mark C. Christie), available at https://www.energy.senate.gov/services/files/0A896B12-2895-4F68-A367-74009F2975C4.

48 Oversight of the Federal Energy Regulatory Commission: Hearing before the Sen. Comm. on Energy and Natural Resources, 118th Cong. 2 (May 4, 2023) (statement of FERC Commissioner James P. Danly), available at https://www.energy.senate.gov/services/files/0A896B12-2895-4F68-A367-74009F2975C4.

49 Id.

EPA has only exacerbated the threats to grid reliability by proposing new carbon pollution standards for coal and natural-gas fired power plants in May 2023.50 The National Rural Electric Cooperative Association is "concerned the proposal could disrupt domestic energy security, force critical, always-available power plants into early retirement and make new natural gas plants exceedingly difficult to permit, site and build."51 This is consistent with a FERC commissioner's concern that "[t]he problem generally is not the addition of intermittent resources, primarily wind and solar, but the far too rapid subtraction of dispatchable resources, especially coal and gas."52 As the Electric Power Supply Association observed upon release of the proposed power plant rule, "For the EPA to issue proposed rules that are likely to drive power plant retirements while simultaneously undertaking separate actions to significantly increase demand for electricity due to electrification of the nation's vehicle fleet creates the conditions for a reliability failure We are not slow walking into a reliability crisis – if this rule is finalized, we will be choosing to run toward that outcome."53 [EPA-HQ-OAR-2022-0829-0537, p. 29]

50 U.S. EPA, "EPA Proposes New Carbon Pollution Standards for Fossil Fuel-Fired Power Plants to Tackle the Climate Crisis and Protect Public Health," May 11, 2023, available at https://www.epa.gov/newsreleases/epa-proposes-new-carbon-pollution-standards-fossil-fuel-fired-power-plants-tackle.

51 National Rural Electric Cooperative Association, "Electric Co-ops: EPA's Power Plant Proposal Would Further Jeopardize Reliability," May 11, 2023, available at https://www.electric.coop/electric-co-ops-epas-power-plant-proposal-would-further-jeopardize-reliability.

52 Statement of FERC Commissioner Mark C. Christie, supra note 47, at 1 (emphasis original).

53 Electric Power Supply Association, "Proposed EPA Power Plant Rules Could Intensify Reliability Challenges," May 11, 2023, available at https://epsa.org/proposed-epa-power-plant-rule-could-intensify-reliability-challenges/.

Into the face of these EPA-exacerbated grid reliability issues come EPA's electric vehicle rules, and many electricity requirement estimates are far less optimistic than EPA's. Before the electric vehicle rules, the U.S. Energy Information Administration was forecasting that "electricity consumption by the transportation sector will increase by more than a factor of 12 between 2021 and 2050 (from 12 billion kWh in 2021 to more than 145 billion kWh in 2050)."54 The American Research Transportation Institute estimates that full electrification of the country's passenger cars and trucks will require a 26.3 percent increase in existing electricity generation.55 When combined with the needs for electricity generation for freight trucks, which EPA is separately proposing, the country needs to increase its existing electricity generation by more than 40%.56 California needs to increase its existing electricity generation by more than 57%.57 [EPA-HQ-OAR-2022-0829-0537, p. 29]

54 North American Electric Reliability Corporation et al., Electric Vehicle Dynamic Charging Performance Characteristics during Bulk Power System Disturbances, Apr. 11, 2023, 2, available at https://www.nerc.com/comm/RSTC/Documents/Grid_Friendly_EV_Charging_Recommendations.pdf.

55 American Transportation Research Institute, Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet, Dec. 2022, 1, available at https://truckingresearch.org/wp-content/uploads/2022/12/ATRI-Charging-Infrastructure-Challenges-for-the-U.S.-EV-Fleet-Summary-12-2022.pdf.

56 Id.

57 Id.

EPA's mandate could require automobile manufacturers to sell 10-12 million electric vehicles in calendar year 2035 alone.58 Millions more would be sold in the years before that. According to a study conducted for the Department of Energy that modeled grid impacts in 2028 from electric vehicles, "The results indicated that the first issues would occur between 30 and 37 million EVs, at which point load could not be reliably met."59 [EPA-HQ-OAR-2022-0829-0537, pp. 29-30]

58 Todd Lassa, Can Automakers Sell 10-12 Million EVs Here By 2032?, AUTOWEEK, Apr. 10, 2023, available at https://www.autoweek.com/news/industry-news/a43555049/epa-announcing-zero-emissions-targets-for-new-vehicles/.

59 M. Kintner-Meyer et al., Electric Vehicles at Scale – Phase I Analysis: High EV Adoption Impacts on the Western U.S. Power Grid, PNNL Report 29894, July 2020, available at https://www.pnnl.gov/sites/default/files/media/file/EV-AT-SCALE_1_IMPACTS_final.pdf.

EPA has failed to consider the significant grid reliability issues caused by its interconnected proposals that increase electricity demand while decreasing electricity supply. [EPA-HQ-OAR-2022-0829-0537, pp. 29-30]

Conclusion

EPA's proposed rule will hurt Arizona families and workers by forcing them to buy vehicles they cannot afford, increasing the cost of goods they need, costing them jobs, decreasing the reliability of the electricity they depend on, and weakening our national security by making us dependent on China. EPA's green dream will be a nightmare for Arizona. EPA should reject the proposed rule and begin acting in the best interests of Arizonans and Americans. [EPA-HQ-OAR-2022-0829-0537, p. 32]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Vehicle-to-Infrastructure Integration

As the infrastructure for BEVs expands and becomes more standardized, vehicles themselves have a role in providing a reliable, consistent, and convenient charging experience for consumers. BEVs also have the unique opportunity to support grid stability in the future through "vehicle-to-grid" systems. However, to broadly realize these consumer and grid service benefits, vehicles must be able to communicate with the chargers themselves, known as electric vehicle supply equipment (EVSE), in a standardized way. [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

International Organization for Standardization (ISO) 15118 is a set of communication and charging management standards intended for use between vehicles and EVSE, including a customer convenience feature referred to as Plug & Charge. To help ensure consistent and successful use of charging infrastructure, CARB recommends that U.S. EPA require manufacturers to integrate these industry-developed standards into the design of future BEVs. CARB notes that several automakers have already introduced or will introduce U.S. vehicles that can support some portions of these standards, especially the Plug & Charge feature, including Audi, BMW, Daimler, Porsche, Lucid, Volkswagen, 60 and Ford. 61 Standardized deployment of vehicle-to-infrastructure communication across the industry will reduce barriers to BEV adoption and maximize benefits. [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

60 In a joint comment to the California Public Utilities Commission on its February 2018 Staff Report on the Vehicle-Grid Integration (VGI) Communication Protocol Working Group, Audi, BMW, Daimler, Lucid, Porsche, and VW stated their intention to implement ISO 15118 on their future vehicles, including the Plug & Charge feature. https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/o/6442457082-oems-final-comments-vgi-wg-draft-report-correction-v2.pdf

61 Ford. “Charging Your Mustang Mach-E.” https://www.ford.com/mustang/ev-charging/mache/. Accessed June 15, 2023.

Specifically, CARB recommends that, for future BEVs, U.S. EPA require manufacturers to: [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

- Implement and conform to ISO 15118-3 Vehicle to grid communication interface – Part 3: physical and data link layer requirements, 62 [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

- Implement and conform to ISO 15118-2 Vehicle to grid communication interface – Part 2: Network and application protocol requirements 63 and ISO 15118-20 Vehicle to grid communication interface: Part 20: 2nd generation network layer and application layer requirements, 64 and [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

- Demonstrate successful results for each certified vehicle configuration with ISO 15118-4 Vehicle to grid communication interface – Part 4: Network and application protocol conformance test 65 and ISO 15118-5 Vehicle to grid communication interface – Part 5: Physical layer and data link layer conformance test. 66 [EPA-HQ-OAR-2022-0829-0780, pp. 43-44]

62 ISO 15118-3:2015.

63 ISO 15118-2:2014.

64 ISO 15118-20:2022.

65 ISO 15118-4:2018.

66 ISO 15118-5:2018.

CARB notes several important benefits associated with widespread deployment of harmonized communication standards between the vehicle and the charging infrastructure. First, drivers will see the benefit of a simplified public charging user experience. Plug & Charge allows drivers to establish their electric charging preferences and input payment information once, providing a more seamless charging experience. With widespread implementation of Plug & Charge, drivers charging their vehicle at a compatible public EVSE will be able to simply plug in their vehicle and walk away while the vehicle and the EVSE communicate and manage the charging session accordingly. [EPA-HQ-OAR-2022-0829-0780, pp. 44-45]

Second, vehicle-to-grid connectivity could enable BEVs to provide important grid services. Implementation of the communications protocols outlined in the suite of ISO 15118 standards is a key step to enable this functionality by ensuring that the vehicle and the EVSE are coordinated on the bi-directional flow of electricity during grid support services. CARB agrees with U.S. EPA's findings that grid reliability is not expected to be adversely affected by the modest increase in electricity demand associated with electric vehicle charging. 67 California's grid has historically expanded and evolved as consumer demand for electricity services has grown, including with the recent emergence of electric vehicles. This trend is reflected in the historical expansion of the national grid as noted in U.S. EPA's proposal. However, BEVs can further support grid resilience with their unique ability to fuel on a flexible schedule depending on the driver's and the grid's needs. Drivers with access to residential charging could also realize greater opportunities to reduce their total cost of ownership by potentially selling electricity back to the grid or powering their homes during peak times. Furthermore, BEVs have already been demonstrated to be able to function as back-up power devices during emergencies, and standardized implementation of this protocol could make such activities even more seamless in the future. [EPA-HQ-OAR-2022-0829-0780, pp. 44-45]

67 CARB. Response to Comments on the Draft Environmental Analysis Prepared for the Advanced Clean Cars II Program. August 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/acciirtc1.pdf.

Third, requiring implementation of these communication standards on the vehicle aligns with—and maximizes the benefits from—recent infrastructure planning and funding. The federal government is making unprecedented investments in charging infrastructure through the Infrastructure Investment Jobs Act. The law set aside $5 billion to build a National Electric Vehicle Infrastructure (NEVI) network that will enable widespread travel across the nation. 68 As part of deploying the NEVI funds, the Joint Office of Transportation and Energy set minimum requirements that NEVI-funded EVSE must meet including minimum payment standards, minimum power, minimum number of ports, and collection of reliability metrics. One of these requirements is the implementation of Plug & Charge on direct current fast chargers (DCFC), utilizing the ISO 15118 suite of standards outlined above. 69 The California Energy Commission is also taking steps in this direction by requiring public chargers it partially or fully funds to install EVSE designed to be compatible with the ISO 15118 suite of standards. 70 Matching vehicle requirements with NEVI implementation will harmonize communication flow between vehicles and charging stations, reducing the number of potential points of failure to communicate in the charging ecosystem. [EPA-HQ-OAR-2022-0829-0780, pp. 44-45]

68 Public Law No. 117-58. Available at: https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf. Accessed June 15, 2023.

69 23 C.F.R. § 680.108(a). (2023).

70 California Energy Commission. TN 241955. Docket 19-AB-2127. "CEC Recommendation for Deployment of ISO 15118-Ready Chargers." February 2022. https://efiling.energy.ca.gov/GetDocument.aspx?tn=241955&DocumentContentId=75632

In addition to individual cost savings and broader economic growth, U.S. EPA's proposal will provide economic benefits for the nation's energy systems. For example, increased ZEV deployment will reduce our reliance on foreign oil, providing economic resilience to global fuel supply chain disruptions and price shocks. With the integration of emerging vehicle-to-grid communication strategies, as CARB recommends, vehicles will be able to promote grid resilience through enabling demand response load management strategies, providing backup power during blackouts, and supporting storage of renewable energy. [EPA-HQ-OAR-2022-0829-0780, pp. 66-67]

Organization: California Attorney General's Office, et al.

These state and local actors are also at the forefront of innovative and emerging solutions to managing grid load, including through EVs, such as “vehicle-to-grid” (“V2G”) technology,151 demand response and distributed energy resource programs,152 and vehicle-integrated microgrids.153 For example, the California PUC is actively investing in V2G technologies, which allow electric vehicles to supply power back to the grid and thereby promote reliability.154 One 2019 study estimated potential benefits to ratepayers from these ancillary services at $670 million to $1.02 billion per year from V2G services.155 [EPA-HQ-OAR-2022-0829-0746, pp. 25]

151 See, e.g., Pacific Gas & Electric Corp., PG&E to Offer Nation’s First Vehicle-To-Grid Export Rate for Commercial Electric Vehicles (Oct. 26, 2022), available at https://investor.pgecorp.com/news-events/press-releases/press-release-details/2022/PGE-to-Offer-Nations-First-Vehicle-To-Grid-Export-Rate-for-Commercial-Electric-Vehicles/default.aspx (announcing PUC approval to establish a utility rate to compensate fleet owners for V2G services during peak energy demand).

152 See, e.g., Green Mountain Power, Bring Your Own Device, available at https://greenmountainpower.com/rebates-programs/home-energy-storage/bring-your-own-device/ (detailing Vermont demand response/distributed energy resource incentive program providing up to $10,500 toward home battery storage).

153 See, e.g., Edison Electric Institute, Duke Energy Announces Microgrid-Integrated Fleet Electrification Depot (Apr. 13, 2023), available at https://theelectricgeneration.org/2023/04/13/duke-energy-announces-microgrid-integrated-fleet-electrification-depot (announcing North Carolina electric fleet depot integrated with microgrid and solar); Daniel Kirschen and Chanaka Keerthisinghe, Techno-Economic Analysis of the Arlington Microgrid: A Report prepared by the University of Washington for Snohomish Public Utility District (Feb. 28, 2022), available at https://www.snopud.com/wp-content/uploads/2022/06/UW_TechnoEcon_AMG_022822.pdf (detailing Washington pilot microgrid consisting of solar, storage, and V2G systems to support grid resiliency and reliability).

154 California PUC, VGI Policy, Pilots, and Technology Enablement, available at https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/transportation-electrification/vehicle-grid-integration-activities (detailing CPUC’s Vehicle-grid integration (VGI) initiatives).

155 S. Chhaya et al., Open Standards-Based Vehicle-to-Grid: Value Assessment, Electric Power Research Institute (Jun. 28, 2019), available at https://www.epri.com/research/products/000000003002014771.

Second, state and local agencies are implementing ambitious programs to ready power grids and charging infrastructure for the increased adoption of electric vehicles and the associated increase in electricity demand, which further supports EPA’s feasibility analysis. [EPA-HQ-OAR-2022-0829-0746, p. 33]

2. State and Local Actions Are Facilitating the Necessary Generation, Transmission, and Charging Infrastructure to Support the Projected Compliance Pathway

While EPA only needs to consider the costs of regulatory compliance incurred within the allotted lead time, Coalition for Responsible Regulation, 684 F.3d at 128, EPA also considers the demands on the power sector from projected compliance with the proposed and alternative standards. 88 Fed. Reg. 29,309-312. We agree with EPA’s assessment that the projected modest increase in electricity demand (0.04 to 2% over the course of the regulated model years) is more than manageable. This is especially true when compared to other historical and current examples of rapid demand increases that the power sector successfully met, see 88 Fed. Reg. at 29,311 (noting widespread adoption of air conditioning in 1960s and 1970s and 21st-century growth of data centers and server farms),188 and given Congress's significant investments in transmission, generation, and charging infrastructure in the Bipartisan Infrastructure Law's NEVI Formula Program and the Inflation Reduction Act. Draft RIA, at 5-14 (Tables 5-2 & 5-3); 88 Fed. Reg. at 29,307-08. Part D.2 of the Background section, supra at 21-25, provides examples of some of the actions our States and Cities are taking, including under the NEVI Formula Program, to ensure there is sufficient charging infrastructure to support the projected electric vehicle penetration rate. [EPA-HQ-OAR-2022-0829-0746, p. 35]

188 See also White House Office of Science and Technology Policy, Climate and Energy Implications of Crypto-Assets in the United States (Sep. 2022), at 14-15, available at https://www.whitehouse.gov/wp-content/uploads/2022/09/09-2022-Crypto-Assets-and-Climate-Report.pdf (estimating U.S.-based cryptocurrency mining operations for Bitcoin alone to consume "33 to 55 billion kWh per year, or 0.9% to 1.4% of total U.S. electricity usage in 2021").

In addition to the federal agencies that ensure the safety and reliability of U.S. power grids, EPA properly recognizes that many of the decisions that affect the power sector's response to widespread electric vehicle adoption will be made by non-federal entities. States, RTOs/ISOs, public utility commissions, and public and private utilities have the responsibility to ensure adequate supply, transmission capacity, and grid resiliency. 88 Fed. Reg. at 29,311; see 16 U.S.C. §§ 824(a), (b)(1), and are at the forefront of developing vehicle-to-grid applications and other grid management solutions. Part D.2 of the Background section, supra at 21-25, details many of the initiatives that states and other non-federal actors are taking to meet the transition. [EPA-HQ-OAR-2022-0829-0746, p. 35]

Organization: Charles Forsberg

Impact on the electricity grid. Fossil fuels provide two services to the electricity grid: energy and energy storage. Fossil fuel energy storage is on the scale of millions of gigawatt hours. Moving off liquid hydrocarbon fuels to electricity implies moving to the most expensive energy source to produce, store and transport. Replacing the hourly to seasonal storage function in the electricity system with batteries has cost estimates of tens of trillions of dollars. Because of the cost difference in energy storage and transport by liquid fuels versus electricity, there is a massive functional and cost difference between hybrid plug-in electric vehicles and all-electric vehicles. All electric vehicles force hourly to seasonal storage onto the electricity grid whereas hybrid plug-in electric vehicles enable use of liquid hydrocarbons to provide these storage and transport functions when the electricity grid is stressed. Plug-in hybrid vehicles can be "good citizen" electricity customers by buying electricity when generating capacity is available and the electricity grid is not overloaded because they have liquid hydrocarbon fuel backup. Battery electric vehicles raise electricity rates because need very expensive upgrades to assure recharging on an hourly to seasonal basis. The paper below goes into these energy storage cost challenges. [EPA-HQ-OAR-2022-0829-0738, pp. 2-3]

C. Forsberg, "Addressing the Low-Carbon Million Gigawatt-Hour Energy Storage Challenge", The Electricity Journal, December 2021. https://doi.org/10.1016/j.tej.2021.107042 [EPA-HQ-OAR-2022-0829-0738, pp. 2-3]

Recommended action for EPA. Conduct a detailed analysis on impacts of different electric vehicle options on U.S. electricity prices-including separate analysis of the effects of full-deployment plug-in hybrid versus all electric vehicles. This must include multi-year hourly analysis to include seasonal and more extreme events that only occur every few years. This far, nobody has done such an analysis. There are radically different outcomes in terms of electricity prices for everyone from the use of hybrid/plug-in hybrid versus all-electric vehicles that is not recognized by EPA. Such analysis will likely make the case that the U.S. should not provide any regulatory or financial incentives to all-electric vehicles because of the resulting increases in U.S. electricity prices. [EPA-HQ-OAR-2022-0829-0738, pp. 2-3]

Organization: Chevron

4. Feasibility and implementation.

Chevron is concerned that the rapid increases in forecasted BEV sales rate are optimistic and may overstate the benefits of the proposals. The proposals may limit choices and increase costs for consumers, including those in economically disadvantaged groups and smaller businesses. [EPA-HQ-OAR-2022-0829-0553, p. 6]

BEV sales forecasts may rely on optimistic expectations for increased electricity generation and charging infrastructure. EPA should conduct an assessment to account for the costs and timing associated with upgrades to the nation's grid infrastructure, including new and upgraded generation, transmission, and distribution, and the costs associated with the installation of public and private electric vehicle chargers. If it is not feasible to complete expansion and improvements for the current grid, it may not be possible to meet the additional demand created by the proposed regulation. [EPA-HQ-OAR-2022-0829-0553, p. 6]

Organization: Clean Fuels Development Coalition et al.

These aggregate costs include: [EPA-HQ-OAR-2022-0829-0712, pp. 5-6]

-Electric power costs. Researchers estimate that the 350 million electric vehicles required to decarbonize the U.S. fleet by 2050 could use as much as half of U.S. national electricity demand. See Thea Riofrancos et al., Achieving Zero Emissions with More Mobility and Less Mining, U.C. Davis Climate+ Community Project (Jan. 2023), https://subscriber.politicopro.com/eenews/f/eenews/?id=00000185-e562-de44-a7bf-ed7751a00000. The proposal would hence amount to a complete transformation of the electric power sector, requiring substantially more generation, transmission, and distribution, which in turn would result in higher power prices not just for those using electrified vehicles, but for all users. [EPA-HQ-OAR-2022-0829-0712, pp. 5-6]

-Air quality effects. These include the air quality and health impacts from significant increases in tire wear from electric vehicles, as well as the increases in CO_2 emissions that will result from manufacturing more electric generation infrastructure, transmission, distribution, and charging equipment, and the manufacturing of electric vehicles themselves, which produce far more upstream emissions than their internal combustion engine counterparts. [EPA-HQ-OAR-2022-0829-0712, pp. 6-7]

-Taxpayer subsidies: Taxpayers subsidize the sales of electric vehicles, charging infrastructure, roads, and the electricity generation, transmission, and distribution required to power these vehicles. The proposal currently ignores these costs, counting them instead as "transfers."5 88 Fed. Reg. 29,369. [EPA-HQ-OAR-2022-0829-0712, pp. 6-7]

5 As described below, the many direct subsidies (federal and state electric vehicle credits, charging credits, etc.) and regulatory subsidies (EPA multiplier credits, NHTSA multiplier credits, state ZEV credits, etc.) result in real costs to taxpayers and the consumers of the many products that cross-subsidize these "preferred" products. These costs cannot be treated as "transfers" that are cost-free, and they absolutely cannot be treated as "transfers" to circumvent the economic significance prong of the major questions doctrine.

F. The proposed rule neglects the impact of EPA's many other proposed rules on these rules.

Problems with critical minerals and charging infrastructure are made worse when coupled with EPA's proposed heavy-duty vehicle rule, which will compete with the light-and medium-duty market for minerals, batteries, charging infrastructure, and more. EPA has entirely ignored this. See DRIA 5-30 n.107 ("Estimates above do not include PEV charging demand for medium-duty or heavy-duty vehicles."). EPA must account for how these parallel standards will increase the demand for the above and thus raise prices or provide other barriers. [EPA-HQ-OAR-2022-0829-0712, pp. 31-32]

EPA has also failed to confront the interaction of its proposed standards with its standards for electricity generating units—critical to powering electric vehicles— and how these standards and a surge of electric vehicles will interact with an increasingly unreliable grid. EPA has proposed new carbon pollution standards for coal and natural gas-fired power plants. "New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule," 88 Fed. Reg. 33,240 (May 23, 2023). Among other things, this proposal assumes it would cause all coal facilities to close by 2040 or implement—largely unproven—carbon capture and storage technology with at least a 90 percent capture rate. The proposal would also require the use of hydrogen blending or carbon capture in all natural gas plants. [EPA-HQ-OAR-2022-0829-0712, pp. 31-32]

These new rules will drive up electricity costs—by adding large new expenses to the coal and gas the currently provides a majority of our nation's electricity—and reduce grid reliability by driving offline the large thermal generation sources that provide most of our electric grid's reliable power. Grid reliability is a serious concern. A decline in steady thermal sources like coal makes our grid susceptible to the "fatal trifecta": "overreliance on weather-dependent solar and wind, just-in-time natural-gas backstops, and imports of electricity from neighboring states." Michael Buschbacher & Taylor Myers, FERC Gaslights America, American Conservative (Sep. 6, 2022), https://www.theamericanconservative.com/ferc-gaslights-america/. [EPA-HQ-OAR-2022-0829-0712, pp. 31-32]

The effects of decreasing baseload power are already being felt. The North American Electric Reliability Corporation's ("NERC") most recent Long-Term Risk Assessment found that found that most of the country is already at elevated risk of blackouts, with some regions being at high-risk during even normal peak conditions. 2022 Long-Term Reliability Assessment, North American Electric Reliability Corporation (Dec. 2022), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf. These problems are exacerbated by rules like EPA's proposed power plant rule because those rules drive the adoption of less reliable intermittent resources like solar and wind. NERC explained that "[a]s solar decreases as sunset approaches, the total of all available resources can fall short of the demand, especially [during] higher demand levels." Id. [EPA-HQ-OAR-2022-0829-0712, p. 32]

Reliability concerns are also exacerbated by the increasing penetration of electric vehicles in the nation's automotive fleet. A recent NERC report explained that when upticks in electrical vehicle charging coincide with increasingly frequent grid disturbances in the bulk power system. Electric Vehicle Dynamic Charging Performance Characteristics during Bulk Power System Disturbances, North American Electric Reliability Corporation (Apr. 10, 2023), https://www.nerc.com/comm/RSTC/Documents/Grid_Friendly_EV_Charging_Recommendations.pdf. When these events coincide they could "have catastrophic consequences for grid reliability if left un checked (i.e., cascading blackouts and widespread power interruptions)." Id. [EPA-HQ-OAR-2022-0829-0712, p. 32]

The proposal fails to confront these issues and instead waves away concerns about grid reliability by explaining that "U.S. electric power utilities routinely up-grade the nation's electric power system to improve grid reliability and to meet new electric power demand." 88 Fed. Reg. 29,311. This explanation is inadequate. If the Biden Administration is going to adopt a "whole of government" approach to environmental rulemaking, it must consider the interaction of all of those rules. [EPA-HQ-OAR-2022-0829-0712, p. 32]

Even by its own logic, EPA's rule fails because it fails to account for decreased energy security owing to an increased demand for natural gas, which currently makes up 40 percent of our grid's electricity generation. This share—or at least the volume of energy generated—will need to grow dramatically to make up for the increased electricity demand.19 [EPA-HQ-OAR-2022-0829-0712, p. 36]

19 Of course, "[t]he United States is [also] the leading producer of natural gas," and so increasing reliance on natural gas does little to move the needle on energy security. C. Boyden Gray, American Energy, Chinese Ambition, and Climate Realism, 5 American Affairs Journal (Winter 2021), https://americanaffairsjournal.org/2021/11/american-energy-chinese-ambition-and-climate-realism/. But if the proposal intends to count decreases in petroleum in its favor it is completely unreasonable to ignore the concomitant increases in natural gas consumption.

Organization: Consumer Energy Alliance (CEA)

By requiring up to two-thirds of new vehicles sold in the United States to be electric by 2032, over 48 billion kWh of electricity consumption would be added every year to replace only light duty vehicles. Ultimately, seeing two-thirds of the current ICE-powered vehicle fleet transition to EV's would increase electricity consumption by 899.5 billion kWh. As a result, the U.S. EPA needs to ask itself from where this generation is going to come? [EPA-HQ-OAR-2022-0829-0788, p. 2]

In addition to increased electric generation capacity, what kind of improvements to electric transmission and distribution infrastructure will be required to serve this increased electricity demand? Who pays for these upgrades -including the electric vehicle charging infrastructure necessary to serve the additional of 9.3 million EVs every year reliably and affordably? [EPA-HQ-OAR-2022-0829-0788, p. 2]

Organization: Daniel Hellebuyck

Aside from the well publicized drawbacks of electric vehicles (EVs) such as range anxiety, long charging times, purchase costs, lack of available and operating charging stations, and replacement of fuel taxes, there are several other issues to consider: [EPA-HQ-OAR-2022-0829-0526, p. 1]

Strained Electrical Grid: While China is developing EVs on a large scale, they are also building up to two coal-powered generating plants a week to ensure there will be enough power to reliably charge the vehicles. Compare this to the dismantling of coal-powered power plants in the United States. There is no assurance that renewable energy sources will be feasible or sufficient enough to replace all the lost coal-based generating capacity in this nation. Already we are seeing rolling blackouts and brownouts in states like California as more EVs hit the grid. [EPA-HQ-OAR-2022-0829-0526, p. 1]

Organization: Delek US Holdings, Inc.

EPA also assumes the power sector is expected to become cleaner over time using wind/solar generation and electricity storage (i.e., batteries), but ignores the environmental impacts of the overall increase in critical minerals demand for electrical grid storage and how that compounds the stress on critical minerals for the ZEVs themselves. However, the expansion of electrical grids—even ignoring the Proposed Rule's increased demand—requires a large amount of earth minerals and metals. Indeed, copper and aluminum—both needed for ZEVs—are also the two main materials in wires and cables and, as described above, higher prices could have a major impact on future grid investments.45 The need for expanded grid capabilities simultaneous to expanded ZEV production places a more pressing demand on materials like copper and aluminum thereby increasing extraction and refining efforts throughout the global market. [EPA-HQ-OAR-2022-0829-0527, pp. 9-10]

45 International Energy Agency, The Role of Critical Minerals in Clean Energy Transitions (Mar. 2022), 77–80, available at https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

Organization: Dylan Ondek

Dear Environmental Protection Agency, I am writing to express my anger at what you are doing for the environment. Going to electric cars is not the way to go. How are we powering the chargers for these electric vehicles? How are you going to stop every single person in the world from stopping driving? It is not going to happen. [EPA-HQ-OAR-2022-0829-5089]

I do agree with some of the things that the EPA is doing. But going to all electric vehicles is not the right move. [EPA-HQ-OAR-2022-0829-5089]

Organization: Edison Electric Institute (EEI)

A. Electric companies can accommodate increased energy demand.

As EPA notes, the electric power sector has a long history of accommodating growth in electricity demand from the adoption of new technologies, including electric home appliances, residential and commercial air conditioning, and data centers. See id. At 25,983. Electricity use from EVs today is modest. Argonne National Lab estimates the approximately 2.3 million EVs on the road as of the end of 2021 consumed 6.1 terawatt-hours of electricity in that year, or about 0.16 percent of the total electric sales to U.S. customers in that year.18 As EPA also notes, the increase in electricity use resulting from the Proposed Rule also will be modest, increasing electricity end-use by less than 3 percent in 2055. See id. On a macro-level, meeting the increased energy usage from electric truck adoption as contemplated in the Proposed Rule will not be a significant challenge for the electric power sector. Meeting the location-specific power needs of large electric vehicle (EV) charging facilities can be a more pressing challenge. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

However, this is a challenge that can be addressed with deliberate effort and collaboration among electric companies, fleet operators, and stakeholders.

18 See Gohlke, et al., Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010 – 2021, https://publications.anl.gov/anlpubs/2022/11/178584.pdf and U.S. Energy Information Administration, Electric Power Monthly

Electric companies can accommodate localized power needs at the pace of customer demand, provided appropriate customer engagement and enabling policies are in place. The power required by a customer is essential when considering the infrastructure needed at the facility level, because the capacity of the local distribution circuit is sized to meet the peak power requirements of customers on that circuit. Some large EV charging facilities have power requirements in the tens of megawatts (MW). Electric companies are well accustomed to serving facilities with those types of power needs, but large fleet customers differ from traditional electric customers (e.g., commercial or industrial buildings) in several important aspects. These aspects include, but are not limited to: [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

- Construction timelines: A new, large commercial building with a multi-MW power demand, for example, will typically have a multi-year construction timeline, giving the local electric company time to plan and make appropriate upgrades to the electric distribution system serving that customer. A fleet operator, in contrast, may be able to procure vehicles and complete construction on a multi-MW charging facility in a matter of months. This creates a potential misalignment between the fleet operators' timeline to procure vehicles and charging equipment and the electric company's timeline for making the necessary system upgrades to provide power to that facility. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

- Customer familiarity with procuring electric power: Commercial and industrial electric customers are used to working with electric companies for the operation of their facilities as part of their normal course of business, including working with electric companies as part of the construction process for launching new facilities. In particular, national corporate customers often have long-standing relationships with the electric companies that serve them. Electric companies typically assign these customers an account manager, given their scale and complexity. A fleet operator, in contrast, is used to procuring diesel to operate its vehicles, and may consider procuring electricity in the same paradigm. Fleet operators may be small electricity users today and thus that division may not yet be considered a managed account for the electric company. However, EEI members have identified this issue and are expanding their working relationship with these customers. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

• Uncertain and dynamic load profiles: The power usage throughout the day, known as the "load profile," of typical commercial and industrial buildings is well understood (e.g., large retail store, data center, or manufacturing facility). Typical load profiles for electric fleet customers are not yet well understood and often hypothetical given the early stage of electric truck commercialization. A fleet charging load profile is the product of many factors, including the routes of the vehicles, the state of charge of the EV when returning to the facility, the number of operating shifts, etc. Unlike a typical commercial building, the load profile of a fleet facility could also drastically change with a change in vehicle operations (e.g., changing from a one-shift to two-shift operation). This uncertainty adds complexity for electric companies when determining how best to serve the power requirements of a fleet customer. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

These factors could result in misalignment between expectations and reality regarding the timing, cost, and complexity of procuring electric power for fleet charging. Electric companies are taking a multi-pronged approach to remedy this potential misalignment, as discussed in the following sections. [EPA-HQ-OAR-2022-0829-0708, pp. 7-9]

B. Earlier customer engagement through education and coordination will alleviate infrastructure delays.

Early engagement between the relevant fleet customer and electric company is important as it allows planning for the infrastructure to support EV charging to occur much earlier and accommodate longer lead-times. In 2020, EEI began a collaboration with a large, national corporate customer that was planning to electrify a significant portion of its fleet operation. EEI facilitated meetings for this customer to share its conceptual plans with EEI's members and establish points of contact at the customer and each electric company. Over the course of more than a year, the customer identified the locations within each member's territory where it planned to deploy EVs and developed a five-year forecast to inform the electric company how the power demand would increase at each location over time. This unprecedented level of collaboration has resulted in this customer deploying thousands of electric vehicles to date. This includes alternative locations that were identified by the electric company after consulting with the customer. [EPA-HQ-OAR-2022-0829-0708, pp. 9-10]

The extent of collaboration described in this example may not be feasible, or necessary, for every fleet customer. But it does provide a helpful template for how early engagement and planning can streamline fleet electrification. The Electric Power Research Institute (EPRI) is developing a data-sharing platform as part of its EVs2Scale2030 initiative that will formalize and expand this model by allowing fleet customers to upload their forward-looking fleet electrification plans to a common database.19 Electric companies will then be able to access this data to visualize where on its system upgrades will be needed to accommodate growing power needs from fleet customers. [EPA-HQ-OAR-2022-0829-0708, pp. 9-10]

19 See Electric Power Research Institute, EVs2Scale2030, https://www.epri.com/research/products/000000003002025622.

Many electric companies are developing tools and resources to assist fleet customers. These include, but are not limited to: [EPA-HQ-OAR-2022-0829-0708, pp. 10-11]

• Grid capacity evaluation tools: Several electric companies have launched capacity hosting maps that are available on public websites that illustrate local grid capacity in their service territory.20 These maps can be helpful early indicators for fleet customers when considering the level of upgrades that may be required at a particular facility. These maps have limitations, as they are a snapshot in time and do not substitute for a formal engineering study. Even if they have not published such a capacity map, many electric companies have the ability to assist fleet customers by providing an early screen for local grid capacity by location directly. In either case, the outcome is the same: for customers that have the ability to consider multiple locations for their EV deployment plans, pre-screening the local distribution system capacity at these locations allows the fleet to factor grid upgrade timelines into their deployment plans. [EPA-HQ-OAR-2022-0829-0708, pp. 10-11]

• Fleet assessments and advisory services: Many electric companies have launched programs to provide in-depth consulting services to fleets that are considering electrification, including elements like feasibility studies based on total cost of ownership.21 These programs also may include dedicated staff resources to guide customers through the fleet electrification journey, including choosing the appropriate charging strategy and charging infrastructure to meet their operational needs. These programs help to educate fleet customers about the nuances of procuring power for their fleet operations and allow electric companies to learn more about the expected operations of electric fleets. [EPA-HQ-OAR-2022-0829-0708, pp. 10-11]

20 Examples include: AVANGRID (United Illuminating, NYSEG, Rochester Gas & Electric), Ameren Illinois, Con Edison, Dominion Energy, Eversource, Exelon (Atlantic City Electric, Delmarva Power, Pepco, Comed, PECO), Jersey Central Power & Light, National Grid, Orange & Rockland, Public Service Electric & Gas, San Diego Gas & Electric, and Southern California Edison.

21 See Alliance for Transportation Electrification, Fleet Advisory Services (FAS) for Fleet Electrification: Meet Customer Needs and Provide Grid Benefits, https://evtransportationalliance.org/wp-content/uploads/2023/02/PRESS-ATE-EC-White-Paper.pdf, which includes case studies from DTE Energy, Exelon, Portland General Electric, Southern California Edison, and Xcel Energy.

These and other resources being developed and deployed today by electric companies are essential to ensuring that infrastructure plans and efforts are matched to forthcoming electrification efforts from fleets and other operators. [EPA-HQ-OAR-2022-0829-0708, pp. 10-11]

C. Electric companies are planning for fleet electrification.

Investor-owned electric companies are regulated by state commissions, which approve electric company capital plans to maintain and upgrade the electric grid. While policies vary by state commission, two generally applicable principles have important implications for fleet electrification. First, the “used and useful” standard means that regulators will only approve the electric company to build infrastructure that will be utilized and provide value. The onus is on electric companies to provide evidence that their capital plans will meet this standard. Second is the principle that the customer that incurs the cost must pay for the cost. Typically, a customer seeking new or upgraded electric service must submit a formal service request to the electric company, which prompts the electric company to perform an engineering study to determine the cost of the upgrades needed to provide that service. [EPA-HQ-OAR-2022-0829-0708, pp. 11-13]

The implication for fleet electrification, a potentially fast-growing source of significant new demand on the electric system, is that electric companies are not authorized to upgrade the electric system in anticipation of new demand without robust evidence that those upgrades will be "used and useful." Only when a fleet customer submits a service request is the electric company permitted to make the upgrades necessary to serve that customer. Electric company forecasts for load growth, including that due to electrification, are typically at a system level, not the local distribution system level for individual fleet facilities. Given the nascent commercialization of fleet electrification, there is a lack of visibility into how, where, and when fleet electrification will appear on the system sufficient evidence to give electric companies (and their regulators) confidence to build for it. [EPA-HQ-OAR-2022-0829-0708, pp. 11-13]

Importantly, electric companies are recognizing the risks of this approach and are getting ahead of the need. Given the long lead times to make distribution upgrades, particularly if the upgrades are significant to extend further upstream to the substation and transmission level, it will increasingly be unacceptable to customers to wait for the customer service request-driven process. There is a risk that fleet customers, facing increased regulatory pressure to electrify their fleets, will be unable to plan their businesses around these infrastructure lead times and fail to meet their electrification goals. Electric companies must find mechanisms to plan and build for these increased loads now, so that the power is available when the customer needs them. [EPA-HQ-OAR-2022-0829-0708, pp. 11-13]

In California, the investor-owned electric companies use the California Energy Commission's Integrated Energy Policy Report (IEPR) as their base forecast. Southern California Edison (SCE) in its recent General Rate Case found a significant gap between the electric transportation load growth in the IEPR forecast and that expected due to the state's policies, specifically the California Air Resources Board's Advanced Clean Cars II, Advanced Clean Trucks, and Advanced Clean Fleets rules.22 SCE developed a Transportation Electrification Grid Readiness (TEGR) analysis to account for this gap in its General Rate Case that will set the electric company's grid investments for the next several years. SCE used a top-down methodology to apply this higher forecast to the circuit level for electric transportation loads, as well as a bottom-up methodology for certain high growth areas. [EPA-HQ-OAR-2022-0829-0708, pp. 13-14]

22 See Southern California Edison, 2025 General Rate Case, WP SCE-02, Vol. 07 Bk. A, TEGR Forecast Development Workpaper.

SCE has deployed a variety of new methods to account for HDV development and deployment, including the Power Service Availability (PSA) initiative to support transportation electrification. The PSA initiative, working in concert with the TEGR analysis, focuses on improving SCE's internal processes to streamline interconnection, engaging fleet operators to better understand their plans for electrification, improving their ability to forecast and assess the impacts of load growth from electrification, and leveraging new technologies as grid infrastructure solutions. Because some projects will require more time than others to build, SCE actively encourages fleet owners to engage with them early in the process so that SCE can better understand and plan for their needs. For grid upgrades that require a longer construction schedule, SCE is developing temporary solutions that can deploy quickly while those upgrades are being built. These solutions may include mobile battery storage or a mobile substation brought in on a semi tractor-trailer. [EPA-HQ-OAR-2022-0829-0708, pp. 13-14]

In New York, the Public Service Commission opened a proceeding in April to address barriers to medium-and heavy-duty electric vehicle infrastructure. In particular, the order recognizes that "proactive planning for the grid infrastructure needed to serve future electrification load must anticipate the location and magnitude of future demand" and notes an analogy to previous policies in which the commission directed the electric companies in New York to "develop proactive planning processes to anticipate the need for local transmission and distribution system upgrades to enable the renewable interconnections required to achieve the State's renewable energy goals."23 [EPA-HQ-OAR-2022-0829-0708, pp. 14-15]

23 State of New York Public Service Commission, Case 23-E-0070, Proceeding on Motion of the Commission to Address Barriers to Medium-and Heavy-Duty Electric Vehicle Charging Infrastructure.

EPA's assessment that "there is sufficient time for the infrastructure, especially for depot charging, to gradually increase over the remainder of this decade to levels that support the stringency of the proposed standards for the timeframe they would apply" is accurate. 88 Fed. Reg. 25,999. As seen above, EEI members actively are planning for and deploying infrastructure today. However, the increased deployment of this infrastructure over the next decade and beyond will not happen on its own. Proactive planning processes, whether initiated by the relevant electric company or state regulatory commission, will be critical to accommodate fleet electrification to meet customer expectations and planning requirements, while also providing affordable and reliable service. [EPA-HQ-OAR-2022-0829-0708, pp. 14-15]

EPA specifically requests comment on "whether there are additional stakeholders EPA should work with during implementation of the Phase 3 standards." 88 Fed. Reg. 26,000. EPA, states, engine and truck manufacturers, and fleet operators should work with electric companies on a regional or state level to glean additional insight into their planning processes and help bolster proactive planning and infrastructure investments. As discussed above, electric companies and their regulators benefit from the confidence that fleet electrification load will materialize through additional forward planning and outreach, which also provides visibility into where and when that load will materialize on the system. Final adoption of the Proposed Rule will help provide confidence that fleet electrification will occur through the period of the rule, but at a national level. [EPA-HQ-OAR-2022-0829-0708, p. 15]

Additionally, the States, Congress, EPA, and other federal partners should work with the electric power industry to ensure policies are aligned across the federal government to reduce the cost and timelines associated with building infrastructure to support increased electrification. This includes but is not limited to: [EPA-HQ-OAR-2022-0829-0708, p. 15]

- Investing in domestic manufacturing of critical electrical infrastructure, including efforts to alleviate the labor pool shortage limiting domestic manufacturing of critical electrical infrastructure and provide loan or purchase guarantees to manufacturers. [EPA-HQ-OAR-2022-0829-0708, p. 15]

- Not exacerbating the supply shortage of distribution transformers with unsupported efficiency rules. The U.S. Department of Energy should choose an efficiency standard for transformers that does not require switching to a new type of steel or make a determination that no new standard is needed.24 [EPA-HQ-OAR-2022-0829-0708, p. 15]

- Reforming permitting, both at the bulk power level with respect to building electricity generation and transmission, and at the state and local levels with respect to building distribution infrastructure. [EPA-HQ-OAR-2022-0829-0708, p. 15]

24 EEI's comments are attached as Appendix A.

EEI and its members stand ready to work with our regulatory and legislative partners to ensure these challenges are appropriately addressed. [EPA-HQ-OAR-2022-0829-0708, p. 15]

IV. Electric Company Policies and Programs Can Help Reduce Capital and Operational Costs for Fleet Electrification Customers.

Many EEI members over the last decade have sought regulatory approval from their state regulatory commissions to accelerate transportation electrification by reducing customer barriers to adoption. As of March 2023, and as mentioned supra, electric transportation filings from 62 electric companies in 35 states and Washington, D.C. have totaled more than $4.2 billion. The majority of these investments support the deployment of EV charging infrastructure at customer locations, and a significant portion is targeted to fleet customers. These programs can help reduce the cost that the customer would otherwise pay for the installation of EV charging infrastructure, which is a commonly cited barrier to EV charging infrastructure deployment.25 Further, electric companies can work with fleet customers to help manage their EV charging to occur at non-peak times. This can reduce operational costs for the fleet customer and improve utilization of the electric system, which puts downward pressure on rates for all customers.26 [EPA-HQ-OAR-2022-0829-0708, pp. 16-17]

25 An oft cited barrier to adoption for some customers is the low utilization of EV charging stations. Traditional electric rates for commercial customers include a demand component designed to recover the fixed costs of delivery electricity. With low utilization (such as a public EV charging station or some fleet charging use cases), the effective electric price can be higher than a customer with the same demand but higher utilization. Many electric companies offer or are exploring commercial rates or other programs that reduce some of the demand charge exposure for these low utilization customers. See Cappers, et al., A Snapshot of EV-Specific Rate Designs Among U.S. Investor-Owned Electric Utilities, https://emp.lbl.gov/publications/snapshot-ev-specific-rate-designs.

26 See, e.g., Metz, et al., Distribution System Investments to Enable Medium-and Heavy-Duty Vehicle Electrification – A Case Study of New York, https://www.edf.org/media/worth-investment-report-finds-utilities-fleet-owners-consumers-benefit-when-utilities-cover.

EPA notes that “there is considerable uncertainty associated with future distribution upgrade needs, and in many cases, some costs may be borne by utilities rather than directly incurred by BEV or fleet owners” in explaining why it models these costs as part of the infrastructure cost analysis. 88 Fed. Reg. 25,983. In general, the upgrades to the local electric system needed to bring sufficient power to the site may be known as “electric company-side make-ready” or “front-of-the-meter” infrastructure and includes but is not limited to poles, vaults, service drops, transformers, mounting pads, trenching, conduit, wire, cables, meters, other equipment as necessary, and associated engineering and civil construction work. Front-of-the-meter infrastructure is distinct from infrastructure on the customer side of the meter (“behind-the-meter”), which includes the supply infrastructure (conduit and wiring to bring power from the service connection to the charging station, and the associated installation costs, sometimes known as “customer-side make-ready”) and the charging equipment, sometimes known as Electric Vehicle Supply Equipment (EVSE). [EPA-HQ-OAR-2022-0829-0708, pp. 16-17]

Front-of-the-meter infrastructure is generally installed, owned, and operated by the electric company. However, the costs associated with front-of-the-meter infrastructure may be borne by the site host customer in full or in part if the costs exceed an allowance as determined by the electric company’s line-extension and/or service extension policy. These costs may also be known as “contributions in aid of construction.” [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Modeling these front-of-the-meter infrastructure costs is inappropriate for the following reasons. First, estimating distribution upgrade costs may be beyond the scope of EPA's analysis, as it is not clear that a similar scope of analysis is applied to traditional liquid fuels. For example, the analogous cost comparison for internal combustion engine vehicle would include cost considerations for fleet operators either 1) installing refueling stations at their own facilities, or 2) the embedded cost of fuel retailers' business operations in the cost of diesel or gasoline. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Second, as described above, distribution upgrades are highly location specific. The costs associated with these upgrades are also highly variable, depending on the upgrade requested by the customer and the local distribution capacity. As stated in EEI's Preparing to Plug In Your Fleet guide, "the grid can expand as needed to accommodate the needs of any customer, but the time and resources needed to make the required upgrades are highly dependent on the specific facility and the circuit that serves it."27 [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

27 See EEI, Preparing To Plug In Your Fleet – 10 Things to Consider, https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Electric-Transportation/PreparingToPlugInYourFleet.pdf.

Third, the share of any distribution costs that the customer may bear varies as a matter of policy. Some electric companies have or are seeking approval for line extension allowances to cover some or all of these costs for serving EV charging infrastructure. In California, for example, legislation required electric companies in the state to file tariffs that would authorize them to "design and deploy all electrical distribution infrastructure on the utility side of the customer's meter for all customers installing separately metered infrastructure to support charging stations, other than those in single-family residences." This policy prompted tariffs from EEI members Pacific Gas & Electric (PG&E), San Diego Gas & Electric (SDG&E), and SCE that essentially allow electric companies to invest in more of the electric company-side infrastructure costs as part of the standard distribution system investment. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Fourth, EEI expects that the majority of fleets to electrify in the next several years will be those with return-to-base operations, which enables depot charging that is owned and operated by the fleet itself. Public charging, analogous to the existing gas station model, will be needed to serve long-haul electric trucks, but that opportunity will be limited in the near-term by battery capabilities. However, there are many new refueling models emerging, including but not limited to: fleet charging facilities owned by third parties and accessed by fleet operators through a reservation or subscription system; charging-as-a-service companies that disintermediate the fleet operator from the electric company, owning and operating the charging equipment at a customer facility and assessing the fleet operator a fully-bundled, flat charging fee (e.g., $/kWh); and transportation-as-a-service companies that provide the vehicle and charging to a fleet operator, such that the fleet operator pays a fully-bunded, flat service feel (e.g., $/mile). In all of these models, the fleet operator itself is not exposed to the front-of-the-meter infrastructure costs, but rather these costs are borne by a third party that then recoups all of its costs through their charging or service fees. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

In conclusion, EPA is justified in not modeling front-of-the meter costs because doing so would result in an apples-to-oranges comparison to liquid fuels, those costs are site-specific and variable, the recovery mechanism of those costs depends upon state-specific policies, and fleet-operators may not always bear those costs. [EPA-HQ-OAR-2022-0829-0708, pp. 17-20]

Organization: Electric Drive Transportation Association (EDTA)

Across the private sector, vehicle manufacturers, materials and components suppliers, utilities, charging companies and other organizations are making investments in the EV supply chain that parallel these critical essential policy drivers. [EPA-HQ-OAR-2022-0829-0589, p. 1]

In the United States, the EV ecosystem is growing. 3.8 million plug-in electric vehicles have been sold since 2010. There are 87 plug-in electric models available today – and automakers have announced an additional 58 models to be rolled out by 2027. [EPA-HQ-OAR-2022-0829-0589, p. 1]

We would also urge the agency to revisit modeling assumptions regarding the proposed plug-in hybrid (PHEV) utility curve to reflect next-generation PHEVs, whose electric range will be significantly larger than those modelled. New PHEVs' driving range increased 8.5% in 2021 and that trend is expected to continue. The increase in all-electric operation capability will change consumer use patterns over the regulated period and the rule for 2027-2032 should reflect that in an updated utility factor. [EPA-HQ-OAR-2022-0829-0589, p. 2]

Achieving the penetration rates envisioned in the proposed scenarios will also require an equally aggressive expansion of charging and refueling infrastructure, and modernization of the electricity grid. [EPA-HQ-OAR-2022-0829-0589, p. 2]

A comprehensive approach to electric transportation will also require updates to the electricity grid, with demand management and V-2-G technologies, which can optimize the use of EV as a mobile load and distributed energy source while building a more secure, efficient, and resilient grid. [EPA-HQ-OAR-2022-0829-0589, p. 2]

These challenges are all addressable and offer opportunities for creating jobs, a more efficient energy sector and more resilient supply chains. They also present as significant variables that may alter the market trajectories undergirding the proposed Multi-Pollutant Emissions standards. [EPA-HQ-OAR-2022-0829-0589, p. 2]

Organization: Elizabeth Boynton

Even if I did want to wait that time, even at home, the grid infrastructure for such increased demand for such a fairly quick jump in EV demand is not there. According to a May 2023 report from The North American Electric Reliability Corporation (NERC), two-thirds of North America could face power shortages this summer during periods of extreme heat. This, combined with this quote from Federal Energy Regulatory Commission member Mark Christie during a May Senate hearing, "I'm afraid to say it, but I think the United States is heading towards a catastrophic situation." [EPA-HQ-OAR-2022-0829-0568, p. 1]

Organization: Energy Innovation

V. The modern electric grid can support widespread transportation electrification of LDVs and MDVs over time. [EPA-HQ-OAR-2022-0829-0561, p. 2]

Fortunately, the Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Law (BIL) helped tip the scale in favor of climate-oriented investments and the adoption of zero-emission technologies,[ii] particularly battery electric vehicles (BEVs), and also hydrogen fuel cell electric vehicles (FCEVs).[iii] [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

ii This includes technologies that eliminate tailpipe GHG emissions and other pollutants, namely battery electric vehicles (BEVs) for LDVs and MDVs.

iii Based on our analysis and current market trends, we do not anticipate FCEVs will play a sizable role in the LDV and MDV market for the foreseeable future. However, we recognize the value of technology-neutral standards.

Energy Innovation's modeling reveals that the IRA's transportation electrification incentives (combined with infrastructure investments in the BIL) can jump-start transportation decarbonization this decade. However, these federal policies are insufficient to cut the sector's GHG emissions at the pace needed to achieve the U.S. nationally determined contribution (NDC) and to align with the Paris Agreement to limit global warming and achieve net zero by 2050. Mitigating the transportation sector's (especially LDVs and MDVs) impact on the climate and public health will require additional policy and regulatory action in the next decade, including stronger federal tailpipe emissions standards. Our modeling shows that widespread deployment of clean vehicles, powered by a clean grid, can help reduce GHG emissions to meet the U.S. NDC.8 See Figures 1 and 2. [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

8 Robbie Orvis et al., "Closing the Emissions Gap Between the IRA and 2030 NDC: Policies to Meet the Moment" (Energy Innovation Policy and Technology LLC, December 2022), https://energyinnovation.org/publication/closing-the-emissions-gap-between-the-ira-and-ndcpolicies-to-meet-the-moment/.

[See original attachment for line graph titled "Economy-Wide Greenhouse Gas Emissions"] [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

Figure 1. Economy-wide GHG emissions by scenario. Source: Orvis, Robbie, et al., Closing the Emissions Gap Between the IRA and 2030 [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

U.S. NDC: Policies to Meet the Moment (Energy Innovation, December 2022), available at: https://energyinnovation.org/publication/closing-the-emissions-gap-between-the-ira-and-ndc-policies-to-meet-the-moment/. [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

[See original attachment for line graph titled "Transportation Sector GHG Emissions and Reductions"] [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

Figure 2. Reductions in transportation sector emissions in the IRA and NDC scenarios relative to business as usual. Source: Orvis et al., Closing the Emissions Gap Between the IRA and 2030 U.S. NDC. [EPA-HQ-OAR-2022-0829-0561, pp. 4-5]

Other research from the University of California, Berkeley, Grid Lab, and Energy Innovation, 2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future (April 2021), evaluated the technical and economic feasibility (and associated impacts and benefits) of achieving a future scenario where electric vehicles make up 100 percent of new sales of all vehicles by 2035, combined with a 90 percent clean grid (called the DRIVE Clean Scenario).[iv] Compared with the No New Policy scenario (which was pre-IRA and BIL), the total transportation sector pollutant[v] and carbon dioxide emissions reductions in the DRIVE Clean Scenario would reduce ground transportation sector CO_2 emissions by 60 percent in 2035 and by 93 percent in 2050, relative to 2020 levels.9 See Figure 3. The DRIVE Clean Scenario would also avoid approximately 150,000 premature deaths and generate nearly $1.3 trillion in health and environmental savings through 2050.10 Compared to the No New Policy, the DRIVE Clean Scenario would also result in approximately $2.7 trillion in consumer savings through 2050 compared—a household savings of about $1000 per year on average over 30 years.11 [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

9 Amol Phadke et al., "2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future" (Goldman School of Public Policy, University of California, Berkeley, GridLab, April 2021), https://www.2035report.com/transportation/downloads/, iv.

10 Phadke et al., iii.

11 Phadke et al., ii.

iv In the Drive Rapid Innovation in Vehicle Electrification (DRIVE Clean) Scenario, EVs constitute 100 percent of new U.S. LDV sales by 2030 as well as 100 percent of MDV and heavy-duty truck sales by 2035. The grid reaches 90 percent clean electricity by 2035. More details and full study findings are available at https://www.2035report.com/transportation/.

v Namely, fine particulate matter, nitrous oxides, and sulfur oxides.

[See original attachment for line graph "CO_2 Emissions in the Transportation Sector"] [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

Figure 3. Transportation sector CO_2 emissions in the DRIVE Clean and No New Policy scenarios through 2050. Source: Phadke, Amol, et al., 2035 Report 2.0: Plummeting Costs & Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future, University of California Berkeley, Goldman School of Public Policy, Grid Lab, and Energy Innovation, April 2021, available at: https://www.2035report.com/transportation/. [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

V. THE MODERN ELECTRIC GRID CAN SUPPORT WIDESPREAD TRANSPORTATION ELECTRIFICATION OVER TIME.

As part of its analysis, the EPA modeled "changes to power generation due to the increased electricity demand anticipated in the proposal as part of our upstream analysis. [It] project[s] the additional generation needed to meet the demand of the light-and medium-duty BEVs in the proposal to be relatively modest compared to the No Action case, ranging from less than 0.4 percent in 2030 to approximately 4 percent in 2050 (as shown in Figure 23 [below]). The U.S. electricity end use between the years 1992 and 2021 increased by around 25% without any adverse effects on electric grid reliability or electricity generation capacity shortages. As the proposal is estimated to increase electric power end use by electric vehicles by between 0.1% (2028) and 4.2% (2055) – approximately 18% of the increase that occurred between 1995 and 2021—grid reliability is not expected to be adversely affected by the modest increase in electricity demand associated with electric vehicle charging."63 We concur with this finding. [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

63 U.S. EPA, "Proposed Rules," May 5, 2023, 29311.

[See original attachment for graph described below] [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

A similar analysis in the 2035 2.0 study found that the DRIVE Clean Scenario resulted in demand growth from increased electrification averages about 2 percent per year, a growth rate slower than that achieved between 1975 and 2005. See Figure 20. To meet this demand with a 90 percent clean grid (analyzed as part of the DRIVE Clean Scenario), the U.S. would need to install on average 105 GW of new wind and solar and 30 GW of new battery storage each year—nearly four times the current deployment rate.64 See Figure 21. [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

64 Phadke et al., "2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future."

Even with additional electric loads in the DRIVE Clean Scenario, grid modeling found a 90 percent clean grid would be dependable without coal plants or new natural gas plants by 2035. The grid model also found that during normal periods of generation and demand, wind, solar, and batteries provide 72 percent of total annual generation, while hydropower and nuclear provide 16 percent. During periods of high demand and/or low renewable generation, existing natural gas plants (primarily combined-cycle plants) cost-effectively compensate for remaining mismatches between demand and renewables-plus-battery generation—accounting for about 10 percent of total annual electricity generation. The increased electrification and renewable energy and battery storage deployments require investments mainly in new transmission spurs connecting renewable generation to existing high-capacity transmission, rather than new investments in bulk transmission.65 Of note, the rates of LDV/MDV EV adoption envisioned in the DRIVE Clean Scenario are considerably higher than the adoption rates in the proposed rule, even if a more stringent alternative is finalized. [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

65 "Transitioning to All-Electric Cars and Trucks Won't Crash the Power Grid," 2035 2.0, https://www.2035report.com/transportation/evsthe-power-grid/.

[See original attachment for graph described below] [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

Figure 20. Historical and average annual U.S. electricity demand growth in the DRIVE Clean Scenario, 2020-2050. Source: 2035 Report 2.0. [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

Figure 21. National generation mix under the modeled DRIVE Clean Scenario, 2020-2050. Source: 2035 Report 2.0. [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

The examples the EPA provides in its proposed rule offer useful reminders that increased electric demand from new technologies has, throughout recent history, been met with commensurate increases in investments, grid upgrades, and reinforcements to comply with grid reliability standards. Examples include the rapid adoption of air conditioners in the 1960s and 1970s and the rapid growth of power-intensive data centers and server farms over the past two decades.66 As noted in the proposed rule, the U.S. electric power utilities have already successfully designed and built the distribution system infrastructure required for 1.4 million BEVs and have successfully integrated 46.1 GW of new utility-scale electric generating capacity into the grid between 2020 and 2021.67 The challenges posed by the prospect of gradual growth in ZEVs in the HDV sector over the next decade can be addressed with the continued adoption of policies, regulations, planning, and prudent investments. [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

Numerous reports articulate what's needed to support a highly electrified transportation future, including Accelerating Clean, Electrified Transportation by 2035: Policy Priorities: A 2035 2.0 Companion Report and the ACEEE State Transportation Electrification Scorecard.68 [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

66 U.S. EPA, "Proposed Rules," May 5, 2023, 29311.

67 U.S. EPA, 29311.

68 Peter Huether et al., "2023 Transportation Electrification Scorecard" (American Council for an Energy-Efficient Economy, June 2023), https://www.aceee.org/research-report/t2301.

Finally, more nascent vehicle-to-grid (V2G) technologies, vehicle grid integration (VGI), and managed charging programs have the potential to be game changers for transportation electrification and the electric grid. Certain vehicles are especially well suited to deliver on the promise of V2G, given how they are used and where they are located. V2G can help vehicle and fleet owners recoup energy costs while also meeting power needs during grid constraints. For example, a fleet of electric-powered school buses in El Cajon can send electricity back to California's grid, thanks to V2G technology developed by a San Diego company and a partnership with San Diego Gas & Electric.69 More utilities are working with original equipment manufacturers, fleets, and government officials to adopt V2G technologies and develop V2G programs, and the IRA and BIL both contain funding to support pilots and next-generation R&D.70 The EPA points to several other entities engaged in VGI research.71 [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

69 Rob Nikolewski, "How Eight School Buses Are Helping During Power Shortages: They're Transporting Electrons," Los Angeles Times, July 27, 2022, https://www.latimes.com/business/story/2022-07-27/electric-school-buses-in-el-cajon-will-send-power-to-the-grid; "SDG&E and Cajon Valley Union School District Flip the Switch on Region's First Vehicle-to-Grid Project," SDG&E News Center, July 26, 2022, https://www.sdgenews.com/article/sdge-and-cajon-valley-union-school-district-flip-switch-regions-first-vehicle-grid-project.

70 See, e.g., Paul Ciampoli, "Public Power Utilities, Others Pursue Vehicle-to-Grid Opportunities" (American Public Power Association, February 1, 2021), https://www.publicpower.org/periodical/article/public-power-utilities-others-pursue-vehicle-grid-opportunities; Dan Zukowski, "GM Partners with Utilities, Solar and Storage Providers on Vehicle-to-Grid, Home EV Charging," Smart Cities Dive, October 11, 2022, https://www.smartcitiesdive.com/news/gm-energy-electric-vehicles-v2g-v2h-utilities-solar/633734/.

71 U.S. EPA, "Proposed Rules," May 5, 2023, 29311.

Based on other analyses and continued advancements in technologies, we agree strongly with the EPA's finding that the increase in electric power demand attributable to vehicle electrification is not expected to adversely affect grid reliability due to the modest increase in electricity demand associated with EV charging. [EPA-HQ-OAR-2022-0829-0561, pp. 24-27]

Organization: Energy Strategy Coalition

Members of this coalition are already engaging in long-term planning to meet the increased demand for electricity attributable to vehicle electrification, and the LMDV Proposal will provide a regulatory backstop supporting further investments in electrification and grid reliability. Demand for electricity will increase under both the LMDV Proposal and the recently-proposed Phase 3 Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles ("HDV

Proposed Rule”),4 but the electricity grid is capable of planning for and accommodating such demand growth and has previously experienced periods of significant and sustained growth. Moreover, historic growth in demand and generation resources does not reflect the investments that will be made under the Infrastructure Investment and Jobs Act (“IIJA”) and the Inflation Reduction Act (“IRA”) to support the deployment of new renewable and zero-carbon generation resources, energy storage and charging infrastructure. Coalition members are already making investments in the resources and infrastructure needed to support transportation electrification and realize the benefits that integration of EVs can provide to the electricity grid. The Coalition encourages EPA to work closely with state and local partners and other federal agencies to ensure that deployment of this infrastructure occurs on the pace and scale needed to achieve the EV penetration-rates contemplated by these proposals, while ensuring grid reliability. [EPA-HQ-OAR-2022-0829-0610, pp. 1-2]

4 Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 88 Fed. Reg. 25,926 (published April 27, 2023).

II. The proposed rule supports long-term planning and investment

Long-term planning and investment for vehicle electrification is a business imperative for the Coalition’s members and a necessary element of their efforts to provide affordable, clean, and reliable power to their customers. By setting a clear trajectory for vehicle electrification that complements existing regulatory and market forces, EPA’s LMDV and HDV proposals facilitate further investment in the generation and charging infrastructure needed to meet increased demand associated with electrification of the vehicle fleet. [EPA-HQ-OAR-2022-0829-0610, pp. 1-2]

Even before the LMDV and HDV proposals, market forces and government incentives were projected to greatly increase the rate of vehicle electrification. As EPA notes, “virtually every major manufacturer of light-duty vehicles is already planning to introduce widespread electrification across their global fleets in the coming years.” 5The IRA is now providing significant incentivies for automakers to accelerate these commitments through generous subsidies for EV purchases. These include up to $7,500 in tax credits for new EVs,6 $4,000 for used EVs,7 as well as incentives for the commercial purchase of light-and medium-duty vehicles.8 The IIJA also provides significant incentives to support vehicle electrification, including $7.5 billion in funding for installation of public charging and other alternative fueling infrastructure,9 and funding for the Department of Energy’s (“DOE”) Building a Better Grid Initiative, which allocates $2.5 billion to support the development of nationally significant transmission lines, $2.3 billion to strengthen and modernize the power grid against wildfires and other extreme weather exacerbated by climate change, and $10.5 billion to improve grid resilience and grid flexibility (including by supporting transmission and distribution infrastructure).10 [EPA-HQ-OAR-2022-0829-0610, pp. 1-2]

5 88 Fed. Reg. at 29,191.

6 26 U.S. Code § 30D.

7 26 U.S. Code § 25E.

8 See 26 U.S. Code § 45W.

9 88 Fed. Reg. at 29,195.

10 See, e.g., Building a Better Grid Initiative, GRID DEPLOYMENT OFFICE, DEPARTMENT OF ENERGY https://www.energy.gov/gdo/building-better-grid-initiative.

Expectations for electrification of the vehicle fleet are already being incorporated into long-term planning decisions of electric utilities, regional transmission organizations and independent system operators. For example, National Grid co-authored a November 2022 study to "support utility long-term capital planning,"19 which assumed that the two states in its service territory (New York and Massachusetts) reached 100% sales of zero-emission passenger vehicles by 2035 and complied with California's Advanced Clean Trucks regulation.20 By providing regulatory certainty needed for long-term resource planning and investment decisions, the proposed LDMV and HDV rules will help ensure that the necessary resources are deployed to accommodate anticipated growth in demand due to electrification of the vehicle fleet. Indeed, such long-term planning has previously made it possible for the electricity grid to accommodate periods of significant and sustained growth,21 including relatively recently.22 Moreover, these historical periods do not reflect the pace and scale of generation growth anticipated as a result of implementation of the IRA and IIJA. [EPA-HQ-OAR-2022-0829-0610, p. 4]

19 See GIDEON KATSH ET AL., NATIONAL GRID, ELECTRIC HIGHWAYS: ACCELERATING AND OPTIMIZING FAST-CHARGING DEPLOYMENT FOR CARBON-FREE TRANSPORTATION 1 (Nov. 2022), https://www.nationalgrid.com/document/148616/download.

20 Id. at 5.

21 From 1960 to 1980, net generation in the electric power sector increased a remarkable 5.7% per year, with net generation more than tripling from just 756 GWh to 2,286 GWh. See ENERGY INFO. ADMIN., MONTHLY ENERGY REVIEW 134 tbl. 7.2b (May 2023), https://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf.

22 Between 1995 and 2007, average nationwide generation demand grew approximately 1.9% per year. See id. (noting an increase from 3,194 GWh to 4,005 GWh over this 13-year period).

III. Coalition members are investing in EV charging infrastructure

Members of this Coalition have begun making significant investments in the charging infrastructure for electric passenger cars and trucks: [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-National Grid recently received approval for a $206 million initiative to enable up to 32,000 additional charging ports in Massachusetts.23

-The New York Power Authority will have up to 400 fast chargers installed or in construction through its EVolve NY program by the end of 2025.24 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-The Pacific Gas and Electric Company ("PG&E") has successfully installed through March 2023 over 5,700 charging ports through its EV Charge Network, EV Fleet, EV Fast Charge and EV Schools programs.25 To aid with equity efforts to expand EV charging, PG&E recently launched its Empower EV program, which offers income-eligible households up to $2,500 in financial incentives for the installation of a Level-2 charger and any necessary service panel upgrades,26 as well as its Multifamily Housing and Small Business EV Charger program, which will install Level 1 and Level 2 EV chargers at multifamily housing units, not-for-profit organizations and small businesses, at no cost for sites located in a priority community.27 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-Austin Energy provides rebates of up to $1,200 and $4,000 for customers installing Level 2 charging stations at their homes and workplaces respectively.28 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-The Sacramento Municipal Utility District ("SMUD") offers up to $1,000 toward residential charging equipment and installation costs through its Charge@Home program.29 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

-Constellation Energy Corporation's venture arm (Constellation Technology Ventures, or "CTV") has invested in portfolio companies focused on EV and charging infrastructure.30 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

23 NATIONAL GRID, ANNUAL REPORT AND ACCOUNTS 2022/23, at 30 (2023), https://www.nationalgrid.com/document/149701/download.

24 Leading the Way in EV Infrastructure, EVOLVE NY, https://evolveny.nypa.gov/ (last visited June 9, 2023).

25 More information on PG&E's EV charging programs can be found at: https://www.pge.com/en_US/small-medium-business/energy-alternatives/clean-vehicles/ev-charge-network/electric-vehicle-charging/electric-vehicle-programs-and-resources.page.

26 More information on PG&E's Empower EV program can be found at: https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/electric/empower-ev-program.page?WT.mc_id=Vanity_empower-ev.

27 More information on PG&E's Multifamily and Small Business EV Charger program can be found at: https://www.pge.com/en_US/small-medium-business/energy-alternatives/clean-vehicles/ev-charge-network/program-participants/multifamily-housing-smb-ev-charger-program.page?.

28 Commercial Charging, AUSTIN ENERGY (last reviewed or modified July 8, 2022), https://austinenergy.com/green-power/plug-in-austin/workplace-charging; Home Charging, AUSTIN ENERGY (last reviewed or modified July 8, 2022), https://austinenergy.com/green-power/plug-in-austin/home-charging.

29 Drive electric and save, SMUD, https://www.smud.org/en/Going-Green/Electric-Vehicles/Residential (last visited June 9, 2023).

Footntoe 30: For instance, CTV invested in Qnovo, which offers a solution suite that uses advanced computation to optimize the chemical reactions within lithium-ion batteries, resulting in faster charging, increased daily run times, and longer battery lifetimes. See Constellation Technology Ventures, https://www.constellationenergy.com/our-work/innovation-and-advancement/technology-ventures.html. [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

Coalition members are making these investments in part because of the benefits that EVs can provide to grid reliability. EVs' primary near-term grid benefits stem from their enablement of load shifting—whether from periods of higher load demand to periods of lower load demand, or from periods of more carbon-intensive power generation to periods where more renewable energy is available.31 Load shifting can involve both deferral (to avoid charging during periods of peak load) and more targeted scheduling (to take advantage of periods of excess energy supply).32 In addition to enhancing grid reliability, load shifting can also reduce customer electricity rates, increase the value of renewable energy investments (by maximizing usage of excess solar energy produced during the day), and mitigate the need for equipment upgrades (e.g., increased storage capacity to accommodate excess solar energy).33 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

31 See TIMOTHY LIPMAN ET AL., CAL. ENERGY COMM'N, TOTAL CHARGE MANAGEMENT OF ELECTRIC VEHICLES 5 (CEC-500-2021-055, Dec. 2021), https://www.energy.ca.gov/sites/default/files/2021-12/CEC-500-2021-055.pdf.

32 See id.

33 See Aligning Utilities and Electric Vehicles, for the Greater Grid, NAT'L RENEWABLE ENERGY LAB'Y (Jan. 10, 2022), https://www.nrel.gov/news/program/2022/aligning-utilities-electric-vehicles-for-greater-grid.html (citing Muhammad Bashar Anwar et al., Assessing the value of electric vehicle managed charging: a review of methodologies and results, 15 ENERGY ENV'T SCI. 466 (2022)).

For example, PG&E has partnered with the BMW Group to explore ways to incentivize EV drivers to shift their charging times to support grid reliability.34 This program—called ChargeForward— first kicked off in 2015 and moved into its third phase in 2021.35 Building on the success of the first two phases, phase three expanded the program's scope to 3,000 EV drivers (from prior pilots of 100 and 400 drivers in phases one and two).36 Phase two of ChargeForward demonstrated the ability to shift nearly 20% of charging from a particular hour to another time and to shift up to 30% of charging to a particular hour.37 SMUD is also engaged in a managed charging pilot program with BMW, Ford, and GM, and is planning to add Tesla vehicles to the pilot as well, targeting participation of around 2,000 vehicles through 2024.38 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

34 PG&E Corporate Sustainability Report 2022, PG&E CORPORATION 105 (2022), https://www.pgecorp.com/corp_responsibility/reports/2022/assets/PGE_CSR_2022.pdf.

35 CLARION ENERGY CONTENT DIRECTORS, PG&E and BMW kick off 3rd phase of ChargeForward for clean, smart EV charging, POWERGRID INTERNATIONAL (Mar. 23, 2021), https://www.power-grid.com/der-grid-edge/pge-and-bmw-kick-off-3rd-phase-of-chargeforward-for-clean-smart-ev-charging/#gref.

36 PG&E Corporate Sustainability Report 2022, PG&E CORPORATION 105 (2022), https://www.pgecorp.com/corp_responsibility/reports/2022/assets/PGE_CSR_2022.pdf.

37 See Timothy Lipman et al., Total Charge Management of Electric Vehicles, CALIFORNIA ENERGY COMMISSION iii (CEC-500-2021-055, Dec. 2021), https://www.energy.ca.gov/sites/default/files/2021-12/CEC-500-2021-055.pdf.

38 2030 Zero Carbon Plan Progress Report, SMUD 21 (Apr. 2023), https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---April-2023_FINAL.ashx.

Coalition members are also exploring Vehicle-to-Grid ("V2G") technology, through which EVs can send power back to load sources (e.g., homes) and the grid from their batteries. While still in the early stages of development, V2G technology can offer reliability benefits by serving as a grid resource during periods of peak demand.39 PG&E and BMW recently extended their ChargeForward partnership until March 2026 and, as part of that program, will conduct a field trial of V2G-enabled vehicles in order to explore their potential to increase grid reliability.40 In addition, PG&E has announced vehicle-grid integration ("VGI") pilot programs with Ford41 and General Motors to test the ability of EVs to provide backup power to homes.42 SMUD is also in the process of conducting an electric school bus V2G demonstration project with the Twin Rivers Unified School District.43 SMUD is planning to expand the program to additional school districts and is also pursuing other projects to explore V2G capabilities for light-duty EVs.44 [EPA-HQ-OAR-2022-0829-0610, pp. 4-7]

39 See Value Assessment of DC Vehicle-to-Grid Capable Electric Vehicles: Analytical Framework and Results, EPRI (May 24, 2023), https://www.epri.com/research/programs/053122/results/3002026772.

40 More Power To You: PG&E and BMW of North America Start V2X Testing in California, PG&E CORPORATION (May 16, 2023), https://investor.pgecorp.com/news-events/press-releases/press-release-details/2023/More-Power-To-You-PGE-and-BMW-of-North-America-Start-V2X-Testing-in-California/default.aspx.

41 PG&E and Ford Collaborate on Bidirectional Electric Vehicle Charging Technology in Customers' Homes (Mar. 11, 2022), https://investor.pgecorp.com/news-events/press-releases/press-release-details/2022/PGE-and-Ford-Collaborate-on-Bidirectional-Electric-Vehicle-Charging-Technology-in-Customers-Homes/default.aspx.

42 A. Vanrenen, PG&E and General Motors Collaborate on Pilot to Reimagine Use of Electric Vechiles as Backup Power Sources For Customers (Mar. 8, 2022), https://www.pgecurrents.com/articles/3410-pg-e-general-motors-collaborate-pilot-reimagine-use-electric-vehicles-backup-power-sources-customers.

43 2030 Zero Carbon Plan Progress Report, SMUD 22 (Apr. 2023), https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---April-2023_FINAL.ashx.

44 Id.

IV. EPA should work closely with state and local partners to ensure deployment of the resources and infrastructure needed to accelerate transportation electrification while maintaining grid reliability [EPA-HQ-OAR-2022-0829-0610, pp. 13-14]

EPA's LMDV Proposal will help support deployment of the charging and generation resources needed to meet anticipated demand from vehicle electrification. Yet effective and efficient deployment of these resources will require coordination among electric utilities, state public utility commissions, and local governments to factor load from EVs into long-range resource planning and to permit the distribution and transmission system upgrades and new generation and storage resources needed to serve that load. To ensure these resources are deployed on the pace and scale needed to support vehicle electrification and grid reliability, EPA should coordinate closely with federal, state and local agenices to remove deployment barriers and emphasize the benefits that vehicle electrification can provide to the electricity grid, public health, and the climate. [EPA-HQ-OAR-2022-0829-0610, pp. 13-14]

Organization: Environmental. and Public Health Organizations

G. Comparison of Utility Impacts

ERM's results also point to the potential for net revenue (revenue in excess of the costs of serving PEV load) from PEV charging to reduce utility bills for all customers (see Figure V G-1). Since most PEV charging can be accomplished when there is spare capacity on the grid, charging can spread the costs of maintaining the system over a greater volume of electricity sales, reducing the per-kilowatt-hour price of electricity to the benefit of all customers. Public utility regulations require additional revenues in excess of authorized revenue to be returned to all utility customers in the form of reduced rates and bills. [EPA-HQ-OAR-2022-0829-0759, p. 33]

Electrifying L/MD vehicles (especially at the levels projected under an Alternative 1+ approach) could lead to between $7.7 to $11.3 billion in net utility revenue, which could reduce electricity rates by 2.1% to 3.1% ($0.004/kWh to $0.006/kWh). This could save the average U.S. household $35 to $60 per year and the average commercial customer $253 to $428 per year on their electricity bills. This phenomenon has already been observed in the real world. PEV drivers have already contributed $1.7 billion in net revenue that has been returned to all utility customers in the form of rates and bills that are lower than they otherwise would have been.115 [EPA-HQ-OAR-2022-0829-0759, p. 33]

115 Synapse Energy. 2022. "Electric Vehicles Are Driving Electric Rates Down." https://www.nrdc.org/sites/default/files/media-uploads/ev_impacts_december_2022_0.pdf.

SEE ORIGINAL COMMENT FOR Figure V.G-1: Incremental Reduced Utility Bills from L/MDV Charging116

116 Id. at 14.

This analysis looks at all of the costs associated with providing and distributing electricity, as well as any revenue based on the identified utility rate from the Energy Information Administration (which is approximately 10.4 cents per kilowatt hour for commercial customers and 12.7 cents per kilowatt hour for residential customers).117 [EPA-HQ-OAR-2022-0829-0759, p. 34]

117 These electricity rates come from EIA's Annual Electric Power Industry Report (Form EIA-861 for 2021), using the State data tab and adding all Sales (MWh) divided by the Revenues (Thousand $) to obtain the average price ($/kWh) for both Residential and Commercial customers. https://www.eia.gov/electricity/data/eia861/

1. Electric system impacts will be gradual and within the range of historical growth.

When considering infrastructure buildout, it is important to remember that L/MD PEVs will enter the total on-road L/MD fleet gradually and in volumes that will remain below in-use L/MD combustion vehicles for the foreseeable future. EPA's data show that the Proposed Standards, if finalized, would likely result in PEVs comprising just 5% of the total on-road L/MD fleet by 2027, gradually reaching 20% in 2032 and 43% in 2040. Similarly, under the more stringent standards we recommend in this comment letter, the transition of the on-road L/MD fleet to PEVs would be gradual, reaching 22% in 2032 and 49% in 2040 (Table XVII.G-1). In other words, a relatively small portion of the L/MD fleet will be tapping into charging and grid infrastructure over the next decade, and even by 2040, L/MD PEVs would comprise less than half of the on-road fleet under this rulemaking. Infrastructure needs for L/MD PEVs will accordingly grow gradually over time. [EPA-HQ-OAR-2022-0829-0759, p. 121]

Table XVII.G-1: L/MD PEVs as a Share of Total On-Road L/MD Fleet, 2026-2040

[See original attachment for Table XVII.G-1]. [EPA-HQ-OAR-2022-0829-0759, pp. 121-122]

Additionally, projected growth in electricity demand over the coming years, including demand related to PEV deployment in line with strengthened L/MD standards as well as additional economy-wide load growth, is well within the range of past historical load growth. EPA provides estimates of system-wide demand, including L/MD PEVs, under both No Action (i.e., baseline) and the Proposed Standards. DRIA at 5-14. These values show that system-wide increases in demand, including both increased demand from the Proposed Standards (assuming EPA finalizes the stringency levels it has proposed) and projected economy-wide load growth, is projected to average 1.6% per year between 2028 and 2040. Furthermore, based on analysis conducted by ERM (see Section V above), it is expected that incremental annual average electricity demand growth associated with PEV penetration in line with Alternative 1+, as compared to EPA's Proposed Standards, would be minimal—i.e., around or less than one tenth of a percentage point. [EPA-HQ-OAR-2022-0829-0759, p. 122]

Maintaining reliable and safe electric power delivery through this level of demand growth, as well as higher levels of growth resulting from more stringent standards, is within electric utility standard practice as demonstrated through the electric power sector's strong track record of reliability and resiliency. These annual generation increases are well within the range of contemporary, normal operations for the U.S. electric sector (see Figure XVII.G-1 below). According to data reported to the Energy Information Administration in Form 861, in the 31 years from 1990 to 2021, average annual national growth in electricity sales was 1.1%. In 15 of those years, growth was 1.5% or higher, and in ten years it exceeded 2%. The U.S. has also seen previous periods of sustained high demand growth across most states; for example, 1995 to 2007 saw average nationwide growth of approximately 1.9% per year. [EPA-HQ-OAR-2022-0829-0759, pp. 122-123]

Many states saw much higher, sustained levels of growth. In the two decades from 1999 to 2018, North Dakota electric sales more than doubled. Year over year growth averaged nearly 5%, and in 2014 electric sales were 14% higher than the previous year alone. In Nevada between 1992 and 2007, annual electric sales growth averaged 4.9% and fell below 1.5% only once. More recently, Virginia has seen strong annual sales growth, with sales increasing 12.3% in the five years from 2016 to 2021, or 3% on average per year, even accounting for a pandemic dip. [EPA-HQ-OAR-2022-0829-0759, p. 123]

This analysis draws similar conclusions to those of the researchers at the Electrification Futures Study, a multi-year research project to explore potential widespread electrification in the future energy system of the United States. In a report developing an integrated understanding of how the potential for electrification might impact the demand side in all major sectors of the U.S. energy system—transportation, residential and commercial buildings, and industry—this study concluded that "[e]lectrification has the potential to significantly increase overall demand for electricity, although even in the High scenario, compound annual electricity consumption growth rates are below long-term historical growth rates."338 And costs associated with integrating PEV charging onto the grid can also be minimized with effective load management programs, as described immediately below. [EPA-HQ-OAR-2022-0829-0759, p. 123]

338 Trieu Mai et al., NREL, Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States (2018), https://www.nrel.gov/docs/fy18osti/71500.pdf.

Figure XVII.G-1: Projected Demand Growth Rates Under Proposed Standards Compared to U.S. Historic Rates

[See original attachment for Figure XVII.G-1]. [EPA-HQ-OAR-2022-0829-0759, p. 124]

2. Time-of-use electric rates are extremely effective at pushing PEV charging to hours of the day when there is plenty of spare grid capacity.

Real-world data from hundreds of thousands of PEVs reveals that time-of-use (TOU) electricity rates work. At the time the data described below was collected, SCE estimated there were 329,940 PEVs in its service territory (through December 31, 2021).339 Figure XVII.G-2 shows the load profile of households in SCE territory with EVs, with a readily discernible uptick in electricity demand after 9PM (when the on-peak period ends on the time-of-use rates) as a result of PEV charging that increases until just before midnight and trails off in the early morning hours as those PEVs complete their charging. [EPA-HQ-OAR-2022-0829-0759, p. 125]

339 S. Cal. Edison Co., San Diego Gas & Elec. Co. & Pac. Gas & Elec. Co., Joint IOU Electric Vehicle Load Research and Charging Infrastructure Cost Report 10th Report Sec. VI Att. 2 - SCE (Mar. 31, 2022), https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/transportation-electrification/1 0th-joint-iou-ev-load-report-mar-2022.pdf.

Figure XVII.G-2. Load Profile of Households with PEVs on a TOU Rate in SCE Territory340

[See original attachment for Figure XVII.G-2]. [EPA-HQ-OAR-2022-0829-0759, p. 126]

340 Id. at 59.

The impact of TOU rates is even more self-evident in Figure XVII.G-3, which isolates PEVs on separate meters, demonstrating that PEVs charge almost exclusively after 9 PM on that TOU rate. [EPA-HQ-OAR-2022-0829-0759, p. 125]

Figure XVII.G-3: Load Profile of PEVs on a Separately Metered TOU Rate in SCE Territory341 [EPA-HQ-OAR-2022-0829-0759, p. 125]

341 Id. at 60.

[See original attachment for XVII.G-3:]. [EPA-HQ-OAR-2022-0829-0759, p. 126]

The figures above represent real-world data collected from hundreds of thousands of households with PEVs. There is no need to test the proposition that simple TOU rates designed for PEVs work. [EPA-HQ-OAR-2022-0829-0759, p. 126]

The combination of TOU rates and more active means of managing PEV charging can yield even greater benefits. Researchers from NRDC, Lawrence Berkeley National Laboratory, and Pacific Gas & Electric found that well-designed TOU rates could allow the utility's system to accommodate universal light-duty BEV adoption with minimal associated costs.342 This peer-reviewed study used real-world data on the distribution grid and BEVs to simulate what would happen if every household in a major metro area had a BEV, and found that more comprehensive load management could essentially prevent all otherwise necessary grid upgrades.343 [EPA-HQ-OAR-2022-0829-0759, p. 126]

342 Jonathan Coignard et al, Will Electric Vehicles Drive Distribution Grid Upgrades?: The Case of California, 7 IEEE Electrification Mag. 2, 55-56 (June 5, 2019).

343 Id.

Organization: Fermata Energy

II. Why EPA should enable V2G (bidirectional vehicle-to-grid) technologies in the final rulemaking and ensure that warranty and durability requirements adequately consider and do not hinder frequent use of V2G services. [EPA-HQ-OAR-2022-0829-0710, pp. 3-4]

There are numerous reasons for the EPA to encourage the adoption of V2G technology and support our detailed recommendations below. We feel strongly that the EPA has a unique opportunity to make a major difference in the commercialization of V2X technology. If the EPA were to provide incentives or regulations on V2X, as we are recommending, it could provide market confidence for vehicle manufacturers and V2X charging equipment providers, and accelerate V2X by providing a positive value to consumers, including low-and moderate-income consumers. EPA action to unlock the full potential of V2X could help mitigate the emerging generation shortage because with V2X, EVs become grid assets.3 For example, PG&E CEO Patti Poppe recently noted that EVs on the road in "PG&E's service area today have 6,700 MW of capacity," which equals "three Diablo Canyon nuclear power plants. It's on the road today, and we are not using it as a power source. We're only using it as a power draw."4 EPA action on V2X could also help address the duck curve, evening ramp, and summertime "needle" peaks in many generation and distribution grids. More importantly V2G, as a storage asset, unlocks and enables the large GHG benefits of the on-going, large-scale transition to intermittent renewable energy. EPA action to help commercialize V2X could create a low-cost, cleaner alternative to the zero-emission portable gensets required by California Air Resources Board's (CARB) recent Small Off-Road Engines (SORE) regulation and replace dirty portable gensets in other states. Finally, Fermata Energy encourages the EPA to support all connectors, protocols, and EVSE sizes in any V2X recommendations for incentives or regulation in order to foster competition and encourage lower cost solutions. [EPA-HQ-OAR-2022-0829-0710, pp. 3-4]

3 Decommissioning of Diablo Canyon and lack of hydropower in drought years. https://www.utilitydive.com/news/california-drought-could-halve-summer-hydropower-share-leading-to-more-nat/624489/https://www.utilitydive.com/news/california-grid-reliability-2022-2023-summer/609261/

4 https://www.latimes.com/environment/newsletter/2021-10-14/as-california-fires-burn-pge-ceo-promises-fixes-boiling-point

BNEF data (Figures 1 and 2) show over 10 million battery-powered EVs on the road globally at the end of 2020, with a combined 296-gigawatt hours of lithium-ion batteries installed in them. That's a lot of batteries driving around – 8 times more than the number of stationary grid-scale batteries installed globally.5,6 [EPA-HQ-OAR-2022-0829-0710, pp. 3-4]

5 More EVs Are Being Designed to Push Power to The Electrical Grid -Bloomberg (Link: https://www.bloomberg.com/news/newsletters/2021-04-27/more-evs-are-being-designed-to-push-power-to-the-electrical-grid)

6 https://news.bloomberglaw.com/environment-and-energy/electric-vehicles-to-drive-massive-battery-demand-bnef-chart

[See original attachment for Figures 1 and 2: Energy storage onboard EVs is much greater than in stationary battery resources]7 [EPA-HQ-OAR-2022-0829-0710, pp. 3-4]

7 Electric Vehicles to Drive Massive Battery Demand, BNEF, 2021 (Link: https://news.bloomberglaw.com/environment-and-energy/electric-vehicles-to-drive-massive-battery-demand-bnef-chart)

In addition, a May 2022 presentation by the World Resources Institute using Bloomberg NEF and Energy Information Administration (EIA) data projected that in 2030, the power capacity onboard EVs will be 10 to 20 times more than the 2030 power capacity of stationary storage.8 While these numbers are for light-duty EVs, electrified trucks can also contribute and some fleets (e.g., school buses, municipal trucks, trucks in one-shift operations) are expected to be early adopters. [EPA-HQ-OAR-2022-0829-0710, pp. 3-4]

8 See slide 5 at https://www.slideshare.net/emmaline742/building-resiliency-with-v2g-in-residential-homes-by-camron-gorguinpour

V2X bidirectional charging is a win-win-win investment: many benefits accrue:

• Achieves EPA's environmental goals. Just like stationary storage, V2X bidirectional charging platforms can reduce carbon and criteria pollutant emissions from generators by shifting electricity consumption to the cleanest hours of the day and removing the need for dirty thermal peaker electricity generation. However, V2X is more cost-effective than stationary storage, as ratepayers don't have to pay for purchase of the EV battery and can accelerate the renewable transition. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

• Provides grid services. With V2X bidirectional charging, utilities gain a low-cost energy storage resource to help integrate renewable energy into the electric grid by shifting energy, providing resource adequacy, and ancillary services (Figure 3). For example, modeling by the CPUC currently projects 14,700 MW of new energy storage is needed in CA by 2032 to support the integration of renewables but only 2,185 MW is operational today.9,10 V2X, with supportive policies, can provide many thousands of MW by 2030. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

9 CPUC Approves Long Term Plans To Meet Electricity Reliability and Climate Goals, CPUC, 2022 (Link: https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-approves-long-term-plans-to-meet-electricity-reliability-and-climate-goals)

10 Infographic: Q4'21 US Battery Storage by the Numbers, S&P Global, 2022 (Link: https://www.spglobal.com/marketintelligence/en/news-insights/blog/infographic-q4-21-us-battery-storage-by-the-numbers)

[See original attachment for Figure 3 -Grid services and value from different Vehicle-Grid-Integration technologies]11 [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

11 California Energy Commission, March 2019, Distribution System Constrained Vehicle-to-Grid Services for Improved Grid Stability and Reliability, (Link: https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-027.pdf) Figure 42

• Lower vehicle ownership costs. EV owners can earn money by selling electricity back to the grid, significantly cutting the cost of vehicle ownership. Offsetting the cost of owning and maintaining an EV supports equitable access to EVs, particularly those EVs in the used car market, such as the low-income EV driving community. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

• Increased resiliency. Unidirectional charging is a grid load. V2X bidirectional charging cost-effectively supports grid resilience. During blackouts and extreme weather events, such as Public Safety Power Shutoffs (PSPS) in CA, EV owners can power their homes, businesses, and critical infrastructure. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

• Ratepayer benefits. EV adoption has already been shown to significantly benefit utility ratepayers and V2X technology can further those benefits.12 For example, a 2018 CEC study projects $1 billion in annual ratepayer benefits if 50% of chargers were V2X capable.13 V2X technology also improves driver economics which would likely drive further EV adoption and even greater ratepayer benefits. [EPA-HQ-OAR-2022-0829-0710, pp. 4-6]

12 Electric Vehicles Are Driving Electric Rates Down, Synapse Economics, 2019, Electric Vehicles Benefit All Utility Ratepayers, Forbes, 2019 (Link: https://www.forbes.com/sites/jeffmcmahon/2019/02/01/electric-vehicles-benefit-all-utility-customers-as-much-as-their-owners/)

13 Distribution System Constrained Vehicle-to-Grid Services for Improved Grid Stability and Reliability, (Link: https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-027.pdf) CEC 2018, Table 8, High PEV Forecast Scenario

III. Recommendations regarding V2G in EPA rules and EPA's Proposed Battery Durability Monitoring and Warranty Requirements for Light-and Medium-Duty Electric Vehicles

Any eventual battery durability requirements set by EPA should account for frequent bidirectional charging (e.g. such as vehicle-to-grid) activities [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

We recognize that the EPA is proposing battery durability and warranty requirements that are less than those in Advanced Clean Cars II and we appreciate that.. However, the EPA made no mention of the need for V2G technology in light-and medium-duty BEVs and PHEVs in the proposed rule. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

Battery degradation is an inherently complex topic; battery chemistry, temperature, use cases, the EV duty cycle, and other factors all impact battery degradation. Some V2X activities, especially those utilizing bidirectional charging capabilities, will require additional battery cycling that will impact long-term battery durability. While the exact level of cycling will depend on the specific V2X use case and could vary based on customer behavior, it is reasonable to expect that in the future most EVs could experience some incremental level of degradation due to V2X activities. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

Given the extensive public and private benefits that V2X can offer, as detailed above, it is paramount that any battery durability and warranty requirements EPA establishes for EVs not inadvertently foreclose V2X activities, and especially V2G opportunities. Setting overly-stringent durability requirements that limit V2X activities – whether intentionally or not – conflicts with the EPA's larger mission of reducing emissions and accelerating EV adoption. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

Final battery warranty and battery durability requirements should include a thorough understanding of the impact on V2G in light-and medium-duty vehicles so as to not discourage V2G. At a minimum, the EPA should lower the warranty requirement to account for frequent bidirectional charging and allow automakers to exclude vehicles that have done V2X from the pool of vehicles in the durability test sample. [EPA-HQ-OAR-2022-0829-0710, pp. 6-7]

We do not see any consideration of frequent use of V2G in this proposal. V2G technology is emerging in light-duty and medium-duty vehicles, and attractive use cases exist (e.g. EVs that spend many hours connected to a charger or EVSE in a fleet or for personal use, such as school buses). The concern is that overly restrictive warranty or durability requirements by the EPA could place arbitrary restrictions on V2X activities. Fermata Energy appreciates the EPA's intent to ensure consumer protection and customer satisfaction with EV ownership through robust standards and to meet the useful life requirements in the Clean Air Act. However, overly stringent requirements that constrain battery cycling could also constrain the novel set of value propositions that V2X offers and that would otherwise spur EV adoption (e.g., home backup power, payment for grid services, customer bill management, etc.). Overly stringent battery durability requirements could drive OEMs to limit the range, performance, and/or state of charge of EV batteries, or take other measures to provide for sufficient degradation margin in later years. As such, Fermata Energy believes that the EPA should consider an approach to durability and warranty requirements that balances competing factors and specifically considers the GHG benefits of V2G as a storage technology which unlocks and enables a faster, more cost-effective transition to renewable energy. [EPA-HQ-OAR-2022-0829-0710, pp. 7-8]

Furthermore, we note there are ongoing efforts by the Informal Working Group on Electric Vehicles and the Environment under the United Nations Economic Commission for Europe (UN ECE) to develop minimum performance requirements for EV batteries that include V2X considerations. This Working Group is chaired by the US Environmental Protection Agency (EPA) and includes the European Commission, individual European and Asian countries, as well as industry stakeholders from around the world. In order to account for VGI activities, the Working Group is also considering a "virtual km" mechanism, in which the energy discharged by the EV battery in bidirectional mode is converted to a km-equivalent via a predetermined formula.14 The total mileage used for confirming the compliance with the performance requirements would consist of the sum of the km driven and the virtual km. While Fermata Energy is not necessarily endorsing this specific approach or methodology, we believe that the EPA should seriously consider an agreed upon method to account for V2G battery degradation such as the UN Global Technical Regulation "virtual miles" before adopting a final regulation with durability or warranty requirements. [EPA-HQ-OAR-2022-0829-0710, pp. 7-8]

14 For example, see the following presentation on V2X virtual mileage at the 50th EVE IWG meeting: https://wiki.unece.org/download/attachments/128420289/Input%20on%20V2X%20virtual%20mileage.pptx?api=v2

In the absence of an agreed upon method to account for V2G battery degradation, OEMs may choose to reach individual battery warranty agreements with V2X services providers to approve specific equipment for use with their bidirectionally-enabled vehicles. In September 2022, Nissan approved the Fermata Energy bidirectional charger as the first bidirectional charging system for use with its all-electric LEAF vehicle in the US.15 While these sorts of battery warranty approvals are a very important development for the bidirectional charging industry, OEM approval processes can be slow. It may take years for other OEMs to negotiate these sorts of agreements with V2X charger manufacturers and service providers. An agreed-upon methodology for accounting for V2G battery degradation would be the more expedient approach to ensuring battery durability, instead of relying on individual OEM to EVSE agreements, which could take years. [EPA-HQ-OAR-2022-0829-0710, pp. 7-8]

15 https://usa.nissannews.com/en-US/releases/release-5078281d19ed36853371357c4a1a8244-nissan-approves-first-bi-directional-charger-for-use-with-nissan-leaf-in-the-us

Regarding battery warranties, Fermata Energy recommends that the EPA 1) either delay adopting battery warranty requirements to a future rulemaking when more data on V2X is available or 2) reduce the battery warranty requirement in the final regulation to account for and assume frequent vehicle-to-grid charging by battery EVs and plug-in hybrid EVs. We also recommend that the EPA explicitly state that automakers may exclude those vehicles that have done vehicle-to-building or vehicle to grid charging from the pool of vehicles in the battery durability test sample. The Advanced Clean Cars II regulation took this approach, and we recommend the EPA do the same. [EPA-HQ-OAR-2022-0829-0710, p. 8]

The EPA should add in the final regulation a small multiplier credit for vehicles that have on-board AC bidirectional chargers or are integrated with multiple DC off-board chargers. [EPA-HQ-OAR-2022-0829-0710, p. 8]

The promise of bidirectional charging (AC or DC) to address air pollution, GHG emissions, and challenges to the electric grid is very significant with BEVs and PHEVS in medium-and light-duty vehicles. While we understand the desire by the EPA to simplify the regulation and reduce the use of bonus multiplier credits, we believe a small bonus credit in this regulation is justified and needed to unlock this technology because of the large emissions reduction benefits and other grid services enabled by bidirectional charging as described in Section II above. The EPA has a long history of providing multiplier credits to emerging technologies and we strongly encourage the EPA to adopt in the final regulation a modest multiplier credit for light-duty and medium-duty passenger vehicles that appropriately phases out over time. This multiplier should apply to automakers with vehicles that have on-board AC inverters for bidirectional charging and for vehicles that can show they have integrated with many brands of off-board DC fast chargers. This approach will not only will help enable the emerging V2G industry, but it will also help consumers achieve lower operating costs,16 reduce GHG and traditional pollutants from fossil fueled power plants by shifting electricity use to renewable energy in the cleanest hours of the day, and reduce the need for high-emitting peaker plants. V2G also provides a zero-emission, lower cost alternative to high-emitting portable back-up generators, and saves utility ratepayers money with a low-cost resource as compared to battery stationary storage. [EPA-HQ-OAR-2022-0829-0710, p. 8]

16 See footnote 11

By implementing our recommendations, the EPA has a unique opportunity to help the emerging V2G industry, consumers, and the power generation and transportation industries. Fermata Energy appreciates the opportunity to provide these comments and welcomes a more in-depth dialogue on this and offers itself as a resource on V2X topics for EPA. [EPA-HQ-OAR-2022-0829-0710, p. 8]

Organization: Ford Motor Company

To achieve the 2032MY goals EPA has proposed and Ford supports, the final regulation must have the following elements. First, regarding the stringency of the GHG standards, the EPA should finalize the Alternative 3 standards with minor adjustments to the utility allowance inherent in the truck curves and provide a phase-out for refrigerant credits (rather than eliminate all at once). The Alternative 3 standards effectively draw a straight line from 2026 to 2032; that is, they would require roughly equal reductions in absolute grams-per-mile targets over the duration of the program. Alternative 3 reaches the same endpoint in 2032 as the EPA's main proposal, and therefore would achieve the primary goal shared by Ford and EPA—widespread adoption of ZEVs. In contrast, EPA's main proposal, Alternative 1, and Alternative 2 each would require precipitous reductions in 2027 – 2029; this is not feasible and does not align with the anticipated scaling of the EV supply chain and manufacturing base. Similarly, the EPA's proposal to end refrigerant credits altogether in 2027 would be abrupt and have the effect of standards being even more strict; EPA should phase these credits out over time. Lastly, EPA's final regulations must continue to recognize the utility provided by trucks. Although electrified vehicles hold promise for all vehicles classes, ICE-powered trucks will continue to provide unique capability and utility for many years. The EPA proposal (and Alternative 3) would reduce the existing truck utility allowance too severely. [EPA-HQ-OAR-2022-0829-0605, p. 3]

Second, to ensure the final rule does not go too far and too fast, especially in 2027 – 2029, the EPA should adjust two aspects of the proposal regarding criteria emissions: fuel enrichment and particulate matter testing obligations. Although fuel enrichment can lead to higher emissions during brief and infrequent conditions which are disclosed to the EPA, fuel enrichment has been critical for overall emissions reductions. The practice enables automakers to downsize engines while also meeting consumer needs for some of the toughest jobs, without compromising powertrain durability. Removing fuel enrichment, as EPA has proposed, will directly impact customers' acceptance of new products, especially trucks, and they may keep their existing vehicle longer or opt for a larger (i.e., higher emitting) vehicle to be sure they can get the job done. Major powertrain redesigns would be needed to recover this lost utility, and these are not possible within the timeframe defined by the enrichment phase-out proposed by EPA. Next, although Ford supports aspects of EPA's proposed particulate matter (PM) standards which will necessitate the use of gasoline particulate filters, the proposed PM standard will challenge current laboratory equipment and procedures. Ford requests that the EPA eliminate the need to measure PM on the -7°C FTP for vehicles that are equipped with gasoline particulate filters. [EPA-HQ-OAR-2022-0829-0605, p. 3]

Car vs. Truck Stringency

Ford appreciates EPA's efforts to develop a data-driven, analytical basis for determining the appropriate relative stringency between the car and truck footprint curves. It is essential to full-line OEMs that the utility provided by trucks—particularly large pickup trucks—continue to be appropriately credited in the footprint-based standards. Any changes should made cautiously and gradually, with awareness of the broader context of the other sweeping changes that automakers are managing during the timeframe of this rule. [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

Ford believes the following modifications to the EPA's truck utility methodology are appropriate: [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

-Increase the 9 g CO2/mile per 1000 lbs of incremental towing to 11 g CO2/mile to account for increased road loads on highly capable towing vehicles (e.g., losses from larger brakes, axles, and engine parasitics).

-Increase the sales weighted towing delta from 7000 lbs to 8500 lbs to better capture the full range of towing capabilities for full size pickup trucks.

-Decrease the expected EV penetration rate from 50% to 35% for the harder-to-electrify full-size pickup truck market. [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

These refinements would result in an approximately 40 g CO2/mile difference between the Car and Truck curves by 2032MY utilizing the maximum footprint of 70 ft2, as shown in the graph below. Ford would like to continue to work with EPA to fully explain our rational and recommendations. [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

[See original comment for Graph 1: Vehicle Utility vs Truck Footprint Curves] [EPA-HQ-OAR-2022-0829-0605, pp. 5-6]

Limits on EV Growth

Ford is already delivering electrified light-and medium-duty EVs at scale. While we remain optimistic that EVs will constitute a steadily growing portion of new vehicle sales in the US, we are also mindful of the considerable challenges and uncertainties that will affect the rate of growth. The pace of electrification has been and may continue to be limited by many factors and forces, many of which are outside the control of vehicle manufacturers. A few deserve mention here. [EPA-HQ-OAR-2022-0829-0605, pp. 6-7]

Consumer preference is difficult to predict out to 2032. While EV adoption is growing quickly, and we are seeing enthusiasm for EVs among the early adopters, we cannot assume the same enthusiasm from the early majority let alone the late majority. Market studies suggest many people are interested in purchasing an EV, but not at any cost and not while charging infrastructure remains at a nascent stage. [EPA-HQ-OAR-2022-0829-0605, pp. 6-7]

Plug-In Hybrid Vehicle Utility Factor

Ford does not support the proposed update to the Plug-In Hybrid (PHEV) utility factor (UF). We do not believe it is appropriate to recalibrate the PHEV compliance benefit at the same time the EPA is proposing other sweeping changes and historically stringent standards. Product planning lead time and uncertainty in EV market growth requires that all electrification options be available with stable and predictable compliance benefits. Ford would support an EPA program designed to gather additional data for use in a future rulemaking which would yield a robust basis for a UF update and prevent disruption to EV product compliance plans. [EPA-HQ-OAR-2022-0829-0605, p. 8]

Light-and Medium-Duty Fuel Enrichment

EPA is proposing to eliminate commanded enrichment for ICE-powered vehicles for power and component protection. Fuel enrichment protects engine components during infrequent and/or short duration high-power demand events, such as freeway on-ramps or towing on steep grades. The ability to employ limited commanded enrichment has allowed downsized engines to meet customer performance demands across a broad range of real-world driving condition, resulting in considerable CO2 savings. If left unmitigated, the elimination of commanded enrichment would result in performance degradations that would be unacceptable to most customers, forcing many to retain older models or to upgrade to larger, more capable vehicle classes. Either result would run counter to EPA's intention to reduce on-road emissions. [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

In order to meet customer needs without enrichment, Ford will need to implement expensive, long-lead time engine development actions, such as increasing component sizes (turbos and heat exchangers) and adding more expensive engine and manifold materials. Under the EPA proposal, this would need to be accomplished and during a timeframe when we are already stretching our capital and engineering resources to their limits in order to transition to electrification. The proposal would also not provide the lead-time needed to undertake such engine redesign programs. For these reasons, Ford does not consider the proposed phase-in for the enrichment prohibition to be feasible. For recommends that EPA shift the phase-in requirements to at least 2029MY for vehicles below 6,000lb GVWR. [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

[See original comment for Table 2: Ford Recommended Enrichment Phase-in] [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

Regarding EPA's proposed enrichment exception allowances under 40 CFR 86.1811-17(d)(2), Ford requests that EPA include the following additional conditions to account for sporadic pre-ignition and other potential future technologies that may be deemed acceptable for agency approval through the AECD review process: [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

-Temporary and infrequent enrichment following sporadic pre-ignition events (used to prevent follow-on events which are prone to causing engine damage),

-Enrichment conditions substantially demonstrated during emissions testing, or

-Enrichment conditions otherwise approved by the EPA. [EPA-HQ-OAR-2022-0829-0605, pp. 12-13]

Organization: Fred Reitman

Electric grid cannot support this. The electric grid is remarkable engineering. But there is little reserve capacity and the grid is overtaxed. EV charging will stress the grid and is sure to result in brownouts and blackouts, which are dangerous during winter when power is needed for heating homes. Brownouts and Blackouts are already a problem in some states. This rule if finalized would only make the problem worse. [EPA-HQ-OAR-2022-0829-0432, p. 1]

Organization: Fuel Freedom Foundation

Battery electric vehicles are an attractive option for many households. However, they are not yet on par with internal combustion engine (ICE) vehicles in affordability and/or convenience for the majority of American drivers. Moreover, the electric grid needs vast improvement before achieving the necessary capacity, carbon intensity, and reliability for a fully electrified transportation system. GHG reductions should not wait for uncertainties to resolve or for the technology and market to evolve. [EPA-HQ-OAR-2022-0829-0711, pp. 1-2]

Organization: GROWMARK, Inc.

Furthermore, the electric grid is ill-equipped to handle a rapid increase in the number of EVs. According to the North American Electric Reliability Corporation, two-thirds of North America risk energy shortfalls this summer.3 Increasing the number of EVs at the rate mandated by these standards will only exacerbate these issues, especially in rural areas where infrastructure is most vulnerable. This puts the lives and livelihoods of farmers and all rural Americans at risk. [EPA-HQ-OAR-2022-0829-0560, p. 2]

3 North American Electric Reliability Corporation (2023, May 17). Two-thirds of North America Faces reliability challenges in the event of widespread heatwaves. https://www.nerc.com/news/Headlines%20DL/Summer%20Reliability%20Assessment%20Announcement%20May%202023.pdf

Organization: Growth Energy

In contrast, it is not as simple to convert to EV technology. Doing so at scale requires massive investments in both charging infrastructure and the electric power sufficient to support massive new electricity demand. Developing sufficient charging infrastructure can be difficult in rural areas and in locations where there are competing land uses. And developing additional electric power faces multiple challenges—the country will need significantly more electric capacity and, for EVs to have their intended GHG reduction benefits, that additional electric generation will need to be relatively low-carbon. For example, converting vehicles used in the Appalachian region rapidly to EVs and powering them by increasing loads on existing coal-fired power plants would not have the significant benefits claimed by the proposed rule. [EPA-HQ-OAR-2022-0829-0580, p. 6]

The zero grams/mile compliance value for EVs … does not reflect the increase in upstream GHG emissions associated with the electricity used by EVs compared to the upstream GHG emissions associated with the gasoline or diesel fuel used by conventional vehicles. For example, based on GHG emissions from today’s national average electricity generation (including GHG emissions associated with feedstock extraction, processing, and transportation) and other key assumptions related to vehicle electricity consumption, vehicle charging losses, and grid transmission losses, a midsize EV might have an upstream GHG emissions of about 180 grams/mile, compared to the upstream GHG emissions of a typical midsize gasoline car of about 60 grams/mile. Thus, the EV would cause a net upstream GHG emissions increase of about 120 grams/mile (in general, the net upstream GHG increase would be less for a smaller EV and more for a larger EV). [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

75 Fed. Reg. 25,324.

And that estimate of 120 grams/mile for EVs’ upstream emissions does not even account for emissions associated with production of batteries. Recent research has increasingly revealed that there are significant GHG emissions associated with the mining of materials for production of batteries used in EVs.6 For example, mining nickel alone requires both significant fossil energy expenditures and GHG emissions associated with land use, including the clear-cutting of rainforest in Indonesia.7 When compared to production of an ICE vehicle on a cradle-to-grave basis, those emissions represent another source of emissions from EVs that are not addressed in EPA’s assumption that EVs produce zero grams per mile of GHGs. [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

6 See, e.g., Catherine Early, The new 'gold rush' for green lithium, BBC News (Nov. 24, 2020) https://www.bbc.com/future/article/20201124-how-geothermal-lithium-could-revolutionise-green-energy.

7 Jon Emont, EV Makers Confront the ‘Nickel Pickle’, Wall Street Journal, June 4, 2023.

Indeed, a recent National Academy of Sciences (“NAS”) assessment explained that an approach like EPA’s fails to “fully capture” emissions from “the total light-duty vehicle system.”8 NAS noted that one issue of that type of non-system-based analysis is that it would lead to inaccurate comparisons between vehicles using different fuels.9 And NAS further opined that: [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

8 National Academy of Sciences (NAS), Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035 at 13-416 (2021).

9 Id.

[I]f deep GHG emissions reduction is a goal, then there will need to be consideration of not only onboard vehicle emissions, but also the emissions from related sectors, like electricity (for vehicle charging), and manufacturing (of vehicles and their materials and components). This motivates the need for life cycle thinking.10 [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

10 Id.

Organization: Hyundai Motor America

President Biden's Executive Order 14037 – setting an EV penetration target of 50% in MY

Organization: Illinois Corn Growers Association

Enormous advances have been made in electric vehicle technology in the last two decades and there is strong auto industry commitment to eventually replace internal combustion engine powered vehicles with electric ones. There are, however, still technological and economic challenges in creating products that meet consumer expectations. In addition, there are many things that must happen to support electric vehicles, many of which are outside the control of automakers. [EPA-HQ-OAR-2022-0829-0756, p. 3]

These include: [EPA-HQ-OAR-2022-0829-0756, p. 3]

-Increasing the electrical generating capacity in the U.S to provide the power to replace the energy now supplied by gasoline. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-Switching the source of energy used to generate this electricity from fossil fuels to zero-carbon sources such as wind, solar, nuclear and hydroelectric. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-Upgrading the electrical grid to move this additional power from the point of generation to

the point of vehicle recharging. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-Installing recharging stations in nearly every home with an electric vehicle and enough public charging stations to give electric vehicles the same utility as the gasoline powered vehicles they are intended to replace. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-Securing enough raw materials to build the large batery packs needed to give electric vehicles the range consumers demand. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-Upgrading the nation's roads, bridges and parking structures to ensure they can absorb the extra weight of inherently heavier electric vehicles. [EPA-HQ-OAR-2022-0829-0756, p. 3]

Thus, even if in the next eight years automakers, suppliers and retailers can retool their businesses to supply an estimated 7.5 million new vehicles in 2032 and beyond, it is far from assured that: [EPA-HQ-OAR-2022-0829-0756, p. 3]

-The marketplace is willing to buy that many vehicles in spite of their higher purchase cost, charging requirements, limited utility and extremely high batery replacement costs. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-The mines can extract enough raw materials to build the bateries necessary to build these vehicles, especially since it is expected that electric utilities will be buying huge bateries made of the same materials to deal with the intermit nature of wind and solar energy. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-The electric utilities can provide enough electricity. [EPA-HQ-OAR-2022-0829-0756, p. 3]

-The electric grid has been upgraded to handle the new demand, again considering that not only vehicles but residential and commercial heating systems, railroads and even ships will be converting from fossil fuels to electricity. [EPA-HQ-OAR-2022-0829-0756, p. 3]

Given the uncertainty that automakers can meet the proposed Multi-Pollutant Emissions Standards through electric vehicles alone, what other new technologies are available for compliance? [EPA-HQ-OAR-2022-0829-0756, p. 3]

Organization: International Council on Clean Transportation (ICCT)

In addition to all this industry investment in EV manufacturing, battery production, and the battery material supply chain, substantial investments are underway in the electric power sector. From 2012 through mid 2022, about $3.6 billion in utility transportation electrification investment plans have been approved across the country.18 These investments include upgrades in grid capacity, safety, resilience, and managed charging. The U.S. already has enough power generation and transmission capacity to fuel the EV expansion over the next few years.19 Meeting the 2050 demand requires about 1% per year growth in electricity production, well below the 3.2% average annual growth rate for the electricity generation over the past 70 years.20 [EPA-HQ-OAR-2022-0829-0569, p. 9]

18 Lepre, N. (2022, September). Electric utility filing annual update. Atlas Public Policy. https://atlaspolicy.com/wp-content/uploads/2022/09/Electric-Utility-Filing-Brief-July-2021-through-June-2022-v2-1.pdf

19 Houston, S. (2022, September 12). Can the electric grid handle EV charging? Union of Concerned Scientist. https://blog.ucsusa.org/samantha-houston/can-the-electric-grid-handle-ev-charging/

20 Harto, C. (2023, May 10). Blog: Can the grid handle EVs? Yes! Consumer Reports. https://advocacy.consumerreports.org/research/blog-can-the-grid-handle-evs-yes/; Miller, T., and Bischof, A. (2020, November 20). Electricity Demand's COVID comeback. Morningstar investor. https://www.morningstar.com/stocks/electricity-demands-covid-comeback

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

Short Summary

The UAW fully supports the transition to a cleaner auto industry, and it must be done in a way that protects both good union jobs and the environment. We urge the EPA to reach a consensus-based standard for light-and medium-duty greenhouse gas emissions that avoids allowing the burden of compliance to fall heaviest on the workers who currently build ICE vehicles and those who will build ZEVs in the future. [EPA-HQ-OAR-2022-0829-0614, p. 1]

Regulations that push the industry to adopt cleaner technologies are important to creating a strong domestic union manufacturing base. We also know that the US auto industry does not have a perfect track record in keeping up with consumer interest. In the 1980s, we saw the decimation of US auto market share and with it of good union auto jobs in this country, in part due to the companies' misjudging the consumer market and failing to adapt. We cannot allow this pattern to repeat in the 21st century in case the existing US automakers fail to keep up with rising EV demand, further sacrificing market share to foreign, non-union, and low-road employers. There is a risk of US automakers focusing on short-term profit while non-union employers capture future generations of market share, with disastrous outcomes for the industry labor standards and union workers. [EPA-HQ-OAR-2022-0829-0614, p. 1]

However, we are also concerned the proposed standards do not adequately address the projected impact on an industry that balances ICE jobs with the quality of new EV jobs. Nor does it properly account for the role that the sale of ICE vehicles will play in the transition or the availability of charging infrastructure. The EPA must involve stakeholders to reach a mutual agreement. [EPA-HQ-OAR-2022-0829-0614, p. 1]

Organization: John Graham

The IPM modeling assumes that the carbon intensity of the electrical grid will decline by 70 percent over the lifetimes of 2032 vehicles, as renewables replace most fossil fuels throughout the United States. The reader is led to believe that the subsidies for renewables in the Inflation Reduction Act will cause this rapid transformation of the US utility industry. However, the Inflation Reduction Act does not include the permitting reforms that are required for the large new transmission lines necessary to bring renewable energy to the markets where they are needed. Recent reports from both Brookings and the R Street Institute show that, without permitting reform, the monies in the Inflation Reduction Act are likely to have minimal impact on the expansion of renewables in the utility sector.95 The IPM modeling also ignores the massive expansion of grid-scale energy storage that would be required to achieve reliability with renewables. That energy storage, which would likely require large numbers of lithium ion batteries, is not included in the agency's assessment of battery prices, electricity prices, or material supply requirements. For these reasons, it is unrealistic to expect that the electricity currently provided by fossil fuels will be provided by renewables within the average lifetime of the model year 2032 vehicle. Thus, the upstream emissions from BEVs will be significantly larger than the agency assumes. Without this bias, HEVs would look much better in comparison to BEVs, as we illustrate in the simulation below. [EPA-HQ-OAR-2022-0829-0585, pp. 33-34]

> 95 Rayan Sud, Sanjay Patnaik. How Does Permitting for Clean Energy Work? Brookings Institution. Washington, DC. September 28, 2022; Rayan Sud, Sanjay Patnaik, Robert L. Glicksman. Federal Permitting to Accelerate Clean Energy Infrastructure: A Nonpartisan Way Forward. Brookings Institution. Washington, DC. February 14, 2023; Philip Rosetti. Potential Effects of the Inflation Reduction Act on Greenhouse Gas Emissions. R Street. Washington, DC. September 27, 2022; Philip Rossetti. Written Testimony for the Hearing on "Tax Incentives in the Inflation Reduction Act: Jobs and Investment in Energy Communities." Committee on Finance. United States Senate. Washington, DC. May 18, 2023.

The attached Table 1 calculates lifecycle and tailpipe emissions for ICEVs, HEVs, and BEVs for 2021 and 2030. Model years 2021 and 2030 are used because it begins with ICCT's calculation of 101 g/km CO2 for life cycle emissions of a 2021 model year BEV car in ICCT's 2021 lifecycle emission study.96 The 101 g/km CO2 is composed of 60 g/km due to operation from the U.S. national electric grid at 357 g/kWh CO2 and 41 g/km due to manufacturing and maintenance emissions. These are converted into g/mi CO2 in Table 1. BEV emissions with the

CA grid at 225 g/kWh CO_2 are also shown for 2021. [EPA-HQ-OAR-2022-0829-0585, pp. 33-34]

96 George Bieker, International Council on Clean Transportation, "A Global Comparison of the Life-Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars", July 2021, Figure 4.1. https://theicct.org/sites/default/files/publications/Global-LCA-passenger-cars-jul2021_0.pdf

The ICCT lifecycle study also calculates ICEV life cycle emissions for cars of 252 g/km CO_2 for model year 2021, comprised of 55 g/km from upstream fuel production, 31 g/km due to manufacturing and maintenance, and 166 g/km for tailpipe emissions (also converted into g/mi). [EPA-HQ-OAR-2022-0829-0585, p. 34]

Second, the electric utility industry works on longer time scales (about 30 years for a powerplant) than the auto industry (about 15 years for a vehicle). Thus, the decarbonization of the electric power sector will take longer than a transition to BEVs in the transportation sector. Pushing the transport sector to BEVs faster than the utility sector can decarbonize is wasteful of scarce battery resources that will likely be needed for grid-scale energy storage systems in the utility industry. Moreover, it will take many years to site, approve and build new renewables plus the additional years to build grid-scale energy storage and the long-range transmission lines necessary to transport wind and solar energy to markets where it is needed. [EPA-HQ-OAR-2022-0829-0585, p. 9]

Organization: Kentucky Office of the Attorney General et al.

C. The Proposed Rule ignores significant hurdles to the industry transformation that the rule requires.

EPA is pushing forward with this proposal at a breakneck pace and in circumstances ill-suited to the aggressive industry transformations that the Agency demands. The electrical grids are neither stable nor safe enough to handle EPA's proposal. The country will be more energy dependent and less secure because of it. Automakers will be left without the materials they need to comply. And all the while, consumers—our citizens—will have to deal with empty government promises about vehicle pricing, utilization, and safety. In short, the Proposed Rule ignores too many aspects of this too-important issue. [EPA-HQ-OAR-2022-0829-0649, p. 10]

1. The American power grids are not ready for the Proposed Rule.

As with other areas of concern, the Proposed Rule minimizes the damage it is poised to inflict on the power grids. EPA says utility upgrades to "improve grid reliability and … meet new electric power demands" are "routine[]." 88 Fed. Reg. at 29,311. And the Agency projects that increased demand from a greater number of EVs in the market will be "relatively modest" and have no adverse effect on grid reliability. Id. But converting the majority of the automobile market to EVs is not so simple. The Proposed Rule would forcibly phase out an entire fueling and service infrastructure, built over a century, and replace it with one that is still in its infancy. EPA has not accounted for all the problems that will cause. [EPA-HQ-OAR-2022-0829-0649, pp. 10-11]

For starters, the Proposed Rule will send a surge of EV demand to a power grid that is "running on an antiquated delivery system established several decades ago," Gina S. Warren, Hotboxing the Polar Bear: The Energy and Climate Impacts of Indoor Marijuana Cultivation, 101 [EPA-HQ-OAR-2022-0829-0649, pp. 10-11]

B.U. L. Rev. 979, 982 (2021), and “already strained” by the uptick in renewable energy “share and the challenge of more intermittent energy supply.” Luis Avelar, The Road to an EV Future Still Has a Few Potholes. Here’s How To Fix Them, World Econ. Forum (Jan. 31, 2022), http://bit.ly/3gEVgRj. [EPA-HQ-OAR-2022-0829-0649, pp. 10-11]

One need only look to California—a State the Proposed Rule showcases as an example of a State’s “demonstrated . . . ability” to handle the increased charging loads of EVs, 88 Fed. Reg. at 29,312—to see how this plays out in real time. Just days after California officials “voted in favor of banning the sale of new gas-powered vehicles in the state by 2035,” Simrin Singh, California bans the sale of new gas-powered vehicles by 2035, CBS News (Aug. 25, 2022), https://bit.ly/3P5d1s8, California faced a heat wave that triggered calls for residents to avoid charging their EVs during evening hours to “conserve power” as the “aging electricity grid struggle[d]” to keep up, Flex Alert extended to Saturday; EV owners asked to not charge vehicles during peak hours, CBS News (Sept. 2, 2022), https://cbsn.ws/3N4CqQa. As “[a]ll states . . . rethink electricity pricing structures as their EV charging needs increase and their grid changes,” California should serve as a warning, not a model. Mark Golden, Charging cars at home at night is not the way to go, Stanford study finds, Stanford News Service (Sept. 22, 2022) https://bit.ly/46a3qqm; see James Downing, Federal Funding Will Speed Up Grid Modernization, Utility Officials Say, CQ Roll Call (Oct. 12, 2022), 2022 WL 6905896 (predicting Texas will add “nearly a quarter of its peak demand” to its overall load in the coming years). [EPA-HQ-OAR-2022-0829-0649, pp. 10-11]

The beginnings of needed grid upgrades will not be easy, fast, or cheap. Some experts estimate that it will cost between $1 and $2.4 trillion by 2050 to make the necessary changes, including replacing countless miles of transmission lines. See Tim McLaughlin, Creaky U.S. power grid threatens progress on renewables, EVs, Reuters (May 12, 2022), https://bit.ly/43Unta3. Even before the Proposed Rule was announced, experts predicted that a $125 billion share of that price tag would need to be spent just to “allow [the grids] to handle electric vehicles.” Will Englund, Plug-In Cars Are The Future. The Grid Isn’t Ready, Wash. Post (Oct. 13, 2021), http://bit.ly/3SEDPhk. [EPA-HQ-OAR-2022-0829-0649, pp. 10-11]

On top of that, the Proposed Rule is just one part of EPA’s full-court press to transform the very energy sector the grids support. The corollary proposal for tailpipe emissions from heavy-duty vehicles, the Coal Combustion Residuals Rule, new methane restrictions, new GHG regulations under Section 111 of the Clean Air Act, the tighter Mercury and Air Toxics Standards, the recent update to the Good Neighbor Plan for ozone—this comprehensive suite of regulations adds even greater strain to existing baseload capacity. The Proposed Rule flouts the reality of existing infrastructure even considered in a vacuum. The Agency has not explained how pursuing all of these measures together—that is, how the Proposed Rule would operate in the actual context in which EPA plans to promulgate it—only adds to the impossibility of achieving EPA’s vision. In short, these near-simultaneous responses to President Biden’s pledge to “end fossil fuel” and “generate all electricity from carbon-free sources in just over a decade”—by, in part, “shut[ting] down” American coal plants—will “have tangible consequences for grid reliability and security” that the Proposed Rule does not address. WV Amicus Brief at 20-24. [EPA-HQ-OAR-2022-0829-0649, pp. 10-11]

Another serious problem is that power grids present “a massive to-do list” that “belongs to no one in particular.” McLaughlin, supra. Neither of the country’s top electricity regulators “has the authority to fix or upgrade the U.S. grid problems to match Washington’s green-energy ambitions.” Id. Similarly, while “[a]ppropriate permits may be required from the local building and permitting authorities” for new “[c]harging equipment installations,” the “state and local regulators” “have little independent power” to modernize the grids themselves. Charging Electric Vehicles at Home, U.S. Department of Energy Alternative Fuels Data Center, https://bit.ly/42y0f8L. EPA’s claim that the Proposed Rule has “no[] . . . federalism implications” is thus puzzling. 88 Fed. Reg. at 29,405. Basing a massive proposal on anticipated grid expansions when “none of the[] players individually [even] have the power or the responsibility to maintain the U.S. grid in the national interest,” McLaughlin, supra, is too speculative for responsible regulation. And trying to move forward without accounting for the role of the States at all—who at least are “responsibl[e] for grid maintenance, upgrades and inter-regional connections” in their own spheres—only increases the Proposed Rule’s head-in-the-sand approach. [EPA-HQ-OAR-2022-0829-0649, pp. 11-12]

These are just some of the power-grid-related problems the Proposed Rule triggers without a solution. The grids not only lack the capacity to accommodate the Proposed Rule’s new demands on them, but are also nowhere near secure enough to take them on. This security piece cannot be overstated; the Agency’s failure to sufficiently account for it is another red flag. Within the grids themselves, the EV ecosystem is still “emerging.” Mohammad Sayed, Ribal Atallah, Chadi Assi, Mourad Debbabi, Electric vehicle attack impact on power grid operation, 137 Int’l J. of Electrical Power & Energy Systems 107,784 (2022), https://bit.ly/3qFk2WI. The “special nature of EV loads” means that “EVs now present a new cyber-physical attack vector . . . against the power grid” that was “previously not possible.” Id. So every charging station in the country is becoming a potential “entry point[] for cyberattacks directed at the American energy grid.” Karoline Gore, Could electric vehicles present a Cybersecurity risk to the grid?, AT&T Cybersecurity (Dec. 7, 2020), https://bit.ly/3X1L0DW. The increased number of EVs presents new challenges, too. Because “[a]n electric vehicle has far more hardware chips and software components than an internal combustion engine,” manufacturers and consumers alike must “be more careful around security in general.” Paul Seredynski, SAE WCX 2022: EV Cybersecurity threats, SAE International (Apr. 14, 2022), https://bit.ly/3oYJk1q. More cause for caution and concern that, again, the Proposed Rule does not resolve. [EPA-HQ-OAR-2022-0829-0649, pp. 11-12]

At bottom, the Proposed Rule’s high “pressure to achieve rapid expansion” will be “a great hindrance to the secure deployment of the EV infrastructure.” Sayed, et al., at 107,784. And because “[o]perators and manufacturers often forgo security measures to achieve faster and cheaper deployment of their equipment,” id., the Proposed Rule only promises to increase the risk that grid security will falter in the very years it would be called on to take up massive new loads. The logical result, then, is that these “[p]oorly implemented electric vehicle . . . systems could be a significant risk to EV adoption because the political, social, and financial impact of cyberattacks—or public perception of such—would ripple across the industry and produce lasting effects.” Jay Johnson, et al., Cybersecurity for Electric Vehicle Charging Infrastructure, Sandia National Laboratories (July 1, 2022), https://www.osti.gov/servlets/purl/1877784. And with “no comprehensive []cybersecurity approach and limited best practices” in the market to date, id., the Proposed Rule must do much better to explain how those risks will not become reality. [EPA-HQ-OAR-2022-0829-0649, pp. 11-12]

The Proposed Rule somewhat attempts to deal with this concern by predicting that sales will increase as consumers become more familiar with EVs as they see broader “charging infrastructure” and more electric cars “on the road.” 88 Fed. Reg. at 29,189. But that raises another buyer-focused concern that makes it even less likely consumers will change their purchasing habits to the extreme degree EPA predicts. For people who “rely on street parking,” park in a garage over 25 feet from a power source, or own a condo where the building association is not willing to “pay for upgrading the electrical panel or service,” where and how to charge a new electric car is a real concern. Rachel Kurzius, Considering an electric vehicle? Here’s how to prep your home for one, Wash. Post (Sept. 26, 2022), https://bit.ly/3N4Y3zZ. Even for the slowest and most basic “Level 1” charging option, potential EV customers are out of luck; their “home probably can’t accommodate” an EV. Id. And those who are able to upgrade their home parking situations may find themselves in a long line as the need for more complex and expensive charging mechanisms grows at a fast clip. See EV Chargers: How many do we need?, S&P Global (Jan. 9, 2023), https://bit.ly/3X1xFeM (predicting that the EV population uptick will require “about 700,000 Level 2 and 70,000 Level 3 chargers deployed, including both public and restricted-use facilities,” 1.2 million and 109,000 nationally by 2027, and 2.13 million and 172,000 by 2030, “all in addition to the units that consumers put in their own garages”). [EPA-HQ-OAR-2022-0829-0649, pp. 15-16]

Even those who already own EVs may be in for some unpleasant surprises. A recent study concluded, for example, that “[t]he vast majority of electric vehicle owners [who] charge their cars at home in the evening or overnight” are “doing it wrong” and should instead “move to daytime charging at work or public charging stations” so as to not overwhelm the grids. Golden, supra. But standard electricity pricing “charg[es] commercial and industrial customers big fees based on their peak electricity use.” Id. “This can disincentivize employers from installing chargers, especially once half or more of their employees have EVs.” Id. Some of these vehicle owners may thus be left in a vehicle-charging no-man’s land. [EPA-HQ-OAR-2022-0829-0649, pp. 15-16]

Finally, many consumers may not be able to afford electric cars even if they want them. The average new car now costs nearly $50,000. Average New Car Price Tops $49,500, Kelly Blue Book (January 11, 2023) https://bit.ly/3PcSkKT. The typical new car payment is now nearly $800 a month. New Vehicle Affordability Worse Than Ever, Kelly Blue Book (June 18, 2023) https://bit.ly/3X3F8Kt. EPA admits that the Proposed Rule “will result in a rise in the average purchase price for consumers” from even these rates. 88 Fed. Reg. at 29,364. The Agency estimates increased costs for vehicle manufacturers at $7.5 billion annually by 2027. Id. By 2032, the Proposed Rule will cost manufacturers at least $1,200 per vehicle, which they will no doubt pass to consumers. Id. at 29,201. Prices for used cars will rise as well. Id. at 29,364. [EPA-HQ-OAR-2022-0829-0649, p. 17]

The Agency argues that the benefits of EV ownership will offset these costs. Specifically, EPA insists that “projected vehicle technology costs are offset by the savings in reduced operating costs, including fuel savings and reduced maintenance and repair costs.” 88 Fed. Reg. at 29,364. EPA’s reasoning is flawed. [EPA-HQ-OAR-2022-0829-0649, p. 17]

The alleged savings for reduced fuel consumption are based on layers of speculation. The shift to EVs is projected to "reduce liquid fuel consumption (gasoline and diesel) while simultaneously increasing electricity consumption." 88 Fed. Reg. at 29,365. EPA is correct to consider the net result of these effects when analyzing the costs and benefits of the Proposed Rule. But a necessary part of that analysis relies on correctly forecasting electricity prices over the coming decades. Simultaneous with the forced electrification of vehicles, EPA is attempting to dramatically restructure America's power-generating portfolio. Whether such a transformation is possible given resource limitations, geopolitical factors, permitting issues, land-use debates, jurisdictional policy differences, and litigation is still to be determined. Even if it is possible, EPA cannot predict with any accuracy the costs to the retail ratepayer for completing such a drastic transition. In short, no one knows with enough certainty to justify massive regulatory shifts whether charging an EV will be more cost-effective than refueling a gasoline engine. [EPA-HQ-OAR-2022-0829-0649, p. 17]

Moreover, low-income consumers will not be able to afford an EV. Despite the Agency's best efforts to present EVs as increasingly affordable, at the end of 2022 the average new EV sold for $61,448. Average New Car Price Tops $49,500, supra. This is why the Agency acknowledges "low-income households are more likely to buy used vehicles and own older vehicles." 88 Fed. Reg. at 29,344. But used EVs offer little savings if the buyer has to replace the battery. According to the Department of Energy's National Renewable Energy Laboratory, advanced batteries "wear out eventually," and today's batteries last only 8 to 15 years. Electric Vehicle Benefits and Considerations, U.S. Department of Energy Alternate Fuels Data Center, https://bit.ly/3PcOn9i. Replacing an EV battery costs anywhere from $5,000 to more than $15,000. Electric Car Battery Replacement Costs, Edmunds (May 2, 2023) https://bit.ly/3NutoNS. Such substantial expenses hardly qualify as "reduced repair and maintenance costs." 88 Fed. Reg. at 29,364. [EPA-HQ-OAR-2022-0829-0649, pp. 17-18]

All of this comes at a time of record inflation, historic gasoline prices, and high utility bills. Since President Biden took office, food prices are up over 18%, and energy prices are up over 37%. Introducing the 'Presidential Inflation Rate': Biden trails only Carter, Roll Call (March 15, 2023) https://bit.ly/3qH63jd. Home prices have also surged. In the first quarter of 2023, the average home price in the United States was $516,500, Average Sales Price of Houses Sold for the United States, Federal Reserve Economic Data, https://bit.ly/3p4BenX—an increase of 27% in less than three years. Agencies cannot ignore context when weighing the costs and benefits of a proposed rule. Here, the broader economic landscape is another strong mark against the Proposed Rule. [EPA-HQ-OAR-2022-0829-0649, pp. 17-18]

Organization: Lucid Group, Inc.

The Zero Emission Transportation Association (ZETA) and its members have found that electricity providers and grid-readiness will keep pace with the transition to zero-emission vehicles. In 2021, the U.S. fleet of electric vehicles used 6.1 terawatt hours (TWhs) of electricity, accounting for 0.15% of the total national energy generation that year.2, 3 It's estimated that an additional 15-27 TWh of annual new power generation will be needed to service EVs and related technologies. In the past, nearly 100 TWh have been added in a single year, demonstrating that such an increase is accomplishable.4 [EPA-HQ-OAR-2022-0829-0664, pp. 2-3]

2 “Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010–2021,” Argonne National Lab, November 2022, available at https://publications.anl.gov/anlpubs/2022/11/178584.pdf.

3 “Monthly Energy Review May 2023,” EIA, available at https://www.eia.gov/totalenergy/data/monthly/pdf/sec7_3.pdf.

4 “Summary Report on EVs at Scale and the U.S. Electric Power System,” US Drive https://www.energy.gov/eere/vehicles/articles/summary-report-evs-scale-and-us-electric-power-system-2019.

Transmission of the energy generated is another key component, and one that this Administration has begun to address. This year, the Administration published its plan to decrease permitting timelines, including those for new transmission projects.5 Additionally, the U.S. Department of Energy proposed a rule on designating National Interest Electric Transmission Corridors.6 The Federal government is demonstrating its intent to bolster grid resilience, which in part will ensure electricity demand is met. [EPA-HQ-OAR-2022-0829-0664, pp. 2-3]

5 “FACT SHEET: Biden-Harris Administration Outlines Priorities for Building America’s Energy Infrastructure Faster, Safer, and Cleaner,” (May 2023) available at https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/10/fact-sheet-biden-harris-administration-outlines-priorities-for-building-americas-energy-infrastructure-faster-safer-and-cleaner/.

6 Notice of Intent and Request for Information: Designation of National Interest Electric Transmission Corridors, 88 FR 30956 (May 15, 2023).

Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

Throughout the rulemaking process, EPA should also recognize and consider investments from the recently enacted Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0732, pp. 1-2]

Together, these two laws are expected to reduce adoption costs for ZEVs by providing at least $245 billion in federal funds—through tax credits, loans, and grants—to support ZEV charging infrastructure, manufacturing, and purchasing. Long-term regulatory certainty will push domestic manufacturers to take full advantage of these investments. [EPA-HQ-OAR-2022-0829-0732, pp. 1-2]

Organization: MEMA, The Vehicle Suppliers Associated

Infrastructure

To achieve the ambitious vision for U.S. charging infrastructure needed to rapidly electrify a high proportion of new vehicles, as noted above, EPA must work closely with other U.S. government agencies to help ensure that the dozens of programs in the Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL), and others still needed to support the transition, are effectively deployed by the federal government. While it is true that agencies are -so far - rolling out these programs expeditiously, strong coordination of these initiatives is needed to realize nationwide transportation transformation. [EPA-HQ-OAR-2022-0829-0644, p. 11]

V2G bidirectional charging technologies can provide a transformational opportunity to help address the nation's energy crisis while also decarbonizing the transportation sector. The use of bidirectional charging installations, for fleet and private vehicles, can help stabilize local grid activity and balance load versus demand.9 Besides grid load balancing, the use of vehicle batteries as energy sources can also offset local energy production demands and further improve grid resiliency and national security. [EPA-HQ-OAR-2022-0829-0644, p. 11]

9 This notice is one example of "grid services vehicles can provide" according to the US DOE https://content.govdelivery.com/accounts/USEERE/bulletins/3594aae

Organization: Mercedes-Benz AG

Section IV: Batteries

V2X applications such as vehicle-to-grid, vehicle-to-load, and vehicle-to-home are increasingly considered key features that will support the shift to electrification. For instance, the California legislature is currently considering a mandate for all new vehicles in the state to have bidirectional charging capability starting in 2030 MY. Regardless of California's law or separate OEM efforts to advance V2G, inclusion of the parameter, "virtual distance", is fundamental to the transparent deployment of V2G technology. As such, we would like EPA to add virtual distance to the regulatory language in both the durability and warranty mileage calculation. [EPA-HQ-OAR-2022-0829-0623, pp. 15-16]

Organization: Minnesota Pollution Control Agency (MPCA)

-The Minnesota Public Utilities Commission has found that EVs are both an opportunity and a challenge for the electric power sector and has therefore directed Minnesota's investor-owned utilities to take steps to encourage cost-effective integration of EVs and plan for their adoption. Minnesota's utilities have developed and begun implementing a variety of programs to support EV adoption, including home charging and rate design, as well as public charging investments.6 [EPA-HQ-OAR-2022-0829-0557, pp. 3-4]

6 Minnesota Public Utilities Commission, Electric vehicles, https://mn.gov/puc/activities/economic-analysis/electric-vehicles/ (accessed 6/15/2023).

Organization: Missouri Corn Growers Association (MCGA)

Coincidentally, there is no similar proposal to upgrade the power grid to support this rule. Researchers estimate the 350 million electric vehicles required to decarbonize the U.S. fleet by 2050 could use as much as half of the U.S. national electricity demand. Therefore, EPA's proposal would require a complete transformation of the electric power sector, requiring substantially more generation, transmission, and distribution, resulting in higher emissions and power prices not only for those using electrified vehicles, but for all consumers. [EPA-HQ-OAR-2022-0829-0578, p. 2]

Alongside this rule, EPA should be warning Americans of the higher energy costs and increased electrical blackouts that may accompany the forced BEV adoption rates. EPA should also prepare consumers for a future of increasingly expensive vehicles that many lower to middle-class families can't afford, along with coinciding increases in the cost of used vehicles. [EPA-HQ-OAR-2022-0829-0578, p. 2]

Organization: Missouri Farm Bureau (MOFB)

Further, MOFB is greatly concerned that the proposed rule contains zero language regarding what impact it will have on the country's severely aged and inadequate electric grid. In 2020, the U.S. experienced 180 major electrical disruptions, up from fewer than two dozen in 2000.8 [EPA-HQ-OAR-2022-0829-0590, pp. 2-3]

8 America's Power Grid Is Increasingly Unreliable -WSJ, (Link: https://www.wsj.com/articles/americas-power-grid-is-increasingly-unreliable-11645196772) accessed June 14, 2023.

EPA's proposed rule fails to illustrate how electricity will actually be delivered to thousands of new charging stations that will be needed to accommodate this mandate, and what impact it will have upon every other aspect of our lives, much of which relies on the uninterrupted delivery of electricity. EPA should be warning Americans about the higher energy costs and increased electrical shortages and blackouts that could accompany the massive EV rate of adoption mandated by its proposed rule. [EPA-HQ-OAR-2022-0829-0590, pp. 2-3]

As stated in our HD rule comments, MOFB is especially concerned with the future buildout of electric transmission lines that will be needed to carry the proposed rule's mandates into fruition. Unfortunately, and all too often, farmers and ranchers hear others say that their land is needed for the "public's benefit." Government agencies and renewable energy advocates often forget that farmers and ranchers are part of the "public" as well, and need to be fairly compensated for the continued buildout of transmission lines through their private property, which will take away the critical farm and ranch land necessary to run their businesses for generations to come. [EPA-HQ-OAR-2022-0829-0590, pp. 2-3]

Organization: National Association of Convenience Stores (NACS) et al.

iii. Transmission Capacity is Severely Lacking

Another substantial challenge is the generation and supply of electricity to charging stations. Every market participant that our membership communicates with is extraordinarily skeptical that electricity providers will be able to increase generation and transmission activity to service the kind of load necessary to provide charging infrastructure for the volume and type of Level 3 or DCFCs needed to accommodate travelers or those without access to home charging, which is likely to be a majority of future EV drivers—and within the next seven to nine years. A recent analysis of grid upgrades necessary for electrification found that a single highway fast-charging site, which would offer services to light-, medium-, and heavy-duty vehicles, will require the same amount of electricity as a sports stadium or a small town.26 This will require the development of dedicated substations and significant energy resources behind the meter. The Proposed Rule largely assumes that, with an increase in EV production, there will be a sufficient increase in electricity generation and transmission to meet those EV needs. Even when charging sites are financed, lead times for commercial charging infrastructure can range from six months to two or more years.27 [EPA-HQ-OAR-2022-0829-0648, p. 9]

26 Gideon Katsh, et al., CALSTART ET AL., "Electric Highways: Accelerating and Optimizing Fast-Charging Deployment for Carbon-Free Transportation" (Nov. 11, 2022) available at https://calstart.org/electric-highways-study/.

27 SPARKCHARGE, "Commercial EV Charging Station Installation Timeline" (2023) available at https://www.sparkcharge.io/blogs/leadthecharge/commercial-ev-charging-station-installation-timeline.

EPA cannot ignore that the infrastructure and electricity supply needed for the Proposed Rule do not exist in a vacuum; the effects of EPA's Proposal is only further compounded by its simultaneous proposal mandating the electrification of heavy-duty trucks.28 [EPA-HQ-OAR-2022-0829-0648, p. 9]

28 88 Fed. Reg. 25,926 (Apr. 27, 2023) (Proposed Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles— Phase 3).

c. Supply Chain and Market-Related Barriers to EV Adoption

Various other barriers to EV adoption exist beyond public charging, including consumer skepticism toward new technology, higher costs than internal combustion engine ("ICE") vehicles, limited range, lack of convenient public charging infrastructure, uncertain battery aging and resale value, dismissive or deceptive car dealerships, lack of available models, and other supply constraints.29 [EPA-HQ-OAR-2022-0829-0648, p. 9]

29 Matteo Muratori et al., PROG. ENERGY 3 022002 "The rise of electric vehicles—2020 status and future expectations" (Mar. 25, 2021) available at https://doi.org/10.1088/2516-1083/abe0ad.

EPA acknowledges, though does not meaningfully address, many of the barriers to EV adoption.30 If the Agency is interested in electrifying light-duty transportation in the United States, it should proactively redress these obstacles rather than assume they will dissipate on their own under the full weight of unachievable mandates. [EPA-HQ-OAR-2022-0829-0648, p. 9]

30 Proposed Rule at 29,311.

Further, the Proposed Rule overlooks the emissions impacts from the substantial expansion of the electrical grid. While EPA credits emissions reductions from assuming the power sector will become cleaner over time using renewable generation and electricity storage (e.g., batteries), it ignores the impacts of building out that associated infrastructure. New power generation, renewable power generation, and energy storage require the same critical minerals necessary for manufacturing EV batteries. Increased electricity demand will only further compound the stress on critical minerals. Indeed, copper and aluminum—both needed for EVs—are also the two main materials in wires and cables. Battery storage equipment for solar and other renewable energy sources rely on similar battery chemistries as EVs.39 Again, EVs may be the most environmentally compelling solution, but it does neither the climate nor American consumers any favors for the Agency to pretend the solution is more compelling or achievable than it actually is. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

39 And, as described above, higher prices on these materials could have a major impact on future grid investments. INTERNATIONAL ENERGY AGENCY, The Role of Critical Minerals in Clean Energy Transitions (Mar. 2022), 77–80, available at https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

The simultaneous spike in demand for materials such as copper and aluminum for both the grid and EV manufacturing will increase extraction and refining efforts globally, potentially exacerbating consequences on a regional level.40 By failing to consider geographic electricity generation differences and the potential benefits of a non-homogenized vehicle population, the Proposal misses the opportunity to most effectively respond to emissions concerns and, more importantly, could indirectly lead to increased emissions in certain regions. A full accounting of the relative advantages and disadvantages of the different vehicle technologies is necessary to ensure the Proposal harnesses the benefits of competition among different current and potential future vehicle technologies. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

40 The U.S. is almost entirely dependent on other countries, especially China, for materials essential to manufacturing EVs, meaning the Proposal may potentially raise national security concerns.

Organization: National Propane Gas Association (NPGA)

The EPA's efforts will promote additional demand for electricity for zero-emission vehicles at a time when the electric grid is suffering from a reliability crisis. The North American Electric Reliability Corporation's most recent long-term reliability assessment shows more than 50% of the United States is in high risk or elevated risk of shortfalls in electricity supply.5 This assessment is based on existing demand, and show that the grid needs significant improvements to meet rising demand, and extreme conditions. Specifically, the Assessment calls on industry and policymakers to "consider the impact that electrification of transportation, space heating, and other sectors may have on future electricity demand and infrastructure."6 The EPA has failed to present its consideration of the impact of its proposal on grid reliability, and consequently, failed to answer any questions about such necessary analysis.7 Prior to adding additional demand, the EPA should urge its partner, the DOE and the Federal Energy Regulatory Commission, to heed the guidance of the Government Accountability Office and analyze options for grid resilience, so as to avoid enhanced strain without a demand management or supply plan.8 Further, the EPA would benefit particularly in this review by reviewing analysis of grid strain during extreme weather events, which have called for enhanced storage, transmission, and generation enhancement of 35-70 gigawatts of power.9 The EPA's efforts will only exacerbate the strain on the grid, risking consumer blackouts and brownouts, as well as vehicles being unable to charge, which could have fatal follow-on effects when considering the essential role light-and medium-duty vehicles play in the economy. [EPA-HQ-OAR-2022-0829-0634, p. 2]

5 2022_LTRA (nerc.com) [Link: https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf] at 5-7, 23. (last accessed June 21, 2023).

6 Id.

7 Proposed Rule at 29311-29312. The EPA's analysis of grid reliability is perfunctory at best, and at odds with the NERC Report.

8 GAO-21-346, Accessible Version, ELECTRICITY GRID RESILIENCE: Climate Change Is Expected to Have Far-reaching Effects and DOE and FERC Should Take Actions [Link: https://www.gao.gov/assets/720/712874.pdf] (last accessed June 21, 2023).

9 Hopkins, Asa, Takahashi, Kenji and Nadel, Steven; Keep Warm and Carry On: Electrification and Efficiency Meet the Polar Vortex, American Council for an Energy-Efficient Economy at 11-12 (2020).
Organization: National Rural Electric Cooperative Association (NRECA)

Critical Role of Electric Cooperatives as Light-and Medium-Duty Vehicles are Electrified

Electrification of the transportation sector creates both opportunities and challenges for the electric sector, and electric cooperatives will play a critical role in the success of the transformation now underway. As such, electric cooperatives welcome the opportunity to partner with state and local entities on implementing the programs dedicated to building out the nation's electric vehicle (EV) charging network in the bipartisan infrastructure law (BIL) and through other opportunities. The funding in the BIL is an important down payment in the federal support required to electrify the transportation sector, particularly in rural areas that could otherwise be left behind. [EPA-HQ-OAR-2022-0829-0575, pp. 1-2]

To support the electrification of light-and medium-duty vehicles as laid out in EPA's proposed rule, electric cooperatives and other utilities must be involved from the very beginning of planning for the charging infrastructure these vehicles will require. There are already examples of 1 MW charging stations being built to support vehicle fleets. Electric cooperatives and other utilities need to be integrated at the very beginning of planning for such facilities by the project developers, or other relevant planning authorities where applicable, to avoid unintended consequences. [EPA-HQ-OAR-2022-0829-0575, pp. 1-2]

EPA Should Account for Grid-side Investments in Proposed Rule's Analysis

Bearing these realities in mind, we write to express our significant concern that EPA has failed to adequately account for the costs associated with serving the new load that will be created via light-and medium-duty vehicle (LDV and MDV) electrification as outlined in this proposed rule. While EPA accounts for the cost to purchasers for the hardware and installation of charging equipment, EPA fails to include the electric grid-side upgrades that will likely be needed, if not now, certainly in the future as electrification spreads and this could have serious negative consequences to American consumers. [EPA-HQ-OAR-2022-0829-0575, p. 2]

Specifically, within the proposed rule section on PEV Charging Infrastructure Considerations, EPA states:1 "there may be additional infrastructure needs and costs beyond those associated with charging equipment itself. While planning for additional electricity demand is a standard practice for utilities and not specific to PEV charging, the buildout of public and private charging stations (particularly those with multiple high-powered DC fast charging units) could in some cases require upgrades to local distribution systems…However, there is considerable uncertainty associated with…future distribution upgrade needs, and we do not model them directly as part of our infrastructure cost analysis." [EPA-HQ-OAR-2022-0829-0575, p. 2]

1 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,311 (May 5, 2023).

It is important for EPA to correct this failure in the proposed rule stage by updating its analysis with inclusion of a range of expected costs associated with serving the new load from the LDV and MDV fleets created by EPA's proposal. Failure to do so will likely result in unrealistic expectations on the part of consumers and fleet operators and possibly delay plans for electrification as they learn of the full costs that will be required to serve this new load from their electric cooperatives or other electric utilities. Neither these consumers/operators, nor the EPA, should expect that electric cooperatives can bear the burden of these new costs alone, particularly when these costs will ultimately need to be passed on to the end of the line consumer-members of the cooperative. [EPA-HQ-OAR-2022-0829-0575, p. 2]

Overall, it is important for EPA to recognize that electrification of the transportation sector, and the increased flexibility of this newly electrified demand, will require substantial distribution infrastructure investment over time to meet increased average local electric demand and to meet increased demand in new locations (e.g., EV charging stations). Significant transmission infrastructure investment may also be required to meet increased average electric demand and changes in the spatial distribution of electric demand among load centers. According to the

National Academy of Sciences, to transition the transportation sector through increased electrification, electric utilities will need to increase generation by up to 170% and see a three-fold expansion of the transmission grid by 2050. Over time, electrification of the transportation sector will require additional generation investment to ensure resource and energy adequacy to meet increased average electric demand and changing consumption profiles. Unfortunately, this investment challenge is becoming more complex due to several recent EPA actions that are jeopardizing flexible, dispatchable always available generation resources.2 These actions would require increased reliance on intermittent energy sources. Particular attention will be needed to ensure that generation investment is adequate in amount and in operational characteristics to meet the demands of electrification while ensuring grid stability, security, and reliability. [EPA-HQ-OAR-2022-0829-0575, pp. 2-3]

2 These actions include: Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 88 FR 18824 (March 29, 2023); National Emission Standards for Hazardous Air Pollutants: Coal-and Oil-Fired Electric Utility Steam Generating Units Review of the Residual Risk and Technology Review, 88 FR 24854 (April 24, 2023); Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Legacy CCR Surface Impoundments, 88 FR 31982 (May 18, 2023); New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 FR 33240 (May 23, 2023); and Federal Good Neighbor Plan for the 2015 Ozone National Ambient Air Quality Standards, 88 FR 36654 (June 5, 2023).

Specific Costs for EPA to Consider Incorporating in the Proposed Rule’s Analysis

Again, we urge EPA to update its analysis to account for the costs needed to make updates to the grid to support transportation electrification as envisioned in this proposal. Grid upgrade costs for EV charging will vary by region, neighborhood, cooperative, circuit, and feeder. However, to illustrate the types and ranges of costs that EPA should account for, we provide the following costs sourced from four different cooperative regions, broken down by charge level: [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

-Residential (Level 1 and Level 2): One out of three households will need an expanded electric panel to accommodate 240 V Breakers. If a household purchases two electric vehicles, then four slots on a breaker will be needed to accommodate this load. The average cost will be approximately $4,000 for a Level 2 residential charger with a panel upgrade.

--Upgrading panel (20% of panels must be upgraded) – can start around $600

--Transformer upgrades -$2,600 and climbing

--Service wire gauge upgrades to accommodate higher amperage -$3,000

- Public (Level 2 and DC Fast Charging (DCFC)): For commercial sites, transformer upgrade needs will vary. Most sites will already have three-phase power available; however, in very rural locations single-phase power will need to be upgraded to three-phase. If transformers do need to be upgraded on a three-phase line, then three transformers will need to be upgraded.

--Level 2 charger including panel -approx. $4,000 on average

--National EV Infrastructure Program (NEVI)-Compliant DCFC -approx. $25,000-

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-Transformer -$25,000 -$40,000 (reflects current prices for three transformers)

-Service entrance -$3,000-$4,000

-Metering package (including instrumentation, voltage transformers (PT) and current transformers (CT) -$2,000

-Line extension, if required (site dependent) -$50,000 -$75,000

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Circumstances vary across cooperatives, but some of these costs will be borne directly by the consumer-members and others will be paid for by the cooperative. Regardless, these costs help to illustrate more accurately the investment it will take to implement on EPA's proposed rule. [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

We note that these costs reflect a snapshot estimate in time and are likely to increase, particularly due to the significant challenges and delays utilities are facing in their supply chains, which are contributing to an unprecedented shortage of the most basic machinery and components essential to ensure the continued reliability of the electric grid. Electric cooperatives are waiting a year, on average, to receive distribution transformers. Additionally, lead times for large power transformers have grown to more than three years. And orders for electrical conduit have been delayed five-fold to 20 weeks with costs ballooning by 200 percent year-over-year. As a result, new projects are being deferred or canceled, and electric cooperatives are concerned about their ability to respond to major storms due to depleted stockpiles. We expect these supply chain challenges to persist with the increased demand for electrification projects being incentivized by the U.S. federal government. All these delays will likely impact the cost and timing of charging infrastructure buildout needed to support the transportation. [EPA-HQ-OAR-2022-0829-0575, pp. 3-4]

EPA should update its analysis in the proposed rule to account for the significant grid investments that may be needed to support transportation electrification as laid out in the proposal. As detailed above, these costs may be significant and should not be shouldered by the electric cooperatives serving this new load. Again, electric cooperatives are consumer-owned and operate at cost on a not-for-profit basis. They also serve 92% of the nation's persistent poverty counties. Affordability is critical to electric cooperatives and the consumer-members they serve, and any new costs imposed on an electric cooperative are ultimately borne by the consumers at the end of the line. EPA should update its analysis to ensure it more accurately represents the costs associated with electrifying both LDVs and MDVs, which could be significant across the country. [EPA-HQ-OAR-2022-0829-0575, p. 4]

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EPA should update its analysis in the proposed rule to account for the significant grid investments that may be needed to support transportation electrification as laid out in the proposal. As detailed above, these costs may be significant and should not be shouldered by the electric cooperatives serving this new load. Again, electric cooperatives are consumer-owned and operate at cost on a not-for-profit basis. They also serve 92% of the nation's persistent poverty counties. Affordability is critical to electric cooperatives and the consumer-members they serve, and any new costs imposed on an electric cooperative are ultimately borne by the consumers at the end of the line. EPA should update its analysis to ensure it more accurately represents the costs associated with electrifying both LDVs and MDVs, which could be significant across the country. [EPA-HQ-OAR-2022-0829-0575, p. 4]

Organization: National Tribal Air Association (NTAA)

Electrified Vehicles

As noted in the announcement of the proposed standards, "EPA's proposal builds upon a proliferation of announcements by automakers that collectively signal a rapidly growing shift…toward zero-emission technologies, including electrification"5. This anticipated reliance on hybrid, plug-in hybrid, and fully electric power trains may be disproportionately burdensome and costly in Indian country. Far too many homes on many reservations lack access to an electric grid. Further, vehicle reliance on centralized or individual battery charging sites as anticipated in the proposed regulations presents a huge challenge. [EPA-HQ-OAR-2022-0829-0504, p. 3]

5 Biden-Harris Administration Proposes Strongest-Ever Pollution Standards for cars and trucks to Accelerate Transition to a Clean – Transportation Future, USEPA News Release, April 12, 2023

The NTAA is well aware of many initiatives to enhance the deployment of renewable energy technologies to support the nation's electricity demand. We actively participate in meetings, webinars, forums, etc. as programs emerge under the Bipartisan Infrastructure Law, Inflation Reduction Act, and other climate change – related initiatives. The NTAA continues to formally comment on EPA proposals that emerge which have the potential to impact Indian country. NTAA remains concerned about realistic access to funding and other resources that are essential to advance renewable energy in Tribal communities and are necessary to transition vehicle fleets as anticipated by the proposed light-duty and medium-duty vehicle emissions standards. [EPA-HQ-OAR-2022-0829-0504, p. 3]

Organization: Nebraska Corn Board (NCB) and Nebraska Corn Growers Association

According to the North American Electric Reliability Corporation (NERC), two-thirds of the country could experience rolling blackouts this summer. The current power grid is unable to handle the added light-duty vehicles and does not include adding heavy-duty electric fleets requiring larger amounts of electricity. Not only does the infrastructure need updating, but it will take a large amount of public investment to meet this goal. [EPA-HQ-OAR-2022-0829-0583, p. 1]

Further, EVs are not a zero emissions product as 60% of the U.S. power grid is requires coal and natural gas along with the mining of rare earth minerals. Aside from not being a zero emissions vehicle, Americans will face rolling blackouts and weakened energy security with EVs depending on the electrical grid. Current energy infrastructure cannot support this proposal. [EPA-HQ-OAR-2022-0829-0583, p. 1]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

Like ZEV sales regulations, the shared ambition memorialized in these multi-state agreements sends strong and consistent signals to industry and investors and promotes public and private investment in zero-emission technologies and infrastructure. For example, the public utility commissions in the U.S. signatories to the 2022 MOU have already approved more than $2 billion dollars of utility funding for medium-and heavy-duty ZEV infrastructure planning and deployment.22 [EPA-HQ-OAR-2022-0829-0584, pp. 5-6]

22 U.S. Department of Energy, Alternative Fuels Data Center, Alternative Fueling Station Counts by State, https://afdc.energy.gov/stations/states (visited June 9, 2023).

Organization: Paul Bonifas and Tim Considine

EVSE Port Costs & Grid Upgrades: The EPA purposefully ignores a fundamental truth about EV charging. The EPA's study does NOT include the massive costs to upgrade the electrical grid to accommodate EV charging, as they consider it outside of the scope of their Rule. However, these mandatory grid upgrades must be included in the analysis as they will be a large cost burden for every consumer of electricity in the country. Including these grid upgrade costs results in a more realistic cost of $330 billion, a $210 billion cost increase from the EPA's calculations. [EPA-HQ-OAR-2022-0829-0551, p. 3]

This rule is like the Clean Power Plan proposed by the Biden Administration. The US Energy Information Administration conducted a study of the Clean Power Plan and found that average retail electricity rates would increase upwards of 3-7%.13 Taking the mid-range of this price increase, or 5%, the proposed rule would raise the previous electric rate increase of 55% to 58% and increase electricity costs for EV charging from EPA's estimate of $460 billion to $728 billion. [EPA-HQ-OAR-2022-0829-0551, p. 5]

13 https://www.eia.gov/analysis/requests/powerplants/cleanplan/

This $728 billion in higher electricity expenditures more than offsets the savings in reduced liquid fuel spending of $620. On balance, the fuel cost savings are a NEGATIVE $108 billion in contrast to EPA's estimated pre-tax fuel savings of $890 billion. This is a nearly $1 trillion difference. So, under rather conservative but realistic assumptions and elementary economic analysis, the proposed EV rule will not save consumers money but instead will lead to higher electricity costs, especially for poor and lower to middle class households living in rental units. [EPA-HQ-OAR-2022-0829-0551, p. 5]

There is also another concern related to timing. The electrical grid may not be ready to accommodate the additional load from this head long rush to force consumers to buy EVs. Electricity supply is like a backwards "L," with low marginal costs for generation levels up to capacity constraints. Once demand reaches those capacity constraints, the supply curve is vertical, and prices can reach extraordinary heights until demand falls or new capacity is available. We have witnessed this phenomenon in Texas and other regional electricity markets due to weather events. The EPA's proposed EV rule is a similar demand shock, however, it would be persistent unlike transitory weather demand shocks and unless electricity providers respond in a timely manner, rates could increase much more than 58%. [EPA-HQ-OAR-2022-0829-0551, p. 5]

EVSE Port Costs & Grid Upgrades

EPA Claimed Costs: $120 billion

Realistic Costs: $330 billion

[EPA-HQ-OAR-2022-0829-0551, p. 5]

This cost category purposefully ignores a fundamental truth about EV charging. Simply put, the EPA's study does NOT include the colossal costs to upgrade the electrical grid to accommodate EV charging. When the EPA discusses Electric Vehicle Supply Equipment (EVSE), they only consider the costs to install the physical "plugs" or "ports" that provide electricity to a vehicle and charges its battery, a measly $120 billion cost (present value at 3 percent discount rate). [EPA-HQ-OAR-2022-0829-0551, pp. 8-9]

In their RIA, the EPA states: [EPA-HQ-OAR-2022-0829-0551, pp. 8-9]

"Charging infrastructure is different from the electric power utility distribution system infrastructure, which is comprised of distribution feeder circuits, switches, protective equipment, primary circuits, distribution transformers, secondaries, service drops, etc."29 [2] [EPA-HQ-OAR-2022-0829-0551, pp. 8-9]

29 Page 364 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

and in the EPA rule, they state: [EPA-HQ-OAR-2022-0829-0551, pp. 8-9]

"The buildout of public and private charging stations (particularly those with multiple high-powered DC fast charging units) could in some cases require upgrades to local distribution systems. For example, a recent study found power needs as low as 200 kW could trigger a requirement to install a distribution transformer…. there is considerable uncertainty associated with the uptake of these technologies as well as with future distribution upgrade needs, and we do not model them directly as part of our infrastructure cost analysis".30 [EPA-HQ-OAR-2022-0829-0551, pp. 8-9]

30 Page 128 of EPA's Rule -https://www.govinfo.gov/content/pkg/FR-2023-05-05/pdf/2023-07974.pdf

However, these mandatory grid upgrades made by utility companies MUST be included in the analysis as they will be a large cost burden on consumers of electricity, even for those that do not own EVs. [EPA-HQ-OAR-2022-0829-0551, pp. 8-9]

As of 2021, the department of transportation reported more than 272 million vehicles (cars, buses, and trucks) were registered in the US31. Using the EPA's "EV Penetration Rates" as a proxy for eventual nationwide EV adoption, their rule would force the ownership of 76 million more EVs by 2032 compared to the "no change" scenario 32. [EPA-HQ-OAR-2022-0829-0551, p. 9]

31 https://www.fhwa.dot.gov/policyinformation/statistics/2021/mv1.cfm

32 Pages 668 & 670 of EPA's Draft Regulatory Impact Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10175J2.pdf

The Boston Consulting Group estimates that: [EPA-HQ-OAR-2022-0829-0551, p. 9]

"Depending on charging patterns, [a utility] will need to invest between $1,700 and $5,800 in grid upgrades per electric vehicle (EV) through 2030"33. [EPA-HQ-OAR-2022-0829-0551, p. 9]

33 https://www.bcg.com/publications/2019/costs-revving-up-the-grid-for-electric-vehicles

The midpoint of that cost range ($3,750 per EV) yields an incremental electric grid upgrade cost of $286 billion for the eventual 76 million additional EVs. These costs would be in addition to the $120 billion the EPA estimates solely for EVSE ports. [EPA-HQ-OAR-2022-0829-0551, p. 9]

Another study by the Brattle Group, estimates $60 billion in electric grid upgrades (generation, storage, transmission, and distribution) for every $40 billion in EVSE port costs34. Therefore, since the EPA is estimating three times (3X) the EVSE port costs that Brattle is showing, this would result in an electric grid upgrade cost of $180 billion to accommodate the EV charging. This would be in addition to the $120 billion in costs the EPA estimates solely for EVSE ports. [EPA-HQ-OAR-2022-0829-0551, p. 9]

34 https://www.brattle.com/insights-events/publications/electric-power-sector-investments-of-75-125-billion-needed-to-support-projected-20-million-evs-by-2030-according-to-brattle-economists/

Assuming the costs are evenly spread out over the next 8 years, using an average of the Boston Consulting Group's and Brattle's data for grid upgrades ($233 billion avg, $210 billion PV3), the resulting combined PV3 costs for EVSE ports and electric grid upgrades is $330 billion, a 175% increase from the EPA figure of $120 billion. [EPA-HQ-OAR-2022-0829-0551, p. 9]

According to a recent report by electric grid experts (NERC, CMC, WECC), the mass charging of EVs as penetration levels increase "may have catastrophic consequences for grid reliability" and may cause "cascading blackouts and widespread power interruptions" including causing transmission lines to suddenly go dead, or knocking out a power plant35. This report warns that widespread EV charging may trigger a fault-induced delayed voltage recovery (FIDVR) that utility companies have had to deal with since 2010 due to air conditioning units coming online simultaneously. FIDVRs can ripple from its local neighborhood distribution system through the transmission lines into other distribution systems. A result can be "cascading voltage collapse" and "widespread blackouts"36. [EPA-HQ-OAR-2022-0829-0551, pp. 9-10]

35 https://www.nerc.com/comm/RSTC/Documents/Grid_Friendly_EV_Charging_Recommendations.pdf

36 https://www.eenews.net/articles/needed-car-experts-to-fend-off-grid-disaster/

Not only will EV charging dramatically increase the US's overall electricity consumption, but the immediate issue is that many EVs will all be charging at the exact same time. As an analogy, [EPA-HQ-OAR-2022-0829-0551, pp. 9-10]

"Imagine a college dorm, where every student switches their 1,800-watt blow dryers on at exactly 8:00 in the morning. Breakers are going to blow. Lights are going to go out. That's similar to the potential nightmare for local electricity providers. If just one or two people on a street have EVs, the load on the local transformers and wires can be met without issues. However, if everyone on the street has an EV, there might be a problem. That's especially true in older neighborhoods, where existing demand may already be straining the infrastructure."37 [EPA-HQ-OAR-2022-0829-0551, pp. 9-10]

37 https://cars.usnews.com/cars-trucks/features/can-the-nations-electrical-grid-support-electric-cars

Organization: Plains All American Pipeline, L.P.

By 2032—less than 10 years from now—the EPA's Proposal would require nearly 70% of light-duty cars and trucks sold in the U.S. to be electric or "zero tailpipe emission." We have a number of concerns with this approach, a few include: [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• By focusing on tailpipe emissions alone, most internal combustion engine vehicles that run on gasoline, diesel and biofuels would be unable to meet the standards set forth in the Proposal. This overlooks critical efforts of the energy and automotive industries to pursue continued innovation and optimization of fuel/vehicle systems to improve efficiency and reduce emissions.1 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Effectively outlawing most liquid fuel-powered vehicles would undercut U.S. energy security,2 harm our domestic energy industry and leave the U.S. more dependent on foreign-controlled supply chains.3 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Transferring a significant amount of energy demand to electricity will strain already challenged electrical generation and transmission infrastructure. Without substantial additional investment and significant streamlining of electric transmission permitting, it's unclear whether the electrical grid could support charging new EVs at the level necessary to support the proposed emissions reductions.4 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Traditional energy sources are essential for ensuring effective evolution of the energy landscape-including the manufacture and growth of renewable energy sources and EVs. However, the Proposal would reduce energy investments and increase costs to consumers for all forms of energy. Furthermore, this policy risks the continued viability of critical domestic energy manufacturing infrastructure, which, if idled, would be very challenging to restore. [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

• Eliminating most new gasoline and diesel vehicles from the market limits consumer choice. Significantly fewer new affordable vehicles are available for sale today5 than a few years ago. Used cars are also increasing in price6 as some automakers warn that they will be forced to cut back on supplying popular gasoline models because of government regulations restricting sales of traditional vehicles.7 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

1 https://www.afpm.org/newsroom/news/afpm-epa-vehicle-proposal-will-effectively-ban-gasoline-and-diesel-vehicles

2 https://www.visualcapitalist.com/chinas-dominance-in-battery-manufacturing/

3 https://www.nytimes.com/interactive/2023/05/16/business/china-ev-battery.html

4 https://www.reuters.com/investigates/special-report/usa-renewables-electric-grid/

5 https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have-all-but-abandoned-the-budget-market-a68862f0

6 https://www.consumerreports.org/cars/buying-a-car/when-to-buy-a-used-car-a6584238157/

7 https://www.reuters.com/business/autos-transportation/stellantis-may-limit-some-gas-powered-vehicles-states-adopting-california-2023-05-24/

Organization: POET, LLC

EPA's assumptions for electricity costs are also questionable. EPA uses residential electricity prices from EIA's AEO 2021 without explaining why it has not relied on EIA's price forecasts for electricity "used in the transportation sector" instead.95 Those costs are generally 2% to 4% higher than the residential rates.96 The residential rates also do not reflect the grid mix assumed by EPA.97 For instance, EPA assumes that renewables will account for approximately 80 percent of U.S. electricity generated by 2050.98 Yet EIA's AEO 2021, which EPA has relied on for energy prices, predicts that renewable energy generation will make up only about 42% of electricity generation in 2050.99 The difference in those projections calls into question EPA's choice to rely on the AEO 2021 electricity prices. EPA does not explain whether its own projected grid mix will affect electricity prices, when it almost certainly would differ from the AEO 2021 prices based on a very different energy mix. [EPA-HQ-OAR-2022-0829-0609, pp. 23-24]

95 Id.

96 Id.

97 Id.

98 Id.

99 Id. at 8.

EPA also relies on questionable assumptions regarding the mix of renewable and non-renewable energy sources serving the electric grid. Trinity compared EPA's assumptions to EIA's AEO 2023, and found that EPA is assuming over 20 percent more renewable sources serving the grid by 2050 compared to EIA's "high uptake" most optimistic estimate, including incorporates impacts from IRA incentives for renewables.108 According to Trinity, "[e]ven accounting for the increase in demand for electricity over the period, U.S. EPA claims that GHG emissions from electricity generation will be reduced by about 80% from 2020 through 2030 compared to EIA's forecast of about 50%."109 EPA fails to explain why its estimates of renewables in the grid mix differ so greatly from EIA's. [EPA-HQ-OAR-2022-0829-0609, p. 25]

108 Id.

109 Id. at 10-11.

OnLocation also finds that if BEV upstream emissions are considered, "real-world" emissions to the atmosphere from covered vehicles would be at levels significantly higher than the proposed compliance standards. More specifically, if upstream fuel production emissions are accounted for regarding BEVs, the Proposed Rule's 86 gram per mile target in 2032 cannot be met when using electric grid GHG emission intensities from EIA, the leading U.S. governmental source for independent energy statistics and analysis.116 Note that OnLocation's analysis does not seek to account for battery manufacturing lifecycle emissions, which is addressed in Trinity's report, as described above. As Trinity has shown, "actual BEV lifecycle emissions would be even higher if battery manufacturing impacts are considered."117 [EPA-HQ-OAR-2022-0829-0609, pp. 26-27]

116 Id. at 1, 10.

117 Id. at 10.

OnLocation further finds that "using only tailpipe emissions provides inconsistent incentives between BEV and ICE vehicles, while optimistic projections for the grid carbon intensity and BEV penetration could reduce the effectiveness of the Proposed Rule in reducing carbon."118 Regarding electric grid intensity, OnLocation finds that EPA's Draft Regulatory Impact Analysis (DRIA) using its model shows a 70% reduction of power sector-related CO_2 emissions from current levels by 2055, while EIA's reference case "shows closer to a 50% reduction from current levels and substantially less CO_2 reduction if renewable costs do not decline as quickly as in the Reference scenario."119 While ICE vehicles have incentives under the proposal to reduce their tailpipe GHG emissions, BEVs and the electric grid lack GHG reduction incentives since the Proposed Rule effectively assumes that all electricity used by BEVs is zero carbon.120 [EPA-HQ-OAR-2022-0829-0609, pp. 26-27]

118 Id. at 14.

119 Id.

120 Id. at 16.

U.S. EPA's assumed costs for electricity are another source of concern. As indicated in DRIA Chapter 2.6.6., U.S. EPA used residential electricity prices from EIA's AEO 2021. It should first be noted that AEO also includes price forecasts for electricity used in the transportation sector, which are generally 2 to 4% higher than those for residential electricity. U.S. EPA provides no explanation for the agency's selection of residential electricity prices instead of transportation sector electricity prices. Another issue with the U.S. EPA's selection of AEO residential electricity rates is that they do not reflect the grid mix assumed by U.S. EPA (see Figure 5-8 in Chapter 5 of the DRIA). As shown in Figure 5-8, by 2050 U.S. EPA assumes that renewables (hydro and non-hydro renewables) will account for approximately 80% of U.S. electricity generation by 2050. In contrast, in EIA's AEO 2021, which U.S. EPA relies upon for electricity prices, only about 42% of power generation was forecast to be renewable in 2050. Given that U.S. EPA assumes about twice as much renewable power generation in 2050 than EIA, it is not appropriate for U.S. EPA to use the EIA AEO 2021 prices for electricity without establishing that the price of that electricity as delivered to vehicles will not be higher than the EIA forecasts. Further, this "as delivered" price needs to account for much more than just generation costs (which may be lower than for fossil generating sources) including transmission lines and energy storage. [EPA-HQ-OAR-2022-0829-0609, pp. 59-60]

Organization: Porsche Cars North America (PCNA)

Other areas important to consumer adoption can benefit from additional policy development. Further work is needed to reduce barriers to electrification such as streamlining building codes to futureproof new construction to ease the installation of charging at homes, apartments, and workplaces. The magnitude of the challenge related to a robust charging infrastructure is becoming increasingly clear with updated reports such as the Department of Energy's 2030 assessment.1 This single report indicates a total investment of $53-127 billion dollars for private and public charging which does not even include costs associated with grid upgrades to support the 26 million plus ports that are estimated to be needed. Consumers won't be satisfied with roadblocks that make owning an electric car more complicated than a gasoline model. Actions are also needed to help lower the cost of electricity as a fuel to ensure that EVs are competitive and attractive against gasoline models. [EPA-HQ-OAR-2022-0829-0637, p. 3]

1 The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure, US Department of Energy, 2023

Organization: Rivian Automotive, LLC

Rivian is encouraged by the efforts currently underway across state and federal agencies, private companies, national labs, and non-profits to address the key challenges and opportunities with scaling charging infrastructure. One of those challenges is the impact of widespread electrification on the electric grid infrastructure. We applaud EPA for acknowledging this challenge as it is a top concern for many industry stakeholders, but also an area where significant attention is being paid. For example, EPRI has launched its EVs2Scale 2030 initiative, which is focused on increasing collaboration between industry and utilities to increase communication around commercial fleet electrification plans and utility capacity mapping.50 Several deliverables are planned by the group, including key tools focused on helping utilities across the country receive the necessary buy-in from their decision makers to plan for the grid upgrades necessitated by transportation electrification. In addition, as noted in the DRIA, NREL recently published a quantitative needs assessment by state and city for a national charging network focused on personally owned, light-duty vehicles.51 The granularity of the analysis available on the state and city level52 will allow it to serve a similar function as the EPRI effort—increasing utilities' awareness of the forthcoming load on their systems, thus providing more time to make necessary grid upgrades. Overall, increasing transparency and information flow with the broad range of utilities operating in the US will be critical to achieving the electrification goals this rulemaking aims to help meet. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

50 Robert Walton, Utility Dive, "EPRI Launches 3-Year Initiative to Address Grid Constraints, Develop Toops to Serve Coming EV Loads," April 19, 2023, available at www.utilitydive.com/news/epri-initiative-electric-vehicle-loads-power-grid-constraints-interconnection/648024/.

51 Wood, E., B. Borlaug, M. Moniot, D.-Y. Lee, Y. Ge, F. Yang, and Z. Liu, National Renewable Energy Laboratory, The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure (2023), NREL/TP-5400-85654.

52 See data files for Wood, E., B. Borlaug, M. Moniot, D.-Y. Lee, Y. Ge, F. Yang, and Z. Liu, National Renewable Energy Laboratory, The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure (2023), NREL/TP-5400-85654, available at https://data.nrel.gov/submissions/214.

In addition to increasing collaboration with utilities, leveraging load management technologies to reduce the need for additional build out of grid capacity will be imperative. As the DRIA notes, there are many commercially available technologies able to manage charging load, from smart charging to mobile and stationary storage, to vehicle grid integration. In recent years, these technologies have demonstrated their ability to subtract years from their project energization timeframes or even enable the completion of a project that would have otherwise been unable to proceed if a full-nameplate upgrade was required. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

While we acknowledge new distribution infrastructure will be necessary, we agree with EPA that commercially available load management technology can leverage the inherent flexibility of EV charging use cases and insert much-needed efficiency into EV-related distribution grid planning and buildout processes. Per EPA's analysis in Figure 5-15 in the DRIA, the majority of charging will be needed at home and at work, which is where load management technologies are particularly impactful due to long dwell times with maximum charging flexibility. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

Overall, increased transparency around the location and scale of future charging load will enable utilities and their decision makers to make necessary investments in the electric grid infrastructure as well as increase their adoption of load management technologies. Therefore, we view the near-term finalization of Alternative 1 as a critical step to build on the existing momentum described above and continue it into 2027 and beyond. [EPA-HQ-OAR-2022-0829-0653, pp. 15-17]

Organization: Scott Wilson

You will have read also that EVs are unaffordable. Actually, there are 18 new EV models below the average new car price in the US. (see attached) You will have read there is no charging infrastructure. Not true, since any home with electricity near a parking place can support an EV. However, more long-distance highway charging is needed and is the motivation for the administration's NEVI charger program. You will have read that the grid can’t support an EV fleet. Major electric utility trade groups point out that off-peak charging will become widespread. It’s notable also that 124 business entrepreneurs, executives, and academics have submitted favorable comments. [EPA-HQ-OAR-2022-0829-0515, p. 1]

In addition to concerns about the legality of these proposals, the EPA is forcing this transition to electric vehicles at a time when the capacity and reliability of our nation's electric grid to meet current demand is of increasing concern. A recent American Transportation Research Institute study found that full-scale electrification of the transportation fleet would require the addition of generation and transmission capacity equal to more than 40 percent of our current electricity demand. Grid operators are already raising concerns over other EPA proposals targeting the electricity generation sector that will significantly impact existing capacity and reliability.3 PJM recently released a report highlighting how baseload power retirements are policy driven and "retirements are at risk of outpacing the construction of new resources."4 Concerns like these from electric industry stakeholders draw attention to proposed EPA regulatory mandates on that sector that will decrease the capacity of our nation's grid to meet that existing demand, including the Mercury and Air Toxics Standards, regulations on Coal Combustion Residuals, a new proposal on Effluent Limitation Guidelines, and the recently announced Clean Power Plan 2.0 Rule. Given this upcoming regulatory onslaught on the electric fleet and the chronic delays and uncertainty associated with federal and state permitting of new generation and transmission assets, it is unclear that current levels of electric service can be maintained -much less expanded to replace the latent energy of liquid fuels with electricity to power BEVs. [EPA-HQ-OAR-2022-0829-5083, pp. 1-2]

3 See generally comments on EPA's proposed "Federal Implementation Plan Addressing Regional Ozone Transport for the 2015 Ozone National Ambient Air Quality Standard."

4 See Energy Transition in PJM: Resource Retirements, Replacements & Risks (Feb. 24, 2023).

Organization: Steven G. Bradbury

Where does EPA purport to find this authority in the Clean Air Act?

The logic is as follows:

Because most automakers have announced ambitious timetables for transitioning to the production of EVs going forward and have pledged to make large capital investments to finance this gradual switchover,13 and because Congress has recently approved generous federal subsidies for some EV purchases and charging infrastructure,14 EPA says it can now declare that battery-electric vehicle technology is a “feasible” alternative to the tradi-tional internal-combustion engine (ICE) powertrain.15 And on that basis, EPA is proposing to treat EVs as an available “control technology” for achieving compliance with the tailpipe emissions restrictions under Clean Air Act section 202.16 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

13 See 88 FR at 29191, Figure 1 (reproducing a chart prepared by the Environmental Defense Fund depicting the automakers’ announced goals for future electrified vehicle sales as a percentage of total sales); id. at 29193-94 (summarizing automakers’ announced plans for investments in EV technology).

14 See id. at 29195-96; Infrastructure Investment and Jobs Act, Public Law 117–58, 135 Stat. 429 (2021), https://www.congress.gov/117/plaws/publ58/PLAW117publ58.pdf; Inflation Reduction Act of 2022,

Public Law 117–169, 136 Stat. 1818 (2022), https://www.congress.gov/117/bills/hr5376/BILLS117hr5376enr.pdf.

15 See 88 FR at 29194 (light-duty and medium-duty vehicles); 88 FR at 25972 (heavy-duty trucks).

16 See 88 FR at 29284 (for light-duty and medium-duty vehicles); 88 FR at 26015 (for heavy-duty trucks).

This reasoning obviously depends on a kind of feedback loop. The automakers are pledging to invest in the transition to EVs because governments around the world—like China, the EU, the Biden White House, and Governor Gavin Newsom and his climate regulators in California—are demanding that they do so. But everyone knows there is a large looming impediment to this Green Dream: resistance from American consumers. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

The American public is not jumping on the electric bandwagon. EVs are expensive— beyond the reach of many American families—and most Americans remain skeptical that EVs will reliably serve the full range of their needs, that quick and convenient charging stations will be widely available, that EVs will maintain their promised driving range over time or in cold weather, that they will have any significant resale or trade-in value down the road, and that insurance carriers will cover the huge costs of battery replacement when the battery wears out or is damaged in a minor accident.17 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

17 See Nick Carey, Paul Lienert, and Sarah McFarlane, "Scratched EV battery? Your insurer may have to junk the whole car," Reuters, March 20, 2023, https://www.reuters.com/business/autos-transportation/scratched-ev-battery-your-insurer-may-have-junk-whole-car-2023-03-20/ ("For many elec-tric vehicles, there is no way to repair or assess even slightly damaged battery packs after accidents, forcing insurance companies to write off cars with few miles—leading to higher premiums and under-cutting gains from going electric.").

To push the automakers to convert to EV production in the absence of sufficient mar-ket demand, EPA plans to ratchet down the emissions limits for carbon dioxide and for the traditional criteria and other pollutants associated with smog (such as unburned hydrocar-bons, particulate matter, oxides of nitrogen, and ozone) to super-stringent levels that are technologically impossible for gas-powered vehicles (even hybrids) to satisfy.18 At the same time, EPA is proposing to phase out certain regulatory buffers that allow automakers to report better emissions compliance results, such as "off-cycle credits" for the addition of onboard technologies that improve the fuel efficiency of ICE vehicles.19 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

18 See, e.g., 88 FR at 29237-38; id. at 29257-61.

19 See id. at 29249-50.

The automakers' only recourse will be to replace more and more of the ICE vehicles in their fleets (including hybrids) with the "alternative control technology" of battery-elec-tric vehicles. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

And here is the trick: For enforcement purposes, EPA applies the emissions limits to each automaker on a fleetwide average basis, and it proposes to reduce these fleetwide averages dramatically each model year from 2027 through 2032 on a ramp rate calculated to achieve the Biden administration's desired percentage mix of EVs in the U.S. auto fleets. [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

In other words, EPA is now proposing to set fleetwide average tailpipe pollution limits that are intended by design to apply increasingly over time to vehicles that have no tailpipes and that EPA says emit none of the pollutants covered by the regulations.20 [EPA-HQ-OAR-2022-0829-0647, pp. 6-8]

20 Automakers can avoid violating the average emissions limits in certain circumstances with regulatory "credits," earned by producing vehicles, like EVs, that outperform the limits. Under the EPA's rules, credits can be "banked" from one model year to another within limits, "transferred" from one fleet to another (for example, from the automaker's light truck fleet to its passenger car fleet), or "traded" between automakers, which usually involves a privately negotiated purchase. Tesla, which manufactures nothing but EVs and accounts for approximately 70 percent of the U.S. EV market, receives a large portion of its income from selling emissions credits to the other automakers. Predictably, the EPA is proposing to retain this credit system to continue the subsidization of EV manufacturing. See 88 FR at 26245-46.

What is clear is that EPA sees an endless horizon for its new-found power to regulate practically all aspects of the American automotive market. No doubt, for example, the Agency intends to be involved in overseeing the buildout and operation of electric vehicle charging infrastructure around the country—once again, as an incident of the regulators' own expansive conception of their section 202 authority to ensure the adequacy of EPA's chosen control technology. [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

We can easily imagine that someday this self-assumed mandate will include the power to ration the timing and extent of drivers' access to charging networks, as EPA deems necessary to maintain the general supply of electricity for EVs. California is already doing this. Because the buildout of charging infrastructure will depend critically on gov-ernment subsidies and approvals, government rationing of access to this infrastructure is a very real prospect, especially given the strains on grid reliability that I discuss below. [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

The bottom line under the Major Questions Doctrine is that section 202, on which the proposed rules rest, contains no clear and express delegation of any authority that could sustain these massively consequential proposals. As the Court observed in West Virginia v. EPA, "Congress certainly has not conferred [such] authority upon EPA anywhere … in the Clean Air Act." [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

The Analyses and Assumptions on Which the Proposed Regulatory Actions Are Based Are Arbitrary, Fundamentally Flawed, and Fail to Recognize and Account Properly for the Hugely Negative Consequences that Would Result from These Actions [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

EPA claims that, despite the coercive power and industry-transforming ambition behind its proposals, these rules will somehow deliver a stupendous bounty of net benefits, ranging at the high end from $1.5 trillion to $2.3 trillion for the light-and medium-duty vehicle rule,23 plus another $180 billion to $320 billion for the heavy-duty truck rule.24 [EPA-HQ-OAR-2022-0829-0647, pp. 10-11]

23 Id. at 29200.

24 88 FR at 25937.

Finally, the $1,200-per-vehicle cost figure touted by EPA is simply borrowed and carried over from the EPA's 2021 rulemaking without additional substantive analysis.32 It is not reasonable to assume that the per-vehicle cost of the current proposal for model years 2027 through 2032 would be anywhere close to the same as the estimated cost figure for the 2021 rule covering model years 2023 through 2026 (even if the figure was accurate for the 2021 rule). The current proposal is far more expansive and involves much more draconian reductions in emissions limits. [EPA-HQ-OAR-2022-0829-0647, pp. 13-14]

32 See 86 FR 74434, 74497, https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model-year-light-duty-vehicle-greenhouse-gas-emissions-standards.

The true per-vehicle technology costs of the proposed rules must be far higher than the figure thrown out by EPA. Even accepting the thoroughly implausible "no action" base-line that EPA has posited for future EV sales, EPA is projecting that the regulatory force of the current proposal, considered in isolation, will by itself cause the overall percentage of EV sales nationally to go from 39 percent to 67 percent—a huge increase, nearly a doubling in EV production and sales. Notably, based on EPA's own assumptions, this regulation-forced increase would have to come after all the early adopters have already purchased their EVs. Such an industry-wide transformation in production volumes and sales of EVs to non-early-adopters would involve a massive capital investment and marketing surge, and all the costs associated with that transformation would be attributable to the EPA's administrative rule, if the rule were indeed expected to be the forcing action. [EPA-HQ-OAR-2022-0829-0647, pp. 13-14]

In addition, the comparative lifecycle costs of owning and operating an EV versus an ICE vehicle are not nearly so different as EPA's NPRMs assert. EPA claims huge cost savings for EV owners over ICE owners from the avoided costs of fuel and maintenance and repairs over the life of the vehicle,33 but EPA's analysis fails to include the full costs of owning an EV: [EPA-HQ-OAR-2022-0829-0647, pp. 13-14]

33 See 88 FR at 29200.

EPA also undercounts the cost of electricity charging over the life of the EV. EPA relies on a pricing model that claims to show that electricity prices will somehow not rise significantly in a world where EVs comprise more than half of new cars sold in the U.S., but that claim is wholly unrealistic. Even absent high EV penetration, the Bureau of Labor Statistics reports that electricity prices are steadily rising in the U.S.38 Increased EV charging demand will only cause those prices to rise even faster. Driving a single EV 15,000 miles per year and charging it at home could raise the annual electricity bill for the average family by 50 percent or more.39 If the nation converts to EV ownership at the rates EPA is aiming for, such a large increase in overall electricity demand will inevitably cause electricity rates to rise significantly. [EPA-HQ-OAR-2022-0829-0647, pp. 14-15]

38 See generally https://data.bls.gov/pdq/SurveyOutputServlet (allowing user to generate graph showing the rise from 2003 to the present in the average price of electricity in the U.S.).

39 The Energy Information Agency reports that the average American household uses about 886 kilowatt hours of electricity per month, https://www.eia.gov/tools/faqs/faq.php, and the EPA says the average EV consumes 36 kilowatt hours of electricity per every 100 miles driven, https://www.epa.gov/greenvehicles/comparison-your-car-vs-electric-vehicle. If the family's EV is driven 15,000 miles per year, or 1,250 miles per month, it would consume 450 kilowatt hours of electricity every month.

The EPA's glib premise that car buyers in the U.S. will respond with strong demand for the supposed flood of future EVs (notwithstanding the practical concerns, cost consid-erations, and other uncertainties that surround EVs in the minds of American consumers), is typical of the consistently rosy—almost relentlessly rosy—assumptions about cost factors and consequential risks that underlie all parts of EPA's supporting analysis. [EPA-HQ-OAR-2022-0829-0647, pp. 14-15]

EPA fails to consider the negative societal consequences and second-order cost effects of its proposals. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

In putting forward regulatory proposals designed to force upon the American people a vast and rapid industrial transformation, EPA has an obligation to go further than just considering the direct cost effects of its proposals (which are themselves woefully under-estimated, as highlighted above); it must also consider the broader indirect economic con-sequences and negative societal costs that would follow if these rules are finalized as pro-posed. So far in these rulemakings, the Agency has either ignored or deliberately down-played these second-order effects. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

Some of the most consequential burdens and negative ramifications of the proposed rules that EPA hides, disregards, or minimizes include the following: [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Stifling consumer choice at the dealership. Many of the vehicle models most pop-ular with American families will no longer be sustainable under the EPA's proposed rules. Automobiles have long been America's favorite freedom machines. When the models of ICE vehicles Americans love the most disappear from dealerships, that will represent an enormous drop in consumer welfare (in basic happiness and well-being) for the average American family and for the U.S. economy as a whole. For many of these ICE vehicle models, there is no EV option likely to be available that could provide the same performance, utility, or recreational value at a comparable price (or at all). EPA makes no real effort to quantify this generational loss of con-sumer welfare. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Increasing the purchase price of all new vehicles. Notwithstanding EPA's gaming of the numbers, the true costs of the industrial transformation forced by the EPA's proposed rules will be spread across the automakers' fleets, resulting in a significant increase in the prices of all new vehicles, with greater price increases concentrated on those vehicles for which the demand is highest relative to supply. All Americans will be harmed by these price increases, but the biggest losers will be lower-income Americans who cannot afford to buy an EV or to pay more for a gas-powered vehicle at the dealership, as well as those who live in rural areas and need to drive longer distances and for whom EVs are impractical. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

• Destroying jobs in the U.S. auto industry. The loss of popular new vehicle options and the significant price increases at the dealership will mean that fewer new vehicles will be purchased—almost certainly far fewer than EPA is predicting. This drop-off in demand will challenge the profitability of the auto industry and lead to a loss of jobs for tens of thousands of America's autoworkers, as well as a loss of jobs in the many U.S. companies that supply inputs for the production of auto-mobiles and heavy trucks.40 The United Auto Workers union has warned of the potential for job losses from the transition to EVs,41 as automakers announce more plant closures and layoffs due to the costs of electrification.42 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

40 See Technality, “Ford Just Proved How Far Ahead Tesla Really Is: Profitability May Continue to Be a Struggle for All Legacy Automakers,” May 10, 2023, https://medium.com/tech-topics/ford-just-proved-how-far-ahead-tesla-really-is-6a4d95cff519 (“Despite wanting to be a fully-electric brand by 2035, as of Q4 2022, Ford’s average net margin on the Mustang Mach-E was -40.4%. Unfortunately, that’s a figure that’s only gotten worse since, to the point where Ford is now losing an average of $58,000 for every EV sold.”).

41 See Press statement, United Auto Workers, “UAW Statement on Job Cuts at Stellantis,” April 26, 2023, https://uaw.org/uaw-statement-job-cuts-stellantis.

42 See Michael Wayland, “Stellantis to indefinitely idle Jeep plant, lay off workers to cut costs for EVs,” CNBC.com, December 9, 2022, https://www.cnbc.com/2022/12/09/stellantis-to-idle-jeep-plant-lay-off-workers-to-cut-costs-for-evs.html.

• Causing more deaths and serious injuries on America’s highways. As new vehicle models become unaffordable or unappealing, many American families will be left driving older and older used cars, and the age of the nation’s auto fleet will rise dramatically. Already, the average age of a car on the road in the United States is approaching 13 years, and many cars are on their fifth or sixth owners. The aging of the American fleet has very negative safety consequences, as NHTSA statistics show that older vehicles are much less safe than newer models in an accident.43 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

43 See https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/newer-cars-safer-cars_fact-sheet_010320-tag.pdf.

Straining America’s power grid and raising the price of electricity. EPA pre-tends that its rules will not put a colossal additional strain on our already vulnerable national power grid. But that is fantasy, if the forecasted EV sales actually were to materialize. To accommodate EPA’s future fleet of EVs, our national electric grid capacity would need to grow 60 percent or so by 2030 and much more over the long term,52 and that is growth in infrastructure alone, not in power generation. This buildout is simply not practicable in the timeframe EPA is contemplating.53 Even if it could happen, it will have to be paid for, and those costs will inevitably be reflected in higher electricity rates for all users of electricity across the U.S. and higher EV charging fees in particular. EPA says not to worry about grid reliability— utilities and the government will be able to manage the EV charging draw on the grid by rationing the hours for charging.54 American drivers will not tolerate that. [EPA-HQ-OAR-2022-0829-0647, pp. 18-19]

52 See https://www.energy.gov/policy/queued-need-transmission.

53 See Robert Bryce, “47,300 Gigawatt-Miles from Nowhere,” May 26, 2023, https://robertbryce.substack.com/p/47300-gigawatt-miles-from-nowhere.

54 See 88 FR at 29312.

At the same time that EPA is proposing to force the electrification of the American auto fleet, it has just proposed separate rules under the Clean Air Act aimed at forcing power generators to phase out 90 percent of America’s fossil-fuel-powered electric generating capacity.55 Conveniently for the Agency’s cost accounting estimates, EPA’s newly proposed power plan ignores the extra electricity draw that would be required by EPA’s proposed vehicle rules, and the vehicle rules, in turn, fail to account for the electricity supply crunch that would be caused by EPA’s own power plan—a perfect concert of coordinated regulatory analysis, orchestrated to make the costs on Americans appear lower. [EPA-HQ-OAR-2022-0829-0647, pp. 18-19]

55 See https://www.epa.gov/newsreleases/epa-proposes-new-carbon-pollution-standards-fossil-fuel-fired-power-plants-tackle.

Putting the Highway Trust Fund at risk. The Highway Trust Fund, which covers a large percentage of the costs of state and local highway improvements and main-tenance in the U.S., is currently funded through a gas tax. The gas tax is relatively easy to administer because it is paid at the level of wholesale gasoline and diesel fuel distribution by a small number of large distributors. If more than half of new vehicles sold in the U.S. were EVs, as contemplated in the EPA's proposals, the gas-tax revenues for the Fund would drop dramatically, and the solvency and utility of the Fund would collapse. That would threaten the viability of the national high-way system and the capacity of states to maintain highways in good repair. [EPA-HQ-OAR-2022-0829-0647, p. 19]

If the Fund were to be retained in some form, it would require a new source of revenue, such as a tax on all vehicle miles traveled, or VMT. The idea behind a VMT tax is that it would equitably capture the VMT of EVs, just as well as ICE vehicles. However, a VMT tax is likely to be more complicated and costly to ad-minister than the gas tax. There are significant questions about the design and ad-ministrability of a VMT tax that would need to be worked out and proven—for example, through one or more state-wide pilot programs—before implementation. Since EPA is proposing to adopt rules that would cause a national shift to EVs, which in turn would undermine the revenue basis for the Highway Trust Fund, EPA should recognize and consider as part of these rulemakings the upfront costs and dislocations that would be involved in transitioning to a new revenue basis for the Highway Trust Fund, as well as the ongoing higher costs of administering such an alternative tax. [EPA-HQ-OAR-2022-0829-0647, p. 19]

EPA's benefits analysis is flawed and arbitrary.

On the benefits side of the ledger, EPA claims sky-high monetized benefits from the asserted reductions in carbon dioxide emissions—to the tune of upwards of a trillion dollars.64 These estimates are based on predicted reductions in the amount of gasoline and diesel fuel that would be burned if the U.S. auto fleet converts to EVs at the rates projected by EPA. But they completely ignore the very large increase in carbon dioxide emissions that would necessarily occur from the projected expansion in the production of EV batteries. They also ignore the upstream emissions of carbon dioxide from the increased electricity generation that would be needed to charge the projected fleet of EVs. [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

64 See id. at 29200, 29344.

EPA's refusal to account for these huge offsetting emissions of carbon dioxide fundamentally distorts its analysis of net benefits in a manner that arbitrarily favors the Agency's preferred regulatory outcome. It is, in fact, false and misleading to label EVs "zero-emission vehicles" when the production of EV batteries and the charging of the batteries over the life of the vehicles both generate enormous amounts of carbon dioxide. [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

EPA's projections of benefits from carbon dioxide reductions are primarily based on the so-called "social cost of carbon" models. However, as summarized in analyses pub-lished by my colleague from The Heritage Foundation, Kevin Dayaratna, these models are deeply flawed and unreliable. Among other things, they depend on outdated assumptions and fail to account for the positive agricultural effects of higher carbon dioxide levels. Using more appropriate assumptions, these models would show a social cost of carbon dioxide emissions that effectively approaches zero.65 [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

65 See Kevin D. Dayaratna, "Climate Change, Part IV: Moving Toward a Sustainable Future," Testimony before Subcommittee on Environment Committee on Oversight and Reform, U.S. House of Representatives, September 24, 2020; Kevin Dayaratna and David Kreutzer, Loaded DICE: An EPA Model Not Ready for the Big Game, Backgrounder No. 2860, The Heritage Foundation, November 21, 2013, https://www.heritage.org/environment/report/loaded-dice-epa-model-not-ready-the-big-game; Kevin Dayaratna and David Kreutzer, "Unfounded FUND: Yet Another EPA Model Not Ready for the Big Game," Backgrounder No. 2897, April 29, 2014, http://thf_media.s3.amazonaws.com/2014/pdf/BG2897.pdf; Kevin Dayaratna, Ross McKitrick, and David Kreutzer, "Empirically Constrained Climate Sensitivity and the Social Cost of Carbon," Climate Change Economics, Vol. 8, No. 2 (2017), pp. 1750006-1-1750006-12, https://www.worldscientific.com/doi/abs/10.1142/S2010007817500063; and Kevin Dayaratna, Ross McKitrick, and Patrick Michaels, "Climate sensitivity, agricultural productivity and the social cost of carbon in FUND," Environmental Economics and Policy Studies, 22: 433-448 (2020), https://link.springer.com/article/10.1007/s10018-020-00263-w.

Conclusion

If and when the American people feel the true effects of these rules—when they lose the vehicle options they love at the local dealership and find themselves stuck driving older and less safe cars, when the bottom falls out of the job market in the U.S. auto industry, when drivers cannot find convenient charging stations for their electric vehicles—in sum, when American voters realize what the EPA's far-reaching regulatory enterprise has wrought for the nation, they will be angry. [EPA-HQ-OAR-2022-0829-0647, p. 24]

At issue are matters of life, liberty, and prosperity, and the considerations involved are fundamentally political in nature. That is exactly why, under our constitutional republic, it is for Congress, and Congress alone, to make the monumental decisions that EPA is purporting to take upon itself in these proposed rules. For these reasons, EPA should with-draw its proposed tailpipe rules and reconsider the wisdom of these proposals. [EPA-HQ-OAR-2022-0829-0647, p. 24]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

EPA should consider adding a small bonus for vehicles that have on-board AC bidirectional chargers or are integrated with multiple DC off-board chargers. Alternatively, at minimum, EPA should conduct an analysis on how EPA can advance bi-directional charging in the future. Justification: The promise of bi-directional charging (AC or DC) to address air pollution, GHG and electric grid issues is very significant with BEVs and PHEVS in light-, medium-and heavy-duty vehicles, or off-road equipment. For example, a recent May 2022 presentation by the World Resources Institute using Bloomberg NEF and Energy Information Administration data found the power capacity in 2030 for EVs to be 10 to 20 times more than the 2030 power capacity of stationary storage.8 EPA can and should play a role in helping to unlock this potential. [EPA-HQ-OAR-2022-0829-0646, p. 9]

8 See slide 5 at https://www.slideshare.net/emmaline742/building-resiliency-with-v2g-in-residential-homes-by-camron-gorguinpour

a. For example, the internal combustion engine in a PHEV has a much lower emission signature than a stand-alone, backup generator. [EPA-HQ-OAR-2022-0829-0646, p. 9]

b. Bidirectional charging, like battery stationary energy storage, can reduce GHG and traditional pollutants from fossil fueled power plants by shifting electricity use to renewable energy in the cleanest hours of the day and reducing the need for high-emitting plants (such as traditional peaker power plants). [EPA-HQ-OAR-2022-0829-0646, p. 9]

c. Bidirectional charging can also provide many types of grid services including ancillary services, providing resource adequacy, and helping with the evening transition from renewables to other generation resources. Because the batteries are already paid for by the car and truck owners, utilities can gain a low-cost resource compared to battery stationary storage. [EPA-HQ-OAR-2022-0829-0646, p. 9]

d. The potential value is significant and can contribute to lower operating costs for BEVs and PHEVs.9 [EPA-HQ-OAR-2022-0829-0646, p. 9]

9 California Energy Commission, March 2019, Distribution System Constrained Vehicle-to-Grid Services for Improved Grid Stability and Reliability, Figure 42

While we understand the desire by EPA to simplify the regulation and reduce the use of bonus multiplier credits, we believe a small bonus credit in the final regulation for a few years is justified and needed to unlock this technology because of the large emission reduction benefits and other benefits enabled by bidirectional charging. [EPA-HQ-OAR-2022-0829-0646, p. 9]

Organization: Tesla, Inc.

Utility Rate Design Reform Will Spur Greater Infrastructure Investment

Additionally, utility investment in grid infrastructure to support EV charging will accrue over the next several years, as evidenced by active proceedings in many jurisdictions.208 As part of this investment, addressing utility demand charges will also play a role in facilitating the expansion of charging infrastructure.209 The combination of low load factors with high demand charges can result in uneconomic operation of charging stations and stymies investment in charging infrastructure in otherwise promising markets where electrification is growing. EPA should recognize that this issue is changing with many utilities now proposing or already having implemented novel approaches to mitigate the impact of demand charges and encouraging time of use rates to facilitate further proactive investments in charging infrastructure.210 Moreover, since BEV charging stations are large upfront investments assessed over a long-time horizon, the longer-term certainty provided in many of these rate reform proceedings will drive greater infrastructure investment. A number of utility proceedings have already addressed these issues including the following: [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

208 See e.g., New York State Department of Public Service, Proceeding on Motion of the Commission Regarding Electric Vehicle Supply Equipment and Infrastructure, Case No. 18-E-0138 available at h ttps://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-E-0 138&CaseSearch=Search

209 See, Alliance for Transportation Electrification, Rate Design for DC Fast Charging: Demand Charges (May 2022) available at h ttps://evtransportationalliance.org/wp-content/uploads/2022/06/Rate.Design.TF_.Demand-Charge-Paper-Final-2.pdf

210 Utility Dive, With looming EV load spikes, PG&E, Duke, other utilities adopt new rate design and cost recovery strategies (Apr. 18, 2023) available at h ttps://www.utilitydive.com/news/electric-vehicle-load-spikes-pge-duke-sce-entergy-aps-d ynamic-rate-design-reduced-demand-c

harges/646603/?utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:%202023-04-21%20Utility%20Dive%20Newsletter%20%5Bissue:49850%5D&utm_term=Utility%20Dive

-Illinois Commerce Commission Docket No. 20-0170 – In the Matter of Ameren Illinois Company d/b/a Ameren Illinois's Proposed Creation of Rider Optional Vehicle Charging Program ("Rider EVCP"). [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

-Oregon Public Utilities Commission Docket No. UE 374 – In the Matter of Pacificorp d/b/a Pacific Power Request for a General Rate Revision [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

-New Jersey Board of Public Utilities Docket No. EO18101111 – In the Matter of the Petition of Public Service Electric and Gas Company for Approval of its Clean Energy Future – Electric Vehicle and Energy Storage ("CEF-EVES") Program on a Regulated Basis [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

-Colorado Public Utilities Commission Proceeding No. 21AL-0494E – In the Matter of Advice No. 1867-Electric Filed by Public Service Company of Colorado to Revise Its PUC No. 8-Electric Tariff and to Add Schedule S-EV-CPP and Implement Changes to Schedules S-EV, EVC, and TEPA, to be Effective on Thirty-Days' Notice [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

-Massachusetts Department of Public Utilities Docket # 21-90 – Petition of NSTAR Electric Company d/b/a Eversource Energy for approval of its Phase II Electric Vehicle Infrastructure Program and Electric Vehicle Demand Charge Alternative Proposal [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

-Illinois Commerce Commission Docket No. 22-0432 Petition for Approval of Beneficial Electrification Plan under the Electric Vehicle Act, 20 ILCS 627/45 and New EV Charging Delivery Classes under the Public Utilities Act, Article IX [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

-New York PSC's Case No. 22-E-0236 Proceeding to Establish Alternatives to Traditional Demand-Based Rate Structures for Commercial Electric Vehicle Charging. [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

Additional proceedings addressing these issues will help further facilitate investment and deployment of charging infrastructure, supporting the agency's adoption of a more ambitious light-duty standards. [EPA-HQ-OAR-2022-0829-0792, pp. 32-33]

Organization: Texas Public Policy Foundation (TPPF)

As if that weren't enough, electric vehicles are especially susceptible to damage from flooding and hurricanes. When the grid goes down, those who own electric vehicles will be left at the mercy of the elements, trapped and unable to flee disaster due to the inability to reliably recharge their cars and trucks. And should they survive but their cars take on water, it is likely that the vehicles will catch on fire without warning due to corrosion from saltwater. See Jen Frost, Florida's electric vehicles are catching fire after Hurricane Ian, INSURANCE BUSINESS (Nov. 4, 2022), https://www.insurancebusinessmag.com/us/news/auto-motor/floridas-electric-vehicles-are-catching-fire-after-hurricane-ian-426452.aspx. [EPA-HQ-OAR-2022-0829-0510, pp. 6-7]

In sum, implementing the emission limitations mandated by the LMD Tailpipe Rule will require a massive, nationwide overhaul of our electrical grid and refueling network. By regulating in this manner, the EPA will make driving and daily living more expensive and difficult. [EPA-HQ-OAR-2022-0829-0510, pp. 6-7]

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

We know that these effects are serious and costly. Some states, such as California and Texas, have experienced many brownouts and blackouts in recent years as the existing electric grid cannot meet existing demand. Few new net sources of electricity generation are coming online. Electricity is not a fully reliable source of energy in these states. Moreover, it is becoming increasingly expensive. Pacific Gas and Electric has advised its customers that the average electricity bill will be $187 a month as of March 1, 2023, and increase of 5% from January 1, 2023. Over the past two years rates have risen by almost a third.6 Upper-income residents can afford backup generators to deal with blackouts, but poor and middle-income residents cannot. Food spoils in their refrigerators and their children cannot do homework without electricity for lights and computers. [EPA-HQ-OAR-2022-0829-0674, p. 3]

6 California Public Utilities Commission, Rate Change Advisories, https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-rates/rate-change-advisories (accessed April 30, 2023).

Electric vehicles are not emissions free. In addition to batteries made with fossil fuels, increased electricity demand places additional stress on the electrical grid, as California has found out from rolling blackouts. In its proposal, EPA discusses the benefits of reducing pollutants from cars,19 but higher emissions will come from the electricity generated to recharge the cars. This electricity is made with natural gas and coal, because wind and solar powers a small share of America's power. EPA admits that "We expect that in some areas, increased electricity generation would increase ambient SO2, PM 2.5, ozone, or some air toxics."20 [EPA-HQ-OAR-2022-0829-0674, p. 5]

19 U.S. Environmental Protection Agency. "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." Federal Register, 5 May 2023, www.federalregister.gov/documents/2023/05/05/2023-07974/multi-pollutant-emissions-standards-for-model-years-2027-and-later-light-duty-and-medium-duty (accessed June 20, 2023).

20 Ibid., p. 48.

Organization: The Mobility House et al.

While this development was troublesome for the EV industry, there were also clear implications for electric grid resilience following natural disasters. In spring 2022, the Biden Administration took the remarkable step of activating the Defense Production Act (DPA), deeming the shortage a national security threat and giving the Department of Energy temporary power to influence manufacturing of grid components in an attempt to increase supply. This was before the federal government's historic investment in transportation electrification via the Infrastructure Investment and Jobs Act and later the Inflation Reduction Act set timetables for deployment of electric school buses, electric transit buses, and a nationwide network of high-powered direct current chargers for fast refueling on highways, all of which will require unprecedented construction using the same components that were already in dangerously short supply. Congress has declined to fund the DPA activation, making it far less likely that the

United States can manufacture its way out of this situation. [EPA-HQ-OAR-2022-0829-0657, p. 1]

We, the undersigned businesses and organizations support the Biden Administration's new EV emissions standards as proposed. As leaders in transportation electrification, vehicle-grid integration, and power control systems (PCS) implementation, the signatories are uniquely positioned to recognize not only the significance of the Environmental Protection Agency's (EPA's) new proposals, but also the context in which they are made. We urge the EPA and other implementing agencies to prioritize strategies to enable use of PCS to facilitate coherent and efficient secondary and primary upgrade planning. [EPA-HQ-OAR-2022-0829-0657, p. 1]

As a result of industrial consolidation and pandemic-related supply chain disruption in 2020 and 2021, companies engaged in site development for electric vehicles (EVs) watched wait times for switchgear, and thus for site energization, extend from a standard eight weeks to fifty-two weeks. It became apparent in 2021 that transformers, switchgear, and even copper and aluminum for electric lines were increasingly scarce. [EPA-HQ-OAR-2022-0829-0657, p. 1]

While this development was troublesome for the EV industry, there were also clear implications for electric grid resilience following natural disasters. In spring 2022, the Biden Administration took the remarkable step of activating the Defense Production Act (DPA), deeming the shortage a national security threat and giving the Department of Energy temporary power to influence manufacturing of grid components in an attempt to increase supply. This was before the federal government's historic investment in transportation electrification via the Infrastructure Investment and Jobs Act and later the Inflation Reduction Act set timetables for deployment of electric school buses, electric transit buses, and a nationwide network of high-powered direct current chargers for fast refueling on highways, all of which will require unprecedented construction using the same components that were already in dangerously short supply. Congress has declined to fund the DPA activation, making it far less likely that the United States can manufacture its way out of this situation. [EPA-HQ-OAR-2022-0829-0657, p. 1]

On page 5-35 of its draft regulatory impact assessment, EPA recognizes that successful implementation of the new proposed emissions standards will likely lead to increased distribution upgrades. EPA then goes on to note that PCS may mitigate the need for infrastructure upgrades for a range of use cases. While we acknowledge that new distribution infrastructure will be necessary, we agree with EPA that acknowledging the ability of PCS to tap the inherent flexibility of many EV charging use cases will insert much-needed efficiency into EV-related distribution grid planning and buildout processes in the United States. [EPA-HQ-OAR-2022-0829-0657, p. 1]

The signatories of this letter represent a small subset of the universe of companies implementing PCS across market segments and use cases. This class of technologies includes both hardware and software solutions applicable across light, medium, and heavy-duty EV models in the residential, commercial, and fleet segments. PCS can facilitate a number of flexible use-cases, including but not limited to a combination of EV loads with co-sited solar and storage resources, use of batteries to mitigate EV load, intelligent scheduling of networked chargers to minimize aggregate load, batteries integrated into the chargers themselves, home energy management systems, new advanced electrical panels, price-responsive charging, bi-directional charging, enabling communications standards, and new metering technologies. PCS technologies are widely available but have historically been under-utilized as a means of minimizing grid impacts of new loads and integrating EVs to the grid. Simply put, efficiency in these areas was generally not necessary. Now, however, minimization, deferral, or planned phasing of upgrades based on use of PCS is increasingly enabling customers to subtract years from their project energization timeframe or save a project that would have been unable to proceed if a full-nameplate upgrade were required. [EPA-HQ-OAR-2022-0829-0657, pp. 1-2]

Organization: Transfer Flow, Inc

Electric Vehicles require the ramp-up of many new electricity-generating power plants to provide enough power to charge all the projected electric vehicles, and then those electricity-generating power plants must rely heavily on carbon capture technologies to keep the emissions from these electricity-generating power plants out of the atmosphere. Current carbon capture technologies are experimental and may prove dangerous.22 [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

22 https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f

In many places, such as rural environments or for use in utility vehicles, electric vehicles are not a practical solution. Utility companies working on phone lines, power lines, and performing construction work all need reliable power sources that can be used for transporting people and powering equipment, as well as function when the electric power grid may be in need of repair. Electric vehicles do not have a network in remote areas or the energy density to effectively transport and power auxiliary equipment needed to, among other functions, install or perform repairs to electric power lines. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

Pacific Gas and Electric (PG&E), two years after the historical Dixie Fire, is still powering affected Californians with diesel-powered generators as the infrastructure required to bring electricity into homes has still not been rebuilt. Citizens living in these affected areas would need to charge electric vehicles using electricity created from diesel generators, and the logistics of that simply do not make sense. [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

Organization: Travis Fisher

Specifically, the EPA's DRIA regarding the impact of the Proposed Rule on the cost and reliability of electricity in the U.S. is gravely flawed. It should be redrafted to enable the EPA Administrator to give appropriate consideration to the cost and safety factors of the Proposed Rule, as required by section 202 of the Clean Air Act.1 Further, the DRIA should address the interactions between the Proposed Rule and other EPA rules—including the recently proposed rule on greenhouse gas emissions from power plants2—as required by Executive Order 12866.3 As written, the Proposed Rule: [EPA-HQ-OAR-2022-0829-0655, p. 1]

1 42 U.S.C. § 7521, https://www.law.cornell.edu/uscode/text/42/7521.

2 New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 FR 33240; May 23, 2023. Available at: https://www.federalregister.gov/documents/2023/05/23/2023-10141/new-source-performance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed (accessed July 2, 2023).

3 Executive Order 12866, Regulatory Planning and Review, 58 FR 51735; October 4, 1993. Available at: https://www.archives.gov/files/federal-register/executive-orders/pdf/12866.pdf (accessed July 2, 2023).

1. Violates section 202 of the Clean Air Act by failing to adequately consider:

A. Impaired bulk power system reliability and

B. Increased retail electricity prices;

2. Does not comply with Executive Order 12866; and

3. Violates the Unfunded Mandates Reform Act. [EPA-HQ-OAR-2022-0829-0655, p. 1]

A. THE PROPOSED RULE FAILS TO ADEQUATELY CONSIDER IMPAIRED BULK POWER SYSTEM RELIABILITY

The reliability of the electric grid is a matter of public health and safety. The connection between access to reliable electric power and public health and safety is well established: blackouts are a safety hazard worthy of the Administrator's consideration.5 As one recent example, hundreds of lives were lost during Winter Storm Uri in February 2021 due to a lack of reliable electricity supplies during a long-lasting extreme cold weather event.6 EPA should avoid contributing to such losses in the future. Unfortunately, because EPA unreasonably assumed the Proposed Rule will have no reliability impacts, it failed to consider the risks to human health stemming from unreliable electricity among the many issues discussed in Chapter 7 of the DRIA (Health and welfare impacts). [EPA-HQ-OAR-2022-0829-0655, p. 2]

5 Power Outages and Community Health: A Narrative Review, available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7749027/ ("The existing literature suggests that power outages have important health consequences ranging from carbon monoxide poisoning, temperature-related illness, gastrointestinal illness, and mortality to all-cause, cardiovascular, respiratory, and renal disease hospitalizations, especially for individuals relying on electricity-dependent medical equipment.")

6 See: https://comptroller.texas.gov/economy/fiscal-notes/2021/oct/winter-storm-impact.php (accessed July 2, 2023).

The Proposed Rule was issued after many serious warnings of supply shortfalls in the U.S. electricity system. PJM Interconnection, Inc. (PJM), the largest regional transmission organization in the U.S., has warned federal policymakers about the rapid retirement of generation resources. PJM notes: [EPA-HQ-OAR-2022-0829-0655, pp. 2-3]

Historically, thermal resources have provided the majority of the reliability services in PJM. Today, a confluence of conditions, including state and federal policy requirements, industry and corporate goals requiring clean energy, reduced costs and/or subsidies for clean resources, stringent environmental standards, age-related maintenance costs, and diminished energy revenues are hastening the decline in thermal resources.7 [EPA-HQ-OAR-2022-0829-0655, pp. 2-3]

7 Energy Transition in PJM: Resource Retirements, Replacements & Risks. February 24, 2023. Available at: https://www.pjm.com/-/media/library/reports-notices/special-reports/2023/energy-transition-in-pjm-resource-retirements-replacements-and-risks.ashx (accessed July 2, 2023) (emphases added).

The following figure illustrates forecast retirements in PJM, of which policy-driven retirements comprise the majority. The total expected closures—40 GW—represent 21 percent of PJM's installed generating capacity. Taken together, the suite of EPA regulations already impacting the supply side of the electricity sector poses a significant threat to the reliable operation of the nation's bulk power system. [EPA-HQ-OAR-2022-0829-0655, pp. 2-3]

[See original for graph titled "Retirement Capacity (GW ICAP)] [EPA-HQ-OAR-2022-0829-0655, pp. 2-3]

The North American Electric Reliability Corporation (NERC), which is the organization responsible for establishing mandatory reliability standards, is also sounding alarms. In its most recent Long Term Reliability Assessment (LTRA), NERC highlighted the significant grid reliability problems facing the United States in the near term. The LTRA states that "[w]ithin the 10-year horizon, over 88 GW of generating capacity is confirmed for retirement."8 Speaking to the press about the report, John Moura, NERC's director of reliability assessment and performance analysis, said "[w]e are living in extraordinary times, from an electric industry perspective. There are extraordinary reliability challenges and opportunities in front of us."9 [EPA-HQ-OAR-2022-0829-0655, p. 3]

8 2022 Long-Term Reliability Assessment. NERC. December 2022. Available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf (accessed July 2, 2023).

9 Most of US electric grid faces risk of resource shortfall through 2027, NERC finds. Utility Dive. December 16, 2022. Available at: https://www.utilitydive.com/news/nerc-grid-resource-adequacy-shortfall-reliability-assessment/638949/ (accessed July 2, 2023).

In May of this year, NERC released its Summer Reliability Assessment, which warned that "two-thirds of North America is at risk of energy shortfalls this summer during periods of extreme demand." Figure 1 from NERC's 2023 Summer Reliability Assessment shows the regions of the country that face an elevated risk of supply shortfalls this year.10 [EPA-HQ-OAR-2022-0829-0655, pp. 3-5]

10 2023 Summer Reliability Assessment, page 6. NERC. May 2023. Available at: https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2023.pdf.

[See original for graphic titled "Figure 1: Summer Reliability Risk Area Summary"]

These risks are well known. NERC has been warning about the speed of the energy transition for years, largely from the perspective of the changing supply resource mix. However, more recently, NERC has set up working groups to help maintain the reliability of the bulk power system under increased penetration of plug-in electric vehicles (PEVs). Earlier this year, NERC CEO Jim Robb said "As the electrification of the transportation sector continues to grow, the North American grid must be prepared. … Collaboration, innovation, and information sharing are critical if we are to be able to meet future demands successfully."11 [EPA-HQ-OAR-2022-0829-0655, pp. 3-5]

11 Cross-Sector Collaboration: Addressing the Potential Challenges from Electric Vehicle Grid Impacts, available at: https://www.nerc.com/news/Headlines%20DL/CMC%20EV%20Grid%20Reliability%20Working%20Group%20Re port%20Press%20Release_11APRIL23.pdf.

EPA should be involved in NERC working groups in order to base its rulemakings in sound science and to fully consider the safety impacts of its rules. Given the requirement in section 202 of the Clean Air Act that the Administrator consider safety factors, EPA should not move forward with a final rule (or a new proposed rule) until it reaches a better understanding of

NERC's warnings, including NERC's concerns about distribution-connected inverter-based resources like PEVs.12 [EPA-HQ-OAR-2022-0829-0655, pp. 3-5]

12 White Paper: BPS-Connected Inverter-Based Resource Priorities. NERC Task Force on Inverter-Based Resources. June 2020. Available at: https://www.nerc.com/comm/PC/InverterBased%20Resource%20Performance%20Task%20Force%20IRPT/IRPTF_Priorities_June_2020.pdf

NERC's elevated risk scenario is for this summer, meaning reliability challenges are already here. Hence any EPA proposal—including the Proposed Rule—to force an increase in demand or a decrease in supply will further weaken an already fragile state of grid reliability. The Proposed Rule creates a new safety hazard by forcing a rapid increase in electricity demand from PEVs amid an extraordinary and worsening supply crisis. The DRIA notes this tension but ultimately makes no adverse finding in Chapter 11 (Energy Security Impacts): [EPA-HQ-OAR-2022-0829-0655, p. 5]

It is difficult to assess the combined effects of higher demand for electricity from PEVs, increasing extreme weather events in the context of climate change, and the greater use of variable supply technologies, such as wind/solar power, on electricity grid reliability and resiliency issues in the U.S. In part, this is because there is little experience to assess the impacts of significant PEV use on U.S. electric grid reliability and resiliency.13 [EPA-HQ-OAR-2022-0829-0655, p. 5]

13 DRIA at 11-14 (PDF page 603).

Although it is true that EPA has little experience in assessing the impacts of increased PEV penetration, that is precisely why EPA should work more closely with grid experts before moving forward in this docket. [EPA-HQ-OAR-2022-0829-0655, p. 5]

Chapter 5 (Electric Infrastructure Impacts) of the DRIA makes similar findings regarding a lack of impact, but, in doing so, reveals a fundamental misunderstanding of the role of the Federal Energy Regulatory Commission (FERC). FERC is the federal agency responsible for ensuring the reliability of the bulk power system (and approving the mandatory standards drafted by NERC), and its authority lies at the transmission level. However, the DRIA states that EPA staff "consulted with FERC staff on distribution system reliability and related issues."14 If that is true, EPA staff talked to the wrong agency about the distribution system. Further, it is alarming that EPA staff seem unaware that FERC has no jurisdiction over the reliability of the distribution system. [EPA-HQ-OAR-2022-0829-0655, p. 5]

14 DRIA at 5-38 (PDF page 380).

The DRIA also misidentifies NERC as the "National Electricity Reliability Corporation." (As defined above, NERC is short for the North American Electric Reliability Corporation.) These mistakes in the DRIA indicate a lack of familiarity with the topic area and a fundamental misunderstanding of the role of FERC and NERC in overseeing the reliability of the bulk power system. If EPA moves forward with a final rule, it should explain the extent to which EPA staff have consulted with FERC and NERC regarding the Proposed Rule's impact to the reliability of the bulk power system. Absent better coordination and information sharing, it is impossible for the EPA Administrator to give "appropriate consideration" to the electric reliability impacts of the Proposed Rule as he is required to do under section 202 of the Clean Air Act. [EPA-HQ-OAR-2022-0829-0655, p. 5]

B. THE PROPOSED RULE FAILS TO ADEQUATELY CONSIDER INCREASED RETAIL ELECTRICITY PRICES

The Retail Price Model (RPM) and Integrated Planning Model (IPM) cited in the DRIA contain fundamental errors that allow EPA to claim the rule will not increase retail electricity prices. EPA's modeling is opaque, but upon close inspection it appears to selectively rely on business-as-usual scenarios for some inputs and altered assumptions in others. Taken together, EPA's electricity price modeling in the DRIA yields significantly flawed results and does not enable reasoned decision-making by the Administrator. [EPA-HQ-OAR-2022-0829-0655, p. 6]

First, the DRIA violates the law of supply. An outward shift in the demand curve for electricity will increase prices because the new, higher demand intersects the supply curve at a higher price point. This phenomenon is well established in the economics literature, and a specific application of the impact of increasing demand on wholesale electricity prices is outlined in detail in a tutorial by the New England Independent System Operator (see figure below).15 This effect holds regardless of the time of day a PEV user decides to charge the vehicle. [EPA-HQ-OAR-2022-0829-0655, p. 6]

15 See https://www.iso-ne.com/about/what-we-do/in-depth/how-resources-are-selected-and-prices-are-set (accessed July 2, 2023).

[See original for graph titled "Supply Stack"] [EPA-HQ-OAR-2022-0829-0655, p. 6]

Astonishingly, the DRIA states that "[r]egional average retail electricity price differences showed small increases or decreases (less than approximately 1 to 2 percent),"16 meaning that EPA's model violates the law of supply. In no case should a rule that forces the rapid electrification of the transportation fleet—which represents a large increase in the demand for electricity—cause a reduction in prices. This observation alone is enough to require EPA to rework its modeling. [EPA-HQ-OAR-2022-0829-0655, p. 6]

16 DRIA at 5-15 (PDF page 357) (emphasis added).

Second, the RPM states that the "models use generation-related outputs from an IPM-modeled scenario together with T&D and other cost projections and assumptions from EIA's AEO Reference Case to estimate the retail price of electricity."17 This is unreasonable because the increased T&D (transmission and distribution) costs of the Proposed Rule are not captured in the Energy Information Administration's Annual Energy Outlook Reference Case. That case is used as a baseline and should apply only to the "no-action" case analyzed in the DRIA. The Proposed Rule would certainly cause distribution costs to increase because PEVs require substantial and costly upgrades. For example, a recent report prepared for the California Public Utilities Commission "estimates up to $50 billion in traditional electricity distribution grid infrastructure investments by 2035."18 The Proposed Rule could also cause an increase in transmission costs if the demand increased triggered by the Proposed Rule necessitates an expansion of the transmission system. [EPA-HQ-OAR-2022-0829-0655, p. 7]

17 Documentation of the Retail Price Model, page 1. Available at: https://www.epa.gov/sites/default/files/2019-06/documents/rpm_documentation_june2019.pdf.

18 Electrification Impacts Study Part 1: Bottom-Up Load Forecasting and System-Level Electrification Impacts Cost Estimates. May 2023. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M508/K423/508423247.PDF

Finally, EPA's retail price estimates do not account for the loss in electricity supply resources caused by EPA rules. The DRIA should cross-reference the EPA rules impacting generating resources and rework the electricity price estimates after taking into account the reasonably foreseeable power plant closures caused by its own rules (see Section 1.A of this comment). [EPA-HQ-OAR-2022-0829-0655, p. 7]

Principle 6 states:

"Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs." [EPA-HQ-OAR-2022-0829-0655, pp. 7-8]

EPA fails to comply with Principle 6 because it has not undertaken a reasonable assessment of the cost of the Proposed Rule. As discussed above, EPA does not fully account for the Proposed Rule's impacts on the electricity system, which include increasing the cost of electricity and harming electric grid reliability. [EPA-HQ-OAR-2022-0829-0655, pp. 7-8]

Principle 7 states:

"Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation." [EPA-HQ-OAR-2022-0829-0655, p. 8]

EPA fails to comply with Principle 7 because, as detailed above, it has not availed itself of the ample scientific and technical information—well known and published by leading sources such as NERC, FERC, and PJM—regarding the consequences of EPA regulations on the cost and reliability of the electricity system. [EPA-HQ-OAR-2022-0829-0655, p. 8]

Principle 8 states:

"Each agency shall identify and assess alternative forms of regulation and shall, to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt." [EPA-HQ-OAR-2022-0829-0655, p. 8]

EPA fails to comply with Principle 8 because the Proposed Rule is a de facto mandate for PEVs. Much like the unlawful Clean Power Plan,23 the thrust of the Proposed Rule is to force a shift away from internal combustion engine vehicles and toward PEVs. Indeed, the performance objectives outlined in the Proposed Rule are only viable if the regulated entities—drivers in the U.S.—behave as specified by EPA. [EPA-HQ-OAR-2022-0829-0655, p. 8]

23 See https://archive.epa.gov/epa/cleanpowerplan/clean-power-plan-existing-power-plants-regulatory-actions.html (accessed July 2, 2023).

Principle 10 states:

"Each agency shall avoid regulations that are inconsistent, incompatible, or duplicative with its other regulations or those of other Federal agencies." [EPA-HQ-OAR-2022-0829-0655, p. 9]

EPA fails to comply with principle 10 because, as outlined in the section on electric grid reliability above, the Proposed Rule is incompatible with the suite of existing and new EPA regulations that are forcing a large reduction in electricity supply. Although a minor conflict with an obscure rule from a different agency might be forgivable, EPA's Proposed Rule unreasonably conflicts with a concurrent proposed rule issued by EPA—the Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants, issued in May of 2023.24 In fact, it appears that the DRIA fails to reference or otherwise acknowledge the power plant rule. [EPA-HQ-OAR-2022-0829-0655, p. 9]

> 24 New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 FR 33240; May 23, 2023. Available at: https://www.federalregister.gov/documents/2023/05/23/2023-10141/new-source-performance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed (accessed July 2, 2023).

If the EPA moves forward with a final rule, it should explain why it finds that the federal mandates included in the Proposed Rule would not significantly affect State, local, or Tribal governments. As drafted, the Proposed Rule does not detail how it has satisfied the above procedural requirements of the UMRA and does not indicate that the EPA has undertaken the required analysis of the impacts on states and local governments and tribes of compliance with the Proposed Rule. For example, some electric utilities are owned and operated by State, local or Tribal governments.27 The Proposed Rule will significantly impact the cost of the distribution systems of those publicly owned utilities, and the DRIA should be amended to evaluate the extent of the cost increases and the impact of the Proposed Rule on the budgets of State, local or Tribal governments. [EPA-HQ-OAR-2022-0829-0655, pp. 9-10]

> 27 Navigating the EV Market: Trends and Changes for Public Power to Know. American Public Power Association. Available at: https://www.publicpower.org/system/files/documents/Navigating-the-Electric-Vehicle-Market.pdf (accessed July 2, 2023).

Organization: U.S. Chamber of Commerce

-Impacts on grid reliability and resiliency. The electric grid will be called upon to handle increased demand during its own period of transition. By EPA's own estimates, deployment of EVs as envisioned by the proposed rule would increase power demand by 114 terawatt-hours (2.25 percent) nationwide by 2035. Some geographic regions and subregions will experience higher changes on a percentage basis, and as EPA notes in the proposed rule, EV charging will result in "large and abrupt electricity demand peaks" during certain periods of the day. This presents a major challenge for an electricity system that is now facing its most difficult reliability challenges in decades, and in which an already accelerated loss of existing dispatchable generating capacity could be exacerbated by EPA's concurrently proposed rule targeting these same types of electric generating facilities. The Chamber urges EPA to undertake thorough analysis of the impact of recent and forthcoming regulations and other policies on the cost and feasibility of this proposal. [EPA-HQ-OAR-2022-0829-0604, p. 3]

Organization: United Steelworkers (USW)

EPA only models for BEVs, even though our nation's electric grid is far from ready for the energy transition.8 America's electric grid will be sorely challenged by the need to deliver clean power to BEVs. Even today, the electric grid barely functions in times of ordinary stress, and fails altogether too often for comfort, as widespread blackouts in California, Texas, Louisiana, and other states have shown.9 Problems ranging from grid congestion to age of transmissions to demand for electric cannot be addressed overnight even with investments from the IRA and IIJA. EPA must work with DOE and other relevant departments and agencies to understand current bottlenecks, and the additional strain that a high percentage of BEVs would have on our electric grid. [EPA-HQ-OAR-2022-0829-0587, p. 5]

8 The New York Times, (Link: https://www.nytimes.com/interactive/2023/06/12/climate/us-electric-grid-energy-transition.html) "Why the U.S. Electric Grid Isn't Ready for the Energy Transition", June 12, 2023.

9 The Washington Post, (Link: https://www.washingtonpost.com/business/2021/10/13/electric-vehicles-grid-upgrade/) "Plug-in cars are the future. The grid isn't ready", October 16, 2021.

Organization: Valero Energy Corporation

Although EPA acknowledges that upgrades to electricity distribution systems may be required to meet the charging loads associated with EVSE, it immediately dismisses the costs, explaining that [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

"EPA acknowledges that there may be additional infrastructure needs and costs beyond those associated with charging equipment itself. While planning for additional electricity demand is a standard practice for utilities and not specific to PEV charging, the buildout of public and private charging stations (particularly those with multiple high-powered DC fast charging units) could in some cases require upgrades to local distribution systems. For example, a recent study found power needs as low as 200 kW could trigger the need to install a distribution transformer while a load of 5 MW or more could require upgrades to feeder circuits or the addition of a feeder breaker."9 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

9 DRIA at 5-34 to 5-35.

"There is considerable uncertainty associated with future distribution upgrade needs as well as with the uptake of the technologies and approaches discussed above that could reduce upgrade costs, and we do not model them directly as part of our infrastructure cost analysis."10 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

10 DRIA at 5-36.

Regardless of who is paying, upgrades to electrical infrastructure are real impacts associated with EVSE installation and come with real costs. In their EV Infrastructure Deployment Plans, several states quantify the cost of electrical system upgrades needed to accommodate EVSE, including: [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

- Idaho cites that "charging stations installed with NEVI formula funds must be able to provide a power output of at least 600kW. In Idaho, most NEVI sites will require transformer upgrades. Additional improvements such as installing new feeder lines and completing substation upgrades also may be needed. At the very least, new electrical upgrades for a new transformer cost approximately $20-30,000."11 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

11 Idaho Transportation Department, "2022 State of Idaho Electric Vehicle Infrastructure Baseline Plan" at 38 (August 1, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/id_nevi_plan.pdf.

- Indiana cites that "Utilities estimated investment between $50,000 to $125,000 to serve 600kW per station with locations requiring significant system upgrades totaling greater than $1 million. Upgrades could include new transformers, trenching, concrete/asphalt work, conduit, underground vaults, new conductor, and other miscellaneous equipment to serve the DCFC. Respondents expressed they would not deny an installation from proceeding. However, as expressed above, costs may be prohibitive for the prospective customer at certain locations."12 [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

12 Indiana Department of Transportation, "Indiana Electric Vehicle Infrastructure Deployment Plan" at 37 (July 29, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/in_nevi_plan.pdf.

These utility costs may not be borne solely by individual customers; in some cases, these costs will ultimately be passed on to ratepayers. EPA fails to acknowledge these costs and fails to assess the cumulative cost burden resulting from the concurrent increase in electrical demand resulting from implementing the proposed LMD vehicle rule in the same time frame it seeks to force electrification of the heavy-duty vehicle fleet. [EPA-HQ-OAR-2022-0829-0707, pp. 1-3]

E. EPA does not adequately consider potential grid reliability impacts.

As part of its evaluation of potential economic impacts to the welfare of Americans and businesses, EPA must assess grid reliability impacts stemming from the proposed rule's forced electrification of the LD and MD transportation sector. Reliance on BEVs may have unintended, negative consequences, especially in relation to the electricity generation sector. In addition, EPA needs to accurately predict the number of additional chargers that will be needed to support the anticipated BEV population. At present, charging infrastructure is inadequate to meet the country's transportation needs.227 [EPA-HQ-OAR-2022-0829-0707, pp. 41-42]

227 See JD Power, "2023 U.S. Electric Vehicle Consideration (EVC) Study," June 15, 2023, and JD Power, "2023 U.S. Electric Vehicle Experience (EVX) Home Charging Study," March 16, 2023.

1. EPA's analysis of grid impacts and electrical reliability is unrealistic.

ZEV mandates like the proposed rule also present significant risks to grid reliability and the stability of the transportation sector, yet EPA's analysis of electrical grid impacts is weak. [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

- EPA expects that the proposed standards will drive an increase in electricity demand and generation across the U.S.228 [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

- EPA estimates an increase in electricity consumption in response to this proposal of 2 Terawatt-hours (TWh) in 2028 (a 0.04 percent increase), 18 TWh in 2030 (a 0.39 percent increase), 114 TWh in 2035 (a 2.25 percent increase), 195 TWh in 2040 (a 3.52 percent increase) and 252 TWh in 2050 (a 3.92 percent increase)."229 [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

- EPA does not expect grid reliability to be adversely affected by this increase in electricity demand and generation, as long as charging behavior is carefully managed.230 This begs the question who would manage charging behavior, by what authority, and based on what standards or criteria. In the absence of any specific and credible information about how charging behavior will be managed, it is unreasonable for EPA to assume that it will be. [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

- In its analysis of electric grid reliability, EPA refers to a 25% increase in electrical demand that occurred over 1992 to 2021 and concludes that since the increase in demand occurred “without any adverse effects on electric grid reliability or electricity generation capacity shortages,” “grid reliability is not expected to be adversely affected by the modest increase in electricity demand associated with electric vehicle charging.”231 However, this glib assessment overlooks the vast increase in inexpensive natural gas occurring during this period which made it possible to meet the increased demand without compromising reliability. It also overlooks the potential impacts to electrical grid costs and reliability from EPA’s recently proposed New Source Performance Standards for GHG emissions from power plants.232 [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

228 EPA’s Multi-Pollutant LMDV Proposal at 29311.

229 DRIA at 11-14.

230 DRIA at 11-14 to 11-17.

231 EPA’s Multi-Pollutant LMDV Proposal at 29311.

232 88 Fed. Reg. 33240 (May 23, 2023).

Considering the regional and temporal nature of the PEV charging load, the recent trends of seasonal strain on grid reliability, and the increasing replacement of baseload generation with intermittent renewable sources, EPA’s comparison to a national trend occurring over the past three decades is not relevant or meaningful. [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

EPA also acknowledges that “PEVs can pose challenges for electricity supply reliability if PEV charging is not coordinated.”233 EPA references efforts by California, public and private electrical utilities, major automakers, EV charging companies, and other organizations to demonstrate “the ability of U.S. electric utilities to reschedule up to 20 percent of electric vehicle charging loads occurring at any hour of the day to any other hour of the day,”234 and concludes that since the expected increase in electric power demand from PEV charging is less than 20%, “we do not anticipate it to pose grid reliability issues.”235 With this statement, EPA blithely disregards the regional variations in expected PEV uptake, electricity generation, electricity demand, and grid reliability. [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

233 DRIA at 11-16.

234 DRIA at 11-14 to 11-17.

234 EPA’s Multi-Pollutant LMDV Proposal at 29312.

235 EPA’s Multi-Pollutant LMDV Proposal at 29312.

In seeming contradiction to the confidence of its earlier statements on impacts to grid reliability, EPA acknowledges the difficulty and lack of experience in assessing the combined effects of higher PEV electricity demand with other variables that could affect the electrical grid: “Projections of PEV uptake will need to be accounted for by U.S. electric utilities and transmission system operators in their resource planning processes. It is difficult to assess the combined effects of higher demand for electricity from PEVs, increasing extreme weather events in the context of climate change, and the greater use of variable supply technologies, such as wind/solar power, on electricity grid reliability and resiliency issues in the U.S. In part, this is because there is little experience to assess the impacts of significant PEV use on U.S. electric grid reliability and resiliency.”236 [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

236 DRIA at 11-14.

EPA explains that most of the electric power grid is owned and operated by the private industry, with Federal, state, local, Tribal and territorial governments playing significant role in enhancing the reliability of the electric power grid.237 While EPA is neither the expert in nor holds responsibility for the reliability of the electrical power grid, the agency offers suggestions for accommodating the increased electricity demand, such as: [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

237 EPA's Multi-Pollutant LMDV Proposal at 29311.

- Grid operators incorporating vehicle-grid integration (VGI) technology to manage vehicle charging time and rate;238 [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

238 EPA's Multi-Pollutant LMDV Proposal at 29312.

- Utilities developing new electric utility tariffs, including submetering for PEVs;239 and [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

239 EPA's Multi-Pollutant LMDV Proposal at 29312.

- Encouraging the adoption of vehicle-to-grid (V2G) technology, "which allows electricity to be drawn from vehicles when not in use."240 [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

240 DRIA at 5-37, 11-16.

EPA does not account for the costs of these suggestions in its DRIA nor for any other safeguards to protect grid reliability. [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

EPA asserts that it has statutory authority to adopt technology-forcing standards for reducing emissions from motor vehicle tailpipes. CAA Section 202(a) does not authorize the agency to force grid operators to manage electrical loads in completely new ways, or to dictate vehicle charging behavior. Yet EPA must account for the costs and impacts on the grid in the RIA for the rule and consider such costs and impacts and the availability and reliability of the grid. [EPA-HQ-OAR-2022-0829-0707, pp. 42-44]

2. EPA fails to adequately account for the regionality of the increased electrical demand.

EPA explains in the Preamble that "the anticipation of a highly regionalized initial rollout of electric vehicles under the California ZEV program necessitated modeling of the regionalization of PEV charge demand in order to fully capture emissions and other impacts on the electric power sector."241 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

241 EPA's Multi-Pollutant LMDV Proposal at 29303.

EPA discusses the integration of several models that it used to project and regionally disaggregate the electricity demand for PEV charging, as shown in Figure 5-1 of the Draft RIA.242 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

242 DRIA at 5-2.

- First, for each compliance scenario considered by EPA, the OMEGA Compliance Model solves for the lowest cost compliance solution, thereby generating projections of national vehicles sales, stock, energy consumption, and tailpipe emissions. However, EPA acknowledges that "to produce estimates of the spatiotemporal charging loads needed for power sector emissions modeling, the national PEV stock from OMEGA must first be disaggregated regionally."243 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

243 DRIA at 5-2.

- To regionally disaggregate the national PEV stocks, EPA indicates that it leverages NREL's "likely adopter model" (LAM).244 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

244 DRIA at 5-2.

- NREL is actively engaged in transportation and mobility research and offers dozens of integrated modeling and analysis tools designed to "overcome technical barriers and accelerate the development of advanced technologies and systems" 245 – the LAM upon which EPA relies is not amongst these NREL tools. [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- Rather, the LAM makes an appearance in an NREL report246 that predicts the relative likelihood of a household to purchase a PEV based on access to charging. This LAM is developed from 3,772 survey responses, calibrating likelihood to purchase a PEV with household income, state of residence (i.e., whether or not the state has ZEV initiatives), housing type and tenure, and population density of the residential location.247 The NREL study is nice work, but EPA's reliance on the study for this application is wholly unsuitable. [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- Figure 3 of the NREL report shows the geographical distribution of survey respondents used to develop the LAM, almost none of which are located in the Midwest states or other areas of low population density.248 Based on the geographical distribution of survey respondents, the LAM offers EPA no insight into or basis for estimating the PEV update and grid reliability impacts for most of the United States. [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

245 https://www.nrel.gov/transportation/adopt.html.

246 Ge, et al, "There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electrical Vehicle Charging Infrastructure," 2021.

247 Ge, et al at 3-4.

248 Ge, et al at 5.

[See original for graphic titled "Figure 3. Geographic Distribution of the survey respondents overlaid on a population density map] [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- Ge, et al thoroughly acknowledge the limitations of the survey and the resulting LAM, none of which are acknowledged by EPA in its adoption of the LAM: [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- "Our final respondent sample underrepresents the highest income bracket, overrepresents those with higher levels of education (e.g., those with bachelor's degrees), underrepresents those with lower levels of education, underrepresents single-family detached housing, and overrepresents single-family attached housing and high-capacity apartments."249 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- “Admittedly, the likely adopter model estimated in this study is not able to account for PEV owners’ preference that could cause this result to vary. For example, some PEV owners might prefer to have a traditional gasoline vehicle in the household to cover long-distance travel. Therefore, the accuracy of the results on the vehicle ranking is subject to further scrutiny once a more accurate PEV likely adopter model is available. “250 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- “There are several limitations to this analysis, and some require future research to improve accuracy. Sampling error associated with a small sample size compared to the reference population is a concern. Because the U.S. population is so large, and the PEV market is still in its infancy, a large sample is necessary to reach enough vehicle (PEV and non-PEV) owners to guarantee an adoption model with results at a high confidence interval.”251 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- “The adoption model suffers from data limitations, such as low goodness of fit and predictive power, due to the omission of psychological variables.” “The survey also relied on the respondents’ non-technical judgement about the ability to extend electrical access to their home parking option. It is unclear if this subjective assessment over-or underestimates the true potential of enhanced electrical access scenarios.”252 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- “This analysis assumes ceteris paribus conditions. Specifically, we project future results based on historic data. However, due to the early stage of PEV adoption, an adoption model calibrated on the current PEV owners is not ideal for projecting adoption likelihood in the future.”253 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- “The analysis herein was conducted without a specific time scale in mind. In particular, we did not incorporate a specific timeline associated with achieving different PEV penetration levels. Time-specific factors, such as vehicle replacement, turnover, and scrappage rates, were likewise not incorporated.” “The national-level results shown here may not be representative of the residential charging accessibility of smaller regions as it does not distinguish location-specific characteristics other than density class.”254 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

- “The framework established in this study can be adapted and improved with higher accuracy PEV adoption modeling and with further increased PEV market penetration.”255 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

249 Ge, et al at 6.

250 Ge, et al at 23.

251 Ge, et al at 25.

252 Ge, et al at 25.

253 Ge, et al at 25.

254 Ge, et al at 25-26.

255 Ge, et al at 26.

• EPA then purports to have developed four chassis-specific LAMs – a LAM each for PEV sedans, PEV S/CUVs, PEV pickups, and PEV vans,256 but neither the basis nor the results are provided for review by stakeholders. How did EPA go about establishing chassis-specific LAMs when the original NREL report mentioned nothing about vehicle classifications? Did EPA resurvey the 3,772 respondents with new questions relating to vehicle classification? Did EPA conduct a separate survey for commercial vehicle use to support its truck and van LAMs? Why is none of this provided in the docket? [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

256 DRIA at 5-3.

• The only results that EPA shares from its chassis-specific LAMs fit into a roughly 1-square inch corner of DRIA Figure 5-2.257 Despite the lack of LAM survey respondents in the Midwest and Alaska, EPA inexplicably projects these regions to have the highest PEV pickup stocks of the entire United States. [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

257 DRIA at 5-3. "PEV adoption (IPM region-level)" image within Figure 5-2.

• Without an adequate understanding or representation of the regional PEV adoption that its proposed standards would drive, EPA uses the results of its chassis-specific LAMs to feed into NREL's EVI-X modelling suite, which simulates PEV charging infrastructure requirements and spaciotemporal electricity loads.258 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

258 DRIA at 5-2.

• Finally, EPA aggregates county-level load profiles into its Integrated Planning Model (IPM), which provides projections of least-cost capacity expansion, electricity dispatch, and emission control strategies for meeting energy demand and environmental, transmission, dispatch, and reliability constraints.259 [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

259 DRIA at 5-2.

EPA's assessment of local and temporal impacts to the electrical grid is entirely discredited by its failure to reasonably disaggregate national PEV adoption. [EPA-HQ-OAR-2022-0829-0707, pp. 44-47]

3. EPA fails to recognize existing grid reliability concerns.

EPA's analysis of impacts to the electrical power grid overlooks existing grid reliability issues such as the following: [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

• The North American Electric Reliability Corporation's (NERC's) "2023 Summer Reliability Assessment" warns that two-thirds of North America is at risk of energy shortfalls this summer during periods of extreme demand. While there are no high-risk areas in this year's assessment, the number of areas identified as being at elevated risk has increased. The assessment finds that, while resources are adequate for normal summer peak demand, if summer temperatures spike, seven areas — the U.S. West, SPP and MISO, ERCOT, SERC Central, New England and Ontario — may face supply shortages during higher demand levels.260 [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

260 NERC, "2023 Summer Reliability Assessment" (May 17, 2023), https://www.nerc.com/news/Headlines%20DL/Summer%20Reliability%20Assessment%20Announcement%20May%202023.pdf.

• NERC's "2022-2023 Winter Reliability Assessment" warned that a large portion of the North America BPS was at risk of insufficient electricity supplies during peak winter conditions, including Texas RE-ERCOT, MISO, SERC-East, WECC-Alberta, NPCC-Maritimes, NPCC-New England.261 [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

261 NERC, "2022-2023 Winter Reliability Assessment" (November 2022), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_WRA_2022.pdf.

• NERC's "2022 Long Term Reliability Assessment" identifies three high risk areas – MISO, NPCC-Ontario, and the California/Mexico part of WECC – that are projected to not have adequate electricity supply to meet demand forecasts associated with normal weather over the 10-year assessment period. Several other areas are identified as having elevated risk, i.e., meeting the resource adequacy criteria for normal forecasted conditions but at risk of shortfall in extreme conditions. These areas include the U.S. West—CA/MX, Western Power Pool (WPP), and the Southwest Reserve Sharing Group (SRSG), Texas RE-ERCOT, SPP and New England. Specific recommendations from NERC to manage the risks include considering "the impact that the electrification of transportation, space heating, and other sectors may have on future electricity demand and infrastructure."262 [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

262 NERC, "2022 Long-Term Reliability Assessment" (December 2022), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf.

• As California has faced rolling blackouts and historic energy prices, Governor Newsom in his May 2022 state budget proposal, has pivoted to the use of traditional fuel infrastructure to ensure system reliability to protect against outages. Approximately one week after the California Air Resources Board approved its "Advanced Clean Cars II" rule prohibiting sales of new ICEV passenger cars in California by 2035, Governor Gavin Newsom issued a statewide request for electric vehicle owners to refrain from charging their vehicles in order to prevent blackouts.263 [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

263 https://www.nytimes.com/2022/09/01/us/california-heat-wave-flex-alert-ac-ev-charging.html.

• Twelve states expressed concerns regarding electrical grid and utility impacts in their DOT-approved state EV Infrastructure Deployment Plans, as summarized below. EPA has not accounted for these concerns in its analysis. [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

State: Hawaii

Concern: HDOT submits requests for discretionary exceptions based on grid capacity, "as there is insufficient power availability in areas where charging stations must be installed" and "delivering sufficient power requires significant upgrades to existing infrastructure. In evaluating the grid capacity, HDOT considered renewable energy sources, like photovoltaic panels, and has determined that this approach is also infeasible in supporting these charging facilities."264 [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

264 "National Electric Vehicle Infrastructure (NEVI) Hawai'i State Plan" at 39 (July 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/hi_nevi_plan.pdf.

State: Idaho

Concern: "Idaho's utilities will need to assess grid capacity and plan for increased demand as EV adoption grows in Idaho. Today, most challenges relating to EV charging occur at the distribution system level." "In most, if not all, areas, transformer upgrades will be needed. Additional improvements such as installing new feeder lines and completing substation upgrades may also be required at some sites."265 [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

265 Idaho Transportation Department, "2022 State of Idaho Electric Vehicle Infrastructure Baseline Plan" at 31 (August 1, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/id_nevi_plan.pdf.

State: Illinois

Concern: "Illinois may run into challenges related to sufficient electric grid capacity, particularly in rural areas of the state. Acceptable locations for charging stations may be limited or may require additional make-ready investments either by site hosts or utilities. This could increase the cost of these stations or delay the timeline for implementation."266 [EPA-HQ-OAR-2022-0829-0707, pp. 47-48]

266 Illinois Department of Transportation, "Illinois Electric Vehicle Infrastructure Deployment Plan" at 23 (August 1, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/il_nevi_plan.pdf.

State: Maine

Concern: "The Roadmap already recognizes electric grid issues as a challenge. In the short term, demand charges increase the operating costs for DCFC. In the longer term, as EV adoption rates increase, particularly when combined with other electrification, there will be a need for new grid capacity in certain areas."267 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

267 Maine DOT, "Maine Plan for Electric Vehicle Infrastructure Deployment" at 31 (July 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/me_nevi_plan.pdf.

State: Maryland

Concern: "Electrification of the transportation sector will lead to an increase in electrical demand on the grid. Existing infrastructure may not be able to support the increase and require upgrades to ensure the grid can reliably support the increase in electrical load."268 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

268 Maryland Department of Transportation, "Maryland State Plan for National Electric Vehicle Infrastructure (NEVI) Formula Funding Deployment" at 19 (July 15, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/md_nevi_plan.pdf.

State: Montana

Concern: "NorthWestern Energy, Montana's largest utility provider, anticipates about an 800-megawatt (MW) peaking capacity deficit by 2030 without the addition of new peaking capacity resources (peaking capacity is the amount of power that can be delivered during times of maximum electricity demand)."269 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

269 "Montana Electric Vehicle Infrastructure Deployment Plan" at 10 (July 28, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/mt_nevi_plan.pdf.

State: New Jersey

Concern: "There are areas with little to no existing capacity to accommodate the minimum 600 kW required. In addition, based on the dense population of the State there are certain locations along AFCs where there may not be grid capacity or site hosts within 1 mile from the exit ramp."270 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

270 "New Jersey's National Electric Vehicle Infrastructure (NEVI) Deployment Plan" at 25 (August 1, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/nj_nevi_plan.pdf.

State: New Mexico

Concern: "While grid capacity may be a concern in the future, it is not the primary issue in most areas. Utilities are predominately concerned with significant transformer upgrades and the long lead times the industry is experiencing in the supply chain. Utilities may not be able to obtain the equipment necessary to begin upgrades and construction in a timely manner."271 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

271 New Mexico Department of Transportation, "New Mexico EV Infrastructure Deployment Plan" at 7 (July 13, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/nm_nevi_plan.pdf.

State: North Dakota

Concern: "In addition, stakeholders that represented utility agencies were concerned about the demand on the power grid, especially during peak demand."272 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

272 North Dakota Transportation, "Electric Vehicle Infrastructure Plan" at 17 (2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/nd_nevi_plan.pdf.

State: Pennsylvania

Concern: "PennDOT has also heard through stakeholder outreach that utility demand charges continue to be a barrier for the more rapid deployment of economically self-sustaining DCFC stations."273 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

273 Pennsylvania Department of Transportation, "Pennsylvania State Plan for Electric Vehicle Infrastructure Deployment" at 49 (July 21, 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/pa_nevi_plan.pdf.

State: Utah

Concern: "Lack of grid availability: Some rural and remote areas do not have any existing power infrastructure. In UDOT's previous VW/DEQ grant project, three-phase power did not exist at two sites. The estimated cost to bring three-phase power to two of the sites was quoted at double the entire project budget."274[EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

274 UTDOT, "Utah Plan for Electrical Vehicle Infrastructure Deployment" at 34 (July 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/ut_nevi_plan.pdf.

State: Washington

Concern: "Grid challenges are another known risk and challenge. Washington's electric power system requires substantial alteration. New or expanded transmission capacity is required for access to the best renewable resources and to take full advantage of coordination opportunities across the West."275 [EPA-HQ-OAR-2022-0829-0707, pp. 48-50]

275 "Washington State Plan for Electric Vehicle Infrastructure Deployment" at 27 (July 2022), https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/wa_nevi_plan.pdf.

B. EPA has inappropriately made the 0 g/mile upstream incentive permanent in the proposed rule.

EPA has proposed to "indefinitely exclude upstream emissions from BEV compliance calculations."332 EPA has long maintained that its decision to not count upstream emissions from BEVs was to provide a "temporary regulatory incentive."333 A temporary incentive was appropriate because while EVs do not have a tailpipe, the incentive did not "reflect the increase in upstream GHG emissions associated with electricity used by EVs."334 As EPA explained, in 2010 a midsize EV caused a net upstream GHG emissions increase of about 120 grams/mile compared to a midsize gasoline car.335 EPA's proposal to permanently extend this incentive is entirely unmerited. [EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

332 Proposed Rule at 29247.

333 See Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 25324, 25434–5 (May 7, 2010) (hereinafter 2010 rule); 2017 and Later model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62624, 62650–1 (Oct. 15, 2012) ("In order to provide temporary regulatory incentives . . . EPA is [] finalizing. . . a value of 0 g/mile."); see also, Proposed Rule at 185 ("[T]he 0 g/mile accounting was temporary.").

334 2010 Rule at 25435.

335 Id.

EV charging necessarily affects the grid, one such effect is a contribution to greater electricity demand during peak demand hours.336 While today's grid has seen some emissions reductions in annual total output emission rates since 2010,337 based on EPA's own prior analysis, upstream greenhouse gas emissions would have needed to fall by two-thirds (or ~66%) from 2010 to the present day before the upstream emissions increase caused by EVs is equivalent to the ICE's upstream emissions.338 But greenhouse emissions, from a pure generation-basis perspective, have not fallen by nearly the required amount based on EPA's most recently available data.339 [EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

336 See Siobhan Powell et al., Charging infrastructure access and operation to reduce the grid impacts of deep electric vehicle adoption, NATURE ENERGY 7, at 932 (Jan. 1, 2022).

337 Cf. eGRID 9th edition Version 1.0 Year 2010 GHG Annual Output Emission Rates, EPA (Feb. 2015), https://www.epa.gov/sites/default/files/2015-02/documents/egrid_9th_edition_v1-0_year_2010_ghg_rates.pdf , with eGRID Summary Tables 2021, EPA (Jan. 30, 2023), https://www.epa.gov/system/files/documents/2023-01/eGRID2021_summary_tables.pdf

338 See 2010 Rule, 75 Fed. Reg. 25435.

339 In 2010, the U.S. average GHG emissions rate for electricity was 1,238.52 lbs/MWh CO2e (eGRID 9th edition Version 1.0 year 2010 GHG Annual Output Emission Rates, supra). But in 2021, the U.S. average GHG emissions rate was 857.0 lbs/MWh CO2e (eGRID Summary Tables 2021, supra , at 2), that means U.S. average GHG emissions have only fallen by approximately one-third.

Even worse, the emissions associated with power plants called upon to supply the grid at peak hours generally have higher emissions per generated MWh.340 A fact borne out in EPA's data that shows that non-baseload power, which reflects the power dispatched to the grid during peak demand,341 has not seen any major declines in CO2 emissions since 2010, and is worse than the emissions associated with baseload power in 2010.342 This data suggests that the impact of EVs on CO_2 emissions might be, at best, nearly identical to the upstream emissions increase in 2010. Regardless of which emissions source is used to calculate an EV's true footprint. Indeed, the table below illustrates just how arbitrary and inappropriate it is for EPA's proposal to ignore the upstream emissions increase caused by electric vehicle in light of this reality. [EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

340 See DOE, Emission Reduction Calculation Roadmap (Jan. 2019), https://www.energy.gov/sites/default/files/2019/01/f58/Emission_Roadmap_FINAL.pdf

341 Susy S. Rothschild & Art Diem, Total, Non-baseload, EGRID Subregion, State? Guidance on the Use of eGRID Output Emission Rate, at 5 (last accessed May 2023), https://www3.epa.gov/ttn/chief/conference/ei18/session5/rothschild.pdf

342 In 2010, baseload power GHG emissions rate was 1,238.52 lbs/MWh CO_2e (eGRID 9th edition Version 1.0 year 2010 GHG Annual Output Emission Rates, supra). In 2021, non-baseload GHG emissions rate was 1,417.3 lbs/MWh CO_2e (eGRID Summary Tables 2021, supra , at 2). Despite the fact that "non-baseload values should not be used for assigning an emissions value for electricity," (Rothschild & Diem, supra) the non-baseload emissions rate reflects emissions for plants "that operate coincident with peak demand for electricity." (id.) Because EVs are expected to increase demand at peak hours (See Powell et al., supra) this may be the proper emissions rate to use when evaluating the upstream emissions associated with EVs.

eGRID CO_2e Emissions [EPA-HQ-OAR-2022-0829-0707, pp. 62-64]		EV Upstream CO_2e Emissions[343]	ICEV Upstream CO_2e Emissions[344]	Net Increase[345]
2010	1,238.52 lbs/MWh[346]	173.6 g/mile	60 g/mile	113.6 g/mile
2021	857.0 lbs/MWh[347]	120.1 g/mile	60 g/mile	60.1 g/mile
2021	1,417.3 lbs/MWh[348]	198.6 g/mile	60 g/mile	138.6 g/mile

[EPA-HQ-OAR-2022-0829-0707, pp. 62-64]

343 Calculated based on 2022 Tesla Model 3 Long Range AWD with an efficiency of 0.26 kWh/mi (see https://www.fueleconomy.gov/feg/Find.do?action=sbs&id=45011). Calculation uses an EV charging efficiency of 90% and a transmission efficiency of 93.5% (EPA LMDV OMEGA GHG Compliance Modeling Runs, "onroad_fuels_20220325.csv," supra).

344 See 2010 Rule, 75 Fed. Reg. 25435. Refers to a "typical midsize gasoline car."

345 Calculated as (EV upstream CO_2e emissions) – (ICEV upstream CO_2e emissions).

346 EPA eGRID 9th edition Version 1.0 year 2010 GHG Annual Output Emission Rates.

347 EPA eGRID Summary Tables 2021.

348 Reflects non-baseload power emissions. (See eGRID Summary Tables 2021, supra , at 2.)

Organization: Western Energy Alliance

it is hard to fathom how EPA comes to that conclusion. The electric grid is in no way capable of handling the huge increase in electricity demand that the rule would require, the United States does not have access to the critical minerals required for such a high market penetration of EVs, nor is the increased wind and solar energy generation available now nor in the foreseeable future to make supposedly ZEVs actually ZEVs. EPA has failed to adequately consider the impact of this rule on grid reliability. EPA should analyze grid reliability in this rulemaking and reference the large body of work raising concerns about how increased EVs will destabilize the grid.1 Without the grid capability and the critical minerals, EPA's EPA Proposed Rule on Light-Duty Vehicle Emissions Standards July 5, 2023 statement on technical feasibility is logically flawed, as current and projected grid infrastructure cannot support the goal of the proposed rule. [EPA-HQ-OAR-2022-0829-0679, pp. 2-3]

1 For example see E lectric Vehicle Dynamic Charging Performance Characteristics during Bulk Power System D isturbances, North American Electric Grid Reliability Corp. et al., April 2023; T estimony of Federal Energy Regulatory Commissioners Willie Phillips, Mark Christie, and James Danly before the Senate Energy & Natural Resources Committee, May 4, 2023, warning: "We face unprecedented challenges to the reliability of our nation's electric system."…the U.S. electric grid is "heading for a very catastrophic situation in terms of reliability…" and there is a "looming reliability crisis in our electricity markets."

EPA must reconsider its analysis on technical feasibility by considering a full range of data on grid reliability. The Rapid Energy Policy Evaluation and Analysis Toolkit Domestic, a project of Princeton University, projects electricity demand would need to increase 18% by 2030 and 38% by 2035 to meet the president's EV goals.2 Many are warning of the lack of infrastructure to support the EV goals. The nation would need to spend $20 billion to $30 billion annually on new transmission lines for the increased demand, but is spending next to nothing.3 [EPA-HQ-OAR-2022-0829-0679, p. 3]

2 Preview: Final REPEAT Project Findings on the Emissions Impacts of the Inflation Reduction Act and Infrastructure Investment and Jobs Act, Rapid Energy Policy Evaluation and Analysis Toolkit, Princeton University, April 2023.

3 Rob Gramlich, founder and president of Grid Strategies, a transmission policy group, as quoted in "Why the electric vehicle boom could put a major strain on the U.S. power grid," CNBC, July 1, 2023.

Further, it is not at all clear that the proposed rule will reduce GHGs as planned. Pure plug-in battery-powered vehicles can create more emissions than hybrid EVs (HEV) and even more than some traditional ICEVs for a variety of reasons including the fuel mix of the electrical grid where the EV is being charged and the large GHG footprint for producing the battery. The manufacture of a battery can produce GHGs equivalent to driving 24,000 miles, in the case of a Nissan Leaf up to 60,000 miles in the case of a Tesla Model S.4 Those numbers are before a single mile is driven by the supposed ZEV with its associated GHGs from the electricity used. When CO2 emissions linked to the production of batteries and the energy mix are considered, a study in Germany found EVs emit 11% to 28% more than their diesel counterparts.5 Volvo reports that in comparing a gas-burning model with its fully electric equivalent, with both vehicles built in the same factory, on the same assembly line, and sharing a large number of components, it found the electric version results in 70% more emissions.6 [EPA-HQ-OAR-2022-0829-0679, p. 3]

4 "A Data-Driven Greenhouse Gas Emission Rate Analysis for Vehicle Comparisons," SAE International, Journal of Electrified Vehicles, V132-14EJ, April 13, 2022.

5 Kohlemotoren, Windmotoren und Dieselmotoren: Was zeigt die CO2-Bilanz?, Crhristoph Buchal et al., Ifo Institut, 2019.

6 “Building An EV Produces 70% More Emissions Than ICE, Says Volvo,” InsideEVs, Andrei Nedelea, November 20, 2021.

EPA needs better analysis of the GHG reductions by EVs. The assumption that they are “zero emission” must be tested using a more comprehensive analysis of full lifecycle emissions sources from EVs. [EPA-HQ-OAR-2022-0829-0679, p. 3]

Arbitrary and Capricious

The proposed rule is arbitrary and capricious because EPA relies on incomplete facts, biased studies, and mistaken assumptions in an attempt to restructure the entire vehicle market. The rule exposes the country to severe grid instability and increases the chances for electricity blackouts and brownouts. EPA’s reasoning and justification for the rule are similarly flawed, based on a market assessment that is faulty. [EPA-HQ-OAR-2022-0829-0679, p. 8]

EPA relies on rosy market projections, citing a Bloomberg New Energy Finance analysis suggesting that, “under current policy and market conditions, and prior to the IRA, the U.S. was on pace to reach 40 to 50 percent PEVs by 2030. When adjusted for the effects of the Inflation Reduction Act, this estimate increases to 52 percent.” (p. 29189) EPA also cites the International Council on Clean Transportation as projecting an increase in new car sales of 67%. EPA should conduct a more robust market analysis with less biased sources if it is to avoid the charge of being arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0679, p. 8]

However, with the generous assumption that the market penetration numbers are correct, then why does EPA need to move forward with this rule at all? If EPA is right and EV sales will increase to 67% by 2032 anyway, why is the rule necessary? We are inclined to think that a more robust market analysis would reach another conclusion, especially as market penetration increases and the effects from the strain on the electrical grid would become apparent. Given the fundamental lack of authority to force this transition, EPA’s own analysis of market penetration by 2032 suggests the rule is unwise. [EPA-HQ-OAR-2022-0829-0679, p. 8]

Organization: World Resources Institute (WRI)

Thus, we urge EPA to strengthen and finalize the strongest rule possible as [EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

1. Complementary policies provide incentives for vehicle manufacturers and consumers in the transition; and
2. Strong private investments are rapidly expanding supply chains and manufacturing, helping to accelerate the transition to cleaner, electric vehicles.[EPA-HQ-OAR-2022-0829-0544, pp. 1-3]

Organization: Zero Emission Transportation Association (ZETA)

Expanded EV deployment will lead to significant changes to the 24-hour electricity demand cycle. By incorporating emerging technologies such as power storage and grid-scale battery technology, using smart software to optimize charging schedules, capitalizing on time-of-use rates, and ensuring strategic charging buildout, transportation electrification has the potential to become a mechanism for reinforcing and stabilizing U.S. electricity infrastructure. [EPA-HQ-OAR-2022-0829-0638, p. 2]

c. Electricity Generation and Grid Readiness

Transitioning to zero-emission transportation offers a unique challenge to the energy companies that will need to ensure they have ample electricity supply to match EV-driven demand. At minimum, this will require investments in the electricity distribution system to enable the deployment of electric vehicle charging equipment. In some instances, this may also require investing in new energy generation sources and associated distribution system infrastructure to accommodate high-use EV charging centers. [EPA-HQ-OAR-2022-0829-0638, pp. 45-46]

However, this is not the first time electricity providers have navigated increases in electricity demand brought on by new technologies: similar spikes accompanied the mass adoption of now-standard appliances like refrigerators and in-home air conditioners. Still, it will be important to ensure that providers and government agencies can work within their regulatory frameworks to test solutions and upgrade the grid to prepare for future demand increases accompanying greater EV adoption. [EPA-HQ-OAR-2022-0829-0638, pp. 45-46]

This section will discuss the growing energy demands of widespread EV adoption and new potential hotspots for energy demand. It will also use case studies to highlight how electricity providers are preparing for this transition. These case studies showcase solutions that have the potential to revolutionize energy consumption and highlight how electricity providers support customer EV adoption through incentive programs, building infrastructure, and other initiatives. [EPA-HQ-OAR-2022-0829-0638, pp. 45-46]

The grid's ability to handle millions of additional EVs hinges on utilities' proactive planning capacity. Granting utilities the flexibility to make proactive upgrades to the electrical grid and facilitate transportation electrification will require careful planning and coordination between regulators and stakeholders. [EPA-HQ-OAR-2022-0829-0638, pp. 45-46]

Regulatory certainty will allow utilities to make the investments necessary to facilitate a smooth EV transition. To invest proactively, rather than in response to firm load, energy providers will need clear insight into multi-year schedules for customer electrification, approval from regulators to recover costs, and/or flexibility to serve loads with non-wire alternatives. [EPA-HQ-OAR-2022-0829-0638, pp. 45-46]

Stringent EPA emissions standards will provide the regulatory certainty needed to not only ensure vehicle manufacturers continue to invest in EV technologies, but that the entire supply chain supporting the transition to electrification will have a clearer picture of how to plan capital expenditures today to meet the increased demand over the coming years. [EPA-HQ-OAR-2022-0829-0638, pp. 45-46]

i. Anticipated Impacts to the Electrical Grid from Increased EV Deployment

In 2021, the U.S. fleet of electric vehicles used 6.1 TWhs of electricity to travel 19.1 billion miles.205 That accounted for just 0.15% of the total national energy generation that year.206 In 2022, the United States produced 4,243 TWhs of electricity.207 To meet the demand of transportation electrification, more generation will be needed to service EVs and electrified vehicle technologies. One estimate suggests it would take roughly 800 to 1,900 TWh of electricity to power all vehicles if they were electric.208 It is important to remember, however, that this new demand will not occur all at once but rather more gradually as EVs continue to displace ICEVs. While achievable, meeting this increase in electricity demand will require significant strategy as electric providers transition to renewable, carbon free resources. [EPA-HQ-OAR-2022-0829-0638, p. 46]

205 “Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010–2021,” Argonne National Laboratory, (November 2022) https://publications.anl.gov/anlpubs/2022/11/178584.pdf

206 “Monthly Energy Review May 2023,” EIA, https://www.eia.gov/totalenergy/data/monthly/pdf/sec7_3.pdf

207 Id. at footnote 206

208 “How much electricity would it take to power all cars if they were electric?,” USAFacts, (May 15, 2023) https://usafacts.org/articles/how-much-electricity-would-it-take-to-power-all-cars-if-they-were-electric/

The key to meeting these energy requirements will be the expansion of renewable energy resources but also the addition of new, zero-emission and low-emission load-following resources like advanced nuclear, carbon capture, long-term energy storage, and green hydrogen. In 2022, electricity generated from renewable sources surpassed coal for the first time in U.S. history.209 At the same time, electricity providers are looking at ways to add low-cost energy storage to increase the availability of non-dispatchable renewable generation such as solar and wind. [EPA-HQ-OAR-2022-0829-0638, pp. 46-47]

Currently, renewable energy generates about 20% of all electricity production in the U.S, and renewable sources like solar and wind are expected to account for the majority of new utility-scale electricity generation going forward.210,211 Already, available renewable energy resources in the U.S. are estimated to amount to more than 100 times the nation’s current electricity needs.212 [EPA-HQ-OAR-2022-0829-0638, pp. 46-47]

209 “U.S. renewable electricity surpassed coal in 2022,” Associated Press, (March 28, 2023) https://apnews.com/article/renewable-energy-coal-nuclear-climate-change-dd4a0b168fe057f430e37398615155a0

210 “Renewable Energy,” U.S. Department of Energy, accessed June 4, 2023 https://www.energy.gov/eere/renewable-energy

211 “Solar power will account for nearly half of new U.S. electric generating capacity in 2022,” EIA, (January 10, 2022) https://www.eia.gov/todayinenergy/detail.php?id=50818

212 “Renewable Energy Resource Assessment Information for the United States,” U.S. Department of Energy, accessed June 4, 2023 https://www.energy.gov/eere/analysis/renewable-energy-resource-assessment-information-united-states

Power generation is only one of the considerations when preparing for 100% transportation electrification. In particular, the industry needs to develop its ability to precisely manage demand in real time, including by accurately predicting when and where increases in demand will occur. [EPA-HQ-OAR-2022-0829-0638, p. 47]

It is important to note that energy demand is not constant. Instead, it consists of relatively predictable peaks and troughs throughout the day. High demand consistently occurs between 5:00 PM and 8:00 PM each day, as customers return home, turn up their climate control systems, begin cooking dinner, and turn on other devices.213 System demand peak is typically between 5:00-6:00 PM during the summer, and 7:00-8:00 AM in the winter. As such, EV charging poses minimal impacts to the winter peak hours but could increase summer peaks without managed charging. As discussed further below, electricity providers are looking at ways to reduce the impact of EV charging on these spikes in energy demand by studying the energy needs of their customers. [EPA-HQ-OAR-2022-0829-0638, p. 47]

213 “Yes, the grid can handle EV charging, even when demand spikes,” Yale Climate Connections, (March 23, 2023) https://yaleclimateconnections.org/2023/03/yes-the-grid-can-handle-ev-charging-even-when-demand-spikes/

ii. Utility-Specific Planning Underway

The following collection of case studies demonstrates how electricity providers in ZETA’s membership are preparing for the EV transition and highlights some of their groundbreaking initiatives to support EV adoption in the United States. It should be noted that each provider operates within a regulatory framework that is unique to the state in which it serves. The cases outlined below do not represent the entire portfolio of EV-related products and services offered by these providers. [EPA-HQ-OAR-2022-0829-0638, pp. 47-48]

These examples include programs that exist across the EV supply chain, with earlier examples covering infrastructure planning programs and later examples focusing on programs to engage with EV drivers on their charging needs. [EPA-HQ-OAR-2022-0829-0638, pp. 47-48]

1. Pacific Gas & Electric

As California’s largest electric provider, PG&E continues to play an important role in advancing electric vehicle adoption in support of the state’s broad climate goals. PG&E works in collaboration with the California Energy Commission and California Public Utilities Commission to plan and approve grid infrastructure upgrades to support this shift to zero-emission transportation. [EPA-HQ-OAR-2022-0829-0638, pp. 47-48]

With nearly 500,000 EVs sold in its service area—one in every seven of all EVs on the road throughout the nation—expansion of PG&E’s EV charging network in Northern and Central California is critical to support the State’s transition to a clean transportation future. Over the last half-decade, the provider has deployed more than 5,000 EV charging ports across its service area. Additionally, it offers a variety of resources to help accelerate EV adoption among customers, and PG&E is working collaboratively with vehicle manufacturers to develop vehicle grid-integration technologies. [EPA-HQ-OAR-2022-0829-0638, pp. 47-48]

Grid planning requires precise forecasts to ensure electric infrastructure is available to support future demand. Pre-existing electricity demand (load) forecasts did not provide the geographical granularity needed to best plan for grid investments. PG&E could allocate the load to residential charging locations; however, larger charging loads that are often not associated with existing service points—such as public charging systems—lacked a methodology to be accounted for in long-term forecasting efforts. Without the ability to identify future EV demand with geographic and temporal accuracy, PG&E was limited in its ability to plan future grid capacity. [EPA-HQ-OAR-2022-0829-0638, pp. 47-48]

Lacking a long-term geospatial forecasting methodology, PG&E was primarily dependent on customer requests for service to inform where EV load would materialize. This reliance on customer requests led PG&E to reactively develop capacity solutions to serve load requests. Given the long lead times often associated with capacity projects and the relatively fast pace at which customers wish to build EV charging infrastructure, there would be instances where energization timelines exceeded the requested energization date from customers. This can occur with large load applications associated with public DCFC charging stations or large fleets, which have the potential to exceed the maximum capacity of existing electrical infrastructure in those areas. [EPA-HQ-OAR-2022-0829-0638, pp. 47-48]

Identifying a need for a more proactive approach, PG&E set out to improve its forecasting abilities to increase the clarity of where and when EV loading is most likely to materialize. This enables PG&E to build capacity in advance of service applications being received. Although research indicates that customer preference for EVs is increasing, and there are many regulations and incentives which further support the transition to EVs, there are still uncertainties around the pace of adoption. This impacts how the EV load will manifest on the electric grid. For this reason, a solution capable of supporting a variety of forecast scenarios was necessary for success. PG&E commissioned a multi-faceted project focused on three common categories of EV charging load: 1) public DCFC & Level 2 charging stations, 2) residential EV charging, and 3) fleet charging. [EPA-HQ-OAR-2022-0829-0638, pp. 48-49]

Detailed analysis and machine learning modeling and testing were applied to each of these focus areas to predict where EV charging is most likely to occur. These analyses were performed at the premise level and resulted in over 5 million potential growth points across PG&E's service territory that were integrated into existing distribution planning software. This created a dynamic tool that can adapt to a variety of forecast inputs, such as system-level adoption forecasts, EV charging behaviors, and charging infrastructure assumptions. These scenarios can be integrated into PG&E's distribution planning processes. [EPA-HQ-OAR-2022-0829-0638, pp. 48-49]

Developing a solution that was easily integrated into existing distribution planning processes and software was critical for successful implementation. Involving PG&E forecasting and asset planning teams in the development of the EV forecasting tool, as well as reviewing and approval of the major inputs and assumptions used to develop forecast scenarios, ensured alignment in the scenarios generated. [EPA-HQ-OAR-2022-0829-0638, pp. 48-49]

Using varying EV forecast scenarios, PG&E was able to assess the localized grid impacts from high EV adoption scenarios that are better aligned with state transportation electrification goals and policies. PG&E assessed how various levels of EV adoption, as well as the impacts that changing charging behaviors (such as on vs. off-peak charging), can have on grid needs. Early analysis has indicated that off-peak charging can reduce near-term grid constraints. In the future, this may lead to new circuit peaks and capacity constraints that must be addressed. [EPA-HQ-OAR-2022-0829-0638, pp. 48-49]

Results from these analyses were helpful in advocating for approval of higher transportation electrification forecasts with regulators and the state energy commission, which are ultimately used for electric grid planning. PG&E has also used these forecasts to produce directional assessments of the resources needed to support capacity investments included in their long-term capital planning. PG&E continues to work to improve its forecasting and planning capabilities. Still, the solutions implemented to date have enabled a more robust approach that will allow PG&E to continue to support its customers' electrification transition. PG&E's plan for a high electrification future also includes the following measures:214 [EPA-HQ-OAR-2022-0829-0638, pp. 49-50]

214 “Answers to Administrative Law Judge’s Ruling Seeking Additional Information on the Distribution Planning Process by Pacific Gas and Electric Company,” PG&E, (April 10, 2023) https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M505/K839/505839889.PDF

-Working diligently to plan and develop capacity infrastructure to ensure electricity is available where peak demand is expected to increase as zero-emission vehicle adoption continues to grow. Efforts include close collaboration with state agencies, technology partnerships, EV charging developers, vehicle original equipment manufacturers, and adopters of zero-emission vehicles to proactively prepare electric capacity in high demand areas in ways that consider economic development and customer electricity rates. [EPA-HQ-OAR-2022-0829-0638, pp. 49-50]

-Proactive discussions with customers and municipalities to understand their individual plans for electrification load growth to better include them in PG&E forecasting and planning. [EPA-HQ-OAR-2022-0829-0638, pp. 49-50]

-In addition to using customer TE plans to inform longer-term load forecasts and planning, PG&E is also using these customer plans to inform our near-term priority proactive upgrades. [EPA-HQ-OAR-2022-0829-0638, pp. 49-50]

-Working with state agencies and regulators to increase the load forecasts that are used for utility planning, enabling a faster build out of additional capacity infrastructure (as described earlier). [EPA-HQ-OAR-2022-0829-0638, pp. 49-50]

2. Vistra

Electricity generators are making the transition to low-and no-carbon-emitting sources of energy as quickly as possible in response to investor, regulator, policymaker, and customer expectations. This transition is backed by a strong business case for doing so, as renewables and battery storage systems are able to compete effectively with fossil fuel generation and provide benefits to the power grid. The International Energy Agency expects renewable energy resources to provide 18% of the world’s power by 2030, up from 11.2% in 2019.215 However, certain renewable energy sources—such as solar and offshore/onshore wind—are dependent on weather conditions and the time of day. This means deploying these resources at scale will require accompanying battery technology to ensure electric grid reliability. [EPA-HQ-OAR-2022-0829-0638, p. 50]

215 “Modern renewables,” IEA, accessed June 4, 2023 https://www.iea.org/reports/sdg7-data-and-projections/modern-renewables

Energy storage allows for the integration of more intermittent resources by storing electricity until it is needed. It also augments existing energy generation by allowing excess energy to be produced when low demand is stored until demand peaks. Energy storage can provide benefits beyond emissions reduction, including cost-savings for consumers, reliability, and backup and startup power during extreme events. [EPA-HQ-OAR-2022-0829-0638, p. 50]

Vistra operates the Moss Landing Energy Storage Facility in California, the largest of its kind in the world, and is pursuing an expansion that will bring 750 MW online in the second quarter of 2023.216 This facility is particularly valuable in California, where the swift transition to renewable energy, paired with a constantly growing demand for electricity, illustrates the need for reliability in the electric grid and the role energy storage can play. As of 2021, non-hydroelectric renewables provide approximately 35% of California's electricity, and electricity demand has increased due to a variety of factors, including severe weather events, widespread electrification, and electric vehicle deployment.217 This combination was put to the test in September 2022, when the state faced its most extreme September heat event in recorded history. This weather event put unprecedented strain on the electric grid and set records for electricity demand. To the surprise of many, the lights stayed on. During that event, batteries, including Vistra's Moss Landing facility, provided about 4% of supply—over 3,360 MW, more than the Diablo Canyon nuclear power plant (the state's largest electricity generator)—during the peak demand, averting rolling blackouts. A report from the California Independent System Operation (CAISO) following the September 2022 event specifically highlighted the increase in energy storage resources as a key factor that supported the grid's reliability.218 As a comparison, the August 2020 heat wave, which occurred when California's energy storage resources were few and far between, resulted in rolling blackouts over multiple days. [EPA-HQ-OAR-2022-0829-0638, pp. 50-51]

216 "Vistra Announces Expansion of World's Largest Battery Energy Storage Facility," Vistra, (January 24, 2022) https://investor.vistracorp.com/2022-01-24-Vistra-Announces-Expansion-of-Worlds-Largest-Battery-Energy-Storage-Facility

217 "2021 Total System Electric Generation," California Energy Commission, accessed June 5, 2023 https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-genera tion

218 "California ISO posts analysis of September heat wave," California ISO, accessed June 5, 2023 http://www.caiso.com/Documents/california-iso-posts-analysis-of-september-heat-wave.pdf

Recognizing that the replacement of fossil fuel-powered assets with zero-carbon resources is not a one-to-one exchange, Vistra is working to maintain reliability by using energy storage and installing zero-carbon investments on the sites of retired or soon-to-be-retired fossil fuel plants. This also ensures that communities do not lose key energy supplies or ongoing tax revenue. [EPA-HQ-OAR-2022-0829-0638, pp. 51-52]

Vistra is also focused on ensuring that existing zero-carbon generation remains online, such as the Comanche Peak Nuclear Power Plant in Texas, which is currently going through the Nuclear Regulatory Commission's relicensing process to continue operations through 2053. This high-performing plant is able to produce power—rain, snow, or shine—increasing grid reliability for Texans and making it a keystone generator for the Electric Reliability Council of Texas (ERCOT) grid. Alongside the transition to cleaner generation resources, Vistra has been able to maintain reliability for its consumers and ensure that individuals and businesses are able to keep their lights on, even during extreme weather events. During Winter Storm Uri in Texas in 2021, Vistra's plants produced between 25-30% of the power on the grid during the storm, far beyond its ~18% market share. [EPA-HQ-OAR-2022-0829-0638, pp. 51-52]

As the energy supply mix shifts toward low-and zero-carbon resources, energy storage will fill the reliability gap and allow that mix to evolve more reliably and flexibly. The Inflation Reduction Act provides new tax incentives for investment in energy storage technologies and resources to support the R&D of advanced and long-duration energy storage technologies. These investments will enable the deployment of utility-scale energy storage and add reliability to the grid, no matter what the future energy generation mix looks like. It is crucial that the United States continues to make the transition to a carbon-neutral economy and electric grid in a way that ensures the continued reliability of the grid at a reasonable cost to consumers. [EPA-HQ-OAR-2022-0829-0638, pp. 51-52]

3. Southern California Edison

About 40% of the nation's electric vehicles, more than 1.3 million, have been sold in the state of California. More than 430,000 of those are in SCE's service area alone. Many have expressed doubts that the grid is ready for the energy demand created by the need to charge so many EVs, but electric power companies, including SCE, are keeping up with increasing levels of adoption. In anticipation of growing EV demand in Southern California, SCE is continuously taking the steps to upgrade the grid and promote customers' transition to electric transportation and proactively solve near-term issues, while also undertaking long-term investments to ensure the grid is ready for all levels of anticipated electrification adoption. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

Solving near-term challenges

One way SCE is addressing the near-term issues is its Power Service Availability (PSA) initiative for Transportation Electric service. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

-SCE is focusing on (1) improving its internal processes to streamline interconnection, (2) engaging fleet operators to better understand their plans for electrification, (3) improving its ability to forecast and assess the impacts of transportation electrification (TE) growth, and (4) leveraging new technologies as grid infrastructure solutions [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

-Because some projects require more time than others to build, SCE is encouraging fleet owners to engage with the utility early in the process so that SCE can better understand and plan for the fleets' needs. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

SCE is also improving how we partner with customers to meet their needs. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

-This includes streamlining buildout, developing deeper customer engagements that include rate planning and load management education, and right-sizing grid solutions to meet the expected charging demand growth in both the near and long term. These efforts will provide more innovative and customer-focused solutions. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

In addition to customer project deployment, SCE has also pushed to accelerate EV adoption through customer-side infrastructure programs such as Charge Ready for light-duty vehicles. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

-Through its Charge Ready program, SCE installs, maintains, and covers installation costs for charging infrastructure while participants own, operate, and maintain the charging stations. For those ready to invest in EV charging for medium-and heavy-duty vehicles, SCE's Charge Ready Transport program similarly offers low-to no-cost site upgrades to support the installation. The program provides funding to help electrify semi-trucks, buses, and delivery vehicles, among others. Through its Charge Ready programs, SCE has installed more than 3,000 charging ports throughout its service area and is targeting 30,000 charging ports by 2026. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

SCE's Transportation Electrification Advisory Services program is also available for commercial customers considering electric transportation options. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

-On top of offering educational webinars and workshops, the program also offers to develop site-specific EV-readiness studies to help determine the feasibility of proposed projects and grant writing assistance to help customers secure zero-emission vehicle grants. [EPA-HQ-OAR-2022-0829-0638, pp. 52-53]

Long-term Planning and investing in the grid for TE

SCE is improving the value of EV adoption forecasts used for grid planning by assessing where, when, and how much EVs are likely to charge. [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-SCE led the West Coast Clean Transit Corridor Initiative, composed of nine other electric utilities and two agencies representing more than two dozen municipal utilities, to conduct a multi-phase and multi-year research study to forecast EV truck populations and determine the proper number and size of highway charging sites. Subsequent phases of this initiative are supporting internal planning operations across the participating utilities. [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-SCE developed an augmented forecasting approach to capture accelerated load growth due to Medium-Duty / Heavy Duty (MDHD) vehicles as well as the direct current fast charging (DCFC) for Light-Duty vehicles and port electrification for the recent General Rate Case (GRC) Application. [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-Because MDHD electrification is still nascent, current forecasting methodologies that are based (in part) on historical adoption are insufficient [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-For the GRC, SCE's augmented forecasting methodology leverages MDHD fleet industry data to more accurately predict MDHD electrification adoption and corresponding grid needs [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-The augmented forecasting approach also included added load from DCFC charging plazas for Light-Duty vehicles. [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-SCE (and the IOUs) are collaborating with CPUC on a new "Freight Infrastructure Planning" (FIP) Framework to further address planning for MDHD [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-SCE is working to expand the current distribution planning forecast window from 10 years to 20 years. Developing and implementing an interagency-sponsored forecast that spans 20 years for distribution will bring benefits, such as: [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-Identifying long lead time projects that are needed beyond the 10-year horizon

-Identifying important land acquisition needs

-Informing how the development of infrastructure may need to be levelized to practically achieve the scale of development required by achieving state ZEV policies and GHG targets. [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-SCE has proposed robust investments in its GRC application to support TE adoption and load growth. [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-The investments proposed are designed to ensure long-lead infrastructure projects (such as substation expansion or new substations) will be completed when load growth arrives. The plan especially focuses on high TE locations: freight corridors, fleet hubs, Port of Long Beach, etc. [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

-Specific TE-focused projects include: [See original comment for project types table] [EPA-HQ-OAR-2022-0829-0638, pp. 53-54]

4. Con Edison

Con Edison is helping to accelerate New York State's transition to clean transportation and EV adoption through grid and customer investments that support buildout of a widespread charging network. The Company's PowerReady Program provides incentives to connect thousands of new public and private charging stations to the electric grid. Authorized by the New York State Public Service Commission's July 2020 Order Establishing Electric Vehicle Infrastructure Make-Ready Program and Other Programs, the program offsets the electric infrastructure costs associated with installing chargers for light-duty EVs, including cars and small vans. To date, nearly 4,000 Level 2 and 175 DCFC chargers have been installed under the program, with the goal of installing 18,539 Level 2 and 457 DCFC chargers by 2025, with the potential for significant expansion of the program budget and goals as recently recommended by the New York State Department of Public Service Staff. The Company provides a similar pilot program for medium-and heavy-duty (MHD) vehicles, and a full-scale program is being considered in the recently launched New York State proceeding to address barriers to MHD charging infrastructure (MHD Proceeding). [EPA-HQ-OAR-2022-0829-0638, pp. 54-55]

Along with these infrastructure incentive programs, Con Edison also offers the SmartCharge New York managed charging program that provides incentives for personal drivers to charge outside of grid peak periods and the Company is launching a commercial managed charging program later this year including eligibility for all fleets, public stations, and multi-unit dwellings. SmartCharge New York is discussed below as an example of how managed charging can help mitigate the impact of EV charging on the grid. [EPA-HQ-OAR-2022-0829-0638, pp. 54-55]

An essential step in EV charger buildout is interconnection with the grid. Con Edison has developed dedicated teams that support the growing number of EV charging interconnections, including those that provide load evaluation, engineering review, project queue management, and incentive deployments. The Company is implementing multiple efforts to improve the customer experience and speed interconnection timelines and will continue to identify and implement efficiencies and improvements. For example, the Company provides pre-application advisory services for fleets and other customers to evaluate site feasibility and understand electric fueling costs, automates internal processes such as service rulings for smaller stations, and is coordinating with permitting agencies to identify and resolve challenges. Con Edison provides load-serving capacity maps to help those seeking to install EV charging infrastructure identify suitable sites with adequate grid capacity. [EPA-HQ-OAR-2022-0829-0638, pp. 54-55]

While Con Edison is supporting installation of increasing numbers of EV chargers under its programs today, the Company is also working to evolve its robust planning processes to prepare for the ramp in clean transportation loads. These loads are expected to drive significant grid impacts in New York State and ambitious emissions regulations will further accelerate an already rapidly growing EV market, with the exact timing in the inflection point unknown. The timeline to install EV chargers is relatively short compared to that of other new customer infrastructure, such as a new building, while the buildout of utility-side grid infrastructure to meet the significant increase in demand from EV chargers requires longer timelines, sometimes of 5 to 7 years. A proactive grid planning process to meet near-term needs and build out the grid in advance to support long-term growth in the deployment of EVs is being considered in the New York State MHD Proceeding. Con Edison, along with other NY State Utilities, filed comments proposing a proactive utility infrastructure planning framework to prepare the grid in advance of future transportation electrification needs. [EPA-HQ-OAR-2022-0829-0638, pp. 54-55]

SmartCharge New York Managed Charging Case Study

In 2017, Con Edison launched SmartCharge New York program with the goal of instilling grid-beneficial charging behavior in parallel with the upswing in electric vehicle adoption. The goal was to influence driver behavior at the inflection point of transitioning from combustion-engine fueling to electric battery charging and have drivers default to grid-optimizing charging activity. Program participants received a free cellular-enabled device that plugs into the vehicle's diagnostic port that allowed Con Edison to track time, energy, and power consumed when charging in the utility's service territory. Incentives encourage drivers to 1) avoid charging during the system peak (2 PM to 6 PM) during summer weekdays from June to September, and 2) charge overnight from 12 AM to 8 AM. Incentives were initially paid off-bill through gift cards to the customer's business of choice, such as Amazon, Starbucks, or Home Depot. [EPA-HQ-OAR-2022-0829-0638, p. 56]

As electric vehicle adoption continues to rise, managing charging behavior will grow increasingly important in maintaining a healthy and reliable grid. Since its inception, the SmartCharge New York program has evolved to meet customer needs and program objectives. Starting in 2023 for example, the program was overhauled to allow participation through a mobile application and payments are now issued through Venmo or Paypal, in line with participant feedback. This shift also changed the way the program collects data, favoring more cost-effective vehicle onboard telematics or networked electric vehicle supply equipment such as a Wi-Fi-enabled charger or charging cable. This enables the program to scale efficiently with the market and give a greater number of drivers insight into their behavior and how that activity translates to incentive earnings. [EPA-HQ-OAR-2022-0829-0638, p. 56]

In light of the EPA announcement of its heavy-duty and light/medium-duty proposed emissions standards, Con Edison released the following statement: [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

"Con Edison applauds the Environmental Protection Agency's efforts to rev up the market for electric vehicles, which will improve the air in the communities we serve and help in the fight against climate change. [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

A rapid shift to mass EV adoption looks more achievable all the time, with vehicle options expanding and new charging stations being built across New York City and Westchester County, including locations that serve the needs of disadvantaged communities. [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

Con Edison will continue to support the EV market's development through investment in the grid and by offering a range of programs, from incenting new chargers to managing the grid impact by rewarding drivers for charging overnight."219 [EPA-HQ-OAR-2022-0829-0638, pp. 56-57]

219 "Con Edison Supports Effort to Encourage Electric Vehicle Adoption," Con Edison Media Relations, (April 12, 2023) https://www.coned.com/en/about-us/media-center/news/2023/04-12/con-edison-supports-effort-to-encourage-electri c-vehicle-adoption

5. SRP

When EVs were still in the early stages of adoption, SRP recognized the importance of exploring ways to identify EV households and analyze their charging behavior in order to help prepare for greater EV uptake in the future. It was also important to begin engaging customers who were EV drivers in order to understand their interests and their charging patterns and assess ways to influence charging behaviors. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

In 2014, SRP launched "EV Community" (EVC)—a program that offers customers a $50 bill credit for each EV they register (up to two vehicles per household)—as a means to incentivize EV drivers to identify themselves and engage with SRP. Participants provide basic information about the electric vehicle and the type of charger they use. This provides a way for SRP to learn more about EV customers and their charging behavior and needs while offering them an incentive to help support EV growth in the region. There are currently more than 7,500 customers enrolled in the program. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

While EVC members only account for a small number of total EV households, they are a fair overall representation of the EV customer base since all price plans are included, as well as households with one vs. two EVs. The program offers SRP a good platform for analysis, including the type of cars they drive (PHEV, BEV, brand, etc.) and the charge levels they use. In addition, SRP found that EVC members are willing to share information and are eager to participate in future pilot programs. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

The EVC program also provides SRP with a method and channel to promote their Electric Vehicle Price Plan, a special time-of-use pricing plan which offers EV drivers the most opportunity to save on EV charging costs by charging during super off-peak times (between 11 PM and 5 AM). Load research has shown that this program has been highly effective at shifting EV charging loads away from peak periods. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

The EVC program has helped SRP plan and prepare the grid for widespread EV adoption by enabling them to: [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Anticipate load growth. A pilot study with EVC members that monitors their EV driving and charging behavior through data telematics devices enables SRP to estimate typical consumption and charging load profiles per EV. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Understand the impacts of EV charging on the grid. EVC data is used to model the impacts of EV charging on the electric grid, identify when transformers and wires may need to be upgraded, and understand when and how customers need to charge. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Recruit for Managed Charging pilot programs. The EVC program and channel have enabled SRP to recruit participants for additional Managed Charging pilot programs to test other active control technologies to control EV charging load on the grid. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Survey participants for insights. EVC members are surveyed regularly to get more data on their charging behaviors, including their use of home, workplace, and public charging and their satisfaction with EVs overall. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

-Engagement. EVC participants receive regular newsletters and other communications with EV-related information. [EPA-HQ-OAR-2022-0829-0638, pp. 57-58]

6. Duke Energy

Electric fleet commitments are increasing as companies with ambitious sustainability goals work to decarbonize operations. Fleet owners are also seeking ways to take advantage of the cost savings available by transitioning to EVs. However, programs for fleet electrification and managed charging options are still limited to date. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

When transitioning to an electric fleet, it is important that fleet managers understand the full scope of charging multiple vehicles while maintaining fleet operations and that larger MHDVs bring with them additional factors to consider. Fleet owners who have electrified fleets without consulting experts or an electric provider have likely been experiencing avoidable operational and technological issues. Long-term energy cost and performance risk are also potential issues for fleets and can hinder mainstream fleet electrification technology development if not managed correctly. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

Duke Energy's significant experience and large customer base make it well-positioned to design and implement fleet electrification and charging programs. Duke Energy is building a first-of-its-kind performance center that will model and accelerate the development, testing, and deployment of zero-emission light-, medium-, and heavy-duty commercial electric vehicle EV fleets. The site will be located in North Carolina at Duke Energy's Mount Holly Technology and Innovation Center and incorporate microgrid integration. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

The fleet electrification center will provide a commercial-grade charging experience for fleet customers evaluating or launching electrification strategies—reinforcing reliability, clean power, and optimization by integrating solar, storage, and microgrid controls software applications. The center will be connected to both the Duke Energy grid—charging from the bulk electric system—and to 100% carbon-free resources through the microgrid located at Mount Holly. This project is the first electric fleet depot to offer a microgrid charging option. [EPA-HQ-OAR-2022-0829-0638, pp. 58-59]

In addition to fleet charging, the site will also function as an innovation hub, allowing Duke Energy to collect data around charger use, performance, management, and energy integration with various generation resources. It will also allow for the development of managed charging algorithms for fleets connected to the bulk power system or integrated with renewables and storage—which can be utilized to minimize the upgrades needed to the distribution system, easing the transition to electrifying fleets. Identifying EV charging technologies and how they may be used to power any type of fleet with vehicles (ranging from class 1) will help develop a model to show the industry a clear, integrated, and cost-effective path to fleet electrification. [EPA-HQ-OAR-2022-0829-0638, p. 59]

Duke Energy is teaming up with Daimler Truck North America and Electrada on this important work. Electrada, an electric fuel solutions company, is providing funding for research and demonstration efforts. For fleets seeking to electrify, Electrada invests all required capital "behind the meter" and delivers reliable charging to the fleet's electric vehicles through a performance contract, eliminating the complexity and risk that fleets face in transitioning to this new source of fuel. Electrada's investment in the depot allows Duke Energy to focus on programs that simplify adoption for electric fleet customers and distribution system performance to support the predictable addition of electric load over time. [EPA-HQ-OAR-2022-0829-0638, p. 59]

By the end of 2023, fleet operators will be able to experience a best-in-class, commercial-grade fleet depot integrated with energy storage, solar, and optimization software. Moving to zero-emission vehicles in this sector allows North Carolina to seize the large economic potential of the transition and generate billions in net benefits for the state. Projects like Duke Energy's fleet performance center will be key for fleet owners across the state to take advantage of the cost savings of transitioning to electric vehicles. That said, fleet owners exploring electrification should engage their electricity provider early and often to identify and address site-specific considerations. As fleet electrification accelerates, it will be important for electricity providers and policymakers to identify best practices to proactively plan for fleet electrification, including readying the distribution grid. [EPA-HQ-OAR-2022-0829-0638, p. 59]

7. Xcel Energy

Xcel Energy is committed to electrifying all of its light-duty fleet and 30% of its medium-and heavy-duty fleet by 2030, equating to over 2,500 EVs. It's part of their vision to be a net-zero energy provider by 2050 and enable one out of five vehicles to be electric in the areas they serve by 2030. This will save customers $1 billion annually on fuel by 2030 and deliver cleaner air for everyone. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

With a fleet that includes iconic bucket trucks, all-terrain service vehicles, and a host of pickup trucks and pool cars across eight states, achieving these goals will be no small feat, but an important one. There are notable hurdles, yet evolving technology presents solutions. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

Electrifying the Marquee Fleet Vehicle

Xcel Energy is the first electric provider in the nation to add an all-electric bucket truck to its fleet. The truck features two electric sources: one for the drivetrain and one for the lift mechanism. It has a 135-mile driving range and can operate the bucket for an entire workday on a single charge. Crews are collecting data from real working conditions in Minnesota and

Colorado that will be used to inform further improvement to the vehicle's technology and operation. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

Optimizing Charging to Minimize Grid Impacts

To support a growing electric fleet, over 1,200 EV chargers must be brought into service by 2030, which will result in an electric load increase of 71 megawatts. Charge management techniques enable low-cost charging for this growing electric fleet. It's a sophisticated approach to optimize charging times by using time-of-day and grid demand efficiencies and builds on the expertise Xcel Energy has developed through offering managed charging programs to customers in multiple states. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

For fleets, overnight charging schedules make the most sense. Demand and rates are lower, and renewable wind sources are ample at that time. Yet, fast charging outside of these time periods may be required to help larger vehicles make it through a workday. This is when charging schedules need to be customized and highly specific. [EPA-HQ-OAR-2022-0829-0638, pp. 59-60]

Enabling Cleaner Service Calls Through Bucket Truck Technology

Xcel is also taking immediate action on other high-impact emission reduction opportunities, using technologies such as electric power take-off, idle mitigation, and solar systems to power jobsite tools. [EPA-HQ-OAR-2022-0829-0638, pp. 60-61]

-Electric power take-off (ePTO) -An ePTO system is a device that uses battery power. It's similar to an EV, but instead of moving the vehicle down the road, it powers equipment and tools to avoid engine idling at the job site. These devices are recharged by plugging into the same chargers that EVs use. [EPA-HQ-OAR-2022-0829-0638, pp. 60-61]

-Idle mitigation -An idling truck can consume 1.5 gallons of gas each hour. Idle mitigation on Xcel Energy's utility bucket trucks works by automatically shutting down the gas-powered engine when the vehicle is not in use or when the engine is idling for too long. This helps to reduce emissions and conserve fuel. [EPA-HQ-OAR-2022-0829-0638, pp. 60-61]

Fleet Electrification Solutions for Customers

Xcel Energy's experience and expertise with fleet electrification doesn't stop with their own fleet. They have developed a mix of customer programs across service areas to support fleet electrification for businesses and communities. These customer-centric solutions enable sophisticated planning, lower upfront costs with various rebates and incentives, and minimize impacts to the grid. [EPA-HQ-OAR-2022-0829-0638, p. 61]

Xcel's approach for commercial EV fleet development includes: [EPA-HQ-OAR-2022-0829-0638, p. 61]

-Advisory services: Xcel offers a "white-glove service" to meet customers where they are on their electrification journey by guiding them through customized planning for their infrastructure needs. For fleet operators, this includes a free assessment to help them determine the best path to electrify their fleet and advise them on future electric fleet considerations such as charging best practices. [EPA-HQ-OAR-2022-0829-0638, p. 61]

-Infrastructure installation: Xcel designs and builds EV supply infrastructure to support charging station installations at minimal to no cost to customers. [EPA-HQ-OAR-2022-0829-0638, p. 61]

-Equipment recommendations and rental options: Xcel also provides recommendations for charging equipment and offers customers the option to purchase their own qualifying vehicle chargers or rent them at a monthly fee that includes installation and maintenance. [EPA-HQ-OAR-2022-0829-0638, p. 61]

-Grid continuity: Xcel designs long-term clean energy resource and distribution plans to consider the future impact of new EV load to ensure ongoing grid stability, reliability and affordability. [EPA-HQ-OAR-2022-0829-0638, p. 61]

-Equitable opportunities: Xcel supports EV adoption in higher emissions communities and income-qualified neighborhoods through rebates and incentives. This includes facilitating the electrification of carshare, refuse trucks, school buses, paratransit vehicles, and other fleets operating in these disproportionately impacted communities. [EPA-HQ-OAR-2022-0829-0638, p. 61]

Fleet electrification is a key component of Xcel Energy's larger vision, which includes enabling zero-carbon transportation by 2050 across our eight-state service footprint. This long-term strategy balances affordability with sustainability across the entire grid. It's why Xcel is dedicated to assisting fleet managers across the ecosystem in providing fleet electrification solutions that empower and inspire a clean energy future while also leading by example. [EPA-HQ-OAR-2022-0829-0638, p. 61]

iii. Transmission

A critical part of ensuring a smooth transition to an electrified transportation sector will be a robust build out of high-voltage transmission lines. Doing so will also enable increased penetration of renewables into the grid mix, helping to further improve the environmental benefits of electric vehicles. While progress in this space has historically been slow and bogged down by procedural delays, there are some signs of progress. In April 2023, the U.S. Bureau of Land Management approved a 732-mile transmission line, which will carry wind energy from Wyoming through to Nevada.220 Also in April 2023, a Maine court granted approval to restart work on the 145-mile New England Clean Energy Connect project, which will carry hydropower from Canada to New England.221 The line is expected to carry up to 1,200 megawatts of power. [EPA-HQ-OAR-2022-0829-0638, p. 62]

220 "US approves $3bn Wyoming-Nevada power line," Power Technology, (April 12, 2023) https://www.power-technology.com/news/us-approves-3bn-wyoming-nevada-power-line

221 "Maine court greenlights embattled $1B transmission line," E&E News, (April 17, 2023) https://subscriber.politicopro.com/article/eenews/2023/04/21/maine-court-greenlights-embattled-1b-transmission-lin e-00093087

Electricity transmission is also a key focus of the Biden-Harris Administration. In May 2023, the administration published its plan to decrease permitting timelines for new transmission projects, among other key items.222 Also in May 2023, the U.S. Department of Energy proposed a rule on designating National Interest Electric Transmission Corridors.223 There will also be a role for Congress to play in improving transmission permitting times and this is a policy area where some bipartisan support exists. [EPA-HQ-OAR-2022-0829-0638, p. 62]

222 "FACT SHEET: Biden-Harris Administration Outlines Priorities for Building America's Energy Infrastructure Faster, Safer, and Cleaner," (May 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/10/fact-sheet-biden-harris-administration-o utlines-priorities-for-building-americas-energy-infrastructure-faster-safer-and-cleaner/

223 See 88 FR 30956

ii. Impacts to EVSE Deployment from BIL and IRA Programs

With over $7.5 billion available across multiple programs, the Bipartisan Infrastructure Law represents the nation's largest ever investment in increasing Americans' access to EV chargers. Through the BIL's $5 billion National Electric Vehicle Infrastructure (NEVI) Formula Program, the federal government is partnering with private industry to build out a national charging network along key highway corridors. As of September 2022, the Federal Highway Administration approved formal plans submitted by all 50 States, the District of Columbia, and Puerto Rico and as of June 2023, multiple states had released requests for proposals from organizations seeking access to NEVI funds. The design of these state application processes through the NEVI Formula Program will help drive EVSE standardization, which will in turn improve reliability and consistency in the consumer-facing charging experience. Separately, the BIL's Charging and Fueling Infrastructure (CFI) Discretionary Grant Program allocates another $2.5 billion towards installing EV chargers in communities where people live and work. [EPA-HQ-OAR-2022-0829-0638, pp. 64-65]

As charging deployment continues to increase, the distribution of this network, not just its size, risks limiting electrification—especially in rural areas. In response, the Biden-Harris Administration has taken a comprehensive approach to EVSE build-out, recognizing the diverse demographics, landscapes, and types of communities throughout the United States. Ubitquity and visibility are important components of a national EVSE network deployment. The Department of Transportation has put together separate toolkits to guide EVSE deployment in both urban230 and rural231 areas. Both toolkits go through an explanation of electric mobility basics, as well as the benefits and challenges that are specific to individuals, communities, and transit operators in their respective region types. Both expand on public-private partnership opportunities, as well as best practices for early planning and financing. With respect to EVSE, DOT has identified three levels of EVSE planning: community, corridor, and site. These toolkits are intended to guide private, state, and local entities as they implement federal funding and engage in other equitable, thorough EVSE deployment strategies. [EPA-HQ-OAR-2022-0829-0638, pp. 64-65]

230 "Charging Forward: A Toolkit for Planning and Funding Urban Electric Mobility Infrastructure," U.S. Department of Transportation, (June 2023) https://www.transportation.gov/urban-e-mobility-toolkit

231 "Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure," U.S. Department of Transportation, (June 2023) https://www.transportation.gov/rural/ev/toolkit

<u>EPA Summary and Response</u>

We received many comments from the public related to the electric power sector, including generation capacity, transmission capacity, distribution capacity, electric power reliability and resiliency, air quality and emissions modeling, inventories, infrastructure upgrade costs, electricity rates, etc.

In those instances when complex comments span several subjects, the reply may appear in several related sections. For instance, if a hypothetical comment is submitted regarding "How local health effects may depend upon future natural gas prices and the likelihood that natural gas-fired electric generating units (EGU) will provide electricity to the surrounding community?" the response to the comment may appear in the economics section (as the comment touches upon the price of natural gas over time) or the response may appear in the air quality modeling section (as the comment touches upon health effects) or it may appear in this section (as the topic touches upon electric power sector modeling).

A summary of these comments as well as EPA's response appears below.

Summary:

Topic: Electric Power System: Generation Capacity

We received many comments related to generation capacity from the public. Some commenters expressed concern that the EPA did not adequately consider the generation system capacity, while other commenters stated that there would be sufficient generation system capacity to accommodate the modest increases in electricity demand due to additional PEV charging associated with the final rule.

Topic: Electric Power System: Transmission Capacity

We received many comments related to transmission capacity from the public. Some comments expressed concern that the EPA did not adequately consider the transmission system capacity, while other commenters stated that there would be sufficient transmission system capacity to accommodate the modest increases in electricity demand due to additional PEV charging associated with the final rule.

Topic: Electric Power System: Distribution Capacity

We received many comments related to distribution system from the public. Some comments expressed concern that the EPA did not adequately consider the distribution system capacity, while other commenters stated that the additional distribution needs associated with the rule could be addressed, including through additional distribution buildout, managed charging strategies, and other tools to mitigate distribution needs.

Topic: Electric Power System Reliability and Resilience

We received many comments related to the electric power sector reliability from the public. The comments expressed concern that the EPA did not adequately characterize possible improvements and/or degradation to the electric power system. Other commenters stated that the electric power system has historically been reliable and the rule would not adversely affect grid reliability.

Response:

Overview of Distribution Infrastructure Feasibility and Lead-Time

EPA has carefully considered the comments regarding the distribution infrastructure for charging light- and medium-duty PEVs, including issues of feasibility, lead-time, and costs. In this first response, we focus on the feasibility and lead-time of distribution infrastructure. The agency has conducted comprehensive analyses of distribution infrastructure needed to support light- and medium-duty PEV charging, including in close coordination with the Department of Energy and informed by the extensive public engagement on this issue. We find that there will be sufficient lead-time to develop the necessary distribution infrastructure associated with light- and medium-duty PEV uptake under the modeled potential compliance pathway for the final standards. We note that the final standards themselves provide significant additional lead-time relative to the proposal, which also means additional lead-time to build and connect distribution infrastructure. Our conclusion as to the sufficiency of distribution infrastructure is supported by numerous comments and analyses, including those from the stakeholders most intimately familiar with building and operating distribution infrastructure: the utility industry and state utility agencies. Below, we highlight several key lines of evidence.

Because the need for distribution infrastructure is associated with increases in electricity demand, EPA evaluated demand increases at the national, regional, and local levels. We found only modest increases in demand associated with this Rule at all of these levels. Assuming manufacturers follow the modeled potential compliance pathway—which focuses on increasing penetrations of light- and medium-duty PEVs—we project the additional generation needed to meet the projected demand of the light- and medium-duty PEVs under the final standards combined with our estimate of PEV demand from the Heavy-duty Phase 3 GHG proposed rule, to be relatively modest compared to a no action case, ranging from 0.93 percent in 2030 to approximately 12 percent in 2050 for both actions combined. Of that increased generation, approximately 84 percent in 2030 and approximately 66 percent in 2050 is due to light- and medium-duty PEVs, which are projected to represent approximately 0.78 percent and 7.6 percent of total U.S. generation in 2030 and 2050, respectively. These are modest increases and consistent with historical increases in demand, such as accompanying the introduction of refrigerators, air conditioners, and data centers, which the electric utilities have successfully managed.

At the local level, our analysis is informed by the recent Department of Energy Transportation Electrification Impact Study (TEIS) which found that only a small amount of new infrastructure would be needed. The TEIS evaluated five States susceptible to increased infrastructure needs, including due to high concentrations of freight corridors necessitating additional infrastructure, dense urban areas with less space for infrastructure buildout, and rural areas with relatively little existing infrastructure. The study evaluated the combined effects of both the Light- and Medium-Duty Multi-Pollutant Rule and the Phase 3 Rule. It found only minor incremental increases in peak demand associated with the vehicle rules in 2027 and 2032 (+0.1 to +3.0%) and that even those minor increases could be reduced, in some cases to below zero (i.e., decreases in peak demand relative to the baseline without the vehicle rules), through basic, easily implemented, demand management strategies (-1.8% to +0.5%). The study estimated that the peak demand increases could be accommodated by a small volume of additional infrastructure; for example, in 2027 with basic management strategies, it found the need for zero new substations, five new feeders, and 2,400 transformers. Based on our assessment of the time needed to build different kinds of infrastructure, EPA determined that the level of buildout identified by the TEIS could be achieved within the timeframe available. EPA regards these projected increases in infrastructure as modest. The projected increases in 2027, when there is the shortest lead time for buildout, are small. As expected, demand is projected to increase in 2032 but there is considerably more available lead time in which buildout can be accommodated.

We also carefully evaluated programs and funding to support charging infrastructure, including at the Federal, State, local, and utility levels, for both depot and public charging. The Federal government continues to provide significant funds for developing charging infrastructure, including through the Charging and Fueling Infrastructure Discretionary Grant Program. Many States have also developed programs to support such infrastructure. Many localities and utilities also are actively developing innovative strategies to build and support additional charging infrastructure; for example, Edison Electric Institute, the trade group for the nation's investor-owned utilities, identified numerous such strategies and concluded that needed infrastructure could be timely developed. The final rule provides beneficial regulatory certainty to support the development of these programs and of charging infrastructure generally.

Finally, we underscore the potential for numerous innovative strategies to mitigate distribution infrastructure demands. As noted regarding the TEIS study, even basic mitigation strategies for light- and medium-duty PEV charging can significantly ameliorate or even reduce peak demand. A panoply of potential strategies—including short-term load rebalancing, smart charging contracts, flexible interconnections, hosting capacity maps, managed charging software, vehicle-to-grid technologies, distributed energy generation, integrated battery storage, and more—provides many opportunities for mitigating the impacts of additional demand, and in some cases, for providing benefits back to the grid as the volume of BEV charging increases.

Transportation Electrification Impact Study ("TEIS")

To further respond to comments regarding the lead-time and feasibility of distribution infrastructure, we provide a more in-depth discussion of TEIS, which addresses these issues. TEIS also addresses the costs of distribution infrastructure buildout, which are discussed in preamble IV.C.5 and RIA 5.

The Department of Energy Study, "Transportation Electrification Impact Study" ("TEIS")[591] is a first-of-its-kind study which performs thermal capacity analysis (at the substation, feeder, and service transformer levels) compared to cumulative LMHD vehicle demand (i.e., demand from both the light- and heavy-duty sectors) enabling location-specific estimates of potential buildout capacity needs and costs. This is the first study to be bottom up, comparing parcel level LMHD demand to parcel supply by PV (photo voltaic) and grid capacity at each examined parcel.[592] Previous studies made estimates of how the new demand from BEV might align with the existing grid capacity or studied the parcel level grid needs for a smaller area (as compared to this 5 state analysis). The TEIS is especially valuable, in fact unique, in assessing both a large

[591] Eric Wood, Brennan Borlaug, Kilian McKenna, Jeremy Keen, Bo Liu, Dave Narang, Lawryn Kiboma, Bin Wang, Wanshi Hong, Julieta Giraldez, Chuck Moran, Margot Everett, Troy Hodges "DOE Multi-State Transportation Electrification Impact Study" (March 2024) ("TEIS").

[592] A "parcel", as used in TEIS, means "a real estate property or land and any associated structures that are the property of a person with identification for taxation purposes." TEIS at 16 n. 18.

area (5-State) coupled with parcel-level analysis.[593] The study focuses on five study States (California, Illinois, New York, Oklahoma, and Pennsylvania), and extrapolates those results nationwide. The five states were intentionally chosen to address geographic concerns such as freight corridors, crowded urban areas, and rural areas with widely distributed demand sources. These states represent 30-35% of the costs of the extrapolated results in the TEIS, and 20% of overall peak 2021 demand. [594] They also account for nearly 20% of 2021 nationwide utility noncoincident[595] peak demand and account for 28% of investor-owned utility national investment.[596] The study also incorporates public charging such that the corresponding high power needs are reflected, addressing a concern of many comments. The study estimates overload at the substation level (100% criteria)[597], feeder level (100% criteria), and at the residential service transformer per feeder level (125% criteria).[598] Scenarios examined are no action case (baseline without EPA light-duty or heavy-duty emission standards), and action case with EPA light and heavy duty rules), using as an Action case the same case EPA used for its national and regional estimates presented above.), Both action and no action cases are analyzed with and without mitigation resulting in four scenarios generated. The study examines the same four scenarios for both 2027 and 2032.[599] The TEIS unmanaged (without mitigation) case assumes BEVs charge as soon as they arrive at a charger. In contract, the managed case simply distributes the BEV demand over the vehicle dwell time available for charging so that charging can occur at a slower rate. The BEV charging is ignorant to non BEV loads. Charging could still occur on top of, and increasing, peak demand. As an example, if the peak load due to existing homes and business occurs at 7 pm and the BEV dwell time runs from 6 pm to 6 am, the unmanaged charging would apply peak power charging at 7 pm, exacerbating peak demand. The managed scenario assumes a lower power level and uses the available dwell time. The peak power demand increases but at a lower level.

The TEIS projects minimal increase in demand (energy consumption) and minimal increase in peak demand for the LMHD action case relative to no action for both 2027 and 2032, even without considering any management. In 2027, incremental energy consumption across the five states attributable to the light- and heavy-duty rules ranged from 0.1-0.3%.[600] In 2032, that incremental increase ranged from 1.6% to 2.7%.[601] Incremental impact on 5 state peak demand, again from the unmanaged case, was 0.1-0.2% in 2027 and 0.6-3.0% in 2032.[602]

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[593] TEIS at 22-23.
[594] TEIS at 8, 99, 110. EPA agrees with the TEIS that these States' results are sufficiently representative to allow for national extrapolation. See TEIS App B for description of the extrapolation methodology in the Study.
[595] Noncoincident peak is the maximum power demand for a given time period occuring at different times than other peaks.
[596] TEIS at 111.
[597] Criteria level is showing if the peak loads are directly applicable to the design capacity of the system as is the case for the 100% criteria level. Criteria level of 125% for service transformer shows that many individual noncoincident peaks exist. See TEIS for additional detail.
[598] TEIS at 61 (substation), 62 (feeder), and 63 (transformer).
[599] TEIS at 18-19. The No Action case includes current state and federal policies and regulations as of April 2023. Id.
[600] TEIS at 70.
[601] TEIS at 71.
[602] TEIS at 76

If BEV users engage in non-optimized "conservative" management – spreading charging out over dwell times without consideration of actual extra grid capacity[603] – not only do these estimates of energy consumption and peak demand impacts decrease, but in some instances, peak demand is projected to decrease, that is, to be less than in the no action unmanaged case. Just by engaging in easy-to-implement time of day charging adjustments, overall demand to the grid is reduced (demand relative to the no action case), smoothing out overall demand and allowing for more efficient distribution. Thus, for 2027, incremental peak demand is reduced in four of the five states, and unchanged in the fifth.[604] For 2032, incremental peak demand is positive in two of the states but the increase is only 0.1% and 0.5%, and *reduced* in the other states by 0.5%-1.8% potentially obviating the need for any incremental buildout associated with the vehicle rules.[605]

These minor increases reflect low numbers of incremental transformers, feeders, and substations estimated to be needed (again, for the five states at issue, and for both light and heavy-duty rules together) relative to the no action case. In 2027, the TEIS projects need for only a single substation, and zero in the managed case. In 2032, the TEIS projects that only 8 substations would be needed in the unmanaged case, 4 if conservative mitigative measures are utilized.[606] Of these, all but one would be upgrades to an existing substation.[607] Projections for feeders are 9 in 2027 (5 in the managed case), and 125 in 2032 (75 if managed). In 2027, the TEIS projects 2800 transformers (2,400 if managed), and 30,000 in 2032 (21,000 in the managed case).[608] Compare this to the estimated 1 million transformers sold domestically each year, and the estimated 50 million transformers associated with the U.S. electric grid.[609] Industry is also responding with actions such as Prolec GE's $30 million expansion at its Shreveport, Louisiana transformer plant, their $85 million new plant in Monterrey, Mexico, and Siemens Energy investing $150 million to build their first transformer production facility in the US in Charlotte, North Carolina.[610]

EPA finds that this projected amount of buildout attributable to the rule can be accommodated in the rule's time frame. Realistic estimates for time needed to install infrastructure components have been studied and are shared here (and see also RIA Chapter 5 for further discussion):

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603 TEIS at 19.
604 TEIS at 76.
605 TEIS at 77.
606 TEIS at 84.
607 TEIS at 91-95.
608 TEIS at 84.
609 Power Technology Research, "The U.S. Distribution Transformer Market: A Replacement and Expansion Story" (June, 2022) at https://ptr.inc./the-u-s-distribution-transformer-market-continues-to-be-replacement-driven; and Environmental and Energy Study Inst, "Driven to Be More Energy Efficient, Distribution Transformers Are More than Meets the Eye" (August 25, 2023) at https://www.eesi.org/articles/view/driven-to-be-more-energy-efficient-distribution-transformers-are-more-than-meets-the-eye.
610 "Siemens Energy addresses the shortage of U.S. power transformers and invests in new factory". Siemens Energy press release. February 14, 2024. Available online: https://www.siemens-energy.com/global/en/home/press-releases/siemens_energy_addresses_shortage_US_powertransformers_invests_new_factory.html#:~:text=Siemens%20Energy%20addresses%20the%20shortage%20of%20U.S.,and%20invests%20in%20new%20factory&text=Siemens%20Energy%20is%20addressing%20the,creating%20almost%20600%20local%20jobs

		Time to Implement (months)	
Component	**Capacity per Borlaug**	**Borlaug et al. 2021[611]**	**EPRI[612]**
Substation New	3 – 10+ MW	24–48	36–60
Substation Upgrade	3 – 10+ MW	12–18	24–36
Feeder New	5+ MW		12–24
Feeder Upgrade	5+ MW	3–12	6–12
Transformer New	200+ kW	3 - 8	3 - 8

Although new substations are a significant undertaking that can take multiple years as shown in the Table above, as noted, the TEIS finds that, for the 5-state analysis, only 4 incremental substations are required for the managed scenario and 8 for unmanaged in 2032. In 2027, TEIS found that only a single upgraded substation (or none in the managed case). We note further that the estimates in the TEIS Study of the amount of distributive buildout needed are likely conservative with respect to this rule as the TEIS Study considered aggregate effects of the light/medium duty standards and the Phase 3 heavy duty emission standards together and did not disaggregate the results. Given the relatively low power requirements associated with light- and medium-duty electric vehicle charging, we expect the associated distribution system infrastructure upgrades to be less significant than that associated with heavy-duty charging. In addition as noted above, the "unmanaged" scenario presented above considers no mitigation efforts at all. In the managed scenarios with basic management practices, the estimated impacts decrease sharply. The action managed case is projected to *reduce* peak loads in all 5 States in 2027, and to reduce peak loads in 3 of the 5 States in 2032.

Additional Considerations Supporting Feasibility and Leadtime of Infrastructure

Commenters representing the utility sector also emphasized their ability to upgrade their systems as needed to accommodate the increases in electricity demand associated with PEV charging. EPA notes this assessment from the Energy Strategy Coalition:

> Members of this coalition are already engaging in long-term planning to meet the increased demand for electricity attributable to vehicle electrification, and the LMDV Proposal will provide a regulatory backstop supporting further investments in electrification and grid reliability. Demand for electricity will increase under both the LMDV Proposal and the recently-proposed Phase 3 Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles ("HDV Proposed Rule"), but the electricity grid is capable of planning for and accommodating such demand growth and has previously experienced periods of significant and sustained growth. Moreover, historic growth in demand and generation resources does not reflect the investments that will be made under the Infrastructure Investment and Jobs Act ("IIJA") and the Inflation Reduction Act ("IRA") to support the deployment of new renewable and zero-carbon generation resources, energy storage and charging infrastructure.

[611] Borlaug, B., Muratori, M., Gilleran, M. et al. "Heavy-duty truck electrification and the impacts of depot charging on electricity distribution systems". Nat Energy 6, 673–682 (2021). Available online: https://www.nature.com/articles/s41560-021-00855-0

[612] EPRI. "EVs2Scale2030TM Grid Primer". August 29, 2023. Available online: https://www.epri.com/research/products/000000003002028010

We also note the following supportive comment from Edison Electric Institute:

> As EPA notes, the electric power sector has a long history of accommodating growth in electricity demand from the adoption of new technologies, including electric home appliances, residential and commercial air conditioning, and data centers. See id. At 25,983. Electricity use from EVs today is modest. Argonne National Lab estimates the approximately 2.3 million EVs on the road as of the end of 2021 consumed 6.1 terawatt-hours of electricity in that year, or about 0.16 percent of the total electric sales to U.S. customers in that year. As EPA also notes, the increase in electricity use resulting from the Proposed Rule also will be modest, increasing electricity end-use by less than 3 percent in 2055. See id. On a macro-level, meeting the increased energy usage from electric truck adoption as contemplated in the Proposed Rule will not be a significant challenge for the electric power sector. Meeting the location-specific power needs of large electric vehicle (EV) charging facilities can be a more pressing challenge. *** However, this is a challenge that can be addressed with deliberate effort and collaboration among electric companies, fleet operators, and stakeholders.

We have also observed States and localities taking appropriate action to support needed infrastructure. For example, as the Energy Strategy Coalition notes, “Expectations for electrification of the vehicle fleet are already being incorporated into long-term planning decisions of electric utilities, regional transmission organizations and independent system operators. For example, National Grid co-authored a November 2022 study to “support utility long-term capital planning,” which assumed that the two states in its service territory (New York and Massachusetts) reached 100% sales of zero-emission passenger vehicles by 2035 and complied with California’s Advanced Clean Trucks regulation.”[613] Numerous States and Cities also submitted supportive comments reflecting the support for charging infrastructure in their jurisdictions.[614]

Historical precedent also provides substantial support for the feasibility of the needed distribution buildout. As we noted at proposal, and as several commenters agreed, U.S. electric power utilities routinely upgrade the nation’s electric power system to improve grid reliability and to meet new electric power demands. For example, when confronted with rapid adoption of air conditioners in the 1960s and 1970s, U.S. electric power utilities maintained reliability and met the new demand for electricity by planning and building upgrades to the electric power distribution system. Likewise, U.S. electric power utilities planned and built distribution system upgrades required to service the rapid growth of power-intensive data centers and server farms over the past two decades. The U.S. electric power distribution system infrastructure has already successfully accommodated the addition of 1.4 million electric vehicles in 2023 alone.[615]

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[613] See GIDEON KATSH ET AL., NATIONAL GRID, ELECTRIC HIGHWAYS: ACCELERATING AND OPTIMIZING FAST-CHARGING DEPLOYMENT FOR CARBON-FREE TRANSPORTATION 1 (Nov. 2022), https://www.nationalgrid.com/document/148616/download.

[614] See CA AG Comment at 21-25.

[615] U.S. DOE. Statement by U.S. Energy Secretary Jennifer M. Granholm on 2023 EV Sales. Accessed February 22, 2024. January 5, 2024. Available online: https://www.energy.gov/articles/statement-us-energy-secretary-jennifer-m-granholm-2023-ev-sales

We note further that the need for additional infrastructure buildout is not an unprecedented situation with CAA section 202 standards. For example, when EPA required the removal of lead from gasoline, an entire new parallel fuel distribution system was developed to dispense the new unleaded gasoline. Other examples where new distribution systems arose to ensure delivery of fuels necessary to vehicular pollution control include the infrastructure to supply diesel exhaust fluid (used to support selective catalytic reduction) and ultra-low sulfur diesel fuel (used to support diesel particulate filters). We thus see that there can be successful market responses to demand created by a section 202 standard, including successful responses from unregulated entities.

Consistent with this historical precedent, we expect that the final rule itself will serve as a strong signal to the utility industry to make proactive investments and otherwise proactively analyze and plan for potential buildout needs. Numerous commenters, including utilities, State and local governments, NGOs, and other experts, filed comments in agreement.

Putting this together, EPA finds that the increases in national electricity demand associated with the rule are very low in 2027 and increase to modest and manageable levels in later years of the program. At a regional and local level, we expect some areas to see small increases in peak demand, while other areas may see small decreases in peak demand associated with basic managed charging strategies. The resulting level of needed infrastructure buildout is small and manageable given the lead-time available.

Time for Interconnection

Certain commenters noted that even if no distributive buildout is needed, the time for interconnection can be significant. In response, EPA notes that the timeline for EVSE deployment—even without distribution upgrades—is very site specific and also has considerable variability based on the permitting jurisdiction, but we believe that where connection is required, that can be accomplished within the leadtime provided. Electrify America found that after site construction is completed, an additional 12 weeks was required on average for inspection, commissioning and other steps before a site was energized. In addition, permitting times can vary by region and site specifics. For example, Electrify America reported that the permitting process took an average of 13 weeks for its U.S. "ultra-fast" DCFC stations in 2021, but took over twice as long for stations in New Jersey.[616] Finally, we note FERC Order 2023, which relates to interconnection reforms. Order 2023 requires grid operators to adopt certain interconnection practices with the goal of reducing interconnection delays. These practices include a first-ready, first-served interconnection process that requires new generators to demonstrate commercial readiness to proceed, and a cluster study interconnection process that studies many new generators together.[617]

[616] Electrify America, "2022 Annual Report to U.S. Environmental Protection Agency," April 2023. Accessed March 11, 2024 at: https://media.electrifyamerica.com/assets/documents/original/1018-2022NationalAnnualReport.pdf.

[617] See generally FERC Order 1023, 184 FERC ¶ 61,054 (July 28, 2023) (Docket No. RM22-14-000).

Additional Comments and Responses

When commenting on the methodology that we used to determine the effects and costs of generation, transmission, and distribution system impacts presented in the proposed rule, some commenters stated that "EPA does not include in its assessment a clear explanation on how this estimate was obtained."

EPA conducted extensive electric power sector modeling analyses in which it concluded that there is adequate generation and transmission capacity required to meet the electric load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity.

In this final rule, EPA demonstrates that the impacts of both this rule alone and this rule combined with other proposed EPA actions result in anticipated power grid changes that 1) are consistent with key National Electric Reliability Corporation (NERC) assumptions, 2) that are consistent with historical trends and empirical data, and 3) are consistent with goals, planning efforts and Integrated Resource Plans (IRPs) of industry itself.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985 (also referred to as "Resource Adequacy Technical Memorandum").

EPA also conducted extensive and first-ever, national-level distribution system modeling analyses in conjunction with the U.S. Department of Energy (DOE), the National Renewable Energy Laboratory (NREL), and the Lawrence Berkeley National Laboratory (LBNL) in support of this final rule. This analysis found that managed electric vehicle charging confers many benefits to the distribution system and its reliability and. For additional discussion For additional discussion, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the joint DOE-NREL-LBNL-EPA Technical Report for the Transportation Electrification Infrastructure Study (TEIS).

One commentor expressed concern that electric vehicles will require new EGUs that "rely heavily on carbon capture technologies to keep the emissions from these electricity-generating power plants out of the atmosphere. Current carbon capture technologies are experimental and may prove dangerous."

The final rule is not premised on the adoption of CCS technologies at EGUs. The electric power grid has been and continues to be in transition, from coal-fired to renewably-sourced generation. As such, we expect that the electric power generation capacity required to charge the electric vehicle fleet will be derived increasingly from renewable sources and less so from fossil fuel-fired sources. Variations of CCS have been in use safely for over 40 years for enhanced oil recovery, a process by which carbon dioxide is injected underground to increase oil production.

One commenter stated, "As indicated by a study conducted by the National Renewable Energy Laboratory (NREL), dramatically accelerating electrification of sectors such as transportation, may make it more difficult to decarbonize the electricity system due to the higher rate of generation and transmission capacity additions needed." However, the authors of the cited NREL report go on to state in the sentence following the one provided by the commentor that implementing such transportation electrification, when combined with the electrification of building end-uses "is likely a key part of the most cost-effective pathway to achieving largescale decarbonization across the economy." EPA's modeling of the emissions impacts of this rule, including the upstream impacts associated with increased electricity generation, concludes that the rule will create significant net reductions of GHGs and criteria pollutants and will lead to air quality improvements across the United States.

One commentor stated that the results of the final rule "leap-frog even President Biden's ambitious 2030 target… described in The U.S. National Blueprint for Transportation Decarbonization, authored by four cabinet level agencies."

As a "blueprint", the self-described U.S. National Blueprint for Transportation Decarbonization does not set enforceable targets but, rather, serves as a long-term guide for federal agencies tasked with writing climate change-related policies. While EPA is aware of the U.S. National Blueprint for Transportation Decarbonization, it is not part of EPA's rationale for this rulemaking. Rather, EPA promulgated this rulemaking under its own authority in the Clean Air Act and based on the Administrator's own judgments as to feasibility, costs, lead-time, and other factors.

Some commenters claim that the Integrated Planning Model (IPM), EPA's multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector that EPA used to develop this final rule, does not consider the cost of grid-scale electric power storage. EPA disagrees; IPM provides projections of least-cost capacity expansion, electricity dispatch, and emission control strategies for meeting energy demand and environmental, transmission, dispatch, and reliability constraints and does, in fact, consider the cost of grid-scale electric power storage.

As some commenters note, the Inflation Reduction Act does not include transmission system permitting reforms.

As an initial matter, the need for new transmission lines associated with the final rule and the HD Phase 3 Rule between now and 2050 is projected to be very small, approximately one percent or less of transmission. Nearly all of the projected new transmission builds appear to overlap with pre-existing transmission line right of ways (ROW), which makes the permitting process simpler. Approximately 41-percent of the potential new transmission line builds projected by IPM have already been independently publicly proposed by developers. The agency finds that the utility sector can reasonably manage this very limited need for additional transmission.[618] We do not believe transmission system permitting reforms are needed to accommodate the minimal increases in transmission infrastructure associated with this rule.

Further, several recent initiatives have been undertaken to improve the transmission system planning and permitting process. These initiatives have been undertaken by the Congress, DOE, and FERC. For example, FERC issued a Notice of Proposed Rulemaking (NOPR) in 2022, titled Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection, that requires transmission operators to conduct long-term

[618] See RIA 5.2.7.

transmission planning as well as requiring transmission providers to work with states to develop a cost-allocation formula, among other changes. The primary goal of the NOPR is to improve the quality of transmission projects that get built and to align the projects with long-term capacity needs to insure that the new builds are will continue to foster grid reliability into the future.

DOE recently announced several programs and projects to accelerate transmission system permitting reforms. Examples of such programs and projects include DOE's Interconnection Innovation e-Xchange (i2X), which aims to increase data access and transparency, improve process and timing, promote economic efficiency, and maintaining grid reliability; DOE's Grid Resilience and Innovation Partnerships (GRIP) program, with $10.5 billion in Bipartisan Infrastructure Law funding to develop and deploy Grid Enhancing Technologies (GET), such as Dynamic Line Ratings (DLR) and Advanced Power Flow Controllers (APFC), which help to increase the load carrying ability of transmission lines. To facilitate upgrading and rebuilding transmission lines, DOE issued a Notice of Proposed Rulemaking to update its National Environmental Policy Act ("NEPA") implementing regulations. DOE also conducted the National Transmission Planning Study to designate areas experiencing electricity transmission constraints or congestion as National Interest Electric Transmission Corridors (NIETCs). In February 2024, DOE announced a Request for Proposals (RFP) for the second round of the Transmission Facilitation Program, a revolving fund supported by the Bipartisan Infrastructure Law to help overcome financial hurdles facing large-scale new and upgraded transmission lines.

To facilitate transmission interconnection reforms, FERC has initiated a rulemaking for Order 2023 (Improvements to Generator Interconnection Procedures and Agreements), which requires grid operators to adopt certain interconnection practices with the goal of reducing interconnection delays in the face of rapidly growing interconnection queues of new resources looking to connect to the transmission system. These practices include a first-ready, first-served interconnection process that requires new generators to demonstrate commercial readiness to proceed, and a cluster study interconnection process that studies many new generators together.

Citing perceived hurdles in the transmission line siting process, the Congressional Research Service (CRS) notes that transmission permitting reform has been a topic of debate in the 118th Congress and that Congress amended FERC's siting authority in the Infrastructure Investment and Jobs Act in 2021. The CRS also notes that "DOE and FERC are currently developing regulations to implement this revised authority. Some transmission permitting reform legislative proposals would further amend this authority, for example by granting siting authority for all large interstate transmission lines to FERC."[619]

Energy storage projects can also be used to help to increase transmission line capacity by reducing line congestion and are seen as alternatives to transmission line construction. These projects, known as Storage As Transmission Asset (SATA), can help to reduce transmission line congestion, have smaller footprints, have shorter development, permitting, and construction times, and can be added incrementally, as required. Examples of SATA projects include the ERCOT Presidio Project, a 4 MW battery system that improves power quality and reducing momentary outages due to voltage fluctuations, the APS Punkin Center, a 2 MW, 8 MWh battery system deployed in place of upgrading 20 miles of transmission and distribution lines, the

[619] Congressional Research Service, 2023. Electricity Transmission Permitting Reform Proposals (https://crsreports.congress.gov/product/pdf/R/R47627/3).

National Grid Nantucket Project, a 6 MW, 48 MWh battery system installed on Nantucket Island, MA, as a contingency to undersea electric supply cables, and the Oakland Clean Energy Initiative Projects, a 43.25 MW, 173 MWh energy storage project to replace fossil generation in the Bay area.

Through such efforts, the interconnection queues can be reduced in length, transmission capacity on existing transmission lines can be increased, additional generation assets can be brought online, and electricity generated by existing assets will be curtailed less often. These factors help to improve overall grid reliability.

This should not be considered a comprehensive list of transmission system initiatives or storage activities currently underway.

One commenter claimed that “The electrical grids are neither stable nor safe enough to handle EPA’s proposal” and that “The country will be more energy dependent and less secure because of it.” The commenter, however, fails to adduce any data, analysis, or other evidence in support of its view. Therefore, its comment is not raised with reasonable specificity as required. As we explain in preamble IV.C.5, EPA has performed comprehensive analysis of grid reliability and projects that this rule will not adverse affect grid reliability. Further, EPA’s analysis of energy security shows that this rule will create significant positive energy security benefits. See IV.C.7.iii of this preamble for a discussion of energy security benefits.

One commenter claim that the electric power system is “already strained” by the uptick in renewable energy.”

Sources of renewable electricity generation currently comprise one-quarter of total generation by the U.S. power sector (EIA Monthly Energy Review (2/24). EPA also notes that this increase in renewable electric power generation coincides with an increase in grid reliability.(https://www.eia.gov/todayinenergy/detail.php?id=45796).

These indicators suggests that the U.S. electric power system is capable of safely and effectively delivering electricity from renewable sources. Studies from DOE show how the U.S. could accommodate between 70-79% of wind and solar generation by 2050 (Brinkman, Gregory, Dominique Bain, Grant Buster, Caroline Draxl, Paritosh Das, Jonathan Ho, Eduardo Ibanez, et al. 2021. The North American Renewable Integration Study: A U.S. Perspective. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-79224. https://www.nrel.gov/docs/fy21osti/79224.pdf).

EPA’s analysis in the Resource Adequacy Technical Memorandum further finds that this rule and the HD Phase 3 Rule (“Vehicle Rules”), whether alone or combined with other EPA rules affecting the power sector (“Power Sector Rules”), are associated with changes in grid composition that do not adversely affect resource adequacy, a key element of grid reliability. As part of this analysis, we show that significant increases in variable renewable penetrations can be achieved while respecting resource adequacy, as projected by multiple, highly respected peer-reviewed models.

Citing an article about indoor marijuana cultivation, one commenter claimed that the electric power system is “running on an antiquated delivery system established several decades ago.”

We overview the history of the electric power sector in preamble IV.C.5. While aspects of this claim may be correct, many articles, reports, and studies from sources such as Institute of Electrical and Electronics Engineers (IEEE), a “professional association for electronics engineering, electrical engineering, and other related disciplines,” find that electric vehicles can facilitate the integration of renewable resources. For instance, see “EVs Are Essential Grid-Scale Storage” (https://spectrum.ieee.org/electric-vehicle-grid-storage), which summarizes the results of the research of Xu et. al (Xu, C., Behrens, P., Gasper, P. et al. Electric vehicle batteries alone could satisfy short-term grid storage demand by as early as 2030. Nat Commun 14, 119 (2023). https://doi.org/10.1038/s41467-022-35393-0).

Citing a California news report, one commenter claimed that “EV owners asked to not charge vehicles during peak hours” during the 2022 heatwave that affected southern California. The article cited by the commentor cites an alert issued by the California Independent System Operator (ISO), which oversees the operation of California's bulk electric power system. In the alert, California ISO requested “voluntary electricity conservation” when temperatures in Northern California were 10-20 degrees warmer than normal and 10-18 degrees warmer than normal in Souther California. The California ISO’s request continued: “To minimize discomfort and help with grid stability, consumers are also encouraged to pre-cool their homes and use major appliances and charge electric vehicles and electronic devices before 4 p.m., when conservation begins to become most critical.”

The California ISO alert also provided a list of ten voluntary ways in which electricity consumers could help to reduce electricity consumption during the alert, of which postponing electric vehicle charging was one. A U.S. Department of Energy (DOE) report agrees with these actions as options for consumers to improve energy efficiency (https://www.energy.gov/energysaver/reducing-electricity-use-and-costs#:~:text=Incorporate%20passive%20solar%20design%20concepts,heater%20and%20operate%20it%20efficiently).

Generally, we find that scheduling electric vehicle charging during lower demand periods can significantly reduce the costs of charging as well as provide important services to the grid. We further discuss the benefits of managed charging practices in preamble IV.C.5.

Citing an article, a commenter claims that the cybersecurity concerns associated with electric vehicle charging are “without a solution.” However, the cited article presents “several patches for the existing (cybersecurity) vulnerabilities and discuss two methods aimed at detecting EV attacks.” Continuing, the commenter claims that “The grids not only lack the capacity to accommodate the Proposed Rule’s new demands on them, but are also nowhere near secure enough to take them on.”

The commenter makes two claims: that the grid lacks capacity and that the grid is not secure. Regarding the first claim, EPA conducted extensive electric power sector modeling analyses in support of this final rule in which it concluded that there is adequate generation and transmission capacity to meet the load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to also meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity. Through such analyses, we project that the final rule will not have adversely affect resource adequacy and grid reliability. The managed charging of electric vehicle has also been shown to increase grid reliability and facilitate the deferral of electric power sector infrastructure.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

Regarding the second claim, Presidential Executive Order 13636: Improving Critical Infrastructure mandates that the Department of Homeland Security (DHS) establish a Cybersecurity Framework, which has been done in conjunction with the National Institute of Standards and Technology (NIST). As directed by DHS, NIST has undertaken several actions and activities, including the recently released NIST Cybersecurity Framework (CSF) 2.0, designed to contend with a range of threats and multiple attack vectors, both physical and cyber. In response to a National Security Memorandum, "Improving Cybersecurity for Critical Infrastructure Control Systems," DHS's Cybersecurity and Infrastructure Security Agency (CISA), in coordination with NIST, developed preliminary cybersecurity performance goals (https://www.govinfo.gov/content/pkg/DCPD-202100622/pdf/DCPD-202100622.pdf). In addition to collaborating with DHS, NIST works closely with the Department of Energy and several National Laboratories in securing EV charging stations, data flow networks, and utility power distributers.

We note, moreover, that cybersecurity concerns are not limited to PEV charging. The same true with respect to power outages more generally. Both of these concerns apply to infrastructure more generally, including the infrastructure used to fuel ICE vehicles. For example, as gasoline pumps are electric powered, power outages affect both owners of all vehicles. As we note in RIA 5.4.5:

The effect of power outages on electric vehicle owners is expected to be similar to that of non-electric vehicle drivers. Neither driver will be able to "fuel" during power outages, as gasoline pumps are electric powered. However, electric vehicles can provide their owners with residential power for a limited time. Moreover, electric vehicle chargers that are attached to distributed energy resources, such as homes or businesses with solar and/or stationary battery storage, would be unaffected by power outages and, thereby, can continue to provide charge for electric vehicles via its independent capacity. In fact, electric vehicles could be used to power gasoline pumps during electric power outages. Given that the physical extent of typical power outages tends to be relatively small, electric vehicle drivers, as well as conventional vehicle drivers, can be expected to drive out of the outage area and to unaffected charging or refueling stations, should it become necessary. Furthermore, we note that there are cybersecurity concerns uniquely associated with refueling of ICE vehicles, for example, cybersecurity attacks on petroleum pipelines. See The Attack on Colonial Pipeline: What We've Learned & What We've Done Over the Past Two Years, https://www.cisa.gov/news-events/news/attack-colonial-pipeline-what-weve-learned-what-weve-done-over-past-two-years

One commentor claims that "EPA fails to account for the rising cost of electricity over the regulatory period." Another commentor claims that "in some cases, these costs will ultimately be passed on to ratepayers" when discussing the cost of electrical infrastructure upgrades associated with this final rule. EPA discusses the impacts on retail electricity prices in preamble IV.C.5 and RIA 5.

When discussing possible costs associated with National Electric Vehicle Infrastructure (NEVI) program, a formula program administered by the Federal Highway Administration (FHWA) and the Joint Office of Energy and Transportation and funded through the Bipartisan Infrastructure Law, as enacted in the Infrastructure Investment and Jobs Act, one commentor cited infrastructure costs from the Electric Vehicle Infrastructure Deployment Plans from Idaho and Indiana.

EPA notes that NEVI funds can be used to offset certain increases in EVSE and distribution costs due to increased PEV charging associated with the final rule. The existence of NEVI funds, along other funding opportunities, further supports that the needed charging infrastructure can be developed. We further discuss funding opportunities for EVSEs in RTC 17.

NEVI is a federally-funded voluntary program to which state apply. As such, it is presumed that the states of Idaho and Indiana voluntarily sought NEVI funding and, conversely, that if these states did not desire electric vehicle infrastructure funding from this voluntary program, they would not have applied. The NEVI program has funded a total in $615 million in 2022, an estimated $885 million in 2023, and $885 million in each successive year until the end of fiscal year 2026.

NEVI Formula Program funds can be used for electric grid equipment and upgrades. The costs to acquire and install on-site electric service equipment (e.g., power meter, transformer, switch gear) are eligible. Costs for minor grid upgrades are also eligible, provided the work is necessitated solely by the construction or upgrading of the EV charging station and participation in the upgrade does not exceed the allocable cost of the minimum upgrades needed to match the planned power requirements of the EV charging station. A minor grid upgrade is defined as the work necessary to connect a charging station to the electric grid distribution network; for example, extending power lines or upgrading existing power lines several miles. Finally, major grid upgrades, such as longer line extensions or upgrades, improvements to offsite power generation, bulk power transmission, or substations are ineligible.

State DOTs are encouraged to consider the magnitude of these costs and explore whether they could be covered by the electric utility or programs other than the NEVI Formula Program so as to minimize use of NEVI Formula funds for grid upgrades where possible. See the Utility Planning section below for additional information.

States are also encouraged to consult with the FHWA and the Joint Office of Energy and Transportation to determine if an exception to charging station siting requirements may be warranted or if there are additional viable alternatives.

One commentor claims that “EPA fails to account for the impacts of mass electrification (increased electricity demand), the transmission infrastructure upgrades and battery storage that will be needed to support a transition to renewable generation sources, and the potential impacts to electrical grid costs and reliability” in its projection of future electricity prices.

As noted earlier, EPA conducted extensive electric power sector modeling analyses in support of this final rule in which it accounted for the impacts of mass electrification (increased electricity demand), the transmission infrastructure upgrades and battery storage that will be needed to support a transition to renewable generation sources and the potential impacts to electrical grid costs. In conducting the modeling analysis, EPA demonstrated that there is adequate generation and transmission capacity to meet the load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to also meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

One commentor claims that "EPA does not adequately consider potential grid reliability impacts."

As noted earlier, EPA conducted extensive electric power sector modeling analyses in support of this final rule in which it considered potential grid reliability impacts. In this modeling analyses, EPA demonstrated that there is adequate generation and transmission capacity to meet the load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to also meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity for the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

One commentor alleges that "Reliance on BEVs may have unintended, negative consequences, especially in relation to the electricity generation sector." The commenter, however, fails to adduce any data, analysis, or other evidence in support of its claim. Therefore, its comment is not raised with reasonable specificity as required.

Notwithstanding the commenter's failure to provide any data or analysis in support of its contentions, EPA conducted extensive electric power sector modeling analyses in support of this final rule in which it considered potential grid reliability impacts. In this modeling analyses, EPA demonstrated that there is adequate generation and transmission capacity to meet the load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to also meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity for the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas

Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

One commentor claims that "charging infrastructure is inadequate to meet the country's transportation needs."

This study cited by the commentor discusses shoppers' interest in purchasing electric vehicles. The study cited by the commentator finds that "26% of shoppers say they are "very likely" to consider purchasing an EV, up from 24% a year ago, while the percentage of shoppers who say they are "overall likely" to consider purchasing an EV increases to 61% from 59% in 2022." The study also finds that "Most EV owners will say charging is one of the greatest benefits of ownership, because 85% of it is done at home, But it's the exceptional use case—like a vacation road trip—that's holding shoppers back." While the study also reveals dissatisfaction with public charging, the study makes no claims about the adequacy of the U.S. charging infrastructure. We further respond to comments about EVSEs, including public charging stations, in RTC 17.

The second reference cited by the commentator considers "home charging behaviors and attitudes", rather than the adequacy of the U.S. charging infrastructure. Moreover, the second reference cited by the commentator is scheduled to be published after this rule is finalized. As the study has not yet been released to the public, EPA cannot comment on the merits of the claims made therein.

One commentor claims that "EPA's analysis of grid impacts and electrical reliability is unrealistic" and that "ZEV mandates like the proposed rule also present significant risks to grid reliability and the stability of the transportation sector, yet EPA's analysis of electrical grid impacts is weak." EPA disagrees. EPA conducted extensive electric power sector modeling analyses in support of this final rule in which it considered potential grid reliability impacts. In this modeling analyses, EPA demonstrated that there is adequate generation and transmission capacity to meet the load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to also meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity for the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

Moreover, as we explain in RTC 2, this rule is not a "ZEV mandate." Manufacturers may comply with this rule in many ways, including by producing no additional BEVs above the no-action baseline. See preamble IV.

Some commentors expressed a need to be better-integrated into the planning processes. The National Association of Regulatory Utility Commissioners (NARUC) has undertaken several key initiatives that help to facilitate outreach and communications between Public Service

Commissions and Public Utilities Commissions and the investor-owned utilities, publicly owned utilities, and member-owned or cooperative utilities that they regulate.

Some commentors expressed concerns about supply chain shortfalls related to electric power sector components. The Department of Energy is undertaking several programs to reduce supply chain lead times for electric power sector components. These programs range from addressing the ongoing shortage of grain-oriented electrical steel (GOES) to developing and approving approaches to speed the development of EV charging infrastructure and include a Siemens transformer manufacturing facility (Expanding U.S. transformer manufacturing and service footprint (siemens-energy.com)), a DOE award to CorePower Magnetics to build a manufacturing facility for magnetic components and advanced metals (CorePower Magnetics Awarded $20M from DOE to Establish Domestic Manufacturing Facility in Pittsburgh), a DOE funding announcement for Flexible and Innovative Transformer Technologies (U.S. Department of Energy Announces $18 Million for Flexible, Innovative Transformers | Department of Energy), and a late 2022 announcement from Hitachi Energy of a $37 million investment in its transformer manufacturing facility in Virginia (Hitachi Energy invests US$37 million to expand transformer manufacturing facility in South Boston, Virginia).

Significant investment is going toward improving grid component supply chains and many innovative charging solutions are available to minimize the need for grid upgrades. BIL and IRA incentives have led to significant new investments in grid component supply chains in the U.S. that will reduce lead times and costs for needed utility upgrades. In February 2024, Siemens announced that it will invest $150 million in a transformer manufacturing facility in North Carolina that will build and refurbish large power transformers.[620] CorePower Magnetics received a $20 million DOE award to build a manufacturing facility for amorphous metals and magnetic components that are used in transformers, among other applications. The facility will increase U.S. production by 20%.[621] DOE also announced a funding opportunity in February 2024 for $18 million to advance research, deployment, and demonstration of transformer technologies that can alleviate supply chain constraints.[622] In addition, numerous tools are available to accelerate connection of new EV charging loads to the utility grid. As discussed in Section IV.C.5 of the Preamble, flexible interconnection using power control systems can allow new fast charging loads to connect to the grid while utility upgrades are still in progress. Battery-integrated charging, which reduces charging stations' maximum power draw from the grid, can accelerate deployment by mitigating the need for utility system upgrades and can also potentially lower levelized costs of charging.[623] One company, Freewire, sells DC fast chargers with built-in battery storage.[624] Other types of distributed generation (including solar, linear generators, and fuel cells) can similarly be used to reduce the dependence of charging infrastructure on the grid. Utilities also have opportunities to smooth deployment of charging infrastructure, and can help their customers find locations where fewer grid upgrades would be needed. Utility hosting

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620 Siemens Energy. February 15, 2024. Available online: https://www.siemens-energy.com/global/en/home/stories/transformer-manufacturing-and-service-expansion-in-us.html.

621 U.S. Department of Energy. "Advanced Energy Manufacturing and Recycling Program Selections". Available online: https://www.energy.gov/mesc/advanced-energy-manufacturing-and-recycling-program-selections.

622 https://www.energy.gov/oe/articles/us-department-energy-announces-18-million-flexible-innovative-transformers

623 Poudel, S., J. Wang, K. Reddi, A. Elgowainy, and J. Zhou. Forthcoming. "INNOVATIVE CHARGING SOLUTIONS FOR DEPLOYING THE NATIONAL CHARGING NETWORK: TECHNOECONOMIC ANALYSIS".

624 https://freewiretech.com/dc-boost-charger/

capacity maps are available in at least 24 states and the District of Columbia, and maps that show capacity for additional load can direct charging infrastructure developers toward sites where installations can be completed more quickly.[625] New software platforms like the Energy Services eXchange (ESX), developed by Evoke and Argonne National Laboratory with funding from DOE, can help utilities manage EV loads on their distribution systems to further limit required upgrades.[626] Other potential solutions to accelerate EVSE deployment include mobile charging, sharing private chargers, and battery swapping.[627,628,629]

When inquiring about managed charging, one commentor asks "who would manage charging behavior, by what authority, and based on what standards or criteria."

The standards and criteria by which managed charging will occur are being addressed by the relevant state agencies, electric utilities, national associations representing these state agencies, standard-setting organizations, and the public. The motivation to address such issues is primarily economic self-interest. Electric utilities benefit from managed charging. The shareholders of electric utilities benefit from managed charging. Electric vehicle users benefit from managed charging. And electricity ratepayers – including those who are not electric vehicle users – benefit from managed charging.

The commenter alleges that "EPA does not account for the costs of these suggestions in its DRIA nor for any other safeguards to protect grid reliability." The commenter, however, fails to adduce any data, analysis, or other evidence in support of its claim. Therefore, its comment is not raised with reasonable specificity as required.

Notwithstanding the commenter's failure to provide any data or analysis in support of its contentions, EPA conducted extensive electric power sector modeling analyses in support of this final rule in which it concluded that there is adequate generation and transmission capacity to meet the load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to also meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity.

Our examination of the record, informed by our consultations with DOE, FERC, and other power sector stakeholders, is that the final standards of this rule, whether considered separately or in combination with the Phase 3 HD vehicle standards and upcoming power sector rules, are unlikely to adversely affect the reliability of the electric grid, and widespread adoption of PEVs could have significant benefits for the electric power system. For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

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[625] https://www.energy.gov/eere/us-atlas-electric-distribution-system-hosting-capacity-maps
[626] https://esx.energy/
[627] https://www.bloomberg.com/news/articles/2023-11-04/these-electric-vehicle-chargers-will-come-to-you
[628] https://evmatch.com/
[629] https://www.technologyreview.com/2023/05/17/1073265/how-5-minute-battery-swaps-could-get-more-evs-on-the-road/

One commentor asks about the role of natural gas in helping to secure grid reliability between 1992 and 2021.

According to the Energy Information Administration, four times as much coal was used to generate electricity in the U.S. in 1992 than natural gas. In 2001, three times as much coal was used to generate electricity in the U.S. than natural gas. In 2009, two times as much coal was used to generate electricity in the U.S. than natural gas. It was only in 2015 that the amount of coal used to generate electricity in the U.S. was roughly equal to the amount of natural gas used to generate electricity. EPA projects that significant natural gas capacity will remain online to support grid reliability. We further discuss our projections of generation capacity in RIA 5.2.5.

Renewable sources of electricity have recently supplanted coal-fired sources of electricity and the increasingly successful integration of the renewable sources into the electric power sector will continue to help secure grid reliability.

One commentor suggests that EPA "disregards the regional variations in expected PEV uptake, electricity generation, electricity demand, and grid reliability."

EPA disagrees with this comment. Regional variations in expected PEV uptake are addressed in the Likely Adopter Model (LAM). Regional variations in electricity generation and demand are also addressed in the electric power sector modeling, and resource adequacy related issues are addressed in the Resource Adequacy Technical Memorandum.

As noted earlier, EPA conducted extensive electric power sector modeling analyses in support of this final rule in which it accounted for the impacts of mass electrification (increased electricity demand), the transmission infrastructure upgrades and battery storage that will be needed to support a transition to renewable generation sources and the potential impacts to electrical grid costs. In conducting the modeling analysis, EPA demonstrated that there is adequate generation and transmission capacity to meet the load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to also meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

One commentor claims that "CAA Section 202(a) does not authorize the agency to force grid operators to manage electrical loads in completely new ways, or to dictate vehicle charging behavior."

EPA expects those agencies and organizations whose responsibility it is to manage electrical loads and/or affect charging behavior to fulfill their obligations. Contrary to the commentor's claim, this final rule does not compel or dictate actions beyond which the CAA Section 202(a) currently authorizes the agency to do in carrying out its environmental protection mission. EPA has assessed how grid operators and vehicle drivers may respond to the increased PEV adoption associated with the rule, but the final rule does not require grid operators to manage electrical loads in any specific way or dictate the vehicle charging behavior of EV drivers. Citing North

American Electric Reliability Corporation's (NERC's) reliability assessments, some commentors suggest that the final rule "fails to recognize existing grid reliability concerns."

EPA conducted extensive electric power sector modeling analyses in which it concluded that there is adequate generation and transmission capacity required to meet the electric load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity.

In this final rule, EPA demonstrates that the impacts of both this rule alone and this rule combined with other proposed EPA actions result in anticipated power grid changes that 1) are consistent with key National Electric Reliability Corporation (NERC) assumptions, 2) that are consistent with historical trends and empirical data, and 3) are consistent with goals, planning efforts and Integrated Resource Plans (IRPs) of industry itself.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

Moreover, as we note in preamble IV.C.5, power interruptions caused by extreme weather are the most-commonly reported, naturally- occurring factors affecting grid reliability, with the frequency of these severe weather events increasing significantly over the past twenty years due to climate change. Decreasing emissions of greenhouse gases can be expected to help reduce future extreme weather events, which would serve to reduce the risks for electric power sector reliability. By requiring significant reductions in GHGs from new motor vehicles, this rule mitigates the harmful impacts of climate change, including the increased incidence of extreme weather events that affect grid reliability.

Citing a suite of integrated modeling and analysis tools created by the Department of Energy's National Renewable Energy Laboratory (NREL) – which are designed to "overcome technical barriers and accelerate the development of advanced technologies and systems" – and were used to develop this final rule, one commentor claims that the model in question is "not amongst these NREL tools."

This claim is incorrect: The model in question is featured prominently as a "Transportation & Mobility Research" tool on the NREL website" (https://www.nrel.gov/transportation/evi-x.html). Further, the model in question serves as the analytic basis for NREL's "seminal" 2030 National Charging Network study, which can be found on NREL's website at: https://www.nrel.gov/docs/fy23osti/85970.pdf. Other NREL studies using the model in question can be found on NREL's website. For instance, Ge et al (2021) was a component of the 2030 study, which can be found on NREL's website at: https://www.nrel.gov/docs/fy23osti/85654.pdf.

Citing the above-referenced suite of integrated modeling and analysis tools created by the Department of Energy's National Renewable Energy Laboratory (NREL) – which are designed to "overcome technical barriers and accelerate the development of advanced technologies and systems" – and were used to develop this final rule, the commentor alleges that "The NREL study is nice work, but EPA's reliance on the study for this application is wholly unsuitable."

EPA appreciates the commentor's candor regarding NREL's technical and scientific competence; the development of this final rule benefited from the technical and scientific competence as well as the professionalism of NREL and the Department of Energy. The commenter, however, fails to adduce any data, analysis, or other evidence in support of its view. Therefore, its comment is not raised with reasonable specificity as required.

The commentor claims that the model in question "offers EPA no insight into or basis for estimating the PEV update and grid reliability impacts for most of the United States."

This claim is incorrect: "The geographic distribution of responses is representative of the population distribution in the United States..." which is supported by comparative distributions of spatial and demographic variables shown in Figures 3-6 of Ge et. al. (2021), as referenced above.

A commentor cited examples in which the authors of scientific research used in support of this final rule discussed limitations associated with the methodology used.

As is standard practice in scientific research publications, study limitations are discussed freely as a measure of transparency and in the name of scientific integrity. However, the examples of limitations cited by the commentor do not invalidate the subsequent analysis.

When discussing the suite of integrated modeling and analysis tools created by the Department of Energy's National Renewable Energy Laboratory (NREL) and used to develop this final rule, a commentor asks: "How did EPA go about establishing chassis-specific LAMs when the original NREL report mentioned nothing about vehicle classifications?" A "LAM" (Likely Adopter Model) is a type of model used by NREL, which provides a relative ranking of the likelihood of electric vehicle adoption across the general population.

Rather than develop four LAMs specific to each chassis type, the same LAM was applied to each of the four cited chassis types. The vehicle population for each chassis type features a unique spatial distribution (as reflected in registration data across all fuel types). The LAM was applied to the national population of each chassis type independently, providing regionalized adoption scenarios for each chassis type that reflect a combination of relative preference for chassis type and PEV likely adopters.

A commentor asks "Despite the lack of LAM survey respondents in the Midwest and Alaska, EPA inexplicably projects these regions to have the highest PEV pickup stocks of the entire United States."

We believe the commentor misinterpreted the data provided by EPA. Among the top five states for simulated adoption of PEV pickup trucks in 2032, the state of Ohio is ranked fifth. The state of Alaska is ranked 44th.

One commenter asserts that the EPA rule will require $1-2.4 trillion to update through 2050.

The high costs specified in the comment are not related to EPA's rules; rather, the comments refer to the costs of upgrading the entire aging transmission system (independent of EPA's rules) as well as the costs of capturing benefits associated with the renewable energy provisions of the IRA. This commentor cites a Reuters article from May 2022, which, in turn, refers to other two reports as sources of the article's information.

The first source appears to be an article from PUF (Public Utilities Fortnightly) in May 2020, entitled Modernizing Aging Transmission – A Golden Opportunity. This article states that the aging U.S. electrical transmission system – without potential EV load – will require $700 billion to upgrade its 140,000 miles of transmission lines by 2050. The article then goes on to claim that the costs of upgrading the transmission system to allow for vehicle electrification will increase this cost to more than $1 trillion by 2050. The article assumes an electric load growth associated with EVs of 45%. The article does not include technical details, so it is not possible to comment on them. However, the load growth associated with vehicle electrification from EPA's rule are more on the order of 11% by 2050, and not 45%, as claimed in the article.

The second source cited in the Reuters piece is from a Princeton Report on transmission general system upgrades the report authors believed were necessary in order to capture renewable energy provisions of the Inflation Reduction Act (IRA). Note that the study pertains to the IRA, not EPA's rules. This is a preliminary report and its conclusions are subject to change.

As EPA explains in the RIA, the regulatory analysis for this rulemaking evaluates the impacts of this rule relative to the regulatory baseline. This is consistent with OMB Circular A-4's guidance on regulatory analysis. For our analysis of electric sector impacts, EPA took the extra step of evaluating the combined impacts of this rule and the HD Phase 3 Rule, and in some cases, also evaluating the additional impacts of the Power Sector Rules, in order to better understand the context for this rule and the cumulative impacts of our rules, and to respond to comments regarding those cumulative impacts. Our analysis, including the IPM, also considers the impacts of the IRA and BIL, which provides important context for the final rule, including by significantly reducing the costs to purchase PEVs. We disagree with the commenter's suggestion, however, that the impacts of actions beyond this rule should be attributed to this rule for purposes of assessing costs. For example, even were EPA to accept as true the $1-2.4 trillion price tag for a complete overhaul of the electric grid, those costs are not attributable to this rule, and those numbers are therefore irrelevant. In the same way, although we project that manufacturers may use advanced gasoline vehicle technologies to comply with this rule, it would not be appropriate to consider the considerable costs associated with US petroleum infrastructure development as attributable to this rule. In any event, we have fully considered the costs of increasing electricity demand due to increased PEV adoption associated with this rule and found that those costs are modest and reasonable, as explained in RIA 5 and preamble IV.C.5.

A commentor claims that states have "expressed concerns regarding electrical grid and utility impacts in their DOT-approved state EV Infrastructure Deployment Plans".

The "DOT-approved state EV Infrastructure Deployment Plans" to which the commentor refers to is known collectively as the National Electric Vehicle Infrastructure (NEVI) program, a voluntary program administered by the Federal Highway Administration (FHWA) and the Joint Office of Energy and Transportation and funded through the Bipartisan Infrastructure Law, as enacted in the Infrastructure Investment and Jobs Act.

NEVI is a federally-funded program to which states may voluntarily choose to apply. As such, it is presumed that the states cited by the commenter have voluntarily sought NEVI funding. By extension, it seems reasonable to conclude that if the states cited by the commentor did not desire electric vehicle infrastructure funding from this voluntary program, they would not have applied. The NEVI program has funded a total in $615 million in 2022, an estimated $885 million in 2023, and $885 million in each successive year until the end of fiscal year 2026.

NEVI Formula Program funds can be used for electric grid equipment and upgrades. The costs to acquire and install on-site electric service equipment (e.g., power meter, transformer, switch gear) are eligible. Costs for minor grid upgrades are also eligible, provided the work is necessitated solely by the construction or upgrading of the EV charging station and participation in the upgrade does not exceed the allocable cost of the minimum upgrades needed to match the planned power requirements of the EV charging station. A minor grid upgrade is defined as the work necessary to connect a charging station to the electric grid distribution network; for example, extending power lines or upgrading existing power lines several miles. Finally, major grid upgrades, such as longer line extensions or upgrades, improvements to offsite power generation, bulk power transmission, or substations are ineligible.

State DOTs are encouraged to consider the magnitude of these costs and explore whether they could be covered by the electric utility or programs other than the NEVI Formula Program so as to minimize use of NEVI Formula funds for grid upgrades where possible.

States are also encouraged to consult with the FHWA and the Joint Office of Energy and Transportation to determine if an exception to charging station siting requirements may be warranted or if there are additional viable alternatives.

This commentor continues, claiming that "EPA has not accounted for these concerns in its analysis."

Overall, the identification of potential infrastructure issues (along with other challenges) in State NEVI plans indicates that State governments are well aware of these issues and giving due consideration to them as they plan to install new charging infrastructure with NEVI funds. Given the important role of State agencies in electricity infrastructure, we think this awareness and consideration by State agencies is a positive factor supporting the development of charging infrastructure. As we explain in preamble IV.C.5, we do also agree that additional infrastructure buildout is likely to support increased PEV adoption, and based on our analysis, we find that the scope and costs of that buildout is modest and reasonable.

To the extent the commenter is concerned with how the NEVI funds themselves are administered by FHWA and JOET, that issue is beyond the scope of this rulemaking.

A commentor correctly points out that electricity demand varies by time of day. To capture the time-varying nature of electricity demand, we used the Integrated Planning Model (IPM), EPA's multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector, to estimate electric power plant emissions that were used to develop this final rule.

However, the source of the data cited by the commentor is eGRID, a static database which does not vary with time. As such, eGRID is incapable of capturing the time-varying nature of electricity demand, as required, and, therefore, fails to capture actual electric power plant emissions.

One commentor claims that the cost of charging an electric vehicle at home "could raise the annual electricity bill for the average family by 50 percent or more", but fails to note that the reduction of gasoline costs *not* paid by the family are approximately three-times greater.

In other words, the cost of electricity paid for electric vehicle charging by the average hypothetical family would be approximately $675 per year, whereas the cost of gasoline paid for by the aforementioned family would be approximately $1,900 per year, given the assumptions provided by the commenter. As such, the cost of driving an electric vehicle is three-times less-expensive than driving a gasoline-powered vehicle. EPA's own analysis also demonstrates that purchasers of PEVs will incur significant operating savings over the lifetime of the vehicle.

This same commentor alleges that EPA pretends its "rules will not put a colossal additional strain on our already vulnerable national power grid."

As noted earlier, EPA conducted extensive electric power sector modeling analyses in which it concluded that there is adequate generation and transmission capacity required to meet the electric load demands imposed by the final rule. Moreover, the modeling analyses confirmed that there is adequate generation and transmission capacity to meet North American Electric Reliability Corporation (NERC) reliability standards, including those for reserve capacity.

In this final rule, EPA demonstrates that the impacts of both this rule alone and this rule combined with other proposed EPA actions result in anticipated power grid changes that 1) are consistent with key National Electric Reliability Corporation (NERC) assumptions, 2) that are consistent with historical trends and empirical data, and 3) are consistent with goals, planning efforts and Integrated Resource Plans (IRPs) of industry itself.

For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts and the Technical Memorandum for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, and Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 Docket ID No Numbers. EPA-EPA–HQ–OAR–2022–0829 and EPA-HQ-OAR-2022-0985.

Continuing, this commentor alleges that "To accommodate EPA's future fleet of EVs, our national electric grid capacity would need to grow 60 percent or so by 2030."

Based upon the extensive electric power sector modeling conducted in support of this final rule, the expected increase in electric power demand in 2030 will be less than one-percent of the overall expected electricity consumption for that year. In other words, the expected impact on the electric power system is expected to be approximately 60 times less than alleged by the commentor.

Continuing the discussion of the expected electricity demand made by this final rule in 2030, the commentor suggests that the "This buildout is simply not practicable in the timeframe EPA is contemplating."

As noted above, the increase in electricity demand is expected to be less than one-percent by 2030. The increase in expected electricity demand between the kick-off of the Super Bowl and the end of the Super Bowl will be approximately 4.2%, according to PJM Interconnection, a regional transmission organization (RTO) operating the electric transmission system serving all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia that serves 65 million people, or about 20 percent of the U.S. population.

One commenter cited the average retail electricity rates from a 2015 EIA study of the proposed Clean Power Plan. The commenter subsequently used the average retail electricity rates to extrapolate electricity expenditures associated with this final rule and claimed that there "is a nearly $1 trillion difference" between the costs cited in this final rule and those extrapolated by the commentor.

We disagree with the commenter's analysis. We do not think a nearly decade old EIA study of a different rule—indeed a different *proposed* rule regulating an entirely different industry sector—has persuasive value. By contrast, EPA conducted extensive electric power sector modeling analyses in support of this final rule based on the most up to date information. For additional discussion of these topics, see RIA Chapter 5: Electric Power Sector and Infrastructure Impacts.

Further, as noted in the EIA study, the model used to develop the analysis is not a comprehensive macroeconomic model of the economy; rather, it is an energy model, which does not contain a power flow model or assess the reliability of bulk power transmission systems in detail. The EIA model also excludes health effects and was also criticized in congressional hearings for overstating in its base case the emissions from coal plants and understating the power generation contributions from natural gas, nuclear and renewable energy.

Citing a document entitled "Grid-Friendly EV Charging Dynamic Behavior", one commentor referenced concerns regarding potential grid reliability issues associated with residential air conditioning units in the western U.S. and linked these concerns to electric vehicle charging. There have been no documented instances of electric vehicle charging that have led to the similar grid reliability issues. The document in question focused on infrequent grid disturbances that originate on the Bulk-Power System (BPS) that, in 2010, caused residential air conditioning units to stall. There was concern at the time of the incidents, if left unchecked, might lead to blackouts, but the matter was quickly diagnosed by a consortium of electric power sector researchers. Many of these researchers helped author the cited document, which provides recommendations and describes EV charging behavior.

Some commenters claim that natural gas prices have "risen significantly due to the Russian invasion of Ukraine." The claims are incorrect. U.S. natural gas prices have decreased steadily since the start of the Ukrainian war. For instance, the U.S. benchmark Henry Hub natural gas price in 2023 was about a 62% lower than in 2022 due, in part, to record-high natural gas production, flat consumption, and rising natural gas inventories, according to the EIA.

Some commentors claim that "If the conflict ends in the next 5-10 years, natural gas prices in the U.S. could return to pre-invasion levels, which would complicate the accelerated deployment of renewables that the agency is forecasting." The commenter, however, fails to adduce any data, analysis, or other evidence in support of its view. Therefore, its comment is not raised with reasonable specificity as required.

This failure notwithstanding, natural gas prices have decreased, on average, since the start of Russia's invasion of the Ukraine. Further, a return to relatively higher pre-invasion natural gas prices would seem to further accelerate the transition from natural gas-fired EGUs to renewable electric power generation.

Some commenters claim that "dramatic expansion in wind and solar can occur only with breakthroughs in the economics of grid-scale energy storage technologies." According to the EIA Monthly Energy Review, wind and solar-powered electricity generation in the U.S. increased by a factor of 82.5 times – an increase of 2,300% – since 2000 without the need for “breakthroughs in the economics of grid-scale energy storage technologies.” While we are unaware of a strict statistical definition of “dramatic”, we do believe that the 82.5 times increase in renewable energy penetration in the U.S. since 2000 does constitute, if nothing else, a “significant” expansion of wind and solar. In short, the dramatic expansion of wind and solar penetration has already occurred.

Some commentors claim, in part, that EPA “ignores the need for more natural gas peaking capacity and massive transmission, substation, and transformer investment to integrate these technologies into the power grid. Those emissions are significant and may offset or eliminate the benefits that EPA calculates.” This claim is inaccurate. EPA conducted extensive electric power sector modeling analyses in which it concluded that there is adequate generation and transmission capacity required to meet the electric load demands imposed by the final rule. The analysis included the anticipated need for electric power generation, which includes natural gas-fired peaking units. These costs are included in the retail electricity process. We also modeled emissions, including upstream emissions associated with electricity generation, and found that on net, this rule results in significant reductions of GHGs and criteria pollutants, with widespread benefits for air quality.

One commentor expressed their dissatisfaction with this rule and wondered “How are we powering the chargers for these electric vehicles?” EPA conducted extensive electric power sector modeling analyses in which it concluded that there is adequate generation and transmission capacity required to meet the electric load demands imposed by the final rule. The analysis presumes that electric vehicles will be charged with electricity generated at electric generation units (EGU).

When discussing EPA’s analysis of the potential impacts of vehicle electrification, some commentors claim that the EPA violates the “law of supply”. These claims might stand to reason if the economic system described by the commentor was static and unchanging or, as economists might say, “ceteris paribus”.

However, the system, as described by the commentor, is neither.

And the commentor’s reasoning neglects to consider these other factors – factors that may affect electricity prices include location, time, and fluctuations in other inputs (e.g., the effects of lower cost electricity available from distributed energy resources (DER) or vehicle to grid (V2G) technologies, which are available at the periphery of the distribution system, as well as other factors which serve to alter the supply and demand curves). It is through the consumer’s shift to the new, lower-price supply curve that consistency with the “law of supply” is maintained; this is an example of fluctuations in inputs. The commentor’s reasoning also neglects to consider managed charging, which has the effect of shifting electric vehicle charging to times when electricity is less expensive; this is an example of the time sensitivity of electric vehicle charging. Managed charging and related approaches to mitigating distribution system impacts confer additional benefits that are not captured by the commentor, such as those associated with the deferral of capital expenditures for distribution system upgrades.

To lend credence to this claim, the commentor cites a tutorial by the New England Independent System Operator (ISO-NE), an independent, non-profit, regional transmission organization (RTO) that serves approximately 6.5 million people in the states of Connecticut, Maine, New Hampshire, Rhode Island, and Vermont as well as the Commonwealth of

Massachusetts. EPA notes that in the final section of this tutorial, entitled "Reality Is Much More Complicated", ISO-NE states that "The examples above provide a simplified way to understand how the markets work. In reality, the ISO manages market clearing and settlement for hundreds of market participants at hundreds of distinct clearing prices every day of the year". The tutorial then goes on to cite the reasons why electricity prices may vary, which includes location, time, and fluctuation in other inputs, all of which was considered in EPA analysis.

One commentor suggests that the Inflation Reduction Act is "required for the large new transmission lines necessary to bring renewable energy to the markets where they are needed." While constraints in the U.S. electricity transmission system exist, DOE, FERC, and others have taken extensive steps to help reduce the constraints. These are discussed elsewhere in this document. It is also worth noting that the U.S. electric power system has already successfully and reliably integrated enough renewable electricity to surpass, for the first time, nuclear generation in 2021, and coal-fired generation in 2022. In support of the commentor's claim, the commentor cites various reports and testimony. The first cited report states that "to achieve its climate ambitions and fully implement transformative legislation like the Inflation Reduction Act, Congress will also have to enable a massively accelerated build-out of clean energy infrastructure." The report then goes on to discuss possible approaches that may help to facilitate transmission line development. These approaches are laid out in the report as "Actionable Policy Options" and include: a significant expansion of federal planning, general permitting, and programmatic review; siting authority for all interstate transmission lines could be federalized; the administration could conduct a staff capacity, funding, and technology needs assessment across agencies involved with critical permitting for clean energy Congress could support multi-agency coordination by allocating additional funding to the Federal Permitting Improvement Steering Council (FPISC); Congress could transfer initial authority for Clean Air Act permitting for offshore wind from the Environmental Protection Agency (EPA) to the Bureau of Ocean Energy Management (BOEM); Congress could support multi-agency coordination by allocating additional funding to the Federal Permitting Improvement Steering Council (FPISC); and Congress could proceed with narrow reforms to the National Environmental Policy Act (NEPA).

The second report cited by the commentor states that "The IRA may significantly reduce emissions from coal owing to the large volume of subsidy directed for low-carbon electricity generation". However, the report authors then go on to note that the potential effects associated with the IRA on transmission system development were not considered on their report. Acknowledging such, the report authors write that "This analysis did not assess (IRA) provisions for energy efficiency, transmission or permitting." The report authors continue, noting that "This analysis did not assess provisions for energy efficiency, transmission or permitting." As for the reasoning behind why the report authors elected to not consider the potential effects of the IRA on transmission system development in the report cited by the commentors, the report authors write that "…the IRA spends over $2 billion on transmission facilities. As the impact of this spending can be highly variable depending on where it is distributed, we do not assume its effects". The final reference cited by the commentor that electric power transmission may affect the potential benefits associated with the IRA. As noted above, DOE, FERC, and others have taken extensive steps to help reduce transmission constraints.

Continuing, the commentor states that "The IPM modeling also ignores the massive expansion of grid-scale energy storage that would be required to achieve reliability with renewables." EPA conducted extensive electric power sector modeling in support of the final rule, which includes grid-scale storage facilities, which were found to help integrate renewable electricity sources into the grid. See Chapter 5 of the RIA for a discussion on the electric power sector modeling. The commentor continues, "For these reasons, it is unrealistic to expect that the electricity currently provided by fossil fuels will be provided by renewables within the average lifetime of the model year 2032 vehicle." We do expect continuing use of fossil fuels, including coal and natural gas. However, we expect significant increases in renewable penetration over the coming decades. EPA notes that the grid transition referred to by the commentor has already occurred and continues, in part, with support from the IRA.

More generally, to the extent the commenter is requesting legislative action or permitting reforms by other Federal agencies or State agencies, the comments are beyond the scope of this rulemaking.

Some commentors suggested that electric power system upgrades might be needed to accommodate vehicle electrification in a more-timely manner. Should they be required, numerous tools are available to expedite the timely incorporation of electric vehicle charging infrastructure into existing electric power systems. These tools help to ensure that new charging stations can be connected to the grid as quickly as possible and without adversely affecting grid reliability. These tools include managed charging, time-of-use (TOU) electric rates, distributed energy resources (DERs), Power Control Systems (PCS), utility hosting capacity maps, Battery Energy Storage (BES), Advanced Distribution Management System (ADMS), Load Constraint Management System (LCMS), and others. For additional discussions of these topic, please see Chapter 5 of the RIA and preamble IV.C.5.

Some commentors point out that PEV charging can reduce utility bills for all customers. The EPA agrees with the commentor. Moreover, some commentors claim that the "electric system impacts associated with this final rule will be gradual and within the range of historical growth" and that the "projected growth in electricity demand are well within the range of past historical load growth." The EPA agrees with both comments.

Citing Southern California Edison (SCE), an electric utility based in Southern California, some commentors note the importance of time-of-use (TOU) electric rates in shifting charging times for electric vehicles: "The figures above represent real-world data collected from hundreds of thousands of households with PEVs. There is no need to test the proposition that simple TOU rates designed for PEVs work." The EPA agrees with the conclusions of commentor.

19 - Fuels and life cycle analysis (LCA)

19.1 - Fuels

Comments by Organizations

Organization: 25x'25 Alliance, et al.

The failings of the proposed rule follow almost entirely from EPA's decision to "bet the farm" on electric vehicles. The agency would be far better served by taking a more holistic approach. There are 281 million internal combustion engine vehicles on the road today and 100 million more will be built in the next two decades. All of these vehicles could be improved—and for far less than what EPA's proposal would cost—with an improvement in fuel quality. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

SEE ORIGINAL COMMENT FOR PIE CHART of Role for Liquid Fuels [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

SEE ORIGINAL COMMENT FOR BAR GRAPH of EPA-Projected Cumulative U.S. Sales 2023-2032 [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

EPA is statutorily obligated to explore this approach. Section 202(a)(3)(A)(ii) requires that, "in establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors." 42 U.S.C. § 7521(a)(3)(A)(ii) (emphasis added). There are many ways EPA could consider the type of fuel as a means of settings its regulations: through the consideration of life-cycle emissions under the agency's Section 202 powers, through increased volumes of low-carbon renewable fuels under the Renewable Fuel Standard, through alternative, low-carbon certification fuels, or through Section 211(c) rulemaking—as the proposal itself suggests. These options are not beyond the scope of this rulemaking but are obvious alternatives to EPA's current all-electric approach. And "the failure of an agency to consider obvious alternatives has led uniformly to reversal." Spirit Airlines, Inc. v. DOT, 997 F.3d 1247, 1255 (D.C. Cir. 2021). [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

EPA must consider these alternatives, and would be well served to issue a new proposed multipollutant rule that: [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

1) incorporates requirements to improve fuel quality by

- establishing a higher federal octane standard while allowing higher blends of ethanol; and

- "incenting the reduction of carbon and aromatic compounds via reformulation or alternatively increasing ethanol blending. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

2) provides incentives for automakers to produce flex-fuel vehicles by

- creating alternative certification pathways for higher ethanol blends; and

- correcting the problems with R-Value and CO2 penalty that other commentors have identified and re-establishing the Volumetric Conversion Factor in the fuel economy calculation algorithm. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

3) adopts a life-cycle analysis approach to calculating and comparing emissions from different technologies. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

Embracing and enabling a pathway to improve fuel quality will increase and accelerate emission reductions, improve public health, help achieve environmental justice goals, provide greater versatility, and improve reliability all at less cost. This pathway is available to EPA and the consideration of it is demanded by the Clean Air Act. The best and most recent data suggests that the adoption of even mid-level ethanol blends would reduce pollution emissions at least as much as EPA's electrification approach, and at far less cost.i Even if EPA's electrification program could be successful—and as explained above, it cannot—a complimentary fuel improvement would double EPA's projected emissions reduction. The current rule takes this option off the table and leaves those pollutants in the air. EPA could do far better. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

1 See "Higher Ethanol Blends Support the Transition to a Low-Carbon Future," Brian West, SAE Update, February 2023, pp2-6) National adoption of mid-level ethanol blends is available, feasible, and lower cost than current gasoline. https://www.nxtbook.com/smg/sae/23UPD02/index.php#/p/2

Organization: Alliance for Automotive Innovation

X. Fuels

Given the timespan over which internal combustion engine technology will continue to be available to new vehicle purchasers, and the years that those vehicles will remain in the field, improved liquid fuels are a critically important technology enabling pathway. Improved liquid fuels can facilitate increased fuel efficiency, and reduced GHG and non-GHG emissions as the EV market continues to grow. EPA has requested comments on potential future gasoline fuel property standards, and as such we offer the following.403 [EPA-HQ-OAR-2022-0829-0701, p. 260]

403 NPRM at 29197.

A. EPA Should Act Now to Improve Fuels

EPA should act now to: [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Implement a nationwide clean fuel standard to lower GHG emissions;

- Regulate the particulate forming tendency of market gasoline by eliminating the heavy aromatic fraction of gasoline, thereby reducing PM emissions from all ICE vehicles, equipment, and engines to improve air quality for all;

- Lower the sulfur cap of gasoline from 80 ppm to 10 ppm at the refinery gate to further reduce non-GHG emissions from ICE-equipped vehicles and engines to improve air quality;

- Adjust Tier 3 certification fuel specifications to align with current market fuel composition and to enable fuel suppliers to target a particulate matter index of 1.5 to 1.6;

- Cap summer vapor pressure of gasoline at 9.0 psi or less, regardless of ethanol content, to further reduce evaporative emissions as E10 fuel is ubiquitous in the market;

- Immediately eliminate sub-87 anti-knock index ("AKI") octane fuels from the market to increase fuel efficiency and reduce GHG emissions;

- Transition to a higher minimum-octane gasoline (i.e., minimum 95–98 research octane number) to facilitate higher engine efficiency; and

- Limit air toxics, e.g., olefins and aromatics, and their precursors from the fuel to improve air quality for all. [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

In addition to a comprehensive fuels rulemaking, Auto Innovators recommends that EPA also proceed with finalizing its eRINs proposal from the Renewable Fuel Standard Set Rule for Renewable Volume Obligations for 2023-2025 NPRM.404 This proposal provides a complementary approach to EPA's proposed multipollutant rule, including supporting and encouraging both EVs and renewable sources of energy, as well as to the overall goal of decarbonizing the transportation sector. [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

404 Renewable Fuel Standard Set Rule for Renewable Volume Obligations for 2023-2025, https://www.govinfo.gov/content/pkg/FR-2022-12-30/pdf/2022-26499.pdf

B. Legacy and New ICE-Equipped Vehicles Will Continue in the Fleet for a significant Time

Liquid fuels will continue to play a vital role in transportation for years to come, and there are important improvements that can be made to reduce carbon, increase vehicle fuel efficiency, and lower emissions supported directly by high octane, low carbon, and low emissions fuels. [EPA-HQ-OAR-2022-0829-0701, p. 261]

There are nearly 290 million light-duty cars and trucks in the United States,405 and nearly 98% of those vehicles operate on gasoline or diesel fuel.406 Even with the proposed GHG reductions in the NPRM, which as currently proposed would result in a projected BEV penetration of 67% of sales in 2032, it is clear that substantial numbers of liquid-fueled vehicles will be produced well through this decade and into the next. In addition, the average age of a vehicle in the U.S. has grown to over 12 years.407 The car parc will continue to rely on liquid fuels for years to come, and gasoline will continue to play a significant role in transportation and ultimately, air quality. [EPA-HQ-OAR-2022-0829-0701, p. 261]

405 U.S. Vehicle Registration Statistics, Hedges & Company, htps://hedgescompany.com/automotive-market- research-statistics/auto-mailing-lists-and-marketing/ (accessed May 23, 2023).

406 Figures compiled by Alliance for Automotive Innovation with registered vehicle data provided by IHS Markit, htps://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard. (accessed May 23, 2023)

407 U.S. Vehicle Registration Statistics, Hedges & Company, htps://hedgescompany.com/automotive-market- research-statistics/auto-mailing-lists-and-marketing/ (accessed May 23, 2023).

Vehicles and fuels are a system and the role of liquid fuel improvements for gasoline vehicles can reduce emissions and improve air quality now and complement the GHG reduction from the EV fleet turnover. If EPA does not act as part of this rulemaking, or undertake a comprehensive fuels rulemaking in the near future, it is missing an important and crucial opportunity to implement a low-cost approach to improving fuel economy and reducing GHG and criteria pollutant emissions. [EPA-HQ-OAR-2022-0829-0701, p. 261]

C. EPA Has the Authority to Regulate Fuels to Improve GHG Emissions

The Clean Air Act provides statutory authority for the EPA to regulate GHG emissions, which can “cause, or contribute to, air pollution which may reasonably be anticipated to endanger the public health or welfare.”408 Section 211 of the Clean Air Act provides EPA with the authority to regulate motor vehicle fuels in furtherance of the Act’s goals. Specifically, Section 211(c) of the Act grants EPA the authority to set new national fuel standards, including octane rating, under the following circumstances: [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

408 Massachusetts v. EPA, 549 U.S. 497 (2007).

- (1)(A) “if in the judgment of the Administrator, any fuel or fuel additive or any emission product of such fuel or fuel additive causes or contributes to air pollution or water pollution… that may reasonably be anticipated to endanger the public health or welfare,” or

- (1)(B)“if emission products of such fuel or fuel additive will impair to a significant degree the performance of any emission control device or system which is in general use, or has been developed to a point where in a reasonable time it would be in general use were such regulations to be promulgated.” [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

It is important to note that the addition of GHGs to the list of Clean Air Act “pollutants” is changing how one thinks of emissions control. For purposes of considering EPA’s authority under 211(c)(1)(B), it is important to realize that the term “any emission control device or system” must be understood more broadly than it once was. With this realization, it is easy to see that engine efficiency improvements offer emission control benefits. However, low-octane fuel acts as a barrier to these efficiency benefits. EPA has the authority and must stand firmly on the side of removing these barriers and providing manufacturers with a full menu of options for striving to meet the future GHG standards. [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

In light of increasing GHG and CAFE requirements, it continues to be essential for vehicles and the fuels they operate on to be treated as a system and developed in tandem. Prospective fuels should enable greater vehicle efficiency and lower emissions, optimize the consumer experience, and fulfill societal values. Technology is in place to produce advanced engines. However, without a promulgated higher-octane fuel standard, the advanced engines cannot optimize their potential operational efficiency. It is now timely for EPA to undertake an accelerated process to implement and synchronize the market introduction of higher-octane gasoline that will enable the benefits of advanced technologies and support manufacturer investments. EPA has the authority to regulate national commercial gasoline octane specifications under the Clean Air Act. EPA should initiate a fast-track process to assure higher octane gasoline that meets the market and timing needs of new vehicle technologies for the U.S. commercial supply. [EPA-HQ-OAR-2022-0829-0701, pp. 261-262]

D. EPA Should Implement a Nationwide Clean Fuel Standard

Achieving ambitious climate goals requires regulators to recognize and incentivize all carbon reducing technologies. Fuels and vehicles should be treated as a holistic system, and as such, decarbonizing liquid fuels would yield immediate benefits for lowering the carbon intensity of transportation energy. Inclusion of low carbon fuels within a multi-pathway approach to emissions reductions would enhance the probability of meeting emissions goals. Low carbon fuels offer a hedge against uncertainties that could affect the pace of electrification. In addition, low carbon fuels would offer consumer choice on vehicles while still supporting decarbonization of transportation energy. The proposed regulations should factor for a range of consumers whose needs or budgets require different solutions, consistent with environmental justice objectives. Low carbon liquid fuels are an important part of enabling all vehicle owners to play a role in reducing emissions as fast as possible during the transition to an all-electric future. [EPA-HQ-OAR-2022-0829-0701, pp. 262-263]

EPA should take actions to support low or net-zero carbon liquid fuels. Although automobile manufacturers are focused on electrification, as noted above, actions on liquid fuels can provide benefits to legacy vehicles, would support even lower GHG emissions from PHEVs, and could provide much-needed GHG reduction pathways. EPA should leverage a new national Clean Fuel Standard (i.e., Low Carbon Fuel Standard or LCFS) and/or modified renewable fuel standard (RFS) to incentivize low carbon fuel use (e.g., renewable fuels and emerging carbon-neutral fuels, such as eFuels and synthetic fuels) in legacy and future ICE vehicles and engines. Upon introduction, this would have an immediate impact, reducing GHG emissions across the entire fleet of in use vehicles and engines. In addition, a properly structured nationwide Clean Fuel Standard, while providing GHG reductions, can also create new revenue sources to incentivize market adoption of EVs. [EPA-HQ-OAR-2022-0829-0701, pp. 262-263]

F. EPA Should Take Further Action on Fuels to Reduce Emissions and Improve Air Quality

Use of improved liquid fuels supports ongoing efforts to improve air quality and can provide an important bridge in reducing emissions during the transition to expanded vehicle electrification. [EPA-HQ-OAR-2022-0829-0701, p. 274]

In many cases gasoline improvements would improve emissions from virtually all of the 290 million vehicles on the road today, in addition to other liquid-fueled equipment. Given that these vehicles are on the road today and that benefits would accrue immediately upon introduction, we see no reason for EPA to delay in implementing a rulemaking. Auto Innovators has commented extensively in the past on the fuel improvements needed to address criteria pollutant and air toxics emissions. Several improvements to market fuels should be pursued: [EPA-HQ-OAR-2022-0829-0701, p. 274]

1. Reduce Refinery Gate and Downstream Sulfur Caps to 10 ppm

When EPA finalized the Tier 3 rules governing gasoline, it lowered the maximum average sulfur level from 30 ppm to 10 ppm. This change was essential to enable advance emissions control technology to achieve the lower tailpipe emissions standards that are part of the Tier 3 standards because, as EPA points out, "any amount of gasoline sulfur will deteriorate catalyst efficiency."446 However, EPA continues to allow gasoline with 80 ppm sulfur at the refinery gate and 95 ppm downstream. Auto Innovators continues to stand behind previous industry comments on sulfur as detailed in the Auto Alliance Tier 3 comments.447 Refiners and the distribution system have had many years to adjust to lower sulfur standards. [EPA-HQ-OAR-2022-0829-0701, p. 274]

446 Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards, Proposed Rule, 78 Fed. Reg. 29816, 29821 (May 21, 2013).

447 Supplemental Comments of the Alliance of Automobile Manufacturers on Market Gasoline Sulfur, Alliance of Automobile Manufacturers (Oct. 31, 2013), Docket ID EPA-HQ-OAR-2011-0135-4950.

If EPA pursues lower Tier 4 emissions standards in the NPRM, we urge EPA to reduce the refinery gate cap to 10 ppm, perhaps with a phase-in period, and at the same time to develop a pathway toward a downstream retail cap of 10 ppm per gallon. The elimination of gasoline with greater than 10 ppm sulfur will enable advanced emissions control technology and will reduce the impact of sulfur on catalyst efficiency. This cap aligns with sulfur caps in the European Union and many parts of Asia, including China. The lower sulfur cap also aligns with the lower NMOG + NOx standards as proposed in the NPRM. [EPA-HQ-OAR-2022-0829-0701, p. 274]

2. Cap Summer Vapor Pressure at 9.0 psi or Less

EPA should cap summer gasoline vapor pressure at 9.0 psi or less regardless of ethanol level. From a vehicle operability perspective, there is no need for fuel vapor pressure to be even as high as 9.0 psi. California summer fuel is capped at 7 psi, and there have been no operability issues with on-specification fuel in California. Lower vapor pressure will reduce evaporative emissions across the fleet, particularly in older vehicles and off-road and handheld equipment. Since the beneficial effects of lower vapor pressure are enhanced by progressively lowering it and applying it to all gasoline fueled equipment from day one, there is no reason for EPA not to follow the California example for summer fuels and cap other seasons at ASTM D4814 maxima. [EPA-HQ-OAR-2022-0829-0701, pp. 274-275]

3. Eliminate sub-87 AKI Market Fuels

Vehicles sold in the U.S. require fuel octane of 87 AKI or higher. Tier 3 regular grade certification fuel has closely controlled octane and is specified at 87-88.4 AKI. In the majority of the U.S., the minimum market octane is 87 AKI by regulation or custom. However, in the Rocky Mountain states sub-octane fuel continues to be marketed. This was justified in the past by high altitude effects on engine knock. However, as ASTM D4814 section X1.6 points out: [EPA-HQ-OAR-2022-0829-0701, p. 275]

New vehicles have sensors to measure [sic] and engine management computers, which take into account such conditions as air charge temperature and barometric pressure. These vehicles are designed to have the same antiknock requirement at all altitudes and a reduced sensitivity to changes in ambient temperature. This more sophisticated control technology began to be used extensively in 1984. This technology, while constantly evolving and improving, is used on almost all new vehicles. This means that many vehicles in today's fleet require fuel having the same antiknock index regardless of changes in altitude or ambient temperatures.448 [EPA-HQ-OAR-2022-0829-0701, p. 275]

448 ASTM D4814, Standard Specification for Automotive Spark-Ignition Engine Fuel.

This text implies that the vehicles produced in the last 39 years require the same fuel as the rest of the country. More recently, automakers have produced increasing proportions of vehicles with turbocharged engines. These engines boost manifold pressure using turbochargers and are insensitive to altitude. [EPA-HQ-OAR-2022-0829-0701, p. 275]

The result of misfuelling these vehicles, whether they have sensors and engine management computers dating from 1984 or more advanced technologies, is that the vehicle will knock on the sub-octane fuel resulting in spark retard and enrichment to protect the engine from damage. Spark retard will reduce fuel economy and increase GHG emissions, while fuel enrichment will increase CO and HC emissions. The solution to these issues is easy: EPA must mandate that all market fuels meet or exceed the octane of Tier 3 certification fuel. [EPA-HQ-OAR-2022-0829-0701, p. 275]

4. EPA Should Adopt a High-Octane Fuel Standard

Higher-octane gasoline enables opportunities for the use of key energy-efficient technologies, including higher compression-ratio engines, lighter and smaller engines, improved turbocharging, and optimized engine combustion phasing and timing. All of these technologies, when paired with higher-octane gasoline, permit smaller engines to meet the demands of the consumer while at the same time providing higher efficiencies and thus reducing GHG emissions during vehicle use. Furthermore, depending on its composition, high-octane fuel is safe to use in many existing vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 275-277]

The relative efficiency gain enabled by higher octane rated gasoline is well documented. A literature review published by Leone et al. shows that increasing fuel octane rating from 91 RON to 95 RON facilitates an increase in efficiency by 3 to 5%.449 Figure 95 shows the correlation of efficiency gain enabled by higher octane rated fuels with higher compression ratio engines. [EPA-HQ-OAR-2022-0829-0701, pp. 275-277]

449 Thomas Leone et al., "The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark- Ignition Engine efficiency." Environ. Sci. Technol. (2015) 49 (18), 10778-10789, htps://pubs.acs.org/doi/10.1021/acs.est.5b01420 (accessed Sep. 24, 2021).

[See original for graph titled "Figure 95: Relative efficiency gain with higher octane fuel rating. Raising octane enables engine compression ratio increases, resulting in improved engine efficiency."] [EPA-HQ-OAR-2022-0829-0701, pp. 275-277]

Auto Innovators (and its predecessor associations) has long advocated that EPA should require a transition to a higher minimum-octane gasoline (minimum 95–98 RON). There are several ways to produce higher octane-grade gasoline. Increasing the ethanol content of gasoline is one approach. Hydrocarbon composition changes are another. Reducing the proportion of low octane naphtha or increasing the proportion of higher-octane streams such as alkylate or reformate will result in higher octane fuels. Ethanol blends higher than E10, with misfuelling mitigation measures in place, have been suggested by some to provide better value to consumers to achieve higher octane numbers and reduce carbon emissions. Auto Innovators does not promote any sole or particular pathway. [EPA-HQ-OAR-2022-0829-0701, pp. 275-277]

Producing higher octane fuel for the future ICE fleet will not impose any significant burdens on the refining and retail sectors. Hirshfeld et al. analyzed the refining economics of raising the average octane rating of the U.S. gasoline pool by increasing the octane rating of refinery produced blendstocks for oxygenated blending and/or the ethanol content of the finished gasoline.450,451 These studies found a transition to higher-octane (95 RON, E10) gasoline was technically feasible and could be made without considerable increases in cost or CO2 emissions for refineries.452 The implementation of higher octane-rated gasoline in the marketplace would be a cost-effective means of improving fuel economy and therefore should be encouraged as soon as possible to maximize environmental benefits across the new car fleet. [EPA-HQ-OAR-2022-0829-0701, pp. 275-277]

450 David S. Hirshfeld et al., "Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content," 48 ENVT'L SCI. & TECH. 11,064 (2014), htps://pubs.acs.org/doi/10.1021/es5021668 (accessed Sep. 24, 2021).

451 David S. Hirshfeld et al., "Refining Economics of Higher Octane Sensitivity, Research Octane Number and Ethanol Content for U.S. Gasoline," Energy Fuels 2021, Publication Date: September 1, 2021, htps://doi.org/10.1021/acs.energyfuels.1c00247 (accessed Sep. 24, 2021).

Footnote 452: Id.

EPA has the ability to enable the ICE to achieve increased fuel efficiency by requiring higher minimum octane rated gasoline in the marketplace. Research, data, and evidence confirms the ability to increase ICE efficiencies as the octane rating of gasoline increases. EPA, in the past, has recognized its authority to alter fuel quality to increase efficiencies. Specifically, as the criteria emission standards have increased in stringency, the allowable sulfur concentration decreased in recognition of sulfur's deleterious effects on emission control systems. Today, the

GHG regulation has achieved such levels that the minimum market gasoline octane rating is limiting the ability to advance ICE technology. It is now necessary to adjust the gasoline octane rating (higher) commensurate with required decreases in GHG emissions. The new minimum octane rating needs to be set immediately to 95 RON and then increased to 98 RON as new GHG standards are implemented. The new gasoline octane levels are backwards compatible, and a subset of the vehicles in the legacy fleet have the ability to also increase efficiency in response to higher octane. Being able to leverage the legacy fleet in assisting in the reduction in transportation carbon emissions can significantly benefit the portfolio of technology solutions in achieving the collective goals associated with the climate. [EPA-HQ-OAR-2022-0829-0701, pp. 275-277]

The implementation of higher octane-rated gasoline in new vehicles would be a cost-effective means of improving fuel economy and reducing GHG emissions for the light-duty vehicle fleet. [EPA-HQ-OAR-2022-0829-0701, pp. 275-277]

Organization: Alliance for Vehicle Efficiency (AVE)

AVE seeks stronger support for hydrogen engine and fuel cell platforms as a means for the U.S. to meet its environmental goals.

AVE seeks stronger support from EPA for hydrogen fuel cells (H2FC) and hydrogen engine (H2ICE) vehicles, especially at MD levels. Although the Proposal acknowledges the benefits of fuel cell electric vehicles, ending the credit multipliers will hamper market penetration. Incentives could also help accelerate and encourage more hydrogen refueling infrastructure, which is desperately needed. [EPA-HQ-OAR-2022-0829-0631, p. 7]

AVE also asks EPA to consider H2ICE as a ZEV technology, as EPA did in its Phase 3 proposal. H2ICE could be an excellent opportunity to decarbonize the MD fleet faster with continued incentives. As the engine platform emits zero grams of CO2 at the tailpipe, H2ICE should be included as a compliance pathway. [EPA-HQ-OAR-2022-0829-0631, p. 7]

The IRA allocates billions of dollars towards the hydrogen marketplace, and President Biden has created a hydrogen policy roadmap. EPA can support these measures with compliance incentives for hydrogen-powered vehicles as they emit zero CO2 at the tailpipe and should qualify for the same incentives as all ZEV vehicles. [EPA-HQ-OAR-2022-0829-0631, p. 7]

AVE supports incentivizing renewable and low-carbon fuels as a compliance pathway.

AVE supports all efforts to help accelerate reaching the nation’s environmental goals. Although BEVs are expected to reach higher sales volumes, little attention is paid to the increased sales of larger SUVs. The International Energy Agency estimates that despite large gains in the future BEV market, the predominant vehicle technology sold in the U.S. will continue to be ICE vehicles. Moreover, the ICE vehicles will be bigger and have lower fuel economy than most passenger cars.21 [EPA-HQ-OAR-2022-0829-0631, pp. 8-9]

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Despite these market predictions, the Proposal does nothing to incentivize manufacturers to produce ICE vehicles that can operate on higher blends of renewable or low-carbon fuels. To fully appreciate the importance of incentivizing the use of low carbon fuels in ICE vehicles, EPA need not look any further than the analysis from the DOE's Energy Information Agency (EIA). EIA predicts fewer BEVs on U.S. roads than what EPA and others estimate over the next 27 years. [EPA-HQ-OAR-2022-0829-0631, pp. 8-9]

[See original for graphic titled "Light-duty vehicle sales by technology or fuel AEO2022 Reference case] [EPA-HQ-OAR-2022-0829-0631, pp. 8-9]

[See original for graphic titled "New vehicle sales of battery-powered vehicles AEO2022 Reference case] [EPA-HQ-OAR-2022-0829-0631, pp. 8-9]

Incentivizing renewable and low-carbon fuels will dramatically improve the emissions of the nation's existing fleet. The legacy LD fleet consists of approximately 280 million vehicles and consumers are now keeping vehicles for an average approaching 13-years. [EPA-HQ-OAR-2022-0829-0631, pp. 8-9]

Other regions of the world are investing in advanced biofuels and eFuels. In Europe, regulators have acknowledged the benefit of reducing the carbon footprint of liquid fuels and are supporting the expansion of eFuels.22 The EPA should support these efforts as well here in the U.S. Incentivizing the use of renewables and low-carbon fuels for compliance would accelerate and significantly increase CO2 reduction and bring greater environmental gains. [EPA-HQ-OAR-2022-0829-0631, pp. 8-9]

22 https://www.euronews.com/my-europe/2023/03/28/in-win-for-germany-eu-agrees-to-exempt-e-fuels-from-2035- ban-on-new-sales-of-combustion-en

Organization: American Coalition for Ethanol (ACE)

From the perspective of tailpipe-focused emissions, EPA's proposal represents the most ambitious standards ever for light-duty vehicles, effectively requiring 60% of all vehicle sales to be battery electric vehicles (BEVs) only by 2030, ramping up to BEVs representing 67% of all vehicle sales just two years later (2032). The Agency is seeking comment on alternative compliance scenarios; Alternative 1 would require BEVs to represent 69% of all vehicle sales by 2032 and Alternative 2, the "least stringent," would require BEVs to make up 64% of all vehicle sales by 2032. [EPA-HQ-OAR-2022-0829-0613, p. 1]

While ACE members share EPA's goal to significantly reduce lifecycle greenhouse gas (GHG) emissions from U.S. passenger vehicles, we know there is a better way than arbitrarily regulating a solution which merely focuses on the tailpipe and is practically unachievable. Therefore, ACE does not support the proposal nor either alternative. [EPA-HQ-OAR-2022-0829-0613, p. 1]

To be clear, ACE members recognize BEVs can play a meaningful role in decarbonizing the transportation sector. We also support technology-neutral policies which enable electric vehicles to compete on a level playing field with other low carbon technology solutions such as ethanol. We oppose policies which tilt the scale in favor of BEVs and ignore the lifecycle GHG emissions associated with them. [EPA-HQ-OAR-2022-0829-0613, p. 1]

Our comments will 1) discuss the practical, technical and legal problems associated with arbitrarily regulating BEVs as the only solution to reduce GHGs from the transportation sector, and 2) how EPA can fix its proposal to develop a practical and achievable technology-neutral final rule which achieves the goals we share to meaningfully reduce carbon pollution from transportation emissions. [EPA-HQ-OAR-2022-0829-0613, p. 1]

Another misnomer is the assertion BEVs have no emissions. BEVs are not zero emission vehicles. They are zero tailpipe emission vehicles. EPA's proposal conveniently ignores this reality by failing to account for the entirety of lifecycle GHG emissions associated with BEVs and the minerals/materials necessary to produce and power them. The Agency risks exposing itself to litigation regarding the potential arbitrary and capricious nature of a rule which ignores the lifecycle GHG emissions associated with BEVs in relation to how EPA assesses the emissions of biofuels. [EPA-HQ-OAR-2022-0829-0613, p. 3]

What's more, EPA lacks the authority to ignore upstream emissions for BEVs. The Agency has authority under 42 U.S.C. § 7521(a)(1) to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in its judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." If BEVs are not "vehicles" "which cause, or contribute to, air pollution," then EPA may not set standards for them. If BEVs are "vehicles" "which cause, or contribute to, air pollution," then EPA must account for those emissions, which in the case of BEVs come from upstream electricity generating units. [EPA-HQ-OAR-2022-0829-0613, p. 3]

Recommended changes to ensure final rule achieves meaningful reductions in GHGs

EPA itself acknowledges millions of vehicles with internal combustion engines will continue to be sold well beyond 2032 and millions more of these vehicles will remain on U.S. roads for decades to come.7 Given this reality, we recommend the Agency develop a technology-neutral final rule which gives much more consideration to replacing the fossil fuel-based gasoline powering these vehicles with a lower carbon and higher-octane alternative, such as ethanol. President Biden himself has said we "simply cannot get to net-zero [emissions] by 2050 without biofuels."8 [EPA-HQ-OAR-2022-0829-0613, p. 4]

7 Fed. Register Page 29,397 of EPA's Proposed Rule.

8 U.S. President Joe Biden during an April 12, 2022 visit to Iowa announcing a temporary national emergency waiver for E15. https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/04/12/remarks-by-president-biden-on-lowering-energy-costs-for-working-families/.

Many leading corn ethanol producers are on a trajectory to both net-zero and net-negative lifecycle emissions in the not-too-distant future. Compared to the massive supply chain disruptions and hurdles that must be cleared to achieve a transition to 67% BEVs by 2032, billions of gallons of low carbon and high-octane renewable liquid fuels such as ethanol are available right now to rapidly decarbonize transportation-related GHG emissions. Importantly, today's vehicle fleet and refueling infrastructure is mostly compatible with renewable fuels such as ethanol, biodiesel, and renewable diesel, making for a smoother, lower cost transition with the added benefit of not having to wait for immediate reductions in GHG emissions. If the overarching goal for the Biden Administration is net-zero emissions by mid- century, let's start making progress right now by taking full advantage of the 15 billion gallons of domestically produced ethanol available today as an affordable way to boost octane and meaningfully reduce GHG emissions from gasoline powered engines. [EPA-HQ-OAR-2022-0829-0613, p. 4]

EPA's final rule must address fuel quality and establish new certification fuel pathways to account for the tremendous benefits of high ethanol blends such as E15 and E85. This is the most effective way to rapidly reduce carbon pollution from light-duty vehicles. We strongly encourage the Agency to pay particularly close attention to the comprehensive comments submitted on July 2 by Pearson Fuels, the largest distributor of E85 in California, supplying more than 315 retail E85 stations. ACE specifically supports the recommendations Pearson Fuels makes with respect to establishing a GHG emissions factor or restoring a multiplier for E85 utilized in flexible fuel vehicles (FFVs) and developing an incentive to facilitate the development of hybrid FFVs such as the Toyota Hybrid Flex Corolla being pioneered in Brazil. [EPA-HQ-OAR-2022-0829-0613, p. 4]

We welcome EPA specifically identifying fuel and the opportunity to address particulate matter (PM) emission reductions from sources of liquid fuels in a separate future rulemaking. Given the inescapable link between vehicle emissions and the fuel used to power the engines in those vehicles, we strongly recommend the Agency not wait for a future rulemaking but rather address fuel quality and PM reductions as part of the final rule for 2027 and later model year vehicles. EPA's proposal explains the complications facing refiners with respect to reducing the content of high-boiling point compounds in gasoline given the need to meet market octane requirements (since removing aromatics from gasoline requires a method to replace the octane those aromatics contained). This presents another opportunity for the Agency to rely on greater concentrations of ethanol in gasoline because ethanol delivers the highest-octane rating for fuel at the lowest cost, allowing automakers to benefit by continuing to develop high-compression and fuel-efficient engine technologies to reduce vehicle GHG emissions. We believe high octane, low carbon blends comprised of 25 to 30 percent ethanol would enable more fuel-efficient vehicles, reduce GHG emissions, and reduce other pollutants. [EPA-HQ-OAR-2022-0829-0613, pp. 4-5]

There are approximately 25 million FFVs in the U.S. today. The ideal way to transition from today's legacy fleet of internal combustion engines to new vehicles with advanced engine technologies designed to run optimally on a high-octane fuel is to utilize FFVs as bridge vehicles that can provide immediate demand for midlevel ethanol blends. [EPA-HQ-OAR-2022-0829-0613, pp. 4-5]

As a matter of fact, the Department of Energy Oak Ridge National Lab has investigated the use of high- octane ethanol blends such as E25 and E30 in FFVs that are designed and compatible with ethanol blend levels from 0 to 85 percent and can therefore seamlessly and with OEM approval utilize midlevel ethanol blends.9 Key findings from Oak Ridge include: "Experiments were performed with four FFVs using an E10 (92 RON) and E30 (100 RON) fuel. The two direct-injection FFVs demonstrated performance improvements for E30 compared to E10 of 2.5 to 3 percent, based on the 15-80 wide- open throttle acceleration time. Three of the four FFVs showed performance improvement with high- octane E30 compared to regular E10. (…) Marketing E25 or E30 to FFV owners as a performance fuel may enable greater utilization of ethanol in the near term and could help establish the refueling infrastructure to enable manufacturers to build dedicated vehicles designed for a high-octane midlevel ethanol blend." [EPA-HQ-OAR-2022-0829-0613, pp. 4-5]

9 Effects of High-Octane Ethanol Blends on Four Legacy FFVs and a Turbocharged GDI Vehicle." Thomas, J, West, and Huff, S, U.S. DoE ORNL. March 2015.

Vehicle incentives/credits are not the only area in which EPA seems to penalize technologies designed to operate efficiently on ethanol-blended fuel, indeed another inequity exists with the Agency's outdated fuel economy formula. In previous statements, EPA has acknowledged part of the fuel economy formula (the R-factor) unfairly penalizes fuel containing ethanol. Consequently, EPA is discouraging automakers from developing efficient engines that require higher octane ratings and higher ethanol content. EPA has previously said the 0.6 R-factor is erroneous and fails to achieve the statutory purpose of evaluating the fuel economy of fuels containing ethanol. The auto industry has asked EPA for an R-factor of 1.0. In response, EPA has suggested the correct value may lie "between 0.8 and 0.9." ACE supports an R-factor of 1.0. [EPA-HQ-OAR-2022-0829-0613, p. 5]

Section 202(a)(3)(A)(ii) of the Clean Air Act authorizes EPA to look beyond the basic engine to set its engine or vehicle emission standards. Specifically, the statute says "in establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors (emphasis added)." To account for the "type of fuel used" EPA needs to conduct a full lifecycle GHG emissions analysis. [EPA-HQ-OAR-2022-0829-0613, p. 5]

The full lifecycle GHG emissions analysis in the final rule must be based upon the latest version of the Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model developed by U.S. Department of Energy's Argonne National Laboratory. GREET is considered the gold-standard for calculating energy use, GHGs, and other regulated emissions that occur during the full lifecycle production and combustion of all transportation fuels and sources. GREET is used by the California Low Carbon Fuel Standard program and the Oregon Clean Fuels program and has more than 40,000 registered users worldwide. Congress directed the Treasury Department to use GREET for the new 45Z clean fuel production tax credit in the Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0613, pp. 5-6]

While it may be an inconvenient truth for some to accept, corn ethanol is a proven and cost-effective low carbon fuel playing an important role in reducing GHG emissions and air pollution from the transportation sector. In fact, the RFS has cut GHG emissions by nearly 600 million metric tons since 2007, exceeding EPA's original expectation of 444 million metric tons.10 [EPA-HQ-OAR-2022-0829-0613, pp. 5-6]

10 Unnasch. S. (2019) GHG Reductions from the RFS2 – A 2018 Update. Life Cycle Associates Report LCA. LCA.6145.199.2019 Prepared for Renewable Fuels Association.

Ethanol and Agriculture are Part of the Solution

ACE members believe ethanol can and should be an even bigger part of the solution to climate change, and we are encouraged by statements from you and USDA Secretary Vilsack that biofuels and agriculture will have a seat at the table as the Biden administration determines how to achieve the ambitious yet important goal of reaching net-zero carbon emissions in the U.S. by midcentury. [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

The science is clear: agriculture is critical to reduce GHG emissions. In 2018, the Intergovernmental Panel on Climate Change (IPCC) found that 89% of the globe's capacity to mitigate carbon emissions comes from agricultural soil carbon sequestration.11 Farmers help mitigate climate change through practices such as conservation tillage which promotes soil carbon sequestration. It is estimated that U.S. farmers already store 20 million metric tons of carbon per year and scientists with EPA and USDA believe agricultural soil has the potential to sequester an additional 180 million metric tons per year.12 [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

11 Smith, P., D. Martino, Z. Cai, D. Gwary, H. Janzen, P. Kumar, B. McCarl, S. Ogle, F. O'Mara, C. Rice, B. Scholes, O. Sirotenko, 2007: Agriculture. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, at p. 499 (emphasis in original), available at https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg3-chapter8-1.pdf (last viewed July 16, 2020) (hereafter, 2018 IPCC Agriculture Chapter).

12 Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture. EPA 430-R05-006.

We are particularly encouraged by new funding provided to USDA through the IRA to scale the deployment of climate-smart farming practices and demonstrate the link those practices have on reducing GHG emissions from products such as biofuels. [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

In 2018 ACE published a White Paper, titled "The Case for Properly Valuing the Low Carbon Benefits of Corn Ethanol," explaining if policymakers encouraged investment and adoption of more technology innovation, many ethanol plants would respond to the market signal to produce even cleaner fuel.13 A study published by MIT, Harvard, Tufts, and Environmental Health & Engineering Inc. scientists cites ACE's 2018 White Paper and reinforces the fact that the GHG reduction benefits of corn ethanol have been significantly undervalued because some regulatory bodies refuse to apply or use the latest lifecycle science. The MIT/Harvard/Tufts study found that average corn ethanol reduces GHGs by 46 percent compared to gasoline and given improvements occurring in corn farming and within ethanol facilities, corn ethanol's carbon footprint will continue to decline over time.14 [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

13 The Case for Properly Valuing the Low Carbon Benefits of Corn Ethanol. (2018) https://ethanol.org/ethanol-essentials/low- carbon-benefits-of-corn-ethanol.

14 https://ethanol.org/news/news/2021/01/26/new-study-showing-corn-ethanol-reduces-carbon-emissions-by-nearly-50- percent-cites-ace-low-carbon-white-paper/.

Understanding the need to more reliably validate how climate-smart agriculture reduces ethanol GHG emissions, ACE is proactively working to document the benefits climate smart practices have on the carbon intensity of corn ethanol in a scientifically irrefutable manner. We are leading a USDA funded Regional Conservation Partnership Program (RCPP) project, in partnership with top land-grant scientists and the U.S. Department of Energy's Sandia National Laboratory, to validate the current predictive model results of climate smart practice adoption showings significant GHG benefits of reduced tillage, cover crops, and nutrient management on corn ethanol's carbon footprint.15 [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

15 https://ethanol.org/carbon/usda-rcpp/.

The best way to unlock decarbonization opportunities from climate-smart agriculture is through technology neutral clean fuel policy which stands up markets to help offset farmer cost of adoption. For example, in 2020, Argonne National Laboratory indicated no-till, cover crops and nutrient management could be worth $279 per acre if they were allowed to generate credits under California's Low Carbon Fuel Standard (LCFS).16 At that value, farmers would rapidly adopt practices leading to meaningful reductions in the lifecycle carbon emissions of biofuels. [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

16 https://iopscience.iop.org/article/10.1088/1748-9326/ab794e.

Unfortunately, the California LCFS does not yet allow carbon credits for biofuels produced from climate- smart agriculture, and since EPA's proposal puts all our eggs in one basket, it fails to unlock the significant carbon mitigation potential from agricultural lands and ethanol. [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

We can and should do better. With this in mind, the result of our RCPP project will be the establishment of a non-proprietary, scientifically verified protocol for biofuel producers and farmers to document the carbon intensity benefits of changes in agricultural practices that are validated with on-farm data at production level scale. [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

ACE is pleased Congress provided significant resources in the IRA for USDA to build upon the progress we are making to validate the benefits of climate smart practice adoption and view this as an opportunity to scale farmer access to state LCFS markets and federal policies such as the RFS. We have briefed top EPA leadership about this partnership and want to work in collaboration with the Agency on this project to ensure corn ethanol benefits are acknowledged by EPA as part of the climate solution. [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

In conclusion, EPA should reconsider its proposal, develop a technology-neutral approach to decarbonizing transportation fuel, and engage with ACE as we implement our project to ensure fair and accurate accounting for GHG reductions from climate-smart agriculture and ethanol. [EPA-HQ-OAR-2022-0829-0613, pp. 6-7]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

The U.S. needs the strongest vehicle standards

The United States will need to greatly reduce light-duty vehicle (LDV) greenhouse gas emissions if it is to have any chance of meeting the Biden Administration's economy-wide emissions reduction goal of 50% by 2030 and stave off the worst impacts of climate change. Transportation is now the largest source of greenhouse gas emissions in the United States and the light-duty sector makes up 58% of those emissions.1 Reducing carbon emissions is critical to tackling climate change but increasing LDV efficiency will also have significant benefits to air quality and will reduce driver fueling costs. Vehicles are a significant contributor to local air pollution and the associated health impacts, leading to increased rates of asthma, increased risk of heart attacks, strokes, and lung cancer.2 These impacts are particularly bad in low-income communities and communities of color, which bear a disproportionate air pollution burden.3 Greater efficiency can also provide significant cost savings for drivers when they refuel their vehicles. Low-income households are especially burdened by fueling costs, paying three times more than their higher-income counterparts on gasoline, as a percent of their total income.4 [EPA-HQ-OAR-2022-0829-0642, pp. 1-2]

1 https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

2 https://www.consumerreports.org/emissions/how-your-car-can-make-the-air-cleaner/

3 https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities

4 https://www.aceee.org/white-paper/2021/05/understanding-transportation-energy-burdens

The Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) have set aside historic amounts of funding for electric vehicles and will greatly reduce greenhouse gas (GHG) emissions from the transportation sector if that money is invested with climate impacts in mind. EPA's standards must build off of these investments. While we commend EPA for proposing strong standards that help the U.S. achieve President Biden's 2030 goal of 50% zero emission new vehicle sales, these historic investments mean we can go even further.5 Since the IRA was signed into law, $50 billion in investments in EV and battery manufacturing, and supply chain projects have been announced.6 These investments could get the U.S. to over 60% new light-duty EV sales by the early 2030s.7 But more will be needed to adequately address the climate emergency. EPA's MY 2027-2032 standards should fully account for the recent federal activity and build off them to achieve further emissions reductions. [EPA-HQ-OAR-2022-0829-0642, pp. 1-2]

5 https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/

6 https://www.charged-the-book.com/na-ev-supply-chain-map

7 https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23.pdf; https://rmi.org/insight/how-inflation-reduction-act-will-affect-ev-adoption-in-the-united-states/

Continued improvement in internal combustion engine vehicles is needed

Even under Alternative 1, there would still be over 40 million new ICEVs sold over the life of these standards. These vehicles could be on the road for two decades, contributing significantly to local air pollution, climate change, and costing drivers considerably at the pump. It is critical that the new standards continue improvements on ICEV efficiency while also pushing the market to electrify. Our modelling shows that under EPA's achieved emissions rates, ICEV emission rates would needlessly rise and would be as high as MY 2023 levels. Under the proposed standard, ACEEE estimates that average ICEV emissions could increase by up to 2.9% per year, contributing an extra 805 million metric tons of lifetime CO2 compared to a future where ICEV performance flatlines at model year 2026 levels. This is equivalent to an approximately 11% increase in emissions from the projected savings in the rule of 7,300 million metric tons of CO2 (FR 29198, Table 3). [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

This calculation assumes BEV penetration reaches what EPA projects under its proposal and includes upstream emissions accounting for all vehicles. However, it also factors in the reduction of credits, which limits the increase in ICEV emissions compared to model year 2026 (when there are significantly more credits available). Removing the effects of the proposed off-cycle and A/C credit changes in both model year 2026 and under the proposed standards means that ICEVs emissions reductions backslide even further, reaching almost 5% annually. [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

Under EPA's proposed standards, rapid electrification can allow automakers to meet their targets even while letting ICEVs worsen, squandering some of the emissions benefit of electrification and missing an important opportunity for further emissions reductions. This is unacceptable given that mature emissions-reducing technologies, such as hybridization, already exist on the market today and often go underutilized by manufacturers. Our modeled findings are consistent with EPA's own analysis, which projects that ICEV emissions rates will increase over the life of the standard. In fact, EPA compliance modeling indicates that manufacturers will go so far as to remove emissions-reducing technologies from many ICEV models, a completely counterproductive behavior.10 On the other hand, if manufacturers do not move backwards on ICEV efficiency, they will be able to meet the standards with fewer BEVs than EPA projects, also an undesirable outcome. In either case, the conclusion is that the standards should be strengthened to incentivize ICEV improvements more strongly. [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

10 Based on analysis of EPA's OMEGA model outputs, 2023_03_14_22_42_30_central_3alts_20230314_Proposal_vehicles.csv

Just a 3% annual reduction in the average emissions for ICEVs — compared, for example, to the 4.6% per-year reduction called for under the 2012 standards for MY 2017-202511 — could lead to a further reduction of almost 800 million metric tons of CO2 and ICEVs that are about 30% cleaner compared to EPA's proposal. Much of this reduction could come from the continued adoption of hybrid vehicles in the US market. EPA expects little contribution from strong hybrids in meeting the proposed standard even though hybridization is a proven technology with decades of usage, as discussed above. EPA projects that strong hybrids will be completely phased out under the proposed standards by 2032 (FR 29329, Table 83), despite hybrids accounting for a record 10% of new vehicles offerings in model year 2022.12 We should not be moving backwards on ICEV performance and the penetration of proven efficiency technologies like hybridization over the life of these standards. [EPA-HQ-OAR-2022-0829-0642, pp. 3-4]

11 https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EZ7C.PDF?Dockey=P100EZ7C.PDF

12 https://www.epa.gov/automotive-trends

EPA should implement upstream accounting to encourage BEV Efficiency

EPA proposes to continue, and make permanent, the treatment of electric vehicles as entirely zero emission vehicles (ZEVs)(FR 29252). While it is true that BEVs generate no emissions at the tailpipe, charging these vehicles does create emissions upstream. The major flaw with ignoring refueling emissions is that EPA loses the opportunity to influence the efficiency of a growing component of the vehicle market. EPA is both empowered and required to regulate the emissions from on-road light duty vehicles. Given that BEVs are expected to reach the majority of new sales within this decade,13 it is imperative we address their emissions. Using the rule to improve BEV efficiency will accomplish this. Upstream accounting in compliance is a simple and effective way to promote efficiency. It recognizes that different BEVs, by virtue of their wide range of efficiencies, are responsible for different levels of emissions from our still fossil fuel-based electricity grid. EPA's GHG standards for LDVs have historically led to innovations in emissions reduction technology and design for ICEVs and the same should be true in an all-electric future. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

13 https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/

Our own analysis shows that even among BEVs of the same vehicle type and weight there can be considerable differences in efficiency and, therefore, upstream emissions, as shown in Figure

1.14 Not all BEVs are created equal and there is still plenty of room for innovation and emissions improvements in the BEV market. The fact that BEVs with curb weights of 5,000 pounds can have efficiencies varying from under 2.5 mi/kWh to over 4 mi/kWh demonstrates how important it is that these standards continue their historical role in advancing automotive innovation as we electrify. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

14 https://www.aceee.org/blog-post/2023/04/boosting-ev-efficiency-would-cut-emissions-and-reduce-strain-grid

[See original for graph titled "Figure 1. Efficiency versus weight in model year 2023 BEVs"]

By our calculations, if upstream accounting, or another mechanism, led to a 3% annual growth in BEV efficiency over the life of the standards, lifetime emissions from MY 2027- 2032 vehicles would be reduced by over 170 million metric tons under both the proposed standards and Alternative 1. This does not include the benefits from vehicles sold from model year 2033 onwards that would take advantage of advancements in efficiency technologies and designs potentially spurred by this standard. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

Greater BEV efficiency has a number of benefits beyond just reducing upstream emissions. Greater BEV efficiency can allow a vehicle to go the same distance with a smaller battery, effectively reducing the use of high-demand minerals and the emissions generated from vehicle production (the calculations discussed above do not account for these emissions reductions impacts from improved BEV efficiency). While BEVs are certainly still better from an emissions perspective than their equivalent ICEV when looking at the entire life-cycle, it is still important to reduce their environmental impact. Mineral supply and battery manufacturing capacity also have the potential to be limiting factors for rapid electrification, so reducing battery needs per vehicle by increasing efficiency can facilitate achievement of the MY 2027-2032 standards. [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

Greater BEV efficiency also means a smaller impact on our electricity grid and drivers' wallets, as less electricity is needed to drive the same distance.15 If all LDVs on the road were electric and had an average efficiency equivalent to the highest-efficiency vehicle on the market today, we could save enough electricity annually to power 21 million homes. Full on- road fleetwide electrification is not expected for decades so this improvement in BEV efficiency is feasible and could even be surpassed if incentivized by the standards.16 [EPA-HQ-OAR-2022-0829-0642, pp. 4-6]

15 https://www.aceee.org/blog-post/2022/09/evs-surge-utilities-need-transparent-equitable-comprehensive-plans-support-them

16 https://www.aceee.org/blog-post/2023/04/boosting-ev-efficiency-would-cut-emissions-and-reduce-strain-grid

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA also unreasonably ignored alternative solutions to the proposed light- and medium-duty emissions standards. Agencies are required, as part of any reasoned decisionmaking process, to consider all "significant and viable and obvious alternatives" to their proposed action. Dist. Hosp. Partners, 786 F.3d at 59 (citation omitted); see Spirit Airlines, Inc. v. DOT, 997 F.3d 1247, 1255 (D.C. Cir. 2021) ("[T]he failure of an agency to consider obvious alternatives has led uniformly to reversal.” (quoting Yakima Valley Cablevision, Inc. v. FCC, 794 F.2d 737, 746 n.36 (D.C. Cir. 1986))). [EPA-HQ-OAR-2022-0829-0683, p. 65]

Here, EPA failed to consider any alternatives that did not fall within the narrow category of tailpipe-emissions standards. The agency instead considered only whether emissions standards of varying level of stringency or with differing phase-in periods may be appropriate alternatives. See 88 Fed. Reg. at 29,201. But tailpipe-emissions standards are not the only means available to achieve EPA’s stated goal of “reduc[ing] . . . criteria pollutants and GHG emissions from the transportation sector.” Id. at 29,186. [EPA-HQ-OAR-2022-0829-0683, p. 65]

For instance, as EPA acknowledges in the proposed rule, the agency has authority to impose fuel controls, one possible alternative to emissions standards. 88 Fed. Reg. at 29,397–98. But EPA requested comment only on whether fuel controls should be used in the future as a “complement” to emissions standards, rather than as an alternative to them. Id. That omission violates the requirement of reasoned decisionmaking.10 Cf. Am. Radio Relay League, Inc. v. FCC, 524 F.3d 227, 242 (D.C. Cir. 2008) (remanding where agency did not “consider responsible alternatives to its chosen policy and . . . give a reasoned explanation for its rejection of such alternatives” (citation omitted)). EPA’s failure to consider any non-emissions-standard-based alternatives to the proposed rule renders the proposed rule arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0683, p. 66]

10 We do not at this time express any view on any particular fuel-control measure, and any regulation incorporating such measures would first have to be proposed for public comment. See 42 U.S.C. § 7607(d). We simply note the proposed rule’s failure to address fuel controls as an alternative.

Organization: American Fuel & Petrochemical Manufacturers

We are also troubled by EPA’s failure to evaluate the lifecycle emissions of various powertrains and the national security implications of the proposal. Focusing exclusively on “tailpipe” emissions paints a distorted picture and perpetuates the false notion that electric vehicles are “zero emitters.” EPA must present the public with a complete picture, one that shows how the various powertrains stack up against each other cradle-to-grave and the major carbon reductions that vehicle manufacturers and fuel producers have made over the last few decades and continue to make. EPA’s failure to do so would render any final rule arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0733, pp. 1-2]

EPA offers no support for its conclusion that there will be substantial consumer adoption of ZEVs to achieve the increases projected by the Proposed Rule. To the contrary, recent polling shows that most Americans continue to say that they are unlikely, or will categorically refuse, to buy an EV. As just one example, a Gallup poll conducted in April revealed that only 4 percent of adults owned an EV and just 12 percent are seriously considering buying one. However, 41 percent of adults said they would never buy an EV, raising fundamental questions about how EPA can predict that ZEV sales will reach 67 percent in 2032.136 [EPA-HQ-OAR-2022-0829-0733, p. 31]

136 Megan Brenan, Gallup, Most Americans Are Not Completely Sold on Electric Vehicles (April 12, 2023). Retrieved a https://news.gallup.com/poll/474095/americans-not-completely-sold-electric-vehicles.aspxt .

According to Wards Intelligence, through May 2023, Americans purchased 5.9 million ICEVs, representing 93 percent of all LDVs sold during the first five months.137 At this pace, more than 14 million new ICEVs will be purchased during 2023.138 With the continued sales of ICEVs, this Rule's effort to limit the ability to purchase ICEVs, and more than 50 percent of ICEVs remaining in service, it is mindboggling, as discussed in Section IV.6 below, that EPA never considered the alternative scenarios using vehicle technologies and lower carbon fuels. [EPA-HQ-OAR-2022-0829-0733, p. 31]

137 John Eichberger, Decarbonizing Combustion Vehicles – A Critical Part in Reducing Transportation Emissions, Transportation Energy Institute, June 2023. Available at Decarbonizing Combustion Vehicles – A Critical Part in Reducing Transportation Emissions - Transportation Energy Institute.

138 Id.

6. EPA failed to consider, let alone evaluate, alternative emissions reductions strategies

Despite all the well-known constraints with mandating electrification of the transportation sector and building the necessary nationwide infrastructure, EPA never considered, let alone evaluated, emissions reductions from modifications to ICEVs' emissions control systems, bio and renewable fuels, alternative fuels (e.g., hydrogen), and use of carbon capture and sequestration. To reduce carbon emissions and ensure energy security and independence, Congress created the RFS, which requires increasing volumes of renewable fuel to be blended into transportation fuel. The four categories of renewable fuel must emit anywhere from 20 percent to 80 percent fewer GHGs relative to the fossil fuel it replaces. In response to this mandate, U.S. refineries dramatically increased renewable fuel production and invested billions of dollars to expand U.S. production of liquid renewable fuels, which can now achieve 79 to 86 percent GHG emissions reductions as compared to petroleum fuels.188 [EPA-HQ-OAR-2022-0829-0733, pp. 40-41]

188 Hui Xu, Longwen Ou, Yuan Li, Troy R. Hawkins, and Michael Wang, Environmental Science & Technology 2022, 56 (12), 7512-7521. DOI: 10.1021/acs.est.2c00289

According to the Energy Information Agency's June 2023 Short-Term Energy Outlook (STEO), [EPA-HQ-OAR-2022-0829-0733, pp. 40-41]

- Biomass diesel (which includes biodiesel and renewable diesel) production averaged 3.1 billion gallons in 2022. EIA expects production to average 4.0 billion gallons in 2023 and 4.8 billion gallons in 2024.

- Ethanol and renewable oxygenate production is expected to increase from 18.4 billion gallons in 2022 to 19.2 billion gallons in 2023, and to 20.4 billion gallons in 2024.

- Biodiesel production averaged 1.6 billion gallons in 2022. Production is expected to decline to 1.5 billion gallons in 2023, and to 1.4 billion gallons in 2024.

- Renewable diesel production averaged 1.5 billion gallons in 2022. Production is projected to increase to 2.4 billion gallons in 2023, and to 3.4 billion gallons in 2024. [EPA-HQ-OAR-2022-0829-0733, pp. 40-41]

In response to the RFS and other government programs encouraging the production of lower carbon renewable liquid fuels, U.S. refiners are undertaking significant capital expenditures to reduce GHG emissions such as: [EPA-HQ-OAR-2022-0829-0733, pp. 40-41]

- Taking advantage of Congress' 45Q tax credit for CCS, ethanol producers are looking to used carbon capture and sequestration to reduce GHG emissions from the 15 billion gallons of ethanol blended into our nation's gasoline.189 [EPA-HQ-OAR-2022-0829-0733, pp. 40-41]

189 Erin Voegele, Carbon America to develop CCS project at Nebraska ethanol plant, Ethanol Producer Magazine, October 4, 2022 (Carbon America announced its third CCS project at a U.S. ethanol plant). Retrieved at https://ethanolproducer.com/articles/19655/carbon-america-to-develop-ccs-project-at-nebraska-ethanol-plant.

- Renewable diesel and sustainable aviation fuel production capacity will total 5.1 billion gallons per year if all announced expansion projects, which represent $10.8 billion in investments, are completed.190 [EPA-HQ-OAR-2022-0829-0733, pp. 40-41]

190 EIA,U.S. renewable diesel capacity could increase due to announced and developing projects, Today in Energy, July 29, 2021. Retrieved at https://www.eia.gov/todayinenergy/detail.php?id=48916

Although the RFS, an EPA program, has achieved significant emissions reductions for more than a decade, there is no mention in the Proposal or the DRIA of alternative emissions standards that could be achieved through the use of additional changes to emissions control equipment, alternative fuels, or bio and renewable fuels. Lifecycle assessments (LCAs) of GHG emissions from ICEVs reveal that 73 percent of lifecycle GHG emissions come from fuel combustion.191 By comparison, lifecycle emissions from ZEVs occur not from fuel combustion from the vehicle, but from fuel use and various energy and material inputs upstream from the vehicle. Therefore, EPA's failure to consider standards that reduce the carbon intensity of liquid fuels used in ICEVs and ignoring the carbon intensity of EVs is arbitrary and capricious. It results in a highly flawed assessment of emissions from new motor vehicles which "cause, or contribute to, air pollution" as envisioned in CAA section 202(a) and demonstrates its unvarnished bias in favor of EVs. The Agency's refusal to evaluate biofuels illustrates EPA's tunnel vision that proposes a single panacea for a highly complex problem in a rapidly changing world [EPA-HQ-OAR-2022-0829-0733, pp. 40-41]

191 Decarbonizing Combustion Vehicles – A Critical Part in Reducing Transportation Emissions - Transportation Energy Institute.

As discussed above, because EPA may only prescribe standards applicable to vehicles that "cause or contribute" to air pollution, its standards cannot account for ZEVs with no tailpipe emissions. However, if EPA is authorized to promulgate such standards, those standards must account for any upstream emissions from upstream electric generating units, the mining of battery materials, and the production of the vehicle.197 Without consideration of upstream and full life- cycle impacts (e.g., frequent battery replacements), EPA has failed to inform the public of the comparative costs of emission reductions, whether from ZEVs, ICEVs, energy efficiency, or other sectors. EPA's continued failure to address this "major aspect of the problem" is another example of EPA moving toward its predetermined outcome—the forced electrification of U.S. transportation.198 AFPM has continually put EPA on notice of the need to include a LCA to avoid an arbitrary comparison—the agency continues to ignore this issue of central relevance to EPA's benefit analysis. [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

197 Proposed Rule at 29,353–55.

198 See, e.g., Comments of the American Fuel & Petrochemical Manufacturers on EPA's Reconsideration of a Previous Withdrawal of a Waiver of Preemption 10 (July 6, 2021), https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0257-0139, Comments of the American Fuel

& Petrochemical Manufacturers on EPA's/NHTSA's Proposed The Safe Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks 68-73 (Aug. 24, 2018), https://www.regulations.gov/comment/EPA-HQ-OAR-2018-0283-5698; Comments of the American Fuel & Petrochemical Manufacturers on EPA's California State Motor Vehicle Pollution Control Standards; Advanced Clean Trucks; Zero Emission Airport Shuttle; Zero Emission Power Train Certification; Request for Waiver of Preemption 7-12 (Aug. 2, 2022), https://www.regulations.gov/comment/EPA-HQ-OAR-2022- 0331-0088.

For instance, the fuel source of a PEV, like a ZEV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces emissions. The fact that emissions occur 100 percent upstream of the vehicle's operation and therefore fall outside of the tailpipe emissions calculation does not make these emissions any less significant. There is no logical basis for this omission because, as EPA is aware, concerns about GHG emissions relate to their longer-term global concentrations. Consequently, air pollutant emissions are an important consideration regardless of where such emissions occur. Without comparing lifecycle ZEV emissions to lifecycle emissions from ICEVs, EPA cannot know if or how much its standards are decreasing total emissions. Thus, while EPA is not required to solve all emissions problems in one rulemaking, EPA cannot claim to be solving part of the problem here without addressing upstream and downstream emissions. EPA's approach of mandating ZEVs cannot possibly be reasonable if it is merely shifting emissions from one source to another at the cost of hundreds of billions of dollars—trillions when costs to upgrade EV infrastructure are factored in— or could do so more cost-effectively by choosing a different approach.199 [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

199 5 U.S.C. § 706(2)(A); cf. Antonin Scalia, "Regulatory Review and Management," Regulation Magazine 19 (Jan./Feb. 1982) ("Is it conceivable that a rule would not be arbitrary or capricious if it concluded with a statement to the effect that 'we are taking the foregoing action despite the fact that it probably does more harm than good, and even though there are other less onerous means of achieving precisely the same desirable results'?").

The flaw in EPA's approach is illustrated by the fact that emissions standards easily become meaningless by changing the engine's location. The proposed rule would treat a ZEV charged by a diesel-powered generator as if it had zero tailpipe emissions, notwithstanding the fact that it remains "powered" by a diesel engine located outside the vehicle. A LDV directly powered by a diesel engine inside the vehicle, however, is credited with the emissions produced by that engine. EPA's inconsistent approach begs the question of how nascent technologies such as a vehicle propelled by compressed air would be evaluated. Thus, the energy source of the "fuel" matters and EPA arbitrarily ignores lifecycle emissions from ZEVs and also proposes to remove requirements for upstream emissions calculations.200 EPA admits "the program has now been in place for a decade, since MY 2012, with no upstream accounting and has functioned as intended, encouraging the continued development and introduction of electric vehicle technology."201 EPA's mandate is to establish feasible standards rooted in the statute, not to ignore real-world emissions to "encourage" the development of its favored technology. EPA requested comment on whether it should account for upstream emissions for all fuel and vehicles. If technologies are being treated equally, as they must, the answer is an unequivocal yes. [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

200 88 Fed. Reg. at 29,197.

201 Id. at 29,253.

Organization: American Highway Users Alliance

In addition, EPA seems to have given little or no consideration to incentives for lower emission liquid fuels as part of the solution to reducing lifecycle emissions from these vehicles. Such fuels are already in the marketplace; increasing their use would appear to be achievable. Policy approaches to help encourage the production of lower emission liquid fuels could offer near-term emissions reductions from existing vehicles, potentially at a lower cost to society. Yet, EPA's proposal in this docket (as well as in the heavy-duty vehicle docket) focuses on electrification as the sole means of reducing emissions from vehicles, even though in 2022 EVs constituted less than 7 percent new light duty vehicle sales. [EPA-HQ-OAR-2022-0829-0696, p. 4]

Greater use of lower-emission liquid fuels should be part of the overall approach to reducing emissions from vehicles

Further, and as noted earlier, the discussion in the NPRM and in the heavy-duty vehicle Phase 3 NPRM seem to have given little or no consideration to the potential gains in emissions reductions that could be achieved through greater use of lower emission fuels. Fuels produced with lower emission renewable feedstocks and traditional fuels produced with lower carbon intensities, such as in association with carbon capture and sequestration, exist today and are scalable with the right policy support. Greater use of these fuels could help reduce emissions from the hundreds of millions of vehicles already on the road while EV charging infrastructure, fueling infrastructure for other alternate fuels, and critical mineral supply chains develop and don't otherwise create additional energy security or geo-political risks. [EPA-HQ-OAR-2022-0829-0696, p. 5]

Even with the accelerated fleet turnover the EPA's proposed standards seek, hundreds of millions of vehicles with internal combustion engines will remain on the roads in the coming decades. Instead of pursuing policies that focus on a sole technology pathway for achieving transportation-related emissions reductions, EPA should allow for multiple technology pathways – including pathways that recognize how to improve the overall lifecycle carbon intensity for existing vehicles and fuels. This might include linked carbon-intensity based vehicle and fuel standards that enable consumers to retain the preference for engine type or powertrain, while still participating in societal aims to achieve emissions reductions. [EPA-HQ-OAR-2022-0829-0696, p. 5]

Organization: American Petroleum Institute (API)

a. API Supports Emission Reductions in the Transportation Sector.

API appreciates EPA's efforts to address transportation sector emissions. As detailed in the API Climate Action Framework1, we support technology-neutral policies at the federal level that drive GHG emissions reductions in the transportation sector and our members have committed to delivering solutions that reduce the risks of climate change while meeting society's growing energy needs. API members work to advance the development, transmission, and use of lower carbon intensity and lower criteria pollutant fuels and technologies to provide choices for consumers. Specifically, API members have made, and continue to make, significant investments in new technologies that reduce emissions in transportation, including: [EPA-HQ-OAR-2022-0829-0641, p. 4]

1 https://www.api.org/climate.

GHG Emission Reduction [EPA-HQ-OAR-2022-0829-0641, p. 4]

- Stand-alone production and coprocessing of bio-feedstocks to make renewable fuels.
- Manufacturing of low-carbon ethanol.
- Manufacturing of renewable natural gas from wastewater, landfill gas, and biodigesters at farms as fuel for compressed natural gas (CNG) vehicles.
- Production of blue and green hydrogen for transportation and stationary applications including building infrastructure.
- Direct air carbon capture.
- Carbon capture and sequestration of CO2.
- Development of advanced plastics to meet auto industry standards and consumer expectations while mitigating environmental impact through emissions reduction and improved vehicle efficiency by light-weighting.
- Installation of electric vehicle charging stations.
- Installation of hydrogen fueling stations. [EPA-HQ-OAR-2022-0829-0641, p. 4]

Criteria Pollutant Reduction [EPA-HQ-OAR-2022-0829-0641, p. 4]

- Tier 3 gasoline sulfur standards
- MSAT II gasoline benzene standards
- Lower vapor pressure reformulated gasoline [EPA-HQ-OAR-2022-0829-0641, p. 4]

API shares the goal of reduced emissions across the broader economy and, specifically, those from energy production, transportation and use by society. To achieve meaningful emissions reductions that meet the climate challenge, it will take a combination of policies, innovation, industry initiatives and a partnership of government and economic sectors. The objective is large enough that no single approach can achieve it. [EPA-HQ-OAR-2022-0829-0641, p. 4]

ii. EPA failed to address emission reductions in the existing LMDV fleet to help achieve near-term emission reductions.

Fuel- and vehicle-based GHG emissions reduction solutions are currently available in the marketplace and could achieve nearer-term emission reductions from the existing light- and medium-duty vehicle fleet. A singular focus on future ZEV technologies does not seem to meet the stated goals of the proposed program. The proposal would require a significant ramp-up of electric vehicle production in relation to the scale of the current market, would depend on infrastructure that may not be readily available at the scale needed to meet the proposal’s requirements, and would be on an extremely challenging (at best) timeline. Meaningful emission reductions are achievable sooner, and potentially at lower cost, via the use of proven and available technology. For example, the U.S. Department of Energy (DOE) Co-Optimization of Fuels & Engines (Co-Optima) initiative examined fuels and engine/vehicle technologies simultaneously.18 The combination of sustainable fuels uncovered by the Co-Optima research can reduce the emissions of vehicles now, while enabling a faster transition to net-zero-carbon emissions for on-road transportation in the future. The lifecycle GHG emissions of these studied fuels were found to be reduced by more than 60%.19 Such an approach could be utilized by EPA to better achieve the stated goals of the agency. EPA must address this factor. [EPA-HQ-OAR-2022-0829-0641, pp. 8-9]

18 U.S. Department of Energy Offce of Energy Effciency & Renewable Energy, "The Road Ahead Toward a Net-Zero- Carbon Transportation Future Findings and Impact, FY15–FY21." https://www.energy.gov/sites/default/files/2022- 06/beto-co-optima-fy15-fy21-impact.pdf

19 Gaspar, Daniel J., West, Brian H., Ruddy, Danial, Wilke, Trenton J., Polikarpov, Evgueni, Alleman, Teresa L., George, Anthe, Monroe, Eric, Davis, Ryan W., Vardon, Derek, Suton, Andrew D., Moore, Cameron M., Benavides, Pahola T., Dunn, Jennifer, Biddy, Mary J., Jones, Susanne B., Kass, Michael D., Pihl, Josh A., Pihl, Josh A., Debusk, Melanie M., Sjoberg, Magnus, Szybist, Jim, Sluder, C S., Fioroni, Gina, and Pitz, William J. 2019. "Top Ten Blendstocks Derived From Biomass For Turbocharged Spark Ignition Engines: Bio-blendstocks With Potential for Highest Engine Efficiency". United States. https://doi.org/10.2172/1567705.

2. Current and future solutions – lower carbon fuels, hydrogen, ICE-based solutions.

As previously noted in our comments, lower-carbon options currently exist and could be used for near-term reductions. Lower carbon fuels are available in the market now, and research and development to bring costs down and improve operability is ongoing. [EPA-HQ-OAR-2022-0829-0641, pp. 10-11]

Bio and renewable fuels can and should be considered as part of an "all-of-the-above" approach to decarbonization of the transportation sector, including biocircularity. As previously noted, API members are currently investing heavily in renewable fuel production – continued investment and development will increase the available volumes of such fuels in the marketplace and allow them to serve both as a viable lower carbon solutions leading up to the start of the EPA proposed rule, throughout implementation, and beyond. [EPA-HQ-OAR-2022-0829-0641, pp. 10-11]

Further, EPA's LCA modeling for the proposal is based on biocircularity with atmospheric CO2 consumed by biomass, resulting in zero tailpipe carbon emissions if the combusted biofuels were made from renewable biomass. The agency is thus not taking the source of carbon into account and is classifying all carbon tailpipe emissions as the same related to their atmospheric GHG impact. [EPA-HQ-OAR-2022-0829-0641, pp. 10-11]

Organization: Andrea Strzelec

[*From Hearing Testimony, May 11, 2023*] Let me start by acknowledging that I absolutely support the goal of this proposal and believe that we need to work to further reduce pollutant and GHG emissions however I emphatically do not support the specifics of this proposed rule. I believe that both the EPA and the passionate speakers from the past couple of days are very well intentioned but you are also likely familiar with the quote that the road to Hell is paved with them, because intentions can have unintended consequences. We cannot make such gravely important decisions based on intentioned or impassioned pleas. The stakes are much too high. It is imperative that we make decisions based on science, in this case, it means including lifecycle analysis in policy development because dirty is in the details. My strong concern with the proposed rule is the unintended consequences that we risk because of the outdated methodology that has been used to develop it. The EPA claims that the proposed rule is technology neutral but functionally it is not as it only considers tailpipe emissions. Because mobile and stationary source emissions are not coupled in the regulatory sense though of course they are in reality, it means if we only consider tailpipe emissions for this rule, electric vehicles are then considered to be zero-emissions. Let me be clear this is a policy based definition and is not factually true. Zero emissions is a physical impossibility, you can blame thermodynamics. EVs simply move the mobile source emissions that would have come out of the tailpipe to the stationary power generating source. In the United States that means a vast majority of EVs are actually being powered by coal or fossil fuels. The hardware is not the problem. Neither the engine nor the electric drive motor are bad. In fact they both suffer from the same fundamental problem in terms of emissions, the energy source that allows them to deliver power. In addition only considering the tailpipe emissions does not consider the emissions from manufacturing and I'll note that battery materials and manufacturing issues have been described by previous speakers. The only way to truly understand the impact of any standard technology or rule is by looking at the entire picture by doing accurate lifecycle analysis that considers all the inputs and outputs, not just the convenient ones. Therefore I urge the EPA to reconsider the rule using lifecycle analysis. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 3]

Organization: Anonymous

There should be provisions in the rule for the handling of biofuels and/or synthetic fuels ("efuels") in GHG emission calculations. Phasing out fossil fuels for ICEVs while phasing in renewable fuels/efuels could be just as effective in achieving climate goals as a shift to so-called "zero-emission" vehicles (most likely BEVs), possibly even more so. In fact, even if 100% of new vehicle sales are BEV by 2035, or any other date for that matter, it could potentially be counterproductive from an environmental perspective. ICEVs will be on the road for decades even if new ICEVs are effectively banned by regulation, and those vehicles would be contributing to significantly reduced GHG emissions with bio/efuels, while still in use. The European Union just adopted a provision to allow new ICEVs to be sold after 2035 if efuels are used exclusively to fuel the vehicles, in spite of efforts to "ban" ICEVs after 2035 [EPA-HQ-OAR-2022-0829-0490, p. 1]

According to Argonne National Laboratory (ANL), efuels produced by the Fischer- Tropsch (FT) process can actually be carbon NEGATIVE from a well-to-wheels perspective if the system is properly configured (https://pubs.acs.org/doi/10.1021/acs.est.0c05893). Some FT biofuels can also be carbon negative with CCS (e.g., https://velocys.com/2019/10/10/negative-emission-fuel-agreement/), or by sequestering carbon produced as a byproduct from the process (https://www.greencarcongress.com/2023/04/20230415-terrastar.html). There are no pathways in ANL's GREET model for BEVs to be carbon negative, or even carbon neutral, not even with 100% renewable electricity. If GHG emission reduction is really the goal, these fuels should be given top priority from a regulatory perspective. It should also be pointed out that FT ediesel fuel has very low upstream (well-to-tank) criteria pollutant air emissions according to ANL's GREET model. The Renewable Fuel Standard (RFS) could be used as a mechanism for phasing out fossil-based fuels in favor of biofuels/efuels. Alternatively, the U.S. could follow the European model and allow only ICEVs that use efuels/biofuels exclusively to be produced post 2035. Some consideration of biofuels/efuels should be adopted. [EPA-HQ-OAR-2022-0829-0490, p. 1]

Organization: Billy Brooks

[*From Hearing Testimony, May 10, 2023*] I agree with the need to reduce emissions however I believe the proposed ruling is shortsighted and needs to focus on the lifecycle emission of light and medium-duty vehicles from the production of the component in vehicle to the useful life of the vehicle instead of focusing solely on the tailpipe emissions. This ruling is pushing for the extinction of internal combustion engines while small businesses have shown the success in the reduction of tailpipe emissions with alternative fuel technology. COBB Tuning is one of many in the aftermarket auto sector that has shown fuel technologies specifically flex fuel and ethanol blends. New engines and transmission calibrations, emission control equipment, hybrid and other technologies, a reduction of tailpipe emissions while ultimately leading to improved lifecycle emissions. These areas of innovation still has potential to be realized and continue feasibility demonstrated. We know technological breakthroughs usually don't come as quickly as most would like but innovation does pay off. We just need to give it time. We need to approach the goals outlined in the EPA ruling with an all of the above approach with diverse fuel technology not just electric. Without focusing on lifecycle emissions, we may be reducing tailpipe emissions but continuing to pollute our world with no real way to recycle the batteries from the EVs. Here in Texas as in many parts of the country, the infrastructure can't handle the current electrical grid requirements for the amount of EVs that would be proposed. Roughly two years ago the majority of Texas was without power during the freeze. There needs to be more R&D before making EVs the only option. In the meantime, bring other technologies to light, give the innovators of this country a level playing field. I am confident we can reach our desired environmental goals by clearing the way of technology to provide us with the answers. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 2]

Organization: Brian Kalina

[*From Hearing Testimony, May 11, 2023*] I am aligned with the EPA's end goals and because of this alignment I do encourage EPA to not discount renewable fuel and combustion engine technology as an important neighbor of the greenhouse portion of these goals. In my own personal and professional studies over the last 15 years, I continue to come across evidence that pursuing a mix of clean solutions and not just battery electric will lead to greatest environmental economic and geo political sustainability. I am concerned by not considering battery electric vehicle upstream emissions, emissions which are typically greater than that of internal combustion engine vehicles, the proposal as it presently stands would treat battery electric as a less greenhouse gas intensive technology than it really is. In effect the proposal in its current stance would force a greater fraction of battery electric vehicle sales than I do believe is optimal for a minimized greenhouse gas emissions and moreover is optimal for a country's economic and geo political interests. There are four issues associated with increased battery electric vehicle production and use that I would like to highlight. Number one, increase in adverse environmental impact associated with battery raw material extraction, battery manufacturing and electricity generation for battery charging. Number two, political conflict which may arise from over reliance on battery raw materials which often times must be sourced from certain regions of the world. Number three and this hits close to home, permanent reduction in auto industry job counts seeing how battery electric does not use as many parts as an internal combustion engine. These parts frankly power thousands of good paying jobs. And number four, the decimation of U.S. biofuels industry, an industry that would otherwise be poised to greatly assist in bringing to fruition EPA's greenhouse gas emissions goals. To help protect against the issues, I strongly encourage EPA to adopt greenhouse gas quantification methods which are guided by lifecycle assess. To only focus on tailpipe emissions is to discount very important big picture factors. If we are to achieve balance which is essential for long term sustainability, I sincerely believe that renewable fuel, internal combustion engine must play a similarly important role as battery electric as we make transportation clean and sustainable. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 3]

Organization: Charles Forsberg

There are lower cost options to reduce greenhouse gas emissions built upon American strengths and thus can be implemented much less time. The U.S. globally leads in five areas: finance, software (but the Chinese are closing in fast), weapons, agriculture and oil/gas. The U.S. is far behind in mining and manufacturing. Betting on weak industries with near total dependence on foreign suppliers for non-earth-abundant materials is a good way to assure failure. Furthermore, it will not take long for the supplier nations to get together and further increase prices. Because the U.S. is unwilling to expand its mining industry by orders of magnitude, it can't win this game. [EPA-HQ-OAR-2022-0829-0738, pp. 3-4]

We use liquid hydrocarbons (gasoline, diesel and jet fuel) because of their remarkable chemical properties including high energy density, low storage costs and low cost to transport long distances from producer to consumer. If crude oil had never existed, we would have invented gasoline, diesel and jet fuel. These liquid fuels can be made from many feed stocks. They are currently made from crude oil, coal, natural gas and biomass. [EPA-HQ-OAR-2022-0829-0738, pp. 3-4]

We assessed the demand for liquid hydrocarbons-gasoline, diesel, jet fuel and chemical feed stocks. The U.S. currently consumes 18 million barrels per day. That demand could go as low as 10 million barrels per day before the costs of replacing liquid hydrocarbons with other technologies dramatically increases with serious reductions in the U.S. standard of living. We include the adoption of hybrid and plug-in hybrid electric vehicles in estimates of future liquid hydrocarbon fuel demand but no significant number of battery electric vehicles. The demand could be as high as 20 million barrels per day if liquid fuels have to replace any significant fraction of the current energy storage functions of natural gas and coal. All electric vehicles are not included in the analysis of the need for gasoline, diesel and jet fuel because (1) they are unaffordable for the majority of Americans and (2) their large-scale use significantly increases electricity prices. [EPA-HQ-OAR-2022-0829-0738, pp. 3-4]

We developed a pathway to replace all crude oil with cellulosic hydrocarbon drop-in fuels that (1) could produce 25 million barrels of hydrocarbon liquids per day without significant impacts on food and fiber prices and (2) simultaneous sequestration of atmospheric carbon dioxide. Cellulosic biomass include materials such as com stover, trees and kelp. It does not include sugars, vegetables oils or carbohydrates-that are currently used for most biofuels production. These feed stocks are insufficient to replace crude oil and compete with human food demand. [EPA-HQ-OAR-2022-0829-0738, pp. 3-4]

The major difference between this biofuels strategy and the traditional biofuels strategy is the abandonment of the 100,000 year old campfire model of biomass that should be left to the Boy

Scouts. Gasoline, diesel and jet fuel are made of carbon and hydrogen. Most current biofuels strategies use biomass as (1) a carbon source to produce the hydrocarbon product and (2) an energy and chemical source for the conversion process. The traditional conversion of biomass into gasoline, diesel and jet fuel involves using some of the biomass carbon for (1) removal of 40% by weight of the oxygen in biomass as carbon dioxide, (2) the production of hydrogen and (3) the energy to operate the process. Only a fraction of the biomass carbon ends up in the final product. Our cellulosic biofuels strategy uses external heat and hydrogen for converting cellulosic biomass into hydrocarbon liquids. With the conventional strategy, U.S. biofuels production is limited to something like 6 million barrels per day versus 25 million barrels per day with external heat and hydrogen inputs. The use of external heat and hydrogen inputs have two effects: (1) doubles hydrocarbon liquid fuels produced per ton of biomass and (2) makes hydrogen (not biomass) the primary cost of liquid fuels. If biomass feedstock is not the primary cost component of biofuels, one can pay more for cellulosic biomass without large impacts on final liquid fuel costs. [EPA-HQ-OAR-2022-0829-0738, pp. 3-4]

In the near term, the low cost hydrogen source is conversion of natural gas to hydrogen with underground sequestration of the byproduct carbon dioxide. For 10 million barrels per day of liquid hydrocarbons, this input will require a quarter to a third or more of U.S. natural gas production capability. There are internal tradeoffs between hydrogen, quantities of biomass and biomass characteristics. Hydrogen would be shipped via pipeline to the bio-refineries. The main conversion processes would be done at large bio-refineries with capacities of 250,000 barrels per day-mostly existing refineries with front-end modifications. The gigawatts of heat required per refinery would ultimately be provided by nuclear reactors co-located with refineries. Heat can only be shipped short distances. Nuclear energy is the only credible low-carbon energy source today for gigawatts of 24/7 heat that is required by integrated refineries. [EPA-HQ-OAR-2022-0829-0738, pp. 4-5]

This strategy requires major changes in agriculture and modifications of the big refineries but not changing the entire U.S. economy-enabling a fast transition off fossil crude oil with large scale sequestration of atmospheric carbon dioxide and massive economic benefits to rural America. The natural gas industry becomes the hydrogen supply industry where the primary market is perhaps a100 integrated bio-refineries. American agriculture provides most of the biomass with systems that recycle nutrients and carbon char to the soils for long-term agricultural and forest sustainability. Example feed stocks include com stover (the part of the com plant you do not eat) and double cropping. Double cropping was done in the Midwest in the early 1900s to grow forage crops for horses-plant in the fall and harvest in the spring. When tractors arrived, the horses disappeared and the land was left bare in winter-accelerating soil erosion. The right strategy will not impact food or fiber prices while increasing the sustainability of American soils. [EPA-HQ-OAR-2022-0829-0738, pp. 4-5]

This approach is built upon American strengths in agriculture and the oil/gas industry-thus the fast track option. It provides an evolutionary pathway for the oil/gas industry to become a negative carbon emitter. Industry is slowly heading toward this solution. Our recent analysis (below) indicates there is the possibility of replacing all crude oil within 20 years. [EPA-HQ-OAR-2022-0829-0738, pp. 4-5]

C. Forsberg and B. Dale, "Can We Replace All Crude Oil Within 20 Years with Cellulosic Liquid Hydrocarbons?", The Biofuels Digest, May 29,

2023. https://www.biofuelsdigest.com/bdigest/2023/05/29/can-we-replace-all-crude-oil-within-20- years-with-cellulosic-liquid-hydrocarbons/

Recommended EPA action. Develop a technologically-neutral strategy for decarbonization. The record on predictions of future technologies is one of failure. U.S. emissions per unit of GDP are substantially lower than other countries because of the development of natural gas fracking that is rapidly pushing coal out of the market-a technology that nobody in government predicted. Having the EPA chose future technologies for a low-carbon economy will delay decarbonization by decades with massive negative impacts on American standards of living. There are many technology neutral regulatory options-including clean fuel standards adopted by California, Oregon, Washington and British Columbia or carbon taxes. Carbon dioxide coming out of the tail pipe may or may have a greenhouse impact depending upon whether it is fossil carbon (net addition of carbon to atmosphere) or bio-carbon (net negative carbon emission for many production options). [EPA-HQ-OAR-2022-0829-0738, pp. 4-5]

Organization: Chevron

3. The role of biofuels.

The light and medium duty proposal does not address the potential for biofuel use to create energy security benefits. EPA should consider options to reduce the nation's dependence on a single transportation energy resource infrastructure while it supports a reliable and affordable decarbonization plan for transportation. EPA should support the use of diversified fuels in the nation's transportation fleet to meet nationwide GHG reduction goals. [EPA-HQ-OAR-2022-0829-0553, pp. 5-6]

Chevron is investing in capabilities to increase the supply of biofuels. In 2022, Chevron acquired Renewable Energy Group, a leading biodiesel and renewable diesel fuel producer. Chevron announced a collaboration with Corteva to introduce winter canola that will produce lower carbon intensity feedstocks. Chevron has invested in CoverCress to develop and introduce small winter oilseeds that will also produce lower carbon intensity feedstocks. A Chevron joint venture with Bunge, a leading oilseed processor, will expand crush capacity to yield greater access to lower carbon intensity feedstocks. The biomass-based diesel fuels resulting from these technology and commercial initiatives are well-suited to reduce emissions from the medium duty vehicles that are powered by diesel engines. [EPA-HQ-OAR-2022-0829-0553, pp. 5-6]

We believe there is also potential for increased use of lower CI ethanol and other renewable fuels to produce renewable gasoline blends for the light and medium-duty fleet. With more than 265 million gasoline-powered vehicles on the road today in the United States, renewable gasoline blends could empower virtually all drivers to contribute to a lower carbon transportation future. Recently, we partnered with Toyota to demonstrate lower carbon technologies are compatible with internal combustion engines by demonstrating the use of fuel with more than 40% lower carbon intensity than traditional gasoline on a life cycle basis. [EPA-HQ-OAR-2022-0829-0553, pp. 5-6]

Looking into our transportation future, Chevron is developing, producing, and testing blends of lower carbon intensity renewable gasoline. These blends can be manufactured using today's facilities and used in almost any gasoline-powered vehicle, delivering an immediate GHG reduction compared to traditional gasoline. Renewable gasoline blends use a variety of feedstocks and technologies to achieve carbon intensity reductions. Along with innovation from engine manufacturers and public policies supporting lower carbon intensity fuels, renewable gasoline blends are intended to reduce the carbon intensity of light and medium duty vehicles already on the road. [EPA-HQ-OAR-2022-0829-0553, pp. 5-6]

Organization: Clean Fuels Alliance America

The biodiesel and renewable diesel industry is on a path to sustainably double the market to 6 billion gallons annually by 2030, eliminating at least 35 million metric tons of CO2 equivalent greenhouse gas emissions annually with our members leading the U.S. companies investing in new biodiesel, renewable diesel and SAF capacity. These fuels are among the cleanest and lowest-carbon fuels available today to help reduce greenhouse gas (GHG) emissions now and are available to meet President Biden's near- and long-term climate goals.2 To date, the utilization of low carbon liquid fuels like biodiesel and renewable diesel reduces greenhouse gas emissions by more than 70% on average, directly and immediately reducing GHG emissions from the vehicles that use our fuels. [EPA-HQ-OAR-2022-0829-0626, pp. 1-2]

2 Executive Office of the President. Executive Order 14008: Tackling the Climate Crisis at Home and Abroad, 86 FR 7619 (February 1, 2021), available at https://www.federalregister.gov/d/2021-02177

Our fuels reduce more than just greenhouse gas emissions. Biodiesel and renewable diesel also reduce criteria pollutants from existing diesel engines, reducing health and environmental impacts in major trucking corridors, warehouse distribution centers and other diesel hot spots close to major population sectors. This means that using these fuels today will also lower health care impacts and costs for all populations living in and near these areas including minority, low-income, and indigenous populations. [EPA-HQ-OAR-2022-0829-0626, pp. 1-2]

Low-carbon liquid fuels are the lowest cost option for decarbonization and can be used in every diesel- fueled application or engine technology today. Our fuels are being used in fleets utilizing medium-duty vehicles around the country and provide reliable transportation for those with unknown schedules and unplanned routes, including emergency vehicles, tow trucks, and snowplows. It cannot be overlooked that the medium-duty sector will continue to rely on the internal combustion engines when you consider the decades it will take to pursue across the board electrification and other decarbonization strategies. As a result, EPA cannot discount the immediate benefits biodiesel and renewable diesel have and will continue to bring as we decarbonize the medium-duty sector. [EPA-HQ-OAR-2022-0829-0626, pp. 1-2]

While the proposed rule outlines fuel neutral standards, in order to meet the across-fleet average of a 44% GHG reduction by 2032, EPA is in fact forcing the adoption of zero-emission vehicles. The proposed rule ignores the potential to achieve similar emissions reduction goals by simply increasing the use of biodiesel and renewable diesel in existing and future engines. These emission reductions benefits are already being seen by fleets that have chosen to lower their GHG emissions through the adoption of biodiesel. [EPA-HQ-OAR-2022-0829-0626, pp. 1-2]

Climate and Air Quality Urgency

Clean Fuels clearly understands the urgency we face in terms of addressing climate and air quality. When looking at greenhouse gas (GHG) reductions today, biodiesel is a solution that reduces carbon dioxide now. Specifically, when compared to electric vehicles (EVs), utilizing biomass-based diesel now will allow the United States to meet our carbon reduction goals earlier than if we were to rely on EVs alone. The benefits of using and increasing the use of biomass-based diesel now will not only provide immediate greenhouse gas reductions, but also will have a positive impact on health in disadvantaged communities. [EPA-HQ-OAR-2022-0829-0626, p. 2]

When considering options to help reduce greenhouse gas emissions from vehicles and equipment, there are two essential elements to consider: the amount of the reduction and when it happens. This is because carbon emissions are persistent and accumulate. The resulting increased levels of GHGs in the atmosphere contribute to global warming now and for decades to come. A reduction in GHG emissions now can avoid decades of associated heating, thus having significantly more value than carbon reductions made in the future. The time value of carbon is key, and the next decade is critical.3 The importance of reducing carbon today cannot be understated as the Intergovernmental Panel on Climate Change (IPCC) clearly reaffirmed in their Sixth Assessment Report: Carbon reductions today are more important than carbon reductions in the future.4 [EPA-HQ-OAR-2022-0829-0626, p. 2]

3 National Biodiesel Board. Biodiesel.org. (2021). Cutting Carbon: Comparing Biomass-Based Diesel & Electrification for Commercial Fleet Use.

4 Intergovernmental Panel on Climate Change. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Greenhouse Gas Emissions Standards

Per Argonne National Labs GREET model, biodiesel and renewable diesel reduce greenhouse gas emissions by more than 70% on average compared to petroleum, directly and immediately reducing GHG emissions from the vehicles that use our fuels. [EPA-HQ-OAR-2022-0829-0626, p. 3]

The immediate reductions achieved by biodiesel and renewable diesel are crucial to reach our near- and long-term carbon reduction goals. Importantly, biofuels are already reducing GHG emissions. The biodiesel and renewable diesel industry is on a path to sustainably double the market size to 6 billion gallons annually by 2030 if not earlier and eliminating over 35 million metric tons of CO2 equivalent greenhouse gas emissions annually. Removing this important mechanism will be detrimental to meeting our nation's clear air and energy goals. [EPA-HQ-OAR-2022-0829-0626, p. 3]

Criteria Pollutant Emissions and Environmental Justice

In addition to reducing greenhouse gas emissions, biodiesel also reduces particulate matter emissions. This benefits all populations including minority, low-income, and indigenous populations. Clean Fuels Alliance America, through our continued partnership with Trinity Consultants, quantified the health benefits and corresponding economic savings from converting petroleum-based diesel to 100% biodiesel at 23 sites across the country. 5 [EPA-HQ-OAR-2022-0829-0626, p. 3]

5 Trinity Consultants, Assessment of Health Benefits from Using Biodiesel as a Transportation Fuel and Residential Heating Oil, (April 2022). https://cleanfuels.org/resources/health-benefits-study

The Trinity Report assesses the health benefits of substituting biomass-based diesel in transportation- related sources currently fueled by conventional ultra-low sulfur diesel (ULSD or diesel fuel) at 14 locations and as a replacement for home heating oil in one location throughout the United States. This study expands upon the Assessment of Health Benefits from Using Biodiesel as a Transportation Fuel and Residential Heating Oil completed by Trinity Consultants in 2021. This study uses a "bottom-up" approach, focusing on specific population groups such as those living in crowded urban housing complexes and portside communities. Even greater total benefits can be seen when considering comparable communities outside of these specific markets and locations. [EPA-HQ-OAR-2022-0829-0626, p. 3]

The research finds that switching to 100% biodiesel can provide immediate community health improvements including more than 436,000 fewer/reduced asthma cases per year; more than 137,000 fewer sick days per year; nearly 9,400 less cancer cases; the prevention of more than 885 premature deaths per year; over $7.4 billion in avoided health costs annually; and a 45% reduction in cancer risk when legacy heavy-duty trucks such as older semis use B100.6 [EPA-HQ-OAR-2022-0829-0626, p. 3]

6 id.

The immediacy of these potential health benefits, especially for disadvantaged communities, is even more critical when one considers the years, possibly decades, it will take for states to pursue deep electrification and other decarbonization strategies. [EPA-HQ-OAR-2022-0829-0626, p. 3]

Costs and Consumer Savings

While the stated purpose of the proposed rule is to significantly reduce greenhouse gas emissions, hydrocarbons, nitrogen oxides, and particulate matter to result in widespread reductions in air pollution, EPA has discounted the known benefits of biodiesel and renewable diesel. Meeting clean air demands does not require switching to a zero-emissions vehicle. Biodiesel and renewable diesel are drop-in alternatives, achieving valuable carbon reductions today at a relatively low cost.7 Fleets utilizing biodiesel today view it as an opportunity to maximize their emissions reductions while minimizing any effect on their operations. [EPA-HQ-OAR-2022-0829-0626, pp. 3-4]

7 Source: Frank, J. et al. Quantifying and comparing the cumulative greenhouse gas emissions and financial viability of heavy-duty transportation pathways for the Northeastern, United States. Fuel, 323, 124243, Sep. 2022. https://doi.org/10.1016/j.fuel.2022.124243. See Table 4.

These fuels offer owners, users, and fleet operators affordable, low-carbon solutions to immediately improve the sustainability of their operations. These fuels are available now and can be used in every diesel fueled application and every engine technology. Nearly all medium-duty original equipment manufacturers (OEMs) support using biodiesel blends of 20% or more in the vehicles they produce, and the vast majority of OEMs support the use of biodiesel blends up to 20%. For those that do not, warranties cannot be voided or impacted in any way using biodiesel, due to existing federal law.8 [EPA-HQ-OAR-2022-0829-0626, pp. 3-4]

8 Magnuson-Moss Warrant Act, P.L. 93-637

When compared to other decarbonization strategies such as zero emissions and specifically electrification approaches, which require both new vehicles and infrastructure to realize the benefits, biodiesel and renewable diesel remain the lowest cost option. According to a report by Diesel Technology Forum, prospective fleets contemplating EVs immediately face 3.8 times higher upfront cost to their diesel counterparts.9 While new technology diesel vehicles fueled with biodiesel and renewable diesel have three times lower cost.10 [EPA-HQ-OAR-2022-0829-0626, pp. 3-4]

9 Environmental Benefits of Medium- and Heavy Duty Zero Emission Vehicles Compared with Clean Bio- & Renewable-Fueled Vehicles 2022-2032, Prepared for Diesel Technology Forum By Stillwater Associates LLC, Irvine, California, USA, July 19, 2022, available at https://dieselforum.egnyte.com/dl/MWHPcRW4e6

10 id.

Infrastructure

As EPA looks to the Inflation Reduction Act (IRA) as a policy to support charging infrastructure in conjunction with the proposed rule, it is important for EPA to consider the timeframe of such investments along with the timeframe of growing and transitioning an existing fleet. Congress demonstrated when passing IRA, the need to continue to support biofuels infrastructure growth to supply low carbon biofuels remains a priority. The U.S. Department of Agriculture's Higher Blends Infrastructure Incentive program (HBIIP) increases the sales and use of higher blends of biodiesel by expanding the infrastructure for renewable fuels derived from U.S. agricultural products. The program by design encourages a more comprehensive approach to market higher blends by sharing the costs related to building out biofuel-related infrastructure. The expansion of biofuel infrastructure, as facilitated by HBIIP, broadens the availability of renewable fuels like B20 and higher blends while reducing carbon emissions and harmful tailpipe pollution today. Under HBIIP, the grants support fueling stations, convenience stores, hypermarket fueling stations, and fleet and fuel distribution facilities, including terminal operations and home heating oil distribution centers throughout the country. Federal matching grants have helped and continue to help the industry build or retrofit terminals, storage, and rail capacity to enable broader consumer access to these clean fuels and in turn clean air. This infrastructure complements existing fueling infrastructure throughout the country and does not require investment in new vehicles and a full infrastructure overhaul to realize GHG benefits. [EPA-HQ-OAR-2022-0829-0626, p. 4]

Conclusion

The immediate and compounding benefits that biodiesel and renewable diesel provide cannot be underscored enough. We ask that EPA adjust the fuel neutral standards to reflect a more appropriate and feasible mix of technologies available in the time frame proposed to meet the future standards as we work together to decarbonize the transportation sector today and, in the years to come. Clean Fuels looks forward to working with EPA to ensure the optimization of the immediate benefits of biodiesel and renewable diesel as you address multi-pollutant emissions from medium duty vehicles. [EPA-HQ-OAR-2022-0829-0626, p. 5]

Organization: Clean Fuels Development Coalition (CDFC)

B. Higher ethanol blends lower carbon intensity.

The proposal projects that millions of liquid fueled vehicles will continue to be sold throughout the compliance period and that millions more will remain on the road in the decades to come. There are two ways to reduce the greenhouse gas emissions from this fleet: improve the fuel efficiency of the vehicles or reduce the carbon intensity of the fuel. While vehicles running on these fuels would emit approximately the same amount of CO2 from their tailpipes, the net CO2 emitted would be substantially reduced. This is because these fuels make use of carbon that was recently sequestered by plants, and thus removed from the atmosphere in the same quantity that it will reenter it. Converting plants to biofuels does not result in any net increase in carbon emissions within this natural cycle. [EPA-HQ-OAR-2022-0829-0712, p. 40]

When ethanol is blended into gasoline, the carbon intensity of the fuel decreases from average life cycle number of 95.3 gCO2e/MJ down toa 90.2 gCO2e/MJ for E15 and 79.8 gCO2e/MJ for E30, after adjusting for the lower energy density of ethanol. See Steffen Mueller, High Octane Low Carbon Fuels: The Bridge to Improve Both Gasoline and Electric Vehicles, The University of Illinois at Chicago (Mar. 22, 2021), https://erc.uic.edu/wp-content/uploads/sites/633/2021/03/UIC-Marginal-EV-HOF- Analysis-DRAFT-3_22_2021_UPDATE.pdf. If liquid fuel consumption stays constant at approximately 135 billion gallons per year, adopting nationwide E15 would reduce carbon emissions between 2027 and 2032 by 384 million tons, 1.65 times more than the proposal's estimate 232 million tons over the same time frame. Adopting nationwide E30 could reduce emissions by 1,167 million tons, five times the savings of EPA's proposed rule. Id. Other studies have confirmed this result, suggesting that the adoption of even mid-level ethanol blends would reduce pollution emissions at least as much as EPA's electrification approach, and at far less cost. See Brian West, Higher Ethanol Blends Support the Transition to a Low-Carbon Future, SAE Int'l Update (Feb. 2023), https://www.nxtbook.com/smg/sae/23UPD02/index.php#/p/2. [EPA-HQ-OAR-2022-0829-0712, p. 40]

But 2012, EPA declined to extend these FFV incentives. 77 Fed. Reg. 62,624. After EPA's discontinuation. FFV production dropped from 20% of all 2014 light-duty vehicles to only 8% of 2016 vehicles. See The 2020 EPA Automotive Trends Report, EPA-420-R-21-002, Environmental Protection Agency (Jan. 2021), https://ne-pis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1010U68.pdf. FFV production has dropped even further since 2016 due to EPA's failure to recognize the real-world lifecycle benefits of bioethanol used in FFVs. [EPA-HQ-OAR-2022-0829-0712, pp. 43-44]

EPA removed these incentives because it believed that greenhouse gas emissions compliance must be based on "demonstrated GHG emissions performance." 77 Fed. Reg. 62,823. Commentors agree. Because of their "demonstrated GHG emissions performance," EPA should reintroduce crediting for vehicles that can utilize higher blends of renewable fuels and should expand the program to include technologies other than just FFVs. [EPA-HQ-OAR-2022-0829-0712, pp. 43-44]

F. EPA should account for the benefits of fuel improvements by accounting for lifecycle emissions and allowing for new higher ethanol certification fuels.

There are two ways EPA can account for the benefits of renewable fuels to reduce greenhouse-gas emissions and improve the feasibility of its standards. First, should use lifecycle emissions to account for the net emissions reductions that come from renewable fuels in the fleet. EPA has detailed knowledge of the exact volumes and benefits of these fuels because it administers the Renewable Fuel Standard and has significant data about the volumes of these fuels that are already used by the fleet.24 Accounting for the current emissions savings of renewable fuels sets the stage for fuel improvements that dramatically reduce lifecycle emissions. [EPA-HQ-OAR-2022-0829-0712, p. 44]

V. The Proposed Rule Fails to Adequately Consider Fuels Related Alternatives.

Beneath the complexity of its reverse-engineered system, the proposal's plan for reducing greenhouse gas emissions is remarkably straightforward: electrify the light-duty fleet as fast as—or perhaps even faster—than possible. But this narrow vision of pursuing a singular regulatory White Whale entirely neglects other more feasible technological solutions auto manufacturers could adopt to meet the standards if they were properly credited for them: namely, the manufacture of vehicles that run on low-carbon, renewable fuels. [EPA-HQ-OAR-2022-0829-0712, pp. 36-37]

There are 281 million internal combustion engine vehicles on the road today and 100 million more will be built in the next two decades. All of these vehicles could be improved—and for far less than what EPA's proposal would cost—with an improvement in fuel quality and the blending of renewable fuels. Gasoline blended with renewable ethanol up to 10 percent by volume, E10, already reduces greenhouse gas emissions from the light-duty fleet by tens of millions of tons a year. And we could do better. EPA has determined that E15 is suitable for use in all model year 2001 and later vehicles. See e.g., Regulation History of the E15 Partial Waivers Under the Clean Air Act, EPA-420-F-15-044, Environmental Protection Agency (Sep. 2015), https://www.epa.gov/sites/default/files/2015-09/documents/420f15044.pdf. [EPA-HQ-OAR-2022-0829-0712, pp. 36-37]

Many newer vehicles on the road could run on mid-level blends like E25. See e.g., Amber Rucker, EPA Approves The Use Of E30 In Nebraska Fleet Demonstration Poised To Reduce Costs, Pollution, State of Nebraska (Oct. 21, 2022), https://etha- nol.nebraska.gov/epa-approves-the-use-of-e30-in-nebraska-fleet-demonstration- poised-to-reduce-costs-pollution/. Every automaker could readily make vehicles designed to run on mid-level blends with only minimal design changes. And over 27 million flex-fuel vehicles ("FFVs") are capable of running on approximately 85% ethanol are already on the road. See Growth Energy, Flex Fuel Database, https://growthenergy.org/choice-at-the-pump/flex-fuel-database/ (last accessed July 5, 2023). [EPA-HQ-OAR-2022-0829-0712, pp. 36-37]

Increased ethanol blends have a myriad of benefits: they reduce the carbon intensity of liquid fuels, they enable higher compression rations and thus more fuel- efficient engines, and they reduce the aromatics and particulate matter that come out of the tailpipe. The auto industry,20 the petroleum industry,21 and the renewable fuels industry22 are all on the record calling for EPA to use its power to improve fuel quality by increasing the minimum octane number. And there are many direct fuel-related ways EPA might act to incentivize better fuel quality and the adoption of higher-level blends: through increased volumes of low-carbon renewable fuels under the Renewable Fuel Standard, through alternative, low-carbon certification fuels, and through Section 211(c) rulemaking—as the proposal itself suggests. [EPA-HQ-OAR-2022-0829-0712, pp. 37-38]

20 See, e.g., Letter from Mitch Bainwol, President and CEO, Alliance of Automobile Manufacturers, to Lisa Jackson, Administrator, EPA (Oct. 6, 2011), available at https://legacy-assets.ee-news.net/openfiles/assets/2011/10/31/document_pm_04.pdf ("recommend[ed] increasing the mini- mum gasoline octane rating, commensurate with increased use of ethanol" to "help achieve future requirements for the reduction of greenhouse gas emissions."); Julian Soell & R. Thomas Brunner, Mercedes-Benz,

Comments on Proposed Tier 3 Rule, EPA-HQ-OAR-2011-0135-4676 (June 28, 2013), at 3–4 ; Robert Babik, General Motors LLC, Comments on Proposed Tier 3 Rule, EPA-HQ-OAR-2011- 0135-4288 (June 28, 2013), at 14 (“support[ing] the future of higher octane and higher ethanol content in order to provide a pathway to improved vehicle efficiency and lower GHG emissions”); Cynthia Williams, Ford Motor Company, Comments on Proposed Tier 3 Rule, EPA-HQ-OAR-2011-0135-4349 (July 1, 2013), at 16 (“Ford supports the development and introduction of an intermediate level blend fuel (E16-E50), with a minimum octane rating of 91 anti-knock index (AKI) that increases proportionally as ethanol is splash-blended on top of the base Tier 3 gasoline emission test fuel. The development of such a fuel would enable the first steps to the development of a new generation of highly efficient internal combustion engine vehicles. We look forward to future collaboration with the EPA on this item.”); id. at 3 (commending the idea of “maximiz[ing] vehicle efficiency in tandem with use of renew- able fuels”).

21 See, e.g., Testimony of Chet Thompson, President and CEO, American Fuel & Petrochemical Manufacturers before U.S. House Energy and Commerce Subcommittee on the Environment (Apr. 13, 2018), https://www.afpm.org/sites/default/files/issue_resources/20180411-AFPM-Written-Testi- mony.pdf (“a 95-RON used in optimized high-compression engines would provide more than a three percent efficiency gain.”) 95 RON Octane Standard: A Smarter Way to Cut Carbon from Vehicles, American Fuel & Petrochemical Manufacturers (May 27, 2021), https://www.afpm.org/news- room/blog/95-ron-octane-standard-smarter-way-cut-carbon-vehicles (a nationwide 95 RON octane standard “can deliver major carbon reductions in the nation’s light-duty vehicle fleet faster and at a lower cost than any other proposal being considered by policymakers at the national level right now.”).

22 See, e.g., RFA Welcomes Inclusion of High Octane Fuels in 2021-2026 CAFE/GHG Proposal, Renewable Fuels Association (Aug. 2, 2018), https://ethanolrfa.org/media-and-news/category/news-re-leases/article/2018/08/rfa-welcomes-inclusion-of-high-octane-fuels-in-2021-2026-cafe-ghg-proposal (“high octane fuels can help enable more efficient engines and reduce GHG emissions, and we believe the Agency should use its authority to include high octane low carbon fuels as an option available to automakers for meeting more stringent fuel economy and emissions standards in the future.”); Kevin Heavican, Corn Growers Back Higher Ethanol Blends, Brownfield Ag News (Mar. 11, 2021), https://brownfieldagnews.com/news/corn-growers-back-higher-ethanol-blends/ (“Nebraska Corn introduced a resolution at the recent Corn Congress calling for 95 RON E15, a 15-percent blend of ethanol to raise octane to help auto makers create cleaner engines.”).

But EPA also has the authority to consider the impact of these fuels in its consideration of life-cycle emissions under the agency’s Section 202 powers. The agency has done so in the past, and acknowledging these benefits again would incentivize the use of more renewable fuels, and allow automakers to achieve greater emissions reductions, in a shorter time frame, and at a net savings to consumers. Agencies are required, as part of any reasoned decision making process, to consider all “‘significant and viable and obvious alternatives’” to their proposed action. Dist. Hosp. Partners, L.P. v. Burwell, 786 F.3d 46, 59 (D.C. Cir. 2015); see Spirit Airlines, Inc. v. DOT, 997 F.3d 1247, 1255 (D.C. Cir. 2021) (“‘[T]he failure of an agency to consider obvious alternatives has led uniformly to reversal.”’). Ignoring the benefits of renewable fuels— and of ethanol in particular—violates EPA’s duty to give “appropriate consideration to the cost of compliance” with the proposed regulations, 42 U.S.C. § 7521(a)(2), and would render the rule arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0712, pp. 38-39]

C. Higher ethanol blends raise octane number, improving engine efficiency.

In addition to reducing carbon-intensity, higher ethanol blends of gasoline benefit from higher octane numbers. After reducing carbon intensity, improving engine efficiency is the only way to reduce greenhouse gas emissions from internal combustion engine vehicles. Engine efficiency has improved dramatically over the last fifty years, through a blend of technologies that are now widely used in all new vehicles. But future improvements to vehicle technology to further reduce CO_2—as EPA is well aware—will come at steep and increasing marginal cost. Internal combustion engines operate together with their fuel as a system and engine efficiency is now limited by the fuel that is available. Specifically, low-octane gasoline, standard in the U.S. market, limits the ability of automobile manufactures to produce high compression, and thus high efficiency, engines. Without higher octane gasoline, the cost of higher efficiency vehicles will rise, slowing their adoption and raising the overall CO2 emissions of the American fleet. [EPA-HQ-OAR-2022-0829-0712, pp. 40-41]

Raising the minimum Research Octane Number (RON) of gasoline to 95, would have immediate impact. Existing vehicles would, overnight, become more fuel efficient. Thomas G. Leone, et al., The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark-Ignition Engine Efficiency, 49 Environmental Science & Technology 10778, 10781 (2015), https://pubs.acs.org/doi/abs/10.1021/acs.est.5b01420?src=recsys. With calibration, the entire existing U.S. fleet would gain up to 4.4% in engine efficiency and see larger reductions in CO2. Id. Future vehicles, equipped with high compression engines, would achieve even higher efficiencies. Emissions savings from these high-octane vehicles would rapidly outstrip those of electric vehicles and cumulatively save nearly 700 million tons of CO2 by 2035. And these benefits would come at only marginal increases in fuel costs – likely less than $0.03 per gallon. David S. Hirshfeld, et al., Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content, 48 Environmental Science & Technology 11064, 11067 (2014), https://pubs.acs.org/doi/10.1021/es5021668. [EPA-HQ-OAR-2022-0829-0712, pp. 40-41]

These benefits are why individual auto manufacturers, industry groups, and groups across the liquid fuels space have all called for a high-octane fuel standard. Testimony of Chet Thompson, President and CEO, American Fuel & Petrochemical Manufacturers before U.S. House Energy and Commerce Subcommittee on the Environment (Apr. 13, 2018), https://www.afpm.org/sites/default/files/issue_re sources/20180411-AFPM-Written-Testimony.pdf ("a 95-RON used in optimized high- compression engines would provide more than a three percent efficiency gain."). As American Fuel & Petrochemical Manufacturers has explained, a nationwide 95 RON octane standard "can deliver major carbon reductions in the nation's light-duty vehicle fleet faster and at a lower cost than any other proposal being considered by policy makers at the national level right now." 95 RON Octane Standard: A Smarter Way to Cut Carbon from Vehicles, American Fuel & Petrochemical Manufacturers (May 27, 2021)," https://www.afpm.org/newsroom/blog/95-ron-octane-standard-smarter- way-cut-carbon-vehicles. [EPA-HQ-OAR-2022-0829-0712, pp. 41-42]

E. Flex-fuel vehicles are at least as effective as electric vehicles at reducing greenhouse gas emissions.

EPA's proposal also neglects the potential benefits of FFVs. Over 27 million FFVs capable of running on approximately E85 ethanol are already on the road. See Growth Energy, Flex Fuel Database, https://growthenergy.org/choice-at-the- pump/flex-fuel-database/ (last accessed July 5, 2023). Because of the lower carbon intensity of ethanol, FFVs produce far less greenhouse gas emissions than conventional gasoline vehicles. An FFV running E85 made from corn starch ethanol and natural gasoline reduces greenhouse gas emissions as compared to a conventional liquid fueled vehicle by 46 percent. EPA's Proposed Tailpipe Standards Overlook Ethanol's Low-Carbon, Efficiency Benefits, Renewable Fuels Association (Apr. 12, 2023), https://ethanolrfa.org/media-and-news/category/news-releases/article/2023/04/epa-s- proposed-tailpipe-standards-overlook-ethanol-s-low-carbon-efficiency-benefits. Using corn kernel fiber ethanol and renewable naptha reduces emissions as compared to a conventional liquid fueled vehicle by 77 percent. Id. This is more than the net emissions reductions realized by electric vehicles. Id. [EPA-HQ-OAR-2022-0829-0712, p. 43]

Recognizing these benefits, in EPA rules through model year 2015, and in the existing NHTSA fuel economy standards, FFVs received compliance benefits. See EPA regulations at 40 CFR 600.510-12(j)(2)(iv)(B) (providing FFV crediting through Model Year 2015); see also 49 CFR 536.10 (indicating that dual-fuel vehicles can earn credits under the standards); 77 Fed. Reg. 62,624, 62,829–30 (Oct. 15, 2012) (providing that FFVs could generate credits under the standards). These standards incentivized FFVs by accounting for E85's real-world greenhouse gas reductions, and not merely tailpipe emissions. [EPA-HQ-OAR-2022-0829-0712, p. 43]

Second, EPA must update its certification pathways to allow vehicles to certify on dedicated alternative fuels, like the various, widely available high ethanol blends. As detailed in the next section, there are several problems with the way EPA handles its Tier 3 certification fuel that penalizes renewable fuels. EPA should fix these problems and establish new pathways for higher ethanol blends—like EPA is proposing to do with hydrogen—to open new routes by which auto manufacturers can seek to reduce the emissions from their vehicles. [EPA-HQ-OAR-2022-0829-0712, pp. 44-45]

By failing to consider the benefits of renewable fuels, EPA precludes the most effective way for automakers to reduce emissions and meet EPA's standards. This would violate EPA's statutory duties under Section 202 and would, at the very least, make the proposed rule arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0712, pp. 44-45]

Organization: Countymark

The Environmental Protection Agency (EPA) should consider an alternative approach and propose a multipollutant fuel rule. The proposed rule should include requirements to improve fuel quality by establishing a higher federal octane standard and allowing higher ethanol blends. It should also incentivize the reduction of carbon and aromatic compounds through reformulation or increased ethanol blending. [EPA-HQ-OAR-2022-0829-0665, p. 3]

Additionally, the rule should incentivize automakers to produce more efficient vehicles by creating alternative certification pathways for higher ethanol blends and addressing issues with R Value, CO2 penalty, and the Volumetric Conversion Factor in fuel economy calculations. Adopting a life-cycle analysis approach to compare emissions from different technologies would yield many benefits. For instance, embracing and enabling a pathway to improve fuel quality would lead to increased and accelerated emission reductions, improved public health, environmental justice goals, greater versatility, and improved reliability, all at a lower cost. The Clean Air Act authorizes the consideration of this pathway by the EPA. Even mid-level ethanol blends would reduce pollution emissions at least as effectively as the EPA's electrification approach and at a significantly lower cost. Incorporating a fuel improvement strategy would double the EPA's projected emissions reduction. However, the current rule disregards this option, leaving pollutants in the air and leaving the EPA with less than optimal outcomes. [EPA-HQ-OAR-2022-0829-0665, p. 3]

Organization: Darius

While the goal of this proposal is to reduce the U.S. automotive fleet's carbon footprint, it simply shifts how emissions are produced. The EPA is ignoring the value of technologies produced by American workers, manufacturers, and farmers that are critical to our transportation future. Specialty automotive aftermarket businesses are leading the way through alternative fuel innovations from replacing older engine technologies with newer, cleaner versions to converting older ICE vehicles to new electric, hydrogen, and other alternative fuels. Sadly, the EPA's plans to reduce greenhouse gases and criteria pollutants do not factor this in. [EPA-HQ-OAR-2022-0829-0519, p. 1]

Organization: Departments of Transportation of Idaho, Montana, North Dakota, South Dakota and Wyoming

Before closing we note that there are many other concerns with this proposal that may well be developed by others commenting to this docket. For example, we are struck by the singular focus in the NPRM on tailpipe emissions reduction that virtually compel a transition to EVs and inadequate attention to low carbon liquid fuels and biofuels as additional means of addressing emissions concerns that would not be dependent on an adequate electric vehicle charging network, something that certainly is not available at this time, particularly in rural areas. [EPA-HQ-OAR-2022-0829-0525, p. 2]

Questions could be raised regarding: life-cycle rather than tailpipe emissions; and the ability of the electric grid, even with costly additions and connections to charging stations, to support all the EVs. [EPA-HQ-OAR-2022-0829-0525, p. 2]

Organization: East Kansas Agri-Energy (EKAE)

As a member of the EPA Farm Ranch and Rural Communities Committee I am looking to help our rural communities prosper and operating ethanol plants do just that. EVs are not practical for everyday use here in rural America so let's make regulations that benefit the whole country. Ethanol is a clean low carbon fuel that's environmentally friendly and overlooked in most every conversation on lowering carbon emissions. [EPA-HQ-OAR-2022-0829-0734, p. 1]

Thank you for the opportunity to comment on this important issue. As a member of the Renewable Fuels Association, we also wish to endorse and support their written comments, as submitted. EPA-HQ-OAR-2022-0829-0734, p. 1]

Organization: Energy Marketers of America (EMA)

EMA member companies provide a growing portfolio of affordable, efficient, and greener liquid fuels and alternative energy sources. These liquid fuels have played a critical role in lowering emissions over the past half century. Through innovation and technological advancements, liquid fuels will continue to reduce emissions further and be a crucial driver of economic growth in this country in the coming decades. Therefore, EMA fully supports and endorses the comments submitted by the American Fuel & Petrochemical Manufactures (AFPM) regarding EPA’s GHG standards for light-duty and medium-duty vehicles for model years 2027 and later. [EPA-HQ-OAR-2022-0829-0616, p. 1]

EMA urges the EPA to consider lifecycle emissions and a technology neutral approach when considering emission reductions. The proposed rule should consider the lifecycle emissions associated with EV production, usage, and end-of-life disposal including emissions from raw material mining and refining, battery manufacturing, and electricity generation for EV charging. Further EPA needs to consider the logistics, investment, and timing associated with EV and battery production, electric generation and transmission, and EV charging to support a substantial increase in EV production. Achieving a significant ramp up of domestic supply of raw materials for batteries, mineral refining, and battery and vehicle manufacturing as well as upgrades to the electricity generation and transmission will be complex and take time. [EPA-HQ-OAR-2022-0829-0616, pp. 1-2]

Again, EMA urges the EPA to consider lifecycle emissions and a technology neutral approach when it comes to promoting policies to reduce emissions. The most cost-effective and timely way to reduce emissions from transportation is to support multiple technologies that do so for both new vehicles and vehicles currently on the road. [EPA-HQ-OAR-2022-0829-0616, pp. 1-2]

Organization: Exxon Mobil Corporation

EPA's Proposal establishes standards for emissions reductions that can be achieved only through a rapid transformation of the transportation sector and through limited technology pathways. Specifically, the proposed standards could require as many as two-thirds of all new light-duty vehicle purchases to be battery electric vehicles (BEVs) by 2032. ExxonMobil believes BEVs will play an important role in reducing transportation sector emissions. Indeed, we produce plastics that can help reduce vehicle weight and increase fuel efficiency, butyl rubber that improves air retention in tires and can improve BEV range by up to 7 percent,6 and our Mobil EV™ suite of electric vehicle fluids and products help enable further, longer, and safer performance for electric cars, vans, and trucks.7 We believe, however, that EPA should encourage a diversity of technology pathways that allow for consumers to choose between vehicle types. Standards that encourage a combination of BEVs, plug-in hybrids, full hybrids, and efficient internal combustion engine vehicles, that could operate with bio and renewable fuels, are a better way to reduce GHG emissions and manage dependence on foreign critical minerals. Such a technology-neutral policy approach would foster innovation and competition across all technologies and could ultimately help encourage more effective and lower cost solutions for consumers and businesses. [EPA-HQ-OAR-2022-0829-0632, p. 2]

6 ExxonMobil Advancing Climate Solutions 2023 Progress Report (2023), page 20.

7 www.mobil.com/en-us/commercial-vehicle-lube/pds/na-xx-mobil-ev-drive-201-

EPA's Proposal further relies exclusively on vehicle fleet turnovers to accomplish emissions reductions and thus misses the opportunity to reduce emission from vehicles already in use and that will continue to be in use for decades. About 12 million new vehicles are sold in the U.S. each year8 while there are about 280 million cars, S.U.V.s, vans, and pickup trucks on America's roads today.9 Even after the proposed standards are fully implemented for MY 2032 vehicles, the majority of vehicles on the road in 2035 are still expected to be powered using conventional fuels such as gasoline.10 [EPA-HQ-OAR-2022-0829-0632, pp. 2-3]

8 Bureau of Transportation Statistics, Annual U.S. Motor Vehicle Production and Domestic Sales (2021).

9 The U.S. National Blueprint for Transportation Decarbonization, A Joint Strategy to Transform Transportation, DOE/EE- 2674 (Jan 2023).

10 Id.

ExxonMobil believes that existing transportation sector-based federal policies could be improved to achieve meaningful GHG emissions reductions through complementary fuel and vehicles standards. Specifically, we encourage EPA to consider how it may assist with the development and implementation of a federal low carbon fuel standard that would encourage investment in lowering the carbon intensity of fuels (liquid, compressed/liquefied gas, electricity, hydrogen) and vehicle standards that account for lifecycle GHG emissions, including emissions upstream of a vehicle's tailpipe. [EPA-HQ-OAR-2022-0829-0632, p. 3]

To encourage investment in technologies to reduce GHG emissions from existing fuels, ExxonMobil is encouraging U.S. policymakers to consider the development of a federal lifecycle and carbon-intensity based fuel standard measured in gCO2e per Mega Joule (MJ) of fuel energy (gCO2e/MJ) that would provide a long-term market signal for the production and use of lower carbon fuels. Such a standard, which could be increased in stringency over time, would establish a market for credit trading that would offer compliance flexibility and would underpin investments in technologies to reduce carbon emissions from gasoline and diesel used for existing vehicles. Examples of lower carbon-intensity fuels that might generate credits under such a standard would include ethanol, biodiesel, renewable diesel, renewable natural gas, hydrogen, electricity produced for EVs, and traditional fuels produced with lower emission technology such as carbon capture and sequestration. Moreover, the standard could be expanded beyond road transportation to the marine and aviation sectors in the future. [EPA-HQ-OAR-2022-0829-0632, p. 3]

Organization: Fuel Freedom Foundation

The central role of liquid fuels in transportation

Due to the diverse and all-American energy sources used for power generation, electric vehicles are structurally decoupled from the fluctuations of petroleum market. However, there is significant uncertainty surrounding the market's ability to transition to electrification as quickly as anticipated by EPA's proposal, which exceeds the goal previously established and reiterated by the Biden Administration.1,2,3 Further, even if the ambition in the proposed rule is fully realized and two-thirds of vehicle sales are electric vehicles by 2032, about 75% of the vehicles on the road will still use liquid fuels. A more holistic approach is warranted to avoid ceding the light- duty liquid fuel market to petroleum dominance—and the attendant upstream GHG emissions— for the period covering this rulemaking as well as many years beyond. [EPA-HQ-OAR-2022-0829-0711, pp. 1-2]

1 Energy Policy Research Foundation "EV Electricity Requirements and EPA's Challenging Rules", Chart 26 at https://eprinc.org/chart-of-the-week/

2 Alliance for Automotive Innovators comment to docket of this Proposed Rule "Auto Innovators does not believe [GHG and criteria pollutant standards] can be met without substantially increasing the cost of vehicles, reducing consumer choice, and disadvantaging major portions of the United States population and territory. EPA's proposed rules effectively assume that everything will go perfectly in the transformation to electric vehicles (EVs) between now and 2032."

3 President Biden Executive Order of Aug 5, 2021 "…bolstering our domestic market by setting a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles" accessed at https://www.whitehouse.gov/briefing-room/presidential-actions/2021/08/05/executive- order-on-strengthening-american-leadership-in-clean-cars-and-trucks/ and U.S. National Blueprint for Transportation Decarbonization (2023) "Government, industry, and labor set a target of 50% new light-duty EV sales share by 2030" accessed at https://www.epa.gov/greenvehicles/us-national-blueprint-transportation-decarbonization

More than 280 million ICEs are on the road today, and about 90 million are expected to be sold by the end of the period covered under this rulemaking. In order to provide insurance for maximum success of the GHG Standards, EPA should encourage all viable decarbonization pathways in the light-duty sector. Specifically, the final rule should incorporate provisions to incentivize the production of vehicles that facilitate decarbonization of the liquid fuels that will power light-duty transportation for decades to come. [EPA-HQ-OAR-2022-0829-0711, pp. 1-2]

By not including provisions to incentivize the production of flex-fuel vehicles (FFVs) including plug-in hybrid electric vehicles that can take advantage of the favorable properties of higher ethanol blends including high octane, the EPA risks leaving on the table GHG emissions reductions sooner rather than later. Extrapolating from California's current E85 use in the current onroad FFV fleet to a national level, annual GHG emissions would be reduced 4.27 MMT tons of GHG in 2022 and 74.71 MMT in 2032.4 We strongly encourage EPA to leverage the GHG-reduction potential of FFVs. [EPA-HQ-OAR-2022-0829-0711, p. 2]

4 Pearson Fuels, Comment letter to Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles rulemaking, p. 11

There are multiple public policy rationales for crediting FFVs within the GHG program:

Maximize cost effectiveness of GHG reductions. As GHG reduction targets are strengthened over time to achieve Net Zero carbon emissions in transportation, economic costs will inevitably increase. However, the total economic burden can be lessened, and the social benefits maximized, by keeping the door open to the most cost-effective fuel pathways. Fuel Freedom funded a study by Lifecycle Associates to evaluate possible scenarios for achieving an 80% fuel cycle reduction in light-duty vehicle GHG emissions for the U.S. and for California by 2050.7 The analysis used government estimates8 of fuel carbon intensity, vehicle efficiency improvements, and incremental costs for each fuel-vehicle combination, to develop feasible market penetrations for various pathways, including high-octane fuels with high-compression-ratio ICEs coupled with electrification, biofuels used in ICEs with and without hybridization, hybrid and plug-in hybrid vehicles, fuel cell EVs, and battery electric vehicles, to compare both feasibility and relative cost effectiveness for carbon reductions.9 Long-term results to 2050 show that it is critical to provide market flexibility for both electrification and liquid pathways in the near term to promote long-term feasibility and cost-effectiveness of GHG reductions. Regulations should therefore encourage and/or facilitate all feasible vehicle-fuel pathways that can 1.) immediately reduce carbon intensity in the transportation sector and, 2.) maximize long-term GHG reductions by transitioning to renewable sources, including electricity, hydrogen, and increasingly lower-carbon and advanced biofuels. [EPA-HQ-OAR-2022-0829-0711, pp. 2-3]

7 Life Cycle Associates, "Assessing Greenhouse Gas Emission and Petroleum Reduction Scenarios for the U.S. and California Transportation Sectors Final Report" (March 2019) – Submitted in conjunction with previous comments at Docket EPA–HQ– OAR–2021–0208

8 EIA Annual Energy Outlook 2016; Argonne National Laboratory (ANL), Greenhouse Gasses, Regulated Emissions and Energy Use in Transportation (GREET) Model, VISION2015, and Cradle-to-Grave Lifecycle Analysis of U.S. Light Duty Vehicle Fuel Pathways (2016);); National Academies of Science Transitions report (2013); EPA-NHTSA Draft Technical Assessment Report, EPA Fuel Economy Guide; CARB VISION2.1 and CA-GREET2 models

9 Each pathway centered on a dominant vehicle technology, constrained by practical limitations and the attributes of cars versus trucks or SUVs. Vehicles not suitable for battery electric propulsion were assumed to be ICEs.

Realize GHG reductions sooner rather than later. Given the urgency to forestall the increasing effects of climate change, the EPA should not foreclose pathways that can immediately reduce GHG emissions. With a signal from EPA that FFVs will be recognized for their decarbonization value, higher blends of low-carbon ethanol can be made quickly available in the marketplace to immediately displace higher-carbon gasoline. Today, more than 20 million FFVs are already on the road, compared to 3.8 million plug-in EVs. FFVs are a mature vehicle technology that can quickly be reintegrated into OEM offerings at virtual price parity to existing internal combustion engine (ICE) vehicles. E85 also has widely available distribution and dispensing infrastructure to deliver the fuel to retailers and consumers. Another key finding of the Lifecycle Associates analysis is that policies accelerating a decrease in the carbon intensity of fuels reduce total GHGs sooner. As EPA has noted, “future [GHG] emissions are expected to produce larger incremental damages as physical and economic systems become more stressed in response to greater climatic change.”10 Given the uncertainties in measuring the long-term impacts of GHG emissions,11 and the accumulated impacts of carbon emissions,12 EPA should not discount the benefits of pathways with significant promise to reduce emissions more quickly in the near-term. [EPA-HQ-OAR-2022-0829-0711, p. 3]

10 Preliminary Regulatory Impact Analysis (PRIA) for the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021 – 2026 Passenger Cars and Light Trucks, p.10768

11 SAFE PRIA, p. 1069

12 National Academies of Sciences, Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide, (2017)

Minimize consumer disruption and cost. Since first being introduced more than 15 years ago, FFVs have been manufactured and sold with no consumer disruption. The functioning and fueling are virtually indistinguishable to drivers, and from a policy perspective are only limited in utility by uneven availability of E85. However, the state of California offers an illuminating example of FFVs fueled by a more robust fueling infrastructure. Due to a long-term sustained discount of E85 relative to regular gasoline (87 RON), California drivers have continued to increase use in the state. E85 consumption in California has been increasing by an average of 33% per year—and 40% from 2021 to 2022.14 The usage rate of E85 in FFVs was 16% in 2022 for a total of 103 million gallons.15 A primary driver of increased E85 use has been its sustained discount relative to retail gasoline. E85 has consistently offered a steady pump price discount of ~$1.00/gallon in California. Further, when gasoline prices spiked after Russia’s invasion of Ukraine, FFV drivers in the State were buffered from the impact. Unlike gasoline prices, ethanol prices are not dependent on world oil prices. Consequently, while gasoline prices spiked, E85 prices remained stable, resulting in a discount of up to $2.50/gallon for E85 relative to regular gasoline, and in some cases more. [see Appendix A] [EPA-HQ-OAR-2022-0829-0711, pp. 4-5]

14 California Air Resources Board E85 consumption data

15 California Air Resources Board and Pearson Fuels data

FFVs are already equivalent to existing vehicles in cost, attributes and convenience. Reinvigorating FFV production can leverage the major evolution since the FFV credit was eliminated. The Department of Agriculture, pump manufacturers and fueling stations have dedicated significant investments to increasing distribution infrastructure. Ethanol has become much less carbon intensive and is price advantaged in many areas of the country that sell blends above E10, while FFVs can use any blend up to E85. [EPA-HQ-OAR-2022-0829-0711, p. 5]

Summary

By not incorporating a program incentive for the production of FFVs, the proposed GHG Standards leave on the table the most substantial opportunity to rapidly and cost-effectively reduce GHG emissions in light-duty transportation in the near term. As acknowledged in the U.S. Blueprint "Some biofuels and biofuel blends are drop-in replacements for tradi4onal fossil fuels and offer the most substan4al immediate GHG emissions reduc4ons." Further, foreclosing the best possibility of lowering the carbon intensity of the liquid fuels that will dominate roadways for many years effectively cedes the liquid fuel market to petroleum-based fuels and the attendant climate consequences for the long-term. Even for California, which leads the nation in EV adoption, ICEs are expected to remain in significant numbers after 2035 and beyond and beyond. The Institute for Transportation Studies report "Driving California's Emissions to Zero" concluded that achieving carbon neutrality required a complete transition to bio-based gasoline and equivalents by 2045.16 [EPA-HQ-OAR-2022-0829-0711, pp. 4-5]

16 University of California Institute of Transportation Studies, "Driving California's Transportation Emissions to Zero" (April 2021) accessed at https://escholarship.org/uc/item/3np3p2t0

Because consumer sales determine the vehicles on the road, affordability and convenience are critical to the success of the GHG Standards, and ultimately the transition to a zero-carbon transportation system. Encouraging the purchase and use of lower-carbon technologies and fuels in the vehicles that Americans buy today will set us on a path toward that goal, given that these cars and trucks will be on the road for 15 to 20 years. [EPA-HQ-OAR-2022-0829-0711, pp. 4-5]

Organization: Green Diesel Engineering LLC

There is a consensus that the rising rate of CO2 is leading to global climate change. CO2 does fluctuate naturally on this planet over time, and it can change rapidly when a calamitous natural disaster occurs, such as a large volcanic eruption, or meteor impact that burns a significant portion of the planet. These have happened several times on planet earth. CO2 spikes from a natural disaster are somewhat similar to the CO2 spike we have seen in the last 100 years. With the advent of the industrial revolution, the imprint of human activity contributed significantly to the release of CO2. If this trend continues, subsequent generations will be at risk. [EPA-HQ-OAR-2022-0829-0457, p. 4]

The goal should be carbon neutral, but this will take decades to achieve and new technology required. In the interim, we must limit CO2 generation as best we can. Changing to plant-based fuels offer the largest net decrease in CO2 formation. If all transportation was converted to plant-based fuel, net CO2 would drop 70% on a yearly basis. This approach offers the lowest net carbon in the atmosphere. [EPA-HQ-OAR-2022-0829-0457, p. 4]

The graph above is from a NASA satellite image which highlights the areas with NOx issues. [See original comment for map of nitrogen dioxide levels throughout the Unites States] Since these areas are predominantly urban vicinities or downstream of power plants, it would be more beneficial to focus on localized efforts to reduce NOx. A good 70% of people live in the urban areas and reducing NOx in these inner cities will provide the most focused assistance. Ideally, most city transportation would be electric to eliminate emissions at source. Cities could build large parking lots outside urban areas for combustion vehicles and mass electric transit into city center. Keep in mind, electric vehicles do not reduce emissions, but rather change where those emissions are produced (battery mining / manufacturing / recycling plants) and electric power-distribution facilities. Moving the emissions away from where most people live would be prudent. Electric transportation does not reduce CO2 emissions over the vehicle life cycle due to battery manufacturing, mining, recycling and charging. Electric vehicles will help reduce smog in LA, Denver, etc. where there is poor airflow, however, they will not reduce carbon emissions when battery recycling/lifespan is incorporated in the well to wheels analysis. (https://climate.mit.edu/ask-mit/are-electric-vehicles-definitely-better-climate-gas-powered-cars),(https://www.iea.org/data-and-statistics/charts/comparative-life-cycle-greenhouse-gas-emissions-of-a-mid-size-bev-and-ice-vehicle),(https://www.epa.gov/greenvehicles/comparison-your-car-vs-electric-vehicle), (https://www.sciencedirect.com/science/article/pii/S1361920921000614). [EPA-HQ-OAR-2022-0829-0457, p. 4]

Proposed Emission Standard Guidelines [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Modify the emission standards on gasoline and diesel with the primary emphasis to be on minimizing CO2.

- Increase NOx limit for diesel engines to 3 gram/mile on EPA emission test cycles. This is still cleaner than 1980 standards. With proper engine tuning, the smaller NOx increase allows for a decrease of 100 gram/mile of CO2.

- Maintain the theme of clean diesel and keep particulate filters to prevent PM (particulate matter) emissions. [EPA-HQ-OAR-2022-0829-0457, p. 6]

- Manufacturers could add GPS software to go into low NOx mode when near NOx abatement zones.

- Re-allocate tax incentives for urban residents to purchase BEV (battery electric vehicle)

- Work with states on regional smog issues as these are very limited in geographical area. The top cities are: Los Angeles, Denver, Miami, New York City, Houston, Atlanta, etc. Moving to primarily electric vehicles in dense population zones eliminates point of use emissions.

- Work with bio-fuel producers, farmers, refineries as needed to promote plant- based fuels that do not impact the food system. Hemp would be a good starting point as the entire plant can be utilized. The seed oil produces bio-diesel and the stalk produces ethanol. A robust bio fuel industry could reduce CO2 up to 1000 million metric tons yearly.

- Electric is a good solution for local driving patterns. It is not good for long distance runs or pulling loads and does suffer in range with extreme cold or heat.

- Re-calibrating vehicles in the field for low CO2 will yield the quickest return on investment. [EPA-HQ-OAR-2022-0829-0457, p. 6]

Organization: GROWMARK, Inc.

Our system's approach to fuel and energy business is to provide the fuel and energy sources that our customers want and use. We do not prefer or advocate for one technology over the other, but we feel that the proposed rule will cause a tremendous burden on farmers and rural Americans, where the lack of charging infrastructure will make the conversion to EVs at the rates necessitated by this proposed rule extremely difficult. Furthermore, current EVs lack the capabilities that internal combustion engine (ICE) vehicles currently have, which are vital for farmers as they work to feed our nation and the world. Additionally, we feel that the prioritization this proposed rule places on EVs ignores the tremendous potential of biofuels as a low-carbon fuel source, especially given the current realities of carbon intensity for EVs and biofuels. [EPA-HQ-OAR-2022-0829-0560, p. 1]

Prioritization of EV Technology Over Biofuels

Given the percentage of new vehicle sales that will be required to be EVs in order to comply with these standards, the EPA is picking EV technology over biofuels grown and produced in America, much to the detriment of American farmers and the environmental goals of the EPA. [EPA-HQ-OAR-2022-0829-0560, p. 2]

According to Dr. Steffen Mueller at the University of Illinois Chicago (UIC) Energy Resources Center, a high-octane fuel (HOF) of E30 or higher that utilizes carbon capture and storage (CCS) results in fewer greenhouse gas (GHG) emissions per mile than EVs operated on the Marginal Midwest Grid. E85 with CCS results in fewer GHG emissions per mile than the U.S. Baseload Average Electricity Grid and the California Marginal Electricity Grid.8 [EPA-HQ-OAR-2022-0829-0560, p. 2]

8 Mueller, S. (2021, December). Life Cycle Emissions of Different Vehicle/Fuel Technology Pathways [PowerPoint slides]. Illinois Commerce Commission. https://www.icc.illinois.gov/downloads/public/informal-processes/Doc%203_UIC%20ICC%20EV%20Emissions%20Final_12-15-21.pdf

The EPA's approach with these proposed standards ignores these scientific analyses, and as a result the unnaturally created leap in adoption of EVs will lead to less investment in biofuel advancements. Besides actually creating more GHG emissions, this will cause a major economic burden in rural America as an important market of crops produced by farmers will be diminished at the same time that they are forced to adopt a more expensive, less reliable technology. [EPA-HQ-OAR-2022-0829-0560, pp. 2-3]

Our system thanks you for your consideration of these comments, and we ask that you reconsider this rule that will have such a negative effect on the farmers and customers that we serve across our nation. [EPA-HQ-OAR-2022-0829-0560, pp. 2-3]

Organization: Growth Energy

Yet the Proposed Rule almost entirely ignores the GHG-reduction and other benefits of ethanol and other biofuels. Most significantly, it fails even to consider the upstream carbon sink that results from growing crops used in biofuels while simultaneously dismissing the upstream carbon emissions of building and powering EVs. EPA assesses the emissions lifecycles of two complex vehicle systems—EVs and internal combustion engine ("ICE") vehicles—in a way that heavily puts the thumb on the scale in favor in EVs. First, although both EVs and ICE vehicles generate "upstream" emissions from vehicle and engine production and power generation, EPA dismisses this reality. Second, although ICE vehicles can run on a diverse range of fuels with vastly different GHG emissions profiles, EPA fails to consider this diversity when assessing "downstream" emissions from petroleum-based and biofuels-based vehicle systems. The result is a proposal that inaccurately treats EVs as if they generate zero grams per mile of carbon and just as inaccurately treats emissions from the use of biofuels the same as emissions from combusting petroleum fuels. [EPA-HQ-OAR-2022-0829-0580, p. 3]

EPA's failure to adequately incorporate the benefits of biofuels into its analysis of the comparative GHG emission profiles of EVs and ICE vehicles pervades the Proposed Rule. For example, EPA arbitrarily assumes that biofuels will stay at a constant percentage of the nation's liquid fuel supply, ignores the potential of greater blends of biofuels in its cost and feasibility analyses, and fails to consider the potential for incentivizing greater biofuel use through credits. Of course, as the agency charged with administering the Renewable Fuel Standard, EPA is uniquely positioned to promote biofuels and increase their percentage of the nation's transportation fuel supply, all in accordance with Congress's understanding that renewable fuels must play a central role in reducing the impact of transportation-related GHG emissions. [EPA-HQ-OAR-2022-0829-0580, pp. 3-4]

The Proposed Rule's blind spot for biofuels has major policy consequences. EPA misses an opportunity to further reduce emissions with a biofuel like ethanol that has 46 percent lower GHG emissions on average and is already in use in the vast majority of light-duty vehicles and fuels markets across the country. EVs are undoubtedly an important and growing technology, but not every consumer or business in the country can adopt EVs and not every electricity source in the country will be able to meet more stringent GHG emissions standards in the timeframe established in the proposal. The Proposed Rule thus would perversely incentivize EVs in regions where electricity will continue to be generated from fossil fuels when incentivizing higher biofuel use in those areas instead could achieve greater emissions reductions. [EPA-HQ-OAR-2022-0829-0580, pp. 3-4]

The Proposed Rule is different in kind than EPA's prior tailpipe rules. For one, it makes permanent EPA's disregard of the upstream emissions of EVs, which prior rules promised would be temporary. [EPA-HQ-OAR-2022-0829-0580, p. 4]

There are several steps that EPA can and should take to address those deficiencies, both in the final rule and in other contexts: [EPA-HQ-OAR-2022-0829-0580, p. 4]

- First, EPA should fix its system of scoring the emissions from vehicles, which both undercounts EV emissions and overcounts emissions from biofuels used in ICE vehicles. The most accurate way to do so would be by conducting a complete lifecycle analysis for BEVs—using the Argonne laboratory's GREET model or its equivalent—and compare that to a lifecycle analysis for ICE vehicles using various blends of liquid fuels. Alternatively, if EPA does not use a lifecycle analysis, it should at a minimum assign the portion of fuel used in ICE vehicles attributable to biofuels a value of zero g/mi in recognition of the fact that the carbon emitted from combusting biofuels is biogenic carbon sequestered from the atmosphere by crops. [EPA-HQ-OAR-2022-0829-0580, p. 4]

- Second, EPA should account for the potential of higher blends of biofuels. At a minimum, EPA should use E15 as its test fuel and strongly promote E15 as an in-use fuel, because current ICE technology is capable of using E15. EPA should also adjust its methodology to account for increasing use of mid-level and higher-blend fuels such as E30 and E85. Fuels and vehicles act as a system, so naturally an improvement in fuels will help EPA achieve its emissions goals. [EPA-HQ-OAR-2022-0829-0580, p. 4]

- Third, EPA should use credits to incentivize biofuel use in ICE vehicles. EPA can and should use its Section 202 authority to provide credits to manufacturers who create engines and other technologies that facilitate use of higher blends of ethanol and other biofuels. And, as part of or in addition to that program, EPA should award credits that are tied to actual use of biofuels in ICE vehicles. [EPA-HQ-OAR-2022-0829-0580, p. 4]

- Fourth, EPA should also consider additional actions outside of Section 202 to further incentivize biofuel use. One such action would be to incentivize increased ethanol and other biofuel production through appropriate volumes under the Renewable Fuel Standard (“RFS”) program. Another would be to establish a minimum octane standard and approve a high-octane, low-carbon mid-level ethanol blend, which would lower GHG emissions both by ensuring that ethanol makes up a greater part of the liquid fuel supply and by allowing auto manufacturers to manufacture more efficient engines. [EPA-HQ-OAR-2022-0829-0580, p. 4]

Ethanol also has lower emissions of numerous other pollutants. To begin with, ethanol boosts octane in fuel without the harmful impacts of alternative octane-boosting fuel additives such as methyl tert-butyl ether (MTBE), lead, and aromatics (including benzene, toluene, ethylbenzene, and xylene) or olefins. Indeed, the level of aromatics in fuel decreases by about seven percent for every 10 percent by volume increase in ethanol content.3 Decreasing aromatics in fuel has direct impacts on tailpipe emissions, with higher-ethanol fuels resulting in lower emissions of black carbon (BC), particle number (PN), benzene, toluene, ethylbenzene, m/p- xylene and o-xylene (BTEX), and olefins.4 Using higher blends of ethanol also reduces total hydrocarbon (THC), carbon monoxide (CO), and particulate matter (PM) emissions. For PM emissions in particular, recent studies have demonstrated substantial benefits from higher blends of ethanol in fuel.5 [EPA-HQ-OAR-2022-0829-0580, p. 5]

3 Kazemiparkouhi et al., Comprehensive US database and model for ethanol blend effects on regulated tailpipe emissions. 812 Science of The Total Environment 151426, (Mar. 2022).

4 MacIntosh, et al., Response to Proposed Renewable Fuel Standard (RFS) Program Standards for 2023–2025, Environmental Health & Engineering (Feb. 10, 2023).

5 See Karavalakis, Durbin, & Tang, Final Report, Comparison of Exhaust Emissions Between E10 CaRFG and Splash Blended E15, Prepared for: California Air Resources Board (CARB), Growth Energy Inc./Renewable Fuels Association (RFA), and USCAR (Jan. 2022).

II. The Benefits of Biofuels

In its extensive proposal and preamble, EPA included next to no analysis of the benefits ethanol and other biofuels. That omission is glaring because of the significant GHG-reductions and other benefits that biofuels offer. [EPA-HQ-OAR-2022-0829-0580, p. 5]

To begin with, the carbon absorbed by agricultural crops when they grow means that the lifecycle emissions of biofuels are significantly lower than petroleum fuels. A recent meta-analysis by Harvard researchers that accounted for all aspects of the lifecycle emissions of corn ethanol concluded that ethanol reduces GHG emissions by 46 percent compared to gasoline.1 Recent developments in the biofuels industry, such as the increasing use of carbon capture and storage and clean power sources at biofuel production facilities, are helping to drive lifecycle emissions from biofuels even lower.2 And innovative "climate smart" agricultural practices continue to increase yields while minimizing inputs and lower the GHG emissions from biofuels feedstock production as well. [EPA-HQ-OAR-2022-0829-0580, p. 5]

1 Scully, et. al., Carbon intensity of corn ethanol in the United States: state of the science 16 Environ. Res. Lett. 043001 (2021).

2 Growth Energy, Putting Carbon to Work: Biorefineries' Critical Contributions to Net-Zero, https://growthenergy.org/wp-content/uploads/2022/06/GROW-22019-Issue-Brief-Carbon-Capture-2022-06-22- R8.pdf.

Biofuels also provide significant flexibility in achieving GHG emissions goals because they can be used in existing ICE vehicles and fueled at existing gas stations. Consumers and operators of fleets around the country have the ability to use more biofuels. To the extent that some upgrades are necessary to facilitate storage and fueling with higher blends, the marginal cost of doing so is minimal. The carbon-reduction benefits of biofuels are therefore achievable in the near-term even without the massive expansion in electricity generation (and low-carbon electricity generation in particular) that will be required to power EVs. [EPA-HQ-OAR-2022-0829-0580, p. 5]

Indeed, a recent National Academy of Sciences ("NAS") assessment explained that an approach like EPA's fails to "fully capture" emissions from "the total light-duty vehicle system."8 NAS noted that one issue of that type of non-system-based analysis is that it would lead to inaccurate comparisons between vehicles using different fuels.9 And NAS further opined that: [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

8 National Academy of Sciences (NAS), Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy—2025-2035 at 13-416 (2021).

9 Id.

[I]f deep GHG emissions reduction is a goal, then there will need to be consideration of not only onboard vehicle emissions, but also the emissions from related sectors, like electricity (for vehicle charging), and manufacturing (of vehicles and their materials and components). This motivates the need for life cycle thinking.10 [EPA-HQ-OAR-2022-0829-0580, pp. 6-7]

10 Id.

Moreover, EPA has not acknowledged the inaccuracy of failing to account for the carbon absorbed by biofuel feedstocks when they are grown. Because all of the carbon emitted from a tailpipe is sequestered by crops while they grow, EPA's emissions values assigned to ICE vehicles using biofuels misses dramatically in the other direction. [EPA-HQ-OAR-2022-0829-0580, pp. 7-8]

The fundamental scientific reality that emissions from combusting biofuels is offset by crops' absorption of carbon is reflected in other EPA programs like the Renewable Fuel Standard program. There, emissions from combustion of biofuels in a vehicle are excluded in lifecycle analyses because “[o]ver the full lifecycle of the fuel, the CO2 emitted from biomass-based fuels combustion does not increase atmospheric CO2 concentrations, assuming the biogenic carbon emitted is offset by the uptake of CO2 resulting from the growth of new biomass.” 74 Fed. Reg. 24,904, 25040 (May 26, 2009). Similarly, the IPCC excludes emissions from combustion of fuels from biogenic sources when assessing national or sectoral carbon emissions. See 2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol. 2 at 2.3.3.4. [EPA-HQ-OAR-2022-0829-0580, pp. 7-8]

EPA’s failure to recognize biofuels’ upstream carbon benefits leads to absurd results in the context of the Proposed Rule. For example, a 2019 MIT study found that, when accounting for emissions from all aspects of a vehicle’s manufacturing, fueling, and use, EVs emitted about 200 grams/mile over their lifetimes, compared to about 350 grams per mile for gasoline powered cars, for an emissions reduction of about 43 percent.11 That emissions reduction is very similar to the 46 percent reduction of 100 percent ethanol compared to petroleum.12 Yet, the Proposed Rule would treat an EV as emitting zero GHGs while treating an ICE vehicle running on 100 percent ethanol as having the same lifecycle GHG emissions as petroleum. [EPA-HQ-OAR-2022-0829-0580, pp. 7-8]

11 Massachusetts Institute of Technology, Insights into Future Mobility (2019), available at https://energy.mit.edu/wp-content/uploads/2019/11/Insights-into-Future-Mobility.pdf.

12 Scully, et. al., Carbon intensity of corn ethanol in the United States: state of the science 16 Environ. Res. Lett. 043001 (2021). Regional differences in electricity generation and the fuel efficiency of certain ICE vehicles can make the Proposed Rule’s comparison even more absurd. For example, driving a flex-fuel vehicle that can run on E85 would have significantly lower GHG emissions than using an EV in a state like West Virginia where electricity is generated largely from combustion of coal.13 Indeed, driving a highly fuel-efficient ICE vehicle or non-plug-in-hybrid like a Toyota Prius with higher blends of biofuels would compare favorably in those circumstances.14 Yet, the proposal would still treat EVs as emitting no GHGs and biofuels as achieving no emissions reductions. [EPA-HQ-OAR-2022-0829-0580, pp. 8-10]

13 See Massachusetts Institute of Technology, Insights into Future Mobility (2019), available at https://energy.mit.edu/wp-content/uploads/2019/11/Insights-into-Future-Mobility.

14 Id.

IV. EPA Must Consider the Benefits of Biofuels and Higher Biofuel Blends Throughout the Rule.

In addition to treating biofuels unfairly and inaccurately when assessing GHG emissions compared to EVs, EPA systematically ignores the benefits of biofuels throughout the Proposed Rule. In the vast majority of the proposal, EPA assumes a binary choice between petroleum fuels and EVs. And when EPA does include any consideration of ethanol, it fails to explore the potential of higher blends—it assumes that all gasoline contains and will always contain at most E10. [EPA-HQ-OAR-2022-0829-0580, p. 12]

A. Other Pollutants

In discussing the impacts of the rule on emissions of other pollutants, EPA entirely leaves out consideration of biofuels. As discussed above, ethanol has lower emissions of many pollutants than petroleum gasoline. Indeed, recent studies by the University of California Riverside and the University of Illinois at Chicago found that use of more ethanol and ethanol- blended fuel significantly reduces harmful pollutants such as particulate matter (PM), carbon monoxide, and benzene.19 Just as with GHGs, that failure renders EPA's assessment of emissions of other pollutants inaccurate. And just as with GHGs, EPA misses an opportunity to reduce emissions through incentivizing biofuel use. [EPA-HQ-OAR-2022-0829-0580, p. 12]

19 Patrick Roth et al., Investigating the Effect of Varying Ethanol and Aromatic Fuel Blends on Secondary Organic Aerosol (SOA) Forming Potential for a FFV-GDI Vehicle: Comparison of Exhaust Emissions Between E10 CaRFG and Splash Blended E15, University of California Riverside (2018); Steffen Mueller, The Impact of Higher Ethanol Blend Levels on Vehicle Emissions in Five Global Cities, University of Illinois at Chicago Energy Resources Center (November 2018).

That failure is particularly egregious in the context of EPA's efforts reduce aromatics in petroleum fuels that contribute to PM emissions. 88 Fed. Reg. at 29,401. As discussed above, ethanol has an excellent octane rating, and blending it into gasoline in greater quantities can therefore allow reductions in aromatics and associated PM emissions. EPA explicitly sought comment on ways to reduce aromatic content, but it completely ignored that increasing the ethanol content of gasoline is a simple way to do so that has significant benefits. Multiple studies continue to show that increasing ethanol content in gasoline reduces PM emissions.20 Indeed, the benefits of ethanol in reducing PM were recently confirmed in EPA's own work with Environment and Climate Change Canada.21 In that study, fuel with increased ethanol content showed the deepest reduction in PM compared to the baseline fuel with heavy aromatics. Growth Energy therefore urges EPA to explore the widespread use of higher ethanol blends to replace heavy aromatics to significantly reduce PM emissions. [EPA-HQ-OAR-2022-0829-0580, p. 12]

20 Growth Energy has provided such studies in previous submissions to EPA, including our comment in support of EPA's proposal to implement the "Request from States for Removal of Gasoline Volatility Waiver."

21 EPA, Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources (Apr 2023), Dkt ID: EPA–420–R–23–008.

B. Other Considerations

EPA also continues to ignore biofuels in other parts of its proposal and preamble. To give just a few examples, EPA ignores biofuels entirely or fails to examine the impacts of different blends in the following ways [EPA-HQ-OAR-2022-0829-0580, p. 13]:

- EPA considers impacts of the proposed rule on employment in the petroleum industry, but not in the biofuels industry. Id. at 29,393.

- EPA considers the energy security risks of petroleum fuels, but not the energy security benefits of biofuels. Id. at 29,388.

- EPA uses a Tier 3 test fuel that is 10 percent ethanol and makes no effort to quantify how GHG emissions reductions would be altered by different levels of use of E15, E85, or other biofuel blends. Id. at 29,240. [EPA-HQ-OAR-2022-0829-0580, p. 13]

EPA is therefore failing entirely to look at an important consideration in numerous places throughout the proposal. That failure is inexcusable given that E15 use is currently increasing in use around the country, and EPA itself has undertaken to allow for year-round sale of E15. In the final rule, EPA should consider all of the benefits of biofuels—and consider the impacts of incentivizing adoption of higher blends—in each of its analyses of costs, benefits, and impacts. [EPA-HQ-OAR-2022-0829-0580, p. 13]

In particular, EPA should ensure that its test fuel is not limited permanently only to E10. It should instead project increasing biofuel use going forward, and it could potentially test with multiple different blends based on different projected scenarios of biofuel adoption across the country. Doing so will ensure that the test fuel reflects the growing range of options for ethanol use across the country. [EPA-HQ-OAR-2022-0829-0580, p. 13]

B. Options Outside of Section 202

EPA should also consider taking actions outside of Section 202 to further incentivize biofuels. To begin with, EPA should set robust renewable volume obligations under the RFS program for total and advanced biofuels. The RFS is one of America's most successful clean energy policies, and it has abundant potential to further reduce emissions. Yet, just a few weeks ago, EPA set the total and advanced volumes for 2023, 2024, and 2025 significantly below what the industry can achieve, despite Congress's desire that the RFS be a technology-forcing and demand-driving program. EPA must do more to help incentivize production of biofuels through the RFS, which means that it must set volumes going forward that expand market opportunities for higher blends like E15 instead of leaving readily available carbon reductions on the table. [EPA-HQ-OAR-2022-0829-0580, pp. 16-17]

Another such action would be to require a higher octane standard and approve a high- octane, midlevel ethanol blend. Growth Energy has been a leader on the need for higher octane, mid-level ethanol blends, first submitting a proposal for a 100 RON, E30 fuel nearly a decade ago. A higher octane requirement that incentivizes greater use of mid-level ethanol blends would reduce emissions by ensuring that a greater portion of the gasoline supply consists of ethanol. But that is not the only benefit—moving towards using a higher octane, mid-level blend would also enable automakers to optimize engines to improve efficiency by making engines smaller and increasing the use of turbocharging.22 So, a higher octane standard would be a win-win that would reduce emissions of GHGs and other pollutants both by incentivizing more ethanol use and by facilitating more efficient engines. [EPA-HQ-OAR-2022-0829-0580, pp. 16-17]

22 See, e.g., Oak Ridge National Laboratory, Summary of High-Octane, Mid-Level Ethanol Blends Study (July 2016), available at https://info.ornl.gov/sites/publications/Files/Pub61169.pdf.

VI. EPA Should Establish or Expand Credits for Biofuels and Should Consider Other Measures to Encourage Greater Biofuel Use.

A. Credits and Other Measures Under Section 202

Simply addressing EPA's errors regarding the lifecycle emissions of biofuels and EVs will not sufficiently drive biofuel use in a manner consistent with Section 202 and the RFS. EPA should also establish credits that specifically reward auto manufacturers for taking measures to incentivize increased biofuel use. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

EPA clearly has authority to issue such credits under Section 202. It has for years issued credits for various measures that reduce emissions that are not reflected in tailpipe emissions, including credits for efficient air conditioning and off-cycle credits. 88 Fed. Reg. at 29,246. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

The simplest type of credits to incentivize biofuels are those that allow greater biofuel use in vehicles, such as flex-fuel vehicles (“FFVs”) that can use E85 and higher blends of ethanol. EPA, along with the National Highway Traffic Safety Administration (“NHTSA”), has already established credits both under CAFE and Section 202 that provide an incentive for E85 use. 77 Fed. Reg. at 62,829. Those credits were initially awarded to FFVs regardless of the fuel they actually used, but were later adjusted to account for the amount of fuel actually used. In its 2012 rulemaking for MY 2017 and later years, EPA explained that: [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

In the final rulemaking for MYs 2012-2016, EPA promulgated regulations for MYs 2012-2015 ethanol FFVs that provide significant GHG emissions incentives equivalent to the long-standing “CAFE credits” for ethanol FFVs under EPCA, since many manufacturers had relied on the availability of these credits in developing their compliance strategies. Beginning in MY 2016, EPA ended the GHG emissions compliance incentives and adopted a methodology based on demonstrated vehicle emissions performance. This methodology established a default value where ethanol FFVs are assumed to be operated 100 percent of the time on gasoline, but allows manufacturers to use a relative E85 and gasoline vehicle emissions performance weighting based either on national average E85 and gasoline sales data, or manufacturer-specific data showing the percentage of miles that are driven on E85 vis-[a]-vis gasoline for that manufacturer's ethanol FFVs. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

EPA should, at a minimum, extend and expand upon existing credits for FFVs. Existing credits are limited in several ways—they do not provide an incentive for other technologies that facilitate biofuel use in vehicles, they do not incentivize investments in blending infrastructure or other non-vehicle equipment for biofuel use, and they do not incentivize greater use of biofuels in standard, non-FFV engines. EPA therefore should also develop additional credits that can further reduce GHG emissions by incentivizing greater biofuel use. To begin with, EPA could expand credits to include technologies that facilitate different biofuel blends, like E30, and investments that help facilitate fueling of vehicles with higher blends. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

An even better system of credits would be to provide credits based on overall biofuel use in the manufacturer’s fleet, regardless of whether the manufacturer manufactures FFVs or any specific technology. That type of credit would give manufacturers incentives to increase biofuel use in their fleet in any way possible—everything from making more FFVs, to making it easier for non-FFVs to run on higher blends, to facilitating investments in fueling with higher blends. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

Given the discussion of various credit programs in the proposal and past FFV incentive programs, EPA can finalize a credit program based on biofuel use in this rule. But to the extent that EPA believes it would require an additional rulemaking proposal, EPA should propose and finalize such an incentive program as quickly as possible—it need not wait until the end of its currently proposed standards to develop an important additional mechanism for reducing greenhouse gas emissions while continuing to maintain options for multiple types of vehicles in our transportation system. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

VII. Conclusion

The proposed rule misses a significant opportunity to reduce GHG emissions through biofuels. EPA should adjust its proposal by: (1) accounting for the upstream emissions of EVs and the upstream carbon sinks of biofuels; (2) considering the potential for higher blends of biofuels in EPA's test fuel and throughout the rule; and (3) developing credit programs and other measures that incentivize greater biofuel use. [EPA-HQ-OAR-2022-0829-0580, p. 17]

Organization: HF Sinclair Corporation

EPA's regulations also have a chilling effect on additional investments by companies, such as HF Sinclair, in carbon reducing technologies like carbon capture and sequestration projects, green hydrogen, renewable fuels and other low-carbon liquid fuel technologies that can reduce emissions from ICE vehicles. In addition, HF Sinclair has voluntarily announced a target to reduce its net greenhouse gas emissions intensity by 25% by 2030 compared to a 2020 baseline. [EPA-HQ-OAR-2022-0829-0579, p. 2]

Organization: Illinois Corn Growers Association

A new technology path is need that would, in the best-case scenario, lower greenhouse gas emissions from the transportation sector to a greater extent than the proposed standards and, in the worst-case scenario, make up for any shortfalls if electrification does not go as planned. [EPA-HQ-OAR-2022-0829-0756, p. 1]

A new technological pathway would need to dramatically reduce CO2 emissions, displace fossil fuels and be readily implemented on liquid fueled new vehicle. This would involve changes to vehicle fuels in harmony with changes in vehicle design. [EPA-HQ-OAR-2022-0829-0756, p. 1]

For a decade, the National Laboratories and Department of Transportation have been evaluating fuel blends that would replace a significant amount of fossil fuel with low-carbon renewable fuel and have properties that would allow automakers to produce more efficient internal combustion engines. After evaluating over 400 possible compounds, one compound emerged that is highly effective and had the fewest barriers to implementation: ethanol. [EPA-HQ-OAR-2022-0829-0756, p. 1]

It is imperative that any consideration of potential fuels controls include the implementation of regulations and standards that, within the agency's authority, would help bring about a cleaner, more renewable and less expensive high-octane fuel for use in the advanced, high efficiency internal combustion engines of the future. [EPA-HQ-OAR-2022-0829-0756, p. 1]

Over the last decade, there has been much discussion within the automotive and ethanol industries about a new pathway that automakers could use to lower CO2 tailpipe emissions – High Octane Low Carbon (HOLC) fuel. [EPA-HQ-OAR-2022-0829-0756, pp. 5-6]

A brief summary of key events in the development of HOLC fuels is shown in Table 3.

[See original attachment for figure "Table 3. Development Timeline for High Octane Low Carbon Fuel] [EPA-HQ-OAR-2022-0829-0756, pp. 5-6]

These include: [EPA-HQ-OAR-2022-0829-0756, pp. 5-6]

High octane fuels symposiums. Two Society of Automotive Engineers (SAE) high octane fuels symposiums were held in Washington, DC in February 2013 and January 2014 to discuss the potential of using higher levels of ethanol in gasoline to reduce vehicle emissions. Research from automakers, Oak Ridge National Laboratory and others presented at these symposiums showed that an ethanol-gasoline blend fuel made up of 20% - 30% ethanol would have an octane rating of 95 to 98 Research Octane Number (RON), which is significantly higher than today's 91 RON regular grade fuel. The higher-octane rating in the fuel would allow automakers to design more efficient engines which would minimize or eliminate the mileage penalty associated with ethanol blend fuels. Since the resulting fuel would have less carbon than gasoline alone, vehicles would emit lower CO2 emissions. Also, adding ethanol (a single compound with known properties) to gasoline (a mixture of hundreds of compounds) dilutes the concentration of non-ethanol compounds in the final blend. The impact of HOLC fuels on octane rating and aromatic concentrations is shown in Figure 1. [EPA-HQ-OAR-2022-0829-0756, pp. 5-6]

[See original attachment for "Figure 1. Ethanol Blended with Regular Grade Petroleum Blend Stock"] [EPA-HQ-OAR-2022-0829-0756, pp. 5-6]

A Federal research program called Co- Optima. Begun in 2016, Co-Optima is a U.S. Department of Energy program that coordinates the work of nine national laboratories to evaluate various compounds to determine their suitability as a blending agent with gasoline. The basic goals of creating a new HOLC fuel was expressed in the most recent public report of the Co-Optima program: [EPA-HQ-OAR-2022-0829-0756, pp. 6-7]

"The urgent need to decarbonize our transportation system—switching from petroleum-based fuels to cleaner, more sustainable energy sources—has become ever more apparent. While the nation is moving to rapidly boost production of electric vehicles, the transportation of goods and people will still rely heavily on gasoline and diesel fuel for decades to come. [EPA-HQ-OAR-2022-0829-0756, pp. 6-7]

In just a few short years, breakthroughs from the recently completed U.S. Department of Energy (DOE) Co-Optimization of Fuels & Engines (Co-Optima) initiative could improve cars' fuel economy by 10% for today's turbocharged engines and as much as 14% more for advanced engines using multiple combustion modes, compared to a 2015 baseline. At the same time, new bio-based fuel components could produce at least 60% fewer greenhouse gas (GHG) emissions than those generated by petroleum-based fuels for all on-road vehicles."4 [EPA-HQ-OAR-2022-0829-0756, pp. 6-7]

4 "The Road Ahead Toward a Net-Zero-Carbon Transportation Future, Findings and Impact FY15–FY21," DOE/EE-2539 June, 2022

After evaluating over 400 possible blending options, the program narrowed it down to six compounds that "were determined to have the fewest barriers to adoption and use."5 The evaluation process distilled the results for each of the candidate compounds into a merit function score, which reflected how well the compound: 1) increased the research octane number and octane sensitivity, 2) lowered the heat of vaporization, and 3) could be expected to reduce particulate mater emissions. Of the six compounds out of 400 deemed to have the fewest barriers to implementation, ethanol had the best merit function score. [EPA-HQ-OAR-2022-0829-0756, pp. 6-7]

5 Gaspar, Daniel. 2019. Top Ten Blendstocks For Turbocharged Gasoline Engines: Bioblendstocks With Potential to Deliver the for Highest Engine Efficiency. PNNL-28713, Pacific Northwest National Laboratory.

From the original work done by Oak Ridge National Laboratory as presented at the SAE symposiums to the extensive evaluation done by Co-Optima, the result has been the same: the best way to reduce fossil fuel use and carbon emissions while lowering aromatics and increasing octane in liquid fuels is to increase the amount of ethanol blended into that fuel. [EPA-HQ-OAR-2022-0829-0756, p. 7]

A bipartisan bill in Congress outlining the steps necessary to bring HOLC fuel to the market. Based on the findings presented at SAE and the corroborating work done in Co-Optima, the "Next Generation Fuels Act" has been introduced into the 116th, 117th and 118th Congresses. This bill would require the phase-in of a new fuel with higher octane and lower aromatics and carbon intensity beginning in 2028. Vehicle manufacturers would then need to produce vehicles optimized to run on high octane fuel and warrant these vehicles for higher concentrations of ethanol in the fuel. It also requires new certification test fuels for 95 and 98 RON fuels with higher levels of ethanol. Finally, it removes legal barriers to the introduction of these fuels into the market. [EPA-HQ-OAR-2022-0829-0756, p. 7]

The Greenhouse Gas Benefits of Using HOLC Fuel. What is referred to as "gasoline" is a blend of a fossil fuel (gasoline blend stock) and a renewable fuel (ethanol). Nearly all such blended fuel consists of 90% gasoline blend stock and 10% ethanol known as E10. As shown in Figure 4, the total volume of gasoline blend fuels peaked just prior to the Covid pandemic. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

Thus, due to the blending of ethanol into gasoline, the fossil fuel component of liquid fuel peaked in 2006 while total gasoline blend usage peaked in 2018. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

The first substantial reduction in the use of fossil fuels in the transportation sector occurred over a relatively short period of time. While the overall use of motor fuel began to stabilize starting in 2005, the replacement of gasoline blend stock by ethanol reduced fossil fuel use enough to turn the trend downward. This was due primarily to the enactment of the Renewable Fuel Standards (RFS) which dictated the annual volume of biofuel that must be blended into gasoline and diesel fuels. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

[See original attachment for "Figure 5. Impact of Proposed GHG Emission Reductions on U.S. Fuel Consumption" and "Figure 6. Benefits from a Possible HOLC Fuel"] [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

Figure 5 illustrates what these trends would look like if the current rulemaking would achieve the results shown in Table 1. Note that while overall liquid fuel use goes down, the amount of ethanol used also declines because the concentration of ethanol in gasoline has remained unchanged at 10%. Thus, the full potential of the proposed shift to electric vehicles is blunted by the decreased use of ethanol. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

If, on the other hand. EPA were to adopt changes to the regulations to bring about widespread use of HOLC fuel with triple the ethanol that is in today's fuel, an additional 8% to 16%10 of the fossil fuel portion of the fuel (the gasoline blend stock) would be displaced by 2055. Figure 6 illustrates what the trends would look like if the current rulemaking would achieve the results shown in Table 1. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

10 This assumes a 2% reduction in mpg due to ethanol after energy density, heat of vaporization and optimization impacts are considered.

To illustrate the difference, consider that the amount of petroleum used for light and medium duty vehicles in 2055 if the proposed standards are successful would drop to 1962 levels. If, however, HOLC fuel with 20% to 30% ethanol were to replace E10 by 2055, the amount of petroleum used would drop to levels not seen since 1952. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

Organization: Illinois Farm Bureau (IFB)

Therefore, in developing the final rule, we urge USEPA to consider an all-of-the-above, technology-neutral approach to GHG reductions, to create opportunities for market-based solutions and innovations without picking "winners and losers." A diversified portfolio of vehicle and fuel technologies that meets the diverse transportation needs of Americans and makes meaningful GHG reductions can be achieved while also allowing new zero-emission vehicle ("ZEV") and battery electric vehicle ("BEV") technologies to advance. In addition, improved crop yield, innovative biofuel and refined product processing, and manufacturing efficiency tied with carbon capture each represent promising advancements for liquid fuels to continue to accelerate emissions reductions. Finally, significant opportunities remain to improve ICEV efficiency by itself and when tied to electrification technology. [EPA-HQ-OAR-2022-0829-0532, pp. 2-3]

Current and more near-term solutions exist for medium and light duty vehicles that are on the road today and will remain in use for decades to come. Accelerating the turnover of existing fleets to advanced diesel technology and using more renewable and alternative fuels will deliver substantially more GHG reductions sooner and at significantly lower cost than the current USEPA proposed rule. These technologies can help to reduce emissions from light and medium duty vehicles while ZEV infrastructure and vehicles envisioned by the proposal are being developed, tested, and eventually deployed. [EPA-HQ-OAR-2022-0829-0532, pp. 2-3]

Organization: KALA Engineering Consultants

Before full comments begin, a personal note

As a personal note, the principal of KALA Consulting wants to let all of EPA administrators, scientists, and engineers know that I am ON YOUR SIDE. I happen to disagree with the approach used in this proposed rulemaking that appears to promote extensive electrification of the US fleet, which I believe to be unsupportable from a GHG reduction standpoint. I believe that you may not have reviewed the National Academy of Sciences 2010 report that shows, when all knowable upstream and downstream GHG emissions are considered, BEV associated GHG emissions are essentially the same as conventional gasoline-fueled vehicles for a projected 2030 time frame. Once Republican law makers and think tank mavens read my section on that study, they may use it to bash this attempted rulemaking the likes of which you may never have experienced. I hate to do this to the EPA because I support most of the emissions reduction efforts you have made up to now and your agency and the national laboratories were so beleaguered and mistreated by the Trump Administration. [EPA-HQ-OAR-2022-0829-0617, p. 2]

However in my best engineering judgement, this rulemaking is misguided. There is a biofuel substitute that could make significant reductions in both criterial pollutants and GHG emissions if it were to be made from cellulosic sources and entrained into the national fuel mix in high percentages. We have done extensive research and engineering adaptation of this biofuel, butanol, that could surprise many of you. We ask your forbearance as we have included a discussion of this advanced biofuel in our comments as an alternative to mass electrification. Therefore, we are extending our hand and our knowledge base to EPA and the Department of Energy to contact us and discuss what we might learn from each other. [EPA-HQ-OAR-2022-0829-0617, p. 2]

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Changing fuel composition to lessen both GHG and many emission species

Shortly after incorporating in 2009, KALA looked at what could be done quickly and efficiently to significantly reduce GHG emissions from transportation sources, and soon discovered a new genetic engineering breakthrough made by researchers at UCLA, headed by Dr. James C. Liao, with extended enhancements to candidate fermentation organisms by UC Berkely researchers. The breakthrough was a novel method of engineering the metabolic pathways in certain microbes to produce iso-butanol from the same feedstock materials as ethanol is now made and any sugars obtained from saccharification of cellulosic biomass. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

When we looked at the possibilities for GHG reductions by substituting cellulosic feedstocks for grains like corn, we realized that this breakthrough had enormous possibilities for substituting carbon-neutral butanol for fossil petroleum liquid fuels By substituting butanol that is superior in virtually all respects to ethanol and can be blended with gasoline in greater percentages because it has lower oxygen content than ethanol we could make significant GHG reductions. Butanol can also be transported in regular hydrocarbon liquid transport pipelines, where ethanol cannot. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

However, the main concern for how to drastically reduce GHG emanating from fossil petroleum use was the short amount of time in which we have to make those changes. The United Nations' Intergovernmental Panel on Climate Change (IPCC) has for a number of years stated that we have limited time left, especially considering the potential for runaway warming from release of methane stored in frozen states in the arctic regions of the planet. https://www.scientistswarning.org/2022/09/01/methane-emergency/ [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

KALA performed a systems analysis of the pathways to drastically (greater than 80%) reduce GHG emissions from the Transportation Sector. The first system element steps we considered were from what has become the standard answer for many so-called Climate Change experts and that is Electrification of the fleet. This so-called “solution” appears not to take into consideration the amount of time it will take to convert the existing and near-term fleet of vehicles using petroleum derived liquid fuels and change out the existing infrastructure of gasoline distribution and dispensing in favor of electric recharging facilities. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

The second systems analysis we looked at was for introducing and eventual full to nearly full displacement of petroleum-based fuels with carbon-neutral cellulosic butanol.

We offer a comparison of the system steps for electrification and then displacement of petroleum fuels with cellulosic butanol or analog hydrocarbon fuels derived from butanol. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

System: Electrification Scenario Elements:

Step 1. Initiate a system driver or drivers that requires replacement of liquid fueled vehicles in favor of electrified vehicles (usually BEV technology). The “forcing” (driver) factor that the EPA is attempting to promulgate in the EPA–HQ–OAR– 2022–0829 Docket appears to be how EPA intends to initiate this step. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

Step 2. Replace the multi-trillion dollar petroleum fuels (mostly gasoline) distribution and dispensing infrastructure with electric recharging (i.e., electric “fuel” dispensing) infrastructure, in effect discarding the existing liquid fuel infrastructure. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

Step 3. Since the United States is not a command economy, attempt to convince vehicle consumers that they should accept electrified vehicles as the new form of personal and work transportation. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

Step 4. Fortify the electric grid and encourage Utility Companies to create additional electric generating facilities to handle the increased demand for electricity for recharge and improve electric transmission capabilities to handle increased power demands. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

Ostensibly, the ideal additional generating capacity should be from renewable sources, but the choice of how to produce electricity is still left up to private Utility Companies. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

Each of these system steps has a time element associated with it. Various estimates for the amount of time it will take for Electrification Step 2 have varied between 25 and 75 years, but those estimates did not take into account the “forcing” factor of an EPA set of regulatory mandates. Even so, EPA admits that the amount of time it will take for the existing fleet will be lengthy with estimates that use the year 2055, 28 years after the first model year, 2027, affected by the EPA–HQ–OAR– 2022–0829 rulemaking occurs. [EPA-HQ-OAR-2022-0829-0617, pp. 30-31]

The next major transportation GHG reduction system analysis target KALA looked at was the breakthrough in genetic engineering that allows fermentation of sugars into the advanced biofuel Butanol. [EPA-HQ-OAR-2022-0829-0617, pp. 34-36]

System: Large-Scale displacement of Fossil liquid Fuels with Butanol:

Step 1. Initiate a system driver or drivers that requires replacement of fossil carbon containing petroleum liquid fuels with the Carbon-Neutral advanced biofuel, cellulosic Butanol. This, at a minimum, would require the Federal Government, probably through the Renewable Fuels Standard (RFS) authority, to declare the government’s intention to move from ethanol as the majority renewable fuel to butanol and its intention to move butanol production to entirely cellulosic by a date certain. This requirement should not become an ”unfunded mandate” and, therefore, should be backed by commitment of Federal funding for existing ethanol producers to replace the fermentation and distillation equipment in their production trains to new equipment that will produce butanol from sugars being supplied by their current methods (usually corn mash). As requirements for cellulosic feedstock sourcing are put in place, additional funding will be required to assist butanol producers to add cellulosic processing equipment. Think of these funds as one-time subsidies as per-gallon subsidies are phased out. [EPA-HQ-OAR-2022-0829-0617, pp. 34-36]

Step 2. Leverage the multi-trillion dollar petroleum fuels (mostly gasoline) distribution and dispensing infrastructure to begin displacing fossil carbon containing fuels with the advanced biofuel, butanol, that at first will be made from the same grains (mostly corn) as ethanol was made from in the same production plants and later moving to cellulosic sources of fermentable sugars that will reduce the GHG impact of burning cellulosic butanol fuels dramatically. [EPA-HQ-OAR-2022-0829-0617, pp. 34-36]

Step 3. Implement a consumer education campaign about the new fuel they are putting in their gas tanks that is more than an oxygenate because it also naturally reduces the tendency of our fuels to jump into the air as volatile organic compounds (VOC) that are one of the ingredients of Ozone formation. An emphasis should be put on the fact that a much larger percentage of the fuel they are using is made right here in America by American workers. [EPA-HQ-OAR-2022-0829-0617, pp. 34-36]

Step 4. Promote moves in Congress to legislate around cellulosic butanol as a major solution to GHG emissions both from our Transportation Sector and the US as a whole. Explain to members of Congress that voting for measures that will promote the production and use of butanol at high blend percentages will bring new good-paying jobs to their districts as butanol production expands all across the country. These changes will require changes to new vehicles that are similar to existing Flex Fueled Vehicles [FFV] but do not need the extra “hardening” of gas tanks, fuel pumps and lines that the high percentage of E85 require – in all, about $20 to $40 worth of changes to allow those new vehicles to operate with up to 85% butanol (Bu85) and 15% gasoline. [EPA-HQ-OAR-2022-0829-0617, pp. 34-36]

When we looked at the comparative system steps between the two alternatives and we learned from the Hidden Costs of Energy report that the upstream GHG emissions attributable to BEVs might well be about the same or, as we have described above and MPTODR considerations, even higher than downstream GHG emissions from gasoline vehicles, it became a slam dunk that cellulosic butanol was the correct solution to current and near-term transportation GHG emissions. The speed at which the US could implement a fuel change over as described in Large-Scale Displacement with Butanol Step 2 above, where the existing refueling infrastructure is leveraged to entrain larger and larger percentages of carbon-neutral butanol into the US fuel mix could be astonishingly fast. As we have discussed, it is likely that Climate Change related calamities may well overwhelm any life-saving results of the new proposed EPA–HQ– OAR–2022–0829 Docket rulemaking. Which in our view, makes drastic GHG reductions from both Electrical Generation and Transportation a priority – a priority which should inform the EPA to make proper and realistic decisions about what solutions should be applied. We believe that Fuel Changeover with cellulosic butanol is the correct solution for drastically reducing Transportation GHG emissions. Let us explain why below. [EPA-HQ-OAR-2022-0829-0617, pp. 34-36]

Introduction to fuel butanol

We are adding an introduction to butanol as a fuel (not an oxygenate even though it serves that purpose as well) to the readers of these comments, because very many of them may not know what butanol is and may have never heard of it. That, by the way, is exactly how the Oil Companies would like to keep it because they know full well that butanol is a serious threat to their continued profits from petroleum sales where ethanol could never be. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Butanol Facts Generated by KALA Consulting, LLC Lakewood, CO [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

What is Butanol? : Butanol is a 4-carbon “higher” alcohol that can be used as a motor fuel.

What is the difference between ethanol which we use in our gasoline now and butanol?

1. Ethanol is a 2-carbon alcohol made from fermenting starches and sugars with yeasts

2. Butanol has 4 carbons in each molecule and is made from the same material with bacteria

3. Butanol has 26% more energy in a gallon than ethanol, and nearly the same as E10 gasoline (16.4% lower energy content)

4. Unlike ethanol, butanol does not corrode vehicle fuel systems in blends higher than 10%

5. Unlike ethanol, butanol can be moved and stored using our existing petroleum infrastructure [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Can Butanol be used as a motor fuel; can it replace gasoline in our existing cars?

1. Butanol is a direct substitute for E-10 gasoline in your existing vehicle up to about 48%

2. Butanol can be expected to yield slightly lower to better gas mileage and safer emissions

3. N-butanol has a Cetane rating of 25 and can be blended up to 30% with diesel fuel

4. Iso-Butanol has an R+M/2 octane rating of 97 and will not lower octane in gasoline blends [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Any drawbacks to using Butanol?

Butanol has a higher viscosity than gasoline – about the same as diesel fuel and it will gel at very low temperatures (-25°F). It may need an anti-gelling agent for extremely low temperatures but some gasoline like that in E85 will serve as anti-gel in cold weather. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Why haven't I heard more about butanol as a replacement for gasoline before now?

Butanol has been known as a replacement fuel since World War 2. In fact, British and Japanese fighter planes ran on butanol during that war! If an oil company viewed your knowledge of butanol as a threat to their business and profits, would they try to keep you from hearing about it, having the Federal Government test it or acknowledge it as an alternative fuel? [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

The Federal Government has known what the problem is with our dependence on oil for some time and a succinct statement of the problem was issued by Oak Ridge National Laboratory in a May 2006 report where authors David Greene and Paul Leiby stated: [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Section 4. Oil Security and Energy Technology R&D: The root of the United States' oil security problem is economic and strategic dependence on an energy commodity, (1) whose resources are concentrated in an unstable region, (2) whose supply is vulnerable to disruption by various causes and subject to substantial collusive control by a cartel of oil producing nations, and (3) for which demand and supply are highly inelastic, especially in the short-run. Petroleum is the single largest source of energy for the U.S. economy and its use is highly concentrated in the transportation sector, a sector vital to all economic activity and one that to this day has found no ready substitute for petroleum fuels. The combination of these factors has created a situation in which supply disruptions, whether intentional or unintentional, can produce very large and sudden price increases that do significant damage to the U.S. economy. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

This report states that as of 2006: "Petroleum is the largest single source of energy for the U.S… and one that to this day has found no ready substitute…" If the consequences of being strategically dependent on one source of energy, especially for transportation, can result in sharp rises in the price of that commodity which can result in damage to the economy of the United States, why is there "no ready substitute?" If that source of energy is so vitally important to our country and its national security and its availability is questionable and using it results in global climate change, why has the Federal Government not found and promoted introduction of a "ready substitute?" Are there ready substitutes out there waiting to take the place of oil – biofuels perhaps? [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

With the 2022 Russian invasion of Ukraine, we once again learned the fragility of supply and the enormous economic damage spikes in the price of our fuels can do to the American economy. Just as our economy suffered in 1973 when the OPEC oil cartel embargoed oil imports to the US and once again when crude oil reached an unprecedented high price of $147.50 per barrel in August 2008, our dependency on this atmosphere-damaging commodity has consequences not only to our national security but to our economic security. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Our central question is when are we going to realize there is a “ready substitute,” butanol, already being made for chemical feedstocks and fuel that will stabilize the cost of fuels at a reasonable price and, in so doing, stabilize the American economy? [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

We Americans may think we are exceptional, but we are not free of the stranglehold our dependence on fossil petroleum has on us. We need to ask how we can eliminate the use of fossil fuels in an environmentally responsible way. How much is it worth to America to prevent the economic chaos brought on by world events and a capricious commodity market over which we have no control. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Could Butanol Actually be a Substitute for Petroleum Fuels

We know how to convert many different types of biomass into different types of fuel and some sources can lead to a variety of end products. Most scientists in the field consider using crop items that could be used as either human or animal food as not the best ultimate feedstock sources for biofuels. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Most biofuels scientists would prefer the use of what are called ligno-cellulosic sources to produce liquid biofuels that are similar to gasoline.

[See original attachment for possible biofuel production pathways] [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

There are two principal methods for converting ligno-cellulosic materials into liquid biofuels:

1) Fermentation and 2) Pyrolytic Deconstruction

Each of these methods have their advantages and their drawbacks. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

The reason these raw materials are called ligno-cellulosic is because most plant body parts are constructed of three major constituents:

1) Cellulose 2) Hemicellulose and 3) Lignin

We will not discuss Pyrolysis here because fermentation with bio-engineered microbes seems to be the best way to arrive at purified butanol.

[See original attachment for the chemical pathway to make Butanol] [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Major advances in genetic manipulation of microorganisms commonly used as fermentation agents have been made in the last few years, principally in the private sector as patentable proprietary organisms. Native bacteria or yeasts that might ordinarily make several by-products, only one or two of which could be used as fuels have been genetically transformed by knocking out the undesired production pathways and enhancing or leaving only the pathway for producing the desired fuel metabolic products. Groups like that at UCLA under Dr. James Liao have been using the techniques of "synthetic biology" to add highly productive fuel producing pathways to bacteria, yeasts, and cyano- bacteria. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

[See original attachment for composition of typical woody lignocellulosic compared to corn grain and stover] [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

To use cellulose for fermentation, it must be broken down into the sugars that made up the original polymers. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Were it not for the remarkable advancements in bioengineering and gene manipulation the fermentation organisms that can now use sugars from starches and cellulose processed into fermentable sugars we would not have a way produce a single desirable product, butanol. The companies that are using these bioengineering methods to produce butanol have developed a number of methods to separate butanol from the fermentation broth and remove the last traces of water to produce purified butanol. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

The next question for viability as a fuel must answer is, "Can we make enough of it to make a difference? If we are going to make this fuel from cellulosic material, is there enough that we can harvest all over the country? Fortunately, that question has been answered by a study done by the Federal Government. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

We know from a study done by the Oak Ridge National laboratory and the US Department of Agriculture that with minor changes in land use, the nation could harvest up to 1.3 billion tons of varieties of biomass. This study published in 2005 is commonly called the "Billion Ton Study (BTS)." [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

The BTS divided the sources of ligno- cellulosic feedstocks into two broad categories: Agricultural residues and forest- derived woody biomass. The changes in land use that the report assumed to arrive at the maximum figure of 1.3 billion tons per year involved land owners devoting some of their land to the production of dedicated energy crops (EC), growing such plants as switchgrass and fast-growing hybrid poplar trees. Other land use assumptions were that land now used for purposes other than food crop production or that is now considered marginal land would be put into EC production. A 2011 update of the BTS found that the earlier estimate of 1.3 billion dry tons of biomass could actually be 1.6 billion tons with similar land use changes. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

The next question to be asked is, if we seem to have enough biomass available, how much butanol can we get from each dry US ton. That does not mean that the cellulosic biomass that would be brought into butanol processing facilities would need to be absolutely dry, but for calculation purposes, normalizing the biomass to complete dryness puts those calculations on an equal footing. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

The chart at right shows the theoretical maximum yield of ethanol from common cellulosic biomass types such as corn stover (the residue from the corn plant that does not include the corn kernels) and waste paper. Several strategies can be used to recover carbon that might otherwise be wasted from the fermentation process and the lignin leftovers that still have carbon in them. The theoretical maximum yields shown do not include any conversion of lignins, which up to now have been considered not to be able to be convertible into fuel products. If lignins can be converted, these maximums would be higher. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

[See original attachment for chart of the theoretical maximum yield of ethanol from common cellulosic biomass] [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

KALA has set a goal of 100 gallons per dry ton of cellulosic biomass for the idealized butanol production process we have considered. Even if we are only able to get 90 gallons per dry ton, a total of 90 * 1.6 billion DTons = 144 billion gallons of butanol possible each and every year. If further fuel economy standards were put in place, lowering our national annual gasoline consumption to around 120 billion gallons, we would have an extra 24 billion gallons of butanol to devote to other purposes or to cover volumetric losses from conversion of butanol to analog hydrocarbon fuels that we call “Green” gasoline and “Green” diesel. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Yes butanol with its 4-carbon molecule (iso- butanol shown at right) can be converted into hydrocarbon fuels using well known and understood process technologies from oil refining and post fractional distillation reformation. Iso-butanol is dehydrated to iso- butylene, which is reformed by oligomerization methods into different hydrocarbon fuels, such as Gasoline, Diesel, and Aviation Jet fuel. The type of hydrocarbon is dependent on the oligomerization techniques used. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

https://www.globenewswire.com/news-release/2020/08/18/2079991/0/en/Gevo-and-Praj-to-Commercialize- Sustainable-Aviation-Fuel-in-India.html [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

[See original attachment for hydrocarbons from Cellulose Process Schematic] [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

So, there is a possibility that current engine control computers could handle higher percentages of neat butanol blended with either petroleum gasoline or gasoline made from butanol. This strange “Green” gasoline has interesting properties because it is made from a pure feedstock instead of being fractionated out of a refining stream that has numerous side chemicals incorporated into what we know as gasoline. Green gasoline made from butanol would have no benzene, toluene, ethylbenzene or xylene as well as a host of other substances such as polycyclic aromatic hydrocarbons (PAH), other aromatics and metals. Many of the air toxics and criteria pollutants are products of combustion of the other organic chemicals in gasoline other than the 4-carbon to 12- carbon hydrocarbon molecules making up the bulk of gasoline. Butanol derived gasoline would have none of those side organics in its makeup. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

A 2021 study done by University of Nebraska at Lincoln has done testing on numerous Tier 2 and Tier 3 non-flex fuel vehicles (NFFV) that shows that the engine control computers are able to adapt to the oxygen content of a 30% ethanol, 70% gasoline fuel blend (E30). https://ethanol.nebraska.gov/wp-content/uploads/2021/03/E30-Demonstration-FINAL-1.pdf

If this study holds up and NFFV’s ECUs are capable of adjusting to the oxygen content in a 30% ethanol blend, there is an opportunity to run NFFV vehicles with up to 48% butanol and 52% gasoline blends rather than an E30 ethanol blend. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Note: To obtain the oxygen equivalent percentage content from ethanol percentage to equivalent butanol percentage, divide the ethanol percentage by 0.62. Therefore, an E30 blend would translate to a 48% butanol blend based on oxygen content. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

The thought of operating an older or non-FFV vehicle that has not been “hardened” to handle ethanol percentages higher than 10% (E10) is daunting. The reason non-FFV vehicles are not recommended by the manufacturers to use ethanol percentages greater than 10% in fuel is that the vehicle’s gas tank, the fuel pump, metal fuel lines, elastomeric (rubber) fuel lines and injection components have not been adjusted in their composition to handle ethanol blends greater than 10% for any length of time. It seems odd that in the Nebraska research there has not been a tear-down of any of the aforementioned components to check for excessive corrosion or decomposition of the interior of elastomeric hoses that handle fuel. The folks in Nebraska so desperately want to show that more ethanol can be used in ordinary vehicles that they may have missed some important ethanol attack issues. However, the important part of the Nebraska research for the use of high percentages of butanol is the reported tolerance of the engine control computer (ECU) to the oxygen percentage in E30 not causing problems with fuel trim, which opens the door to much larger butanol percentage blends if the EPA and Department of Energy will look at the research closely. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

All these suggestions to drastically change fuel blend compositions represent conflicts with the antiquated Fuel Blend Waiver structure incorporated into the Clean Air Act (CAA). Requirements in the CAA for private parties requesting waivers for fuel blends demands those parties perform testing for their particular fuel blend and then present that evidence to the EPA, upon which the EPA would then rule on the request. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

However, in the case of the Growth Energy universal waiver request for increases in the ethanol content of gasoline from 10% (E10) to 15% (E15), the EPA and Department of Energy (DOE) insisted that the Federal Government carry out testing of its own rather than asking the private concern who brought the waiver request to conduct further tests. In fact, the principal reasons given by the EPA for delaying a decision on the E15 waiver was to allow more time for the EPA and DOE to conclude their own testing. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

In our view, this process destroyed any pretense that a private party could mount a research effort and present evidence that would make a fundamental change in the US gasoline supply without the Federal Government conducting its own battery of tests and research in the matter. In essence, Growth Energy was forced to waste its own private resources in generating test results when it became apparent that the Federal Government was determined to conduct its own duplicative research and testing. In our opinion, the Federal Government should drop that pretense and not force private parties to go to the horrendous expense of conducting private testing only to have their testing duplicated and, perhaps, expanded upon by Federal agencies or laboratories. If the E15 waiver experience is any indication of what the Federal Government intends to do in response to future similar waiver requests made under provisions of the CAA, both EPA and DOE should simply require a well-reasoned request for a waiver and conduct the testing themselves as they did for the E15 waiver. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

In this context, we ask that the EPA and DOE conduct testing for several blend ratios of iso-butanol blended with ordinary gasoline and with gasoline converted from butanol, if available, to determine engine performance and emission results in real-world conditions. What in the world are the National Laboratories for if they cannot be tasked with a simple task such as this. Several national laboratories have already done research on butanol blends, so any additional testing would be adding to that body of research. The potential for drastic GHG reductions by substituting fossil petroleum- based fuels for both butanol and gasoline made from butanol are stunning to say the least. Therefore, it is in the national interest to proceed with butanol blend testing forthwith. [EPA-HQ-OAR-2022-0829-0617, pp. 36-44]

Organization: Kentucky Office of the Attorney General et al.

The Proposed Rule also runs contrary to Congress's intent by frustrating the purpose of the Renewable Fuel Standards program. See Brief of Amici Curiae State of West Virginia and 5 Other States, Texas v. EPA, No. 22-1031 (D.C. Cir. Nov. 15, 2022), ECF 1973638, at 24-27 ("WV Amicus Brief"). Through that program, Congress intended the renewable fuel standards program to act as "market forcing policy," increasing utilization of renewable fuels. Growth Energy v. EPA, 5 F.4th 1, 33 (D.C. Cir. 2021). The program has led to a reduction in air pollution and oil imports, and the creation of American jobs. See Renewable Fuel Standard, Renewable Fuels Ass'n, https://bit.ly/3TWyRxa. But pushing EVs as aggressively as the Proposed Rule does is directly at odds with the promoted utilization of renewable fuels. "It is well established that when two regulatory systems are applicable to a certain subject matter, they are to be reconciled and, to the extent possible, both given effect." Pennsylvania v. ICC, 561 F.2d 278, 292 (D.C. Cir. 1977). The Proposed Rule does nothing to "give effect" to the statutory authority Congress provides to the Department of Transportation and for the Renewable Fuel Standards Program. Indeed, the Proposed Rule does not even mention the Program at all. [EPA-HQ-OAR-2022-0829-0649, p. 5]

Organization: Kia Corporation

Kia Supports Fuel Standard Improvements

Kia urges EPA to take further action to improve fuel standards that will help lower vehicle fuel consumption and emitted GHG and non-GHG emissions from legacy and new ICE vehicles. As Kia is significantly increasing resources for developing and transitioning to electrified powertrains, Kia will have fewer resources available to improve ICE. Kia urges EPA to adopt cost effective solutions to lower emissions from ICE vehicles such as stringent fuel standards. [EPA-HQ-OAR-2022-0829-0555, p. 16]

Kia offers the following on gasoline fuel property standards:

- Kia recommends EPA increase the minimum research octane number (RON) in market gasoline to 95-98. This increase in RON could improve efficiency by 3-5 percent. An increase in RON could be achieved in multiple ways, through increasing the ethanol content of market gasoline or altering the composition of hydrocarbons during the reforming process to higher octane molecules. For a small segment of legacy vehicles, this increase could improve their efficiency simply with the fuel change. [EPA-HQ-OAR-2022-0829-0555, p. 16]

- The EPA must mandate that all market fuels meet or exceed the octane of Tier 3 certification fuel. Sub 87 Anti-Knox Index (AKI) fuel is still sold despite no longer needing to do so. Mandating market fuels meet this standard could decrease fuel consumption, lower the likelihood that enrichment will be needed, and lower GHG, CO and HC emissions. [EPA-HQ-OAR-2022-0829-0555, p. 16]

- The EPA should leverage a new national Clean Fuel Standard similar to California's Low Carbon Fuel Standard. A national Clean Fuel Standard requiring lower or net-zero emission liquid fuels would improve emissions in new and legacy ICE vehicles. [EPA-HQ-OAR-2022-0829-0555, p. 16]

- EPA's Tier 3 rules lowered the gasoline maximum average sulfur level from 30 parts per million (ppm) to 10 ppm stating that "any amount of gasoline sulfur will deteriorate catalyst efficiency."29 Yet refiners are still allowed 80 ppm with a 95 ppm downstream cap. Kia urges EPA to require a gasoline retail cap – not average – of 10 ppm. This standard is more aligned with global standards and aligns with the EPA proposed lower NMOG + NOx standard. [EPA-HQ-OAR-2022-0829-0555, p. 16]

29 Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards, Proposed Rule, 78 Fed. Reg. 29816, 29,821 (May 21, 2013).

Organization: Letter Campaign, Ethanol Producers

EPA's own research has shown that high-octane, low-carbon renewable fuels like ethanol, when paired with appropriate engine technologies, deliver immediate improvements in fuel efficiency and carbon performance. Flex fuel vehicles (FFVs) using E85 and other ethanol flex fuels offer significant emission reduction opportunities. High-compression-ratio engines running on higher-octane fuels provide substantial fuel efficiency gains and emissions reductions without relying on foreign mineral imports or causing unintended environmental and economic consequences. Unfortunately, EPA's proposal does nothing to recognize or encourage growth in the use of low-carbon liquid fuels in advanced internal combustion engines. [EPA-HQ-OAR-2022-0829-0739, p. 2]

We urge EPA to reconsider its proposal and adopt a technology-neutral approach that treats all low-carbon transportation options fairly and equally. We ask that EPA use this rulemaking to establish a full lifecycle approach for assessing carbon emissions from all fuel and vehicle options. We also request that EPA use this regulatory opportunity to increase the required minimum octane rating of our nation's light-duty vehicle fuel, as well as encouraging increased production of FFVs. [EPA-HQ-OAR-2022-0829-0739, p. 2]

Thank you for the opportunity to comment on this important issue. As a member of the Renewable Fuels Association, we also wish to endorse and support their written comments, as submitted. [EPA-HQ-OAR-2022-0829-0739, p. 2]

Organization: Marathon Petroleum Corporation (MPC)

EPA should consider changes to how it treats CO_2 emissions from renewable liquid fuel combustion in vehicles to be consistent across programs it oversees. EPA mandates the blending and use of renewable liquid fuels in vehicles in its Renewable Fuel Standard while simultaneously ignoring the positive impacts of this use in the vehicle emissions standards. Consistency across programs would eliminate disparate treatment and reduce regulatory ambiguity. [EPA-HQ-OAR-2022-0829-0593, p. 2]

MPC supports the comments that have been entered into the docket by American Fuel & Petrochemical Manufacturers and American Petroleum Institute. [EPA-HQ-OAR-2022-0829-0593, p. 1]

Organization: Mass Comment Campaign sponsored by Missouri Corn Growers Association (MCGA). (web) (168 signatures)

As a corn grower or allied industry member of the Missouri Corn Growers Association (MCGA), I write to share my comments on EPA's proposed Multi-Pollutant Emissions Standards for model year 2027 and later vehicles. As producers of feedstocks for low-emission biofuels, farmers across the country share EPA's emission reduction goals. However, this proposal limits fuel and energy options unnecessarily and fails to take greater advantage of clean, low-carbon ethanol to contribute to greater emission reductions that consumers can more readily afford. There is no one-size-fits-all solution to lowering vehicle emissions. Through this rule, EPA has an opportunity to level the playing field for all low-carbon fuels and technologies and use ethanol's proven potential to support sustainability in the transportation sector. [EPA-HQ-OAR-2022-0829-0718]

Today's ethanol cuts greenhouse gas emissions in half compared to gasoline and has pathways to achieve net zero emissions. Clean, high-octane fuel from mid-level ethanol blends, used as a system with advanced engines, offers an essential pathway for achieving significant greenhouse gas and complementary criteria emission reductions from model year 2027 and later vehicles. It also offers substantial public health benefits by reducing particulate matter emissions from gasoline, all while reducing costs for consumers. In addition to focusing on outcomes and enabling a wider range of vehicle and fuel choices, I ask EPA to set a clean, high-octane fuel standard that takes advantage of higher ethanol blends to enable automakers to deploy advanced engine technologies. [EPA-HQ-OAR-2022-0829-0718]

I strongly urge EPA not to focus on one single solution but to consider all options that advance transportation toward our shared goal of reducing emissions. [EPA-HQ-OAR-2022-0829-0718]

Respectfully submitted by the following list of 168 Missouri corn farmers and allied industry members who stand in support of MCGA opposing this proposed rule. [EPA-HQ-OAR-2022-0829-0718]

Organization: Mass Comment Campaign sponsored by Missouri Corn Growers Association (MCGA). (web) (168 signatures)

As a corn grower or allied industry member of the Missouri Corn Growers Association (MCGA), I write to share my comments on EPA's proposed Multi-Pollutant Emissions Standards for model year 2027 and later vehicles. As producers of feedstocks for low-emission biofuels, farmers across the country share EPA's emission reduction goals. However, this proposal limits fuel and energy options unnecessarily and fails to take greater advantage of clean, low-carbon ethanol to contribute to greater emission reductions that consumers can more readily afford. There is no one-size-fits-all solution to lowering vehicle emissions. Through this rule, EPA has an opportunity to level the playing field for all low-carbon fuels and technologies and use ethanol's proven potential to support sustainability in the transportation sector. [EPA-HQ-OAR-2022-0829-0718]

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I strongly urge EPA not to focus on one single solution but to consider all options that advance transportation toward our shared goal of reducing emissions. [EPA-HQ-OAR-2022-0829-0718]

Organization: Mass Comment Campaign sponsored by Michigan Corn Growers Association (MCGA). (email) (30 signatures)

I am submitting comments today to express my concern over the EPA's proposed Multi-Pollutant Emissions Standards for model year 2027 and later vehicles. This proposed rule is irresponsible and foolish. Instead of working to achieve an environmental goal, the EPA is effectively mandating the use of electric vehicles, which will have significant impacts on my farm. [EPA-HQ-OAR-2022-0829-0757]

Primarily, I am concerned with an estimated 1 billion bushels in lost corn demand from 2022-2032 due to USEPA regulations dictating electric vehicles as the only option. This rule could decimate corn prices. This rule will hurt family farms all over the country, including my own. [EPA-HQ-OAR-2022-0829-0757]

Secondarily, I understand that the rule will force 67 percent of light duty vehicle sales and nearly 50 percent of trucks sold to be battery electric vehicles (BEVs) by 2032. The infrastructure does not yet exist in rural America for my family to efficiently utilize a BEV, nor am I convinced that a BEV will do the work that I need it to do on my family farm. As a result, when I purchase an internal combustion engine vehicle for my family, I know I will pay more, impacting the economic health of our family farm. This is yet another unfair burden for rural America. [EPA-HQ-OAR-2022-0829-0757]

Finally, the impact of this forced reliance on BEVs will compromise our national security. This will incentivize batteries and minerals produced and mined in countries hostile to the U.S. that have questionable labor standards. Knowing that a disproportionate amount of those that enlist in the U.S. military come from rural areas of our country, I'm very concerned about rulemaking that would potentially send more rural family members to new wars over batteries. [EPA-HQ-OAR-2022-0829-0757]

Should the U.S. EPA honestly wish to tackle carbon emissions, they should not dictate how regulated parties must achieve the lowered emissions and they should not dictate the use of a specific fuel or vehicle. Rather, the EPA should set a standard for emissions that opens the marketplace to a broad array of technologies, removes its arcane regulatory barriers, and lets the market work its magic. [EPA-HQ-OAR-2022-0829-0757]

Organization: Mass Comment Campaign sponsoring organization unknown (76 signatures)

I am a small business energy marketer who provides a growing portfolio of affordable, efficient, and greener liquid fuels and alternative energy sources. These liquid fuels have played a critical role in lowering emissions over the past half century. Through innovation and technological advancements, they will continue to reduce emissions further and be a crucial driver of economic growth in this country in the coming decades. [EPA-HQ-OAR-2022-0829-1709]

I'm also a member of the Energy Marketers of America (EMA) which is a federation of 48 state and regional trade associations representing family-owned and operated small business energy marketers throughout the United States. [EPA-HQ-OAR-2022-0829-1709]

As a small business owner, I am concerned that EPA's tailpipe emission standards for light and medium duty vehicles for model year 2027 and beyond will effectively discourage investment in lower carbon liquid fuels and more efficient internal combustion engines. This focus on EV production will essentially eliminate an opportunity to provide liquid fuels that immediately lower emissions not only for new vehicles, but for the vehicles currently on the road. In addition, the rule will limit consumer choice on cleaner internal combustion engines and threaten the viability and jobs of small business energy marketers around the country. [EPA-HQ-OAR-2022-0829-1709]

I urge the EPA to consider the lifecycle emissions associated with EV production, usage, and end-of-life disposal including emissions from raw material mining and refining, battery manufacturing, and electricity generation for EV charging. An assumption of zero emissions from EVs fails to consider the significant emissions associated with a transition to EV. For instance, a Hummer EV, with its near-3,000-pound battery weighing more than a full Hyundai Elantra, would count as having ZERO emissions and less impact on the environment than a Prius. [EPA-HQ-OAR-2022-0829-1709]

Further, the EPA needs to consider the logistics, investment, and timing associated with EV and battery production, electric generation and transmission, and EV charging to support a substantial increase in EV production. Achieving a significant ramp up of domestic supply of raw materials for batteries, mineral refining, and battery and vehicle manufacturing as well as upgrades to the electricity generation and transmission will be complex and take time. [EPA-HQ-OAR-2022-0829-1709]

Again, I urge the EPA to consider lifecycle emissions and a technology neutral approach when it comes to promoting policies to reduce emissions. The most cost-effective and timely way to reduce emissions from transportation is to support multiple technologies that do so for both new vehicles and vehicles currently on the road. [EPA-HQ-OAR-2022-0829-1709]

Thank you for the opportunity to submit comments on this important rulemaking that affects small business energy marketers nationwide.

Organization: Mass Comment Campaign sponsoring organization unknown (1,851 signatures)

I am submitting comments today to express my concern over the EPAs proposed Multi-Pollutant Emissions Standards for model year 2027 and later vehicles. Instead of working to achieve an environmental goal, the EPA is effectively mandating the use of electric vehicles, which will have significant impacts on rural America. This rule could severely diminish corn and soybean prices and put rural Americans whose economies rely on agriculture at a disadvantage. This rule will hurt family farms all over the country. [EPA-HQ-OAR-2022-0829-1710]

I understand that the rule will force 67 percent of light duty vehicle sales and nearly 50 percent of trucks sold to be battery electric vehicles (BEVs). By mandating electric vehicles, EPAs proposal inhibits the marketplace from identifying the most efficient, lowest cost opportunities to reduce GHG emissions from vehicles and greatly restricts consumer choice. I am concerned that such a prescriptive policy is not in the best interest of the consumer or the U.S. economy. Vehicle technologies have made great strides in emission reductions from common pollutants. By dictating electric vehicles as the only option, on-going investments in vehicle improvement will be severely hampered. The proposal will also tie the hands of American automakers flexibility to develop and implement innovative strategies for decarbonizing vehicles. [EPA-HQ-OAR-2022-0829-1710]

Of additional concern is the infrastructure for electric vehicles does not yet exist in rural America. This is further discrimination against rural communities, family farms and agribusiness as they do not have the ability to efficiently utilize BEVs. [EPA-HQ-OAR-2022-0829-1710]

I am also concerned with the shift from supporting Illinois produced fuels - corn-based ethanol and soy-based biodiesel to supporting batteries produced overseas (i.e. Australia, Chile and China). I am not in favor of a move that will incentivize batteries and minerals produced and mined in countries that are hostile to the U.S. over renewable liquid fuels grown in the Midwest. [EPA-HQ-OAR-2022-0829-1710]

In closing, the EPA should not bet the farm on a defacto electric vehicle mandate with many deficiencies including removing incentives for innovation, not appropriately analyzed costs, nor an effective implementation plan. Please think of the renewable supply of corn and soybeans grown on my farm and farms across Illinois and the Midwest. As a life long dairy farmer who uses renewable resources your approach using a limited supply material is just not well researched or sustainable. Please use the renewable approach. [EPA-HQ-OAR-2022-0829-1710]

Organization: Mass Comment Campaign sponsoring organization unknown (2,309 signatures)

As a corn grower in Sd, I write to share my comments on EPAs proposed Multi-Pollutant Emissions Standards for model year 2027 and later vehicles. As producers of feedstocks for low-emission biofuels, farmers across the country share EPAs emission reduction goals. However, this proposal limits fuel and energy options unnecessarily and fails to take greater advantage of clean, low-carbon ethanol to contribute to greater emission reductions that consumers can more readily afford. There is no one-size-fits-all solution to lowering vehicle emissions. Through this rule, EPA has an opportunity to level the playing field for all low-carbon fuels and technologies and use ethanols proven potential to support sustainability in the transportation sector. [EPA-HQ-OAR-2022-0829-1716]

Todays ethanol cuts greenhouse gas emissions in half compared to gasoline and has pathways to achieve net zero emissions. Clean, high-octane fuel from mid-level ethanol blends, used as a system with advanced engines, offers an essential pathway for achieving significant greenhouse gas and complementary criteria emission reductions from model year 2027 and later vehicles. It also offers substantial public health benefits by reducing particulate matter emissions from gasoline, all while reducing costs for consumers. In addition to focusing on outcomes and enabling a wider range of vehicle and fuel choices, I ask EPA to set a clean, high-octane fuel standard that takes advantage of higher ethanol blends to enable automakers to deploy advanced engine technologies. [EPA-HQ-OAR-2022-0829-1716]

I strongly urge EPA not to focus on one single solution but to consider all options that advance transportation toward our shared goal of reducing emissions. [EPA-HQ-OAR-2022-0829-1716]

Organization: Matthew DiPaulo

While the goal of this proposal is to reduce the U.S. automotive fleet's carbon footprint, it simply shifts how emissions are produced. The EPA is ignoring the value of technologies produced by American workers, manufacturers, and farmers that are critical to our transportation future. Specialty automotive aftermarket businesses are leading the way through alternative fuel innovations from replacing older engine technologies with newer, cleaner versions to converting older ICE vehicles to new electric, hydrogen, and other alternative fuels. Sadly, the EPA's plans to reduce greenhouse gases and criteria pollutants do not factor this in. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: Mazda North American Operations

In March 2019, the Company assessed the life cycle CO2 emissions from internal combustion engine vehicles and electric vehicles (EVs) in five regions of the world. The results revealed that the significance of CO2 emissions from internal combustion engine vehicles and EVs during their life cycles depends on the electric power supply status, fuel/electrical power cost, total mileage, and other factors in each region. Conclusion being EVs do not necessarily have the advantage when it comes to life cycle of CO2 emissions in certain markets globally. For this reason, as well as others, Mazda has adopted the Building-Block concept to steadily realize its goal of reducing CO2 emissions and raising the average fuel economy of Mazda vehicles. The Building Block Concept calls for the commercial introduction of electric, plug-in and other electrified vehicles (EVs) with the combination of optimal control technology and efficient electrification technologies in consideration of each country or region's energy resources, regulations, power generation methods, infrastructure, and so on. [EPA-HQ-OAR-2022-0829-0595, p. 1]

Organization: MEMA, The Vehicle Suppliers Associated

The success of our industry is interwoven with the success of this proposal and the ability of the government to work with industry and other stakeholders to meet significant challenges. Therefore, the rule must address: [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- The need for regulatory certainty. The final rule must contain an effective mix of feasible, demonstrated technology along with emerging technology, leaving options to improve emissions reductions in today's advanced propulsion designs. This will foster innovation in a coordinated direction, aligned with U.S. policy, but not mandate application of a narrowly defined technology path to make a positive impact on the country's urgent environmental goals. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- The influence of other technologies - including internal combustion engines fueled by hydrogen and other renewable carbon-neutral fuels - which can impact measurable environmental improvements at scale technologies can provide immediate improvement to the environment. This is important not only for environmental improvements but for environmental justice in providing cleaner consumer vehicles immediately to communities living and working close to busy streets, highways, and other transportation networks. Inclusion of all technologies that can decarbonize the transportation sector will foster the necessary growth in manufacturing capacity, vocational performance, infrastructure improvements, and consumer acceptance. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Technology Neutrality and BEV Emissions. EPA should ensure that battery electric vehicles (BEV) are included in metrics for vehicle-to-vehicle comparison by assigning a metric that captures the pollutant emissions related to BEV operation, aligned with national electricity generation figures. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Challenges in our nation's infrastructure and power grid. MEMA appreciates the significant public investments being made to support clean transportation infrastructure. As these new investments in highways and main corridors are deployed, federal and state incentives are needed to further expand the EV charging and refueling infrastructure in areas that connect these major thoroughfares. Urban industrial centers will need focused buildout while rural areas will need thoughtful rollouts to achieve an effective EV charging infrastructure. These buildouts must include Direct Current Fast Charge (DCFC) and vehicle-to-grid (V2G) bidirectional charging. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Supply chain challenges. The proposed rule assumes that all materials advanced vehicles, which are not available today in the quantities needed to support the massive growth in vehicle construction, will become available within sufficient time. This places a significant and unnecessary risk on manufacturers and suppliers. Furthermore, once a company has converted production to new technology lines, that company cannot easily pivot its facilities and workforce back to the previous technology if EPA projections are not realized by the mid-to-late-2020s. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Workforce challenges. A significant increase in skilled workers will be needed to support the implementation of this rule and long-term success thereof [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Extended warranty. The necessity to clearly define the applicability of the extended warranty and the need to provide repair access to service these new vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

MEMA members are working to accelerate the performance and availability of clean-operating vehicle technologies and are directly contributing to their realization. Besides battery electric options, effective low- and zero-carbon technologies for future and current in-use vehicles also exist and can readily be put to use to reduce nationwide emissions and help EPA meet its climate goals. The success of this rule depends on greater inclusion of all available emissions reduction technologies, significant investment in infrastructure, careful understanding and investment in the domestic and global supply chain and ensured repair access to serve the improved and enhanced domestic vehicle fleet. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

It is imperative that EPA aligns with the Joint Office of Energy and Transportation through the implementation period of this rule to identify shared concerns and solutions for the many moving parts of the rule. Failure in one key sector, lithium sourcing as one example, could result in significant cost or schedule impacts, stunting availability or adoption of these new vehicles. Positive regulatory certainty bolsters consumer confidence in new technologies and decreases the use of gasoline- and diesel-fueled vehicles. EPA should adopt an "all hands on deck" approach with regards to emissions-lowering technologies and encourage greater acceptance of and investment in renewable fuels, which can positively impact the net emissions of the entire U.S. internal combustion engine (ICE) vehicle fleet. [EPA-HQ-OAR-2022-0829-0644, p. 4]

Technology Neutrality Pairs with Regulatory Certainty

The proposed rule disproportionally favors battery electric propulsion, which in turn discourages any further advancements for internal combustion technology, including carbon-neutral renewable fuels. Emerging innovations and recent technologies offer significant reduction in emissions from ICE vehicles, in both future and current fleets. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

Technology-forcing regulations that foster innovation aligned with policy, rather than regulations that mandate a narrowly defined technology path, will lead to a more positive national outcome. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

MEMA recognizes that the proposal attempts a performance-based standard, and the agency makes forecasts that estimate a variety of technology combinations in future fleets. By accepting the potential for technologies other than battery electric and hydrogen fuel cell, EPA can make a more immediate, widespread, positive impact on nationwide emissions reductions. Therefore, EPA must incent the development and deployment of advanced technology options to include advanced internal combustion (ICE) technologies, renewable fuels, and post-combustion CO2 capture (known as mobile carbon capture). These incentives will assist in accelerating the necessary infrastructure improvements needed to support advanced technology vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

One of the pathways which deserves to be highlighted is the Hydrogen Internal Combustion Engine (H2ICE). This technology is a promising pathway which for certain applications is preferable to other alternate advanced technologies in the proposed rule. For example, a vehicle towing a trailer requires sustained torque output to tow a heavy load. H2ICE would offer the best solution for this vehicle to achieve the emission targets while fulfilling the customer needs for range and load. BEVs and fuel cell electric vehicles (FCEV) have weight and load limitations that might not allow this vehicle to meet its operational requirements. Indeed, the agency has recognized the benefit of H2ICE in the separate rulemaking for "Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles - Phase 3 [1]. We refer to section II. Proposed CO2 Emission Standards, D. Vehicle Technologies, 1. Technologies to Reduce GHG Emissions from

HD Vehicles with ICES, paragraph 5 [2] which states: [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

1 https://www.regulations.gov/document/EPA-HQ-OAR-2022-0985-1423121

2 11. Proposed CO? Emission Standards, D. Vehicle Technologies, 1. Technologies to Reduce GHG Emissions from HD Vehicles with ICES, paragraph 5

Manufacturers may develop new ICE vehicle technologies through the MY 2032 timeframe. An example of a new technology under development that would reduce GHG emissions from HD vehicles with ICES is hydrogen-fueled internal combustion engines (H2ICE). These engines are currently in the prototype stage of innovation for HD vehicles but have also been demonstrated as technically feasible in the past in the LD fleet. H2ICE is a technology that produces zero hydrocarbon (HC), carbon monoxide (CO), and CO2 engine-out emissions. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

Furthermore, a large portion of manufacturing technology and workforce skills needed to manufacture H2ICE equipment may be adapted from currently available gasoline or diesel manufacturing footprints. H2ICE also builds hydrogen demand, which is a nascent market in the U.S. Building that market will help supply the needs of hydrogen fuel cell electric vehicles in due course. The two are complementary to each other's growth and commercialization. MEMA therefore strongly suggests that EPA adopt a consistent pathway for H2ICE for light-duty and medium-duty vehicles just as proposed for heavy-duty vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 5-6]

Renewable fuels, such as hydrogen, ethanol, renewable natural gas (RNG) and carbon-neutral renewable diesel are viable, proven pathways to lower emissions in the transportation sector almost immediately. The EPA has dismissed alternate fuel options, and as a result is missing opportunities for greater emissions reductions. We refer the EPA to the U.S. DOE alternate fuels data center for detailed examples of how alternate fuels can reduce vehicle emissions.1 Several studies and programs run by Argonne National Laboratory also point to reduced emissions through alternate fuels.2 EPA should include more analysis of these alternatives and do more to encourage investment and deployment of these technologies. We note CARB recognizes one renewable fuel3 and allows it to be used for compliance with certain regulations. EPA should consider similar provisions. [EPA-HQ-OAR-2022-0829-0644, p. 6]

1 https://afdc.energy.gov/fuels/

2 https://www.anl.gov/taps/fuels

3 See § 2449.1(f) of the CARB In-Use Off-Road Diesel-Fueled Fleets Regulation https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/off-roaddiesel/ord15dayatta-1.pdf

MEMA urges: [EPA-HQ-OAR-2022-0829-0644, p. 7]

- EPA to move beyond tailpipe emissions and include emissions from electricity generation in BEV calculations.

- EPA to act decisively to further encourage and incentivize the development and deployment of advanced clean ICE technologies, including renewable fuels, and mobile carbon capture.

- EPA to develop an efficiency metric to comparatively analyze ZEV energy needs and if not incorporated into this rule - report that metric to the public as an initial step. [EPA-HQ-OAR-2022-0829-0644, p. 7]

Organization: Minnesota Biofuels Association

While we appreciate EPA's focus on strengthening tailpipe emissions standards for light-duty and medium-duty vehicles to reduce harmful air pollutants like carbon monoxide, benzene, and other particulates from the transportation sector, we are concerned that the proposed rule undervalues and overlooks the contributions that American-made biofuels can make in achieving enhanced vehicle efficiency and emissions reductions. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

Rather than giving automakers the flexibility to pursue innovative strategies for reducing emissions from the current and future light- and medium-duty fleets through environmentally friendly, lower cost options like E15 and E85, the proposal tips the scale toward a single technology – electric vehicles. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

A level playing field for all technologies and fuels is the key to reaching net-zero greenhouse gas emissions by mid-century. In its overview of the proposed standards1 EPA notes a "…shift away from a focus on internal-combustion engines (ICE) technologies and toward zero-emission technologies, including electrification." We disagree with the assertion that electrification is the only zero-emission technology available and that ICE technologies cannot play a meaningful role in the decarbonization of the U.S. transportation sector. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

1 https://www.epa.gov/system/files/documents/2023-04/420f23009.pdf

First, Minnesota-made biofuel is a readily available renewable energy solution that has a proven track record of reducing carbon emissions. The Department of Energy's Argonne National Laboratory has shown that today's low-carbon corn ethanol reduces greenhouse gas emissions by nearly 50 percent compared to gasoline. According to recent estimates and projections, internal combustion engine vehicles will still occupy more than half the light-duty vehicle marketplace by 2040. Incentivizing the use of higher blends of ethanol like E15 and E85 can immediately reduce carbon emissions from those vehicles. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

Moving forward, technology investments will ensure that ethanol reduces greenhouse gas emissions by 70 percent on average by 2030 and 100 percent by 2050. Many production facilities are already utilizing or plan in the next three to five years to adopt a combination of technologies and practices that lower the carbon intensity of the ethanol produced. These include production plant upgrades (combined heat and power, fermentation efficiencies, renewable electricity integration, heat/exhaust recovery), carbon capture, sequestration, and utilization (CCUS), and carbon-efficient farming practices. [EPA-HQ-OAR-2022-0829-0672, pp. 1-2]

Organization: Minnesota Corn Growers Association (MCGA)

In addition to improving this proposal to enable more solutions than only electric vehicles, we urge EPA to advance a much-needed rulemaking addressing fuel quality to cut emissions from the millions of liquid fuel vehicles on the road now and the new vehicles that will be sold through the compliance period. Greater lifecycle emission reductions are available from sustainable, affordable low-carbon ethanol through a clean, high-octane standard, by removing barriers to higher ethanol blends and by equitably incenting all alternative fuels and vehicles. [EPA-HQ-OAR-2022-0829-0612, pp. 1-2]

There are many obstacles to this shift including geopolitics, long lead times, capital investments, and consumer acceptance. In order to achieve emission reduction goals in the most robust, rapid, and affordable way, EPA must instead encourage multiple additional solutions such as hybrid electric vehicles (including plug-in hybrids), reinstating meaningful flex-fuel vehicle credits, and the introduction of credits that encourage the utilization of internal combustion engines (ICE) designed to utilize higher blends of biofuels (such as ethanol) by recognizing the combined carbon and multi-pollutant emission reduction benefits of the engine technology and fuel. [EPA-HQ-OAR-2022-0829-0612, p. 3]

Low-carbon liquid fuels have a unique and important role to play, immediately and in the long term. Fuels such as E15 (15% ethanol) are approved for and available for use in the millions of vehicles already on the road today, and thus offer immediate emissions benefits on a much larger scale than changes to only new vehicles. In the longer term, low-carbon or zero-carbon liquid fuels offer emissions solutions for market segments and customers that may not be well served by battery electric vehicles. [EPA-HQ-OAR-2022-0829-0612, p. 3]

To foster a vibrant and competitive landscape of multiple solutions, it is critical for EPA to set performance-based and technology-neutral emissions standards. Unfortunately, the proposed standard falls short of this ideal. It is essential to look beyond the tailpipe and use life cycle analysis for fair comparisons and a “level playing field”. [EPA-HQ-OAR-2022-0829-0612, p. 3]

Under the Clean Air Act, EPA has an obligation to protect the health and welfare of Americans. While EPA projects the proposed standards will result in 7.3 billion cumulative tons of avoided GHG emissions through 2055, EPA leaves significant GHG emission reductions on the table if the agency fails to take steps in this proposal, or in a parallel action, to also improve liquid fuels along with vehicles. EPA must include complementary fuel improvements that would enable greater total GHG reductions, greater fuel efficiency and substantially greater air quality improvements than the current proposal offers. [EPA-HQ-OAR-2022-0829-0612, p. 3]

Low-carbon liquid fuels can achieve GHG reductions faster than new vehicles can displace the existing fleet. A relatively simple change such as replacing E10 (10% ethanol) with E15 (15% ethanol) can offer greater GHG reductions3 than the phase-in of battery electric vehicles, because it can immediately affect a huge fleet of vehicles that are already in use. [EPA-HQ-OAR-2022-0829-0612, p. 4]

3 Fuels Institute report “Decarbonizing Combustion Vehicles: A Portfolio Approach to GHG Reductions”, June 2023.

But E15 is not the only way to achieve large emissions benefits with ethanol. To enable further displacement of petroleum by ethanol, many stakeholders have agreed to support E25 (25% ethanol) capability in all vehicles by 2028, and E30 by 2033, as specified in the Next Generation Fuels Act. However, EPA currently has authority to support the production of new vehicles with E25/E30 capability through new fuel standards, as well as incentivize flex-fuel vehicles (FFVs) with E85 capability. Getting these vehicles on the road quickly will build the foundation for future increases in cleaner liquid fuels, resulting in GHG and multi-pollutant emissions reductions. [EPA-HQ-OAR-2022-0829-0612, p. 4]

Recognizing vehicles and fuels as a complete system, increasing the octane rating of the nation's fuel supply through a clean, high-octane standard would deliver greater GHG emission reductions from the approximate 281 million internal combustion engine (ICE) vehicles on the road today and the 100 million projected to be added by MY 2032, and during the 15 to 20 years those vehicles remain on the road after introduction. [EPA-HQ-OAR-2022-0829-0612, p. 4]

In summary, EPA should pursue stringent new fuel standards – not only for reduced particulate emissions but also for dramatically lower GHG emissions. Fuel standards can achieve benefits much more quickly than standards which only impact new vehicles. [EPA-HQ-OAR-2022-0829-0612, pp. 10-11]

EPA's STATUTORY AUTHORITY and ACTIONS NEEDED

NCGA believes EPA should take the following actions to improve the proposal and through rulemaking on fuel property standards: [EPA-HQ-OAR-2022-0829-0612, p. 11]

Set a minimum fuel octane level of 98 RON, phasing out lower octane fuels as new optimized vehicles enter the market.

NCGA believes EPA has ample authority to regulate fuel octane because of the impact higher fuel octane would have on reducing GHG and criteria emissions from the vehicle fleet. EPA has previously acknowledged the agency has authority to regulate fuel octane under Section 211(c). [EPA-HQ-OAR-2022-0829-0612, p. 11]

Approve a high-octane, midlevel ethanol blend vehicle certification fuel (98-100 RON, E25-E30).

EPA's timely approval of a high-octane, midlevel ethanol blend vehicle certification fuel would enable automakers to expedite design and testing of optimized vehicles for use with this new low carbon fuel. [EPA-HQ-OAR-2022-0829-0612, pp. 11-12]

Lower summer vapor pressure to 9 psi or less for all fuel or provide parity in Reid Vapor Pressure (RVP) treatment for all ethanol blends with E10.
Higher ethanol blends such as E15 offer an immediate decarbonization opportunity and support a transition to low carbon, high octane fuel. However, outdated RVP rules and the oil industry's refusal to produce lower volatility blend stock prevents E15 – which is lower in evaporative, tailpipe and GHG emissions – from reaching the market on the same terms as standard E10 fuel. [EPA-HQ-OAR-2022-0829-0612, p. 12]

By using existing authority in the Clean Air Act to require lower volatility conventional gasoline blend stock during the summer months to reduce emissions of volatile organic compounds and decrease the potential for ozone formation, EPA would simultaneously open the market to E15 year-round. NCGA urges EPA to take this action to improve air quality while simultaneously eliminating outdated barriers to cleaner, low carbon higher ethanol blends like E15 and future high-octane fuel. [EPA-HQ-OAR-2022-0829-0612, p. 12]

Reinstate the 0.15 volumetric conversion factor for FFVs. [EPA-HQ-OAR-2022-0829-0612, p. 13]

Organization: Missouri Corn Growers Association (MCGA)

Immediate progress toward decarbonizing the light duty fleet will help meet the Administration's goal of cutting emissions by 2030 and reaching net zero emissions by 2050. Achieving those decarbonization goals in transportation will require a mix of solutions. As recent analysis from the Rhodium Group concludes, a "portfolio of strategies is the lowest cost and most likely to succeed," including low carbon liquid fuels such as biofuels.1 However, the singular focus of the currently proposed multi-pollutant emission standards for model year (MY) 2027 through 2032 light and medium duty vehicles on battery electric vehicles (BEVs), ignores the immediate and long-term benefits of leveraging a portfolio of various transportation technologies and the emission reductions they can achieve. [EPA-HQ-OAR-2022-0829-0612, p. 3]

1 Rhodium Group, "Closing the Transportation Emissions Gap with Clean Fuels," January 15, 2021. https://rhg.com/research/closing-the- transportation-emissions-gap-with-clean-fuels/

The proposed rule and EPA's larger policy vision around vehicles ignore the broad and diverse range of powertrain and liquid fuel options that could be more widely deployed to reduce emissions. This includes the use of domestically produced biofuels, like high-octane, low-carbon ethanol blends used in conjunction with advanced high-technology engines and flex-fuel hybrid vehicles. This path would leverage existing fueling infrastructure and avoid the vast number of implementation challenges if this rule is adopted. [EPA-HQ-OAR-2022-0829-0578, p. 3]

That's why MCGA, state and national corn partners, as well as a growing list of businesses, support the Next Generation Fuels Act (NGFA). NGFA, introduced in both the U.S. Senate and House of Representatives, can bridge this divide. NGFA would update U.S. gasoline fuel standards to more efficient, high-octane, low-carbon fuels beginning in 2028. It does not dictate how regulated entities must achieve the higher octane and lower carbon requirements, nor does it require the use of a specific fuel or vehicle. Instead, it sets the criteria for a new high-octane fuel standard optimized for tomorrow's high-tech, low-emission engines. This opens the marketplace to a broad array of high-octane, low-carbon fuel sources, providing consumers and businesses with various choices and options to meet their transportation needs. [EPA-HQ-OAR-2022-0829-0578, p. 3]

Organization: Missouri Farm Bureau (MOFB)

EPA's proposed rule gives no consideration or opportunity for other liquid fuel technologies to meet emissions goals, and effectively bans gasoline- and diesel-powered vehicles by mandating that auto manufacturers build EVs. Again, MOFB urges EPA to thoroughly consider an all-of- the-above approach, and not overlook the important role that biofuels such as ethanol and biodiesel, produced in Missouri and throughout the heartland of America, can and should play in this policy discussion. [EPA-HQ-OAR-2022-0829-0590, p. 2]

According to a 2021 study conducted by the U.S. Department of Energy and published by Argonne National Laboratory, ethanol has 52 percent less greenhouse gas (GHG) emissions than gasoline.5 In addition, biodiesel and renewable diesel reduce GHG emissions 50-80 percent when compared to petroleum diesel, depending on the feedstock used.6 Meanwhile, EPA's proposed rule, which appears to be an attempt to completely electrify the light-duty vehicle market, projects to achieve a mere 26 percent decrease in cumulative GHG emissions through

2055.7 EPA must look to biofuels as a key part of the solution, instead of the approach taken by its proposed rule, which will surely prop up the economies of foreign countries – namely China's instead of our own. EPA should acknowledge that higher utilization of biofuels and subsequent greenhouse gas reductions can occur today with the majority of vehicles on our nation's roadways, rather than attempting to replace all of the internal combustion engines being driven by Americans on a daily basis. [EPA-HQ-OAR-2022-0829-0590, p. 2]

5 Ethanol vs. Petroleum-Based Fuel Carbon Emissions | Department of Energy, (Link: https://www.energy.gov/eere/bioenergy/articles/ethanol-vs-petroleum-based-fuel-carbon-emissions#%3A%7E%3Atext%3DThe%20most%20recent%20DOE%20study%2Cstudies%20have%20found%20similar%20results%20) accessed June 14, 2023.

6 https://cleanfuels.org/docs/default-source/one-pagers/2019-greenhouse-gas-benefit.pdf?sfvrsn=d4909bbc_10, accessed June 14, 2023.

7 U.S. EPA Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Vol. 88, Fed. Reg. 29184, p. 29198 (May 5, 2023) (to be codified at 40 CFR pts. 85, 86, 600, 1036, 1037 & 1066).

Organization: National Association of Convenience Stores (NACS) et al.

Renewable fuels such as ethanol materially lower gasoline's carbon footprint. If properly incentivized, these technologies' capability to reduce emissions can continue to grow alongside other decarbonization technologies such as clean electricity. Pursuing one solution does not require abandoning others. [EPA-HQ-OAR-2022-0829-0628, pp. 1-2]

As articulated in this letter, and in our associations' respective comments in response to the Proposal, we are concerned that EPA is pursuing a single technology as the solution to decarbonize light-duty transportation. The speed at which the Agency appears to anticipate the market and consumers will transition to electric vehicles is divorced from our members' assessment of reality. The Proposed Rule does not appreciate the market obstacles associated with such a massive transition in consumer behavior. It also abandons proven decarbonization technologies, such as higher-octane liquid fuels, that can deliver material emissions reductions using existing infrastructure, existing vehicles, and working with consumers' existing behavior. [EPA-HQ-OAR-2022-0829-0628, pp. 1-2]

Our associations support the Agency's stated goal of improving the emissions consequences of over-the-road transportation. The Proposed Rule's approach toward realizing that objective, however, is flawed. A technology-neutral approach to transportation decarbonization will help to mitigate costs, promote innovation, and address the practical challenges associated with electrification. All fuels and technologies should be treated equally within the context of emissions standards. The Proposal does not do this, but instead artificially tilts the scale towards electric vehicles ("EVs") by only accounting for emissions from one segment of the value chain: vehicle tailpipes. [EPA-HQ-OAR-2022-0829-0628, pp. 1-2]

I. Renewable Liquid Fuels Meaningfully Reduce Emissions.

During the past few decades, there has been extraordinary growth in the consumption of biofuels such as ethanol and biodiesel, as well as other low-carbon fuels such as renewable natural gas, compressed natural gas, and renewable diesel. These liquid fuels are all mostly compatible with existing infrastructure that was originally developed for hydrocarbons and is already ubiquitous throughout the country. [EPA-HQ-OAR-2022-0829-0628, pp. 2-3]

Biofuels and other renewable fuels work to build and maintain a competitive marketplace, maximize the climate benefits of liquid fuels, minimize fuel supply disruptions, and impose meaningful downward pressure on fuel prices. Existing alternative fuel incentives, including the Renewable Fuel Standard ("RFS") and biofuel blending and alternative fuel infrastructure tax credits, have successfully enabled our collective membership to build a robust renewable fuel value chain in the United States. The incentives Congress established over the past few decades have caused the displacement of significant volumes of petroleum-based fuel with renewable fuels. [EPA-HQ-OAR-2022-0829-0628, pp. 2-3]

Congress, in designing programs such as the RFS, recognized that the most effective way to get American motorists to purchase lower-carbon alternatives is to make renewable fuel blends less expensive than the petroleum-based fuels they are designed to displace. Over the past few years, the economic opportunities associated with selling higher biofuel blends have grown. As petroleum prices rise and refined product supplies tighten, blending incentives tend to increase as retailers gravitate toward lower-priced, lower-carbon alternatives such as ethanol and other renewable fuels. [EPA-HQ-OAR-2022-0829-0628, pp. 2-3]

It is also important to recognize the role renewable liquid fuels play in harnessing existing infrastructure to maximize diverse investments and achieve emissions reduction goals. Importantly, renewable fuels do not require new vehicle purchases and lead to significant emissions reductions by improving the emissions profile of vehicles already on the road. It is exponentially less expensive to leverage existing infrastructure than to create entirely new supply chains and infrastructure. To the extent environmental objectives can be achieved by utilizing the infrastructure already in place, consumers will more seamlessly gravitate to new types of fuels and vehicles. [EPA-HQ-OAR-2022-0829-0628, pp. 2-3]

If the final rule better leverages the existing low-carbon fuel value chain and retailers' understanding of consumer behavior, vehicle manufacturers will be able to lower emissions in new vehicles (including EVs) while also reducing emissions in the current fleet. Given the uncertainty surrounding the Agency's overly optimistic timelines, this represents a commonsense approach to reducing both tailpipe emissions and lifecycle emissions in the most timely, cost-effective, and efficient way possible. [EPA-HQ-OAR-2022-0829-0628, pp. 2-3]

IV. The Proposed Rule Blunts Innovation and Competition.

Climate research has consistently emphasized the importance of near-term emissions reductions relative to future reductions.41 More efficient vehicle engines coupled with low-carbon, renewable liquid fuels can reduce emissions immediately. [EPA-HQ-OAR-2022-0829-0648, pp. 12-13]

41 See G. Cornelis van Kooten, Patrick Withey, and Craig M.T. Johnston, BIOMASS AND BIOENERGY 151 "Climate Urgency and the Timing of Carbon Fluxes," (Aug. 2021) available at https://doi.org/10.1016/j.biombioe.2021.106162. ("The current climate emergency dictates that immediate action is required to mitigate climate change, which implies that carbon fluxes occurring 20 or more years from now are too late to have any mitigative effect.")

EPA's effort to mandate a shift to EV technologies directly disincentivizes investment in new technologies that have the potential to deliver tangible emissions savings in both the near and long term. Indeed, EPA's proposal risks zeroing out new innovations in the ICE vehicles that most consumers are still expected to drive for decades to come. There is no way for manufacturers to comply with the Proposal by producing ICE vehicles alone. This means their only choice will be to divert investments away from ICE fuel economy improvements. [EPA-HQ-OAR-2022-0829-0648, pp. 12-13]

An analysis conducted by McKinsey & Company estimates that if, in 2030, 50 percent of new vehicle sales are EVs, given the rate of turnover of the fleet, the number of used vehicle sales, and other factors, EVs will constitute just 17 percent of the vehicles in operation around the country. Importantly, this analysis also projected the impact of partial electrification on gasoline demand. Based on those figures, and the fact that many of the ICE vehicles on the road at that time will be less efficient than the vehicles that the new EVs replaced, McKinsey concludes that the reduction in gasoline demand based on the increased number of EVs on the road will be only four percent. This further underscores the importance of adopting a technology-neutral approach to decarbonization. A laser-focus on electrification means that we will not have maximized the decarbonization potential of 83 percent of vehicles (ICE engines) that will be on the road in 2030. [EPA-HQ-OAR-2022-0829-0648, pp. 12-13]

There are many decarbonization technologies beyond even improved fuel economy that EPA leaves on the table. Higher octane gasoline blended with higher concentrations of biofuels can allow ICE vehicles to be far more efficient in terms of emissions and fuel economy. There have also been increasingly innovative technologies surrounding expanded natural gas vehicle ("NGV") production in recent years. But the Proposed Rule fails to provide the automotive sector with any meaningful incentive to continue developing such technology or similar vehicles that can effectively rely on renewable natural gas ("RNG"). The latest data available from the California Low Carbon Fuel Standard Program indicates that the average carbon intensity of bio-CNG (compressed natural gas) sold in 2020 was -5.85gC)2e/MJ.42 In the coming years, the carbon intensity of RNG is expected to be even lower as greater amounts of low-carbon dairy gas is produced and used in NGVs. This is especially important in light of market considerations. [EPA-HQ-OAR-2022-0829-0648, pp. 12-13]

42 CALIFORNIA AIR RESOURCES BOARD, "LCFS Pathway Certified Carbon Intensities" (2023) available at https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities.

Further, existing alternative fuel incentives—such as the Renewable Fuel Standard ("RFS") and biofuel blending and alternative fuel infrastructure tax credits—have allowed fuel retailers to offer less expensive, lower carbon fuels to our customers, while also supporting investments in renewable fuel production. The incentives Congress established over the past few decades have caused the displacement of significant volumes of petroleum-based fuel with renewable fuels. [EPA-HQ-OAR-2022-0829-0648, pp. 12-13]

Increased utilization of renewable fuels could lead to significant emissions reductions by improving the emissions profiles not only of new vehicles but existing vehicles as well.43 The Proposed Rule surrenders the market's ability to deliver near-term emissions savings by imposing a top-down, hurried transition to one technology. It will ensure that any technological breakthroughs with respect to any of these or other liquid fuels and ICE engines in the future simply will not happen because there will be no economic incentive to pursue those advances. [EPA-HQ-OAR-2022-0829-0648, pp. 12-13]

43 The automotive industry has demonstrated consistent reductions in emissions and gains in efficiency through focus on the ICE. The Department of Energy's Office of Energy Efficiency and Renewable Energy has estimated that over the past 30 years, advances in internal combustion engines have reduced emissions of criteria pollutants by more than 99%. See DEP'T. OF ENERGY, "Internal Combustion Engine Basics" (Nov. 22, 2013), available at https://www.energy.gov/eere/vehicles/articles/internal-combustion-engine-basics. Since MY2004, carbon dioxide emissions have fallen 25% and improved in fourteen of seventeen years while fuel efficiency has increased by 32%. EPA, "Highlights of the Automotive Trends Report" (Dec. 12, 2022), available at https://www.epa.gov/automotive- trends/highlights-automotive-trends-report#Highlight1. Similarly, data from the Bureau of Transportation Statistics from 2011 to 2018 shows that engine efficiency has reduced light duty fuel consumption. BUREAU OF TRANSP'N STATISTICS, "Vehicle Miles Traveled by Highway Category and Vehicle Type" (Dec. 2022), available at https://www.bts.gov/browse-statistical-products-and-data/freight-facts-and-figures/vehicle-miles-traveled-highway.

Organization: National Corn Growers Association (NCGA)

As the producers of the low carbon feedstock for low carbon ethanol, corn farmers are part of the solution to cut transportation emissions. We urge EPA to focus less on one solution, electric vehicles, and instead focus on outcomes and opening pathways for all low carbon fuels and technologies that enable more stringent vehicle emission standards, taking advantage of not only the low carbon benefits of higher ethanol blends, but also the cuts in toxic emissions, greater fuel efficiency and consumer cost savings that come with more renewables. For automakers to use new technologies and enhanced engines to meet stringent standards, they need updated fuel that enables new vehicles and fuels to work as a system to enhance greenhouse gas (GHG) and other tailpipe emissions reductions. Higher ethanol blends used with advanced engines optimized for higher octane would provide a much-needed pathway for low carbon, low-emission fuels. [EPA-HQ-OAR-2022-0829-0643, p. 1]

Higher octane fuel is an essential tool for automakers to meet revised standards, but higher octane must also be clean octane to meet emission reduction goals. Clean octane from today's ethanol is 50 percent lower in GHG emissions than gasoline and replaces the most harmful hydrocarbon aromatics to improve air quality and prevent adverse health impacts. EPA failed to use the proposal to broaden the solutions that reduce transportation emissions by beginning a transition to low carbon, high-octane fuels to advance climate, air quality and environmental justice goals with these and future standards. Furthermore, alternative fuel vehicles such as flex-fuel vehicles, which have the potential to reach zero emissions, should be equitably incentivized through these vehicle standards. [EPA-HQ-OAR-2022-0829-0643, p. 1]

Low-carbon liquid fuels have a unique and important role to play, immediately and in the long term. Fuels such as E15 (15% ethanol) are approved for and available for use in the millions of vehicles already on the road today, and thus offer immediate emissions benefits on a much larger scale than changes to only new vehicles. In the longer term, low-carbon or zero-carbon liquid fuels offer emissions solutions for market segments and customers that may not be well served by battery electric vehicles. [EPA-HQ-OAR-2022-0829-0643, p. 2]

To foster a vibrant and competitive landscape of multiple solutions, it is critical for EPA to set performance-based and technology-neutral emissions standards. Unfortunately, the proposed standard falls short of this ideal. It is essential to look beyond the tailpipe and use life cycle analysis for fair comparisons and a "level playing field". [EPA-HQ-OAR-2022-0829-0643, p. 2]

Under the Clean Air Act, EPA has an obligation to protect the health and welfare of Americans. While EPA projects the proposed standards will result in 7.3 billion cumulative tons of avoided GHG emissions through 2055, EPA leaves significant GHG emission reductions on the table if the agency fails to take steps in this proposal, or in a parallel action, to also improve liquid fuels along with vehicles. EPA must include complementary fuel improvements that would enable greater total GHG reductions, greater fuel efficiency and substantially greater air quality improvements than the current proposal offers. [EPA-HQ-OAR-2022-0829-0643, p. 2]

Each year, sales of new vehicles displace a small fraction of the existing vehicle fleet. EPA estimates that 67% of new vehicles sales will be battery electric in 2032. The projections for battery electric vehicle adoption are based on very few—and very small—real-world data points. See generally 88 Fed. Reg. 29,187–90. Battery electric vehicles made up 5.8 percent of the new light-duty passenger vehicle market in 2022. Id. at 21,190. EPA needs these sales to increase by a factor of ten over the next 8 years. [EPA-HQ-OAR-2022-0829-0643, pp. 2-3]

Clearly, a large number of new vehicles that burn liquid fuels will continue to be produced for many years, and those vehicles will remain on the road for many additional years. According to data from the Department of Energy's Oak Ridge National Lab, 2 16% of passenger cars and 32% of light-duty trucks remain on the road for more than 20 years. If new electric vehicles are more expensive or less attractive to consumers, older liquid-fueled vehicles will remain on the road even longer. [EPA-HQ-OAR-2022-0829-0643, pp. 2-3]

2 Davis and Boundy, "Transportation Energy Data Book: Edition 40", Oak Ridge National Laboratory report ORNL/TM-2022/2376, February 2022; https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf

Low-carbon liquid fuels can achieve GHG reductions faster than new vehicles can displace the existing fleet. A relatively simple change such as replacing E10 (10% ethanol) with E15 (15% ethanol) can offer greater GHG reductions 3 than the phase-in of battery electric vehicles, because it can immediately affect a huge fleet of vehicles that are already in use. [EPA-HQ-OAR-2022-0829-0643, pp. 2-3]

3 Fuels Institute report "Decarbonizing Combustion Vehicles: A Portfolio Approach to GHG Reductions", June 2023

But E15 is not the only way to achieve large emissions benefits with ethanol. To enable further displacement of petroleum by ethanol, many stakeholders have agreed to support E25 (25% ethanol) capability in all vehicles by 2028, and E30 by 2033, as specified in the Next Generation Fuels Act. However, EPA currently has authority to support the production of new vehicles with E25/E30 capability through new fuel standards, as well as incentivize flex-fuel vehicles (FFVs) with E85 capability. Getting these vehicles on the road quickly will build the foundation for future increases in cleaner liquid fuels, resulting in GHG and multi-pollutant emissions reductions. [EPA-HQ-OAR-2022-0829-0643, p. 3]

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The Renewable Fuel Standard (RFS) has already resulted in more 1 billion metric tons of cumulative GHG savings from 2008-2021, exceeding original projections largely due to the reduced carbon intensity of corn ethanol, highlighting the importance of using biofuels like ethanol to enhance the GHG emissions reductions from transportation with the right policies. 18 [EPA-HQ-OAR-2022-0829-0643, p. 6]

18 Unnasch, S. & Parida, D., Healy, B. “GHG Emissions Reductions due to the RFS2: A 2022 Update,” February 2023; chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://d35t1syewk4d42.cloudfront.net/file/2424/GHG%20Emissions%20Reductions%20due%20to%20the%20RFS2%20-%20Feb%202023.pdf

The most recent assessment from the Department of Energy’s Argonne National Laboratory concludes corn ethanol’s carbon intensity decreased 23 percent from 2005 to 2019 due to increased corn yield, reduced fertilizer intensity and improved ethanol production efficiency, with corn ethanol now between 44 and 52 percent lower in carbon intensity (CI) than the gasoline it replaces. 19 Argonne’s conclusions are similar to analysis from Environmental Health and Engineering finding ethanol now results in 46 percent fewer GHG emissions compared to gasoline, due to improved corn production, ethanol production efficiencies and land productivity. 20 [EPA-HQ-OAR-2022-0829-0643, p. 6]

19 Lee, Uisung & et al. ANL, “Retrospective Analysis of the U.S. Corn Ethanol Industry for 2005–2019: Implications for Greenhouse Gas Emission Reductions,” (2021). https://onlinelibrary.wiley.com/doi/10.1002/bbb.2225

20 Scully, Melissa J., et al, “Carbon intensity of corn ethanol in the United States: state of the science,” (2021) Environmental Research Letters 16 043001. https://iopscience.iop.org/article/10.1088/1748-9326/abde08

Bringing high octane fuel to market in the form of midlevel ethanol blends will be significantly less capital-intensive than attempting to increase blend stock octane with hydrocarbon components at refineries. It will also be incredibly cleaner. The avoided production cost and offset emissions lower end-costs to consumers, reducing both economic costs and social costs related to health and environment, key considerations in advancing environmental justice and avoiding adverse impacts from oil refineries on communities that have historically borne them. [EPA-HQ-OAR-2022-0829-0643, p. 7]

Increased volumes of ethanol in fuel displace the most harmful compounds from gasoline. 25 These aromatic hydrocarbon additives (i.e. benzene, toluene, ethylbenzene, xylene – or BTEX) have high cancer-causing potential. Increasing the ethanol volume in fuel to a midlevel blend has a positive impact on tailpipe emissions of toxins, including significant reductions in particulates and carbon monoxide. These same aromatic hydrocarbons are also precursors to the formation of secondary organic aerosols (SOA), which in turn are a major contributor to particulate matter emissions (PM 2.5). [EPA-HQ-OAR-2022-0829-0643, pp. 7-8]

25 Environmental and Energy Study Institute. Ethanol and Air Quality – Separating Fact from Fiction. October 12, 2018. https://www.eesi.org/articles/view/ethanol-and-air-quality-separating-fact-from-fiction

According to EPA’s review for the 2020 Anti-backsliding Study, ethanol does not form SOA directly or affect SOA formation. However, as EPA states, toluene is a large contributor to SOA. Ethanol’s high-octane value “greatly reduces the need for other high-octane components including aromatics such as toluene.” 26 [EPA-HQ-OAR-2022-0829-0643, pp. 7-8]

26 U.S. Environmental Protection Agency, Clean Air Act Section 211 (v)(1) Anti-backsliding Study, (2020) Appendix A, Page 61.

Perhaps the most credible and comprehensive study on the effects of ethanol on particulate emissions topic was published by the University of California Center for Environmental Research and Technology. 30 The study showed statistically significant improvements in particulate emissions for E15 compared to E10. [EPA-HQ-OAR-2022-0829-0643, p. 8]

30 Tang et al., "Expanding the ethanol blend wall in California: Emissions comparison between E10 and E15", Fuel, June 2023; https://doi.org/10.1016/j.fuel.2023.128836

EPA should adopt rules to limit PMI of both finished fuels and the hydrocarbon blend stocks used for E10, E15, and E85. Limiting PMI of hydrocarbon blend stocks will ensure that the particulate emissions benefits of ethanol are not offset by negative changes at refineries. [EPA-HQ-OAR-2022-0829-0643, p. 8]

Improved fuel property standards should be a high priority because they can achieve significantly lower particulate emissions and dramatically lower GHG emissions. California's Low Carbon Fuel Standard already recognizes the importance of fuel standards, and it has led to dramatic increases in sales of E85 and other low-carbon biofuels. High-octane low-carbon fuels are a key enabler for continued GHG emissions improvements in the millions of liquid-fueled vehicles which will be produced over the next 10+ years, as documented by the U.S. Department of Energy Co-Optimization of Fuels & Engines initiative and in numerous other studies, such as those by MIT and by automakers. A detailed proposed blueprint for future high-octane low-carbon fuels exists in the Next Generation Fuels Act, and EPA has the statutory authority to make these changes without waiting for Congress to act. [EPA-HQ-OAR-2022-0829-0643, pp. 8-9]

In summary, EPA should pursue stringent new fuel standards – not only for reduced particulate emissions but also for dramatically lower GHG emissions. Fuel standards can achieve benefits much more quickly than standards which only impact new vehicles. [EPA-HQ-OAR-2022-0829-0643, pp. 8-9]

Beyond ethanol's utility in all gasoline engines to reduce GHG emissions, other alternative vehicle technologies can also harness the GHG reductions and air quality benefits of ethanol, such as Flex Fuel Vehicles (FFVs). FFVs utilizing higher blends of low carbon ethanol, such as E85, can provide immediate emissions reductions without tangibly altering the price of the vehicle and reducing fuel costs. In fact, E85 is typically sold at a substantially lower price than gasoline, translating to monetary savings in addition to the significant air pollution savings. [EPA-HQ-OAR-2022-0829-0643, p. 9]

Compared to gasoline, E85 leads to significant reductions in NOx and GHG emissions. E85 avoids use of toxic hydrocarbon aromatics in gasoline that are precursors to secondary organic aerosols that result in harmful fine particulate matter emissions that cause serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. [EPA-HQ-OAR-2022-0829-0643, p. 9]

Incentivized to reduce emissions through the state's Low Carbon Fuel Standard (LCFS), in California some FFVs are even powered by a blend of 15 percent renewable naphtha with 85 percent ethanol. These vehicles use zero fossil fuels, have improved air emissions profiles, and have an extremely low carbon intensity. [EPA-HQ-OAR-2022-0829-0643, p. 9]

NCGA believes EPA should take the following actions to improve the proposal and through rulemaking on fuel property standards:

Set a minimum fuel octane level of 98 RON, phasing out lower octane fuels as new optimized vehicles enter the market. NCGA believes EPA has ample authority to regulate fuel octane because of the impact higher fuel octane would have on reducing GHG and criteria emissions from the vehicle fleet. EPA has previously acknowledged the agency has authority to regulate fuel octane under Section 211(c). [EPA-HQ-OAR-2022-0829-0643, pp. 9-10]

Approve a high-octane, midlevel ethanol blend vehicle certification fuel (98-100 RON, E25-E30).

EPA's timely approval of a high-octane, midlevel ethanol blend vehicle certification fuel would enable automakers to expedite design and testing of optimized vehicles for use with this new low carbon fuel. [EPA-HQ-OAR-2022-0829-0643, pp. 9-10]

Correct the fuel economy formula by updating the R-Factor to 1.0 to reflect documented operation of modern engine technology.

Correcting the R-Factor in the fuel economy formula would support automakers developing high efficiency engines that require higher octane ratings and a higher ethanol content. EPA has acknowledged that the current EPA-mandated R-Factor of 0.6, originally established in the 1980s, is outdated and fails to achieve the statutory purpose of making fuel economy testing on today's fuel equivalent to fuel economy testing in 1975. An update to 1 from 0.6 would reflect results of analysis by the Department of Energy and EPA using modern engines and fulfill previous observations and commitments from EPA to address this issue. Published studies have shown that R for modern vehicles should be around 0.93 to 0.96. 31[EPA-HQ-OAR-2022-0829-0643, pp. 9-10]

31 Sluder, C., West, B., Butler, A., Mitcham, A. et al. 2014. Determination of the R Factor for Fuel Economy Calculations Using Ethanol-Blended Fuels over Two Test Cycles. SAE Int. J. Fuels Lubr. 7(2):2014, doi:10.4271/2014-01-1572.

Setting the R-factor to 1.0 sets fuel economy results on an energy basis. In application, the R factor equation is a "fuel response factor," adjusting for more than just energy density. An R of 1.0 essentially converts fuel economy to mile per gallon gasoline equivalent (MPGge), which is how other alternative fuels such as propane, natural gas, and electricity have been compared to their gasoline counterparts for decades. Setting R to 1.0 provides equitable treatment to renewable ethanol that other alternative fuels already receive. This change could help speed the transition to certification with Tier 3 fuel as well as encourage vehicle manufacturers to seek certification for even higher ethanol blends, such as E15 or the high octane E30 EPA suggested in its Tier 3 proposal several years ago. Manufacturers are not incentivized to build dedicated high-octane vehicles that reduce GHG emissions when those low carbon benefits are penalized by a low R factor. [EPA-HQ-OAR-2022-0829-0643, pp. 9-10]

Lower summer vapor pressure to 9 psi or less for all fuel or provide parity in Reid Vapor Pressure (RVP) treatment for all ethanol blends with E10.

Higher ethanol blends such as E15 offer an immediate decarbonization opportunity and support a transition to low carbon, high octane fuel. However, outdated RVP rules and the oil industry's refusal to produce lower volatility blend stock prevents E15 – which is lower in evaporative, tailpipe and GHG emissions – from reaching the market on the same terms as standard E10 fuel. [EPA-HQ-OAR-2022-0829-0643, pp. 9-10]

By using existing authority in the Clean Air Act to require lower volatility conventional gasoline blend stock during the summer months to reduce emissions of volatile organic compounds and decrease the potential for ozone formation, EPA would simultaneously open the market to E15 year-round. NCGA urges EPA to take this action to improve air quality while simultaneously eliminating outdated barriers to cleaner, low carbon higher ethanol blends like E15 and future high-octane fuel. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Organization: National Farmers Union (NFU)

National Farmers Union (NFU) appreciates the opportunity to comment on the proposed Multi- Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles ("Proposed Rule"), published at 88 Fed. Reg. 29,184. NFU has long supported biofuels and has urged the U.S. Environmental Protection Agency (EPA) to facilitate the use of mid-level ethanol blends (e.g., E20-E40), which are the most economical high-octane fuels available today. Despite EPA's limited actions to date in this regard, there remains widespread agreement regarding the need to move this country toward high octane fuels to take advantage of improved engine technologies for internal combustion engine (ICE) vehicles that are likely to continue to be a significant portion of the transportation sector for years to come. Although EPA is well aware of the benefits of high octane fuels, NFU is disappointed that EPA has yet again largely ignored and failed to capitalize on the benefits of biofuels, particularly mid-level ethanol blends, in establishing its vehicle emissions rules. These are technologies available today and can achieve significant reductions in greenhouse gas (GHG) and criteria pollutant air emissions and help this country reach its climate change goals. [EPA-HQ-OAR-2022-0829-0581, p. 1]

NFU submits these comments to urge EPA to take a more balanced, technology neutral approach to emissions standards that better reflects the benefits of biofuels and achieves much needed emissions reductions sooner rather than later. We further, again, urge EPA to take necessary administrative actions to support the use of mid-level ethanol blends that provide a significant cost-effective means of reducing GHG and other air pollutant emissions. [EPA-HQ-OAR-2022-0829-0581, p. 1]

I. Executive Summary

The proposed EPA standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. Battery electric vehicles will play a large role in achieving the goals, but this will require huge investments and rapid growth in many industries including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0581, p. 2]

It would be naive to believe that these dramatic changes will be achieved smoothly and quickly. There are many obstacles including geopolitics, long lead times, capital investments, and consumer acceptance. In order to achieve emissions goals in the most robust, rapid, and affordable way, EPA should encourage multiple additional solutions such as hybrid electric vehicles (including plug-in hybrids), biofuels, and E-Fuels. [EPA-HQ-OAR-2022-0829-0581, p. 2]

Low-carbon liquid fuels have a unique and important role to play, immediately and in the long term. Biofuels, including mid-level ethanol blends, are compatible with a large number of vehicles on the road today, and thus offer immediate emissions benefits on a much larger scale than changes to only new vehicles. Moreover, recent reports show that Americans are holding on to their vehicles longer than in prior years.1 In the longer term, low-carbon or zero-carbon liquid fuels offer emissions solutions for market segments and customers that may not be well served by battery electric vehicles. [EPA-HQ-OAR-2022-0829-0581, pp. 2-3]

1 Tom Krisher, Repelled by high car prices, Americans are holding on to their vehicles longer than ever, Associated Press, May. 15, 2023, https://apnews.com/article/cars-older-record-age-prices-shortages-supply-6e3273208399803a402e707e1393475c ("The average age of a passenger vehicle on the road hit a record 12.5 years this year, according to data gathered by S&P Global Mobility. Sedans … are even older, on average — 13.6 years.").

In order to foster a vibrant and competitive landscape of multiple solutions, it is critical for EPA to set performance-based and technology-neutral emissions standards. Unfortunately, the proposed standard falls short of this ideal. It is essential to look beyond the tailpipe and use lifecycle analysis for fair comparisons and a "level playing field". [EPA-HQ-OAR-2022-0829-0581, pp. 2-3]

II. Ethanol Can Provide Cost-Effective Emissions Reductions Today

NFU continues to believe that high octane fuels "are the cheapest CO2 reduction."2 Improved engines and high octane fuels, specifically mid-level ethanol blends, are technologically feasible and economically reasonable means to achieve reduced GHG emissions, as well as reduced emissions of criteria pollutants and air toxics that have significant adverse health impacts. [EPA-HQ-OAR-2022-0829-0581, p. 3]

2 Eric Brandt, 100-Octane, Super Premium Fuel is Coming to a Pump Near You, The Drive, May 1, 2017, http://www.thedrive.com/news/9836/100-octane-super-premium-fuel-is-coming-to-a-pump-near-you.

Increased volume of ethanol increases the octane level of gasoline across grades. In addition to its higher octane level, ethanol also features high sensitivity and high heat of vaporization, which increase engine efficiency.3 In short, ethanol offers engine knock resistance at a lower cost than any other octane booster in gasoline. Higher ethanol blends can increase fuel octane without expensive refinery upgrades. [EPA-HQ-OAR-2022-0829-0581, p. 3]

3 Ricardo, Inc., The Draft Technical Assessment Report: Implications for High Octane, Mid-Level Ethanol Blends, Final Report, at 24 (2016), available at https://ethanolrfa.org/library/reports-studies-and-white-papers/mid-level- blends-octane-and-fuel-properties.

Ethanol is also substantially cleaner than petroleum-based octane additives. It reduces emissions of particulate matter and air toxics such as benzene, toluene, and xylene. Ethanol further provides GHG emissions reductions, which is increasingly important as the carbon intensity of gasoline is increasing with greater use of unconventional fossil fuels. "Emissions from fossil fuel combustion comprise the vast majority of energy-related emissions," with an increase in emissions from the transportation sector largely attributed to increased vehicle miles travelled and motor gasoline consumption by light-duty vehicles.4 At the same time, energy use in ethanol production and lifecycle GHG emissions have decreased with changes in farming practices and increased intensification (e.g., higher yields). As EPA has found, the land use, land-use change, and forestry sector resulted in a net increase in carbon stocks (i.e., net CO2 removals).5 This has occurred despite the loss of cropland and the struggle to retain existing agricultural lands against the ongoing pressures from urban and industrial expansion. [EPA-HQ-OAR-2022-0829-0581, p. 3]

4 EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021, at 3-1, 3-23-3-24 (2023), available at https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf.

5 Id. at 6-2. Low-carbon liquid fuels can achieve GHG reductions faster than new vehicles can displace the existing fleet. As illustrated in Figure 21 below,8 a relatively simple change such as replacing E10 (10% ethanol) with E15 (15% ethanol) can offer greater GHG reductions than the phase-in of battery electric vehicles, because it can immediately affect a huge fleet of vehicles that are already in use. [EPA-HQ-OAR-2022-0829-0581, pp. 5-6]

8 John Eichberger, Decarbonizing Combustion Vehicles, June 2023, https://www.transportationenergy.org/resources/blog-post/decarbonizing-combustion-vehicles-a-critical-part-in- reducing-transportation-emissions/.

[See original comment for Figure 21, Light and Medium Duty Vehicle Annual GHG Emissions Reduction Scenario (2022-2023)] [EPA-HQ-OAR-2022-0829-0581, pp. 5-6]

Ethanol can continue to significantly contribute to reductions in GHG emissions from the transportation sector. Argonne National Laboratory published a study finding that the carbon intensity of corn-based ethanol improved 23% from 2005 to 2019 and that “displacement of gasoline by corn ethanol on an energy equivalent basis from 2005 to 2019 has resulted in a cumulative GHG emissions reduction of 544 MMT CO2e.”9 To enable further displacement of gasoline by ethanol, many stakeholders have agreed to support E25 (25% ethanol) capability in all vehicles by 2028, and E30 by 2033, as specified in the Next Generation Fuels Act.10 EPA need not wait for legislation, however. It can use existing authority to mandate or encourage the production of new vehicles with E25/E30 capability, as well as flex-fuel vehicles with E85 capability. Getting these vehicles on the road quickly will build the foundation for future increases in ethanol usage, and consequent dramatic GHG emissions reductions. [EPA-HQ-OAR-2022-0829-0581, pp. 5-6]

9 Uisung Lee, et al., Retrospective analysis of the U.S. corn ethanol industry for 2005-2019: implications for greenhouse gas emission reductions, Biofuels, Bioproducts and Biorefining, May 2021, available at https://doi.org/10.1002/bbb.2225.

10 The Next Generation Fuels Act was reintroduced by a bipartisan group of Senators in March of 2023. See Sen. Grassley Mar. 22, 2023 Press Release, Grassley Introduces Bipartisan Bill to Improve Vehicle Efficiency and Lower Fuel Costs, https://www.grassley.senate.gov/news/news-releases/grassley-introduces-bipartisan-bill-to-improve- vehicle-efficiency-and-lower-fuel-costs.

While not the only available biofuel to support GHG emissions reductions in the transportation fuel sector, ethanol is well-developed and cost-effective. Moreover, gasoline vehicles continue to dominate and likely will continue to make up a significant portion of the light-duty and medium-duty vehicle market. Further, ethanol is compatible with efforts toward renewable gasoline.11 [EPA-HQ-OAR-2022-0829-0581, p. 6]

11 See, e.g., https://www.chevron.com/-/media/chevron/newsroom/2023/Q2/renewable-gasoline-blend-factsheet-may-2023.pdf; https://pressroom.toyota.com/exxonmobil-and-toyota-team-up-to-test-fuels-with-a- lower-carbon-footprint/; Uisung Lee, et al., Carbon Intensities of Refining Products in Petroleum Refineries with Co- processed Biofeedstocks, Argonne National Laboratory, ANL/ESD-21/20, at 19 (2022), available at https://greet.es.anl.gov/files/refinery_co_processing_ci (discussing lifecycle emissions reductions for various feedstocks for co-processed fuels).

Organization: Natural Gas Vehicles for America

EPA must act now to adopt regulations that reward, credit, or account for the emission reductions provided by biofuels. Without this requested action, eventually there could be no new natural gas vehicles or other biofuel vehicles, and consequently no use of biofuels in transportation unless they are used to produce electricity for electric vehicles. To continue to certify and sell new natural gas vehicles, the current and proposed approach means that natural gas vehicle manufacturers will eventually be forced to subsidize electric vehicle truck sales to offset their tailpipe greenhouse gas emissions. This factor combined with regulations adopted by California and approved by EPA that mandate the sale of zero- tailpipe vehicles eventually will force manufacturers to stop offering natural gas trucks despite delivering substantial criteria pollutant and greenhouse gas emission reductions, and supplying a significant portion of the on- and off-road vehicles that will not be able to be electrified. This will have a negative impact on emission reductions and will be extremely financially detrimental to businesses that have invested in and employ workers in supporting the use of natural gas in transportation. [EPA-HQ-OAR-2022-0829-0597, pp. 4-5]

The pressure on natural gas vehicle manufacturers is not limited to the U.S. Similar regulatory proposals in Europe could have the same effect of marginalizing or limiting the future role of biofuel powered vehicles. NGVA Europe recently wrote that: It is necessary to break silos when designing fuel and mobility policies. Vehicle manufacturers must be encouraged to invest in solutions that can immediately reduce CO2 emissions, including vehicles with Internal Combustion Engines (ICE) that can run on fuels with lower GHG footprints, such as fuels from renewable sources.2 We wholeheartedly agree with that sentiment and admittedly lean heavily on our European trade association partners in our comments. [EPA-HQ-OAR-2022-0829-0597, pp. 4-5]

2 CO2-HDV Position-paper-Eurogas-NGVAv2.pdf

Emission Benefits of Natural Gas Vehicles

Numerous studies and analyses support the conclusion that there are significant environmental benefits associated with powering natural gas vehicles with RNG to displace petroleum motor fuels. Many of these studies support the conclusion that RNG fueled vehicles offer superior benefits to electric vehicles. To be fair, that should not be a requirement for equitable treatment. It should not be the job of RNG advocates to prove that RNG is superior to electricity or hydrogen, or that it is more cost-effective, or more readily deployable, or doesn’t rely on rare earth minerals, etc. [EPA-HQ-OAR-2022-0829-0597, p. 5]

EPA must stop favoring one technology over others by relying on outdated methods of certifying vehicles and engines. There is not a single environmental journal that would publish a paper or study that evaluates greenhouse gas emissions by only looking at tailpipe emissions or tank to wheel emissions. They would not do it because it is not defensible and would be an absurd comparison. The same is true for retaining greenhouse gas vehicle regulations that only look at tailpipe emissions. It is no longer rational, defensible, or equitable. [EPA-HQ-OAR-2022-0829-0597, p. 5]

As noted in the introduction, data from California's Low Carbon Fuel Standard (LCFS) program demonstrates how clean and low carbon these RNG fueled heavy-duty vehicles truly are. The most recent data confirms that the average carbon intensity (CI) value of California's bio-CNG is negative 99 gCO2e/MJ and has been negative for three consecutive years. In California, 97 percent of the natural gas consumed or credited to on-road transportation fuel in 2022 was renewable natural gas. Nationally the percentage was 69 percent in 2022 including fuel used in California. California continues to be a critical market for natural gas vehicles, but it is noteworthy that nearly 50 percent of the RNG reported in 2022 was for use in areas outside of California. [EPA-HQ-OAR-2022-0829-0597, p. 5]

RNG Supply Can Support Additional NGV Uptake Here and Abroad

The International Energy Agency's (IEA) World Energy Outlook 2022 projects that, under its different scenarios to 2050, renewable biogases (hydrogen and others) reach more than 400 billion cubic meters (bcm) by 2050; around 65 percent of that (260 bcm) is biomethane.5 The World Biogas Association's far more aggressive outlook estimates that biomethane could substitute 993 to 1380 bcm of natural gas, equivalent to 26-37 percent of the current natural gas consumed globally.6 European authorities recently set a target of achieving 35 bcm of biomethane by 2030.7 That target is roughly the energy equivalent of 8.9 billion diesel gallons. The European target is notable in that if achieved it would represent a ten-fold increase in production levels in less than ten years.8 [EPA-HQ-OAR-2022-0829-0597, pp. 7-9]

5 International Energy Agency, World Energy Outlook, Chapter 8, Outlook for Gaseous Fuels pp. 370, 377, and 380.

6 https://www.worldbiogasassociation.org/wp-content/uploads/2019/09/WBA-execsummary-4ppa4_digital-Sept-2019.pdf

7 European Parliament supports 35 bcm biomethane target in EU Gas Package (gasworld.com)

8 EBA: 30% increase in European biomethane plants since 2021 | Bioenergy Insight Magazine (bioenergy-news.com)

Part of the reason NGV advocates are confident there are ample supplies is that the RNG industry and technology associated with it is very mature and existing domestic resources have not been fully exploited. Another reason is that NGVs are expected to make up a portion of the on-road market but not totally displace all gasoline or diesel vehicles. For example, NGVAmerica projects that successful future commercialization of NGVs in the heavy-duty market segment, specifically Class 8 trucks, in the U.S. could begin to displace between 10 – 15 percent of annual sales in the next several years. [EPA-HQ-OAR-2022-0829-0597, pp. 7-9]

If NGVs sales attain and maintain a level of 10 – 15 percent of new Class 8 sales, over the next decade that could result in several hundred thousand Class 8 NGV trucks consuming the equivalent of roughly 3 – 3.5 billion diesel gallon equivalents of fuel. Based on projections developed by the America Gas Foundation and other organizations, this level of fuel consumption -- even if the vehicles were operated 100 percent on biomethane -- would represent only a small portion of the available RNG supplies projected to be available in the U.S. As noted above, natural gas vehicles operating on blends considerably less than 100 percent still offer significant greenhouse gas benefits. [EPA-HQ-OAR-2022-0829-0597, pp. 7-9]

Various reports include projections of U.S. renewable natural gas supply. The most recent is a 2019 report prepared by ICF for the American Gas Foundation.9 Based on the projections in that report and shown below, there is more than sufficient potential supply of RNG to meet the demand posed by on-road NGVs. NGVs today consume approximately 75 trillion Btu per year (tBtu/y) and based on NGVAmerica's projections could grow to about 485 tBtu/y by 2035. This amount is far below what the AGF report projects is possible in the future. [EPA-HQ-OAR-2022-0829-0597, pp. 7-9]

9 AGF 2019 RNG Study Full Report - FINAL 12-18-2019 (1).docx (gasfoundation.org)

[See original comment for Figure 2: Estimated Annual RNG Production, High Resource Potential Scenario, tBty/u] [EPA-HQ-OAR-2022-0829-0597, pp. 7-9]

The graphic below shows how the AGF figures compare with other less recent reports.

[See original comment for RNG Supply Forecasts (Billion DGE Year)] [EPA-HQ-OAR-2022-0829-0597, pp. 7-9]

EPA Must Amend its Proposal to Account for Benefits of Biofuels

NGVAmerica is not alone in making the case that EPA must amend its proposal. Other organizations including the refinery industry, independent fuel retailers, and the ethanol industry have argued that EPA must make a course correction and following through on its prior commitment to do so. [EPA-HQ-OAR-2022-0829-0597, pp. 9-10]

In 2012, EPA10 committed to sunset the use of the 0 g/mi allowance for electric vehicles as explained below:

10 2012-21972.pdf (govinfo.gov)

EPA is finalizing the full net upstream GHG emissions approach for the compliance treatment for EV/PHEV/ FCVs beyond the per-company vehicle production threshold caps in MYs 2022–2025. EPA is not adopting any type of ‘‘phase-in’’, i.e., the compliance value will change from 0 g/mi to the full net upstream GHG emissions value once a manufacturer exceeds the cap. EPA believes that the levels of the per company vehicle production caps in MYs 2017–2025 are high enough to provide a sufficient incentive such that any production beyond those caps should use the full net upstream GHG emissions accounting. [EPA-HQ-OAR-2022-0829-0597, pp. 9-10]

The preamble to that rule included the following discussion aptly summarizing the opposition to the use of the 0 g/mi standard. [EPA-HQ-OAR-2022-0829-0597, pp. 9-10]

(1) EPA should amend its greenhouse gas regulations for all types of vehicles including light-, medium-, and heavy-duty motor vehicles and incorporate the well-to-wheel benefits of natural gas and renewable natural gas as part of the engine and vehicle certification regulations; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(2) EPA to the extent it incorporates other technology advancement credits in its vehicle regulations should extend these incentives to natural gas and natural gas hybrid- electric vehicles

based on the demonstrated benefits of these vehicles and the need to accelerate the introduction of a diverse mix of cleaner vehicle technologies; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(3) EPA should provide enhanced SmartWay designations for trucks powered by low-NOx engines and fueled by carbon-neutral or even carbon-negative renewable natural gas; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(4) Federal agencies should fund pilot programs and infrastructure development that demonstrate the ways in which natural gas can be used to fuel a variety of different transportation sectors by supporting the purchase of vehicles and equipment at multimodal facilities such as ports and rail facilities; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(5) Federal agencies should ensure that federal funding provided under the CMAQ Program and the DERA Program and other programs enacted as part of the Bipartisan Infrastructure Law and Inflation Reduction Act are competitively awarded for projects that provide the most cost-effective emission reductions and offer increased funding levels for engines and vehicles that are certified to more demanding standards in advance of EPA's adoption of such standards; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(6) Federal agencies should work with state authorities to ensure that transportation policies include performance metrics and consider a variety of different technologies as opposed to only promoting specific technologies regardless of their cost; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(7) The Administration should work with Congress to amend the federal excise tax on new trucks to reduce the impediment to fleets and businesses purchasing cleaner new trucks by either eliminating the tax altogether since it discourages new purchases or amend the tax so that it does not penalize more costly, lower polluting technologies (i.e., eliminate the excise tax on the incremental cost). [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

Organization: Nebraska Corn Board (NCB) and Nebraska Corn Growers Association

On behalf of the nearly 2,500 Nebraska Corn Growers Association (NeCGA) dues paying members and the over 21,000 corn farmers in Nebraska who contribute to the state's corn checkoff program through the Nebraska Corn Board (NCB), we appreciate the opportunity to comment on the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. [EPA-HQ-OAR-2022-0829-0583, p. 1]

Nebraska corn farmers and ethanol producers have worked diligently in reducing greenhouse gas emissions while supplying the fuels industry with a low carbon, high octane alternative. However, the EPA seemingly overlooks the contribution that biofuels, such as ethanol, can provide to reducing carbon emissions through tailpipes and internal combustion engines. [EPA-HQ-OAR-2022-0829-0583, p. 1]

This proposal gives EVs an unfair advantage when the EPA upstream emissions. [EPA-HQ-OAR-2022-0829-0583, p. 1]

As most Americans will continue driving their current vehicle, it is crucial to ensure they have access to an affordable and environmentally friendly product such as gasoline with 15% ethanol, known as E15. This is a fuel that is acceptable for vehicles 2001 and newer which are 97% of the vehicles on the road. If made available to every consumer in the country, this would reduce carbon emissions by 280 million tons in the next decade. We ask the EPA to consider the University of California, Riverside's study on the Comparison of Exhaust Emissions between E10 and splash blended E15 as it demonstrates the opportunity that E15 has at reducing emissions. This study states around 54% reduction in carbon emissions compared to E10. We strongly believe in the role biofuels have as a critical step in reducing carbon emissions and being a cost-effective fuel for consumers. [EPA-HQ-OAR-2022-0829-0583, p. 2]

Organization: Nebraska Farm Bureau Federation (NEFB)

Rather than selecting winners and losers, EPA should pursue an "all-of-the-above", technology-neutral approach and ensure a place for both electric and liquid fuel, including biofuel, powered vehicles. A continued diversified fuel portfolio can meet meaningful green-house gas emission reductions and also acknowledges our nation's continued need for biofuels and other liquid fuel products. [EPA-HQ-OAR-2022-0829-0660, p. 1]

Farm and ranch families want clean air just as much as the rest of the nation. At the same time, we'd also urge your Administration reconsider these proposals from EPA to better allow for emissions reductions from a myriad of vehicle and fuels technologies while at the same time meeting Americans' transportation needs. [EPA-HQ-OAR-2022-0829-0660, p. 1]

Organization: North Dakota Farmers Union (NDFU)

NDFU urges the Environmental Protection Agency (EPA) to take a more balanced, technology neutral approach that better reflects the benefits of biofuels to emissions reductions efforts. [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

Background

NDFU is a strong supporter of renewable fuels, which provide high octane fuels with lower greenhouse gas (GHG) emissions. Renewable fuels also provide a critical market for farmers' crops and create well-paying jobs in our rural communities. However, barriers to the growth in renewable fuels markets remain. We continue to urge EPA to support the use of mid-level ethanol blends that provide a significant cost-effective means of reducing GHG and other air pollutant emissions. Unfortunately, the proposed rule ignores those benefits. [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

The proposed standards for 2027 and later set very aggressive goals for reducing GHG and criteria emissions. Achieving these goals will require dramatic changes not only in vehicle design, but in the entire automotive supply chain. To achieve these goals with a heavy reliance on battery electric vehicles (BEVs) will require huge investments and rapid growth in many industries including the mining and processing of key minerals, the generation and distribution of electricity, and the recharging of electric vehicles. [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

We are concerned that a swift and dramatic shift to BEVs will be difficult to achieve. The obstacles include geopolitics, long lead times, significant capital investments, and lagging consumer acceptance. In a state like North Dakota where drivers face cold weather and long driving distances, it is difficult to imagine a large portion of the population using BEVs in four years. [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

On the other hand, renewable fuels are already compatible with many vehicles on the road today and can offer immediate emissions benefits on a larger scale than relying solely on new vehicles to achieve EPA's targets. Recent reports show that Americans are keeping their vehicles longer than in prior years.1 In the long-term, promoting multiple solutions, including renewable fuels offers solutions for customers who may not be well served by BEVs. [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

1 Krisher, T. (2023, May 15). Repelled by high car prices, Americans are holding on to their vehicles longer than ever. Associated Press. Retrieved from https://apnews.com/article/cars-older-record-age-prices-shortages- supply-6e3273208399803a402e707e1393475c.

In order to foster a vibrant and competitive landscape where multiple solutions co-exist, EPA should set performance-based and technology-neutral emissions standards. Unfortunately, the proposed standard falls short of this ideal. We urge EPA to look beyond tailpipe emissions and use life cycle analysis for fair comparisons and a "level playing field." [EPA-HQ-OAR-2022-0829-0586, pp. 1-2]

Benefits of Renewable Fuels

NDFU continues to believe that high octanes fuels are the cheapest method for reducing GHG emissions. Improved engines and high octane fuels, specifically mid-level ethanol blends, are technologically feasible and economically reasonable means to achieve reduced GHG emissions. Increased ethanol volume increases the octane level of gasoline across grades. In addition to its higher octane level, ethanol also boosts engine efficiency.2 Higher ethanol blends can increase fuel octane without expensive refinery upgrades. [EPA-HQ-OAR-2022-0829-0586, p. 2]

2 Ricardo, Inc. (2016, September 20). The draft technical assessment report: Implications for high octane, mid- level ethanol blends, Final report. Prepared for Renewable Fuels Association. Retrieved from https://d35t1syewk4d42.cloudfront.net/file/1607/ATTACHMENT-A_Ricardo-TAR-Report-for-RFA_2016_09-20.pdf.

Ethanol is substantially cleaner than petroleum-based octane additives. It reduces emissions of particulate matter and air toxics, such as benzene, toluene, and xylene. Ethanol further provides GHG emissions reductions, which is increasingly important as the carbon intensity of gasoline is increasing with greater use of unconventional fossil fuels. "Emissions from fossil fuel combustion comprise the vast majority of energy-related emissions," with an increase in emissions from the transportation sector largely attributed to increased vehicle miles travelled and motor gasoline consumption by light-duty vehicles.3 At the same time, energy use in ethanol production and lifecycle GHG emissions have decreased with changes in farming practices and higher yields. As EPA has found, the land use, lang-use change, and forestry sector generated a net increase in carbon stocks.4 [EPA-HQ-OAR-2022-0829-0586, p. 2]

3 Environmental Protection Agency (2023). Inventory of U.S. greenhouse gas emissions and sinks: 1990-2021. U.S. Environmental Protection Agency, EPA 430-R-23-002. https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf.

4 Id. Low-carbon liquid fuels can achieve GHG reductions faster than new vehicles can displace the existing fleet. As illustrated below [See original comment for Figure 21. Light and Medium Duty Vehicle Annual GHG Emissions Reduction Scenario (2022-2023)], a relatively simple change such as replacing E10 (10% ethanol) with E15 (15% ethanol) can offer greater

GHG reductions than the phase-in of BEVs,7 because it can immediately affect a huge fleet of vehicles that are already in use. [EPA-HQ-OAR-2022-0829-0586, pp. 4-5]

7 Eichbethanolerger, J. (2023, June). Decarbonizing combustion vehicles – A critical part in reducing transportation emissions. Transportation Energy Institute. Retrieved from https://www.transportationenergy.org/resources/blog-post/decarbonizing-combustion-vehicles-a-critical-part-in-reducing-transportation-emissions/.

Ethanol can continue to significantly contribute to reductions in GHG emissions from the transportation sector. Argonne National Laboratory published a study finding that the carbon intensity of corn-based ethanol improved 23% from 2005 to 2019 and that "displacement of gasoline by corn ethanol on an energy equivalent basis from 2005 to 2019 has resulted in a cumulative GHG emissions reduction of 544 MMT CO2e."8 To enable further displacement of gasoline by ethanol, many stakeholders have agreed to support E25 capability in all vehicles by 2028, and E30 by 2033, as specified in the Next Generation Fuels Act.9 EPA need not wait for legislation, however. It can use existing authority to mandate or encourage the production of new vehicles with E25/E30 capability, as well as flex-fuel vehicles with E85 capability. Getting these vehicles on the road quickly will build the foundation for future increases in ethanol usage and dramatic GHG emissions reductions. [EPA-HQ-OAR-2022-0829-0586, pp. 4-5]

8 Lee, U., Kwon, H., Wu, M., and Wang, M. (2021, May 4). Retrospective analysis of the U.S. corn ethanol industry for 2005-2019: implications for greenhouse gas emissions reductions. Biofuels, Bioproducts and Biorefining. Retrieved from https://onlinelibrary.wiley.com/doi/10.1002/bbb.2225.

9 Grassley, C. (2023, March 22). Grassley introduces bipartisan bill to improve vehicle efficiency and lower fuel costs. [Press Release]. Retrieved from https://www.grassley.senate.gov/news/news-releases/grassley- introduces-bipartisan-bill-to-improve-vehicle-efficiency-and-lower-fuel-costs.

Unfortunately, the significant GHG benefits of ethanol and other low-carbon fuels are not accounted for in the proposed rulemaking. EPA should use life cycle analysis to properly account for and incentivize their use. [EPA-HQ-OAR-2022-0829-0586, pp. 4-5]

Biofuels have an important role to play in supporting family farms and rural communities. Renewable fuels can also significantly contribute to EPA's emissions reduction goals. However, we are concerned that EPA's proposal is biased in favor of BEVs and against renewable fuels. [EPA-HQ-OAR-2022-0829-0586, p. 6]

We also urge EPA to take appropriate regulatory actions to promote higher blends of ethanol and support any legislative changes necessary to overcome limits to EPA's authority. These actions include ensuring that vehicles can use mid-level ethanol blend and revising the certification fuel as needed to do so. We believe this would also provide reduced emissions for particulate matter and air toxics, providing a truly multi-pollutant emissions reduction solutions. [EPA-HQ-OAR-2022-0829-0586, p. 7]

Organization: Novozymes North America

Novozymes' Innovative Technologies Result in Lower Biofuel Lifecycle Emissions

Novozymes' enzymatic catalyst solutions, also known as biocatalysts, make the production of biofuels more efficient and environmentally friendly. Enzymes increase yield, reduce waste, reduce raw material input, and produce higher energy savings. Enzymes enable biofuel producers to convert corn kernel, corn stover, wheat straw, wood chips, sawdust, waste, and sugarcane bagasse into fuel, while collectively increasing yield and energy efficiency throughout the sector. Our enzymes help biofuel producers get more energy out of every harvest. These technologies have already helped the U.S. replace about 10% of liquid fuels with renewable alternatives. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Fiberex is a platform designed by Novozymes to utilize waste cellulosic material found in agricultural products. These cellulase enzymes can convert the cellulosic fiber found in, for example, corn kernel fiber, into high-value, low-CI products including cellulosic ethanol and increases corn oil yield that may be utilized as a raw material for renewable diesel production. This process is critical in maximizing fermentation efficiency and generating the low carbon products the markets (and consumers) are demanding. This technology has been instrumental in generating the roughly 120 million gallons of cellulosic ethanol that is currently being shipped to California every year. With a CI score 70 percent lower than gasoline, this cellulosic ethanol made from the corn kernel is helping to lower carbon emissions, drive sustainability in our transportation sector and create economic impacts from coast to coast. It is vital that, moving forward, this cellulosic technology can be applied not only to the production of low carbon ethanol, but increasingly to low carbon biochemicals as well as Sustainable Aviation Fuel (SAF). This includes supporting large-scale production of critical enzymes and yeast used in fiber conversion as well as ensuring that modeling (i.e. Argonne GREET) accurately accounts for the benefits being seen via this advanced technology. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Novozymes Innova yeast products deliver unparalleled robustness, help increase ethanol yield, and reduce fermentation time and operational costs. Novozymes launched its first yeast product in North America in 2018, and it has now launched 11 yeast products across the globe. Novozymes’ yeast allows producers to consistently reduce corn and chemical inputs and power through the most challenging conditions. Most of Novozymes’ yeast products express enzymes required to hydrolyze starch to produce glucose. Delivering enzymes via yeast decreases exogenous enzyme requirements resulting in a more sustainable, and lower CI fermentation process. Novozymes also developed the Cellerity® yeast platform for second generation biomass refineries. Cellerity enables increased ethanol yield and improved xylose conversion and inhibitor tolerance. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Above the inherent efficiencies and savings achievable with Novozymes’ enzymes alone, the company’s yeast technologies provide additional benefits. Many of our yeasts express critical enzymes needed for the lowest emissions biofuel production, in addition to converting available sugars to ethanol. These enzymes reduce the need for exogenous enzyme addition, further enabling overall lower CI values for today’s biofuels. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

EPA Should Issue a Final Rule That is Technology Neutral and Promotes All Available Lower Emissions Transportation Fuels

Whether intended or not, the practical effect of the proposed rule in its current form would be to pick winners and losers and would fail to help encourage and facilitate the continued growth, production and use of vehicles that run on all lower emissions transportation fuels, including low CI biofuels. This effect would make it harder for the United States to attain its necessarily ambitious goal to achieve net zero emissions by 2050. This conclusion is especially true considering that many in the auto and other industries have predicted as overly ambitious and impractical the myriad policy goals to phase out the sale and production of light and medium duty vehicles with internal combustion engines by 2030 to 2040. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Although, through this proposal, EPA appears to be essentially directing the auto industry to sell approximately 67 percent of new cars and trucks as EVs by 2032, there are real questions whether that many consumers will want to buy them and whether the necessary infrastructure and grid enhancements to handle that many EVs on the road will be available by that time. Meantime, the federal government has formulated laws and policies to encourage the increased investment in and production and use of the cleanest biofuels that have been and continue to be responsible for massive emissions reductions in the transportation fuel sector over the last two decades. These policies and laws, including the federal Renewable Fuel Standard (RFS), have worked together to encourage these outcomes and the ongoing innovation within the biofuels industry that has and continues to improve the carbon and other GHG emissions reduction capabilities of the biofuels used in transportation fuel. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

We respectfully urge the EPA to revise the proposed rule, so that when it is issued in its final form, the regulation will not only help facilitate the wider production, sale and use of EVs, but will simultaneously recognize and build on the enormous emissions reduction success and potential of biofuels. Both of these outcomes will be needed to meet the transportation fuel need in this country at least over the next two decades. Moreover, they will be necessary for this country to achieve net zero emissions by 2050, especially given the realities of legacy ICE vehicles expected to be on the road at least through the 2040s. Put another way, to achieve this country's collective net zero by 2050 emissions reduction goals, U.S. policies and laws will need to recognize and encourage every potential source of clean energy. Biofuels must continue to be on top of this list for the foreseeable future, and the final rule must reflect this fact so as to avoid inadvertently leaving behind millions of tons of avoided emissions reductions, or discouraging the continued investment, innovation and use of low carbon and other GHG emissions fuels in this country. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Organization: Oryxe International Inc.

1. EPA Should Affirm Vehicle Manufacturers Can Use Low Emission Fuel Additives to Achieve Compliance under the Proposed Rule

In the Proposed Rule, EPA states that it "anticipates that a compliant fleet under the proposed standards would include a diverse range of technologies, including higher penetrations of advanced gasoline technologies ..." Oryxe strongly agrees with this and urges EPA to include low emission fuel additives in the list of technology examples. Moreover, Oryxe urges EPA to ensure that any final rule recognizes the ability of vehicle manufacturers to use fuel additives to comply with the carbon dioxide and criteria pollutant standards. Internal combustion engine ("ICE") vehicles are and will continue to be a major part of the domestic fleet for many years to come. EPA's rule should explicitly acknowledge that the fuel placed into ICE vehicle engines will have a significant impact on carbon dioxide and criteria pollutant emissions, as well as on fuel economy. By EPA's own estimation, "tens of millions of gasoline-powered sources will remain in use well into the 2030s." 88 Fed. Reg. 29397. Notably, the Proposed Rule already recognizes the emission reduction benefits associated with using ethanol as a gasoline additive. As stated in the preamble, using gasoline containing 10 percent ethanol results in approximately 1.5 percent lower carbon dioxide emissions than using pure gasoline. Starting in Model Year

2027, the Proposed Rule would require manufactures of light-duty gasoline powered vehicles to demonstrate compliance using gasoline containing 10% ethanol, referred to as Tier 3 fuel. 88 Fed. Reg. 29240-41. Given that EPA understands and accepts the use of fuel additives to reduce emissions, it makes sense for EPA to ensure that any final rule explicitly provide that manufacturers are permitted to use fuel additives to comply with the emission standards. [EPA-HQ-OAR-2022-0829-0752, p. 2]

Oryxe's experience clearly demonstrates that fuel additives such as BetterFill provide an immediate opportunity to achieve significant cost-effective carbon dioxide and criteria pollutant emissions reductions that should be maximized. Such emission reductions will play an important role while the electric utility generation sector transitions to less emitting technologies and as the infrastructure for electrified vehicles develops. [EPA-HQ-OAR-2022-0829-0752, p. 2]

Oryxe's fuel additive technology significantly reduces emissions of carbon dioxide, nitrogen oxides, and particulate matter from gasoline, diesel, and biodiesel. For example, Oryxe has reduced more than 70 million metric tons of carbon dioxide equivalent over the past five (5) years in the United States alone and has recently proven to reduce 4.2 grams of carbon dioxide equivalent per megajoule of energy (gCO2e/MJ) in gasoline and 2.15 gCO2e/MJ in diesel fuel. It is important to note that the reductions associated with the use of fuel additives are immediate and low-cost, without the need for long and costly capital expenditure investments. Treating all diesel and gasoline consumed in the United States would prevent more than 30 billion tons of carbon dioxide from entering the atmosphere each year. It would also result in a reduction of annual emissions of nitrogen oxides and particulate matter by up to eight (8) and 30 percent respectively. Additional benefits would result from treating biodiesel with Oryxe's fuel additive technology. [EPA-HQ-OAR-2022-0829-0752, pp. 2-3]

A final rule that recognizes the ability of vehicle manufacturers to use low emission fuel additives for ICE vehicles to comply with the emissions standards is necessary and appropriate to achieving meaningful reductions, as well as within the scope of the rule. Oryxe understands that in promulgating past emissions standards for vehicles, EPA dismissed comments urging it to set a minimum octane fuel standard as a means of achieving the proposed emission standards as non-germane. 2 Oryxe's comments on the Proposed Rule differ from those comments and should not be dismissed. Here, Oryxe is not seeking a change, for example, to the octane levels; rather, Oryxe is asking EPA to give credit to fuel additives towards meeting the carbon dioxide and criteria pollutant emission standards. Such explicit acknowledgement is germane to this rulemaking, which requires the fuel efficiency gains and emissions reductions to achieve compliance standards without mandating a specific technology. [EPA-HQ-OAR-2022-0829-0752, pp. 2-3]

2 See, e.g., EPA, Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emission Standards: Response to Comments, EPA-420-R-21-027 (Dec. 2021).

As noted above, the preamble to the Proposed Rule maintains that "EPA anticipates that a compliant fleet under the proposed standards would include a diverse range of technologies, including higher penetrations of advanced gasoline technologies as well as zero-emission vehicles. It is therefore important to consider the environmental and other implications of the ICE portion of the fleet." 88 Fed. Reg. 29187. Oryxe agrees that vehicle manufacturers will rely on a diverse portfolio of technologies to achieve the emissions standard. For this reason, Oryxe respectfully requests that EPA ensure any final rule clearly provides that vehicle manufactures may use low emission fuel additives to comply with the carbon dioxide and criteria pollutant standards. [EPA-HQ-OAR-2022-0829-0752, p. 4]

Organization: Our Children's Trust (OCT)

Specifically, there is a clear consensus that decarbonizing transportation requires a rapid shift away from fossil fuel vehicles toward Zero Emissions Vehicles ("ZEVs"), including battery-electric vehicles ("BEVs"), plug-in hybrid vehicles running primarily on electricity ("PHEVs"), and hydrogen fuel cell electric vehicles ("FCEVs"). [EPA-HQ-OAR-2022-0829-0542, p. 1]

1 Transitioning from conventional internal combustion engine vehicles to electric vehicles is believed to be one of the most promising pathways for decreasing greenhouse gas ("GHG") emissions from the road transportation sectors and thus should be pursued aggressively.2 While improving fuel efficiency can help to reduce emissions in the short-term, it cannot achieve the emissions reductions needed to achieve the Administration's net zero emissions target, it contributes to ongoing dangerous levels of GHG emissions, and experts have concluded that the continued use of fossil fuel vehicles is considered "a technological dead end."3 [EPA-HQ-OAR-2022-0829-0542, p. 1]

Organization: Pearson Fuels

On behalf of Pearson Fuels, thank you for the opportunity to submit comments on the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (the "Proposed Standards"). These comments are focused on the light-duty greenhouse gas emissions standards (the "GHG Standards"). As the leading supplier of E85 fuel in California, Pearson Fuels' primary interests in this proceeding are to ensure that: 1) the tremendous policy value of flex fuel vehicles (FFVs) that utilize E85 fuel is recognized as an important GHG mitigation strategy, and 2) this policy value is reflected programmatically by EPA re-integrating a commensurate level of FFV crediting into the EPA's GHG Standards. Through precisely calibrated FFV crediting, EPA will revitalize FFV manufacturing by some automakers and facilitate the development of hybrid FFVs like the Toyota Hybrid Flex Corolla that is being pioneered by Toyota of Brazil.1 This revitalization will not impede EPA's aggressive goal of rapid light-duty electrification but will diversify EPA's portfolio of decarbonization strategies for internal combustion engines thereby catalyzing more rapid and comprehensive decarbonization of the light-duty sector. [EPA-HQ-OAR-2022-0829-0577, pp. 1-2]

1 See ET Auto, "Toyota launches pilot project on flex-fuel strong hybrid EVs in India," at https://auto.economictimes.indiatimes.com/news/toyota-launches-pilot-project-on-flexi-fuel-strong-hybrid-electric- vehicles-ffv-shev-in-india-signs-mou-with-iisc-bengaluru/94786626, and Nikkei Asia, "Toyota to invest $334m to make compact biofuel hybrids in Brazil, Carmaker seeks to provide consumers with cheaper, eco-friendly vehicles," at https://asia.nikkei.com/Business/Automobiles/Toyota-to-invest-334m-to-make-compact-biofuel-hybrids-in-Brazil.

FFVs are a proven, robust, cost-saving and energy security enhancing GHG reduction tool that the U.S. Environmental Protection Agency ("EPA") integrated into the 2012-2016 light-duty GHG standards in a manner that aligned with the methodology of the Corporate Average Fuel Economy ("CAFE") program and facilitated extensive FFV manufacturing. Beginning in 2016, EPA eliminated its use of the 0.15 multiplier in the EPA's GHG Standards which triggered the rapid decline of FFV manufacturing. EPA explained its elimination of the multiplier based on the distinct goals of the CAFE program wherein the use of E85 achieves an 85% reduction in petroleum use thereby justifying the multiplier as compared to the EPA's GHG program which is focused on GHG reduction with no comparable justification for a multiplier.2 [EPA-HQ-OAR-2022-0829-0577, pp. 1-2]

2 77 FR 62816.

If the U.S. as a nation leveraged E85 as California does now, the benefit would be an estimated MMT tons of GHG reduction and petroleum displacement annually in 2022 and 74.71 MMT in 2032.5 We appreciate the opportunity to present these comments to this critical rulemaking and are hopeful that EPA will reassess and leverage the GHG-reduction potential of FFVs. [EPA-HQ-OAR-2022-0829-0577, p. 3]

5 See p. 10-12 of this Comment for the data and analysis underlying these figures.

EPA went on to assert in the Final Rule that despite the very substantial reduction of GHG emissions incentives that would result from the elimination of the 0.15 multiplier in 2016, automakers would continue to manufacture FFVs: [EPA-HQ-OAR-2022-0829-0577, pp. 4-5]

"There are approximately 10 million ethanol FFVs on the road in the U.S. today (far more than any other incentivized technology), and automakers produced approximately 2 million ethanol FFVs in MY 2011 alone. Although the great majority of ethanol FFVs currently use gasoline, EPA believes that automakers will continue to produce ethanol FFVs, as more consumers begin to fuel their ethanol FFVs with E85 fuel. Given the long history of federal incentives for ethanol FFVs, and the fact that ethanol FFVs can achieve small GHG emissions credits after the GHG emissions incentives expire, the Agency believes that there is no need to provide additional incentives for ethanol FFVs in this rulemaking, beyond those already provided."9 [EPA-HQ-OAR-2022-0829-0577, pp. 4-5]

9 77 FR 62823-4.

In making this assertion, EPA failed to recognize that distinct and tailored program structures and incentives are necessary to incentivize GHG-reducing technologies and fuels from different market participants. The 0.15 multiplier was highly effective in motivating automakers to manufacture FFVs. By contrast, the small GHG emissions credits based solely on tailpipe GHG emissions proved to be insufficient to motivate automakers to manufacture FFVs. This deficient GHG program incentive was not overcome by the existence of incentives for ethanol production that exist in RFS2. The credits in the RFS2 program are known as Renewable Identification Numbers (RINs), and are generated by fuel producers of ethanol and other qualifying RFS2 fuels. However, there is no opportunity for automakers to benefit from RINs generated for ethanol production, so the RFS2 program does not influence their manufacturing behavior. [EPA-HQ-OAR-2022-0829-0577, pp. 4-5]

In order to effectively achieve GHG reductions, it is necessary to develop and maintain programs that both put the right vehicles on the road (in this case, FFVs) as well as programs that put the right fuels in fueling stations (in this case, E85). The rapid expansion of the U.S. FFV fleet preceded both the existence of a robust E85 station network and widespread customer recognition of the benefits of ethanol, as well as consumer awareness of FFV capabilities. As a result, the 2012-2015 FFV fleet initially utilized relatively small quantities of E85. In sharp contrast today in California, the drivers of that same fleet (that remains on the road today) are using the Pearson Fuel application on their smart phones to access a burgeoning E85 station network and check local station prices. Upon identifying a cost savings opportunity, the customer is motivated to drive to a targeted E85 station to save money and fill up with an American-grown, low-carbon, octane-boosting fuel. [EPA-HQ-OAR-2022-0829-0577, p. 5]

This GHG Standards rulemaking provides EPA with the unique opportunity to leverage a GHG reducing tool that is already proven in the marketplace and is complementary rather than competitive with EPA's core decarbonization strategy of light-duty electrification. [EPA-HQ-OAR-2022-0829-0577, p. 5]

Restoring more harmonized FFV crediting between the CAFE and GHG programs would benefit automakers, consumers, and marketers by affording all a choice in the market and by establishing a diversified technology portfolio approach to decarbonization. FFVs deliver a wide array of real-world benefits when fueled with E85 or other gasoline-ethanol blends, including improved U.S. energy security, support for the U.S. farm economy, as well as significant reductions in GHG emissions. FFV consumers can respond to fuel market signals by utilizing high blend E85 ethanol when the fuel is at the greatest discount to petroleum and conventional gasoline when ethanol prices are relatively high as compared to gasoline (which has rarely been the case in the past five years). [EPA-HQ-OAR-2022-0829-0577, p. 6]

These are all vital flexibilities to a successful evolution of the vehicle market and to achieving the goals of the GHG rulemaking – increased efficiency, improved energy security, reduced costs to consumers, and reduced GHG emissions from the transportation sector. [EPA-HQ-OAR-2022-0829-0577, p. 6]

c. The use of sustainable biofuels is internationally recognized as a vitally important GHG reduction strategy.

The Intergovernmental Panel on Climate Change (IPCC) recently released a critical GHG report entitled, "Climate Change 2022, Mitigation of Climate Change, Summary for Policymakers."11 [EPA-HQ-OAR-2022-0829-0577, p. 7]

11 IPCC, 2022: Summary for Policymakers, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf.

The report reached the following findings pertaining to biofuels:

- C.8 (…) Sustainable biofuels can offer additional mitigation benefits in land-based transport in the short and medium term (medium confidence). Sustainable biofuels, low- emissions hydrogen, and derivatives (including synthetic fuels) can support mitigation of CO2 emissions from shipping, aviation, and heavy-duty land transport but require production process improvements and cost reductions (medium confidence). (…) [EPA-HQ-OAR-2022-0829-0577, p. 7]

- C.8.3 (…) Sourced sustainably and with low-GHG emissions feedstocks, bio-based fuels, blended or unblended with fossil fuels, can provide mitigation benefits, particularly in the short and medium term (medium confidence). (…)12 [EPA-HQ-OAR-2022-0829-0577, p. 7]

12 Id. at p. 32.

d. California has recognized the value of biofuels as a vitally important GHG reduction strategy; has leveraged its existing FFV fleet to reduce GHGs in the light-duty sector; and has determined that deploying low carbon liquid fuels in all remaining internal combustion engines is essential to achieve carbon neutrality. [EPA-HQ-OAR-2022-0829-0577, pp. 7-8]

The State of California has taken a leadership role in climate policy dating back to 2006, and has developed a network of policies and strategies to enable decarbonization. Consistent with this, Governor Jerry Brown signed Executive Order No. B-55-18 in 2018. The Executive Order established a new statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter. Further to that goal, the California Legislature approved the Budget Act of 2019 (AB 74) that funded two studies, administered by the California Environmental Protection Agency, to: 1) identify strategies to reduce emissions from transportation energy use, and 2) identify strategies to manage the decline in fossil fuel production and associated emissions in parallel with reductions in demand. The study to reduce emissions from transportation use was conducted by the University of California Institute of Transportation Studies ("ITS") at four campuses, UC Davis, UC Berkeley, UC Irvine, and UCLA. [EPA-HQ-OAR-2022-0829-0577, pp. 7-8]

The resulting ITS report is entitled, "Driving California's Transportation Emissions to Zero."13 While California leads the nation in electrifying transportation, the report recognized the reality that a significant number of internal combustion engines will remain on the road beyond 2035. As a result, the Driving California's Transportation Emissions to Zero report concluded that to achieve carbon neutrality it was necessary for California to make a complete transition by 2045 from petroleum-based gasoline to bio-based gasoline including ethanol blends as is illustrated in the following graph. The only existing vehicles that can utilize E85, the only type of bio-based gasoline that has been commercialized, are FFVs. GHG-reducing innovations in fuels as well as vehicles are necessary to meet President Biden's climate goals and should be supported by the EPA's GHG Standards. [EPA-HQ-OAR-2022-0829-0577, pp. 7-8]

13 Institute of Transportation Studies, "Driving California's Transportation Emissions to Zero," (April 2021), available at https://escholarship.org/uc/item/3np3p2t0.

SEE ORIGINAL COMMENT FOR BAR GRAPH of Fuel Consumption 2010-2045 [EPA-HQ-OAR-2022-0829-0577, pp. 7-8]

e. California marketers have identified and promoted E85 as a consumer- friendly fuel; built out a massive E85 station network including in disadvantaged communities; and leveraged California's existing FFV fleet to reduce petroleum dependence and GHG emissions. [EPA-HQ-OAR-2022-0829-0577, pp. 8-9]

As previously noted, Pearson Fuels is the largest distributor of E85 in California and supplies more than 315 retail E85 stations under long-term contracts. Pearson Fuels continues to open 3-4 new E85 stations per month. These stations are spread throughout the state with a high concentration in disadvantaged communities where the fuel savings from E85 are most valuable to low and moderate-income consumers. The following map was developed based on the Pearson Fuels network of stations in Los Angeles overlayed on the California Legislature's SB 535 "Disadvantaged Communities Map" that highlights CalEPA designated communities in red, as further discussed in the attached Exhibit 2. [EPA-HQ-OAR-2022-0829-0577, pp. 8-9]

SEE ORIGINAL COMMENT FOR MAP of LA area [EPA-HQ-OAR-2022-0829-0577, pp. 8-9]

During 2022, Pearson Fuels' station network delivered E85 at massive discounts to conventional gasoline, even after adjusting for fuel mileage per gallon, with price discounts ranging from $1.00-$2.20 on an average monthly basis as compared with same station gasoline prices.14 [EPA-HQ-OAR-2022-0829-0577, pp. 9-10]

14 Pricing graph based on Pearson Fuels' internal price tracking of all grades of unleaded gasoline vs. E85, supporting information available upon request.

SEE ORIGINAL COMMENT FOR Progression Line Graph of Cost of Pearson Fuels E85 vs California Gasoline January- December. [EPA-HQ-OAR-2022-0829-0577, pp. 9-10]

In the aftermath of the Russian invasion of the Ukraine and the resulting price spike in world and U.S. national crude oil prices, E85 offered a refreshingly cost-effective and non-petroleum dependent fuel alternative to FFV drivers- but only to FFV drivers. The price discount spurred a remarkable year-on-year E85 demand growth rate of over 65% in California. Through its E85 program found at Title 13, California Code of Regulations, section §2292.4, CARB tracks every gallon of E85 sold in the state. The following table and chart reflect the dramatic growth in E85 that California has achieved.15 [EPA-HQ-OAR-2022-0829-0577, pp. 9-10]

15 See California Air Resources Board, "Alternative Fuels: E85 Ethanol," website page at https://ww2.arb.ca.gov/our-work/programs/alternative-fuels/alternative-fuels-e85-ethanol, "Annual E85 Volumes based on Reported Test Program Exemption Data," at https://ww2.arb.ca.gov/our-work/programs/alternative- fuels/alternative-fuels-e85-ethanol See also Exhibit 4 attached.

SEE ORIGINAL COMMENT FOR BAR GRAPH of Annual E85 Volumes (Million Gallons) for 2006-2022 [EPA-HQ-OAR-2022-0829-0577, pp. 9-10]

SEE ORIGINAL COMMENT FOR TABLE of Total Volume (gal) for 2006-2022 [EPA-HQ-OAR-2022-0829-0577, pp. 9-10]

Given that the size of the California E85 market in 2022 was 103 million gallons and using Pearson Fuels' corn starch ethanol/renewable naphtha as the reference fuel, California FFVs using E85 displaced the use of approximately 80 million gallons of petroleum gasoline in 2022.20 According to EPA's Green Vehicle Guide, a typical light-duty vehicle emits 8.9 kg CO2/gallon.21 Using this figure, the light-duty vehicle use of 80 million gallons of gasoline will result in 712,000 MT of GHG emissions. The use of the Pearson Fuels' E85 renewable naphtha blend across all of California's demand would provide a 60% GHG reduction, or a 427,000 MT annual reduction in GHG emissions. [EPA-HQ-OAR-2022-0829-0577, pp. 11-12]

20 See U.S. Department of Energy, "Is E85 Fuel Right for You?," referencing a 15-27% mileage penalty due to the lesser energy density of ethanol, at https://www.energy.gov/energysaver/articles/e85-fuel-right-you.

21 U.S. Environmental Protection Agency, "Tailpipe Greenhouse Gas Emissions from a Typical Passenger Vehicle," at https://www.epa.gov/greenvehicles/tailpipe-greenhouse-gas-emissions-typical-passenger-vehicle.

According to the U.S. Energy Information Administration ("EIA"), California accounts for one- tenth of U.S. motor gasoline consumption.22 Thus if California's utilization of E85 in FFVs as a GHG reduction strategy were replicated nation-wide, the U.S. would reap the benefit of 4.27

MMT of GHG reduction per year solely from E85 usage in FFVs. Based on California's 10-year, year-on-year growth rate of 33%, this would reach 17.82 MMT based on 432 MG of E85 in 2027, and 74.71 MMT based on 1.8 BG of E85 in 2032. However, given the sharp decline in FFV manufacturing, this rate of expansion could only be sustained with the re-introduction of additional FFV models by the automakers. [EPA-HQ-OAR-2022-0829-0577, pp. 11-12]

22 U.S. Energy Information Administration, "California State Energy Profile," at https://www.eia.gov/state/print.php?sid=CA.

SEE ORIGINAL COMMENT FOR TABLE Year/Gallons of E85/%Growth 23/ MMT GHG [EPA-HQ-OAR-2022-0829-0577, p. 12]

The above chart is based on the assumption of a continuation of linear growth based on the 10- year average annual growth rate. [EPA-HQ-OAR-2022-0829-0577, pp. 11-12]

23 Chart forecast for future years utilizes Annual Average Growth Rate (AAGR) based on past 10 years of California's E85 market growth as reported by California Air Resources Board 2012-2022. 66% growth rate for 2022 based on actual reported growth rate.

ICF completed an analysis of the growth of E85 in the California marketplace and forecasted a similar growth rate for 2023-2027 (the "ICF E85 Report). However, ICF capped market growth based on a maximum anticipated average usage rate of E85 per FFV of 50%, and also projected a decline in registered FFVs beginning in 2025 because of fleet turnover and the rapid decline in FFV manufacturing. The ICF report, "Forecasting E85 Consumption in California" provides the background and details of the ICF E85 forecast and is attached as Exhibit 3. [EPA-HQ-OAR-2022-0829-0577, p. 12]

The ICF E85 Report also analyzed the current usage rate of E85 in FFVs in California for 2022, and determined this rate to be 0.16. As previously noted, the usage rate of E85 is known as the F Factor that is utilized in determining crediting for FFV manufacturing for the CAFE and GHG programs. Based on California Energy Commission data pertaining to the number of registered FFVs in California and the rapid growth in demand for E85, the ICF Report E85 forecasts the F Factor for California FFVs to grow from 0.16 to 0.50 over the next five years. [EPA-HQ-OAR-2022-0829-0577, p. 12]

Table 2 of the Proposed Rule is entitled the "Projected GHG Emission Impacts in 2055 From The Proposed Rule, Light-Duty and Medium-Duty." For CO2 emissions, the Table contains a projected reduction of 440 MMT in 2055. Thus, even the 2022 national opportunity of GHG reductions from FFVs of 4.27 MMT represents nearly 1% of EPA's total targeted reductions for 2055. Coupled with the California E85 growth rate of 33%, the leveraging of the E85/FFV opportunity through 2032 could contribute to 17% annual GHG reduction opportunity in the internal combustion engine sector of the market. From a policy design perspective, FFV crediting in the GHG program represents low-hanging fruit that EPA should harvest in this rulemaking. [EPA-HQ-OAR-2022-0829-0577, pp. 12-13]

However, as illustrated by the ICF report, in order to realize these potential GHG reduction gains from E85 usage nation-wide, EPA must make a course correction in the light-duty GHG Standards to reinstate a reasonable level of crediting for FFV manufacturing. Without this adjustment, the automakers will continue to manufacture light-duty vehicles that can only be operated on fossil-based gasoline and the nation's FFV fleet will continue to decline. [EPA-HQ-OAR-2022-0829-0577, pp. 12-13]

g. The use of E85 as a decarbonization strategy is a uniquely cost-efficient GHG strategy that reduces petroleum dependence and enhances energy security

As has been discussed, it is now clear that Californians are embracing E85 fuel with the second largest gasoline market in the country showing 66% year-on-year growth in E85 sales from 2021 to 2022. CARB has confirmed the rigor of its oversight program and the rate of E85 growth in a letter to Pearson Fuels that is attached as Exhibit 4 to this comment.24 The sustained growth in demand for E85 from FFVs in California is remarkable, surging from less than 6.5 MGY in 2006 to over 103 MGY in 2022. [EPA-HQ-OAR-2022-0829-0577, p. 13]

24 Letter from Alexander "Lex" Mitchell, Manager, Emerging Technologies Section, California Air Resources Board regarding E85 use, to Graham Noyes, Noyes Law Corporation. This CARB letter is attached as an exhibit to the comment of Pearson Fuels to this proceeding.

The primary reason E85 use is on the rise in California is a typical and crucial driver in the fuel market, price. At the retail level, California FFV owners can fill up on E85 and routinely save 10 percent or more compared to conventional unleaded on a price per mile basis. It is due to these favorable economics that FFV stations are flourishing in disadvantaged communities where spiking gasoline prices are most damaging to consumer budgets. FFV owners previously unable to fuel with E85 because of limited availability are just now being exposed to a robust network of E85 stations offering steep price discounts to gasoline, and providing a cleaner fuel that simultaneously boosts octane, the farm economy, and U.S. energy security. E85's rapidly growing market appeal is not limited to California and is part of a broader U.S. market transition toward higher ethanol blends. This rapid growth in E85 demand is occurring at the same time that diminished FFV crediting under the GHG program has undercut the incentive for automakers to manufacture FFVs. This deployment of FFVs utilizing E85 by U.S. consumers to save money and reduce GHG emissions would be greatly enhanced to the extent EPA establishes an appropriate GHG emissions factor for FFVs. [EPA-HQ-OAR-2022-0829-0577, p. 13]

DOE's analysis of corn ethanol provides an appropriate reference for determining the appropriate multiplier for the use of E85 in FFVs. The midpoint of the range is 48%, and the annualized rate of CI reduction is approximately 1.5% for the period 2005-2019. Applying a steady rate of carbon intensity reduction between 2019 and 2027 provides a forecasted carbon intensity reduction of 12%. This would establish a carbon intensity reduction rate vs. gasoline of 48% (2019) + 12% (8 years of 1.5%/year) = 60% for 2027-2032. This carbon intensity reduction rate is conservative as it is based solely on corn starch ethanol, which is the predominant feedstock for the production of U.S. ethanol but is also the highest carbon intensity ethanol that is supplied in significant quantities. It is forecast that there will be a substantial expansion of new carbon intensity reduction technologies including carbon capture and sequestration, and climate smart agriculture that will significantly lower the CI of corn starch ethanol over the next decade.26 It is also anticipated that there will be a substantial expansion of ethanol produced from lower carbon intensity feedstocks as has occurred in the California marketplace.27 [EPA-HQ-OAR-2022-0829-0577, p. 14]

26 See Reuters, "Ethanol could get boost from carbon capture credits in Biden climate law, at https://www.reuters.com/markets/commodities/ethanol-could-get-boost-carbon-capture-credits-biden-climate-law- 2022-08-18/ and Investigate Midwest, "As U.S. pushes 'climate-smart' agriculture, hopes and fears collide," at https://investigatemidwest.org/2023/03/30/as-us-pushes-climate-smart-agriculture-hopes-and-fears-collide/.

27 U.S. Department of Agriculture, “The California Low Carbon Fuel Standard: Incentivizing Greenhouse Gas Mitigation in the Ethanol Industry,” (November 2020), at https://www.usda.gov/sites/default/files/documents/CA- LCFS-Incentivizing-Ethanol-Industry-GHG-Mitigation.pdf.

i. EPA established a new methodology for calculating FFV crediting for MY 2016 and later in its joint rule with NHTSA for MY 2012-2016.

In the joint NHTSA Final Rule for MY 2012-2016 (“Joint 2012 Final Rule”), EPA established first the approach for FFV crediting for 2012-2016:

(1) The assumption that the vehicle is operated 50% of the time on the conventional fuel and 50% of the time on the alternative fuel, (2) that 1 gallon of alternative fuel is treated as 0.15 gallon of fuel, essentially increasing the fuel economy of a vehicle on alternative fuel by a factor of 6.67, and (3) a ‘‘cap’’ provision that limits the maximum fuel economy increase that can be applied to a manufacturer’s overall CAFE compliance value for all CAFE compliance categories (i.e., domestic passenger cars, import passenger cars, and light trucks) to 1.2 mpg through 2014 and 1.0 mpg in 2015.28 [EPA-HQ-OAR-2022-0829-0577, pp. 14-15]

28 75 FR 25432.

The Joint 2012 Final Rule also established the methodology for FFV crediting for MY 2016 and subsequent years as being distinct from the 2012-2016 methodology as follows:

Starting with model year 2016, as proposed, EPA will no longer allow manufacturers to base FFV emissions on the use of the 0.15 factor credit described above, and on the use of an assumed 50% usage of alternative fuel. Instead, EPA believes the appropriate approach is to ensure that FFV emissions are based on demonstrated emissions performance.29 [EPA-HQ-OAR-2022-0829-0577, pp. 14-15]

29 Id. at 25433.

EPA provided the following example calculation:

For example, for a flexible-fuel vehicle that emitted 300 g/mi CO_2 operating on E85 ten percent of the time and 350 g/mi CO_2 operating on gasoline ninety percent of the time, the CO_2 emissions for the vehicles to be used in the manufacturer’s fleet average would be calculated as follows:

CO_2 = (300 x 0.10) + (350 x 0.90) = 345 g/mi30

[EPA-HQ-OAR-2022-0829-0577, pp. 15-16]

30 Id. at 25434.

Regarding the method of apportionment between E85 usage and gasoline usage, EPA stated:

One option EPA is finalizing is establishing a rebuttable presumption using a national average approach based on national E85 fuel use. (…) EPA plans to make this assigned fuel usage factor available through guidance prior to the start of MY 2016 and adjust it annually as necessary. EPA believes this is a reasonable way to apportion E85 use across the fleet.31 [EPA-HQ-OAR-2022-0829-0577, pp. 15-16]

31 Id.

In subsequent rulemakings, this usage factor has come to be known as the F Factor.32

32 See U.S. EPA, Technical Memorandum Describing Potential Methods for Determining the Weighting Factor (F- Factor) for Testing E85 Flexible Fuel Vehicles (FFV) Light-duty Vehicles, (August 18, 2020), at https://www.epa.gov/sites/default/files/2020-08/documents/f-factor-technical-memo-fy20-determination-2020-08- 18.pdf.

Thus EPA's methodology for determining GHG crediting for FFVs beginning MY 2016 may be summarized as represented by the following equation:

CO2 = (E85 Tailpipe GHG Emissions x F Factor) + [Gasoline Tailpipe GHG Emissions x (1-F Factor)] [EPA-HQ-OAR-2022-0829-0577, pp. 15-16]

Organization: Plains All American Pipeline, L.P.

By 2032—less than 10 years from now—the EPA's Proposal would require nearly 70% of light-duty cars and trucks sold in the U.S. to be electric or "zero tailpipe emission." We have a number of concerns with this approach, a few include: [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- By focusing on tailpipe emissions alone, most internal combustion engine vehicles that run on gasoline, diesel and biofuels would be unable to meet the standards set forth in the Proposal. This overlooks critical efforts of the energy and automotive industries to pursue continued innovation and optimization of fuel/vehicle systems to improve efficiency and reduce emissions.1 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Effectively outlawing most liquid fuel-powered vehicles would undercut U.S. energy security,2 harm our domestic energy industry and leave the U.S. more dependent on foreign-controlled supply chains.3 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Transferring a significant amount of energy demand to electricity will strain already challenged electrical generation and transmission infrastructure. Without substantial additional investment and significant streamlining of electric transmission permitting, it's unclear whether the electrical grid could support charging new EVs at the level necessary to support the proposed emissions reductions.4 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Traditional energy sources are essential for ensuring effective evolution of the energy landscape-including the manufacture and growth of renewable energy sources and EVs. However, the Proposal would reduce energy investments and increase costs to consumers for all forms of energy. Furthermore, this policy risks the continued viability of critical domestic energy manufacturing infrastructure, which, if idled, would be very challenging to restore. [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Eliminating most new gasoline and diesel vehicles from the market limits consumer choice. Significantly fewer new affordable vehicles are available for sale today5 than a few years ago. Used cars are also increasing in price6 as some automakers warn that they will be forced to cut back on supplying popular gasoline models because of government regulations restricting sales of traditional vehicles.7 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

1 https://www.afpm.org/newsroom/news/afpm-epa-vehicle-proposal-will-effectively-ban-gasoline-and-diesel-vehicles

2 https://www.visualcapitalist.com/chinas-dominance-in-battery-manufacturing/

3 https://www.nytimes.com/interactive/2023/05/16/business/china-ev-battery.html

4 https://www.reuters.com/investigates/special-report/usa-renewables-electric-grid/

5 https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have- all-but-abandoned-the-budget-market-a68862f0

6 https://www.consumerreports.org/cars/buying-a-car/when-to-buy-a-used-car-a6584238157/

7 https://www.reuters.com/business/autos-transportation/stellantis-may-limit-some-gas-powered-vehicles-states-adopting-california-2023-05-24/

Organization: POET, LLC

Bioethanol, by contrast, already constitutes a significant share of LDV fuel and can rapidly scale up to significantly reduce GHG emissions from those vehicles. But the Proposed Rule ignores bioethanol. This is a potentially fatal flaw. Bioethanol and other biofuel-derived fuels account for a significant proportion—approximately 10 percent—of current LDV fuel nationwide.5 Over 27 million flex-fuel vehicles capable of running on approximately 85% bioethanol (and 100% renewable energy) are on the road today.6 And, given the many advances in technologies and methods for producing bioethanol discussed above, bioethanol could achieve net-zero emissions before the electric grid is completely decarbonized. [EPA-HQ-OAR-2022-0829-0609, p. 5]

5 See e.g., EIA, More ethanol was blended into U.S. gasoline last summer than ever before (Dec. 1, 2022), available at https://www.eia.gov/todayinenergy/detail.php?id=54839#

6 See Growth Energy, Flex Fuel Database, available at https://growthenergy.org/choice-at-the-pump/flex-fuel- database/ (which notes that over 27 million FFVs are on the road).

If EPA adds incentives for the real-world GHG benefits of renewable liquid fuels, EPA's rule would build on historical carbon-reducing policies and help ensure the success of its light- duty GHG emission reduction program. EPA's vehicle GHG program would not be, as the West Virginia Court put it, an impermissible "transformative expansion of" the agency's "regulatory authority."10 Instead, if EPA revises its proposed approach so as to credit bioethanol's real-world GHG emission reductions, EPA would have more well-considered, legally durable, flexible, cost-effective, and successful regulations to reduce GHG emissions. [EPA-HQ-OAR-2022-0829-0609, p. 6]

10 West Virginia, 142 S. Ct. at 2595.

2. Renewable fuels are a proven technology in a growing industry.

Renewable fuels are proven technology with a well-developed industry that continues to grow. This is due in part to existing federal and state incentive programs for fuels production, including the RFS, California's LCFS, and Oregon's Clean Fuel Standard. EPA can rely on the existing biofuel incentive programs in the same way it relies on the BIL and IRA—which also promote biofuel production—when assessing technology pathways in the Proposed Rule. The existing programs have given EPA years of real-world evidence showing how renewable fuels have succeeded in reducing and replacing fossil transportation fuels at scale. [EPA-HQ-OAR-2022-0829-0609, p. 9]

Beyond innovation in liquid renewable fuels themselves, automakers can readily produce a variety of vehicles capable of running on ethanol blends. Gasoline containing 10% ethanol is the most prevalent gasoline nationwide.19 EPA has determined that E15 can be used as a drop-in fuel for all model year 2001 and later vehicles.20 Many modern vehicles may be able to use E25 as a drop-in fuel, and automakers can readily make vehicles capable of using such "mid-level ethanol blends" ("MLEBs").21 Over 27 million flex-fuel vehicles ("FFVs") capable of running on approximately 85% bioethanol (and 100% renewable energy) are also already on the road.22 Ignoring the significant, real-world emissions reductions from MLEBs and FFVs would run counter to the very purpose of utilizing § 202 to reduce GHG emissions. Instead of encouraging these incredibly promising GHG reduction technologies, the EPA approach would move towards eliminating them from the marketplace by treating MLEB-compatible and FFV vehicles the same as engines that run on only traditional fossil fuel. [EPA-HQ-OAR-2022-0829-0609, p. 9]

19 The Proposed Rule appropriately produces a test fuel that "more closely represents the typical market fuel available to consumers in that it contains 10 percent ethanol." 88 Fed. Reg. at 29,240. See also, EIA, More ethanol was blended into U.S. gasoline last summer than ever before, supra note 5, noting a nationwide average blend rate of 10.5%.

20 See e.g., https://www.epa.gov/sites/default/files/2015-09/documents/420f15044.pdf.

21 See e.g., State of Nebraska, EPA Approves The Use Of E30 In Nebraska Fleet Demonstration Poised To Reduce Costs, Pollution, available at https://ethanol.nebraska.gov/epa-approves-the-use-of-e30-in-nebraska-fleet- demonstration-poised-to-reduce-costs-pollution/.

22 See Growth Energy, Flex Fuel Database, which notes that over 27 million FFVs are on the road, available at https://growthenergy.org/choice-at-the-pump/flex-fuel-database/.

3. Renewable fuels crediting would give vehicle manufacturers more options to comply and make for a more durable emissions reduction program.

Adding a renewable fuel crediting mechanism would make it more feasible for automakers to meet EPA's stringent standards. Renewable fuels would further diversify the pathways for manufacturers to comply with the proposed standards. This would be especially important in places, particularly rural areas with lower population densities, where BEV infrastructure will be difficult to develop at scale and may not be cost-effective. Renewable fuels would serve as a viable alternative to attain significant light-duty vehicle emissions reductions. [EPA-HQ-OAR-2022-0829-0609, p. 10]

EPA and the National Highway Traffic Safety Administration ("NHTSA") have experience with exactly this type of bioethanol crediting that POET proposes. In prior iterations of EPA's § 202 standard through model year 2015, and in the existing NHTSA fuel economy standards, FFVs receive compliance benefits because they can run on alternative fuels such as E85.23 This ability to utilize lower GHG fuels is adjusted by an "F Factor" that represents how much renewable fuel is used in the real world.24 EPA should re-introduce crediting for vehicles that can utilize higher blends of renewable fuels, and should expand the program to include technologies other than just FFVs. [EPA-HQ-OAR-2022-0829-0609, p. 10]

23 See EPA regulations at 40 CFR 600.510-12(j)(2)(iv)(B) providing FFV crediting through Model Year 2015. Regarding currently applicable NHTSA regulations at 49 CFR 523.2 (definition of dual-fuel vehicle includes flexible fuel vehicles); 49 CFR 536.10 (indicating that dual-fuel vehicles can earn credits under the standards); 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate

Average Fuel Economy Standards, 77 Fed. Reg. 62624, 62829-30 (Oct. 15, 2012) (providing that FFVs could generate credits under the standards). See the discussion in section III.d below for additional details.

24 40 CFR 600.510-12(k).

Crediting vehicle engines that run on biofuels would also create a more durable program. Enabling a broader suite of emissions reduction technologies would avoid supply chain and other problems that threaten to undermine the Proposed Rule as currently structured.25 EPA should take a broader, more diversified approach to guard against other unforeseen events that may affect the flow of critical materials in the international economy that are needed to produce BEVs at the scale EPA is envisioning. [EPA-HQ-OAR-2022-0829-0609, pp. 10-11]

25 See below discussion in Section IV of these comments regarding the supply chain and infrastructure challenges facing EVs.

Incentivizing a broader set of technologies may also protect the rule from being withdrawn by future administrations. Biofuels enjoy broad bipartisan support, as evidenced by the recent debt ceiling negotiations between members of Congress.26 Both Republicans and Democrats in the House of Representatives successfully pressed for the removal of provisions in an early version of the debt ceiling bill that would have cut support for biofuels, and Congress remained steadfast in including important biofuels incentives that should not be undermined by the Proposed Rule.27 A rule that moves the needle too far toward a single technology risks political pushback if that technology loses public support or faces widespread technical challenges. [EPA-HQ-OAR-2022-0829-0609, pp. 10-11]

26 K. Brugger, Clean Energy, Ethanol Concerns Dog Debt Ceiling Bill, E&E Daily (Apr. 25, 2023), https://subscriber.politicopro.com/article/eenews/2023/04/25/clean-energy-ethanol-concerns-dog-debt-ceiling- bill-00093594; J. Dillon et al., GOP Scrambles to Address Energy Concerns with Debt Bill, E&E Daily (Apr. 26, 2023), https://www.eenews.net/articles/gop-scrambles-to-address-energy-concerns-with-debt-bill/.

27 Id.

Finally, affordable ethanol blends may be particularly attractive to diverse, lower and middle income populations and in the parts of the country that are centers of biofuel production. EPA's Proposed Rule should cater to diverse communities with unique needs, including those people who may not be able to afford EVs in the near future.28 Historically, vehicles that can utilize higher ethanol blends have been popular with these communities. While California has dominated EV registrations with approximately 39% of all EV registrations nationwide (followed by Florida at approximately 6% of all EV registrations nationwide), the registrations of FFVs still vastly exceed EV registrations in every state in the country.29 [EPA-HQ-OAR-2022-0829-0609, pp. 10-11]

28 See e.g., CalMatters, Who buys electric cars in California — and who doesn't? (Apr. 12, 2023), available at https://calmatters.org/environment/2023/03/california-electric-cars-demographics/ (finding "Communities with high concentrations of electric cars are affluent, college-educated and at least 75% white and Asian" while "electric cars are almost nonexistent in Black, Latino, low-income and rural communities").

29 See DOE, Vehicle Registration Counts by State, available at https://afdc.energy.gov/vehicle-registration.

C. Ethanol Provides a Key Solution to Statutory Goals that Underpin the Proposed Rule and EPA's Stated Purpose for Undertaking the Rulemaking.

EPA justifies the Proposed Rule based on (i) GHG emission reduction benefits, (ii) manufacturer cost and consumer cost, (iii) energy security, and (iv) "criteria" and toxic air pollutant reductions.41 The Proposed Rule also considers environmental justice impacts.42 The Proposed Rule inadequately addresses each of these key factors because EPA fails to consider the benefits of ethanol for each. [EPA-HQ-OAR-2022-0829-0609, pp. 13-14]

41 See e.g., 88 Fed. Reg. at 29347.

42 Regarding EPA's environmental justice analysis, see e.g., Section VIII.I of the Proposed Rule, 88 Fed. Reg. at 29393-97.

VI. EPA Must Not Inhibit the Use of Bioethanol Through Inappropriate "Adjustment Factors" Including an Erroneous R Factor and Improper CO2 Adjustment Factor.

Regarding EPA's choice of a test fuel, POET agrees with EPA that rather than using Indolene "Tier 3 test fuel more closely represents the typical market fuel available to consumers in that it contains 10 percent ethanol."127 EPA proposes to apply certain test formula "corrections" for CAFE calculations from a May 13, 2020 proposed rule,128 including an "R-factor" regarding fuel energy content. EPA must not inhibit the use of bioethanol through inappropriate "adjustment factors," including an erroneous R-factor. [EPA-HQ-OAR-2022-0829-0609, p. 28]

127 88 Fed. Reg. at 29240.

128 Air Plan Approval; Wisconsin; Redesignation of the Shoreline Sheboygan, WI Area to Attainment of the 2008 Ozone Standards, 85 Fed. Reg. at 28564 (May 13, 2020).

EPA requested comment on several potential alternatives to maintain octane levels, including increasing alkylation operations, increasing isomerization production, or increasing reliance on ethanol blending.145 But increased alkylation and/or isomerization are not workable solutions. Refiners already produce alkylate and isomerized natural gas liquids at near capacity, so additional infrastructure would be required to meaningfully increase production.146 And it is unlikely that refiners will make any significant investments into alkylation/isomerization infrastructure, as the gasoline market is facing long-term decline as alternative fuel vehicles become more popular.147 [EPA-HQ-OAR-2022-0829-0609, pp. 31-32]

145 88 Fed. Reg. at 29401-02.

146 Attachment 3 at 2-3, 9.

147 Id. at 9.

POET strongly supports EPA's third proposed alternative: increasing ethanol blending, specifically bioethanol. Increasing bioethanol blending is feasible. The bioethanol industry continues to grow significantly, and trends indicate that this growth will continue. Unlike the infrastructure that supports alkylation and isomerization capacity, bioethanol production infrastructure continues to expand, providing sufficient capacity for a possible increased reliance on bioethanol to lower vehicle PM emissions. Bioethanol is also cost-effective. Edgeworth Economics assessed economic data provided by POET to compare the costs of using gasoline additives other than ethanol and determined that those alternatives would cost between $0.10 to $0.24 cents more per gallon based on prices from January 2021 through January 2022.148 Adding alkylate, for instance, costs $0.19 more per gallon than ethanol.149 [EPA-HQ-OAR-2022-0829-0609, pp. 31-32]

148 EPA Docket No. EPA-HQ-OAR-2021-0427, comment submitted by POET LLC at 22.

149 Id.

As we have discussed above, bioethanol has a significantly lower PMI value than heavy aromatics. Bioethanol also contributes significantly to octane in gasoline. Increasing ethanol blending from E10 to E15 would more than make up for the octane loss related to reducing heavy aromatics in gasoline.150 Using bioethanol blending as a replacement would significantly reduce the PMI beyond the reductions that would be realized simply by imposing the potential PM emissions standards.151 [EPA-HQ-OAR-2022-0829-0609, pp. 31-32]

150 Attachment 3 at 10.

151 Id. at 10, 12-18.

3. U.S. EPA has failed to incorporate provisions into the Proposed Rule that recognize the ability of ethanol and other renewable biofuels to create reductions in GHG emissions from new light- and medium-duty vehicles. [EPA-HQ-OAR-2022-0829-0609, p. 53]

U.S. EPA's analysis of BEV cost and BEV penetration has other issues as well. Of these, U.S. EPA's failure to perform a comparative lifetime analysis of BEVs and conventional vehicles is particularly significant. As noted in Chapter 4 of the DRIA, the U.S. EPA analysis considers costs for only the first eight years of vehicle operation. In addition, as noted in Chapter 4.2.2, U.S. EPA intentionally ignores differences in insurance and depreciation costs claiming that they are equivalent even though some sources suggest that insurance costs are higher2 and resale values are lower3 for BEVs. U.S. EPA does not even consider the costs associated with battery replacement outside of warranty later in the life of a BEV or the fact that the overall lifetime of BEVs may be shorter than that of a conventional vehicle which would also impact a cost comparison based on vehicle lifetime that would negatively affect BEVs. U.S. EPA should account for these factors in its analysis of BEV penetration and at a minimum perform sensitivity analyses to determine how they could affect demand for BEVs and automakers ability to comply with the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, p. 59]

2 See for example, https://www.caranddriver.com/car-insurance/a35600058/insure-electric-car/.

3 See for example, https://www.sciencedirect.com/science/article/abs/pii/S0967070X22002074.

Organization: Porsche Cars North America (PCNA)

Porsche recognizes that a portion of our customers may continue to seek out the qualities of advanced combustion vehicles and is working both internally and with external partners to find opportunities for these vehicles to contribute to decarbonization goals. Porsche believes that a limited suite of advanced combustion vehicles, powered by highly innovative, near carbon-neutral fuels can coexist alongside electrification and positively contribute to environmental and energy goals. Near carbon-neutral fuels derived from renewable electricity, water, and non-fossil carbon dioxide, commonly referred to as "eFuels", can enable advanced combustion and hybrid technologies to operate in near-zero manner. Porsche refers to this emerging strategy as our double-e strategy: electromobility and eFuels. [EPA-HQ-OAR-2022-0829-0637, p. 4]

Porsche is working together with external partners who have successfully launched an eFuel pilot project and are now developing strategies to bring these fuels to global markets at scale. eFuels can be processed along with additives to meet market gasoline standards and offer a drop-in solution that requires no unique fueling infrastructure or vehicle modifications. Because eFuel will meet market fuel standards, the near carbon-neutral benefits can be applicable to new vehicles and many of the existing, on-road legacy combustion cars. [EPA-HQ-OAR-2022-0829-0637, p. 4]

Porsche recognizes that within the context of this specific proposal, EPA has not sought comment on how to include the benefits of innovative, near carbon-neutral liquid fuels within the structure of the light-duty greenhouse gas program for 2027 through 2032. Porsche recognizes that innovations like eFuels are still an emerging development and may take time to reach market scale. Porsche looks to future opportunities with EPA and other policy stakeholders to explore how these fuels in a limited number of vehicles, with potentially near carbon-neutral properties, could work within the range of Federal and State regulations. Porsche recognizes that these strategies may extend into future updates to EPA's GHG regulation as well as for other Federal and State regulations. Nevertheless, Porsche very much appreciates the foresight of governments who may consider an inclusive regulatory framework. [EPA-HQ-OAR-2022-0829-0637, p. 4]

Organization: Reginald Modlin and B. Reid Detchon

As discussed below, and then presented in carefully annotated detail, we believe EPA missed an opportunity to consider the benefits of high-octane, low-carbon fuels to contribute to the objectives of the Proposed Rule. Such fuels could deliver average annualized benefits comparable to that claimed for the Proposed Rule and could achieve them sooner. As you prepare the Final Rule, we urge you to consider that potential and to seek input from stakeholders beyond the walls of EPA as to how an improved fuel can be adopted by the market. This consideration should be seen as a companion to the electrification of the transportation sector by application of feasible, available, and affordable technological solutions to climate and health challenges. [EPA-HQ-OAR-2022-0829-0570, p. 1]

The urgent need for action on the growing global danger of climate change could not be clearer. In response, the world is moving toward a goal of zero net carbon emissions by mid-century. The most important near-term steps on that journey will be to decarbonize the global electricity supply and to shift the transportation sector from fossil fuels to electricity. In the U.S., a rapid transition to electric vehicles should be the object of financial and regulatory incentives by all levels of government. [EPA-HQ-OAR-2022-0829-0570, p. 4]

However, the average car on the road today is over 12 years old, with 25% of cars being over 16 years old. Even if the nation moves to end the sale of cars with internal combustion engines by 2035, replacing the existing fleet of 250 million passenger vehicles will take at least until mid-century. During that transition, increasing the use of biofuels, such as ethanol with a lower carbon footprint than gasoline, would unlock direct and indirect benefits for the climate and for the health of Americans: [EPA-HQ-OAR-2022-0829-0570, p. 4]

-Greenhouse gas emissions from cars and light trucks could be reduced by more than 12% (roughly 123 million metric tons annually) principally by enabling vehicles to operate more efficiently (a greater reduction than would be achieved by EPA's proposed new vehicle standards!). [EPA-HQ-OAR-2022-0829-0570, p. 4]

- Coupled with incentives for carbon capture in agriculture, it could shift tens of millions of acres of farmland now under conventional cultivation to low-impact sustainable practices, delivering further carbon benefits and reducing fertilizer runoff into our waterways. [EPA-HQ-OAR-2022-0829-0570, p. 4]

By providing the octane needed for more efficient engines, increased ethanol content in gasoline would also enable a 40% reduction in the use of aromatic hydrocarbons in the fuel. Aromatics are petrochemicals produced in the oil refining process and used to increase gasoline octane. They comprise roughly 20% of all the gasoline sold in the US. Emissions from these toxic chemicals today pose a significant public health risk. Ethanol offers a cleaner source of octane. [EPA-HQ-OAR-2022-0829-0570, p. 4]

The Clean Air Act Amendments of 1990 required control of toxic emissions from motor vehicles. EPA responded in 2001 with standards based on the technologies and understanding of health effects at that time. However, time and science have moved on. Vehicle engine technologies have advanced, the composition of gasoline has changed, and the public health effects of aromatics have become better understood: Carburetors and port fuel injection have largely been replaced by gasoline direct injection (GDI) technology. More than half of the vehicles entering the market use this technology to enhance fuel economy performance. Unfortunately, GDI technology greatly increases emissions of ultrafine particles when using today's gasoline. [EPA-HQ-OAR-2022-0829-0570, p. 5]

It doesn't have to be this way. Technologies and products have come together to define a new solution for what the Clean Air Act requires: "the greatest degree of emission reduction achievable through the application of technology which will be available." Along with a rapid transition to electric vehicles, a complementary program should include adoption of higher ethanol blends, which have been shown by U.S. National Laboratories to enable higher fuel economy and vehicle performance. Such blends would enable a 40% reduction in the use of toxic aromatics in gasoline. An important recent study, co-authored by the Nobel Prize winner Mario Molina, concluded that reducing the smallest (ultrafine) particles "without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem." [EPA-HQ-OAR-2022-0829-0570, p. 5]

Today, the nation's gasoline fuel pool includes 10% ethanol (E10). Concerns about ethanol consuming food supplies to make transportation fuel, a feared lack of corn and ethanol production capability, and a claimed inability to distribute ethanol to customers have all been considered and assessed as low to no risk in contemporary studies. Gradual uptake of higher-level ethanol blends could be supplied without any expansion of U.S. cropland and offered to consumers at less cost than today's gasoline with lower carbon and toxic emissions. Test programs in the rural Midwest have shown that today's vehicles operate well on higher levels of ethanol blended with conventional gasoline. Automakers have affirmed that such benefits would be realized by both new and existing internal combustion engines and therefore should be encouraged as additional solutions as soon as possible. Consumer demand, supported by automaker recommendations for new cars, would steadily increase the market share of mid-level blends over time. [EPA-HQ-OAR-2022-0829-0570, pp. 5-6]

The pathway to that outcome is straightforward: [EPA-HQ-OAR-2022-0829-0570, pp. 5-6]

- EPA (and similarly the California Air Resources Board) should specify an improved, higher octane gasoline and identify mid-level ethanol blends as the fuel of choice for new vehicles.

- EPA and CARB should cap the permissible level of aromatics allowed in improved gasoline.

- Automakers should optimize new-car design for higher ethanol blends, seek approval for a related certification fuel, and urge its use as a preferred fuel.

Supporting information and references [EPA-HQ-OAR-2022-0829-0570, pp. 5-6]

g. Groundbreaking research at Pacific Northwest National Laboratory (PNNL) has led to new understanding of the process by which PAHs persist and are transported long distances. It was shown that the most carcinogenic PAH, benzo[a]pyrene (BaP) – often used as a marker for PAH content generally – is efficiently bound to and transported with atmospheric particles: [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

i. In the laboratory, particle-bound BaP degrades in a few hours, but field observations indicate it persists much longer in the atmosphere and is transported far from its sources – increasing its global lung cancer risk as much as fourfold. BaP from East Asia, for example, has been shown to travel thousands of miles over the Pacific Ocean, reaching the west coast of the United States. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

99 Manish Shrivastava et al., "Global long-range transport and lung cancer risk from polycyclic aromatic hydrocarbons shielded by coatings of organic aerosol," Proceedings of the National Academy of Sciences (2017): 114(6): pp. 1246-51: https://www.pnas.org/content/114/6/1246 (accessed Feb. 24, 2021).

ii. When SOA particles are formed in the presence of gas-phase PAHs, their formation and properties are significantly different from SOA particles formed without PAHs: They exhibit slower evaporation kinetics and have higher fractions of non-volatile components and higher viscosities, assuring their longer atmospheric lifetimes. This increased viscosity and decreased volatility act as a shield that protects PAHs from chemical degradation and evaporation, allowing for their long-range transport. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

100 Zelenyuk et al., op. cit., supra note 6.

h. Based on numerous experimental studies, PAHs are also widely accepted to be precursors for soot, or black carbon – a major contributor to climate change. Products of toluene combustion (one of the BTEX aromatics) are known precursors of PAHs that are involved in soot formation. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

101 H. Richter and J.B. Howard, "Formation of polycyclic aromatic hydrocarbons and their growth to soot – a review of chemical reaction pathways," Progress in Energy and Combustion Science (2000): 26(4-6), pp. 565-608: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.467.9757&rep=rep1&type=pdf (accessed Feb. 24, 2021).

102 Qian Mao et al., "Formation of incipient soot particles from polycyclic aromatic hydrocarbons," Carbon (2017): 121: pp. 380-88: https://www.sciencedirect.com/science/article/pii/S0008622317305766 (accessed Feb. 24, 2021).

103 Gabriel da Silva et al., "Toluene Combustion: Reaction Paths, Thermochemical Properties, and Kinetic Analysis for the Methylphenyl Radical + O2 Reaction," The Journal of Physical Chemistry A (2007): 111(35): pp. 8663-76: https://pubmed.ncbi.nlm.nih.gov/17696501/ (accessed Feb. 24, 2021).

i. Black carbon is considered the second most important human emission in terms of climate forcing; only carbon dioxide (CO2) has a greater overall effect. The short-term (20-year) global warming potential per ton of black carbon is 3200 times that of CO2. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

Black carbon emissions associated with the shift to GDI engines will lead to increased warming over the U.S., especially in urban regions. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

104 Raza et al., op. cit., supra note 25: p. 5.

ii. However, black carbon is rapidly removed from the atmosphere by deposition, and its atmospheric concentrations respond quickly to reductions in emissions. Reductions in black carbon are thus an attractive near-term mitigation strategy to slow the rate of climate change. [EPA-HQ-OAR-2022-0829-0570, pp. 20-21]

105 T.C. Bond et al., “Bounding the role of black carbon in the climate system: A scientific assessment,” Journal of Geophysical Research Atmospheres (2013): 118(11): pp. 5380-5552: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/jgrd.50171 (accessed Feb. 24, 2021).

III. Cleaner burning substitutes are readily available and affordable and should be phased in as quickly as practicable.

1. Ethanol and vehicle performance

a. Like aromatics, alcohols such as ethanol have a much higher octane rating than base refinery gasoline. Increasing ethanol levels raises the octane rating of finished gasoline. In effect, aromatics and ethanol compete for the octane enhancement market. [EPA-HQ-OAR-2022-0829-0570, pp. 30-31]

b. Higher octane enables greater engine efficiency and improved vehicle performance through higher compression ratios and/or more aggressive turbocharging and downsizing – also facilitated by ethanol’s cylinder “charge cooling” effect due to its high heat of vaporization. Raising the engine’s compression ratio from 10:1 to 12:1 could increase vehicle efficiency by 5-7%. [EPA-HQ-OAR-2022-0829-0570, pp. 30-31]

153 J.E. Anderson et al., "High octane number ethanol-gasoline blends: Quantifying the potential benefits in the United States,” Fuel (2012): 97: pp. 585-94: https://www.sciencedirect.com/science/article/pii/S0016236112002268 (accessed Feb. 24, 2021).

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153 J.E. Anderson et al., "High octane number ethanol-gasoline blends: Quantifying the potential b

154 David S. Hirshfeld et al., "Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content," Environmental Science & Technology (2014): 48(19): p. 11064-71: https://pubs.acs.org/doi/pdf/10.1021/es5021668 (accessed Feb. 24, 2021).

155 Thomas G. Leone et al., "The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark-Ignition Engine Efficiency," Environmental Science & Technology (2015): 49(18): pp. 10778-89: https://pubs.acs.org/doi/abs/10.1021/acs.est.5b01420 (accessed June 17, 2021).

i. To increase octane enough to achieve these efficiency gains (i.e., to a "premium" rating of 94 AKI (anti-knock index) at the gas pump), there are two principal options – aromatics or alcohols. [EPA-HQ-OAR-2022-0829-0570, pp. 30-31]

156 Petroleum Equipment Institute, "Octane Number," https://www.pei.org/wiki/octane-number (accessed Aug. 23, 2021). The AKI rating is used on U.S. gas pumps, while the Research Octane Number (RON) is used in Europe. A U.S. octane rating of 94 is roughly equivalent to 98 RON: http://www.pencilgeek.org/2009/05/octane-rating-conversions.html (accessed Aug. 23, 2021).

ii. Since 2016, researchers at nine national laboratories participating in the U.S. Department of Energy's Co-Optimization of Fuels & Engines initiative (known as Co-Optima) have explored how simultaneous innovations in fuels and engines can boost fuel economy and vehicle performance, while reducing emissions. [EPA-HQ-OAR-2022-0829-0570, pp. 30-31]

157 Magnus Sjöberg, Sandia National Laboratories, "An Introduction to DOE's Co-Optima Initiative," presentation at International Workshop on Fuel & Engine Interactions, Aug. 23, 2017: https://www.osti.gov/servlets/purl/1466483 (accessed Feb. 24, 2021).

1. The initiative identified 10 candidate fuels from four chemical families – alcohols, olefins, furans, and ketones – with the greatest potential to increase vehicle efficiency. Seven of them were alcohols. [EPA-HQ-OAR-2022-0829-0570, pp. 30-31]

158 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Co-Optimization of Fuels & Engines: Scientific Innovation For Efficient, Clean, And Affordable Transportation" (2019): https://www.energy.gov/sites/prod/files/2019/04/f61/CoOptimization_FactSheet_2019%20PRESS%20QUALITY_0.pdf (accessed Feb. 24, 2021).

2. A team at Oak Ridge National Laboratory found that intermediate alcohol-gasoline blends (particularly a 30% ethanol blend, or E30) "exhibit exceptional antiknock properties and performance beyond that indicated by the octane number tests," and that engine and vehicle optimization could offset the reduced fuel energy content of such blends and likely reduce vehicle fuel consumption and tailpipe CO2 emissions. [EPA-HQ-OAR-2022-0829-0570, pp. 30-31]

159 Derek A. Splitter and James P. Szybist, "Experimental Investigation of Spark-Ignited Combustion with High-Octane Biofuels and EGR. 2. Fuel and EGR Effects on Knock-Limited Load and Speed," Energy Fuels (2014): 28(2): pp. 1432-45: https://pubs.acs.org/doi/pdf/10.1021/ef401575e (accessed Feb. 24, 2021).

160 Derek A. Splitter and James P. Szybist, "Experimental Investigation of Spark-Ignited Combustion with High-Octane Biofuels and EGR. 1. Engine Load Range and Downsize Downspeed Opportunity," Energy Fuels (2014): 28(2): pp. 1418-31: https://pubs.acs.org/doi/pdf/10.1021/ef401574p (accessed Feb. 24, 2021).

161 Tim Theiss et al., "Summary of High-Octane, Mid-Level Ethanol Blends Study" (2016): ORNL/TM-2016/42: https://info.ornl.gov/sites/publications/Files/Pub61169.pdf (accessed Feb. 24, 2021).

3. The use of E30 in one test vehicle enabled a 13:1 compression ratio, reducing CO2 emissions by 6-9%. [EPA-HQ-OAR-2022-0829-0570, p. 32]

162 Thomas Leone et al., "Effects of Fuel Octane Rating and Ethanol Content on Knock, Fuel Economy, and CO2 for a Turbocharged DI Engine," SAE International Journal of Fuels and Lubricants (2014): 7(1): pp. 9-28: https://www.sae.org/publications/technical-papers/content/2014-01-1228/ (accessed Feb. 24, 2021).

4. Enabling use of a high-octane mid-level ethanol blend would significantly reduce the cost of stronger fuel economy standards, a 2016 analysis by AIR, Inc., found. [EPA-HQ-OAR-2022-0829-0570, p. 32]

163 Air Improvement Resource, "Evaluation of Costs of EPA's 2022-2025 GHG Standards With High Octane Fuels and Optimized High Efficiency Engines" (2016): http://www.mncorn.org/wp-content/uploads/2016/09/1079-16EU-Final-Report-091616.pdf (accessed Aug. 18, 2021).

c. A shift from E10 to E30 would displace an estimated 40% of the BTEX aromatics – the most carbon-intensive fraction of gasoline. [EPA-HQ-OAR-2022-0829-0570, p. 32]

164 Hirshfeld et al., op. cit., supra note 154: Supporting Information, Table S15: Summary of Refinery Modeling Results: E10/E85 Cases with 20 vol% and 30 vol% Ethanol in the Gasoline Pool: p. SI-34: https://pubs.acs.org/doi/suppl/10.1021/es5021668/suppl_file/es5021668_si_001.pdf (accessed Feb. 24, 2021).

165 M.A. DeLuchi, "Emissions of Greenhouse Gases from the Use of Transportation Fuels and Electricity" (1993), Argonne National Laboratory, ANL/ESD/TM-22, Vol. 2, Table C.2: Analysis of Petroleum Products: p. C-6: https://www.osti.gov/servlets/purl/10119540 (accessed Feb. 24, 2021).

i. The addition of ethanol also hinders the formation of soot precursors, including PAHs, in turn reducing PM emissions. [EPA-HQ-OAR-2022-0829-0570, p. 32]

166 Raza et al., op. cit., supra note 25: p. 15.

ii. Ethanol does not contribute to SOA or PAH formation. [EPA-HQ-OAR-2022-0829-0570, p. 32]

167 U.S. Environmental Protection Agency, "Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis" (2010): p. 579: https://nepis.epa.gov/Exe/ZyPDF.cgi/P1006DXP.PDF?Dockey=P1006DXP.PDF (accessed Feb. 24, 2021).

d. A 2012 study by Ford engineers examined the influence of ethanol on PM emissions from vehicles with GDI engines. It found a very strong reduction in particle emissions by mid-level ethanol blends above E20. In other words, there was a modest benefit from lower-level blends and a dramatic improvement from mid-level blends: "When the ethanol content increases to >######30%, there is a statistically significant 30%-45% reduction in PM mass and number emissions. [EPA-HQ-OAR-2022-0829-0570, pp. 32-33]

168 M. Matti Maricq et al., "The Impact of Ethanol Fuel Blends on PM Emissions from a Light-Duty GDI Vehicle," Aerosol Science and Technology (2012): 46(5), pp. 576-83: https://www.tandfonline.com/doi/pdf/10.1080/02786826.2011.648780# (accessed June 11, 2021).

- Note: Automakers could quickly adapt to higher-level blends and meet consumer preference for increased engine power and efficiency with a cleaner, often cheaper fuel. In a recent letter, the Alliance for Automotive Innovation, a group of automakers that produce nearly 99% of the new light-duty vehicles sold in the U.S., said: [EPA-HQ-OAR-2022-0829-0570, pp. 32-33]

169 Julia M. Rege, Alliance for Automotive Innovation, letter to Senator Tom Daschle, Chairman, High-Octane Low-Carbon Alliance, June 11, 2021.

[A]s automakers invest significantly in the transition to expanded vehicle electrification, the auto industry is also continuing to invest in vehicle improvements that increase fuel economy and reduce greenhouse gases in internal combustion engine vehicles. Many of the technologies being used to make these improvements can be enhanced or complemented with the use of high octane, low carbon liquid fuels. These fuels would simultaneously support vehicle performance, including fuel economy, and further reduce greenhouse gas emissions during vehicle use. Such benefits would be realized by new and existing internal combustion engines and therefore should be encouraged as additional solutions as soon as possible to maximize environmental benefits across the fleet. Given the timespan over which combustion technology will continue to be sought by new car shoppers, and the timespan that those vehicles will remain in the field, low carbon liquid fuels are an increasingly important technology pathway to help achieve carbon reductions while the electric vehicle market continues to grow. (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 32-33]

e. Ethanol has a long history as a transportation fuel. Henry Ford built his very first car to run on what he called farm alcohol. In 1921 Thomas Midgley, the same engineer who later developed tetraethyl lead for a General Motors subsidiary, drove to a meeting of the Society of Automotive Engineers using a gasoline blend with 30% ethanol. The benefits, he said, included "clean burning and freedom from any carbon deposit … [and] tremendously high compression under which alcohol will operate without knocking. … Because of the possible high compression, the available horsepower is much greater with alcohol than with gasoline." [EPA-HQ-OAR-2022-0829-0570, pp. 32-33]

170 Jamie Lincoln Kitman, "The Secret History of Lead," The Nation (2000): https://www.thenation.com/article/archive/secret-history-lead/ (accessed Feb. 24, 2021).

f. The proven technology used by today's ethanol industry enables rapid scale-up. The industry tripled its production capacity in just four years – from 4.4 billion gallons a year in 2005 to 14.5 billion in 2009. U.S. ethanol production capacity today is 17.4 billion gallons. [EPA-HQ-OAR-2022-0829-0570, pp. 32-33]

171 U.S. Department of Energy, Alternative Fuels Data Center, "U.S. Ethanol Plant Count, Capacity, and Production" (2020): https://afdc.energy.gov/data/10342 (accessed Feb. 24, 2021).

172 Renewable Fuels Association, "Essential Energy" (2021): p. 3: https://ethanolrfa.org/wp-content/uploads/2021/02/2021-Pocket-Guide.pdf (accessed Feb. 24, 2021).

i. The transportation fuel infrastructure has also adapted to the increased use of ethanol in cars and light trucks. As 10% ethanol blends became the market's dominant fuel, refiners reduced their use of aromatics and lowered the octane content of their blendstocks. [EPA-HQ-OAR-2022-0829-0570, pp. 33-34]

173 U.S. Environmental Protection Agency, "Modifications to Fuel Regulations To Provide Flexibility for E15," Federal Register (2019): 84(111): p. 26986: https://www.govinfo.gov/content/pkg/FR-2019-06-10/pdf/2019-11653.pdf (accessed Feb. 24, 2021)

174 U.S. EPA, "Fuel Trends Report," op. cit., supra note 14.

ii. New gas pumps are now certified for mid-level ethanol blends.

175 "UL Announces Midlevel Certification for Ethanol Fuel Dispensers," CSP (2009): https://www.cspdailynews.com/fuels/ul-announces-midlevel-certification-ethanol-fuel-dispensers (accessed Feb. 24, 2021).

iii. U.S. ethanol production in recent years has averaged more than 1 million barrels per day. Increasing that level to support an E30 market would displace more oil than the Biden administration's proposed Corporate Average Fuel Economy Standards would save – bringing an oil security premium valued at more than $1 billion per year. [EPA-HQ-OAR-2022-0829-0570, pp. 33-34]

176 U.S. Energy Information Administration, "U.S. fuel ethanol production capacity increased by 3% in 2019," Today in Energy, Sept. 29, 2020: https://www.eia.gov/todayinenergy/detail.php?id=45316 (accessed Aug. 18, 2021); National Highway Traffic Safety Administration, U.S. Department of Transportation, "Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks," proposed rule (Aug. 5, 2021): https://www.nhtsa.gov/sites/nhtsa.gov/files/2021-08/CAFE-NHTSA-2127-AM34-Preamble-Complete-web-tag.pdf (accessed Aug. 18, 2021).

177 U.S. EPA, "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards," op. cit., supra note 128: Table 49, p. 43792.

i. Real-world experience indicates that higher-level blends such as E30 are, like E15, also harmless to existing vehicles. In Watertown, SD, dynamometer testing and on-road driving experience showed that conventional vehicles using E30 benefit from greater horsepower and torque, providing better vehicle performance, drivability, and increased power. They also experience no loss in fuel economy (despite ethanol's lower energy content) due to engine sensors that can recognize the higher octane and adjust spark ignition timing for greater efficiency. [EPA-HQ-OAR-2022-0829-0570, pp. 34-35]

179 Brad Brunner and Andy Wicks, "Fuel Economy and Power Generation of 30% Ethanol (E30) Splash Blended Fuel in Fuel injected Non-FFV Gasoline Engines," Glacier Lakes Energy white paper (2017), gle-e30-challenge-white-paper-1-19-17final.pdf: link at item #12: https://www.forestriverforums.com/forums/f12/towing-with-e30-or-e85-190278.html (accessed Feb. 24, 2021).

1. The State of Nebraska recently conducted similar tests with 50 conventional vehicles and found that "overall performance and adaptability are not compromised by consumption of E30." [EPA-HQ-OAR-2022-0829-0570, pp. 34-35]

180 Adil Alsiyabi et al., "Investigating the effect of E30 fuel on long term vehicle performance, adaptability and economic feasibility," Fuel (2021): 306(121629): https://www.sciencedirect.com/science/article/pii/S0016236121015106 (accessed Aug. 18, 2021).

h. Brazil has been the largest laboratory in the world for ethanol as an automotive fuel, dating back to the launch of the National Alcohol Program in 1975. Ethanol has made up at least 20% of the standard gasoline blend in Brazil almost continuously since 1984. Currently the standard national blend is set at 27%, and one third of the fleet is capable of operating on ethanol alone. [EPA-HQ-OAR-2022-0829-0570, pp. 34-35]

181 Julieta Andrea Puerto Rico, "Programa de Biocombustíveis no Brasil e na Colômbia: Uma Análise da Implantação, Resultados e Perspectivas" (2007): Tabela 3.8 Misturas de álcool anidro com gasolina durante o PROALCOOL: pp. 81-82: https://teses.usp.br/teses/disponiveis/86/86131/tde-07052008-115336/publico/ultimaju.pdf (accessed Feb. 24, 2021).

182 Wikipedia, "History of ethanol fuel in Brazil": https://en.wikipedia.org/wiki/History_of_ethanol_fuel_in_Brazil (accessed Feb. 24, 2021).

i. The city of São Paulo, which had a traditional problem with smog and toxic emissions from automobiles, saw significant improvements in air quality due to ethanol use. São Paulo is among the top 10 urban concentrations in the world, but in 2019 it fared better than 1200 other cities globally in terms of particulate air pollution. [EPA-HQ-OAR-2022-0829-0570, pp. 34-35]

183 Clovis Zapata and Paul Nieuwenhuis, “Driving on Liquid Sunshine – the Brazilian Biofuel Experience,” Business Strategy and the Environment (2009): 18: pp. 536-37: https://www.academia.edu/27002759/Driving_on_liquid_sunshine_%C3%A2_the_Brazilian_biofuel_experience_a_policy_driven_analysis (accessed Feb. 24, 2021).

184 IQAir, “World's most polluted cities 2019 (PM2.5),” online fact sheet: https://www.iqair.com/us/world-most-polluted-cities (accessed Feb. 24, 2021).

1. The use of high levels of ethanol in gasoline made it unnecessary to produce gasoline with high aromatics content. Nor did it result in ambient aldehyde levels that might bring significant risks to the population. (Aldehydes such as acetaldehyde and formaldehyde are byproducts of ethanol combustion but, as noted below, can be easily controlled by conventional emissions technology.) [EPA-HQ-OAR-2022-0829-0570, pp. 34-35]

185 Alfred Szwarc, “Impacts of the use of ethanol on vehicle emissions in urban areas,” in Isaias de Carvalho Macedo (ed.), Sugar Cane’s Energy: Twelve studies on Brazilian sugar cane agribusiness and its sustainability, UNICA (second edition) (2007): pp. 84-85: https://www.researchgate.net/publication/281397642_Sugar_cane's_energy_-_Twelve_studies_on_Brazilian_sugar_cane_agribusiness_and_its_sustainability (accessed Feb. 24, 2021).

2. Ethanol and climate change

a. A 2017 assessment by the consulting firm ICF concluded that life-cycle greenhouse gas (GHG) emissions associated with producing corn-based ethanol in the United States, using today’s practices in a typical natural gas-powered refinery, are almost 43% lower than those of gasoline on an energy-equivalent basis. [EPA-HQ-OAR-2022-0829-0570, pp. 35-37]

186 M. Flugge et al., “A Life-Cycle Analysis of the Greenhouse Gas Emissions from Corn-Based Ethanol,” Report prepared by ICF for the U.S. Department of Agriculture (2017): p. 166: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2623&context=usdaarsfacpub (accessed Feb. 24, 2021). Similarly: J. Rosenfeld et al. (2018), p. 99: https://www.usda.gov/sites/default/files/documents/LCA_of_Corn_Ethanol_2018_Report.pdf (accessed Feb. 24, 2021).

187 Jan Lewandrowski et al., “The greenhouse gas benefits of corn ethanol – assessing recent evidence,” Biofuels (2018): 11(3): pp. 361-75: https://www.tandfonline.com/doi/full/10.1080/17597269.2018.1546488 (accessed Feb. 24, 2021).

i. This estimate is consistent with more than 15 years of life-cycle analysis at Argonne National Laboratory, recently reaffirmed in a retrospective analysis. It is also more than twice as large as the 21% reduction predicted by EPA in its 2010 life-cycle analysis for ethanol produced by an average natural gas-fired plant in 2022. [EPA-HQ-OAR-2022-0829-0570, pp. 35-37]

188 Argonne National Laboratory, “More about GREET” (The greenhouse gases, regulated emissions, and energy use in transportation (GREET) model), online fact sheet: https://greet.es.anl.gov/homepage2 (accessed Feb. 24, 2021).

189 Uisung Lee et al., “Retrospective analysis of the U.S. corn ethanol industry for 2005–2019: implications for greenhouse gas emission reductions,” Biofuels, Bioproducts and Biorefining (2021): https://onlinelibrary.wiley.com/doi/10.1002/bbb.2225 (accessed June 11, 2021).

190 U.S. EPA, “RFS2 Regulatory Impact Analysis,” op. cit., supra note 167: pp. 468-70.

1. Argonne senior scientist Michael Wang estimates that corn ethanol has resulted in a total GHG reduction in the U.S. of more than 500 million metric tons between 2005 and 2019. [EPA-HQ-OAR-2022-0829-0570, pp. 35-37]

191 Kathryn Jandeska, Argonne National Laboratory, “Corn ethanol reduces carbon footprint, greenhouse gases,” Science X, May 24, 2021: https://phys.org/news/2021-05-corn-ethanol-carbon-footprint-greenhouse.html (accessed Aug. 18, 2021).

ii. A recent “state-of-the-science review” by the consulting firm Environmental Health & Engineering yielded a “central best estimate of carbon intensity for corn ethanol” that was 46% lower than for gasoline. [EPA-HQ-OAR-2022-0829-0570, pp. 35-37]

192 Melissa J. Scully et al., “Carbon intensity of corn ethanol in the United States: state of the science,” Environmental Research Letters (2021): https://iopscience.iop.org/article/10.1088/1748-9326/abde08 (accessed Feb. 24, 2021).

iii. In contrast, for electric and plug-in hybrid vehicles EPA used “tailpipe-only values to determine vehicle GHG emissions, without accounting for upstream emissions” in its proposed rule setting new GHG standards for 2023 and later model years. [EPA-HQ-OAR-2022-0829-0570, pp. 35-37]

193 U.S. EPA, “Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards,” op. cit., supra note 128: p. 43746.

1. As EPA notes on its web site, the power used to charge electric vehicles may create carbon pollution, and EPA and DOE’s “Beyond Tailpipe Emissions Calculator” is offered to “help you estimate the greenhouse gas emissions associated with charging and driving an EV or a plug-in hybrid electric vehicle.” [EPA-HQ-OAR-2022-0829-0570, pp. 35-37]

194 U.S. Environmental Protection Agency, “Electric Vehicle Myths” in “Green Vehicle Guide,” online fact sheet: https://www.epa.gov/greenvehicles/electric-vehicle-myths (accessed Aug. 18, 2021).

iv. Another way to assess the value of ethanol is to calculate its net gain in energy content. On that point, a recent USDA report concluded that a corn ethanol plant using conventional fossil fuel power and electricity “produces slightly more than twice the energy in the form of ethanol delivered to customers than it uses for corn, processing, and transportation.” [EPA-HQ-OAR-2022-0829-0570, pp. 35-37]

195 Paul W. Gallagher et al., “2015 Energy Balance for the Corn-Ethanol Industry” (2016), report for U.S. Department of Agriculture, Office of the Chief Economist, Office of Energy Policy and New Uses: p. 18: https://www.usda.gov/sites/default/files/documents/2015EnergyBalanceCornEthanol.pdf (accessed Feb. 24, 2021).

v. California’s Low Carbon Fuel Standard (LCFS) has demonstrated the impact of market-based price incentives for environmental performance. To gain credits under the LCFS, ethanol refineries have steadily reduced their carbon scores through increased production efficiencies, most notably by shifting from coal to natural gas as a process fuel. [EPA-HQ-OAR-2022-0829-0570, pp. 37-38]

1. For the purpose of credits under the LCFS, corn ethanol on average is currently rated as 30% better than its gasoline blendstock. [EPA-HQ-OAR-2022-0829-0570, pp. 37-38]

196 California Air Resources Board, “Low Carbon Fuel Standard – Life Cycle Analysis,” online fact sheet: pp. 16-18: https://ww2.arb.ca.gov/sites/default/files/2020-06/basics-notes_1.pdf (accessed Feb. 24, 2021).

2. LCFS credits have led to an annual average gain in E85 sales of nearly 39% over the last 10 years. [EPA-HQ-OAR-2022-0829-0570, pp. 37-38]

197 California Air Resources Board, "Alternative Fuels: Annual E85 Volumes," online chart (2020): https://ww2.arb.ca.gov/resources/documents/alternative-fuels-annual-e85-volumes (accessed Feb. 24, 2021).

3. Providing credit for soil carbon sequestration under the LCFS would incentivize farmers to employ improved conservation practices. Such practices would reduce ethanol's carbon footprint further – to as much as 70% lower than gasoline, the ICF report found. [EPA-HQ-OAR-2022-0829-0570, pp. 37-38]

198 Flugge et al., op. cit., supra note 186: p. 166. Also Rosenfeld et al., p. 99.

4. In 2020 the House Select Committee on the Climate Crisis recommended that Congress develop a national LCFS reflecting "the best-available science about the carbon intensity of fuel production, farming practices, land use changes, and crop productivity." Such a standard, the report said, should reward producers that use "climate-smart practices that reduce carbon emissions, store soil carbon, and reduce nitrous oxide emissions." [EPA-HQ-OAR-2022-0829-0570, pp. 37-38]

199 U.S. Select Committee on the Climate Crisis, Majority Staff Report: "Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America" (2020): pp. 101-02: https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf (accessed Feb. 24, 2021).

vi. The carbon dioxide produced by the ethanol process is extremely pure – making it easier to capture and reuse than CO2 from a power plant. Ethanol giant Archer Daniels Midland is capturing CO2 from its processing facility in Decatur, IL, and storing it permanently underground – another step that could lower ethanol's carbon footprint. However, this process was made possible by a $141 million federal grant and is not yet justified economically. [EPA-HQ-OAR-2022-0829-0570, pp. 37-38]

200 Archer Daniels Midland Company news release, "ADM Begins Operations for Second Carbon Capture and Storage Project" (2017): https://www.adm.com/news/news-releases/adm-begins-operations-for-second-carbon-capture-and-storage-project-1 (accessed Feb. 24, 2021).

201 U.S. Department of Energy, Office of Fossil Energy, "DOE Announces Major Milestone Reached for Illinois Industrial CCS Project" (2017), news release: https://www.energy.gov/fe/articles/doe-announces-major-milestone-reached-illinois-industrial-ccs-project (accessed Feb. 24, 2021).

1. A recently announced project will capture CO2 from several biorefineries in the Midwest for geologic storage of up to 10 million tons annually in underground saline aquifers in North Dakota. [EPA-HQ-OAR-2022-0829-0570, pp. 38-39]

202 Erin Voegele, "Large-scale CCS project will sequester CO2 from ethanol plants," Ethanol Producer Magazine (2021): http://www.ethanolproducer.com/articles/18001/large-scale-ccs-project-will-sequester-co2-from-ethanol-plants (accessed Feb. 24, 2021).

2. Recently scientists at Argonne National Laboratory reported discovery of a new electrocatalyst that converts CO2 and water into ethanol with very high energy efficiency, high selectivity, and low cost. If proven at scale, this could enable the production of ethanol from CO2 emitted by industrial processes of all kinds. [EPA-HQ-OAR-2022-0829-0570, pp. 38-39]

203 Argonne National Laboratory, "New Electrocatalyst Turns Carbon Dioxide Into Liquid Fuel," SciTechDaily (2020): https://scitechdaily.com/new-electrocatalyst-turns-carbon-dioxide-into-liquid-fuel/ (accessed Feb. 24, 2021).

b. U.S. consumption of gasoline adds roughly 1 billion metric tons of the most significant greenhouse gas, carbon dioxide (CO_2), to the atmosphere per year. [EPA-HQ-OAR-2022-0829-0570, pp. 38-39]

204 U.S. Energy Information Administration, "Monthly Energy Review" May 2020, Table 11.5, Carbon Dioxide Emissions From Energy Consumption: Transportation Sector: https://www.eia.gov/totalenergy/data/monthly/pdf/sec11_8.pdf (accessed Feb. 24, 2021).

i. Based on current consumption rates of gasoline, increasing vehicle fuel economy by 7% with the higher octane of an E30 blend would reduce annual U.S. emissions by 70 million metric tons per year. [EPA-HQ-OAR-2022-0829-0570, pp. 38-39]

205 CO_2 emissions from U.S. light-duty vehicles in 2018 totaled 1050 million metric tons (MMT). A 7% reduction would be 70 MMT per year. U.S. Environmental Protection Agency, "Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions, 1990-2018," online fact sheet: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100ZK4P.pdf (accessed Feb. 24, 2021).

ii. Reducing the share of aromatics in gasoline by 40% – with E30 fuel that is 40% less emitting – would reduce U.S. emissions by another 32 million metric tons per year. [EPA-HQ-OAR-2022-0829-0570, pp. 38-39]

206 Aromatics comprise 20% of U.S. gasoline consumption by light-duty vehicles [U.S. EPA, "Fuel Trends Report," op. cit., supra note 14], producing 200 MMT of CO_2 annually. Replacing 40% of the aromatics, or 80 MMT, with fuel that produces 40% less CO_2 per gallon would reduce total U.S. CO_2 emissions by 32 MMT per year.

iii. GHG emissions from oil refineries would also fall, due to reduced demand for their most intensively refined products. Oil refiners could produce blendstocks for E30 gasoline at a modest additional cost of 1-2 cents per gallon. Reduced refinery throughput and intensity would reduce refinery CO_2 emissions and crude oil consumption. [EPA-HQ-OAR-2022-0829-0570, pp. 38-39]

207 Hirshfeld et al., op. cit., supra note 154: p. 11070.]

1. One assessment found that refinery GHG emissions would decline by 12% to 27% for various E30 cases, due to both lower crude oil throughput and differences in the severity of refining operations. Since the refinery sector emits 180 million metric tons per year, that would mean a further reduction in U.S. GHG emissions of at least 21 million metric tons per year. [EPA-HQ-OAR-2022-0829-0570, pp. 39-40]

208 Vincent Kwasniewski et al., "Petroleum refinery greenhouse gas emission variations related to higher ethanol blends at different gasoline octane rating and pool volume levels," Biofuels, Bioproducts & Biorefining (2016): (10)1: pp. 36-46: https://onlinelibrary.wiley.com/doi/full/10.1002/bbb.1612 (accessed Feb. 24, 2021).

209 U.S. Environmental Protection Agency, "GHGRP Refineries" in "Greenhouse Gas Reporting Program," online fact sheet: https://www.epa.gov/ghgreporting/ghgrp-refineries (accessed Feb. 24, 2021).

iv. Thus, the total reduction in U.S. GHG emissions from adoption of E30 blends – combining fuel economy gains, the replacement of aromatics with a lower-carbon substitute, and the change in refinery operations – would total 123 million metric tons per year. That would be a cut of more than 12% in emissions from light-duty vehicles, which comprise 58% of the emissions from the transportation sector (the source of more GHG emissions than any other sector). It would also exceed the GHG reductions from EPA's strengthened emissions standards for new cars, which reach only 117 million tons in 2050. [EPA-HQ-OAR-2022-0829-0570, pp. 39-40]

210 U.S. EPA, "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards," op. cit., supra note 128: p. 43779.

211 Ibid., Table 43, p. 43778.

1. Valuing the social cost of those avoided emissions at $25 per ton would imply a benefit of more than $3 billion per year. Using the "interim" rate of $51 per ton put forward by the Biden administration in 2021, the benefits would come to more than $6 billion per year. At the rate of $76 per ton used in the administration's proposed Corporate Average Fuel Economy Standards, the benefits exceed $9 billion per year. [EPA-HQ-OAR-2022-0829-0570, pp. 39-40]

212 Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990" (2021): Figure ES-1: Frequency Distribution of SC-CO2 Estimates for 2020, p. 5: https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf (accessed Mar. 1, 2021)

213 National Highway Traffic Safety Administration, op. cit., supra note 176.

v. An aggressive program to increase adoption of electric vehicles is urgently needed to phase out fossil fuels altogether, but even optimistic forecasts recognize that it will take a long time to turn over the U.S. fleet of 250 million light-duty vehicles. (The average age of such vehicles in operation in the U.S. has risen to 12.1 years this year.) Internal combustion engines will still be used in hundreds of millions of vehicles between now and 2050. [EPA-HQ-OAR-2022-0829-0570, p. 40]

214 See, for example, U.S. DRIVE, "Summary Report on EVs at Scale and the U.S. Electric Power System" (2019): U.S. EV Market Penetration Scenarios: pp. 1-2: https://www.energy.gov/sites/prod/files/2019/12/f69/GITT%20ISATT%20EVs%20at%20Scale%20Grid%20Summary%20Report%20FINAL%20Nov2019.pdf (accessed Feb. 24, 2021).

215 IHS Markit, "Average age of cars and light trucks in the US rises to 12.1 years, accelerated by COVID-19," press release, June 14, 2021: https://news.ihsmarkit.com/prviewer/release_only/id/4759502/ (accessed June 21, 2021).

1. California is in the vanguard of the transition to electric vehicles in the U.S., with a newly announced goal of limiting new-car sales in 2035 to zero-emission vehicles. But under the state's LCFS program to date (since 2011), ethanol has reduced GHG emissions nearly three times more than electricity. As more electric vehicles enter the market, that ratio is dropping sharply, but even for the last 12 months reported (through December 2020), ethanol reduced GHG emissions by one third more than electricity – despite being limited almost entirely to E10 blends. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

216 Governor of California, Executive Order N-79-20 (2020): https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-text.pdf (accessed Feb. 24, 2021).

217 California Air Resources Board, "2020 LCFS Reporting Tool (LRT) Quarterly Data Summary: Report No. 4" (2021):

https://ww2.arb.ca.gov/sites/default/files/classic//fuels/lcfs/dashboard/quarterlysummary/20210430_q4datasummary.pdf (accessed June 21, 2021).

3. The use of corn for ethanol

a. Almost any plant-based material can made into ethanol. All plants contain sugars, and those sugars can be fermented to make ethanol. Plant material also can be converted to ethanol using heat and chemicals. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

b. Today, nearly all ethanol produced in the world is derived from starch- and sugar-based feedstocks. Corn serves as the feedstock for most U.S. ethanol production. Its C4 carbon fixation process (also found in sugarcane) is uncommon among plants and unusually efficient – producing four-carbon compounds instead of the usual three. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

218 U.S. Department of Energy, Alternative Fuels Data Center, “Ethanol Feedstocks,” online fact sheet: https://afdc.energy.gov/fuels/ethanol_feedstocks.html (accessed Feb. 24, 2021).

219 Realizing Increased Photosynthetic Efficiency (RIPE), “The difference between C3 and C4 plants,” online fact sheet (2020): https://ripe.illinois.edu/blog/difference-between-c3-and-c4-plants (accessed Feb. 24, 2021).

i. Only about 3% of flowering plant species use the C4 pathway, but this relative handful accounts for 23% of all terrestrial carbon fixation. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

220 Elizabeth A. Kellogg, “C4 Photosynthesis,” Current Biology (2013): 23(14): p. R594: https://www.cell.com/current-biology/fulltext/S0960-9822(13)00507-1 (accessed Feb. 24, 2021).

c. Cellulose (plant fiber) also offers several advantages as a biofuel feedstock: It is abundant and can be derived from either agricultural waste or non-food crops such as switchgrass and miscanthus. However, it is challenging to access the sugars in these feedstocks for conversion, and cellulosic ethanol remains more expensive than corn ethanol, which traded for $1.60 a gallon or less for most of the last five years – albeit with a recent spike in 2021. That is roughly half the cost of cellulosic ethanol, which is burdened by the high capital costs of pioneer facilities. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

221 RIPE, op. cit., supra note 219.

222 Trading Economics, “Ethanol 2005-2020 Data”: https://tradingeconomics.com/commodity/ethanol (accessed Feb. 24, 2021).

223 Lee R. Lynd et al., “Cellulosic Ethanol: Status and Innovation” (2017): https://www.osti.gov/servlets/purl/1364156 (accessed Feb. 24, 2021).

d. The effect of increased corn production to meet ethanol demand has been a subject of long-standing contention in U.S. agricultural and environmental policy. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

i. The amount of land planted in corn rose from 60 million acres in 1983 to roughly 90 million since 2010, much of that due to expanding ethanol production, which now accounts for nearly 40% of total corn use. Yet that represents a shift in cropland more than an increase: The overall amount of U.S. cropland in production has changed little over the last 30 years, varying between 300 and 330 million acres+. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

224 U.S. Department of Agriculture, Economic Research Service, “Feedgrains Sector at a Glance,” online fact sheet: https://www.ers.usda.gov/topics/crops/corn-and-other-feedgrains/feedgrains-sector-at-a-glance/ (accessed Feb. 24, 2021).

225 U.S. Department of Agriculture, National Agricultural Statistics Service, “2012 Census of Agriculture Highlights: Farms and Farmland” (2014): ACH12-13: https://www.nass.usda.gov/Publications/Highlights/2014/Highlights_Farms_and_Farmland.pdf (accessed Feb. 24, 2021).

226 U.S. Department of Agriculture, National Agricultural Statistics Service, “Crop Production Historical Track Records” (2020): Principal Crops Area Planted and Harvested – United States: 1983-2019: https://downloads.usda.library.cornell.edu/usda-esmis/files/c534fn92g/r781x160h/8w32rq739/croptr20.pdf (accessed Feb. 24, 2021).

ii. Corn yields have increased at a remarkably steady rate of about 1.9 bushels per acre per year since the mid-1950s – quadrupling in that time from 40 to 170 bushels per acre. Between 2002 and 2017 U.S. agriculture gained about 669 million metric tons of corn due to yield improvement. That is equivalent to about 71 billion gallons of ethanol (45% of the ethanol produced during that period) plus 223 million metric tons of byproducts for animal feed. [EPA-HQ-OAR-2022-0829-0570, pp. 40-42]

227 R.L. Nielsen, Purdue University, “Historical Corn Grain Yields in the U.S.” (2020): https://www.agry.purdue.edu/ext/corn/news/timeless/YieldTrends.html (accessed Feb. 24, 2021).

228 F.Taheripour et al., “Response to ‘how robust are reductions in modeled estimates from GTAP-BIO of the indirect land use change induced by conventional biofuels?’” Journal of Cleaner Production (2021), letter to the editor: 310(127431): https://www.sciencedirect.com/science/article/abs/pii/S0959652621016504 (accessed June 17, 2021).

iii. Modern farming uses low-impact, “precision” techniques that require less land, less energy and fewer chemicals for every bushel produced. Since 1980, irrigation water use per bushel has fallen by 46%, energy use by 41%, and greenhouse-gas emissions by 31%. [EPA-HQ-OAR-2022-0829-0570, pp. 42-43]

229 Robert Paarlberg, “The Environmental Upside of Modern Farming,” The Wall Street Journal (2021): https://www.wsj.com/articles/the-environmental-upside-of-modern-farming-11612534962 (accessed Feb. 24, 2021), citing: Field to Market: The Alliance for Sustainable Agriculture, “Environmental and Socioeconomic Indicators for Measuring Outcomes of On Farm Agricultural Production in the United States” (Third Edition) (2016): https://fieldtomarket.org/national-indicators-report-2016/ (accessed Feb. 24, 2021).

iv. With increased acreage and yields meeting the demand for ethanol, the price of corn (apart from a sudden spike in the first half of 2021) traded in a narrow range for the past six years, about half its peak in 2012 and lower than the average inflation-adjusted price from 1981 to the present. [EPA-HQ-OAR-2022-0829-0570, pp. 42-43]

230 Macrotrends, “Corn Prices - 59 Year Historical Chart”: https://www.macrotrends.net/2532/corn-prices-historical-chart-data (accessed Feb. 24, 2021).

231 InflationData.com, “What Is the Inflation Adjusted Price of Corn?”: https://inflationdata.com/Inflation/Inflation_Articles/Corn_Inflation.asp (accessed Feb. 24, 2021).

232 Madhu Khanna et al., “Lessons Learned from US Experience with Biofuels: Comparing the Hype with the Evidence,” Review of Environmental Economics and Policy (2021): (15)1: pp. 67-86: https://www.journals.uchicago.edu/doi/abs/10.1086/713026 (accessed Apr. 27, 2021).

v. Concerns about the impact of ethanol production on food prices have largely abated over that time. A study of eight Asian economies found that 64% of the variance in food prices during the 2000-2016 time period was explained by oil price movement, and only 2% by biofuel prices. [EPA-HQ-OAR-2022-0829-0570, pp. 42-43]

233 Farhad Taghizadeh-Hesary et al., “Energy and Food Security: Linkages through Price Volatility,” Energy Policy (2019): 128: pp. 796-806: https://www.sciencedirect.com/science/article/pii/S0301421518308486 (accessed Apr. 27, 2021).

vi. Controversial claims about large negative “indirect land use” effects of increased corn production have not been borne out by data, as shown in a recent review of the research. Life-cycle analyses by ICF and Argonne both reflect modest assessments of indirect land use effects. EPA and California regulators include land-use factors in their evaluations of ethanol’s GHG emissions, and California’s figure, for example, is only 19% of the very high estimate that kicked off the debate. Argonne’s recent retrospective analysis found that the initial estimate was at least five times overstated – indeed, by Argonne’s estimate, nearly 15 times. [EPA-HQ-OAR-2022-0829-0570, pp. 42-43]

234 Khanna et al., op. cit., supra note 232.

235 Flugge et al., op. cit., supra note 186, p. 167. Also Rosenfeld et al., p. 97.

236 Zhangcai Qin et al., “Estimating soil carbon change and biofuel life-cycle greenhouse gas emissions with economic, ecosystem and life-cycle models,” conference paper (2015): https://www.researchgate.net/publication/287330899_Estimating_soil_carbon_change_and_biofuel_life-cycle_greenhouse_gas_emissions_with_economic_ecosystem_and_life-cycle_models (accessed Feb. 24, 2021).

237 U.S. Environmental Protection Agency, “Lifecycle Greenhouse Gas Emissions for Select Pathways” (2016): https://www.epa.gov/sites/production/files/2016-07/documents/select-ghg-results-table-v1.pdf (accessed Feb. 24, 2021).

238 Cf. the value of 19.8 grams of CO2 per megajoule in California Air Resources Board, “Detailed Analysis for Indirect Land Use Change” (2015), Table H-5, Summary of ILUC Values: p. I-25: https://ww2.arb.ca.gov/sites/default/files/classic//fuels/lcfs/iluc_assessment/iluc_analysis.pdf (accessed Feb. 24, 2021) vs. the estimate of 104 gCO2/MJ in Timothy Searchinger et al., “Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change,” Science (2008), Table 1: 319(5867), pp. 1238-40: https://www.researchgate.net/publication/326450544_Use_of_US_Croplands_for_Biofuels_Increases_Greenhouse_Gases_Through_Emissions_from_Land-Use_Change (accessed Feb. 24, 2021).

239 Lee et al., op. cit., supra note 189, Figure 5.

vii. The Energy Information Administration projects that demand for gasoline will decline from 137.5 billion gallons per year in 2021 to 127 billion gallons in 2050, due to increased vehicle efficiency and greater use of electric vehicles. Fueling the 2050 fleet with higher-level blends such as E30 thus would require little more than a doubling of today’s ethanol capacity. Demand will fall further if electric vehicles are adopted more rapidly than currently envisioned. [EPA-HQ-OAR-2022-0829-0570, pp. 42-43]

240 U.S. Energy Information Administration, “Annual Energy Outlook 2021,” Table 11. Petroleum and Other Liquids Supply and Disposition (Reference case): https://www.eia.gov/outlooks/aeo/data/browser/#/?id=11-AEO2021®ion=0-0&cases=ref2021&start=2019&end=2050&f=A&linechart=ref2021-d113020a.3-11-AEO2021&chartindexed=0&sourcekey=0 (accessed Feb. 24, 2021).

Note: The recurrent affliction of American farmers is overproduction and low prices. Increased demand for ethanol in higher-level blends could be met within today's cropland footprint, absorbing that overproduction and helping to restore farm income. A more robust future market for ethanol would also attract additional investment to the production of next-generation biofuels from cellulosic feedstocks – investment that has been lacking in the face of a saturated market for E10. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

e. Environmental concerns about the effects of increased agricultural production on water quality (due to nitrogen fertilizer runoff) can be addressed directly with incentives (e.g., from a low-carbon fuel standard) for improved conservation practices that would increase the amount of carbon sequestered in the soil. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

i. Corn may be a particular beneficiary of carbon sequestration incentives, according to studies that looked at carbon stored below the 30-centimeter depth usually measured (12 inches). A long-term study by USDA in eastern Nebraska found that corn grown with best management practices had average annual increases in soil organic carbon of one ton per acre, more than half of it below the 30 cm depth. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

241 Ronald F. Follett et al., "Soil Carbon Sequestration by Switchgrass and No-Till Maize Grown for Bioenergy," BioEnergy Research (2012): 5: pp. 866-75: https://www.researchgate.net/publication/256147354_Soil_Carbon_Sequestration_by_Switchgrass_and_No-Till_Maize_Grown_for_Bioenergy (accessed Feb. 24, 2021).

- Note: A combination of best practices – the use of renewable natural gas in processing and carbon-sequestering techniques on the farm – would bring corn ethanol's carbon footprint almost to zero, and carbon capture and storage after processing would make it a carbon-negative fuel. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

4. EPA regulation of ethanol blends

a. The Clean Air Act prohibits fuel manufacturers from introducing into commerce, or increasing the concentration of, new fuels and fuel additives unless they are "substantially similar" to fuels or fuel additives used in the certification of motor vehicles. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

242 42 U.S. Code, sec.?7545, "Regulation of fuels", subsection (f), "New fuels and fuel additives": https://www.law.cornell.edu/uscode/text/42/7545 (accessed Feb. 24, 2021).

i. Since EPA now uses ethanol (in E10) as its certification fuel for new vehicles, increasing the concentration of ethanol in gasoline is not prohibited. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

b. The law separately limits Reid vapor pressure (RVP) – a measure of the fuel's propensity to give off evaporative emissions – for fuel blends containing gasoline and 10% ethanol (E10). EPA granted RVP waivers in 2010 and 2011 to enable the use of E15 in late-model vehicles – those produced from model year 2001 on. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

243 Ibid., subsection (h)(4), "Ethanol waiver."

c. In 2019 EPA issued an interpretive rulemaking defining gasoline blended with up to 15% ethanol as "substantially similar" to the E10 fuel it has used since 2014 to certify all new motor vehicles. Referring to the RVP limit, EPA said, “We are interpreting this language as establishing a lower limit, or floor, on the minimum ethanol content … rather than an upper limit on the ethanol content.” However, a federal appeals court struck down that action in 2021. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

244 U.S. EPA, “Modifications to Fuel Regulations To Provide Flexibility for E15,” op. cit., supra note 173: pp. 26980-27025.

245 Ibid., p. 26992.

246 American Fuel & Petrochemical Manufacturer v. Environmental Protection Agency, Opinion 19-1124, U.S. Court of Appeals for the D.C. Circuit, July 2, 2021: https://www.cadc.uscourts.gov/internet/opinions.nsf/D33AF132E64A3D1E85258706005062EC/$file/19-1124-1904888.pdf (accessed July 7, 2021).

i. EPA said in its rulemaking, “We are confident that relative evaporative emissions effects for E15 would largely be similar or slightly less than those for E10.” Since the RVP of ethanol blends reaches its maximum level at E10 and then declines as more ethanol is added, this conclusion would be equally true of higher-level blends. In fact, the RVP of E30 is similar to that of E0. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

247 U.S. EPA, “Modifications to Fuel Regulations To Provide Flexibility for E15,” op. cit., supra note 173: p. 26993.

248 Wei-Dong Hsieh et al., “Engine performance and pollutant emission of an SI engine using ethanol–gasoline blended fuel,” Atmospheric Environment (2002): 36(3), p. 403: https://www.sciencedirect.com/science/article/abs/pii/S1352231001005088 (accessed Feb. 24, 2021).

249 V.F. Andersen et al., “Vapor Pressures of Alcohol−Gasoline Blends,” Energy Fuels (2010): 24(6): pp. 3647-54, Table S-2: https://pubs.acs.org/doi/full/10.1021/ef100254w (accessed June 11, 2021).

250 C. Hammel-Smith et al., “Issues Associated with the Use of Higher Ethanol Blends (E17-E24)” (2002), Technical Report, National Renewable Energy Laboratory: NREL/TP-510-32206, Table 3-1, p. 13: http://www.nmma.org/lib/docs/nmma/gr/environmental/32206.pdf (accessed July 6, 2021).

- Note: EPA could either certify E30 fuel based on an application from an automaker or simply define E30 as “substantially similar” to E10. The benefits derived from adding ethanol to gasoline – in terms of reduced emissions and improved performance that offsets the lower energy content of ethanol – appear to be optimized around the 30% blend level – as Thomas Midgley found a century ago. [EPA-HQ-OAR-2022-0829-0570, pp. 43-45]

d. Citing the need for “the development of infrastructure and promotion of fuels, including biofuels, which will enable the development and widespread deployment of advanced technologies,” in May 2010 President Obama issued an Executive Memorandum requesting that EPA “review for adequacy the current non-greenhouse gas emissions regulations for new motor vehicles, new motor vehicle engines, and motor vehicle fuels, including tailpipe emissions standards for nitrogen oxides and air toxics, and sulfur standards for gasoline.” Yet no action addressing fuels or mobile source air toxics resulted. [EPA-HQ-OAR-2022-0829-0570, p. 45]

251 The White House, “Presidential Memorandum Regarding Fuel Efficiency Standards” (2010): https://obamawhitehouse.archives.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards (accessed July 7, 2021).

e. Regarding other air pollutants, a 2008 study by the National Renewable Energy Laboratory found that increasing ethanol content (to E20) reduced hydrocarbon emissions while increasing emissions of ethanol and aldehydes. Vehicles that used a power enrichment strategy called long-term fuel trim (LTFT) to adjust the engine's air-fuel ratio showed no statistically significant fuel effect on emissions, including NOx. [EPA-HQ-OAR-2022-0829-0570, p. 45]

252 Keith Knoll et al., "Effects of Mid-Level Ethanol Blends on Conventional Vehicle Emissions," NREL/CP-540-46570 (2009): 2009-01-2723: pp. 1-16: https://www.nrel.gov/docs/fy10osti/46570.pdf (accessed Feb. 24, 2021).

V. Summary and recommendations

The use of aromatics in gasoline is an unnecessary cause of toxic air pollution that harms and shortens lives – as a major contributor to fine particle emissions, especially dangerous PAHs and secondary organic aerosol. These emissions are a menace to the health and cognitive development of millions of children who live in high-traffic areas. EPA has yet to fulfill its statutory obligation to produce the greatest degree of emission reduction achievable in the hazardous air pollutants from motor vehicles and motor vehicle fuels. The risk to public health has been increased by the shift to new automotive direct-injection engine technology. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

Pollution causes many threats to public health, not all of which can be cost-effectively regulated, but it is hard to imagine one that could be solved more easily or at less cost than this one. Reducing the use of aromatics requires only a minor regulatory adjustment and would deliver important benefits for both public health and the environment. Reconsideration of national fuel economy standards provides an opportunity for EPA to: [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

257 42 U.S. Code, sec.?7521, op. cit., supra note 125.

- -Immediately permit the sale and use of higher-level ethanol blends.

- Encourage their adoption as a standard fuel for vehicles sold in model year 2025 and beyond.

- Reduce the cap on aromatic co ions [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

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257 42 U.S. Code, sec.?7521, op. cit., supra note 125.

- -Immediately permit the sale and use of higher-level ethanol blends.

- Encourage their adoption as a standard fuel for vehicles sold in model year 2025 and beyond.

- Reduce the cap on aromatic content in gasoline by half – to no more than 12.5% in reformulated gasoline, much as it imposed a cap on benzene in 2007. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

258 U.S. EPA, “Control of Hazardous Air Pollutants From Mobile Sources” (2007), op. cit., supra note 131: p. 8477-79.

The California Air Resources Board should do likewise, and its Low Carbon Fuel Standard should become a model for federal legislation, replacing the Renewable Fuel Standard at the national level. Concurrently, automakers should be encouraged to optimize their vehicle designs to take best advantage of ethanol’s beneficial attributes. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

We are on the cusp of a rapid global shift to electric vehicles as a necessary and urgent response to climate change, but internal combustion engines will remain a substantial part of the light-duty fleet until mid-century. As a transition strategy for the next 30 years, reducing aromatics through the increased use of ethanol would have significant near-term climate benefits for the transportation sector. The public health benefits – especially to newborn children – demand this change and could be replicated at greater scale, to even greater effect, worldwide. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

High-priority opportunities for immediate action

The Clean Air Act prohibits fuel manufacturers from introducing into commerce, or increasing the concentration of, new fuels and fuel additives unless they are “substantially similar” to fuels or fuel additives used in the certification of motor vehicles. Since EPA now uses E10 as its certification fuel for new vehicles, increasing the concentration of ethanol in gasoline to E30 would be permissible. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

- EPA should define gasoline blended with 30% ethanol as “substantially similar” to E10. The benefits derived from adding ethanol to gasoline – in terms of reduced emissions and improved performance that offsets the lower energy content of ethanol – appear to be optimized around the 30% blend level. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

- Concurrently, upon an automaker’s request for approval of an E30 certification fuel, EPA should move quickly to grant it. This would, among other things, resolve any remaining uncertainties about the effect of higher levels of ethanol on pollutants such as nitrogen oxides and aldehydes, which can be managed by appropriate engine settings and emissions technology. Approval would be a green light to automakers to optimize their new vehicles for higher-octane fuel –enabling them to improve vehicle efficiency and performance. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

Near-term regulatory opportunities

- EPA should incorporate the use of higher-octane fuels as an available control strategy for reducing greenhouse gas emissions and increasing fuel economy standards. It should set a minimum octane standard for gasoline used in light-duty vehicles, and that standard should ensure the use of biofuels, not aromatics, to increase octane – either by setting the standard high enough to preclude the use of aromatics only, or by capping the permissible level of aromatics in fuel (at 12.5%, half the current limit for reformulated gasoline), or both. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

- EPA and NHTSA should review and revise available incentives for alternative fuels to support the use of biofuels. In particular, the agencies should discard their outdated analysis of ethanol's life-cycle greenhouse gas footprint and conform it to the most recent assessments from USDA and Argonne National Laboratory. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

- EPA should revise its MOVES model, which estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxics. A 2014 update based on erroneous modeling assumptions has caused the model to predict incorrectly elevated emissions factors for ethanol blends. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

- More generally, EPA should undertake a thorough revision of its air quality models, which fail to account for secondary organic aerosol – a major contributor to deadly fine particle pollution – and should rely more heavily on atmospheric measurement of pollution levels instead of model predictions. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

Longer-term legislative opportunities

The Renewable Fuel Standard has served its purpose but is not well adapted to the urgent need to reduce greenhouse gas emissions. California's Low Carbon Fuel Standard (LCFS) has demonstrated the value, impact, and effectiveness of market-based price incentives for performance and should be adopted by Congress as a substitute for the RFS. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

- Congress should develop a national LCFS reflecting "the best-available science about the carbon intensity of fuel production, farming practices, land use changes, and crop productivity." Such a standard should reward producers that use "climate-smart practices that reduce carbon emissions, store soil carbon, and reduce nitrous oxide emissions." In particular, credit for soil carbon sequestration under a national LCFS would incentivize farmers to employ improved conservation practices that would minimize the environmental impacts of corn production. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

- Congress should provide incentives to retail gasoline outlets to encourage them to update their refueling infrastructure, including UL-certified pumps and waterproof underground tanks. [EPA-HQ-OAR-2022-0829-0570, pp. 47-49]

Organization: Renewable Fuels Association (RFA)

To achieve the Agency's ambitious emissions reduction goals in the most robust, rapid, and affordable way, EPA should use this rulemaking to encourage multiple additional solutions that can decarbonize light- and medium duty transportation. EPA must also recognize that vehicles and fuels operate as integrated systems. Focusing only on emissions from the vehicle—while ignoring emissions related to the extraction and production of the fuel used to power the vehicle—will almost certainly result in falling far short of the administration's overall climate goals. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

Low-carbon liquid fuels like ethanol have a unique and vital role to play in the administration's efforts to combat climate change and reduce overall emissions from the transportation sector—both immediately and in the long term. Fuels such as E15 (15% ethanol) are compatible with nearly all vehicles on the road today, and thus offer immediate emissions benefits on a much larger scale than changes to only new vehicles. In addition, E85 (51-83% ethanol) used in flexible fuel vehicles (FFVs) can substantially reduce GHG emissions from the light-duty vehicle sector. More than 25 million FFVs are already on the road today and FFV production can be ramped up quickly by automakers at no additional cost to the consumer. In the longer term, low-carbon or zero-carbon liquid fuels used in FFVs or plug-in hybrid electric FFVs can offer emissions solutions for market segments and customers that may not be well served by battery electric vehicles (BEVs). [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

To foster a vibrant and competitive landscape of multiple low-carbon solutions, it is critical for EPA to set performance-based and technology-neutral emissions standards. Unfortunately, the proposed rule falls short of this ideal by focusing narrowly on one technology and only one segment of the GHG emissions lifecycle (i.e., tailpipe emissions). It is essential that EPA look beyond tailpipe emissions; the Agency should use a full lifecycle3 analysis to fairly and accurately compare the climate impacts of all current and future transportation options. [EPA-HQ-OAR-2022-0829-0602, pp. 3-4]

3 Throughout these comments, the terms "full lifecycle analysis" refer to a complete "well-to-wheel" analysis as defined by Argonne National Laboratory.

V. The Proposed Rule Ignores the GHG Reduction Benefits of Ethanol and Other Renewable Liquid Fuels

Renewable fuels like ethanol offer an effective and immediate solution for decarbonizing liquid fuels and ICE vehicles across all segments of the transportation sector. Ethanol has a vital role to play in reducing GHG emissions from the transportation sector, but EPA's proposed emissions standards regrettably fail to provide any mechanisms for capturing these benefits or encouraging greater production and sale of vehicles that can operate on higher levels of low-carbon liquid fuel. [EPA-HQ-OAR-2022-0829-0602, pp. 9-11]

Today's corn starch ethanol already reduces GHG emissions by roughly half, on average, compared to gasoline. According to the Department of Energy's Argonne National Laboratory, typical corn ethanol provides a 44% GHG savings compared to gasoline, even when unverifiable emissions from direct and indirect changes in land cover/land use are included.18 When corn ethanol is compared directly to gasoline (i.e., no indirect emissions included for either fuel), Argonne National Laboratory finds that corn ethanol reduces GHG emissions by 52%, on average, versus gasoline. Similarly, researchers affiliated with Harvard University, MIT, and Tufts University concluded that today's corn ethanol offers an average GHG reduction of 46% versus gasoline, including land use change emissions.19 [EPA-HQ-OAR-2022-0829-0602, pp. 9-11]

18 Lee, U., Kwon, H., Wu, M. and Wang, M. (2021), Retrospective analysis of the U.S. corn ethanol industry for 2005– 2019: implications for greenhouse gas emission reductions. Biofuels, Bioprod. Bioref., 15: 1318- 1331. https://doi.org/10.1002/bbb.2225.

19 Melissa J Scully et al (2021), Carbon intensity of corn ethanol in the United States: state of the science. Environ. Res. Lett. 16 043001. https://iopscience.iop.org/article/10.1088/1748-9326/abde08.

In addition, the California Air Resources Board (CARB) has conducted extensive lifecycle analysis and certified that ethanol produced from the cellulosic biomass found in corn generally reduces GHG emissions by 70-80% compared to gasoline; more than 140 million gallons of ethanol from corn-based cellulosic biomass were used in California in 2021, reducing GHG emissions by nearly 800,000 MT CO2e.20 Overall, CARB found that from 2011 to 2021, the use of ethanol from all feedstocks cut GHG emissions from the California transportation sector by 31 million MT CO2e, more than any other fuel used to meet the state's Low Carbon Fuel Standard (LCFS) requirements.21 All liquid biofuels—including ethanol, renewable diesel, and biodiesel—accounted for 74% of the carbon reductions delivered under the LCFS from 2011 through 2021.22 Similarly, ethanol has generated 45% of the carbon reductions achieved under Oregon's Clean Fuel Program (CFP) since its inception 2016.23 When combined with biodiesel and renewable diesel, liquid biofuels have accounted for 87% of total GHG reductions under the Oregon CFP.24[EPA-HQ-OAR-2022-0829-0602, pp. 9-11]

20 CARB. "LCFS Pathway Certified Carbon Intensities." Viewed Feb. 7, 2023. https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities.

21 CARB. "Low Carbon Fuel Standard Reporting Tool Quarterly Summaries." Viewed Jan. 20, 2023. https://ww2.arb.ca.gov/resources/documents/low-carbon-fuel-standard-reporting-tool-quarterlysummaries.

22 Id.

23 Oregon DEQ. "Quarterly Data Summaries." Viewed Feb. 8, 2023. https://www.oregon.gov/deq/ghgp/cfp/Pages/Quarterly-Data-Summaries.aspx.

24 Id.

With the rapid emergence of new technologies and more efficient practices, even greater GHG reductions are coming to the corn ethanol sector. In fact, analysis by the U.S. Department of Agriculture found that some biorefineries are likely already producing corn starch ethanol that offers a 70% GHG reduction versus gasoline.25 Indeed, the U.S. ethanol industry is well on its way to producing corn ethanol that is fully carbon neutral. With the adoption of CCUS, biogas and renewable electricity substitution, and climate- smart farming practices, corn ethanol is expected to achieve net zero emissions, on average, by 2050 or sooner. [EPA-HQ-OAR-2022-0829-0602, pp. 9-11]

25 Jan Lewandrowski, Jeffrey Rosenfeld, Diana Pape, Tommy Hendrickson, Kirsten Jaglo & Katrin Moffroid (2020). "The greenhouse gas benefits of corn ethanol – assessing recent evidence," Biofuels, 11:3, 361-375, DOI: 10.1080/17597269.2018.1546488 https://www.tandfonline.com/doi/full/10.1080/17597269.2018.1546488.

A landmark 2022 study examined numerous technology pathways for corn ethanol producers to achieve net zero emissions, concluding that "…ethanol producers can achieve extremely low corn ethanol emissions and fill a critical need in tomorrow's zero- carbon economy."26 The study found that the corn ethanol industry is likely to meet its goals of producing net-zero ethanol, on average, well before 2050. In fact, RFA's member companies are so confident about the promise of carbon neutral ethanol that they adopted a resolution in 2021 to achieve a net-zero carbon footprint, on average, for ethanol by 2050 or sooner. This pledge was memorialized in a letter to President Biden in July 2021. [EPA-HQ-OAR-2022-0829-0602, pp. 9-11]

26 Emery, Isaac. Informed Sustainability Consulting (2022). “Pathways to Net-Zero Ethanol: Scenarios for Ethanol Producers to Achieve Carbon Neutrality by 2050.” Prepared for the Renewable Fuels Association. https://d35t1syewk4d42.cloudfront.net/file/2146/Pathways%20to%20Net%20Zero%20Ethanol%20Feb%202022.pdf.

It is important to note that the expansion of low-carbon ethanol production in the United States has not resulted in cropland expansion or conversion of native lands (e.g., forest or grassland) to agriculture. As part of the Renewable Fuel Standard (RFS) program, EPA conducts an annual analysis of U.S. agricultural land area to ensure that the RFS has not caused cropland to expand beyond 2007 levels. Each year, EPA’s analysis continues to show that the amount of land engaged in agricultural production is well below the level in 2007 when the RFS was extended and expanded by Congress. Over the last 10 years, the U.S. agricultural land area has averaged 380 million acres, which is 22 million acres less than the agricultural land area in 2007, according to EPA. [EPA-HQ-OAR-2022-0829-0602, pp. 9-11]

In addition to its environmental benefits, ethanol also makes a vital contribution to our nation’s economy. The 199 ethanol biorefineries across the country serve as crucial drivers of employment and income in the communities in which they operate. Even as Russia’s invasion of Ukraine caused a global energy crisis in 2022, and even as abnormally high inflation rates impacted the U.S. economy, the production of 15.4 billion gallons of ethanol directly employed nearly 79,000 American workers in the manufacturing and agriculture sectors. In addition, the ethanol industry supported 343,000 indirect and induced jobs across all sectors of the economy. Meanwhile, the industry generated $35 billion in household income and contributed $57 billion to the national Gross Domestic Product (GDP) in 2022.27 These significant employment impacts and economic contributions should be taken into consideration by EPA as it examines potential future energy and climate regulatory actions that may impact the biofuels sector. [EPA-HQ-OAR-2022-0829-0602, pp. 9-11]

27 J.M. Urbanchuk (ABF Economics). “Contribution of the Ethanol Industry to the Economy of the United States in 2022.” (February 2023).

Organization: South Dakota Department of Agriculture and Natural Resources (DANR)

Biofuels

The proposed emissions standards and the effort to use regulations to essentially mandate EV use ignores the benefits of continued use of renewable biofuels to power our vehicles. South Dakota's primary industry is agriculture, and we are the nation's fifth-largest ethanol producer. Ethanol is clean burning, renewable fuel used in our existing vehicle fleet allowing our citizens to travel across our state safely and reliably. Instead of working to mandate EV use, DANR recommends EPA look for ways to support the continued production and use of renewable biofuels. [EPA-HQ-OAR-2022-0829-0523, p. 3]

South Dakota is a rural state with a small population, wide open spaces, and clean air. South Dakota is in full compliance or attainment with all federal criteria pollutants and the proposed emissions standards will not significantly improve our air quality. However, by essentially mandating EV use, they will limit the ability of our citizens to live and work in rural South Dakota. [EPA-HQ-OAR-2022-0829-0523, p. 3]

Organization: Stellantis

Improve Fuels and Implement a Nationwide Low Carbon Fuel Standard

Stellantis supports cost effective liquid fuel improvements that enable increased fuel efficiency and reduce emissions. To that end, Stellantis fully supports Auto Innovators' comments on improved liquid fuels, proposed changes to Tier 3 test fuel, and request for EPA to take action now on fuels.8 [EPA-HQ-OAR-2022-0829-0678, pp. 22-23]

8 See Alliance for Automotive Innovation comments submitted to docket EPA-HQ-OAR-2022-0829, U.S. Environmental Protection Agency, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles"; Proposed Rule, 88 Fed. Reg. 29184 (May 5, 2023)

Auto Innovators states in their comments that out of the 290 million light-duty cars and trucks on the road in the United States,9 98% operate on gasoline or diesel fuel.10 Auto Innovators also points out that the average age of a vehicle in the U.S. has grown to over 12 years.11 It's clear, even with the NPRM's projected BEV penetration rate of 67% of new car sales in 2032, the car parc will continue to rely on liquid fuels for years to come. Liquid fuels will continue to play a significant role in transportation and, ultimately, air quality. Improved liquid fuel can benefit the entire parc with immediate impact once deployed and need not rely on turnover or the introduction of new vehicle technology, which can take decades to become widespread. [EPA-HQ-OAR-2022-0829-0678, pp. 22-23]

9 U.S. Vehicle Registration Statistics, Hedges & Company, https://hedgescompany.com/automotive-market- research-statistics/auto-mailing-lists-and-marketing/ (accessed May 23, 2023).

10 Figures compiled by Alliance for Automotive Innovation with registered vehicle data provided by IHS Markit, https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard. (accessed May 23, 2023)

11 U.S. Vehicle Registration Statistics, Hedges & Company, https://hedgescompany.com/automotive-market- research-statistics/auto-mailing-lists-and-marketing/ (accessed May 23, 2023).

Improved liquid fuels will complement, not compete with, other technologies like electrification. Improving liquid fuels can provide significant reductions in GHG and non-GHG emissions from ICE equipped vehicles, engines, and equipment while the EV market grows. For example, implementation of a national low carbon fuel standard could act as a market-based approach to decarbonizing transportation fuel and provide revenue sources to incentivize market adoption of EVs. Eliminating a small fraction of heavy boiling aromatics in gasoline can significantly reduce PM emissions from all spark-ignited vehicles and engines. Capping the sulfur content of gasoline to no more than 10 ppm will enable advanced emissions control technology and will reduce the impact of sulfur on catalyst efficiency. Capping summer vapor pressure of gasoline to 9.0 psi or less, regardless of ethanol content, further reduces evaporative emissions. Additionally, octane is a critical fuel parameter for ICE vehicles, and low octane fuels (sub-87 anti-knock index) remain a barrier to market introduction of more efficient ICE vehicles. Furthermore, transitioning to a higher minimum-octane gasoline (i.e., minimum 95–98 research octane number) would enable increased engine efficiency in new ICE vehicles. EPA should act now to improve liquid fuels, treat vehicle and fuels as a system and leverage the opportunities that improved liquid fuels provide to the approximately 290M vehicles in the car parc. [EPA-HQ-OAR-2022-0829-0678, pp. 22-23]

Organization: Strong Plug-in Hybrid Electric Vehicle (PHEV)

In the longer term, EPA, the DOE or the national labs should conduct an analysis on the value of PHEVs as a platform for low-carbon alternative fuels including whether to allow PHEVs with 85% or more low carbon liquid biofuels blended with gasoline to be treated as zero- emission vehicles (ZEVs) in future EPA regulations. The main issue to be studied is feedstock availability in the long run for both diesel and gasoline substitutes that could be used in PHEVs to make them have lower life cycle emissions. Related environmental issues could be studied. [EPA-HQ-OAR-2022-0829-0646, pp. 9-10]

Justification: Some biomass feedstocks used in gasoline can't or won't be used in diesel or jet fuel powered transportation. This should result in large amounts of unused feedstocks because biomass feedstocks for spark-ignited engines may not be needed in the long run (e.g.,2050) for transportation or industrial uses. However, using some of these existing feedstocks would make future PHEVs have even lower full fuel cycle GHG emissions than they have today. Strong plug-in hybrid cars and light trucks using gasoline already can have lower GHG than long range electric cars and light trucks due to the GHG emissions from battery manufacturing and the slightly poorer fuel economy of long-range BEVs. (See Appendix B in this letter). [EPA-HQ-OAR-2022-0829-0646, pp. 9-10]

CARB-funded research by UC Davis,13 shows a PHEV 60 has the same life cycle GHG emissions as a Tesla model S because of the weight of the Tesla and it has fewer GHG life cycle emissions than a heavier BEV with 400- or 500-mile AER. See the first chart below. Toyota's publicly available tool also correctly shows this result.14 Furthermore, the UC Davis analysis does not include battery manufacturing GHG emissions. Using data from the USDOE cradle to grave analysis,15we estimate that adding 350 miles more of AER adds about 10 grams per mile of GHG emissions to the above analysis for a light duty EV. See the next three charts below. Further, a flex fuel vehicle requirement to enable low carbon fuels for these stronger PHEVs would further lower their life cycle GHG. [EPA-HQ-OAR-2022-0829-0646, pp. 18-20]

13 https://ww2.arb.ca.gov/sites/default/files/2020-06/12-319.pdf Figure 82

14 GitHub - khamza075/PVC: A software for assessing the efficacy of various vehicle powertrains at mitigation of greenhouse gas emissions . Also see https://app.carghg.org/

15 See page 143 at https://greet.es.anl.gov/publication-c2g-2016-report. Extrapolate from 210 to 410-mile all electric range and divide by 150,000-mile vehicle life.

[See original for graph titled "BEV Households Have a Lower Average GHG Per Mile"] [EPA-HQ-OAR-2022-0829-0646, pp. 18-20]

[See original for graph titled "GHG Reductions of Strong PHEVs Compared to Large BEVs without Battery Manufacturing"] [EPA-HQ-OAR-2022-0829-0646, pp. 18-20]

[See original for graph titled "GHG Reductions of Strong PHEVs Compared to Large BEVs with Battery Manufacturing"] [EPA-HQ-OAR-2022-0829-0646, pp. 18-20]

[See original for graph titled "PHEVs Can Match BEVs on GHGs"] [EPA-HQ-OAR-2022-0829-0646, pp. 18-20]

Organization: T. Becker Power Systems

1- It is unlawful for EPA to thwart or prevent the implementation of any technology that has the ability to meet the environmental goals of any rule or regulation proposed by EPA. [EPA-HQ-OAR-2022-0829-0567, p. 1]

2- This proposed rule/regulation intentionally thwarts the use of liquid and gaseous fuel technologies that, if implemented, can meet the air quality goals of the proposed rule. [EPA-HQ-OAR-2022-0829-0567, p. 1]

Organization: Toyota Motor North America, Inc.

5. We encourage EPA to consider a role for low-carbon liquid fuels (LCLFs) in future rulemaking. This is the only viable option to reduce GHG emissions from the existing U.S. fleet of 270 million vehicles. Regardless of how quickly the needed shift to electrification occurs, vehicles with internal combustion engines (ICEs) will be on U.S. roads in large numbers for decades to come. Failure to provide a GHG-reduction solution for this massive source of emissions would be missing an enormous opportunity. [EPA-HQ-OAR-2022-0829-0620, p. 2]

5. GHG Program

The Proposed Rule fails to demonstrate the penetration of BEVs assumed for compliance with the proposed standards is feasible. The proposal notes “While emission standards set by the EPA under CAA section 202(a)(1) generally do not mandate use of particular technologies, they are technology-based, as the levels chosen must be premised on a finding of technological feasibility.”17 CAA section 202(a)(1) states “Any regulation prescribed under paragraph (1) of this subsection (and any revision thereof) shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.”18 [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

17 88 Fed. Reg at 29232.

18 42 U.S.C. § 7521(a)(2).

The aggressive ramp up of BEVs (see Table 1) required to comply forces a rapid transformation of how vehicles are manufactured, driven, fueled, and serviced. As such, “leadtime and requisite technology” must extend to the availability of critical minerals, the readiness of a sustainable battery supply chain and fueling infrastructure, as well as other market-related factors that will affect the price and consumer demand of BEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

[Table 1 Annual BEV Penetration Assume for Compliance w/ Proposed Standards [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

MY 2027: BEV Share 36

MY 2028: BEV Share 45

MY 2029: BEV Share 55

MY 2030: BEV Share 60

MY 2031: BEV Share 63

MY 2032: BEV Share 67]

Today's PEV support system clearly cannot meet the needs of the future envisioned by the proposal. Our comments explain why the proposal lacks a clear justification for how the support system will be in place over the period of the proposed standards. Neither EPA nor auto manufactures can control the timing or outcomes of these essential support measures. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Therefore, it is disappointing that EPA removed the e-RIN proposal from the RFS set rule as it is one of the few measures for which EPA has direct authority to provide at least some level of assistance in supporting the EV shares required in the GHG proposal. After a muti-year collaboration with the auto industry, a valuable policy tool for establishing PEV markets and promoting clean energy has been lost. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Finally, EPA has taken a more measured view of technology risk and uncertainty in past vehicle emissions rulemakings in which technology costs were lower and automakers had significantly more direct control over managing their technology development, deployment, and sales mix to comply. In this Proposed Rule, EPA appears to be taking a much more cavalier approach to risk, lead time, and ensuring the "requisite technology" is available, despite the high cost of BEVs, the massive uncertainty around mineral supplies, the significant investment needed in charging infrastructure and the power grid, and the uncertain market demand for BEVs. The standards in the Final Rule should be adjusted to better account for market uncertainties. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

8. Low Carbon Fuels

EPA needs to return to treating fuels and vehicles as a holistic system to capture the benefits of low carbon fuels. Low carbon liquid fuels are (1) technically feasible today, (2) the only viable decarbonization solution for the legacy vehicle fleet, (3) an important complement to vehicle electrification over a long transition, and (4) factor for a range of consumers whose needs or budgets require different solutions. [EPA-HQ-OAR-2022-0829-0620, pp. 46-48]

Toyota has been working with fuels industry partners to demonstrate the technical feasibility of low carbon fuels today. In April 2023, Toyota announced work with ExxonMobil to test research fuels in Toyota's advanced engines and vehicles. ExxonMobil reports their innovative fuels have potential to reduce greenhouse gas emissions up to 75% compared to conventional fuels available today.36 During that same month, Toyota and Chevron demonstrated a real-world use-case of Chevron's Renewable Gasoline Blend (RGB). Toyota and Chevron drove three Toyota vehicles almost 1,000 miles across parts of Mississippi, Louisiana, and Texas. Chevron reports a 40% lower carbon intensity for Chevron RGB compared to traditional gasoline on a lifecycle basis. These low carbon liquid fuels are compatible with the existing vehicle fleet and existing infrastructure and are technically feasible today. The US ethanol industry continues to make great strides in reducing carbon the carbon intensity of their product. In a 2021 study, researchers from Harvard, Tufts, and EH&E estimated corn ethanol was 46% lower carbon intensity compared to average gasoline.37 The Renewable Fuels Association reports their fuel producing members aim to reduce their lifecycle ethanol GHG by at least 70% on average compared to gasoline by 2030, and achieve net- zero lifecycle GHG by 2050.38 Since the vast majority of the 280 million vehicles on US roads today have an internal combustion engine, decarbonizing liquid fuels on a well-to-wheel basis would yield immediate benefits for lowering the carbon intensity of transportation energy. [EPA-HQ-OAR-2022-0829-0620, pp. 46-48]

36 Reductions in Carbon Intensity (CI) estimates are based on the lifecycle greenhouse gas emission of the fuels tested at Toyota's Research Center, compared to petroleum gasoline. Estimated CI values are based on either GREET 2021 estimates, or feedstock Proof of Sustainability documents. Actual results may vary.

37 Melissa J Scully et al 2021 Environ. Res. Lett. 16 043001.

38 Renewable Fuels Association. (2021, July 27). RFA Pledge to President: Ethanol to Achieve Net Zero Emissions by 2050 or Sooner Link: https://ethanolrfa.org/media-and-news/category/news-releases/article/2021/07/rfa-pledge-to- president-ethanol-to-achieve-net-zero-emissions-by-2050-or-sooner.

Low carbon fuels are an additional pathway for reducing transportation GHG. This pathway offers a hedge against uncertainties that could affect the pace of electrification, such as critical mineral supply and charging infrastructure development. The combination of low carbon fuels with hybrids and PHEVs shows excellent overall GHG performance while optimizing usage of potentially scarce critical minerals. In this way, low carbon fuels would be complementary to vehicle electrification and future GHG goals during the long energy transition. [EPA-HQ-OAR-2022-0829-0620, pp. 46-48]

Low carbon fuels preserve consumer choice on vehicles while still supporting decarbonization of transportation energy. Proposed regulations should factor for a range of consumers whose needs or budgets require different solutions. Vehicle electrification will proceed at different paces in different regions. Full vehicle electrification could take longer in rural areas or other locations lacking sufficient charging infrastructure. If forecasts for future battery costs prove inaccurate, it would have disparate impact on different socioeconomic levels. A diverse set of solutions offers more certainty of both emissions reductions and affordability, which is consistent with environmental justice objectives. Low carbon liquid fuels are an important part of enabling all vehicle owners/users to play a role in reducing emissions. [EPA-HQ-OAR-2022-0829-0620, pp. 46-48]

Organization: Transfer Flow, Inc

Transfer Flow disagrees with EPA's transportation technology biases.

A singular fixation focusing only on tailpipe emissions reduction does not consider important life-cycle emission analysis.1 Vehicular emissions should be considered from the cradle to the grave, from manufacturing and usage to end-of-life disposal of both the vehicle and the energy used to power the vehicle or equipment. Requiring new vehicles sold to either be battery electric vehicles (BEVs), plug-in electric hybrids (PHEV), or fuel-cell battery electric vehicles crowds out other near-zero technologies. Implementation of any and all available near-zero technologies should be encouraged for a multitude of reasons. [EPA-HQ-OAR-2022-0829-0496, pp. 1-2]

1 https://www.youtube.com/watch?v=S1E8SQde5rk

All near-zero technologies should be ramped up and implemented as quickly as feasible in order to help meet the EPA's pollution prevention goals. Encouraging the sales of all new vehicles or equipment to contain some sort of electric vehicle technology and, therefore, also contain a heavy-duty battery instead of encouraging the adoption of the plethora of currently available near-zero technologies is a disservice to the citizens of our great country. [EPA-HQ-OAR-2022-0829-0496, pp. 1-2]

It's going to take a suite of technologies to achieve carbon neutrality.

The EPA's technology bias serves to stymie other clean technologies currently being implemented. The anaerobic practices that create renewable natural gas and biofuels created by keeping organic matter out of landfills should be encouraged. [EPA-HQ-OAR-2022-0829-0496, pp. 5-6]

One of the major contributing factors to the devastating wildfires affecting California over the last several years is, besides climate change, decades of forest mismanagement leading to unhealthy forests filled with rotting biomass. A healthy forest is a carbon sink, and an unhealthy forest is a carbon source. In 2022, UC Berkeley published a study that the best way to clean up these unhealthy forests would be to convert that rotting biomass into renewable drop-in gasoline, which requires no change in behavior from consumers.25 It's simply a different and compatible product being dispensed from the gasoline refueling station. [EPA-HQ-OAR-2022-0829-0496, pp. 5-6]

25 https://bof.fire.ca.gov/media/mn5gzmxv/joint-institute-forest-biofuels_final_2022_ada.pdf

The infrastructure buildout and grid reliability needed to support fleet electrification will take considerable time and funding to achieve. The basic strategy of electrifying transportation delays our dependency on fossil fuels and falls short of immediately reducing greenhouse gas emissions with currently available technologies as well as significantly mitigating short-term criteria pollutants methane, black carbon, and CO2. All near-zero transportation technologies, electric, fuel cell, biofuels, renewable natural gas, biodiesel, renewable diesel, sustainable aviation fuels26, and hydrogen internal combustion engines27'28'29'30'31'32'33 are all needed to drive our great nation towards a sustainable future. [EPA-HQ-OAR-2022-0829-0496, pp. 5-6]

26 https://prometheusfuels.com/

27 https://www.autonews.com/technology/toyota-cummins-invest-hydrogen-combustion-engines

28 https://www.act-news.com/news/hydrogen-internal-combustion-mobility-is-here/

29 https://www.equipmentworld.com/alternative-power/article/15306854/why-hydrogen-combustion-engines- not-fuel-cells-are-jcbs-future

30 https://www.act-news.com/news/hydrogen-internal-combustion-mobility-is-here/

31 https://www.hydrogenfuelnews.com/hydrogen-powered-vehicles-classic/8555907/

32 https://learning.sema.org/products/hydrogen-fueled-ice-for-performance-application#tab-product_tab_overview

33 https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/how-hydrogen-combustion- engines-can-contribute-to-zero-emissions

Transfer Flow suggests the EPA encourage usage of all near-zero technologies. [EPA-HQ-OAR-2022-0829-0496, pp. 5-6]

Organization: Transport Evolved LLC (Transportation Consultancy)

3) While calls have been made (mostly from the fossil fuel industry) for the EPA to adopt a "Well to Wheel" calculation, due to the poor quality of data available from the oil and gas industry on the amount of pollution produced, at this point a shift to 'Well to Wheel' calculation would be highly counterproductive.4,5 Should the fossil fuel industry provide accurate, timely and thoroughly researched, independently verified data on the amount of pollution it produces, then it might be more viable, but given the substantial secondary effects (as noted above) it seems incredibly difficult to quantify the harms to society from continuing to allow significant fossil fuel extraction for energy use. [EPA-HQ-OAR-2022-0829-0453, p. 2]

4 https://climatetrace.org/news/more-than-70000-of-the-highest-emitting-greenhouse-gas.

5 https://www.iea.org/news/methane-emissions-from-the-energy-sector-are-70-higher-than-official-figures.

Organization: U.S. Chamber of Commerce

American businesses are playing an essential role in addressing climate change, and the business community is an essential partner in the development of sound policies that protect our environment. We strongly support the continued transition to lower-carbon fuels and vehicles, and are committed to partnering with EPA, the Department of Transportation, and other federal stakeholders to facilitate a successful transition. [EPA-HQ-OAR-2022-0829-0604, p. 1]

EPA Summary and Response

Summary:

Numerous commenters stated that millions of ICE vehicles will remain in widespread use for many years, so it will be beneficial for EPA to incentivize lower-carbon liquid fuels alongside the phase-in of BEVs. Several commenters criticized EPA's proposal for being too narrowly focused on BEVs while ignoring a broader array of options like biofuels and hybrid powertrains. A commenter asserted that EPA has the authority to regulate fuels and vehicles as a holistic system in reducing GHGs.

Some said EPA should put in place a federal low-carbon fuel standard, citing California's program as an example, while others suggested providing certification pathways for higher octane and higher ethanol blends, setting a 95 RON requirement for market fuel, and eliminating fuels with AKI below 87. A commenter encouraged EPA to consider the broad range of fuel-related options that are proven and could be cheaper and faster than widespread rollout of BEVs, including co-processing of biofeedstocks with petroleum, methane production from waste digesters, and carbon capture and sequestration.

Several commenters disagreed with EPA's analyses counting zero CO_2 emissions from EVs, saying that a full lifecycle analysis was needed to evaluate a full range of options, including liquid fuels, and truly make the standards technology-neutral. A commenter stated that Flex-Fuel PHEVs operated on E85 can provide lifecycle GHG performance equivalent to BEVs. Another noted that a proper lifecycle analysis for liquid fuels has not been possible because of the poor quality of data being released by the oil and gas industry, and thus it may be difficult to quantify the harms to society from continued fossil fuel use.

Commenters from biofuel groups highlighted the many hurdles and uncertainties in international supply chains for battery production, meanwhile the domestic ethanol industry has been producing billions of gallons of low-carbon fuel each year while continually reducing their lifecycle emissions. They noted that expansion of ethanol blends can be done with minimal additional infrastructure, something that EPA could further incentivize by establishing carbon intensity factors, FFV multipliers, revising the fuel economy R-factor for E10 test fuel to 1.0, and recognizing ethanol's potential as a high-octane replacement for aromatics. A commenter suggested there is additional potential for net GHG reductions through properly valuing and incentivizing low-carbon agricultural practices where, for example, farmers could earn LCFS credits for acres managed according to certain guidelines. Some ethanol and corn producers stated that they expect rapid vehicle electrification to reduce corn demand and prices, eliminating biofuel jobs and hurting rural communities.

Response:

Implicit (or in some cases, explicit) in many of these comments is that the proposed standards in some manner mandate use of BEVs. They do not. As explained in preamble Sections I and III and RTC 2.3, the final standards are numerical performance-based standards, and can be met in any manner an automaker sees fit that achieves compliance with that numerical standard. In assessing a modeled potential compliance pathway that includes a range of technologies that include ICE vehicles, hybrids, PHEVs, and BEVs, EPA was illustrating one possible approach for compliance as part of its conclusions that the final standards are feasible and appropriate; EPA was not requiring that manufacturers utilize that modeled potential compliance pathway. This is the Agency's approach for all of its CAA Title II standards, following the template set forth initially by the D.C. Circuit in NRDC v. EPA, 655 F. 2d at 332, and echoed many times since in succeeding rules and court opinions.

These standards are vehicle emission standards, and EPA considers all comments asserting that EPA must, or should, set or determine compliance with such standards in a manner other than by reference to emissions from the vehicle as comments asserting that EPA must, or should, consider life cycle assessment. For EPA's response to comments on life cycle assessment, see the next RTC section, 19.2.

EPA recognizes that changes to fuel requirements can result in emission reductions but disagrees that such changes are within the scope of this rulemaking or that EPA is required to consider them as alternatives to this rulemaking, which is concerned with vehicle and engine standards under section 202(a). The CAA has a separate and distinct set of requirements for engaging in fuels regulations and EPA has not at this point undertaken the requisite analyses to regulate GHGs under section 211(c). Indeed, section 211(c)(2)(A) provides that fuel may not be regulated to control harmful air pollution except after "consideration of other technologically or economically feasible means of achieving emissions standards under section [202]." Thus, it is entirely appropriate (if not required) for the Administrator to take the technologically and economically feasible steps of this rule before undertaking further controls on fuels to address emissions reduction.

In light of this statutory structure, with very different regulatory programs for vehicles standards under section 202 and fuels standards under section 211, EPA disagrees that it is required to consider fundamentally altering this rulemaking from a vehicles rulemaking to a fuels rulemaking. "While an agency must consider and explain its rejection of 'reasonably obvious alternative[s],' it need not consider every alternative proposed nor respond to every comment made. Rather, an agency must consider only 'significant and viable' and 'obvious' alternatives." *Nat'l Shooting Sports Found., Inc. v. Jones*, 716 F.3d 200, 215 (D.C. Cir. 2013) (citations omitted). At this point, given that EPA has not met the statutory prerequisites for new fuels controls, much less proposed new fuels controls, the adoption of new fuels controls is not a viable alternative. For these reasons, EPA considers comments in support of adopting changes to fuels requirements as beyond the scope of this rule.

EPA of course continues to separately implement the Renewable Fuel Standard (RFS) program, which provides requirements and incentives to encourage the domestic consumption of low carbon liquid fuels, including cellulosic fuels, under the RFS program pursuant to section 211(o) of the CAA. The most recent renewable fuel standards require the largest volumes to date of renewable fuel use in the U.S. transportation sector. (See 88 FR 44468, July 12, 2023).

19.2 - Life cycle analysis

Comments by Organizations

Organization: 25x'25 Alliance, et al.(25X25)

3) adopts a life-cycle analysis approach to calculating and comparing emissions from different technologies. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

Embracing and enabling a pathway to improve fuel quality will increase and accelerate emission reductions, improve public health, help achieve environmental justice goals, provide greater versatility, and improve reliability all at less cost. This pathway is available to EPA and the consideration of it is demanded by the Clean Air Act. The best and most recent data suggests that the adoption of even mid-level ethanol blends would reduce pollution emissions at least as much as EPA's electrification approach, and at far less cost.

Even if EPA's electrification program could be successful—and as explained above, it cannot—a complimentary fuel improvement would double EPA's projected emissions reduction. The current rule takes this option off the table and leaves those pollutants in the air. EPA could do far better. [EPA-HQ-OAR-2022-0829-0573, pp. 1-4]

1 See "Higher Ethanol Blends Support the Transition to a Low-Carbon Future," Brian West, SAE Update, February 2023, pp2-6) National adoption of mid-level ethanol blends is available, feasible, and lower cost than current gasoline. https://www.nxtbook.com/smg/sae/23UPD02/index.php#/p/2

Organization: Alliance for Automotive Innovation (Alliance)

E. Comments on Estimated Social benefits of the CO2 Standards

In this section, Auto Innovators comments on the major categories of estimated social benefits for the CO2 performance standards for model years 2027-2032. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

1. Local/Regional Air Quality benefits from Control of Criteria Air Pollutants

The final regulatory impact analysis should acknowledge that the peer-reviewed scientific literature does not generally support the agency's claim that a shift from ICEs to BEVs in the light-duty sector will reduce criteria air pollution across the country. In 2021, Burnham et al. of Argonne National Laboratory (DOE) presented a regional U.S. lifecycle analysis of the impact of BEVs through 2050, accounting for upstream emissions of criteria air pollutants at the powerplant. The abstract of their paper concludes as follows: [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

We generated state-level emission factors using a projection from 2020 to 2050 for three light-duty vehicle types. We found that BEVs currently provide GHG benefits in nearly every state, with the median state's benefit being between approximately 50% to 60% lower than gasoline counterparts. However, gasoline vehicles currently have lower total NOx, urban NOx, total PM2.5, and urban PM2.5 in 33%; 15%; 70%; and 10% of states, respectively. BEV emissions will decrease in 2050 due to a cleaner grid, but the relative benefits when compared to gasoline vehicles do not change significantly, as gasoline vehicles are also improving over this time. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

The results of this study concerning total PM2.5 are especially concerning because the agency's quantified criteria-pollutant benefits in this rulemaking are dominated by an alleged advantage of BEVs with respect to PM2.5 control. Moreover, the lifecycle analysis by Burnham et al. (2021) is published in the peer-reviewed literature, while the agency's lifecycle inputs and analysis have not been peer reviewed by qualified experts. For the final rule, Auto Innovators believes it is unwise for the agency to rely on its lifecycle analysis of criteria air pollutant control as a primary rationale for the final rule. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Insofar as criteria air pollution control is considered a primary rationale for a rule that regulates CO2 emissions, we recommend that the agency go beyond an analysis of average ICE emissions and consider "best-in-class" vehicle emissions in the baseline. For example, in a peer-reviewed contribution, Winker et al. (2018) compared HEVs and BEVs in terms of criteria air pollution emissions. When the upstream emissions from BEVs are included, they find that BEV emissions are 0.06 grams per mile (NOx) while average HEV emissions are 0.004 grams per mile (NOx and HC). The results of Winkler et al. are consistent with an earlier paper by Michalek et al. (2011), which found that HEVs and PHEVs, with small battery packs, are environmentally and economically superior to BEVs. Thus, HEVs may be a superior technological option for criteria air pollution control than BEVs, at least in some regions of the country and until the upstream and manufacturing emissions of BEVs are controlled. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

1. Andrew Burnham, Zifeng Lu, Michael Wang, Amgad Elgowainy. Regional Emissions Analysis of Light-Duty Battery-Electric Vehicles. Atmosphere. 12(11). 2021, 1482.

2. S.L. Winkler, J.E. Anderson, L. Garza, W.C. Ruona, R. Vogt, T.J. Wellington. Vehicle Criteria Pollutant (PM, NOx, CO and HCx) Emissions: How Low Should We Go? Climate and Atmospheric Science. 1. 2018, 26.

3. Jeremy J. Michalek, Mikhail Chester, Paulina Jaramillo, Lester B. Lave. Valuation of Plug- In Vehicle Life-Cycle Air Emissions and Oil Displacement Benefits. Proceedings of the National Academy of Sciences. 108(40). 2011, 16554-16558. [EPA-HQ-OAR-2022-0829-0701, pp. 285-288]

2. Climate Change Benefits

Auto Innovators sees CO_2 emissions control as the primary rationale for the agency's rulemaking. We urge the agency to take great pains to ensure that the CO_2 benefits in the final RIA are not exaggerated significantly, as this will make the entire rulemaking vulnerable to reversal, which will create tremendous regulatory uncertainty for our members. The agency's IPM modeling contains three glaring errors or exaggerations that contribute to an overestimation of the CO_2 emissions benefits of the rule. [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

First, the state-of-the art lifecycle analyses (LCAs) of BEVs in the scientific literature account for the upstream emissions associated with a BEV's use of the electrical grid and the emissions associated with the supply chain of lithium ion batteries for use in BEVs (e.g., Peters et al, 2017; Hall and Lutsey, 2018; Cox et al, 2020; Koroma et al, 2020; Woody et al 2022). EPA's LCA tries to account for the grid-related emissions within the IPM model but ignores the CO_2 emissions in the supply chain of lithium ion batteries. This is a serious error because the production of lithium ion batteries requires enormous amounts of energy, especially in the mining and processing of raw materials. The MIT group estimates that building a new EV can produce up to 80% more GHG emissions than building a comparably-sized gasoline-powered vehicle. The ICCT study that EPA cites attributes approximately 100 grams per kilogram of CO_2 to a model year 2021 BEV – 60% from grid-related emissions, 40% from battery production (primarily mining and processing of raw materials in the BEV supply chain). [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

In the structure of EPA's analysis, the battery-production emissions, once added, will be even more important than the grid-related emissions because they occur immediately, in the years that the BEVs are produced (model years 2027 to 2032); they do not gradually decline over the lifetimes of the vehicles as the grid becomes cleaner. The U.S. will not be able to build its own mining and processing sector quickly (e.g., due to permitting obstacles), as standard timelines for new lithium mines in the U.S. are 7 to 12 years. The BEVs sold in the United States from 2027 to 2032 will likely make use of mined and processed materials from countries around the world (e.g., the average grid-associated emissions in 2022 were 530 g/kWh CO_2 in China compared to 368 g/kWh in the United States). Over the long run, the Inflation Reduction Act may reduce the amount of CO_2 emissions in the battery supply chain, but the IRA is unlikely to have much impact on mining and processing in the United States between 2023 and 2027-2032, and the new mining/processing sites in the U.S. may access energy from powerplants using fossil fuels. [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

Sources: [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

1. William Boston. EVs Don't All Affect Climate the Same. Wall Street Journal. May 11, 2023, B1, B4.

2. MIT Climate Portal. Are Electric Vehicles definitely Better for the Climate than Gas- Powered Vehicles? October 13, 2022.

3. Georg Bieker. A Global Comparison of the Life-Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars. White Paper. International Council on Clean Transportation. Washington, DC. July 20, 2021.

4. M. Woody, P Vaishnaw, GA Keolian et al. The Role of Pickup electrification in the Decarbonization of Light-Duty Vehicles. Environmental Research Letters. 17(3). 2022, 034031.

5. JF Peters, M Baumann, B. Zimmerman, J Braun, M. Weil. The Environmental Impact of Lithium-Ion Batteries and the Role of Key Parameters – A Review. Renewable and Sustainable Energy Reviews. 67. 2017, 419-506.

6. D Hall, N Lutsey. Effects of Battery Manufacturing on Electric Vehicle Lifecyle Greenhouse Gas Emissions Briefing. ICCT. February 2018.

7. Cox, C Bauer, A Mendoza Beltran, DP van Vuuren, CL Mutel. Life Cycle Environmental and Cost Comparison of Current and Future Passenger Cars Under different Energy Scenarios. Applied Energy. 269. 2020. Article 115021.

8. MS Koroma, N. Brown, G. Cardellini, M Messagie. Prospective Environmental Impacts of Passenger Cars Under different Energy and Steel Production Scenarios. Energies. 13. 2020, 6236. [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

Third, as mentioned earlier, the EV deployment induced by the EPA rule will occur predominantly in non-ZEV states while the EPA rule will have little incremental effect on EV deployment in the ZEV states (which account for 30-40% of the new vehicle population). The ICCT study that EPA cites reports that, in 2019, the California grid produced only 225 g/kWh CO2 while the U.S. average grid (even accounting for a gradually cleaner grid from 2021 to 2038) produces 357 g/kWh. Thus, the grids in the non-ZEV states are associated with much larger emissions than the grids in the ZEV states. Funke et al. (2023, p. 43 and Figure B3, Appendix B) make the same point with information on the grids in all ZEV states (not just California). To avoid exaggerating the climate benefits of the rule, the agency should assume that most of the BEVs deployed due to the role will be in non-ZEV states that, today, have more carbon-intensive electricity sectors. [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

Source:

1. Christoph Funke, Joshua Linn, Sally Robson, Ethan Russell, Daniel Shawhan, Steven Witkin. What Are the Climate Air Pollution and Health benefits of Electric Vehicles? Resources for Future. Washington, DC. January 2023. [EPA-HQ-OAR-2022-0829-0701, pp. 288-289]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA exacerbates that arbitrarily selective approach in the proposed rule's method for measuring compliance. EPA proposes to determine whether man- ufacturers' fleets meet the new standards based solely on their tailpipe emissions—disregarding the other downstream and all upstream emissions caused by producing and operating vehicles. EPA's proposal thus would skew producers' and purchasers' incentives toward electric vehicles even though they may increase emissions overall. [EPA-HQ-OAR-2022-0829-0683, p. 5]

EPA's Analysis Of Net Emissions Is Flawed

EPA estimates that the proposed rule will result in a net reduction of GHG, criteria air pollutant, and air toxic emissions in 2055. See 88 Fed. Reg. at 29,198. That estimate is dubious. In numerous ways, EPA has underestimated the up-stream emissions—i.e., those that do not come from the vehicle itself but can still be attributed to its manufacture and operation—that will result from a widespread shift to electric vehicles. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

First, EPA improperly cabins its upstream analysis to only those emissions caused by electricity generating units ("EGUs") and refineries. See 88 Fed. Reg. at 29,198, 29,347, 29,353, 29,355; Draft RIA at 9-32–33. But the emissions as-sociated with powering a vehicle—whether by electricity from an EGU or fuel from a refinery—are far from the only ones reasonably attributed to its opera-tion. Depending on the vehicle, there are also emissions associated with pro-ducing, recycling, and disposing of batteries; operating charging infrastructure; and extracting, refining, transporting, and storing petroleum fuels. These emis-sions can be substantial and, when considered together, may undermine EPA's assumption that swapping internal-combustion-engine vehicles for electric ones will necessarily result in an environmental good. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

The International Energy Agency's discussion of emissions from mining il-lustrates this point. According to the IEA, "the production and processing of energy transition minerals are energy-intensive" and involve "relatively high emission[s]." Role of Critical Minerals at 15, 130; see also Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet, Am. Transp. Rsch. Inst., https://ti-nyurl.com/3ktjd85v ("Mining and processing produce considerable CO2 and pollution issues."). For this reason, producing an electric vehicle is a more car-bon-intensive process than producing a conventional one. Role of Critical Miner-als at 194. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

EPA never explains why emissions from EGUs and refineries are the only ones relevant to the analysis. Instead, it acknowledges that "[t]he upstream emissions inventory does not account for all upstream sources related to vehicles, fuels, and electricity generation, such as charging infrastructure, stor-age of petroleum fuels, battery manufacture, etc." Draft RIA at 8-14. But EPA makes no attempt to justify that selective, incomplete approach. [EPA-HQ-OAR-2022-0829-0683, pp. 55-56]

Moreover, EPA's current position marks a change from settled agency prac- tice. In earlier GHG and criteria-pollutant rulemakings, the agency did con- sider additional upstream sources in assessing net emissions. See SAFE Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, 85 Fed. Reg. 24,174, 24,872 (Apr. 30, 2020) (noting that emissions "model accounts for up- stream emissions" from "extraction, transportation, refining, and distribution of . . . fuel"); Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57,106, 57,301 (Sept. 15, 2011) ("To project these impacts, EPA estimated the impact of reduced pe- troleum volumes on the extraction and transportation of crude oil as well as the production and distribution of finished gasoline and diesel."); Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, 81 Fed. Reg. 73,478, 73,852 (Oct. 25, 2016) ("To project these impacts, Method B estimated the impact of reduced petroleum volumes on the extraction and transportation of crude oil as well as the production and distribution of finished gasoline and diesel."). The agency has not acknowl- edged its change in position here, let alone explained "why the new approach" of ignoring these upstream emissions "better comports with . . . the provisions that Congress enacted." Am. Fed'n of Gov't Emps. v. FLRA, 25 F.4th 1, 12 (D.C. Cir. 2022). That is reason enough to conclude that "the [agency] has not, in fact, engaged in reasoned decisionmaking." Id. (internal quotation marks and brackets omitted). Nor could EPA offer a valid explanation for its change. Up- stream emissions are more important in the current rulemaking than they were in previous regulations given that EPA, for the first time, intends to effectively mandate widespread adoption of electric vehicles, which (as explained above) produce emissions primarily through upstream sources. [EPA-HQ-OAR-2022-0829-0683, p. 56]

Finally, EPA may be substantially overestimating the decrease in refinery emissions. The agency's "central analysis estimates that . . . reduced liquid fuel demand results in reduced domestic refining." 88 Fed. Reg. at 29,358; see also id. at 29,198, 29,353. But at the same time, EPA "recognize[d] that there is significant uncertainty in the impact on refinery emissions due to decreased demand." Draft RIA at 8-12. Indeed, there is a distinct "possibility that reduced domestic demand for liquid fuel would have no impact on domestic refining." 88 Fed. Reg. at 29,358 (emphasis added); see Draft RIA at 8-12 ("If refineries do not decrease production in response to lower domestic demand" and "in- crease exports" instead, total upstream emissions "would be higher," not lower. (emphasis added)). EPA must explain the basis for its assumption that refiner- ies will decrease production before it factors these sizeable reductions into the calculation. See Int'l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 645 (D.C. Cir. 1973) (explaining that EPA must "support its methodology as reliable" with more than "speculation"). [EPA-HQ-OAR-2022-0829-0683, p. 58]

In sum, EPA's analysis of upstream emissions rests on unfounded assump- tions and methodological choices that are skewed in favor of the proposed rule. EPA should withdraw its proposal and conduct a more thorough assessment of the ways in which a widespread shift to electric vehicles will impact overall emissions.7 [EPA-HQ-OAR-2022-0829-0683, p. 58]

7 EPA's superficial analysis of upstream emissions also undermines its discussion of "the envi- ronmental justice impacts of [its] proposal." 88 Fed. Reg. at 29,393; see id. at 29,199, 29,393–97. Although the agency acknowledges that upstream emissions can negatively affect certain populations, it improperly discounts those negative effects by failing to consider emissions as- sociated with anything other than EGUs and refineries, speculating that the emissions from EGUs will decrease over time due to changes in the future generation mix, and overestimating the decrease in refinery emissions.

The Method For Measuring Compliance Is Irrational

Under existing rules, beginning in model year 2027, manufacturers are re- quired to account for upstream emissions as part of their compliance calcula- tion. See 88 Fed. Reg. at 29,197. But under the proposed rule, EPA has explic- itly changed course and would "remove[]" that requirement—meaning that electric vehicles, rather than fairly reflecting their actual total emissions, would "be counted as zero grams/mile in a manufacturer's compliance calculation." Id. In other words, EPA proposes that vehicle compliance with the new stand- ards be measured solely by the grams of pollutants emitted from the tailpipe. Id. To survive arbitrary-and-capricious review, EPA must provide a reasoned explanation for this change and show that there are "good reasons" for its new policy. Encino Motorcars, LLC v. Navarro, 579 U.S. 211, 221 (2016) (internal quo- tation marks omitted). The proposed rule does not do so. [EPA-HQ-OAR-2022-0829-0683, p. 59]

First, EPA attempts to justify its change in position by explaining that it does not include upstream emissions when calculating the compliance of inter- nal-combustion-engine vehicles, contending that the principle of equal treat- ment requires that it take the same approach for electric vehicles. See 88 Fed. Reg. at 29,252. But that compares apples to oranges. These vehicle technologies emit air pollutants in different ways. Internal-combustion-engine vehicles cause emissions mostly from the tailpipe, whereas electric vehicles cause emissions mostly by other means. The timing and manner of their respective emissions is thus fundamentally different. Granularly focusing on tailpipe emissions would mean that almost none of the emissions from electric vehicles are counted, while almost all of the emissions from vehicles with internal-combustion vehicles are. If equal treatment is the goal, EPA must account for both types of emissions when calculating compliance, rather than myopically focusing on tailpipe emis- sions, which prejudges any analysis in favor of electric vehicles. [EPA-HQ-OAR-2022-0829-0683, p. 59]

Second, EPA states that it originally proposed including upstream emissions in compliance calculations at a time when there was “little if any regulation” of those upstream sources for GHGs, noting that this approach was “a depar- ture from its usual practice of relying on stationary source programs to address pollution risks from stationary sources.” 88 Fed. Reg. at 29,252. Now that power-generation emissions are declining, EPA asserts that “manufacturers should not account for upstream utility emissions” any longer. Id. That circular explanation assumes that the only or principal reason to consider upstream emissions is to indirectly regulate the power-generation industry itself—to make each unit of power generated by that industry cleaner. But as EPA acknowledges elsewhere in the proposed rule, it designs vehicle-emissions standards to force vehicle manufacturers to adopt technology that reduces the harmful emissions it is charged with regulating. See, e.g., id. at 29,233. Thus, if a vehicle has no tailpipe emissions but massive upstream emissions—e.g., from producing vehicles and their components, and from generating increased amounts of electricity to operate them—incentivizing manufacturers to incor- porate that vehicle into their fleets would be contrary to the agency’s stated goal. The increased regulation of stationary sources will not solve this problem. Increased reliance on electric vehicles will increase demand for the electricity that the power-generation industry produces, and improvements in emissions per unit of power generated would not address the total increase in emissions. Moreover, regulation of stationery sources will not capture many of the up- stream emissions associated with electric vehicles. As discussed above, operat- ing charging infrastructure and producing, recycling, and disposing of batteries all result in emissions. If upstream emissions are not included in the compliance calculation, these emissions may not be accounted for at all. [EPA-HQ-OAR-2022-0829-0683, pp. 59-60]

EPA itself correctly recognized elsewhere in the proposed rule that up- stream emissions are relevant to its overall effort to address the “well-docu- mented buildup of GHGs due to human activities.” 88 Fed. Reg. at 29,207. For instance, when estimating the proposed rule’s impact on overall emissions, as well as the costs and benefits that it generates, EPA took into account at least some (though far from all) relevant upstream emissions. In doing so, EPA acknowledged that it would be irrational to adopt a rule that decreases down- stream emissions but has the effect of increasing overall emissions. The same principle applies here: It would be irrational to find a manufacturer’s fleet com- pliant if the vehicles within the fleet have lower tailpipe emissions but cause emission of harmful pollutants in other ways that exceeds the levels permitted for tailpipe emissions. EPA offers no explanation for this inconsistent approach to upstream emissions. [EPA-HQ-OAR-2022-0829-0683, pp. 59-60]

Moreover, factoring a broader set of emissions into the compliance calcula- tion will not be difficult or unduly burden EPA. The agency has already devel- oped a method for attributing some of these emissions to manufacturers. In its proposed rule, EPA explained that it initially planned to take emissions from electricity generation into account by “attribut[ing] a pro rata share of national CO2 emissions from electricity generation to each mile driven under electric power minus a pro rata share of upstream emissions associated with . . . gasoline production.” 88 Fed. Reg. at 29,252. That method remains available now. And EPA could develop similarly simple and administrable techniques to account for other key sources of upstream emissions like battery production. [EPA-HQ-OAR-2022-0829-0683, pp. 60-61]

For all of these reasons, EPA's proposed method of calculating compliance is irrational. Any final rule must comprehensively account for the emissions generated by electric vehicles to ensure that EPA's solution (a widespread shift to electric vehicles) bears a rational connection to its regulatory goal of reducing harmful emissions. Cf. Am. Fed'n of Gov't Emps., 25 F.4th at 9 (faulting agency for failing to explain why the standard it adopted will address "the principal problem the new standard is designed to fix"). [EPA-HQ-OAR-2022-0829-0683, pp. 60-61]

Organization: American Fuel & Petrochemical Manufacturers (AFPM)

We are also troubled by EPA's failure to evaluate the lifecycle emissions of various powertrains and the national security implications of the proposal. Focusing exclusively on "tailpipe" emissions paints a distorted picture and perpetuates the false notion that electric vehicles are "zero emitters." EPA must present the public with a complete picture, one that shows how the various powertrains stack up against each other cradle-to-grave and the major carbon reductions that vehicle manufacturers and fuel producers have made over the last few decades and continue to make. EPA's failure to do so would render any final rule arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0733, pp. 1-2]

Even if EPA had Congressional authority to promulgate the proposed standards, the proposal is arbitrary and capricious due to the Agency's reliance on incomplete facts, overly optimistic or outright mistaken assumptions, and failure to use reason-based decision-making. The Agency significantly overestimates environmental benefits and feasibility, underestimates costs, and relies on little more than unsupported hope that consumer preferences will change to enable the Agency's intended policy. EPA's decision to not only ignore lifecycle emissions of ZEVs, but to explicitly propose removing the requirement for automakers to account for them, serves neither consumers nor the environment. EPA's reasoning, that its policy of not accounting for these emissions serves its goal of promoting the use of EVs, is the definition of arbitrary and capricious biased decision-making. Unfortunately, the Agency also ignored significant issues related to energy security and U.S. national security. [EPA-HQ-OAR-2022-0829-0733, p. 2]

The purported benefits in terms of reductions in cost, greenhouse gas emissions, and environmental impacts are based on flawed analyses and will not be realized by consumers. EPA's tailpipe-only approach is flawed, and the Agency needs to evaluate light- and medium-duty vehicles on a full lifecycle basis, regardless of whether those emissions result from electricity generation, battery production, or the combustion of liquid or gaseous fuels. Consumer benefits from the proposal are exaggerated by assuming an unrealistic baseline rate of ZEV-adoption, and inadequate assessments of ZEV purchase and ownership costs, charging costs, and road infrastructure costs. [EPA-HQ-OAR-2022-0829-0733, p. 3]

SEE ORIGINAL COMMENT FOR EVs Require Over 4x the Critical Minerals of an ICE Figure 1: Metal intensity – ICEVs vs. EV8 [EPA-HQ-OAR-2022-0829-0733, p. 5]

8 TURNER, MASON & COMPANY. "Evaluation of EPA's Assumptions and Analyses Used in Their Proposed Rule for Multi-Pollutant Emissions Standards" (June 7, 2023) (Research funded by AFPM and available upon request) [hereinafter "Turner Mason Report"].

C. In the Alternative, EPA Should Set Separate Emissions Standards for Each Vehicle Class.

The Clean Air Act authorizes EPA to establish and revise standards for the emissions of air pollutants from “any class or classes of new motor vehicles or new motor vehicle engines….that endanger public health or welfare”111 Assuming for sake of argument EPA has authority to set emissions standards for EVs, which we posit it does not,112 EPA should promulgate distinct emissions standards for each vehicle class on the basis of the vehicle’s powertrain (e.g., diesel, gasoline, natural gas, electricity). At a minimum, this would obligate EPA to abandon its position that ZEVs are emission-less and account for upstream and other lifecycle emissions as the agency envisioned in its 2012 rule.113 This approach would ensure that EPA is regulating relevant pollutants from specific vehicle classes and would promote a level playing field for different vehicle technologies.114 [EPA-HQ-OAR-2022-0829-0733, p. 26]

111 42 U.S.C.§ 7521(a)(1).

112 As discussed in Section III.A., supra, the CAA sec. 202 does not authorize EPA to regulate ZEV emissions because EPA characterizes them as having “zero” emissions.

113 75 Fed. Reg. 25,324, 25,341 (May 7, 2010).

114 42 U.S.C. § 7521(a)(3)(A)(ii) (“In establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the Administrator may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors.”). Although this section of CAA Section 202 references “heavy-duty” vehicles, this applies to light-duty vehicles that weigh more than 6,000 lbs gross vehicle weight rating, such as light-duty heavy trucks, and if EPA has authority to set emissions standards for EVs, the Clean Air Act does not otherwise limit EPA’s discretion to expand its classification of vehicles by fuel type.

ZEVs are entirely distinct from other classes of vehicles. Their powertrain design frontloads emissions, meaning the air pollutants associated with these vehicles are emitted before operation (i.e., during vehicle production and recharging). During operation, a ZEV experiences no direct drivetrain emissions. In contrast, most emissions from ICEVs generally occur during operation, not production and refueling. Such different emissions points require different regulatory standards. [EPA-HQ-OAR-2022-0829-0733, p. 26]

AFPM suggests that EPA establish separate emission standards based on the lifecycle emissions of a ZEV and ascribe those emissions to the vehicle over its useful life. Previous regulatory history supports such an approach. [EPA-HQ-OAR-2022-0829-0733, p. 27]

For example, while EPA did not set widely varying emission standards for methanol-fueled vehicles versus “conventionally fueled” vehicles, the Agency discussed how lifecycle emissions were relevant to its determination of Clean Air Act vehicle emission standards: [EPA-HQ-OAR-2022-0829-0733, p. 27]

Methanol vehicles could have an impact on global warming (i.e., the “greenhouse effect”) as well. While increased combustion efficiency may result in lower carbon dioxide (CO2) emissions from methanol-fueled vehicles compared with petroleum-fueled vehicles, the overall impact of a shift to methanol-fueled vehicles on global warming is uncertain. The analysis of the impact must include the effect of not only emissions from the vehicles, but also emissions from methanol production. [EPA-HQ-OAR-2022-0829-0733, p. 27]

In the long-term, the implications of using methanol as a transportation fuel are difficult to predict. Should petroleum and natural gas prices rise substantially, it is probable that methanol would be produced from coal. Assuming vehicle miles traveled, and other factors remain constant and assuming current process technology, a methanol-fueled system using methanol derived from coal could result in as much as a doubling of the motor vehicle contribution to the greenhouse effect relative to the contribution of current petroleum fuels.121 [EPA-HQ-OAR-2022-0829-0733, pp. 27-28]

121 Id. at 14451-2.

EPA's continued reliance on attribute-based regulation of light duty vehicles which focuses solely on the "footprint" of a vehicle cannot be justified in relation to the larger goals expressed in the Proposed Rule. The statute directs EPA to address "class or classes" of vehicles and EVs constitute such a severable class where emissions must be considered based on the full attributes (including lifecycle GHG emissions) of that class of vehicles. [EPA-HQ-OAR-2022-0829-0733, pp. 27-28]

EPA compounds this flaw by making unsupported assumptions regarding the total emissions impacts of its Proposal. While it claims that the overall analysis for combined downstream and upstream emissions "likely underestimates the net emissions reductions that may result" from the Proposed Rule, EPA fails to offer a data-based substantiation. The Proposed Rule failed to assess emissions from battery manufacturing or electricity production. EPA acknowledges that its standards will increase the demand for electricity and that demand will simultaneously increase emissions from the electric generating sector, but by making the unsupported assumption that low carbon electricity will be readily available, it makes no real attempt to quantify those emissions or compare them to alternative options for reducing emissions from this sector. EPA must provide a more comprehensive analysis to comply with its directive under the Clean Air Act and better assess the resulting impact of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 42-44]

In addition, activities associated with mining produce GHG emissions, particulate matter emissions, nitrogen oxide emissions, and other air pollutant emissions from mining equipment. As shown in Figure 8, mining and processing several minerals and metals used for ZEV production are carbon intensive. [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

SEE ORIGINAL COMMENT FOR Average GHG emissions intensity for production of selected commodities. Figure 8: 210 [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

210 IEA Report 2022 at 17.

Source: INTERNATIONAL ENERGY ADMINISTRATION

The process for extracting and processing critical minerals can be responsible for approximately 20 percent of the lifecycle GHG emissions from battery production.211 EPA failed to weigh any of these consequences appropriately in the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 45-46]

211 H.C. Kim, et al., ENVIRONMENTAL SCIENCE AND TECHNOLOGY (Vol. 50) "Cradle-to-Gate Emissions from a Commercial Electric Vehicle Li-Ion Battery: A Comparative Analysis," (2016), pp. 7715–22.

Another critical aspect of the Proposed Rule not comprehensively considered is that recycling of the battery and related electrical components of ZEVs is in a state of infancy and poses unique materials handling and safety challenges. EPA should consider the environmental profiles of both ZEVs and ICEVs in light of the production, operation, and disposal of the vehicle (its useful life). The following list provides just some of the electric battery disposal-related issues that are likely to impact the environment and need to be addressed by EPA in the Proposed Rule: [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

- Battery packs could contribute 250,000 metric tons of waste to landfills for every 1 million retired ZEVs.212 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

212 Kelleher Environmental, "Research Study on Reuse and Recycling of Batteries Employed in Electric Vehicles: The Technical, Environmental, Economic, Energy and Cost Implications of Reusing and Recycling EV Batteries", (September 2019) available at https://www.api.org/oil-and-natural-gas/wells-toconsumer/fuels-and-refining/fuels/vehicle-technology-studies.

- Less than five percent of Li-ion batteries, the most common batteries used in ZEVs, are currently being recycled "due in part to the complex technology of the batteries and cost of such recycling."213 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

213 Gavin Harper, Roberto Sommerville, et al., NATURE, "Recycling lithium-ion batteries from electric vehicles" (Jan. 21, 2020) available at https://www.nature.com/articles/s41586-019-1682-5.

- Economies of scale will play a major role in improving the economic viability of recycling, for which currently cost is the main bottleneck. Increasing collection and sorting rates is a critical starting point.214 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

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- The cathode is where most of the material value in a Li-ion battery is concentrated. Currently, there are numerous cathode chemistries being deployed. Each of these chemistries needs to be known, and then the appropriate method of recycling identified, which poses a challenge, as batteries pass through a global supply chain and all materials are not well tracked. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

- Lithium can be recovered from existing Li-ion recycling practices but is not economical at current lithium prices. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

- BMI forecasts that near-term recyclers are likely to use scrap material from the increasing number of gigafactories coming online versus used electric vehicle batteries. Scrap is anticipated to account for 78 percent of recyclable materials in 2025.215 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

215 Benchmark Minerals Intelligence, "Battery production scrap to be main source of recyclable material this decade" (Sept. 5, 2022) available at https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable-material-this-decade.

- In 2022, BMI expected over 30 gigawatt hours of process scrap to be available for recycling, growing ten-fold across the next decade. Loss rates vary by region and tend to be higher in earlier years of a gigafactory.216 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

216 Id.

- Many 'spent' EV batteries still have 70-80 percent of their capacity left, which is more than enough to be repurposed into other uses such as energy storage and other lower- cycle applications for approximately another 10 years.217 This will extend the time that batteries and raw materials remain in use and therefore increase the demand for virgin critical minerals. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

217 Pagliaro, M. and Meneguzzo, F., "Review Article: Lithium battery reusing and recycling: A circular economy insight," Heilyon 5: E01866 (June 15, 2019) available at https://doi.org/10.1016/j.heliyon.2019.e01866

- Clear guidance on repackaging, certification, standardization, and warranty liability of spent ZEV batteries would be needed to overcome safety and regulatory challenges reuse poses at scale.218 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

218 IEA Report 2022.

- Recycling ZEV batteries to recover high-value metals has not been proven to a commercial scale. The majority of analysts are aligned that recycling will not become an integral supplier of raw materials until the 2030s, and at that point, only will provide approximately 20 percent of demand.219 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

219 Benchmark Minerals Intelligence, supra at n. 105.

- Unlike ICEVs, EPA has recently stated that ZEV batteries may need to be handled as hazardous waste, further driving up the cost of such recycling efforts.220 [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

220 Letter from Carolyn Hoskinson, Director, EPA Office of Resource Conservation and Recovery, "Lithium Battery Recycling Regulatory Status and Frequently Asked Questions," (May 24, 2023).

- Whether sufficient recycling capacity can be permitted and constructed to facilitate the Proposal. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

EPA must, therefore, conduct a full LCA to compare all environmental impacts to reasonably conclude that the Proposal will decrease environmental impacts rather than merely shift them. [EPA-HQ-OAR-2022-0829-0733, pp. 47-48]

Organization: American Petroleum Institute (API)

b. API Supports the Concepts of a Lifecycle Approach to Emissions Reductions.

i. EPA should use a lifecycle assessment (LCA) approach vs. tailpipe only.

To effectively achieve emissions reductions in the transportation sector, technology- neutral solutions are needed, utilizing an approach that addresses fuels, vehicles, and infrastructure systems. This is best accomplished through holistic policy that encompasses the lifecycle emissions of both the fuel and the vehicle. This combination makes for the most effective reduction of transportation GHG emissions, as emissions occur at multiple stages of the lifecycle of internal combustion engine vehicles (ICEVs) and battery electric vehicles (BEVs) and the fuels used in them. Further, utilizing a lifecycle approach would enable quantification of the emissions associated with light- and medium-duty vehicles (LMDVs), and allow technologies to be identified that provide more expeditious and robust GHG emissions reductions. [EPA-HQ-OAR-2022-0829-0641, p. 2]

Use of a lifecycle approach would better achieve the goals of the proposed rule, as it would allow the agency and stakeholders alike to fully identify and reduce transportation sector emissions and to identify and develop meaningful solutions. The reductions achieved by EPA's existing programs – including the Tier 3 Motor Vehicle Emissions and Fuel Standards, Heavy-Duty (HD) GHG Phase 2 standards, and HD engine and vehicle criteria pollutant standards – are due in large part to addressing emissions holistically, and utilizing all available and emerging technology to do so. The myopic focus on tailpipe emissions in the proposed rule essentially means that the rule would only address certain transportation emissions, while ignoring other sources of emissions and potential emissions reduction solutions. A lifecycle approach would allow EPA to quantify all of the emissions associated with LMDVs, and to mitigate those emissions more effectively. [EPA-HQ-OAR-2022-0829-0641, p. 2]

EPA has set the GHG emissions standards as attribute-based, using vehicle footprint as the attribute. As per EPA, "footprint is defined as a vehicle's wheelbase multiplied by its average track width—in other words, the area enclosed by the points at which the wheels meet the ground. The standards are therefore generally based on a vehicle's size." In Draft Regulatory Impact Analysis (DRIA) Section 1.1.2, EPA states that "footprint does not have any relationship with tailpipe emissions from BEVs or any other zero-emission vehicle." Yet, the proposed footprint-based standards are based on a projected penetration rate of BEVs of greater than 50%. A footprint-based tailpipe emission standard where, for the majority of the feet, there is "no relationship" between footprint and tailpipe emissions could drive undesirable behaviors. For example, the weight of BEVs increases as the footprint is increased. This increase in weight impacts the efficiency of larger BEVs. With BEVs on the same footprint curve as internal combustion engines (ICEs) (with a positive slope) in a tailpipe emission banking and trading system, larger BEVs will generate a larger credit relative to their footprint. This could incentivize the production of larger more inefficient BEVs, increasing the upstream electricity generation emissions. The largest potential credit generator based on the proposal would be large BEV trucks which are the most inefficient BEVs. While BEVs have zero tailpipe emissions, the upstream electricity production does generate GHG emissions. Analysis by Argonne National Laboratory2 showed that a current midsize sedan with 200-mile range could achieve 124 mile per gallon gasoline equivalent (MPGge) while a heavier and larger 400-mile range small sport utility vehicle (SUV) could achieve 88 MPGge. This corresponds to cradle-to-grave lifecycle emissions of ~160 and 250 g CO2eq / mile, respectively. For comparison, the same analysis found that a current midsize hybrid ICE would generate ~270 g CO2eq / mile, similar to the 400-mile range SUV. The emissions from the hybrid ICE could be further reduced with lower-emission fuels. Under the current proposal, the hybrid ICE from this example would generate tailpipe emissions of 190 g CO2 / mile, while the BEVs would generate zero tailpipe emissions. EPA should consider a rulemaking that accurately accounts for all emissions in the lifecycle of a vehicle. [EPA-HQ-OAR-2022-0829-0641, p. 2]

2 Kelly, J. et al., "Cradle-to-grave lifecycle analysis of U.S. light-duty vehicle-fuel pathways: a greenhouse gas emissions and economic assessment of current (2020) and future (2030-2035) technologies", June 2022, ANL- 22/27. https://greet.es.anl.gov/publication-c2g_lca_us_ldv.

By EPA's own account,3 transportation pollution has been reduced significantly since the passage of the Clean Air Act – new passenger vehicles are 98-99% cleaner for most tailpipe pollutants compared to the 1960s, new vehicle estimated real-world CO2 tailpipe emissions are at a record low,4 and U.S. cities have much improved air quality, despite ever increasing population and increasing vehicle miles traveled. Criteria pollutant emissions have been mitigated via engine and after-treatment system improvements as well as through fuel quality improvements (e.g., low sulfur gasoline and ultra-low sulfur diesel). As noted in a study prepared for the Transportation Energy Institute, criteria pollutants are well controlled with the existing feet, and ICEV emissions will continue to be reduced into the future as the ICEV feet becomes more efficient (especially as high-emitting vehicles are replaced in the existing feet).5 [EPA-HQ-OAR-2022-0829-0641, p. 2]

3 https://www.epa.gov/transportation-air-pollution-and-climate-change/history-reducing-air-pollution-transportation.

4 2022 EPA Automotive Trends Report – Executive Summary, December 2022, EPA-420-S-22-001. https://www.epa.gov/system/files/documents/2022-12/420s22001.pdf.

5 "Decarbonizing Combustion Vehicles: A Portfolio Approach to GHG Reductions," study prepared for the Transportation Energy Institute by Stillwater Associates, July 2023. https://www.transportationenergy.org/research/reports/decarbonizing-combustion-vehicles-a-portfolio-approach- to-ghg-reductions/.

These reductions are due in large part to addressing emissions holistically and utilizing all available and emerging technology to do so. Use of a lifecycle approach would better achieve the goals of the proposed rule, as it would allow the agency and stakeholders alike to fully identify and reduce transportation sector emissions and to identify and develop meaningful solutions. The myopic focus on tailpipe emissions in the proposed rule essentially means that the rule would only address certain transportation emissions, while ignoring other sources of emissions and potential emissions reduction solutions. A lifecycle approach would allow EPA to quantify all emissions associated with light- and medium-duty vehicles6 and more effectively mitigate those emissions. [EPA-HQ-OAR-2022-0829-0641, p. 2]

6 EPA's proposed rule covers light-duty vehicles (i.e., less than 8,500 pounds gross vehicle weight rating) and medium-duty vehicles (i.e., up to 14,000 pounds GVWR), https://afdc.energy.gov/data/10380.

ii. Zero emission vehicles also have emissions impacts.

As with ICEVs, ZEVs7 have carbon emissions impact associated both with their production and throughout their lifetime which EPA should incorporate in its analysis. While ZEVs can be an important part of a diverse transportation future to reduce emissions, they do produce GHG emissions. For instance, BEV production, use, and the disposal of BEV batteries, are not zero-emission activities. Further, all fuels – whether conventional fuels or electricity – have associated carbon emissions regardless of their source. A study conducted by Ricardo, which is included in a report by the Transportation Energy Institute,8 concludes that BEVs "have higher embedded GHG emissions" and therefore carbon intensity of the electricity mix also plays a vital role in defining the magnitude of carbon emissions in this phase. While meaningful reductions have historically been accomplished by focusing on tailpipe emissions from the vehicle, the growing market share of different technologies that include significant upstream emissions warrant inclusion of those emissions in the standard. [EPA-HQ-OAR-2022-0829-0641, pp. 5-6]

7 In these comments, "ZEV" refers broadly to PHEVs, FCEVs and BEV refers specifically to battery electric vehicles.

8 Ricardo, Inc. "Life Cycle Analysis Comparison: Electric and Internal Combustion Engine Vehicles", study prepared for the Transportation Energy Institute (formerly known as the Fuels Institute). January 2022. https://www.transportationenergy.org/research/reports/life-cycle-analysis-comparison-electric-and-internlife- cycle-analysis-comparison-electric-and-intern.

We encourage the agency to not only acknowledge and address the emissions of ZEVs, but to also continue to study the impacts. Failure to do both would be arbitrary and capricious. As noted below in these comments, and in our comments on the Heavy-Duty GHG Phase 3 proposed rule,9 we strongly recommend that EPA include both a readiness assessment prior to program implementation as well as a program review once implementation begins. There will be CO2 emissions associated with the production and use of BEVs,10 and it is important to address these emissions to provide a full picture of the emissions impacts and mitigation needs. [EPA-HQ-OAR-2022-0829-0641, pp. 8-9]

9 API Comments on "Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3", Document ID EPA-HQ-OAR-2022-0985-1423.

10 Kelly, J. et al., "Cradle-to-grave lifecycle analysis of U.S. light-duty vehicle-fuel pathways: a greenhouse gas emissions and economic assessment of current (2020) and future (2030-2035) technologies", June 2022, ANL- 22/27. Figure B.8. https://greet.es.anl.gov/publication-c2g_lca_us_ldv.

While still in the early stages and very small market penetration (in model year 2021 there were three hydrogen FCEV models produced, but they were only available in the state of California and Hawaii and in very small numbers25), hydrogen-based vehicles are a promising technology that many stakeholders are considering.26 As acknowledged by EPA in the DRIA,27 modeled compliance relied on the assumption that 55% of new sales of class 2b and class 3 vehicles would be BEV or FCEV. Furthermore, hydrogen fueling infrastructure is covered by the Bi-partisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) funding. API members are engaged in hydrogen projects to support development of hydrogen focused technology. Companies28 are partnering with OEMs to explore commercial business opportunities to build demand for vehicles powered by hydrogen. [EPA-HQ-OAR-2022-0829-0641, pp. 10-11]

25 "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles -Draft Regulatory Impact Analysis." EPA-420-D-23-003. April 2023.

26 Morales, M. (April 25, 2023). "Automakers deeply invested in hydrogen-powered cars." TopSpeed. https://www.topspeed.com/automakers-invested-hydrogen-powered-cars/.

27 Ibid.

28 https://corporate.exxonmobil.com/what-we-do/lower-emission-transportation/emerging-vehicle-and-fuel- technology/exxonmobil-and-porsche-strategic-collaboration;https://www.chevron.com/newsroom/2021/q2/chevron-toyota-pursue-strategic-alliance-on-hydrogen; https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bp-and-daimler-truck-ag- to-accelerate-the-deployment-of-hydrogen-infrastructure.html.

As noted by the American Trucking Associations (ATA), in testimony before the U.S. Senate Committee on Environment and Public Works:29 [EPA-HQ-OAR-2022-0829-0641, pp. 10-11]

29 U.S. Senate Committee on Environment and Public Works, hearing on "The Future of Low Carbon Transportation Fuels and Considerations for a National Clean Fuels Program", February 15, 2023. https://www.epw.senate.gov/public/index.cfm/2023/2/the-future-of-low-carbon-transportation-fuels-and-considerations-for-a-national-clean-fuels-program.

When battery electric vehicles are not the answer, federal support should refrain from playing favorites, and instead assist in the buildout of alternative fuel facilities. Proposals for hydrogen infrastructure for trucks need to ensure that the infrastructure is in place where that technology best fits in supply chains. Where lifecycle emissions can be reduced by deploying renewable diesel and renewable natural gas, those fuel stocks need to be available for trucking. [EPA-HQ-OAR-2022-0829-0641, pp. 10-11]

While this statement is in relation to heavy-duty vehicles, the issues are the same for light- and medium-duty vehicles. Infrastructure readiness and reduction of lifecycle emissions without picking one technology over others should be EPA's focus for the proposed program. [EPA-HQ-OAR-2022-0829-0641, pp. 10-11]

d. EPA is Not Taking a Realistic Approach.

i. Further, EPA should consider a lifecycle approach that would accurately capture all the emissions associated with the life of a vehicle and capture the efficiency differences of different technologies in different applications. [EPA-HQ-OAR-2022-0829-0641, p. 11]

ii. Future program incentives and program adjustment of standards.

In the development of the program, EPA needs to consider future program incentives such as adoption of a lifecycle approach, combined with fuel carbon intensity reductions. Such an approach would provide a broad spectrum of industries that power the transportation system (e.g., OEMs, petroleum refiners, power generators, and renewable fuel manufacturers) with incentives to reduce emissions. [EPA-HQ-OAR-2022-0829-0641, p. 23]

Organization: Anonymous

EPA should conduct a rigorous study on the full environmental impacts of a dramatic shift to BEV with respect to other environmental media (i.e., non-air pollutants/contaminants), since the proposed rule is designed to more or less force transition to that vehicle technology. The European Environmental Agency (EEA) issued a report in 2018 that reveals the far higher "Human Toxicity Potential" of BEVs, largely from mining the mineral requirements for EV manufacturing (https://www.eea.europa.eu/publications/electric-vehicles-from-life-cycle). Note especially Figure 6.2 on page 58 that even if BEVs are charged with 100% RE (i.e., eliminating the "In-use phase" segments of the BEV bars in the graph), human toxicity impacts are still over twice as high. Ecotoxicity is also higher even if BEVs are charged with 100% RE (Figure 6.3). This is supported by a publically-available European LCA model "carculator" (https://carculator.psi.ch/). Damages to environmental media other than air should also be taken into account when a shift to a substantially different vehicle technology is expected, even if some of that contamination currently is non- domestic. [EPA-HQ-OAR-2022-0829-0490, pp. 1-2]

A peer-reviewed study in 2018 (https://onlinelibrary.wiley.com/doi/10.1111/jiec.12862, Figure 1) also demonstrated the far higher human toxicity impacts of BEV. Even in extremely clean future electric grid scenarios (denoted by dotted lines (generally corresponding to the RCP2.6 scenario in the IPCC AR5)), "Human Toxicity" remains ~3 times higher for BEV in the same electric grid mix scenario. Note also that "Particle matter formation" is higher for BEV than ICEV in all but the cleanest future grid mix scenarios, disputing the BEV air quality benefits claims. [EPA-HQ-OAR-2022-0829-0490, pp. 1-2]

It should be noted that 3 recent peer-reviewed studies, one by staffers from ANL (https://www.mdpi.com/2073-4433/12/11/1482/htm), one from European (Spanish) researchers (https://www.sciencedirect.com/science/article/abs/pii/S0959652621001037), and a study by U.S. researchers in academia just published in May 2023 (https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000183) conclude that PM2.5 emissions would generally INCREASE with increasing shift to BEV technology. [EPA-HQ-OAR-2022-0829-0490, p. 2]

The Spanish paper concluded that "electric vehicles will produce an increase in fine particulate matter formation (26%), human carcinogenic (20%) and non-carcinogenic toxicity (61%), terrestrial ecotoxicity, freshwater ecotoxicity (39%), and marine ecotoxicity (41%) relative to petrol vehicles," and will continue to for the foreseeable future. [EPA-HQ-OAR-2022-0829-0490, p. 2]

The 2023 study in California concludes that "…our results indicate that the CVRP [clean vehicle rebate project] has displaced emissions from vehicle tailpipes to electric generating units, leading to a net increase in primary PM2.5 emissions across the state of California….[EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

…Of particular concern for environmental justice and public health is the finding that Disadvantaged Communities, as defined according to CalEnviroScreen 4.0, are disproportionately more likely to experience either larger net increases or smaller net reductions in primary PM2.5, NOX, and SO2 emissions as a result of the CVRP…." That's considering California's current electric grid, which is among the cleanest in the U.S. This is counter to the stated goals of the proposed regulation. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

These studies come on the heels of a 2010 study by the National Academy of Sciences (National Research Council - https://www.nationalacademies.org/news/2009/10/report-examines-hidden-costs-of-energy-production-and-use), which concluded... "Electric vehicles and grid-dependent (plug-in) hybrid vehicles showed somewhat higher nonclimate damages than many other technologies for both 2005 and 2030." According to Figure 3-7b in the full report, BEV is projected to be more damaging than most of the ICEV technologies/fuel pathways in 2030. Even if the NRC committee underestimated the pace of the decline in coal-generated electricity, some ICEV technologies/fuel pathways would still be less damaging than BEV or FCV, even in much cleaner grids, most notably diesel/biodiesel and CNG ICEV. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

Environmental regulations should be technology neutral with respect to compliance with the goals of the regulations. Forcing a transition to 100% BEV will almost certainly result in much higher contamination of toxic substances, both carcinogenic and non- carcinogenic, in ground water, surface water, and soils near mining sites. BEVs will likely play a prominent role in the future vehicle mix regardless, but categorically excluding ICE vehicle technologies via regulation is a mistake and potentially counterproductive. [EPA-HQ-OAR-2022-0829-0490, pp. 2-3]

Organization: Chevron

1. Lifecycle GHG based standards.

The proposal is focused on tailpipe GHG emissions rather than lifecycle emissions. Therefore, upstream GHG emissions for fuel and vehicle manufacturing are not included in the analysis, favoring "zero tailpipe emission" technologies like Battery Electric Vehicles (BEV). [EPA-HQ-OAR-2022-0829-0553, pp. 3-4]

We recommend EPA revise the proposed standards to incorporate a lifecycle GHG assessment of light and medium duty vehicles and fuel technologies. In an analysis of the California Air Resources Board Advanced Clean Cars II program, a study performed by Ramboll1 in 2022 concluded that a transition to lower carbon intensity (CI) gasoline could provide similar lifecycle GHG emissions compared to zero tailpipe emission alternatives. The Ramboll study utilized a full lifecycle approach to account for emissions associated with vehicle material recovery and production, vehicle component fabrication, vehicle assembly, and vehicle disposal/recycling. EPA should consider alternatives such as low-CI liquid fuels to provide multiple compliance options and avoid a one-size-fits-all solution to reducing transportation sector GHG emissions. Lifecycle assessment is a technology neutral approach that allows for more flexibility in the transition towards reducing transportation GHG emissions in the short and long-term. [EPA-HQ-OAR-2022-0829-0553, pp. 3-4]

1 Ramboll US Consulting Inc "Multi-Technology Pathways to Achieve California Greenhouse Gas Goals Light- Duty Auto Case Study" May, 2022; Available here: www.arb.ca.gov/lists/com-attach/477-accii2022- AHcAdQBxBDZSeVc2.pdf beginning page 59

The proposal does not incentivize GHG reductions from the existing vehicle fleet, thus missing an opportunity to accelerate GHG reduction in the early years of the program. Recent published research from SUNY2 shows that the time value of carbon is important in evaluating technology pathways to maximize emission reductions from the fleet of heavy-duty trucks that includes new and older trucks in-use. GHG emissions generated by the truck fleet accumulate in the atmosphere and dissipate slowly over time. GHG emissions that may be reduced or eliminated today can be more valuable than future emission reductions given the annual accumulation of emissions. While this study focused on heavy-duty vehicle examples, the time value of carbon concept would apply equally to GHG emissions from light and medium-duty vehicles. A GHG reduction strategy that focuses on lifecycle emissions, as opposed to tailpipe emissions only, would incentivize near term emission reductions that would create long term environmental benefits. [EPA-HQ-OAR-2022-0829-0553, pp. 3-4]

2 Quantifying the comparative value of carbon abatement scenarios over different investment timing scenarios - College of Environmental Science (exlibrisgroup.com)

2. Broad technology approach.

There are a wide variety of vehicle technologies and fuel types that can be used to meet consumer needs, employing market-based approaches instead of focusing exclusively on zero tailpipe emission technology options. EPA could allow for innovation within the current market to dramatically reduce GHG emissions, without the systemic risks associated with a single technology solution. It is unlikely that the market would identify a single vehicle technology that would be appropriate for all different customer needs. The proposed rule should be broadened to encourage the use of multiple technologies by establishing a neutral, market-based, lifecycle standard. Light and medium duty vehicles powered by biofuels, hybrid technologies, and renewable natural gas leverage the existing infrastructure and are proven to deliver the power, convenience, and functionality desired by consumers. [EPA-HQ-OAR-2022-0829-0553, pp. 4-5]

Hybrid electric, plug-in hybrid electric, and internal combustion technologies can be paired with lower carbon intensity fuels to result in lower GHG emissions from light and medium duty transportation. These alternative pathways would not require the wholesale transformation of electric energy production and distribution infrastructure on an unprecedented, abbreviated time scale. They would allow battery, hydrogen, and low-carbon intensity gaseous and liquid fueled vehicles to compete to achieve the GHG targets for light-duty transportation in the quickest and most cost-effective manner. [EPA-HQ-OAR-2022-0829-0553, pp. 4-5]

For example, the Ramboll Light Duty Auto Case study showed that a zero-tailpipe strategy did not achieve the maximum emission reductions possible. A fleet mix that deployed a wider range of technologies, including hybrid electric, plug-in hybrid electric, BEVs, and fuel cell electric vehicles, along with a gradual phase-in of low-CI gasoline, out-performed the ZEV only deployment strategy in the near-term and achieved equitable emission reductions in the long-term.3 [EPA-HQ-OAR-2022-0829-0553, pp. 4-5]

3 Ramboll US Consulting Inc "Multi-Technology Pathways to Achieve California Greenhouse Gas Goals Light- Duty Auto Case Study" May, 2022; Available here: www.arb.ca.gov/lists/com-attach/477-accii2022- AHcAdQBxBDZSeVc2.pdf Figure 4-8.

Argonne National Laboratory's "Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle- Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies" report4, demonstrates that the combination of advancements in lower carbon fuel and higher efficiency vehicles can help all vehicle propulsion types achieve parity for GHG emissions. The Argonne study states, "…large GHG reductions for LDVs are challenging and require consideration of the entire life cycle, including vehicle manufacture, fuel production, and vehicle operation. Achieving a life cycle reduction in GHG emissions is a challenging task and must overcome both technological hurdles as well as cost and market acceptance constraints." [EPA-HQ-OAR-2022-0829-0553, pp. 4-5]

4 Argonne GREET Publication: Cradle-to-grave lifecycle analysis of U.S. light-duty vehicle-fuel pathways: a greenhouse gas emissions and economic assessment of current (2020) and future (2030-2035) technologies (anl.gov)

This conclusion reinforces our belief that a robust vehicle standard, embracing a lifecycle method to quantify vehicle emissions, is the preferred approach to reducing the GHG impact of light and medium-duty transportation. [EPA-HQ-OAR-2022-0829-0553, pp. 4-5]

Organization: Clean Fuels Development Coalition et al. (CFDC)

- Air quality effects. These include the air quality and health impacts from significant increases in tire wear from electric vehicles, as well as the increases in CO2 emissions that will result from manufacturing more electric generation infrastructure, transmission, distribution, and charging equipment, and the manufacturing of electric vehicles themselves, which produce far more upstream emissions than their internal combustion engine counterparts. [EPA-HQ-OAR-2022-0829-0712, pp. 6-7]

D. EPA lacks the statutory authority to ignore upstream emissions for electric vehicles.

EPA has statutory authority to prescribe "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(1). This presents an interpretive dilemma. On the one hand, if electric vehicles are not "vehicles" "which cause[ ] or contribute to" a given type of air pollution, then EPA may not set standards for them. Id. On the other, if electric vehicles are "vehicles" "which cause, or contribute to" a given type of air pollution, then

EPA must set “standards applicable to the[ir] emissions.” Id. [EPA-HQ-OAR-2022-0829-0712, p. 11]

The proposal tries to solve this problem by splitting the baby.8 EPA reasons that electric vehicles are vehicles that “cause or contribute to air pollution,” but EPA just chooses to set their contribution to zero. This cannot be right. Cf. C.S. Lewis, That Hideous Strength 291 (Samizdat ed., 2015) (“Just imagine a man who was too dainty to eat with his fingers and yet wouldn’t use forks!”). If electric vehicles truly emit no emissions, then they are not the sort of vehicle EPA can regulate. [EPA-HQ-OAR-2022-0829-0712, p. 11]

8 Of course, the point of the story about Solomon is that the baby wasn’t split. See 1 Kings 3:16– 28 (“Give the living child to the first woman, and by no means put him to death; she is his mother.”).

Of course, EPA freely admits that electric vehicles do produce upstream emissions, and that these upstream emissions matter. This is true and very important. And the proposal does consider upstream emissions when determining the rule’s impact on total emissions. EPA’s position is that this inconsistent approach to electric vehicles’ upstream emissions is reasonable because it treats upstream emissions of all vehicles, electrified or not, the same way for compliance purposes. 88 Fed. Reg. 29,252 (“EPA proposes to include only emissions measured directly from the vehicle in the vehicle GHG program for MYs 2027 and later (or until EPA changes the regulations through future rulemaking) consistent with the treatment of all other vehicles. Electric vehicle operation would therefore continue to be counted as 0 g/mile, based on tailpipe emissions only.”) [EPA-HQ-OAR-2022-0829-0712, pp. 11-12]

But this “consisten[cy]” is precisely what makes the rule unreasonable. Electric vehicles are not like “all other vehicles.” EPA has previously recognized that “that for each EV that is sold, in reality the total emissions off-set relative to the typical gasoline or diesel powered vehicle is not zero, as there is a corresponding increase in up-stream CO2 emissions due to an increase in the requirements for electric utility generation.” 74 Fed. Reg. 49,454, 49,533 (Sept. 28, 2009). EPA only chose the initial “zero grams/mile compliance value [a]s an incentive,” Response to Comments, EPA-420-R- 10-012a at 5-237 (Apr. 2010),), and explained that in future standards it “would at- tribute a pro rata share of national CO2 emissions from electricity generation to each mile driven under electric power minus a pro rata share of upstream emissions associated with from gasoline production,” 88 Fed. Reg. 29,252. [EPA-HQ-OAR-2022-0829-0712, pp. 11-12]

EPA never had authority to incentivize electric vehicles in this way. Section 202(a) requires the agency to “standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles.” Because it acknowledged that these emissions are “not zero,” it is arbitrary to treat them as such. Indeed, as EPA previously acknowledged, treating upstream emissions of all vehicles, electrified or not, the same way puts a thumb on the scale against conventional vehicles in favor of electric vehicles. An agency’s bare preference for one technology cannot satisfy the requirement that it “reasonably consider[] the relevant issues and reasonably explain[] the decision.” FCC v. Prometheus Radio Project, 141 S. Ct. 1150, 1158 (2021).

At the very least, the agency is not permitted to change its position on the future inclusion of upstream emissions in compliance calculations without explanation. When an agency makes a decision, it must articulate a “satisfactory explanation for its action including a ‘rational connection between the facts found and the choice made.’” Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). If the agency fails to “cogently explain why it has exercised its discretion in a given manner,” its action will be held invalid. Id. at 48. In addition, the agency must “provide a more detailed justification than what would suffice for a new policy created on a blank slate . . . when, for example, its new policy rests upon factual findings that contradict those which underlay its prior policy." FCC v. Fox Television Stations, Inc., 556 U.S. 502, 515 (2009); see also Perez v. Mortg. Bankers Ass'n, 135 S. Ct. 1199, 1209 (2015). EPA previously thought that the zero grams-per-mile compliance value was only viable as a temporary incentive because "in reality" the total emissions were not zero. Failure to consider and adequately explain departure from this finding would render the entire rulemaking arbitrary and capricious. Fox Television Stations, 556 U.S. at 515. [EPA-HQ-OAR-2022-0829-0712, pp. 12-13]

F. EPA lacks authority to Misleads Consumers by Using the Term "Zero-emissions Vehicle."

While it is true that all-electric vehicles have no tailpipe emissions, it is completely false to claim that they are "zero-emissions vehicles." As already noted, EPA acknowledges that what it calls "ZEVs" have significant upstream emissions. 88 Fed. Reg. 29,303. Despite this, the proposal repeatedly describes these vehicles as having no emissions. This is per se unreasonable, and it enables illegal marketing by auto- manufacturers. Seizing on EPA's label, dozens of auto-manufacturers have described their electric vehicles as "zero-emissions." Making false claims in the marketing of products is prohibited by the Federal Trade Commission Act, which prohibits "unfair or deceptive acts or practices in or affecting commerce" 15 U.S.C. § 45. The agency lacks authority to facilitate these deceptive acts or to promote innumerable other false "zero emission" statements. [EPA-HQ-OAR-2022-0829-0712, pp. 14-15]

B. The proposed rule misstates emissions benefits because it neglects upstream electric generating unit emissions, among others.

In addition to underestimating costs, the proposal also overstates benefits. The most egregious of these comes from the way EPA accounts for upstream emissions for electric generating units ("EGU"). See DRIA 8-10, 11. To realize substantial reductions in GHG emissions—and thus benefits from such emissions—the rule relies on the decrease in emissions from petroleum-fueled vehicles replaced by electric vehicles. But these vehicles are themselves still responsible for emissions from the electricity that powers them. Current electricity GHG emissions factors are approximately 442,000 U.S. Tons of CO2 / Terawatt-Hour. How much carbon dioxide is produced per kilo watt hour of U.S. electricity generation, Energy Information Administration, https://www.eia.gov/tools/faqs/faq.php?id=74&t=11 (last accessed July 5, 2023). [EPA-HQ-OAR-2022-0829-0712, pp. 34-35]

This is unrealistic. Emissions reduction on the U.S. electric grid have thus far come primarily from natural gas replacing coal. To continue to lower CO2 emissions in this manner would require an almost complete conversion to low carbon sources. But barriers to wind, solar, and nuclear adoption will not enable these changes on EPA's timeframe. Furthermore, researchers estimate that the 350 million EVs required to decarbonize the fleet in 2050 could use as much as half of US national electricity demand. Thea Riofrancos et al., Achieving Zero Emissions with More Mobility and Less Mining, U.C. Davis Climate + Community Project (Jan. 2023), https://sub- scriber.politicopro.com/eenews/f/eenews/?id=00000185-e562-de44-a7bf-ed7751a00000. [EPA-HQ-OAR-2022-0829-0712, pp. 34-35]

These costs also ignore that realizing these reductions requires the installation of new solar and wind generation, which itself has a cost. Without additional wind and solar generation, upstream emissions from electricity generating units will not decrease as much as EPA expects, diminishing those benefits. In addition to the direct costs of this generation, the proposal also ignores the greenhouse gas emission associated with manufacturing more, less dense, remotely located intermittent generation sources, and the battery back-up; transmission, substation, and transformer investment to integrate these technologies into the power grid; and natural gas peaking capacity necessary to sustain their intermittency. These emissions are significant and must be accounted for in the calculation of any benefits of the proposed rule. [EPA-HQ-OAR-2022-0829-0712, pp. 34-35]

A. EPA has authority to consider the lifecycle emissions from different fuels in its standard setting.

Section 202(a)(3)(A)(ii) authorizes EPA to look beyond the basic engine to set its engine or vehicle emission standards. Specifically, it states that, "[i]n establishing classes or categories of vehicles or engines for purposes of regulations under this paragraph, the [agency] may base such classes or categories on gross vehicle weight, horsepower, type of fuel used, or other appropriate factors." 42 U.S.C. § 7521(a)(3)(A)(ii) (emphasis added). To account for the "type of fuel used," EPA would need to engage in lifecycle emissions analysis. EPA has often eschewed lifecycle analysis because of the nature of the pollutants it regulates, but it is the obvious best fit for greenhouse gas regulations. Section 202(a)(1) gives EPA's authority to issue rules setting emissions standards for "air pollutants" that it finds may reasonably be anticipated to endanger public health or welfare. And while most air pollutants work on the local and regional level, which makes lifecycle analysis a poor fit, greenhouse gases' harms are all at the global level. Except in truly extreme concentrations, CO2 emissions do not lead to adverse health effects if breathed in. [EPA-HQ-OAR-2022-0829-0712, pp. 39-40]

Clean Air Act Section 202(a)(4)(A) and (B) require that EPA consider whether its proposed standards "will cause or contribute to an unreasonable risk to public health, welfare or safety", including whether the proposed standard "causes, increases, reduces, or eliminates emissions of any unregulated pollutants" and to assess "the availability of other devices, systems, or elements of design which may be used to conform to requirements prescribed under this subchapter without causing or contributing to such unreasonable risk." Neglecting lifecycle greenhouse gas emissions incentivizes compliance options that increase upstream carbon emissions at the expense of measured tailpipe emissions. This is exactly the sort of "other … element[ ] of design" that Congress imagined might "increase[ ] emissions." [EPA-HQ-OAR-2022-0829-0712, pp. 39-40]

24 Despite the benefits of renewable fuels, EPA's recent rulemaking decreases total volumes. EPA finalized a multi-year Renewable Fuel Standard that reduces volumes from proposed levels for both advanced biofuels and corn ethanol. Renewable Fuel Standard (RFS) Program: Standards for 2023–2025 and Other Changes, EPA-HQ-OAR-2021-0427. (EPA's final numbers show a 250-million- gallon reduction in total corn-ethanol volumes for 2024 and 2025 from the original proposal, setting those volumes at 15 billion gallons for both years. This is inexplicable given EPA's aggressive decarbonization plans.

Organization: Countymark

The EPA has ignored lifecycle emissions in its environmental impact assessment. The EPA fails to provide a comprehensive picture of a vehicle's environmental impact throughout its lifecycle by focusing solely on tailpipe emissions. It is argued that a ton of carbon emitted during a vehicle's lifecycle has the same climate impact regardless of when or where it is emitted. This means that emissions from the production of batteries for electric vehicles (EVs) should be considered, as they are carbon intensive. A proper lifecycle assessment should consider all emissions associated with a vehicle, including those from production, recharging or refueling, drivetrain or battery replacements, infrastructure modifications, and end-of-life disposal and recycling. By neglecting these factors, the EPA's assessment does not accurately represent the true environmental impact of different vehicle types. In summary, we believe that the EPA's focus on tailpipe emissions alone distorts assessing a vehicle's environmental impact. A more comprehensive approach considering all emissions throughout a vehicle's lifecycle, including production and disposal, is necessary for a more accurate evaluation. [EPA-HQ-OAR-2022-0829-0665, pp. 2-3]

Organization: Cummins Inc. (Cummins)

II. General Principles

Aligned with Cummins' commitments described above, Cummins offer these principles for consideration as EPA develops its Final Rule addressing criteria pollutant and GHG emissions for light-duty (LD) and medium-duty vehicles (MDV) [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]:

- Well-to-wheels emissions should be considered in assessing technology effectiveness to ensure alignment of the standards with the most beneficial path to zero emissions. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Cummins currently certifies heavy-duty (HD) pickup trucks with gross vehicle weight ratings (GVWR) between 8,501 and 14,000 pounds, also known as Class 2b and 3 vehicles, meeting EPA's Tier 3 criteria pollutant emissions standards and Phase 2 GHG standards. Diesel Class 2b and 3 pickup trucks can have significant towing capability and are used in applications going beyond personal use such as construction and agriculture, and as such, do vital work for America. Our additional comments detailed below pertain to those vehicles. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Organization: Dana Incorporated (Dana)

Sustainable Sourcing

As noted above, Dana is heavily focused on steps to drive sustainable best practices in our operations. Sustainable sourcing of materials is still a concern in the production of LD/MD BEVs and suppliers like Dana will face pressures to provide sustainably sourced products at competitive prices. [EPA-HQ-OAR-2022-0829-0538, pp. 2-3]

There is little consideration of the manufacturing side in the NPRM, which is mainly focused on reducing in-use CO2 emissions from LD/MD vehicles. While the NPRM does discuss upstream power-sector emissions driven by increased PEV charging demand, EPA should also consider the impact of manufacturing the full propulsion system when assessing the environmental impact of its proposals. Doing so could help ensure that the cross-over point of combining manufacturing and in-use vehicle CO2 emissions is reasonable for the targeted adoption rate. Dana suggests that EPA include a cross-over point in addition to what is provided on break-even timing for LD/MD ZEVs. [EPA-HQ-OAR-2022-0829-0538, pp. 2-3]

Organization: Darius

The EPA's proposal boosts an electric vehicle supply chain dominated by China, which powers its manufacturing-base through coal-fired power plants and mines minerals for EV batteries with the use of environmental practices that we would never approve of in the United States. Emissions coming out of tailpipe matter, but so do the lifecycle emissions of building a car, constructing and charging a battery, and retiring vehicles. [EPA-HQ-OAR-2022-0829-0519, p. 1]

Organization: Delek US Holdings, Inc.(Delek)

EPA's Proposed Rule is, at best, arbitrary and capricious or otherwise not in accordance with the Clean Air Act because it is based on flawed projections for zero emissions vehicles ("ZEVs"), such as plug-in electric vehicles ("PEVs") and battery electric vehicles ("BEVs"), will increase domestic reliance on foreign supply chains, underestimates the lifecycle GHG emissions associated with PEVs, overstates the benefits of the proposal, severely underestimates the costs, and fails to consider the impacts to other industries. Accordingly, Delek urges EPA to abandon or substantially reconsider its proposal. [EPA-HQ-OAR-2022-0829-0527, p. 2]

III. The Proposed Rule Underestimates the Lifecycle GHG Emissions of BEVs

Contrary to the naming convention, ZEVs—including PEVs and BEVs—are not truly zero-emission vehicles.19 In fact, the lifecycle GHG emissions of BEVs exceed that of ICE- powered vehicles. If EPA is authorized to promulgate such standards, those standards must account for any upstream emissions from electric generating units. The failure to do so creates an uneven playing field that substantially disadvantages ICE engines. [EPA-HQ-OAR-2022-0829-0527, p. 4]

19 Proposed Rule at 29,187 ("As the term 'zero-emission vehicle' suggests, these cars and trucks have zero GHG and criteria pollutant emissions from their tailpipes.").

Organization: Donn Viviani (Viviani)

GHG emissions embedded in the production of vehicles is responsible for ~10% of vehicle carbon footprints. Slowly reducing down the allowable embedded carbon by class will have several outcomes. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Limiting the embedded carbon per ton would result in, e.g., more steel made with green hydrogen, less metal and more plastic parts (already these are replacing metal) which can require less energy to produce, and even parts made with bio-based plastics which count as negative carbon. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Lastly, here, it is important to ensure that imports would be subject to any such embedded carbon restrictions, as that would serve to increase pressure on overseas EGUs to transition away from coal. [EPA-HQ-OAR-2022-0829-0697, pp. 6-7]

Organization: Energy Marketers of America (EMA)

EMA is concerned over EPA's tailpipe emission standards for light-duty and medium-duty vehicles for model year 2027 and later which will effectively discourage investment in lower carbon liquid fuels. EPA projects that a potential outcome of the rule would require nearly 70 percent of all new light duty vehicle sales to be battery electric vehicles (EVs) by 2032. Unfortunately, the focus on EV production will fundamentally eliminate an opportunity to provide clean green liquid fuels such as renewable diesel, biodiesel, renewable gasoline, clean hydrogen and ethanol that immediately lower emissions not only for new vehicles, but for the vehicles currently on the road. In addition, the rule will limit consumer choice on cleaner internal combustion engines and threaten the viability and jobs of small business energy marketers around the country. [EPA-HQ-OAR-2022-0829-0616, pp. 1-2]

EMA urges the EPA to consider lifecycle emissions and a technology neutral approach when considering emission reductions. The proposed rule should consider the lifecycle emissions associated with EV production, usage, and end-of-life disposal including emissions from raw material mining and refining, battery manufacturing, and electricity generation for EV charging. Further EPA needs to consider the logistics, investment, and timing associated with EV and battery production, electric generation and transmission, and EV charging to support a substantial increase in EV production. Achieving a significant ramp up of domestic supply of raw materials for batteries, mineral refining, and battery and vehicle manufacturing as well as upgrades to the electricity generation and transmission will be complex and take time. [EPA-HQ-OAR-2022-0829-0616, pp. 1-2]

Again, EMA urges the EPA to consider lifecycle emissions and a technology neutral approach when it comes to promoting policies to reduce emissions. The most cost-effective and timely way to reduce emissions from transportation is to support multiple technologies that do so for both new vehicles and vehicles currently on the road. [EPA-HQ-OAR-2022-0829-0616, pp. 1-2]

Organization: Exxon Mobil Corporation (ExxonMobil)

ExxonMobil believes that existing transportation sector-based federal policies could be improved to achieve meaningful GHG emissions reductions through complementary fuel and vehicles standards. Specifically, we encourage EPA to consider how it may assist with the development and implementation of a federal low carbon fuel standard that would encourage investment in lowering the carbon intensity of fuels (liquid, compressed/liquefied gas, electricity, hydrogen) and vehicle standards that account for lifecycle GHG emissions, including emissions upstream of a vehicle’s tailpipe. [EPA-HQ-OAR-2022-0829-0632, p. 3]

To encourage investment in technologies to reduce GHG emissions from existing fuels, ExxonMobil is encouraging U.S. policymakers to consider the development of a federal lifecycle and carbon-intensity based fuel standard measured in gCO2e per Mega Joule (MJ) of fuel energy (gCO2e/MJ) that would provide a long-term market signal for the production and use of lower carbon fuels. Such a standard, which could be increased in stringency over time, would establish a market for credit trading that would offer compliance flexibility and would underpin investments in technologies to reduce carbon emissions from gasoline and diesel used for existing vehicles. Examples of lower carbon-intensity fuels that might generate credits under such a standard would include ethanol, biodiesel, renewable diesel, renewable natural gas, hydrogen, electricity produced for EVs, and traditional fuels produced with lower emission technology such as carbon capture and sequestration. Moreover, the standard could be expanded beyond road transportation to the marine and aviation sectors in the future. [EPA-HQ-OAR-2022-0829-0632, p. 3]

EPA should also consider complementary GHG emission standards for new vehicles based on a well-to-wheels (WTW) lifecycle emissions accounting methodology. Such standards would encourage lower CO2e emissions per mile driven (gCO2e/mile) complementing the above-mentioned carbon-intensity based standards for the energy used by the vehicles. Current vehicle GHG standards account only for fuel combustion or tank- to-wheels emissions. A WTW approach, which accounts for lifecycle GHG emissions, allows for a more transparent comparison between the lifecycle emissions associated with vehicle types. In the case of BEVs or plug-in hybrid electric vehicles, such a standard would allow consumers to see the emissions associated with the electricity used to power these vehicles. Moreover, it enables consistent GHG accounting, and thus provides a more holistic approach toward encouraging advancement in vehicle technologies that can reduce GHG emissions. [EPA-HQ-OAR-2022-0829-0632, pp. 3-4]

Linked fuel and lifecycle vehicle CO2 standards offer a preferred, technology-neutral policy pathway relative to BEV-only mandates. A policy that aims to reduce GHG emissions from existing fuels and that recognizes WTW emissions from new vehicles, can help retain consumer choice for the type of vehicle they prefer to drive, would avoid overdependence on foreign critical minerals, would retain high-paying jobs throughout the transportation sector, could grow the role of agriculture in providing energy feedstocks, and ultimately, would be supported through a credit-based system, not taxes. [EPA-HQ-OAR-2022-0829-0632, p. 4]

ExxonMobil respectfully recommends that EPA consider the role it can play in developing and implementing policy to reduce GHG emissions from both new and existing vehicles through the development of WTW emission standards for new vehicles and complementary support for a federal low carbon fuel standard. We would welcome the opportunity to collaborate with the agency and share in greater detail our views on what a comprehensive policy approach might look like. [EPA-HQ-OAR-2022-0829-0632, p. 4]

Organization: Green Diesel Engineering LLC (GDE)

The graph above is from a NASA satellite image which highlights the areas with NOx issues. [See original comment for map of nitrogen dioxide levels throughout the Unites States] Since these areas are predominantly urban vicinities or downstream of power plants, it would be more beneficial to focus on localized efforts to reduce NOx. A good 70% of people live in the urban areas and reducing NOx in these inner cities will provide the most focused assistance. Ideally, most city transportation would be electric to eliminate emissions at source. Cities could build large parking lots outside urban areas for combustion vehicles and mass electric transit into city center. Keep in mind, electric vehicles do not reduce emissions, but rather change where those emissions are produced (battery mining / manufacturing / recycling plants) and electric power-distribution facilities. Moving the emissions away from where most people live would be prudent. Electric transportation does not reduce CO2 emissions over the vehicle life cycle due to battery manufacturing, mining, recycling and charging. Electric vehicles will help reduce smog in LA, Denver, etc. where there is poor airflow, however, they will not reduce carbon emissions when battery recycling/lifespan is incorporated in the well to wheels analysis.

(https://climate.mit.edu/ask-mit/are-electric-vehicles-definitely-better- climate-gas-powered-cars),(https://www.iea.org/data-and- statistics/charts/comparative-life-cycle-greenhouse-gas-emissions-of-a-mid-size-bev- and-ice-vehicle),(https://www.epa.gov/greenvehicles/comparison-your-car-vs-electric- vehicle),(https://www.sciencedirect.com/science/article/pii/S1361920921000614). [EPA-HQ-OAR-2022-0829-0457, p. 4]

Organization: Growth Energy

There are several steps that EPA can and should take to address those deficiencies, both in the final rule and in other contexts: [EPA-HQ-OAR-2022-0829-0580, p. 4]

- First, EPA should fix its system of scoring the emissions from vehicles, which both undercounts EV emissions and overcounts emissions from biofuels used in ICE vehicles. The most accurate way to do so would be by conducting a complete lifecycle analysis for BEVs—using the Argonne laboratory's GREET model or its equivalent—and compare that to a lifecycle analysis for ICE vehicles using various blends of liquid fuels. Alternatively, if EPA does not use a lifecycle analysis, it should at a minimum assign the portion of fuel used in ICE vehicles attributable to biofuels a value of zero g/mi in recognition of the fact that the carbon emitted from combusting biofuels is biogenic carbon sequestered from the atmosphere by crops. [EPA-HQ-OAR-2022-0829-0580, p. 4]

III. EPA Must Compare the Emissions from Electric Vehicles and Biofuels in a Rational Way.

A. The Proposed Rule Dramatically Misconstrues the Relative Lifecycle GHG Emissions of EVs and Biofuels.

The Proposed Rule's emission standard for GHGs is doubly inaccurate—it both severely underestimates emissions from EVs and overestimates emissions from biofuels. EPA has previously acknowledged the severity of its undercounting of GHG emissions from EVs: [EPA-HQ-OAR-2022-0829-0580, p. 6]

C. EPA Can and Should Conduct a Lifecycle Analysis for all Vehicles.

The best way to address the Proposed Rule's inaccurate assessment of emissions would be to conduct a lifecycle analysis for all vehicles covered by the rule. That analysis should fully assess the upstream emissions from production of the vehicle, the upstream emissions associated with the vehicle's fuel source, any upstream sinks of carbon (e.g., uptake of carbon by growing crops), and the emissions from the vehicle itself. Assessing emissions on that type of lifecycle, cradle-to-grave basis would ensure that all components of a vehicle's emissions are appropriately accounted for and compared to other types of vehicles. [EPA-HQ-OAR-2022-0829-0580, p. 10]

In particular, EPA should assess lifecycle emissions based on the Argonne National Laboratory's Greenhouse Gas and Regulated Emissions and Energy Use in Transportation ("GREET") model. GREET is a state-of-the art model for assessing lifecycle emissions that incorporates the latest scientific consensus on modeling and latest data and assumptions on important variables, like induced land-use change ("ILUC"). It is "continually updated by world-class researchers … provides reliable calculations of life-cycle energy and emissions related to transportation, and accounts for a wide range of conventional and emerging energy systems and vehicle technologies."15 Some other models currently in use include estimates for ILUC that are outside the scientific consensus on the "credible range" for land use change induced by crops like corn grown in the United States.16 GREET's ILUC value for corn ethanol of 7.4 gCO2e/MJ is solidly within the credible range of ILUC values identified in a recent meta-analysis by researchers at Harvard University.17 [EPA-HQ-OAR-2022-0829-0580, p. 10]

15 U.S. Department of Energy, GREET: The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model (May 16, 2019), https://www.energy.gov/eere/bioenergy/articles/greet-greenhouse-gases- regulated-emissions-and-energy-use-transportation.

16 Scully, et. al., Carbon intensity of corn ethanol in the United States: state of the science 16 Environ. Res. Lett. 043001 (2021).

17 See id. (identifying the credible range as between -1.0 and 8.7 gCO2e/MJ).

Tellingly, GREET is already used in numerous applications by EPA and across federal and state agencies. For example, it is a central component of the EPA's assessment of lifecycle emissions under the RFS program. And it has been adapted by California's Air Resources Board for use in assessing pathways under California's Low Carbon Fuel Standard ("LCFS") program. [EPA-HQ-OAR-2022-0829-0580, p. 10]

When assessing lifecycle emissions of ICE engines under a GREET-based approach, EPA must appropriately and accurately consider the emissions of biofuels. In particular, to adequately assess the emissions of biofuels going forward, EPA should assume increasing use of biofuel blends in future years. While the prevailing mix of ethanol in the nation's gasoline supply is currently E10, E15 is being increasingly adopted, and efforts to change to Reid Vapor Pressure ("RVP") requirements are likely to further spur its adoption. EPA should also assume that increasing amounts of E30 and E85 can be used in the future. The marginal cost of converting fueling stations and other infrastructure to accommodate E85 is low, so its use could easily be expanded with appropriate incentives. [EPA-HQ-OAR-2022-0829-0580, pp. 10-11]

If EPA is unable to incorporate lifecycle analysis for all vehicles by the time it intends to publish the final rule, an interim alternative would be to simply treat the emissions from the biofuels used in ICE vehicle as zero grams per mile. That solution would be only a partial one because it would not compare, for example, the emissions associated with creating batteries for EVs to the emissions associated with constructing ICE vehicle engines. But it would at least address the glaring inconsistency of the treatment of EVs and the treatment of biofuels. And using such an assumption would be consistent with GREET, which treats the tailpipe GHG emissions from biogenic sources as zero because they net out with the carbon absorbed by crops. It would also be consistent with several of EPA's prior statements on emissions from biogenic sources, like its 2018 policy with respect to the combustion of woody biomass.18 If EPA adopts that short-term fix in this final rule, it should nonetheless finalize a system for conducting a lifecycle analysis as soon as possible, rather than waiting to incorporate it until the time period covered by the current rule ends after 2032. [EPA-HQ-OAR-2022-0829-0580, pp. 10-11]

18 EPA, EPA's Treatment of Biogenic Carbon Dioxide (CO2) Emissions from Stationary Sources that Use Forest Biomass for Energy Production at 6 (Apr. 23, 2018), available at https://www.epa.gov/sites/default/files/2018- 04/documents/biomass_policy_statement_2018_04_23.pdf.

EPA should ensure that its tailpipe rule maximizes emissions reductions and minimize costs. Appropriately accounting for the lifecycle GHG emissions of vehicles would eliminate unintended consequences like incentivizing fossil hydrogen over low-carbon biofuels. And it would align the incentives provided by EPA's tailpipe rule with an accurate calculation of lifecycle GHG emissions so that the market can achieve the greatest emissions reductions in the most efficient way. For some vehicle needs and local markets, that may be investing in EVs, but in others it may be investing in vehicles with efficient ICE engines that can and do use higher biofuel blends. [EPA-HQ-OAR-2022-0829-0580, pp. 11-12]

B. The Proposed Rule is Arbitrary and Capricious and Outside of EPA's Authority.

EPA failed entirely to consider both the upstream emissions of EVs and the emissions reductions of biofuels as part of a rule that will shift new vehicle production dramatically towards EVs. By doing so, EPA "failed to consider an important aspect of the problem," a hallmark of arbitrary and capricious rulemaking under the APA. Motor Vehicle Manufacturers Association v. State Farm Auto Mutual Insurance Co., 463 U.S. 29, 43 (1983). [EPA-HQ-OAR-2022-0829-0580, p. 14]

VII. Conclusion

The proposed rule misses a significant opportunity to reduce GHG emissions through biofuels. EPA should adjust its proposal by: (1) accounting for the upstream emissions of EVs and the upstream carbon sinks of biofuels; (2) considering the potential for higher blends of biofuels in EPA's test fuel and throughout the rule; and (3) developing credit programs and other measures that incentivize greater biofuel use. [EPA-HQ-OAR-2022-0829-0580, p. 17]

Organization: HF Sinclair Corporation (Sinclair)

a. EPA Fails to Properly Account for All GHG Emissions from PEVs

In an attempt to hinder consumer choice and penalize specific forms of technology, EPA's proposed rule fails fully account for the lifecycle GHG emissions that come from PEVs, creating a disparity between how ICE and PEV vehicle emissions are treated. While EPA purports to have considered the GHG emissions attributed to upstream emissions impacts from fuel production at refineries and electricity generating units,27 EPA assumes – without any factual basis – that the power sector will become cleaner over time through the increased use of wind and solar generation and electricity storage (i.e., more batteries). This in turn will purportedly mitigate EPA's recognized concern that, as a result of the proposed rule, "increases in emissions from [Electric Generating Units] . . . would lead to changes in exposure for people living in communities near these facilities."28 But, EPA glosses over this analysis, and instead only focuses on tailpipe emissions. And even if EPA's assumptions on a cleaner electric grid are correct, EPA fails to account for the increased GHG emissions that will come from an increasing effort to mine, process, and manufacture the critical minerals that will be required to both deliver batteries to power an all- electric future fleet as well as deliver "zero-emission" power to the grid. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

27 Proposed Rule at 29,252.

28 Proposed Rule at 29,327.

. Ultimately, EPA arbitrarily ignores the full scope of emissions that will come from PEVs, and a full lifecycle analysis of all potential vehicle technologies must be conducted to fully understand the environmental impacts of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

III. The Proposed Rule is Arbitrary and Capricious

a. EPA Fails to Properly Account for All GHG Emissions from PEVs

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27 Proposed Rule at 29,252.

28 Proposed Rule at 29,327.

For instance, the power source of a PEV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces emissions. The fact such emissions occur 100% upstream of the vehicle's operation and therefore fall outside of the tailpipe emissions calculation stacks the deck in favor of this technology. In fact, according to the International Energy Association, PEVs require six times the raw materials as a traditional ICE vehicle.30 There is no logical basis for this omission because, as EPA is aware, concerns about GHG emissions relate to their longer term global concentrations. Consequently, air pollutant emissions should be an important consideration regardless of where such emissions occur and, by myopically prioritizing PEVs, EPA fails to look at all technologically feasible options that may provide commensurate GHG reductions in a more cost-efficient manner. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

30 IEA, "In the transition to clean energy, critical minerals bring new challenges to energy security," (June 2023), available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive- summary.

The flaw in EPA's approach is illustrated by the fact that emissions standards easily become meaningless by changing the engine's location. The proposed rule would treat a PEV charged by a diesel-powered generator as if it had zero tailpipe emissions, notwithstanding the fact that it remains "powered" by a diesel engine located outside the vehicle. A light-duty vehicle directly powered by a diesel engine inside the vehicle, however, is credited with the emissions produced by that engine. Thus, the source of the "fuel" matters. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

Finally, EPA has not considered the foreseeable, indirect impacts the Proposed Rule will have on ambient air quality. First, with the high purchase price of new PEVs, consumers will likely hold on to their older, higher-emitting ICE vehicles to avoid the increased purchase price of a PEV. Second, PEVs are heavier, and will increase particulate matter emissions through increased brake, tire, and road wear. Ultimately, EPA arbitrarily ignores the full scope of emissions that will come from PEVs, and a full lifecycle analysis of all potential vehicle technologies must be conducted to fully understand the environmental impacts of the Proposed Rule. [EPA-HQ-OAR-2022-0829-0579, pp. 7-9]

Take Virginia as a representative example highlighting the gap between the Proposed Rule's required infrastructure and that which is actually feasible. According to a report by the Consumer Energy Alliance, attached herein, Virginia currently has 7.6 million light-duty vehicles on the road. Assuming Virginia transitions to 100% PEV by 2035, the state would need an additional 35.5 billion kWh of generation – equivalent to the generation required to power almost 70% of the homes in the state. And to maximize the zero-emission benefit of PEVs, this generation would need to come from zero-emitting sources such as nuclear or renewables (ignoring, for a moment, the energy intensity required to construct these resources). But 35.5 billion kWh corresponds to either 4 new nuclear reactors in the state or over 450,000 acres of off-shore windfarms. Neither of which is remotely feasible under the Proposed Rule.42 [EPA-HQ-OAR-2022-0829-0579, pp. 11-12]

42 CONSUMER ENERGY ALLIANCE, "Freedom to Fuel: Consumer Choice in the Automotive Marketplace," August 2023 [hereinafter, "CEA Study"]. Nor has EPA shown that the electric grid itself can meet this increased demand. As highlighted by the North American Electric Reliability Corporation ("NERC"), certain high-risk areas do not today meet resource adequacy criteria, posing significant concern about adding even more demand to the grid.43 This risk is further exacerbated by EPA's new carbon dioxide standards for fossil-fuel fired power plants, proposed shortly after the Proposed Rule and not otherwise considered in the Proposed Rule, that may rapidly phase out affordable base-load generation.44 Far from what the Proposed Rule requires, the infrastructure upgrades to support a U.S. LD fleet that is only 7% PEV would require an additional $75-125 billion, which would be passed on from utilities directly to customers.45 Today, energy insecure households, defined as those that are unable to adequately meet basic household energy needs because of cost, pay 26 cents more per square foot in energy costs as compared to energy secure households.46 This disparity will only increase as infrastructure upgrades to accommodate the increased load from PEVs is passed along to ratepayers.

43 North American Electric Reliability Corporation, 2022 Long-Term Reliability Assessment (Dec. 2022), 21, available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf (indicating that increased demand projections may lead to reliability concerns for the electric grid, especially as dual-peaking or seasonal peaking times change with increased electrification).

44 See Proposed Rule, "New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule," 88 Fed. Reg. 33,240 (May 23, 2023).

45 CEA Study at 8 (noting that the average price to consumers in New Mexico would be $117-195 per year).

46 EIA, "U.S. energy insecure households were billed more for energy than other households," (May 30, 2023) available at https://www.eia.gov/todayinenergy/detail.php?id=56640.

Organization: International Council on Clean Transportation (ICCT)

Life-cycle comparison of combustion and electric vehicles

The climate benefits of electric vehicles compared to internal combustion engine vehicles are clear and growing. Numerous studies show that BEVs are much cleaner than combustion vehicles over their lifetime. In fact, the most recent ICCT life-cycle analysis shows that only battery electric and hydrogen fuel cell electric vehicles have the potential to achieve the magnitude of life-cycle greenhouse gas emissions reductions needed to meet Paris Agreement goals.40 Specifically, the assessment finds that the life-cycle emissions over the lifetime of BEVs registered in 2021 in the United States are lower than comparable gasoline vehicles by 60%- 68%. For new vehicles registered in 2030, the life-cycle emissions gap between BEV and gasoline vehicles increase to 62%-76%. [EPA-HQ-OAR-2022-0829-0569, pp. 15-16]

40 Bieker, G. (2021). A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars. International Council on Clean Transportation. https://theicct.org/publication/a-global- comparison-of-the-life-cycle-greenhouse-gas-emissions-of-combustion-engine-and-electric-passenger-cars/

SEE ORIGINAL COMMENT FOR Figure 4. Life-cycle GHG emission of average medium-size gasoline internal combustion engine and battery electric vehicles registered in the United States in 2021 and projected to be registered in 2030.41 [EPA-HQ-OAR-2022-0829-0569, pp. 15-16]

41 Bieker, G. (2021). A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars. International Council on Clean Transportation. https://theicct.org/publication/a-global- comparison-of-the-life-cycle-greenhouse-gas-emissions-of-combustion-engine-and-electric-passenger-cars/

There are a few reasons our study finds such high life-cycle GHG benefits of BEVs compared to gasoline passenger vehicles. The foremost reason is that electric motors are far more efficient than internal combustion engines. Another important reason is that we expect continued reductions in the U.S. electricity generation mix as renewables such as solar and wind become more economically competitive (these sources also continue to be supported by fiscal incentives through the IRA). Our analysis accounts for this expected reduction in the GHG emissions from U.S. electricity throughout the 18-year lifetime of a passenger vehicle registered in the U.S. before it is deregistered. A third reason why the life-cycle GHG emissions from BEVs are so low is that estimated GHG emissions from battery production have declined significantly over the past few years as we have collected new data from commercial-scale battery production plants. [EPA-HQ-OAR-2022-0829-0569, pp. 15-16]

These findings are aligned with other life-cycle analysis of electric and combustion vehicles in the U.S. A 2022 UCS study found that electric vehicles produce fewer emissions than new gasoline vehicles everywhere in the U.S., and that on average EVs produce emissions equivalent to 91-mile-per-gallon gasoline cars.42 The same study found that BEVs' higher manufacturing emissions are quickly paid off after about 12,600 to 21,300 miles of driving, which is typically reached in about 1-2 years for most U.S. drivers. [EPA-HQ-OAR-2022-0829-0569, pp. 15-16]

42 Reichmuth, D., Dunn, J., Anair, D. (2022). Driving cleaner: Electric cars and pickups beat gasoline on lifetime global warming emissions. Union of Concerned Scientists. https://www.ucsusa.org/sites/default/files/2022- 09/driving-cleaner-report.pdf

For combustion vehicles, there is no realistic pathway for deep decarbonization, even when the potential for biofuels and biogas are taken into account. For gasoline cars, we account for the current ~10% blend of corn ethanol and its associated GHG emissions. Blending corn ethanol does not significantly reduce the life-cycle GHG emissions from combusting gasoline because the GHG emissions from producing corn ethanol are also quite high when including EPA's estimated GHG emissions from land use change – only around 20% lower than the lifecycle GHG emissions from producing and combusting gasoline. The production and consumption within the U.S. of ultra-low GHG biofuels that can be blended into the gasoline mix (mainly cellulosic ethanol) remains relatively very low.43 Given the greater incentives for second generation biofuels used in aviation compared to the road sector in the IRA, it seems unlikely that biofuels will significantly reduce the overall GHG intensity of the U.S. gasoline mix over the timeframe of EPA's proposal. [EPA-HQ-OAR-2022-0829-0569, pp. 15-16]

43 U.S. EPA (2022 December 13). Public data for the renewable fuel standard. https://www.epa.gov/fuels-registration- reporting-and-compliance-help/public-data-renewable-fuel-standard

Organization: John Graham (Graham)

I. While EPA claims that the NPRM is technologically neutral,1 the structure of the standards for model years 2027 to 2032 is biased in favor of all-electric vehicles and biased against hybrid propulsion systems.

1 Preamble, p. 29342, states, "At the same time, we note that the proposed standards are performance-based and do not mandate any specific technology for any manufacturer or any vehicle."

Rationale: the compliance calculations under the rule assume that BEVs have zero emissions of carbon dioxide, even though it is well established that increasing use of BEVs will increase carbon dioxide emissions at the electric power plant and create more carbon dioxide emissions in the supply chain for BEVs than would be created in the supply chains for hybrids. Based primarily upon ICCT's 2021 lifecycle analysis, we calculate an artificial benefit to BEVs versus hybrids of slightly over $4,500 per vehicle in 2021 and slightly less than $4,500 per vehicle in 2030 towards standard compliance (retail price – artificial benefit in DMC is about $3,000 per vehicle). Had EPA used a lifecycle metric in the CO2 performance standards (rather than the tailpipe metric), the deployment rates of BEVs and hybrids would be more evenly distributed and the overall impact of the standards on CO2 and costs would have been more favorable. [EPA-HQ-OAR-2022-0829-0585, p. 4]

First, the notion that BEVs have zero emissions is a myth; they transfer pollution from the tailpipe to the stack of the electric power plant, where the electricity is produced to power the BEVs. Moreover, the supply chains for BEVs are more polluting than the supply chains for hybrids, principally because of the large amount of energy required to mine and process the raw materials used in batteries and electric motors. The batteries in HEVs are much smaller than batteries in BEVs, typically less than 2% of BEV battery size. Also, upstream emissions from electricity production are usually greater than the energy required to explore, develop, refine, and distribute petroleum resources and ethanol. Thus, environmentally, BEVs and hybrids need to be compared on a lifecycle basis, not simply at the tailpipe. BEVs may be environmentally preferable in some locations (e.g., where electric power is generated from renewables) while hybrids might be environmentally acceptable or even preferable in areas where electric power is dependent on fossil-fuels, especially coal. [EPA-HQ-OAR-2022-0829-0585, p. 9]

Real-World GHG Emissions

In this section, we distinguish the compliance values for greenhouse gas emissions, which address only tailpipe emissions, from real-world lifecycle greenhouse gas emissions, which include induced utility emissions and emissions throughout the BEV manufacturing and supply chain, as well as tailpipe emissions. [EPA-HQ-OAR-2022-0829-0585, p. 33]

The proposed rule states that BEVs are assumed to have zero-GHG emissions for purposes of compliance with the proposed standards. The DRIA includes some flawed IPM modeling of upstream grid emissions that are biased to make BEVs look cleaner than they will be (see below). Even worse, embedded GHG emissions from battery and BEV manufacturing are not only excluded for compliance purposes but are ignored when computing real-world impacts within the IPM model.94 The omission of emissions from the BEV supply chain is especially appalling given that the agency counts some of the environmental benefits of reducing petroleum production (e.g., reduced emissions at refineries). [EPA-HQ-OAR-2022-0829-0585, p. 33]

94 DRIA 8.2.2.5 page 8-14 states, “The upstream emissions inventory does not account for all upstream sources related to vehicles, fuels, and electricity generation, such as charging infrastructure, storage of petroleum fuels, battery manufacture, etc.”

The IPM modeling assumes that the carbon intensity of the electrical grid will decline by 70 percent over the lifetimes of 2032 vehicles, as renewables replace most fossil fuels throughout the United States. The reader is led to believe that the subsidies for renewables in the Inflation Reduction Act will cause this rapid transformation of the US utility industry. However, the Inflation Reduction Act does not include the permitting reforms that are required for the large new transmission lines necessary to bring renewable energy to the markets where they are needed. Recent reports from both Brookings and the R Street Institute show that, without permitting reform, the monies in the Inflation Reduction Act are likely to have minimal impact on the expansion of renewables in the utility sector.95 The IPM modeling also ignores the massive expansion of grid-scale energy storage that would be required to achieve reliability with renewables. That energy storage, which would likely require large numbers of lithium ion batteries, is not included in the agency’s assessment of battery prices, electricity prices, or material supply requirements. For these reasons, it is unrealistic to expect that the electricity currently provided by fossil fuels will be provided by renewables within the average lifetime of the model year 2032 vehicle. Thus, the upstream emissions from BEVs will be significantly larger than the agency assumes. Without this bias, HEVs would look much better in comparison to BEVs, as we illustrate in the simulation below. [EPA-HQ-OAR-2022-0829-0585, pp. 33-34]

95 Rayan Sud, Sanjay Patnaik. How Does Permitting for Clean Energy Work? Brookings Institution. Washington, DC. September 28, 2022; Rayan Sud, Sanjay Patnaik, Robert L. Glicksman. Federal Permitting to Accelerate Clean Energy Infrastructure: A Nonpartisan Way Forward. Brookings Institution. Washington, DC. February 14, 2023; Philip Rosetti. Potential Effects of the Inflation Reduction Act on Greenhouse Gas Emissions. R Street. Washington, DC. September 27, 2022; Philip Rossetti. Written Testimony for the Hearing on “Tax Incentives in the Inflation Reduction Act: Jobs and Investment in Energy Communities.” Committee on Finance. United States Senate. Washington, DC. May 18, 2023.

The attached Table 1 calculates lifecycle and tailpipe emissions for ICEVs, HEVs, and BEVs for 2021 and 2030. Model years 2021 and 2030 are used because it begins with ICCT’s calculation of 101 g/km CO2 for life cycle emissions of a 2021 model year BEV car in ICCT’s 2021 lifecycle emission study.96 The 101 g/km CO2 is composed of 60 g/km due to operation from the U.S. national electric grid at 357 g/kWh CO2 and 41 g/km due to manufacturing and maintenance emissions. These are converted into g/mi CO_2 in Table 1. BEV emissions with the CA grid at 225 g/kWh CO_2 are also shown for 2021. [EPA-HQ-OAR-2022-0829-0585, pp. 33-34]

96 George Bieker, International Council on Clean Transportation, "A Global Comparison of the Life-Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars", July 2021, Figure 4.1. https://theicct.org/sites/default/files/publications/Global-LCA-passenger-cars-jul2021_0.pdf

The ICCT lifecycle study also calculates ICEV life cycle emissions for cars of 252 g/km CO_2 for model year 2021, comprised of 55 g/km from upstream fuel production, 31 g/km due to manufacturing and maintenance, and 166 g/km for tailpipe emissions (also converted into g/mi). [EPA-HQ-OAR-2022-0829-0585, p. 34]

HEV manufacturing and maintenance emissions are assumed to be the same as ICEV since HEVs do not access the grid and the batteries in HEVs are small compared to the batteries in BEVs (see above) Tailpipe emissions are computed by comparing ICEV and HEV fuel consumption from fueleconomy.gov for seven 2022 models offered with optional HEV systems.97 The average reduction was 30%, which was applied to the ICEV upstream and tailpipe CO_2 emissions in Table 1. v [EPA-HQ-OAR-2022-0829-0585, pp. 34-35]

97 The 2022 models are the Kia Sorento, Hyundai Santa Fe, Hyundai Tuscan, Ford Escape, Toyota RAV4, and Toyota Highlander. Calculations were performed for a submitted SAE paper: John D. Graham and Wallace R. Wade, "Reducing Greenhouse-Gas Emissions from Light-Duty Vehicles: Supply- Chain and Cost-Effectiveness Analyses Suggest a Near-Term Role for Hybrids", accepted for publication in SAE International Journal of Sustainable Transportation, Energy, Environment, & Policy (STEEP) and available from the authors upon request.

Table 1 also calculates emissions for 2030 model year vehicles, also based on the 2021 ICCT lifecycle study. ICCT assumes that manufacturing and maintenance emissions will drop from 41 in 2021 to 34 g/km CO_2 in 2030 for car BEVs and from 31 to 26 g/km for car ICEVs; upstream electricity/fuel emissions will drop from 60 to 52 g/km for car BEVs and from 55 to 52 g/km for car ICEVs; and car ICEV tailpipe emissions will drop from 166 to 150 g/km. As for 2021, 2030 car HEV manufacturing and maintenance emissions are the same as 2030 ICEV and 2030 HEV upstream fuel production and tailpipe emissions are 30% lower than 2030 ICEV. All values in Table 1 have been converted to g/mi CO_2. [EPA-HQ-OAR-2022-0829-0585, pp. 34-35]

A key insight from Table 1 is that the emissions advantage of the BEV relative to the HEV is substantially smaller when the BEV is assigned a plausible amount of upstream and embedded emissions. We have understated the upstream emissions of BEVs in Table 1 by using the average carbon intensity of the electrical grid, rather than the marginal emissions that will result from the additional electricity consumed by BEVs. Insofar as BEVs are charged at night, they will often rely on fossil fuel plants that run at night (solar energy is not available at night). [EPA-HQ-OAR-2022-0829-0585, pp. 34-35]

Lifecycle studies that have investigated marginal emissions find that BEVs do not always have a significant advantage over HEVs, especially in some parts of the country where marginal emissions rely on fossil fuels.98 Interestingly, while overall coal use has been steadily declining in the US since 2010, coal use to meet marginal emissions demands has actually been increasing over the same time period.99 [EPA-HQ-OAR-2022-0829-0585, pp. 34-35]

98 J Zivin, M Kotchen, ET Mansur. Spatial and Temporal Heterogeneity of Marginal Emissions: Implications for Electric Cars and Other Electricity-Shifting Policies. Journal of Economic Behavior and Organization. 107 (Part A). 2014, 248-68.

99 Stephen P. Holland, Matthew J Kotchen, Erin T. Mansur, Andrew J. Yate. Why Marginal CO2 Emissions Are Not Decreasing for US Electricity: Estimates and Implications for Policy. PNAS. 119(8). 2022, e2116632119. https://www.pnas.org/doi/10.1073/pnas.2116632119.

Table 1 also shows that the lifecycle emissions advantage of the BEV is larger in the states that have adopted zero-emission vehicle (ZEV) mandates than in states that have not adopted ZEV mandates. This difference reflects that fact that the average reliance on coal and oil for electricity production is much less prevalent in ZEV states (6.9%) than in non-ZEV states (31.2%).100 Since the incremental effect of the EPA rule will be felt predominantly in the non-ZEV states, the most appropriate comparison for this rulemaking is HEV emissions versus BEV emissions in non-ZEV states. [EPA-HQ-OAR-2022-0829-0585, p. 35]

100 EPA. eGRID with 2021 Data. Released January 30, 2023, https://www.epa.gov/egrid/summary-data.

The central case in the DRIA ignores this reality by assuming that no states have adopted zero emission vehicle mandates. There is a sensitivity case where state ZEV mandates are considered in an alternative baseline, but the sensitivity case does not actually assume full implementation of the state-level mandates. Instead, it uses a BEV adopter model with a state-ZEV variable that is not properly specified (this weakness is acknowledged by the authors of the model).101 As a result, even the sensitivity case assumes, incorrectly, that the EPA rule will have a large impact on BEV adoption in the ZEV states. In the final rule, EPA should fix this problem, making sure that the BEV-adoption impact of the rule is concentrated in the non-ZEV states (since the state regulations and ancillary state policies will handle BEV deployment in the ZEV states). We also recommend a specific marginal emissions comparison of BEVs versus HEVs in each of the non-ZEV states. [EPA-HQ-OAR-2022-0829-0585, p. 35]

101 https://www.nrel.gov/docs/fy22osti/81065.pdf (especially p. 18).

The HEV incremental cost (DMC) over ICEV for 2021 of $2,055 in Table 1 was taken directly from the 2021 NAS study.103 The 2030 HEV incremental DMC was reduced using the 0.97 learning factor from PRIA Table 2-26. From the incremental DMC cost and total emissions, the HEV cost per g/mi CO2 avoided was calculated, $19.3 $/g/mi CO2 for 2021 and $20.5 for 2030. (Note: as explained earlier, larger learning factors should be used for HEVs but here we use the agency's assumption for illustrative purposes). [EPA-HQ-OAR-2022-0829-0585, pp. 36-37]

103 National Academies, Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy; 2025-2035. 2021. https://nap.nationalacademies.org/catalog/26092/assessment-of-technologies-for-improving-light-duty- vehicle-fuel-economy-2025-2035.

The final step was to calculate the incremental BEV DMC over ICEV that matches the cost-effectiveness calculated for the HEV, for lifecycle emissions using the US grid and tailpipe only scenarios (CA grid is also shown for 2021 for comparison). The results are similar for 2021 and 2030. Using lifecycle emissions and US grid, a BEV is more cost-effective than a HEV only if the incremental BEV DMC is less than $4,686 in 2021 and $4,679 in 2030. Using tailpipe emissions only, a BEV is more cost effective than a HEV only if the incremental BEV DMC is less than $7,820 in 2021 and $7,513 in 2030. [EPA-HQ-OAR-2022-0829-0585, pp. 36-37]

The important finding from these calculations is the large difference between BEV cost-effectiveness for the lifecycle and tailpipe scenarios, which is $3,134 for cars in 2021 ($7,820 - $4,686) and $2,834 in 2030 ($7,513-$4,679). Applying EPA's RPE of 1.5 to the DMC cost-effectiveness increases the amount to about $4,500. This is an artificial advantage given to BEVs over HEVs from using tailpipe-emissions standards instead of lifecycle emission standards. To put this in perspective, the artificial incentive for car BEVs of about $3,000 is 50% more than the HEV DMC cost increment over ICEVs of about $2,000 in both 2021 and 2030. It is also about 63% of the $4,725 incremental DMC of a car BEV over a car HEV in 2022.104,105 [EPA-HQ-OAR-2022-0829-0585, pp. 36-37]

104 2022 BEV and HEV DMC calculated from ICCT 2022 BEV cost study: Peter Slowik, Aaron Isenstadt, Logan Pierce, Stephanie Searle, ASSESSMENT OF LIGHT-DUTY ELECTRIC VEHICLE COSTS AND CONSUMER BENEFITS IN THE UNITED STATES IN THE 2022–2035 TIME FRAME. ICCT, Oct. 2022. https://theicct.org/wp-content/uploads/2022/10/ev-cost-benefits-2035-oct22.pdf.

105 Data: 2020 car ICEV DMC from ICCT 2022 BEV cost study (described in footnote 98) Table 3 adjusted to 2022 using Table 4 ($19,956); 2022 car BEV-250 DMC from ICCT 2022 BEV cost study Table 6 adjusted to 300 mile range using Table 5 ($26,736); 2022 car HEV DMC as previously calculated from 2021 NAS study ($2,055).

[See original comment for Table 1: Comparison of tailpipe and lifecycle emissions and cost-effectiveness] [EPA-HQ-OAR-2022-0829-0585, pp. 36-37]

The Preamble states on page 29342:

"At the same time, we note that the proposed standards are performance-based and do not mandate any specific technology for any manufacturer or any vehicle. Moreover, the overall industry does not necessarily need to reach this level of BEVs in order to comply—the projection in our analysis is one of many possible compliance pathways that manufacturers could choose to take under the performance-based standards. For example, manufacturers that choose to increase their sales of HEV and PHEV technologies or apply more advanced technology to non-hybrid ICE vehicles would require a smaller number of BEVs than we have projected in our assessment to comply with the proposed standards. [EPA-HQ-OAR-2022-0829-0585, p. 37]

While EPA is correct that specific technologies are not actually mandated and manufacturers can choose to increase their sales of HEV and PHEV technologies, EPA is NOT correct that the "proposed standards are performance-based". As illustrated in Table 1, EPA has put its thumb on the scale and given BEVs approximately a $4,500 ($3,000 DMC) advantage – in addition to the temporary advantages that Congress gave BEVs in the Inflation Reduction Act of 2022. Given that the incremental cost (DMC) of a HEV is only about $2,000, this is a huge artificial disadvantage to HEVs. Had EPA used a lifecycle metric in the CO2 performance standards (rather than the tailpipe metric), the deployment rates of BEVs and hybrids would be more evenly distributed and the overall impact of the standards on total CO2 emissions and total costs would have been more favorable. The agency should run the OMEGA modeling using our suggested assumptions in the final rule. [EPA-HQ-OAR-2022-0829-0585, p. 37]

EPA's Response to Comments document for the 2023-2026 light-duty standards dismissed lifecycle arguments as irrelevant since the Agency has not proposed to address a possible change in the "form" of the standard. However, lifecycle emissions are not a "form of the standard", they are part of what determines the total amount of CO2 emissions caused by vehicles. It is disingenuous to suggest that, for example, selecting between footprint- and weight-based adjustments to the standards, which is well accepted as a change in the form of the standards, is the same as ignoring CO2 emissions equivalent to 40% of 2021 ICEV emissions. Delaying indefinitely a move to a lifecycle standard is not technology-neutral, as it retards HEV deployment and innovation, while hurting the environment and the economy. [EPA-HQ-OAR-2022-0829-0585, p. 38]

Therefore, we are requesting that EPA also consider our comment as a petition for rulemaking (under the APA and CAA) to adopt a lifecycle emissions standard for vehicles. If necessary, the agency could go final with the 2027 standards with the tailpipe metric and hold on finalization of the 2028-2032 standards until the lifecycle rulemaking is completed. This would ensure that automakers have ample lead time (4-5 years) to adjust to the new lifecycle metric and the new lifecycle performance standards. [EPA-HQ-OAR-2022-0829-0585, p. 38]

Moreover, by ignoring upstream and manufacturing emissions that are higher for BEVs than conventional vehicles, the final rule will generate more total carbon dioxide emissions and larger compliance costs than would occur if the final rule was designed objectively using lifecycle emissions. This is contrary to the intent of the Clean Air Act, which authorizes no special treatment of BEVs. [EPA-HQ-OAR-2022-0829-0585, p. 38]

Organization: KALA Engineering Consultants (KALA)

Comments

1. If I was not an engineer deeply steeped in the subtleties of transportation emission issues and I read your Federal Register (FedReg) text or news reports written by reporters unfamiliar with the actual science basis for your proposed rulemaking for Docket EPA–HQ–OAR– 2022–0829 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, I might come away from certain descriptions of vehicles discussed in such text as describing transportation vehicles that have absolutely no emissions coming from them or attributable to them at all. Repeated use by the EPA of the terms Zero Emission and Zero Emission Vehicle (ZEV) could lead some to believe there actually is such a thing, when all of EPA's emission scientists and engineers know this is not the case. We hesitate to charge EPA with putting out deliberately misleading characterizations of Battery Electric Vehicles (BEV) as true ZERO emission vehicles, but it seems that way. Examples from the FedReg text below: [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

From Section I. A. 2, i: "These industry advancements in the production and sales of zero-and near-zero emission vehicles are already occurring both domestically and globally,… [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

As the term ''zero-emission vehicle'' suggests, these cars and trucks have zero GHG and criteria pollutant emissions from their tailpipes, which can represent significant reductions over current emissions (particularly for GHG). [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

[I]t is important to recognize that, despite this anticipated growth in zero-emission vehicles, many internal combustion engine (ICE) vehicles will continue to be sold during the time frame of the rule and will remain on the road for many years afterward." [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

KALA strenuously objects to what seems to be un-scientific and cavalier use of the "zero emission" terminology when referring to all-electric rechargeable vehicles when all of you know that there may well be fossil-fueled electric generating units (EGU), emitting lots of GHG, supplying the electric power to recharge those vehicle batteries. We implore the EPA to be more scientifically precise in its terminology for BEVs as Zero Operating Emission vehicles and use acronyms of (ZOE and ZOEV). Such proper terminology gives the uninformed reader the idea that there may be no emissions from operation of BEVs, but there might be emissions associated with the electrical refueling, ie, recharging, of those vehicles. Yes, we know that the ZEV terminology used by EPA fits into what we believe is misguided regulatory consideration of ONLY the operating emissions or lack thereof from ZOEVs while entirely ignoring the "Upstream" GHG emissions associated with battery recharge. EPA cannot have this situation represent realistic GHG considerations if you cling to that artifice. We could give you several dandy analogies, but we won't waste your time. [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

EPA waxes poetic about all the upcoming public and private BEV recharging facilities that have been and are being installed or planned to be installed. It seems odd to us that the GHG emissions associated with all those charging facilities are simply being ignored in any calculations of attributable GHG emissions that could arguably be linked to BEV expansion in the US fleet. [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

Charging facilities are NOT zero emission when all of the associated GHG emissions are considered. These recharging facilities would not be being installed if there were no BEVs. Therefore, all of these recharging stations and facilities are new to the status quo situation and therefore have GHG emissions directly relatable to the presence of BEVs. All of the copper used in these facilities has GHG emissions associated with mining, haulage, transport, smelting, wire drawing and reeling. The plastic used in these facilities and as wire insulation almost certainly comes from petroleum stocks with GHG emissions associated with the creation of the plastics. Concrete and reinforcing steel used to support the facilities and provide driveways and parking areas have GHG emissions directly associated with the construction of these facilities, plus the fossil fuels used by construction machinery and vehicles doing that construction. We could go on, but it seems that EPA staff is conveniently ignoring the GHG emissions associated with what will become the millions of recharging facilities and stations needed to support the advancement of electric vehicles promulgated under these proposed regulatory rules. Such willful dismissal or ignoring of these types of issues when it comes to GHG emissions associated with rule making that essentially requires vehicle manufacturers to move to BEV adoption as virtually their sole option for compliance smacks of the work of zealots – in this case electrification zealots within the EPA. [EPA-HQ-OAR-2022-0829-0617, pp. 3-4]

Comment

3. The EPA appears to be using a very "special" consideration of emissions that are to be counted as regulated emission from Battery Electric Vehicles (BEV). In unbelievable statements of contorted logic, the EPA has set forth what we describe as a complete artifice designed to promote and "force" a major change to vehicle propulsion starting in model year 2027. While it is true that during operation BEVs produce no criteria pollutants and emit no GHG gasses, the same cannot be said for the probable sources of the electric power used to recharge the batteries of BEVs. We wish this were not so, but we must deal factually with emissions associated with BEV recharging. If the EPA is serious about GHG reductions, they MUST include and consider

the GHG emissions of grid-connected Electric Generating Units (EGU). Much like the water that comes from our faucets, several water sources could be being used to provide that water. So it is with electricity. No one can distinguish or filter out clean electrons coming from wind and solar sources and “dirty” electrons coming from GHG-intensive electric generation. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Power that comes into homes and businesses may well be a mix of so-called clean energy and emission-laden dirty energy produced by burning fossil fuels. In fact, the mix of electricity generation varies greatly by state or region, depending on what the “serving utility” chooses to use for generation. Some regions rely almost entirely on fossil fuel and nuclear generation methods, while others have added or switched to renewable energy production methods, such as wind and solar as part of their generation mix. There are few if any regions of the United States that are completely powered by renewable or GHG-free energy. There are GHG implications for most of the so-called renewable generation methods. Solar panels are often produced with high Global Warming Potential (GWP) chemicals being released and there are GHG emissions associated with the steel, carbon fibers, plastics and copper conductors used in wind turbines. All this is to say there are GHG emissions associated with virtually all forms of electric generation that cannot be ignored when considering whether or not the introduction of a new form of vehicle propulsion that relies on recharging batteries will have associated GHG emissions. The latest figures from the Energy Information Agency for 2022, show the mix of energy production for the US: [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

[See original attachment for U.S. utility-scale electricity generation by source, amount, and share of total in 20221 Data as of February 2023] [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

As you can see, 60.2% of overall US electricity generation was still produced by burning fossil fuels with their associated GHG and other pollutant emissions. When we aggregate how much GHG emissions might be attributable to recharging Battery Electric Vehicles we normally do so on a nation-wide scale using the latest available information. Since regional electric power generation is so varied, we cannot say a BEV in Southern California will have lower associated GHG emissions than one recharging in St. Paul, Minnesota. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Therefore, as of 2022, we can say in aggregate, there is a 60% chance that the electrons used to recharge BEVs over the next few years will be from fossil CO2 emitting fossil fuel generating plants. That is why, any scientific calculations made for the GHG contributions that a BEV makes must consider how the recharging power delivered to the BEV was generated. A BEV may have zero operating emissions but they do NOT have zero GHG emissions associated with their use. It is our considered engineering opinion that much of the so-called “low-hanging fruit” for renewable generation in the US has already been implemented and is now on-line or soon will be. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Think about an Electric Utility company that has literally made billions of dollars of investments in coal and/or natural gas fired power plants. In their board room minds, they are doing just fine making electricity in the same old way as they did 50 years ago and feel no compunction at all about charging their customers more for electricity when the cost of the fossil fuels they burn go up. Why would such a business feel compelled to create “stranded assets” of their fossil-fired generating facilities long before their estimated useful life expires and switch over to renewable forms of electricity generation? Might it be because the board of directors and the management suddenly “feel” like it is the “right” thing to do for the planet. Really?? Seriously, businesses have built-in inertia when they have made large investments in what brings in revenue for the business and for their stock holders. They might agree that new generating capacity should be renewable, but there is great impetus to expand their existing fossil fuel-fired facilities with a new generator unit. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

So, the 60% fossil fuel number may stubbornly stay close to that figure for some time. The EPA attempted to control both pollutant and GHG emissions from power plants when the “Clean Power Plan” was part of policy thrusts, but they were less than successful in courts and countering the Utility and Fossil Fuel lobbies in Congress. [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

https://www.nationofchange.org/2022/07/05/the-supreme-court-has-curtailed-epas-power-to-regulate-carbon-pollution-and-sent-a-warning-to-other-regulators/ [EPA-HQ-OAR-2022-0829-0617, pp. 8-10]

Fig. 2. Alternative metrics for evaluating ethanol based on the intensity of primary energy inputs (MJ) per MJ of fuel and of net greenhouse gas emissions (kg CO2-equivalent) per MJ of fuel. For gasoline, both petroleum feedstock and petroleum energy inputs are included. ‘‘Other’’ includes nuclear and hydrological electricity generation. Relative to gasoline, ethanol produced today is much less petroleum intensive but much more natural gas and coal-intensive. Production of ethanol from lignite fired biorefineries located far from where the corn is grown results in ethanol with a high coal intensity and a moderate petroleum intensity. Cellulosic ethanol is expected to have an extremely low intensity for all fossil fuels and a very slightly negative coal intensity due to electricity sales that would displace coal. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

The caption explains the units for GHG emissions calculated, which should be easily converted to what ever units EPA would like to use for its purposes. So, please, EPA, don’t tell us such calculations would be a huge burden since someone else has done them for you. [EPA-HQ-OAR-2022-0829-0617, pp. 10-15]

B. EPA may not have legislative authority to make such sweeping changes to the vehicle mix in the 250 million strong US fleet.

Comment

4. We begin this comment by citing passages from A Framework for Federal Scientific Integrity Policy and Practice formulated by The Scientific Integrity Framework Interagency Working Group (SIF-IWG) of The National Science and Technology Council (NSTC). “The Framework,” as we will refer to it, was commissioned by the January 27, 2021 Presidential Memorandum on Restoring Trust in Government Through Scientific Integrity and Evidence-Based Policymaking to create a Scientific Integrity Task Force. [EPA-HQ-OAR-2022-0829-0617, p. 16]

While the creation of a Scientific Integrity Policy is laudable, we wonder why people in the Executive Branch felt it necessary to state or re-state the requirements for Integrity in Federal Government science products. We believe the timing of the Presidential Memorandum, after the administration of Donald Trump had left office, is consequential. We further believe, while not stated per se in The Framework verbiage, the Executive Branch felt it was necessary to re-state and strengthen Scientific Integrity policies for Federal agencies directly due to the unethical behavior of Agency heads and group leaders hand-selected to further the Trump Administration's policy agendas. Those agendas in numerous cases had Federal Agencies coming out with so-called scientific findings that were diametrically opposite or nearly so to science findings made under prior administrations and under prior Congressional commissions for scientific studies. [EPA-HQ-OAR-2022-0829-0617, p. 16]

We would be glad to debate our prior statements with anybody, but that is not why we are here. We are going to introduce science results that appear to be directly in conflict with science findings from and related to EPA Docket ID No. EPA–HQ–OAR– 2022– 0829, specifically projected Greenhouse Gas (GHG) emission reductions, and more specifically projected GHG reductions from Battery Electric Vehicles (BEV) as a result of full adoption of the rulemaking and standards set forth in the cited proposed rulemaking. As such, KALA Consulting is hereby requesting that, at a minimum, the complete content of this Comment's section (Section 4) be referred to the Science Integrity Officer(s) who oversees science integrity conflicts and opposing views by staff or outside commentors. We might also suggest review of negative conclusions drawn by KALA for what we view as misguided regulatory stances made in formulating the subject docket in our full set of comments. [EPA-HQ-OAR-2022-0829-0617, p. 16]

There are those that will argue that this report on the Hidden Costs of Energy is too old to be applicable to today's situation and that things have changed enough that the assumptions made in 2009 are far from the realities of today. We would in part agree with that assessment except for the issue of GHG emissions projected for 2030 in the report. In that case, the changes that became apparent between 2009 and today would not be in your favor when it comes to GHG emissions from fossil-fueled power plants, which are the main source of GHG emissions associated with Grid Dependent BEVs. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

Fugitive Methane Emissions: Let's look at those GHG and power plant-related changes that have come up since the NAS Hidden Costs of Energy report was written. The Hydraulic Fracturing of oil and gas shale rocks method of recovering both oil and natural gas (mostly methane) did not really get going until around 2012 when US oil and gas production did a U-turn and both oil and natural gas became more abundant for US consumers. However, as the amounts of natural gas extraction went up, researchers found increasing amounts of methane in the atmosphere that had a carbon signature attributable to fracked gas.

https://news.cornell.edu/stories/2019/08/study-fracking-prompts-global-spike-atmospheric-methane

[EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

It was becoming apparent in research being done in the US that fugitive methane emissions upstream of natural gas electric generating plants was much worse than the power generating industry or the oil and gas industry were reporting. In a landmark study conducted by Purdue University investigators, the "Well to fire-box nozzle" releases of methane may be as much as 120 times higher than previously reported.

https://www.purdue.edu/newsroom/releases/2017/Q1/estimates-of-emissions-from-natural-gas-fueled-plants-much- too-low,-study-finds.html

[EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

It was thought that a switch over to burning natural gas for electricity generation would produce about half of the GHG emissions of a coal-fired power plant (EGU). With the new availability and low price of fracked gas, many electric utility companies switched their coal-fired generating units to natural gas or built new natural gas-fired units. But when upstream methane emissions are considered and the fact that methane is approximately 85 times more potent a greenhouse gas (85x GWP over the first 20 years after release) than CO2, the GHG emissions from natural gas electric generating units is considerably greater than once thought.

https://www.scientificamerican.com/article/methane-leaks-erase-some-of-the-climate-benefits-of-natural-gas/

[EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

These new study revelations would undoubtedly have increased the estimates for GHG emissions from grid-recharged “Electric” vehicles as the Hidden Costs of Energy study calls BEVs. So, in our view, the GHG emissions for BEVs shown in the Hidden Costs of Energy report are undoubtedly UNDERSTATED. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The other major change related to GHG emissions from electric generation that could not have been known to the Hidden Costs of Energy authors has to do with the environmental disaster known as the Trump Administration. That administration attempted to roll back emission standards and promote the use of coal for electric generating. The writing was on the wall for abandoning coal in favor of natural gas for generation during that time, but some utilities may have extended operations of existing coal-fired generating units or added additional coal burners and generators to portfolios under that coal-favorable oversite. For each day of extended coal-fired operation for electricity, the terrible mix of air pollutants and the solid waste problem of coal ash disposal became worse, something those authors could not have foreseen.

https://www.washingtonpost.com/graphics/2020/climate-environment/trump-climate-environment-protections/

[EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

All of these findings and administrative disasters were not known at the time the Hidden Costs of Energy report was being assembled and study authors were not aware of the “Hidden” methane emissions from the natural gas distribution system. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

It may seem odd that a report whose name has Costs as a prominent part of its title would have an assessment of GHG emissions as part of its findings in the Transportation section. The Hidden Costs of Energy report actually made projections for 2030 of environmental damage costs on a cents per vehicle mile traveled basis for multiple carbon-containing fuels, hydrogen and electric vehicles (BEVs). In that projection, BEVs were considered to have higher per mile traveled environmental damage costs than conventional gasoline spark Ignition (CG-SI) vehicles in 2030. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

From Page 210 of the Hidden Costs of Energy report:

[See original attachment for Table 3-18 Relative Categories of Damages in 2030 for Major Categories of Light-Duty Fuels and Technologies (2005 data deleted)]

Notes: Costs are in 2007 USD. ABBREVIATIONS: VMT = vehicle miles traveled; CNG = compressed natural gas; HEV = hybrid electric vehicle; RFG = reformulated gasoline.; E85 = 85% Ethanol / 15% gasoline fuel blend; E10 = 10% Ethanol / 90% gasoline fuel blend [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The authors of the Hidden Costs of Energy report also depicted their environmental damage costs per vehicle mile traveled (VMT) projected to the year 2030 graphically, which makes comparisons by inspection much easier:

[See original attachment for Health and Other Damages by Life-Cycle Component 2030 Light-Duty Automobiles] [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

Graphic abbreviation notes: RFG=Reformulated Gasoline (used in warmer US regions in summer); SI=Spark Ignition as opposed to Compression Ignition (Diesel); CG=Conventional Gasoline; SIDI=Spark Ignition Direct Injection; CNG=Compressed Natural Gas; E85=85% Ethanol / 15% Gasoline fuel blend; E10=10% Ethanol / 90% Gasoline fuel blend; Electric=Battery Electric Vehicle (BEV); SI HEV= Spark Ignition Hybrid Electric Vehicle; BD20=20% Biodiesel / 80% petroleum diesel fuel blend [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

It should be obvious to the most casual observer that it was no walk in the park for the authors of the Hidden Costs of Energy report to consider all 22 of the shown vehicle propulsion fuel and technology types and run projected calculations for each. The graphic also shows that the BEV (Electric) cohort is slightly higher in environmental damages, when monetized, than the spark Ignition Gasoline vehicle types. To put a number to it, if the vehicle travels 100,000 miles, the monetary difference in environ- mental damages between gasoline and BEVs ranges from $10 to $1,000 (2007 USD), which would be about 20% higher in 2022. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The takeaway from this environmental damage assessment in the Hidden Costs of Energy report for 2030 vehicle types is that the EPA is now proposing standards that would probably require high percentages of vehicles, namely BEVs, to be sold into the US fleet that are going to cause MORE environmental damage than a good old gasoline vehicle. If the report's assessment for environmental damages is correct, i.e. that BEVS will be more damaging to the environment than conventional gasoline vehicles, why are we expected to want to drive BEVs and damage the environment more so than the gasoline vehicles we have been using? Moreover, why would the EPA want to force, through regulations, a switch over to BEVs if they are going to do more environmental damage, something that is antithetical to the stated mission of the EPA? [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

We are still scratching our heads over why the EPA would be pushing for a change to vehicles that do more damage to the environment than the gasoline vehicles we have been driving. The environmental damages assessment shown above does not include any attributable damages from GHG emissions for each vehicle type assessed. Fortunately, for those of us who want to see a comparison of estimated GHG emissions between the type of vehicles we have been driving, gasoline vehicles, and BEVs, the Hidden Costs of Energy report did just that projected for the year 2030. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The tabular form of the Hidden Costs of Energy report's table providing ranges of GHG emissions in grams per Vehicle Mile Traveled (VMT) estimates are shown below from Page 215 of the report. (errata note: The final Hidden Costs of Energy report had an error in units for the tabulation of GHG CO2 equivalent emissions by stating gal/VMT, which we would assume to mean Gallons/VMT, when the left axis title in the graphical representation of the same data that will be shown below, correctly indicates the units to be grams of CO2 equivalent per VMT) [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

It should be noted that the ranges of GHG emissions shown in the table below consider ALL upstream and downstream attributable GHG emissions and we would also remind that the calculations done for attributable BEV GHG emissions were made without the benefit of the recent studies that revealed the extent of methane being released in the US natural gas distribution system and at natural gas-fired Electric Generating Units. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

[See original attachment for Table 3-19 Relative Categories of GHG Emissions in 2030 for Major Categories of Light-Duty Fuels and Technologies (2005 data deleted)] [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

ABBREVIATIONS: GHG = Greenhouse Gas; VMT = vehicle miles traveled; CNG = compressed natural gas; CG = Conventional Gasoline; SI = Spark Ignition; HEV = hybrid electric vehicle; BEV = Battery Electric Vehicle; RFG = reformulated gasoline.; E85 = 85% Ethanol / 15% gasoline fuel blend; E10 = 10% Ethanol / 90% gasoline fuel blend; Cellulosic = Alcohol Fuel made from cellulosic biomass [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

We hope you will notice that the calculations made for BEV GHG emissions place the BEV in this table within the same range block as conventional gasoline fueled vehicles. The similarity in attributable GHG emissions for both vehicle types can better be evaluated from the graphic representation of the above estimate data, which when looking at the bar heights, we believe those bars represent the actual numbers calculated for each vehicle type. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

For completeness, we will show the original graphic of GHG emissions for all 22 types as shown in the Hidden Costs of Energy report. However, there are notations that the authors made indicating that further deductions for GHG emissions need to be made for the Cellulosic alcohol fuel sources bar heights. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

Graphic abbreviation notes: RFG=Reformulated Gasoline (used in warmer US regions in summer); SI=Spark Ignition as opposed to Compression Ignition (Diesel); CG=Conventional Gasoline; SIDI=Spark Ignition Direct Injection; CNG=Compressed Natural Gas; E85=85% Ethanol / 15% Gasoline fuel blend; E10=10% Ethanol / 90% Gasoline fuel blend; Electric=Battery Electric Vehicle (BEV); SI HEV= Spark Ignition Hybrid Electric Vehicle; BD20=20% Biodiesel / 80% petroleum diesel fuel blend [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

It is difficult to accurately gauge the respective bar heights in this very dense graphic, the bar heights of which we believe to represent the actual calculated amounts in each source category in the stacked bars. In the caption for this graphic (Figure 3-8) the following statement and instructions for revising the bar heights was provided: [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

Going from bottom to top of each bar, damages are shown for life-cycle stages as follows: vehicle operation, feedstock production, fuel refining or conversion, and vehicle manufacturing. One exception is ethanol fuels for which feedstock production exhibits negative values because of CO2 uptake. The amount of CO2 consumed should be subtracted from the positive value to arrive at a net value. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The reason given for having negative bars for cellulosic alcohols was that cellulosic fuels are derived from living plants that use carbon dioxide in the air, the carbon of which is in what we call the “current” carbon cycle and, while some of the atmospheric CO2 used by plants has fossil carbon in it, the plants are incorporating that CO2 into plant biomass and the roots of cellulosic feedstock plants sequester carbon. For example, the switchgrass perennial plant has often been used as an example of one that could be grown and harvested for cellulosic fuel production. Switchgrass can grow to a height of about 5 feet above ground, while the root system of each switchgrass plant can attain a length of up to 15 feet below ground. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

While the instructions were given on how and why the stacked bars for cellulosic alcohols should be handled and represented, the Hidden Costs of Energy report never actually made those bar height adjustments in a separate graphic. Not to worry, we have done that while removing many of the vehicle types superfluous to this comment, such as vehicles fueled with Hydrogen. We present that revised graphic below: [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

[See original comment for Greenhouse Gas Emissions by Life-Cycle Component 2030 Light-Duty Automobiles] [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

Please notice that we have added a thin red horizontal line that stretches from the top of the Conventional Spark Ignition Gasoline (CG SI) vehicle bar to the “Electric” (BEV) stacked bar. You may also notice that there is no blue bar segment in the BEV bar stack, denoting no GHG emissions from operation of Battery Electric Vehicles, yet there are associated GHG emissions shown for BEVs from attributable upstream sources, namely fossil fuel-fired Electric Generating Units and their upstream emissions. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

Please note that the stacked bar for BEV attributable GHG emissions is nearly equal to the stacked bar height of a normal, everyday, conventional gasoline-fueled vehicle as projected to the year 2030. AND, we would repeat that the calculations done for the Fuel component (green bar segment) did NOT include the upstream GHG impacts of fugitive methane, which recent studies have shown is much greater than previously thought. How much greater is something we think EPA should look into immediately to acquire quantitative figures that could be added to the calculations made by the Hidden Costs of Energy report modelling or new modelling made with updated inputs. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The GHG emission comparison just given in the revised graphic above may well be something the EPA did not want the public to be made aware of. Otherwise, the EPA would not have been so circumspect about accounting for upstream emissions, as we are sure EPA is fully aware of the upstream GHG implications of these new fugitive methane studies. The fact that EPA did not address the attributable upstream GHG emissions associated with BEV recharge may well be because they know that after those upstream GHG emissions are accounted for along with fugitive methane accounting, the result will be similar to what the Hidden Costs of Energy report had shown 14 years ago, or, more likely, even worse for BEVs. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

We believe that if a full accounting of BOTH downstream and upstream GHG emissions for BOTH gasoline and EGU emissions recharging BEV batteries was made and the results will show, as the Hidden Costs of Energy report results shown above suggests, that GHG emissions from gasoline-fueled vehicles may well be about the same or very possibly LOWER than those attributable to BEVs. We DARE the EPA to make ethical calculations and share with the public the results of accounting for ALL attributable GHG emissions, both upstream and downstream, for conventional/RFG gasoline vehicles and BEVs. If EPA fails to do so after reviewing this comment, the assumption will be in the public's mind and ours that EPA has something to hide. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The other implication of full upstream and downstream GHG accounting is, if the results of such accounting shows that the true associated GHG emissions, both upstream and downstream, for CG-SI and BEV vehicles are nearly the same or, as we suspect, attributable GHG emissions will be HIGHER for BEVs than gasoline-fueled vehicles the GHG reduction claims made in the rulemaking documentation cannot possibly be real. If ethical attributable emissions calculations for both gasoline vehicles and BEVs prove to be nearly the same, the claims made on page 29198 of the Federal Register in Table 2 – Projected GHG Emission Impacts In 2055 From The Proposed Rule, Light-Duty And Medium-Duty of a net 420 Million Metric Tonnes of GHG gasses cannot be supported in any scientific way. If that reduction estimate includes assumed reductions in GHG emissions from stationary EGUs as a result of new EPA regulatory standards being imposed, the EPA is being less than candid by not providing a GHG emissions estimate regulated by new standards and estimated emission reductions with no new GHG EGU standards regulation applied comparison. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

[See original attachment for Table 2 – projected GHG emissions impacts in 2055 from the proposed rule, light-duty and medium-duty] [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

It is our belief that EPA made a simple calculation of their zero GHG counting for BEVs replacing a certain number of gasoline vehicles, with some accounting for increased EGU GHG output and subtracted the gasoline vehicle GHGs to arrive at Table 2 figures. [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

The Scientific Integrity Policy and procedures adopted by the EPA reflect the model framework's guidance appearing on Page 31 of "The Framework." [EPA-HQ-OAR-2022-0829-0617, pp. 19-27]

II. Ensuring the Free Flow of Scientific Information

Open and timely communication of EPA science plays a valuable role in building public trust and understanding of EPA's work. EPA shall facilitate the free flow of scientific and technological information and support scientific integrity in the communication of scientific activities, findings and products. Scientific and technological information will be disseminated to the extent allowed by and consistent with privacy and classification standards and responsible communication of scientific information. [EPA-HQ-OAR-2022-0829-0617, p. 27]

We believe that EPA has not lived up to these “Open Government” requirements and has been unnecessarily circumspect, secretive and less than open when it comes to revealing all knowable science facts regarding attributable GHG emissions from BEVs and how they would compare to the majority vehicle type in the US fleet, the gasoline- fueled vehicle. The comparative results taken from the Hidden Costs of Energy report shows beyond a shadow of a doubt that the attributable GHG emissions for BEVs, when both upstream and downstream emissions are counted in an ethical manner, may well be nearly the same or larger than those emitted by gasoline-fueled vehicles. If that is true, the claimed GHG reductions from implementing the proposed regulations from this docket simply cannot be true and cannot be scientifically supported and, therefore, cannot be used as a supporting reason for proceeding with implementing these new standards. [EPA-HQ-OAR-2022-0829-0617, p. 27]

Suggested Alternatives

KALA is an engineering firm and would not be making these comments unless we had some alternatives to suggest to EPA. If the EPA does the right thing and makes known the attributable upstream and downstream GHG emissions for both gasoline and BEV vehicles in a straight-forward comparison, the GHG reduction premise for the EPA Docket ID No. EPA–HQ–OAR–2022–0829 would be nullified. That leaves the criteria air pollutant emission reduction premise for the proposed rulemaking. As we stated above, we concur with EPA that BEVs would reduce criteria pollutant levels where they operate. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

However, looking at what has been happening with weather events, forest and wildfire emissions and more frequent flooding events over the last 20 years, the number of lives lost from those Climate Change-related calamities may soon overwhelm any life-saving measures that would stem from implementing the criteria pollution standards proposed in this docket, previous dockets and future dockets. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Despite that grim assessment, we feel that continuing to try and reduce criteria pollutants is worthwhile, even though massive forest fires in Canada this year seem to have wiped out any progress in that area for the time being. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Focusing Criteria Pollutant Emission Reductions on Nonattainment Areas

In the Federal Register Text for the EPA–HQ–OAR– 2022–0829, EPA identifies the number of air pollution nonattainment areas around the country. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

From Section I. A. 2, i: “There are currently 15 PM2.5 nonattainment areas with a population of more than 32 million people and 57 ozone nonattainment areas with a population of more than 130 million people.” [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Each of those PM 2.5 and Ozone nonattainment areas of the country have vehicles that are either registered within the nonattainment area or are registered in surrounding counties that by regularly driving into the nonattainment area contribute to criteria pollutant emissions within the geographic nonattainment area. The vehicles registered outside the nonattainment area itself that contribute to emissions within the actual geographic confines of the defined nonattainment area are probably used to drive to destinations inside the nonattainment area for work or other reasons. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Our reasoning for what we are about to suggest is based on the question we asked ourselves. “If we really want to make the biggest impact on highly air polluted locations, as defined by nonattainment areas, why require nation-wide criteria pollutant standards when requiring low or no operating emission vehicles to be used within or to enter nonattainment areas might obtain acceptable significant reductions?” We really must agree with the comments from South Dakota Department of Agriculture and Natural Resources (DANR), in which they said, [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

South Dakota is a large state with significant driving distance between many of our communities. Although several new electrical vehicles indicate they have a 200 mile or greater range (note – it is 224 miles one way from Pierre to Sioux Falls), a recent study shows electric vehicles (EVs) do not consistently achieve EPA' s range estimates. In addition, all batteries degrade over time. Reports indicate EV vehicle batteries will degrade between 10 and 40 percent over a 10-year life span. To maintain the battery's life, manufactures recommend batteries are not frequently depleted below 10 percent capacity or charged above 90 percent capacity. This means that an electrical vehicle should be limited to 80 percent of its capacity range to maintain the battery's life. In addition, cold, hot, and windy weather conditions may reduce an EV vehicle's range between 20 to 40 percent and may further impact the reliability of EV. South Dakota is known to have cold and windy winters and hot and windy summers, which, with current EV ranges, batteries conditions, and availability of charging stations, makes widespread use of EV s impractical in South Dakota. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

We believe that a regulatory scheme targeted at vehicles that regularly operate within nonattainment areas, requiring vehicle registrants to use low or no operating emission vehicles if they wish to operate those vehicles inside the nonattainment area on a regular basis would be one approach to reduce criteria emissions in those designated areas. Such a regulatory scheme would require cooperation with the automobile registration agencies, the air quality or resources agencies and potential enforcement agencies within the state where the nonattainment areas are located. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

By shifting focus to nonattainment areas, the efforts underway to add charging stations all over the country could be re-focused to install many more charging stations within nonattainment areas and get more bang for the Federal buck spent. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

Here is how we see such a plan could work. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

A. Vehicle registrants who reside inside the non-attainment area would receive notices that their vehicle(s) do not meet newly promulgated EPA regulations for lowering air pollutant emissions in the local nonattainment area. These of course, would include fleet owners of delivery vans, service vehicles, school busses and other owners of large numbers of vehicles that operate principally inside or very nearby the nonattainment area boundaries. These notices would inform them that one or more of the vehicles they own may no longer be used to drive within the local area because the emissions from the vehicle(s) are too high. The notice would inform the registrants that they can ask for monetary assistance with purchase of a compliant vehicle (sort of like Cash for Clunkers, i.e. high polluting vehicles) or ask for a waiver due to the age of the registrant and/or very low use of the non-complying vehicles (you know, that little old lady who just drives her car to church and the grocery store). [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

B. Since vehicles are re-registered every year, state registration bureaus would ask registrants if they work or travel to destinations inside the nonattainment area on a regular basis. If so and their vehicles are non-compliant, they would receive the same notice that the non-compliant vehicle they drive into the nonattainment area must be changed out to a compliant vehicle by a date certain. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

C. Enforcement could be carried out by application of modern technology. With the advancement of Artificial Intelligence, cameras, many of which are now in place, could be connected to computer systems using software that reads the license plate numbers for vehicles entering the nonattainment area. As time goes by and the same license plates, which of course have vehicle information tied to them including engine type and possibly latest emissions testing data, are read over and over again, the registrant for that vehicle would be notified that the vehicle they are using has been spotted entering the nonattainment area multiple times, enough times to meet criteria for regular entry, and they must switch to a compliant vehicle by a date certain. Warnings and then fines could be levied in stepped amounts against repeat offenders who regularly operate non-compliant vehicles in the nonattainment area. Impoundment would be the final step. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

D. The states where these focused programs would be operating could set up a vehicle connection service similar to or connected to Craig's List in which non-compliant vehicle owners could sell or swap their vehicles with interested parties within the state or outside of the state. The description of such vehicles would be required to notify potential buyers that the vehicle does not comply with nonattainment area emission requirements and buyers should not attempt to register the vehicle if they will be entering a nonattainment area with it regularly. There should also be a website that will show car buyers where nonattainment areas and possible candidates for nonattainment areas are located and the qualifying vehicles for each, which could be tailored to the particular criteria pollutant group, such as PM2.5 or Ozone, the area falls under. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

E. EPA might require large over-the-road trucks to drive to a central off-loading location where their cargo would be removed in a timely manner from their trailers into covered or enclosed staging platforms where pallets or other items would be re-loaded onto heavy-duty all-electric urban delivery vehicles that would then distribute the goods to various destination points within the nonattainment area (about a 75 mile round trip distance). These truck off-loading facilities would be located downwind of the prevailing winds for the area so that PM and diesel soot would be blown away from the nonattainment area most of the time and be dispersed through dilution. Moving trucks and special loads that require heavy lift machinery to off-load would be exempt from these requirements. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

We believe this sort of regulatory scheme could work better than applying universal, nation-wide criteria pollutant standards for all vehicles, especially in those locations where such standards are not actually required to meet local air quality goals. If the proposed rulemaking standards were revised to apply to nonattainment areas, and major urban corridor areas, such as the more dense parts of the I-95 corridor, the complaints seen in the comments to this rulemaking would be lessened or mitigated. We think most people can agree that vehicle requirements that address the worst air pollution areas in the country should be acceptable to protect the health of those who live and work in those areas. [EPA-HQ-OAR-2022-0829-0617, pp. 27-30]

We have some things to say about Electrification Step 3 later. In many of the comments EPA has received for the EPA–HQ–OAR– 2022–0829 Docket, many claim that the existing grid is simply not capable of handling (conductor ampacity) the increased power demands for recharging millions of electric vehicles that will replace much of the 250 million vehicle US fleet. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

We have some thoughts on that grid capability issue if we may digress for a moment. The problem with many analyses of electric vehicle switch-out scenarios has been not understanding and taking into account what we call the Most Probable Time-of-Day for Recharge (MPTODR). The scenario put forth by electric vehicle advocates for recharging is everyone who has a BEV will come home from work to their single family home that has been retrofitted with a high-amperage (50 – 70 amps) charging station or stations if the family has more than one BEV. The BEV owner will plug their BEV into the charge station, go inside and enjoy a relaxing evening. That of course, is the elitist part of the whole electrification mythos that other people are like you, being upper middle class people that can easily afford a BEV and the other expenses associated with owning a BEV. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

If we take Tesla as a typical BEV example, the Tesla Wall Charger is an outlet that requires more amperage at 240 Volts than most home outlets for an electric dryer or stove can supply. We found a cost estimate for installing a Tesla Wall Charger in the Denver, CO metro area that came in at about $5,000. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

[See original attachment for photo of EV calculator] [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

Remember that the large wire gauge conductors needed for the Tesla charger are usually run in metal or plastic conduit and the straight-line distance between the electric distribution box and a garage is not the installed length because the conduit must be routed around your house to the garage, where the new wires will enter that space and be connected to the wall charger or chargers (if you need multiple chargers, the conduit size and cost is increased to run multiple sets of wires for each charger). [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

If you want to travel with your Tesla they recommend you should carry recharging gear that will provide flexibility for charging from various outlet types. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

[See original attachment for picture of various types of TESLA recharging gear] [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

It looks to us like that “flexibility” is another $450 or so just to reduce what we call “Recharge Anxiety” for BEV owners. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

Notwithstanding the larger initial cost of the vehicle associated with owning a typical BEV, we would argue that for people who live paycheck to paycheck who might be in the middle to lower income economic strata, such expenses are probably out of reach. [EPA-HQ-OAR-2022-0829-0617, pp. 31-34]

Now, back to the Most Probable Time-of-Day for Recharge (MPTODR) issue. If most BEV owners will choose to recharge overnight, this is the time when utility companies are generating what is called Base Load. Base Load is the minimum power output load that a utility company has for its daily load swings. This is the time when most people are asleep and not using a lot of electric power, as opposed to increased power needs when people are up and using more electricity. Most utility companies use the Base Load time period to do maintenance on their Intermediate and Peaking generators. With a massive increase in BEV recharging needs in the overnight Base Load time frame, utility companies may have to run their Intermediate generating units during that time, as well as for meeting daytime loads. [EPA-HQ-OAR-2022-0829-0617, p. 34]

Many utility companies use coal-fired generation for Base Load power needs because they cannot switch coal-fired generators on and off like they could a natural gas-fired turbine generator. It can take days for a large coal generating station to come up to temperature from cold start and start making electricity. We believe that some utility companies will choose to add coal-fired or natural gas-fired generating capacity to meet increased Base Load demand, rather than adding renewables, which would need to be wind power because solar power is not available at night. Whatever generating mix utility companies decide to use to meet BEV recharging demand, the proportion of fossil-fueled generation will be larger because solar will not be available during the MPTODR. This is another aspect of making the upstream calculations for fossil-fired pro rata GHG accounting that we are urging EPA to do for attributable BEV GHG emissions. [EPA-HQ-OAR-2022-0829-0617, p. 34]We now present several graphics that show results of butanol blending tests and fuel properties. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for comparison of fuels] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

In the Comparison of Fuels chart above, you can see that Butanol comes the closest to E10 gasoline in energy density than any other non-petroleum fuel. But because it is an alcohol with higher Heat of Vaporization (the ability of a liquid to absorb heat and turn into a vapor - the lower the HOV the more readily the fuel will vaporize on its way into an engine) we will need to add some gasoline to Butanol fuel blends, just as we do for E85 to make cold starting easier, bringing the energy density to 27.8 MJ/L, very close to the 31.8 MJ/L (mega Joules per Liter) of E10. Butanol's stoichiometry at 11.2 : 1 is also far closer to that of E10 gasoline (14.3 : 1) than any other candidate fuel. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

Argonne National Laboratory performed FTIR species characterization for butanol blends in their 2010 work on butanol as a fuel using a direct injection ecotec stationary engine. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for graphic of Speciated Hydrocarbons] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

This graphic shows emissions prior to entering a catalytic converter and depicts a number of selected "species" for different ratios of both ethanol and butanol compared to both gasoline and E10. The two higher alcohol blend ratios are based on equal percent oxygen by mass, meaning that an 83% butanol-gasoline blend has as much oxygen content as a 50% ethanol blend or about 18 mass%. The vertical bars represent the percent of each species by volume when all of them are added together for each blend's emissions. Note that the percentage of Acetaldehyde for the Bu83 blend is about the same as that for E50, even though there is 66% more alcohol in the Bu83 blend. Obviously, there is an increase in Formaldehyde for the Bu83 blend compared to E50.

That is why we are suggesting lower blend percentages up to 48% butanol with 52% or more of gasoline derived from cellulosic butanol as a potential maximum blend ratio for maximum GHG reductions while reducing formaldehyde emissions indicated for the higher ratio blends. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

We also show the Argonne chart of Acetaldehyde emissions below, comparing only 50% ethanol with 83% butanol (66% more alcohol in the butanol blend but same oxygen mass%).

[See original attachment for chart of acetaldehyde emissions] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

Clearly, the Bu83 blend is producing far less aldehydes than an equal Oxygen % blend ratio of ethanol would produce. The three aldehydes expected to increase with alcohol fuels, Acetaldehyde, Formaldehyde and Acrolein (Acrylic-aldehyde) are among the EPA's group of six "priority" Mobile Source Air Toxics compounds. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

From this confirmation, we can conclude that butanol is a far better fuel at equal blend ratios as to emission of aldehydes when compared to ethanol. If we look at oxides of nitrogen (NOx), the Argonne data show that both ethanol and butanol will reduce NOx, but butanol tends to reduce NOx more as the mass percent of oxygen increases. Argonne also indicates that Carbon Monoxide (CO) is also reduced with increasing ratios of both ethanol and butanol. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

While emissions of Acetaldehyde and, perhaps, Acrolein may decrease with butanol in comparison with ethanol for the same blend ratio with gasoline, Formaldehyde (HCHO) emissions will increase. But, unlike Benzene that is in and can evaporate from gasoline, and is also formed by burning other aromatic constituents of gasoline, Formaldehyde is only produced as a combustion product. Formaldehyde is now classified by the EPA as an "A" carcinogen and also has other non-carcinogenic health effects. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for graphs of regulated and formaldehyde emissions] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

It is known that VOC emissions from volatile fuels escape into the air and combine with NOx compounds in the presence of sunlight (photochemical) to form Ozone. The volatility of fuels is measured using the Reid Vapor pressure (RVP) scale. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

In the vapor pressure effect graphic below for blends of ethanol and butanol, the Bu16 blend, equivalent in oxygen to 10% ethanol will lower the RVP of that blend by about 0.6 psi. A 10% ethanol blend would have increased the blend's RVP by anywhere from 0.6psi to 1.2 psi, or an average of 0.9 psi. To compare the two effects, we must look at the difference between the addition of the two oxygenates to understand the complete effect. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for graph of vapor pressure of ethanol and n-butanol in gasoline] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

As shown in the graphic above, vapor pressure is reduced as soon as any butanol is added to gasoline blends, while ethanol additions to gasoline increase vapor pressure and, thus, the tendency for fuel molecules to enter the air more readily. Ethanol at 10% V/V produces the greatest increase in vapor pressure. The vapor pressure difference between the two gasoline additives at equal oxygen content for E10 and Bu16 is 1.5 psi. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

By reducing fuel blend vapor pressure using butanol, the effect is likely to be reduced VOC releases from butanol blended fuels. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

For PM 2.5 considerations, decreasing the amount of aromatics in diesel fuel, especially polynuclear or poly-aromatic hydrocarbons (PAH) could lead to reduced PM emissions and possibly lower mutagenicity (ability to cause genetic mutations) and carcinogenicity risks. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

Testing of blends of butanol with diesel fuel with no attempt to maintain Cetane Number (CN) has been performed by Argonne National Laboratory (ANL). In tests on a light-duty vehicle with a diesel engine, ANL was able to show that increasing ratios of n-butanol with a native CN of about 25, blended at various ratios with a CN 42 diesel fuel (presumably with an initial aromatic content of 35 volume% or less) could significantly reduce diesel smoke with its accompanying PM content. Soot and smoke content is measured by the Filter Smoke measurement where diesel exhaust is run through a filter designed to capture almost all of the PM materials in the exhaust and a Filter Smoke Number (FSN) is obtained. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for graph of smoke and NO Emissions] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

While 100% n-butanol would not operate properly in an engine designed and calibrated for diesel fuel, Argonne found that low to medium blends of 1-butanol and ultra-low sulfur diesel (ULSD) provide acceptable Cetane along with the potential advantage of oxygen in the fuel. Broadly, the study found that on the urban drive cycle, both total hydrocarbon (THC) and carbon monoxide (CO) emissions increased as larger quantities of butanol were added to the diesel fuel. THC increased significantly as the percentage of butanol increased for cold-start UDDS drive cycle and only modestly for the hot-start UDDS cycle. Oxides of nitrogen (NOx) were not significantly affected by the 20% butanol blend and decreased with the 40% butanol blend. For the highway drive cycle, THC and CO emissions were not significantly impacted but NOx showed a slight increase as the butanol blend ratio increased. For the steady-state tests, they found a reduction in filter smoke number with increasing butanol quantity—an 80% reduction in filter smoke number was observed for the 40% butanol blend. The lowest fuel economy reduction (~9%) occurred for the HWFET drive cycle. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

Comments 4. (Cont.) http://pure-oai.bham.ac.uk/ws/portalfiles/portal/54062490/Hergueta_Santos_Olmo_et_al_Impact_bio_alcohol_fuels_Applied_Energy.pdf [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

For PM 2.5 considerations for butanol/gasoline blends, we refer EPA to newer research performed at University of Birmingham, United Kingdom in 2018. In this study, both particulate size and overall particulate quantity released from combustion were characterized for neat gasoline, E25 and Bu33 (not equal in oxygen content). [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for average primary particle diameter] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

The study showed nearly equal PM particle size for both gasoline and Bu33 (B33 in the graph), while particle size for E25 was lower than either. The study text states: “The average primary particle size dp0 is 29.42 nm, 28.60 nm and 25 nm from the combustion of gas- oline, B33 and E25, respectively…E25 [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

emitted the highest concentration of smaller particles in the range between 7 nm and 40 nm.” Not good news for advocates of higher ethanol blends when those Exx blends appear from these results to produce smaller particle sizes, which might be more deeply inhaled into the lungs. The research further looked at overall PM reductions. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for graph of particle size distribution for gasoline and DN/DlogDp] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

The study stated, “The most significant reduction of 80% in the PM peak concentration was achieved in the combustion of B33, when compared to gasoline. The maximum particle concentration was 30% lower from the combustion of E25 when compared to gasoline.” [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

We don’t know how EPA feels about an 80% reduction in PM concentration just by adding 33% V/V of butanol to gasoline, but we think that is pretty darned good. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

The major issue in this Comment #4 has been a discussion of how to dramatically lower GHG emissions from the liquid fuels that will still be being used in all those millions of gasoline vehicles that EPA in the Federal Register document admits will still be on the road emitting GHG and criteria pollutants. From the foregoing research hints at what benefits may be obtained by adding higher blend ratios of butanol to the nation’s gasoline supply, the reduction of fossil carbon emissions we believe to be the most important for Climate Change solutions, solutions that will actually work. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

We are asking the EPA to start thinking differently about GHG emissions. Tail pipe emissions from a vehicle that has a blend of say 48% cellulosic butanol and 52% “Green” gasoline made from that same butanol will show CO2 emissions. But, the carbon in that CO2 will have an extremely small percentage of FOSSIL CARBON in those emissions, because the carbon in the CO2 was inside green plants growing just a few months before being processed into butanol and “Green” gasoline. The measured CO2 emissions will certainly contain carbon, but that carbon will not be fossil carbon. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

We ask that EPA begin to formulate methods of calculating actual fossil and non-fossil GHG emissions from exotic blends of advanced biofuels made from biomass, where the carbon incorporated into the fuels is from the “current” carbon cycle. The emission of CO2 from such fuels will cycle that CO2 back into the bodies of growing plants, which are later harvested and converted into carbon-neutral fuels in an endless cycle. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

We believe efficient production of the advanced biofuel, cellulosic butanol, can and will produce major reductions in FOSSIL carbon emissions from the US transportation fleet. Our calculations for potential GHG reductions use the UC Berkeley RAEL (Farrel, et. al.) calculations done for ethanol GHG emissions compared to gasoline burned in ICEs. Our interpretation of those GHG computations for cellulosic butanol are shown below:

[See original attachment for Effects of Producing Cellulosic Butanol Rather than Ethanol] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

The main reason cellulosic butanol can achieve such high GHG reduction numbers has to do with the opportunity to cycle butanol in a much larger way than ethanol ever could back into the production train, where farm and ranch production, harvesting and transport of cellulosic biomass can be made with machinery and vehicles fueled by butanol/diesel blends and high butanol/gasoline blends. We don't know how EPA feels about a potential for 91.5% reductions in GHG emissions from fuel compositions using high ratios of cellulosic butanol in gasoline and, perhaps "Green" gasoline made from butanol, but we are pretty excited. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

So, let's review. We offer a qualitative review of GHG and liquid fuel combustion air pollutants when cellulosic butanol and analog hydrocarbon fuels made from it are incorporated into the fuel mix for US transportation use. Probable movement: [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

1. GHG emissions

a) Reduced (KALA calculations show that for pure cellulosic butanol and gasoline or diesel made from cellulosic butanol and blends thereof could reduce GHG emissions by 91.5%)

2. Criteria and other air pollution components likely direction

[See original attachment for list or air pollutants and their reductions and increases] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

Another way of looking at the severity of the pollutants and how reductions or increases might affect human health would be to look at a grouping of the highest rated Human Carcinogen Potential (HCP) rating these pollutants have. Therefore, we offer tables of those compounds that are likely to decrease with butanol induction into common fuels and those that would increase in amounts emitted and their associated HCP below. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for Likely-to-be-Reduced Compounds] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

[See original attachment for Inclusive list of Probable Increased EPA Master List & Non-Listed Butanol Fuel Emissions] [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

Listing Notes: * Based on IARC Determination ↓ Likely to be produced in small quantities & consumed in a catalytic converter

We might note that the HCP A-rated compound in the above "Increased" list, Formaldehyde, has a half-life in air in the absence of nitrogen dioxide, of approximately 50 minutes during the daytime; in the presence of nitrogen dioxide, this drops to 35 minutes (source WHO), while the other HCP A-rated compound that will be reduced, Benzene, has a half-life in air of 13.4 days (source: Spectrum Chemical Fact Sheet: Benzene). We would much rather increase an A-rated carcinogen, Formaldehyde, that degrades and decomposes over a matter of hours than keeping an A-rated carcinogen, Benzene, that will only decompose after a matter of tens of days in the air pollutant mix. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

We believe the observable benefits of adding butanol into the US fuel mix outweighs the minimal drawbacks of some increased emission species. This tradeoff, of course, is what we have been doing for a long time in this country, trading the health degrading aspects of vehicle air pollution for the speed and convenience modern vehicles provide. [EPA-HQ-OAR-2022-0829-0617, pp. 44-53]

Comment 5. The Law of Unintended Consequences or Reactions [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

A. We believe public sentiment toward the obvious potential results of adoption of the Docket ID No. EPA–HQ–OAR– 2022–0829 rulemaking of “forcing” manufacturers to predominately produce BEVs in order to meet the proposed standards may well have a host of unintended consequences.

Despite the glowing polling results reported in the Federal Register rulemaking document regarding eager acceptance of BEVs and polls of PHEV and BEV owners that would be willing to purchase such vehicles again, we believe that most of those respondents fall into several categories such as ‘Early Adopters,’ electric car zealots and wealthy people who can afford BEVs and want to impress their friends and neighbors with how “Green they are. Seriously, a person who buys an obscenely ostentatious Lucid 1,000 horsepower electric vehicle cannot be considered represen-tative of the majority of people who will be presented with BEVs as, essentially, their only choice in new car showrooms in a few years. We think there may well be elderly people who buy a new car after 2027 that will get the BEV home and be wondering, “Where do I put in the gas for this thing?” [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

We looked at several polls, as did several other commenters, but the one we chose to discuss here has international representation in several developed countries in Europe as well as the US. The poll was conducted by UK-based Kantar Public in their Journal-04 publication of polling data on public attitudes towards the environment, sustainability, and climate change. If you go to ResearchGate and request the actual PDF of the research, you will get the graphics and discussion we are about to share with EPA. https://www.researchgate.net/publication/355734467_European_attitudes_to_climate_change_i mplication s_for_citizens_institutions_and_governments [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

The Guardian also published excerpts from the polling in 10 countries here:

https://www.theguardian.com/environment/2021/nov/07/few-willing-to-change-lifestyle-climate-survey [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

From those sources we present the second of two graphics below from the survey and then comment on the results. The most interesting results we found were from the following question “How would you rate in terms of importance, the following measures aimed at preserving the environment and the planet?: [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Replacing fossil fuels with renewable energy – 45% say important Reducing people's energy consumption – 32% say important Favoring the use of public transport over cars – 25% say important And most pertinent to this comment's discussion: [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Banning fossil fuel vehicles – 22% say important [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

[See original attachment for poll on how people ranked, in terms of importance, the following measures aimed at preserving the environment and the planet] [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Only 22% felt that banning fossil fuel vehicles (22%) was important to preserve the planet. We would characterize this level of response to that question as dismal at best, people do not want to use electric vehicles. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

In the US, Transportation accounts for slightly more Greenhouse Gas (GHG) emissions than does electricity generation. However, in most other large emitter countries, the opposite is true with Electricity generation being far greater than Transportation. This is especially true of China (the largest global GHG emitter), where much of the country is still rural in nature, most electrical generation is by exceedingly dirty coal-fired power plants and the thought of a personal vehicle being a birthright is a foreign (i.e. US) notion. The most frightening aspect of what we call the "Lifestyle Gap" is the desire by most people in other countries to have a similar lifestyle to what they observe in the US. Having personal transportation (something bigger and more enclosed than a motor scooter) is very high on that desire list. That implies that as other countries catch up to a US lifestyle, Transportation GHG emissions will continue to rise from that sector. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Most other countries that do not have oil reserves, look to the US for what to do about Climate Change. The reasoning goes, the US is the most technically advanced country in the world and whatever solutions the US comes up with must be the "correct" solutions. These facts make it doubly important for the US to act as the leader of the world on Climate Change with truly "correct" and nearly universally applicable solutions. Yet, we do not have a set of National Climate Change Solution Plans that the Federal Government has endorsed as policy and has committed funding and regulations to implement. So far, there have been "Band Aid" measures on Transportation GHG emissions such as the Biden plan to place electric vehicle charging stations all across the country, a partial solution that KALA disagrees with, not on the viability of electric vehicle charging stations, but the lack of focus on deployment in locations that desperately need reductions in emitted vehicle pollution (these are known as EPA's nonattainment areas such as large cities where most of the pollution that creates the nonattainment condition is from vehicles). The opposite is true in China where big city pollution is mostly from nearby electrical generation. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

These dichotomies between nations and their levels of technology and emission profiles also makes it important for the solutions developed by the US be largely applicable to nations with lower levels of technology and wealth. The battery electric vehicle solution so often touted as "THE" solution to transportation GHG emissions, will NEVER apply to the hundreds of millions of motor bikes, motor scooters, motor trikes, motorized boats and various other transport modes, which all use petroleum-based liquid fuels, found all across Asia, India, Indonesia, the

Philippines, the Middle East, Africa and South America. Many countries that are considered "Developed" (I'm thinking Russia and the former USSR vassal states) may not have citizenry that can easily afford a transition to an entirely different vehicle propulsion method, such as battery electric, and will struggle to maintain their existing fleets of vehicles that still use fossil petroleum fuels. In fact, the less developed and lower income nations around the world will balk at implementing the so-called "solution" that seems to be prevalent in the thinking of the United States for Transportation GHG emissions, i.e. Battery Electric Vehicles (BEV). Oil producing states, such as Russia and Saudi Arabia, where oil income is the principal national revenue will be outright hostile to the notion of changing the vehicle propulsion method. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

In response to the Kantar polling as to why they would be hesitant to make drastic changes to help with Climate Change: "I need more resources and equipment from public authorities" (69%) together with "I can't afford to make those efforts" (60%) were major responses. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Any policy makers who see these results, especially in the US, MUST rethink where policy making should go on Transportation GHG reductions. When someone says, "I can't afford to make those efforts" what are they most likely talking about? In our view, for most people, they are referring to the cost of replacing their current gasoline vehicle with an electric vehicle. In the US, vehicles are usually the second most costly item of personal ownership, with a home being in first place. For those who cannot afford home ownership, a large percentage of the Democratic Party's base, a vehicle is their most costly personal possession. If those individuals are middle to lower income, their budgets are usually very tight and the thought of being forced to purchase a vehicle that is 20% to 50% more costly than a gasoline vehicle is generally out of the question even with generous tax rebates that actually mostly apply to more wealthy individuals with high personal incomes. We believe that they will instead, choose to buy a replacement vehicle, when needed, from the existing stock of gasoline-burning used cars for as long as they can. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

This analysis brings up the issue of how little time we have left to actually make the most significant changes to GHG emissions. We simply do not have time for people to run out of gasoline-burning used car choices, which could amount to 20 years or more, for them to finally buy the supposed "solution" to transportation GHG emissions, a BEV. Related to this lower to middle income demographic is the issue of their vehicle being able to provide "Dual Duty." A Dual Duty vehicle is one that can provide short-distance (short time frame) transportation for daily needs such as grocery getting and the back and forth to work commute AND provide a way to take long trips for such things as vacations and family gatherings. Let me relate an interesting response to a question I posed to a Nissan representative at a Denver car show about the Leaf All-Electric vehicle (BEV). I asked what about trips up into places like Wyoming where they will not be welcoming to electric vehicles in that oil producing state? Incredulously, the Nissan rep said, "Oh, you don't use the Leaf for longer trips – you use your 'Other car' for that." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Such a response shows an unbelievable elitism about lower cost BEVs, such as the Leaf and the Chevrolet Bolt, that the owner of such BEVs will have the financial means to have two or more vehicles, one of which is capable of long-distance trips without the bother of waiting 3 to 7 hours for a recharge after the car's battery is exhausted. This has become known as "Recharge

Anxiety." It is a real thing and represents the problem all BEVs have in public perception of: What happens when you run out of battery charge on a long trip or in a traffic jam? Will it take hours to recharge even if I can find an open and working recharge outlet? Why would I ever try to take a BEV on a long trip when I can "recharge" (i.e. refuel) my gasoline vehicle in less than 10 minutes? BEV makers have tried to address this problem, Tesla for example, by providing a Supercharging option at special recharge stations designed to recharge a half-discharged battery in about 15 minutes. But, even Tesla admits that rapid recharge is not good for the individual cells in the battery pack and should not be done too often. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

B. If the EPA attempts to "force" people into BEVs, there may be an unexpected and unforeseen political reaction among people who have traditionally been the base of the Democratic Party who may switch their political allegiance to the other Party who won't force them to drive BEVs. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

So, what choices do the lower and middle income people that comprise a large percentage of the Democratic Party base have when it comes to the supposed Transportation GHG emission "solution," the BEV. The answer is not much, because for the ONE car they can afford, they need the Dual Duty vehicle that is represented best by a gasoline-fueled vehicle that can be refueled on longer trips in less than 10 minutes and then they are on their way again. If the Democratic party at the behest of a Democratic president through a regulatory agency attempts to force those people to purchase and deal with all the recharge problems that BEVs have, they might well not be Democrats anymore. Republicans will NEVER support forcing people to buy BEVs (they are in the back pockets of the oil companies after all) and that may well drive people who were reliable Democratic voters into the Republican camp over this single issue. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

So, the question to EPA administrators is simple. Do you want to risk political reprisals in the form of election of Republican legislators and the head of the executive branch, the president, because you felt this was your chance to "force" the adoption of a vehicle type, the BEV, down peoples throats that, frankly, we believe we have shown conclusively will not perform the GHG reduction function that the EPA claims it will. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Didn't you see what happened when Donald Trump was president and the EPA was rendered powerless and, now that the Supreme Court is constituted the way it is with ultra-conservative judges, how do you think court cases that make it to SCOTUS will turn out for EPA on this and other regulatory Docket issues? Now look, we are not saying to the EPA to be fearful and hunker down and not do anything about GHG and criteria pollutants from transportation. PLEASE review our set of alternatives in Comment Section 4, which we think makes more sense, especially from a GHG reduction standpoint than trying to "force" adoption of BEVs into the US fleet at unreasonable numbers. Making people buy and drive very different vehicle types may not be the answer, especially for GHG reductions. We think the "Fuel Change Out" approach with high GHG reduction potentials and better criteria emissions profiles is a better way to meet the needs for health risk reductions and more importantly, as we have argued above, for dramatic reduction in GHG emissions by substituting fossil carbon containing fuels for carbon-neutral fuels made from biomass. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

We have the technology to make these carbon-neutral fuels that come very close to the properties of gasoline and dramatically reduce GHG emissions if we just have the will and foresight to do so. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

C. The consequences that may arise from full implementation of Docket ID No. EPA–HQ–OAR– 2022–0829 rulemaking standards and requirements may produce something that could be described as a quiet rebellion against what many people would view as government overreach via regulation. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

To give you a better "feel" or Flavor for the reaction to the docket's provisions, we would invite EPA to look at a YouTube video by long-time YouTube maven on automotive issues, Scotty Kilmer. https://www.youtube.com/watch?v=j1R0wTBsK3I [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

In this video presentation, Kilmer starts out blaming President Biden and by association the Democratic Party as the villains who want to take your gasoline car away from you and limit your buying choices in the future. Here are some of the comments elicited from the video with many of the obvious Trumpian attitudes filtered out: [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"How do we do this when 90% of Americans cannot afford a new car?" [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"As someone who has never bought a new car. I can assure you I will never be buying a used electric car." "We can barely get enough minerals to power our phones, and now we want 60%of cars to run on batteries." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"They can build all they want, but you cannot force people to buy them." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"Just where am I supposed to get $61,500 for a car? That is absolutely insane! This is legislation through regulation. Who voted for those EPA bureaucrats? There is exactly ZERO percent probability that I will buy an EV." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"This is the closest thing to government mandating what people get to choose and eliminating a free market based on consumer demand." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"We just need a group of people with the know-how and the financial ability to sue the EPA to stop infringing on our rights to purchase what we want. They're just basically taking our freedom away through regulation without actually saying we don't have the freedom to choose what we want." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"Thanks to Scotty's advice we just bought a 2023 Camry V-6. We're good for 20 years or 300,000 miles." "I have a Tesla but forcing everyone to get an EV is insane. Many don't have the capability to charge at home and a lot of homes need panel upgrades to make room for a EV charger. All of this costs a lot of money for people to afford." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

"In our office people are buying hybrid cars instead of EV cars. It make more sense, 500 miles of range, fill the tank in 6 minutes and probably last longer and they are about the same price or less and are proven technology." [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

“This sounds like used vehicle prices are going to skyrocket worse than before -probably not a good sign for those of us stuck as pizza drivers.” [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

“The EPA doesn't have the authority to change the law or the regulations. The people through congress will make that decision thank you.” [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

“American people remember you have the power to choose your president and who makes the laws, if it’s affecting you who cannot afford to change your car then get someone who sides with the working classes and will help you make your own choices, the fact that making batteries pollutes more than gasoline engines produce doesn’t matter to these politicians who don’t know what it’s like to have to work for a living.” [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

“Is it at all possible for congress to stop this insane man [presumably Pres. Biden]? [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

So, does the EPA get some of the rebellion flavor in those comments? It is our opinion that one of the unintended consequences of implementing this Docket may be to create a rebellion of sorts among millions of Americans. We think that people may decide to hold on to their gasoline vehicles much longer than they otherwise might. We also think that once BEVs are about the only vehicles on dealer’s showroom floors, the price of used gasoline vehicles may well increase dramatically. If that happens, millions of low income people may be priced out of the used car market. What may happen is “Cubanization” of the US used car market. Cuba has long been banned from importing vehicles from the US and elsewhere. With the parts Cubans are able to smuggle in and automotive machine shops making some hard-to-get parts, the car owners in that country are driving around in cars from the Fifties and Sixties with no end in sight. Fortunately, Cuba is a small island, but the idea is that there could be new “cottage industries” like the ones in Cuba pop up all across our country that would be mechanics, auto machine shops, and detailers and upholsterers who keep those old cars in good shape. The very same thing could conceivably happen here in a “Resistance” movement against the regulations the EPA is advocating for. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

The temporal upshot of these possible consequences is that the gasoline part of the US fleet will continue to use gasoline and spew the usual GHG and criteria pollutants as time goes by. The problems we foresee are that as engines in those older vehicles that people in the Resistance Movement are holding onto will get tired and transmissions get less efficient, the amount of pollutants and GHGs could go up – exactly what the efforts to implement these new regulations are meant to avoid. [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

George H. W. Bush stated it best when he said, “The American life-style is non-negotiable.” And in this context, that means that stubborn Americans are not going to be told what they can and can’t drive and they will resist what they might view as an intrusive government trying to alter their “life-style.” [EPA-HQ-OAR-2022-0829-0617, pp. 54-60]

Organization: Kentucky Office of the Attorney General et al. (KY-AG)

What is more, demand for these rare materials will spike outside the automotive context as quickly as the Proposed Rule will spike it within. EPA recognizes this: It acknowledges that critical minerals for EV component production “are also experiencing increasing demand across many other sectors of the global economy . . . as the world seeks to reduce carbon emissions.” 88

Fed. Reg. at 29,313. The Proposed Rule also concedes that other "uncertain issues" like "permitting, investor expectations of demand and future prices, and many others" make it "difficult to predict with precision the rate at which new capacity will be brought online in the future." Id. Yet the proposed solution is just a short "transition period" so that "a robust supply chain" can develop for these products, including new material mining and expanded processing capacity. Id. These obstacles should slow a project with even a conservative timetable; for an overhaul as rushed as the Proposed Rule, they are reason to return to the drawing board. Proceeding without more concrete, realistic projects for expanded supply chains—and more realistic timetables—is another mark of arbitrary and capricious decision-making. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

Other concerns about the minerals' supply and their extraction processes raise still more hurdles. The Proposed Rule had to recognize that it would take an estimated "five to ten" or more years "to develop a new [lithium] mine or mineral source"—and that delay is despite "very high" industry motivation from a "very robust" demand outlook. 88 Fed. Reg. at 29,313. Yet even that estimate is likely far too rosy. Last year, one geometallurgy professor looked at what it would take to shift away from fossil fuels entirely and to these and other rare materials for a single generation. Based on 2019 mining production rates, he predicted that the necessary extraction of "battery metals like lithium, cobalt, and graphite" would take over 9,900 years, 1,700 years, and 3,200 years, respectively. Simon P. Michaux, The quantity of metals required to manufacture just one generation of renewable technology units to phase out fossil fuels, YouTube (Aug. 18, 2022), https://bit.ly/42w7Fcx; see also Simon P. Michaeux, Assessment of the Extra Capacity Required of Alternative Energy Electrical Power Systems to Completely Replace Fossil Fuels (Aug. 18, 2022), https://bit.ly/3qCU1qU. Indeed, in 2022, the global reserves of those same three metals amounted to "less than five percent of what we need [for] one generation." Id. And among those reserves, not every discovery deposit becomes a mine. Only 1 or 2 for every 1000 does, and it takes between 15 and 20 years for those few mines to become fully functional. Id. And of those, 20–30% of the mines that get up and running will eventually "go out of business because of market conditions." Id.; see also The Raw-Materials Challenge: How The Metals And Mining Sector Will Be At The Core Of Enabling The Energy Transition, McKinsey & Co. (Jan. 10, 2022), https://tinyurl.com/2ne5jt37. Throw in the fact that each of these materials has a limited life-cycle after which they must be "decommissioned and replaced," and it becomes clear that we may well need to "make batteries out of something else." Michaux, The quantity of metals required to manufacture just one generation of renewable technology units to phase out fossil fuels, supra. That whole endeavor "is not going to be easy." Id. Quite right. The Proposed Rule needs to deal with real projections for the real demand it creates. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

The view further down the supply chain is no better. The Proposed Rule can say only that supply capacity is "rapidly forming," not that it exists now or in the near-enough future. 88 Fed. Reg. at 29,323. EPA recognizes that it is still only "a goal of the U.S. manufacturing industry to create a robust supply chain for these products." Id. (emphasis added). EPA also says that, "[i]n general, the structure of the proposed standards allows an incremental phase-in to the MY 2032 level and reflects consideration of the appropriate lead time for manufacturers to take actions necessary to meet the proposed standards." Id. at 29,239. But there is nothing "incremental" about an edict for an eight-fold increase in EV sales in eight years. See id. at 29,189, 29,329, 29,346. And there is nothing simple about the amount of time and money needed to get the still-illusory supply chain running at massive new scale. According to former auto executive-turned-industry adviser Larry Burns, "[t]he transition automakers are perusing requires building totally new factories, assembly lines and supply chains, a years-long process." Puko, supra. Automakers will have to apply "major re-engineering" that "usually takes anywhere from three to five years" per model to dozens of vehicle models in under a decade. Id. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

Battery factories, in particular, take years to build. See Eli Leland, So You Want To Build A Battery Factory, Medium: Batteries are Complicated (July 16, 2021), https://tinyurl.com/mv4vhh3x. It takes longer still to create and sharpen production processes that yield quality and safe products that can satisfy consumer demand and federal regulators. Mistakes are too costly for it to be any other way. See Bradley Berman, Battery Experts Provide Deeper Explanations for Chevy Bolt Fires, Autoweek (Nov. 15, 2021), https://tinyurl.com/3r7879u6 (describing recall of 141,000 EVs following 16 reported fires). The Proposed Rule, however, will have "automakers rac[ing] to supplement material shortages," and risking far more than prudence allows, just to "scal[e] these facilities and operations quickly." Paige McKirahan, United States: EV Supply Chain Disruption To Ignite Disputes Over IP, M&As, And More, Mondaq (Dec. 9, 2022), https://bit.ly/3p6eXpI. This demand, in turn, "put[s] at risk the stability of mines and refineries with possible unskilled workers," and "[h]uman rights violations . . . run rampant if safe and proper processes are not identified." Id. None of this is acceptable. All of it can be avoided. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

The Proposed Rule should also account for the reality that too-fast and too-aggressive regulation can stifle the very innovation it relies on. Even with increased governmental subsidies toward rapid EV development, mandates like the Proposed Rule will almost certainly "prompt automakers to make bigger bets on a narrower set of options for complying, which might limit innovation and progress because technology now is changing so rapidly." Puko, supra. Programs like the Renewable Fuel Standards are whittled down, contrary to Congress's intent. See WV Amicus Br., at 24-27. And changing contexts that should command our attention end up ignored, including that EV "battery technology is still evolving," which means "the U.S. may be at risk of building mines and factories to produce batteries that wind up being obsolete in a decade." Joann Muller & Jael Holzman, Why the U.S. Can't build EVs without China, Axios (Apr. 12, 2023), https://bit.ly/42iaoWS. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

The second- and third-order consequences of choosing rushed production based on today's technologies over innovation are weighty, too. Take nickel, for example. It is possible—even likely—that later battery technologies will render it unnecessary. See 88 Fed. Reg. at 29,314 (citing battery applications that "an iron phosphate cathode which has lower energy density but does not require . . . nickel"). And that may prove to be a very good thing: "Reaching the nickel means cutting down swaths of rainforest," and "[r]e?ning it is a carbon-intensive process that . . . produc[es] waste slurry that's hard to dispose of." Jon Emont, EV Makers Confront the 'Nickel Pickle,' WSJ (June 4, 2023), https://bit.ly/3PdIoRH. Nickel, then, exposes "a larger contradiction within the EV industry: Though EVs are designed to be less damaging to the environment in the long term than conventional cars, the process of building them carries substantial environmental harm." Id. Rather than letting market demand and innovation explore other paths forward, the Proposed Rule locks automakers and the rest of our economy into this impossible option. EPA should slow down this endeavor and allow both safety and innovation to drive decision-making in this critically important area. [EPA-HQ-OAR-2022-0829-0649, pp. 13-15]

Organization: Marathon Petroleum Corporation (MPC)

Renewable liquid fuels can play a critical role in a multifaceted solution for reducing carbon emissions, particularly those from the transportation sector. The renewable liquid fuel industry is well-positioned to produce the renewable fuels needed to help attain the EPA's emissions goals. However, EPA has ignored the emission-reduction benefits provided by renewable liquid fuels in its proposed vehicle emissions standards because EPA did not account for the assumption that the CO2 emissions from renewable liquid fuel combustion are zero. [EPA-HQ-OAR-2022-0829-0593, pp. 1-2]

EPA should consider changes to its emissions standards to address total lifecycle emissions of vehicles rather than focusing specifically on tailpipe emissions. EPA's historic methodology no longer meets the needs of the complex vehicle market. Cradle- to-grave lifecycle analysis allows all technologies to be evaluated using consistent criteria. [EPA-HQ-OAR-2022-0829-0593, p. 2]

A. To Properly Compare ICE Vehicles to EVs, EPA Needs to Evaluate the Lifecycle GHG Emissions, and Not Just the Tailpipe Emissions, of These Types of Vehicles.

EPA's approach to vehicle emissions standards includes a strict interpretation that centers on the vehicle's tailpipe in determining standards and compliance. EPA takes this approach because EPA's historic framework for the vehicle emission program only contemplated internal combustion engine ("ICE") vehicles. [EPA-HQ-OAR-2022-0829-0593, pp. 2-3]

With the significant changes in vehicles and vehicle power trains, MPC believes that EPA's approach should include lifecycle analysis ("LCA") and modeling, which would quantify the breadth of vehicle emissions. Use of LCA shows that all vehicle types have emissions impacts across their supply chains and ensures that certain technologies are not disproportionately advantaged or disadvantaged simply based on power train. Adopting an LCA approach to vehicle categorization would present a science-based, technology-neutral solution to adequately capture the differences between electric vehicles ("EVs") and ICE vehicles, as well as future vehicle technology advancements. [EPA-HQ-OAR-2022-0829-0593, pp. 2-3]

LCA most accurately quantifies total EV emissions, which include emissions-intensive operations such as critical mineral mining, electricity generation, and battery production as well as disposal and recycling. These activities can generate significant CO2 emissions and should be fully quantified before setting a standard that effectively mandates an increase in the production of EVs. Full lifecycle impacts, cradle to grave, for all vehicles should be itemized. Then emissions standards based on equivalent metrics among similar vehicle technologies could be applied. [EPA-HQ-OAR-2022-0829-0593, pp. 2-3]

MPC supports efforts to reduce emissions from the transportation sector. However, EPA has failed to recognize in this rule a way to achieve an immediate and significant reduction in transportation emissions by excluding the benefit that renewable liquid fuels provide when used in transportation vehicles. EPA's calculation of tailpipe emissions from ICE vehicles presumes that the vehicle is operating on petroleum fuel. In comparison, renewable liquid fuel use can result in vehicle emissions reductions that are equal to or greater than the reductions EPA is claiming from converting the fleet to electric vehicles. Renewable liquid fuels are readily available and compatible with the current vehicle fleet. Renewable liquid fuels can provide emissions reductions immediately at the scale required to meet emissions reduction targets and do so more economically than EVs or other nascent technologies. [EPA-HQ-OAR-2022-0829-0593, pp. 3-4]

Other emissions reduction programs, including the EPA's Renewable Fuel Standard ("RFS"), as well as LCA models, including the Greenhouse gases, Regulated Emissions, and Energy use in Technologies (GREET) model, do not include CO2 emissions from renewable liquid fuels combustion in their lifecycle analyses. As EPA explained in its RFS rulemaking, "the CO2 emitted from biomass-based fuels combustion does not increase atmospheric CO2 concentrations, assuming the biogenic carbon emitted is offset by the uptake of CO2 resulting from the growth of new biomass."1 Similarly, EPA adopts the Intergovernmental Panel on Climate Change ("IPCC") Tier 1 approach to CO2 emissions from biofuels, including renewable liquid fuels, in its Greenhouse Gas ("GHG") Inventory. IPCC Tier 1 methods are based on default emission factors and define a methodology to track shifts in carbon stocks due to biofuel combustion. When using Tier 1 methods, CO2 emissions from biofuel combustion are attributed to the Agriculture and Land Use sector, where it is assumed that the biofuel emissions are balanced by carbon uptake prior to the feedstock's harvest, resulting in net combustion emissions of zero.2 [EPA-HQ-OAR-2022-0829-0593, pp. 3-4]

1 2010 Renewable Fuels Standard Program (RFS2) Regulatory Impact Analysis, EPA-420-R-10-006, Pg 444.

2 2006 IPCC Guidelines for National Greenhouse Gas Inventories, General Guidance and Reporting, Volume 1, pg. 1.6.

Despite the science-based approach used by these authoritative sources, EPA chose not to assign zero CO2 emissions from renewable fuel combustion in an ICE vehicle to its vehicle emissions standard. With the ever-increasing volume of renewable fuel available in the market, EPA's failure to attribute zero CO2 emissions to renewable fuel results in an over-estimation of CO2 emissions from ICE vehicles. Consistency in the treatment of renewable liquid fuels and their CO2 emissions across programs is key to ensuring that data are treated similarly, and that no technology is favored over another. [EPA-HQ-OAR-2022-0829-0593, pp. 3-4]

Alignment of EPA's tailpipe emissions standards with other programs that promote domestic renewable liquid fuels, such as the RFS is needed. Mandating the blending and use of renewable liquid fuels in vehicles in one program while simultaneously ignoring the positive impacts of their use in another results in rules that are at cross purposes. Renewable liquid fuels can be a part of a multifaceted solution for reducing carbon emissions and similar treatment of their benefits from program to program would be a significant step forward for the EPA. This change would lead to significantly more investments in renewable liquid fuels, providing an option for meeting EPA's goals that is compatible with ICE vehicles and does not require a wholesale shift in vehicle manufacturing and infrastructure, with its concomitant effects on U.S. drivers who would bear the costs. [EPA-HQ-OAR-2022-0829-0593, p. 4]

A continued push from the Agency to further narrow regulations in regard to renewable liquid fuels results in lost opportunities for investments and places additional burden on the transportation and fuels industry, as well as consumers. In addition, these lost opportunities for decarbonization are impactful, as renewable liquid fuels can be deployed quickly, at a large scale, and with significant carbon reductions in the transportation fuel sector. The renewable liquid fuel industry is well-positioned to produce the fuels needed to contribute to the EPA's goals because renewable liquid fuels are widely accepted throughout the country. [EPA-HQ-OAR-2022-0829-0593, p. 4]

Organization: Matthew DiPaulo (DiPaulo)

The EPA's proposal boosts an electric vehicle supply chain dominated by China, which powers its manufacturing-base through coal-fired power plants and mines minerals for EV batteries with the use of environmental practices that we would never approve of in the United States. Emissions coming out of tailpipe matter, but so do the lifecycle emissions of building a car, constructing and charging a battery, and retiring vehicles. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: Mazda North American Operations (Mazda)

As a global automaker that sells in over 120 countries around the world, Mazda is already working to reduce the carbon footprint of our vehicles and our corporate operations. In January 2021, Mazda announced its Endeavor for Carbon Neutrality by 2050. To achieve this, we will first strive to realize carbon neutrality at Mazda manufacturing facilities around the globe by 2035. Mazda sees reducing emissions of CO2 and other greenhouse gases over a vehicle's entire lifecycle - including manufacturing, use and disposal - as one of its top priorities. Life Cycle Assessment (LCA) is a method for calculating and evaluating the environmental influence of vehicles across their entire life cycle through the purchase of materials, manufacture, use, recycling, and final disposal. Since 2009, Mazda has adopted LCA as a means of determining the time required to reduce the environmental impact of vehicles in their life cycle and has been actively working to reduce the environmental impact at each stage of the life cycle. [EPA-HQ-OAR-2022-0829-0595, p. 1]

Organization: Michalek and Bruchon

Thank you for the opportunity to provide comments on the proposed rule for Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehi- cles. We are researchers at Carnegie Mellon University with experience in life cycle as- sessment of plug-in electric vehicles (PEVs). We recently conducted a study, currently in peer review, analyzing how to reduce electric vehicle life cycle emissions during the transition to PEVs (Bruchon et al., 2023). We are attaching the working version of that study for your reference. An interactive app to explore the results is also available at https://mbruchon.shinyapps.io/PJM_EV/ [EPA-HQ-OAR-2022-0829-0514, pp. 2-4]

Our study was motivated by a prior finding, using 2010 grid data of the PJM grid region, that a battery electric vehicle (BEV) would produce an estimated 2x to 3x the consequential air emissions externalities of an ordinary gasoline vehicle, largely due to SO2 emissions from coal fired power plants operating on the margin. In the updated study, using the most recent data available, we find that PEV consequential emissions externalities have dropped by 17-18% as natural gas has replaced coal. Using data on expected generator retirements, we expect consequential life cycle PEV emissions to continue to drop through 2025, bringing PEV emissions in line with those of gasoline vehicles (Figure 1). However, base case projections suggest that consequential PEV emissions externalities will bottom out and remain comparable to gasoline vehicles through at least 2035. These projections reflect a trend that even though the power system is expected to become cleaner on average during that period, marginal generation that responds to changes in load at the times that PEVs charge will remain primarily a mix of fossil fuel sources in this timeframe. Increased renewable capacity will reduce total grid emissions in the near and long term, but it will not substantially reduce consequential PEV emissions in PJM over the period of the proposed policy—only in the long term (later than 2035) if renewables are routinely curtailed and available to supply additional load on the margin. We find that the three largest levers available for reducing PEV emissions externalities during the period of the proposed policy are [EPA-HQ-OAR-2022-0829-0514, pp. 2-4]

1. Shifting electric vehicle batteries away from nickel-based chemistries. We estimate that nickel production emissions contribute a substantial portion of consequential PEV emissions, depending on the source, and a shift away from nickel-based lithium-ion battery chemistries toward lithium iron phosphate (LFP) would reduce electric vehicle life cycle emissions below those of gasoline vehicles and hybrid electric vehicles in PJM (Figure 1). We are already observing this shift in the electric vehicle market. [EPA-HQ-OAR-2022-0829-0514, pp. 2-4]

2. Reducing emissions from fossil generators. Because fossil fuel generators like coal and natural gas power plants will continue to dominate operational responses to changes in load during the period of the proposed policy, emission rates from fossil generators are key to determining the consequential emissions of electric vehicles. EPA's new proposed rule on "New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel- [EPA-HQ-OAR-2022-0829-0514, pp. 2-4]

[See original attachment for: Figure 1: Estimated consequential life cycle emissions externalities as PJM's generator fleet evolves over time. ICEV = internal combustion engine vehicle, HEV = gasoline hybrid electric vehicle, BEV300 = battery electric vehicle with a 300-mile range, LFP = lithium iron phosphate BEV battery chemistry, NMC = nickel manganese cobalt lithium ion BEV battery chemistry. For BEV300 the base case includes uncontrolled (convenience) charging, NMC622 battery chemistry, 10% renewables in 2035, and no accelerated coal retirements or natural gas installations. The y-axis is truncated to make trends visible. From Bruchon et al. (2023)] [EPA-HQ-OAR-2022-0829-0514, pp. 2-4]

Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule"1 has the potential to address this factor directly. [EPA-HQ-OAR-2022-0829-0514, pp. 2-4]

1 Federal Register v88 n99 p33240-33420

3. Revising vehicle fleet emissions standards. Past work has found that when PEVs are adopted this triggers slack in the light duty vehicle greenhouse gas standards that increases permitted emissions from the rest of the fleet (Goulder et al., 2012) and that this "leakage" effect is amplified when the standards count PEVs favorably in compliance calculations by counting each PEV sale as though it were more than one sale and by excluding electric vehicle charging emissions (Jenn et al., 2019, 2016). In our new study we find that this effect is still substantial today, and the emissions consequences of adopting PEVs are higher because of the design of existing light-duty vehicle greenhouse gas emissions standards (Figure 2). [EPA-HQ-OAR-2022-0829-0514, pp. 2-4]

The proposed rule does two things that mitigate this effect.

(a) First, the multipliers used in prior standards to count individual PEV sales as more than one sale in compliance calculations have been discontinued, which reduces the amplification of the emissions leakage effect. [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

(b) Second, while prior light-duty vehicle greenhouse gas standards were not primary drivers of vehicle electrification, the proposed rule is sufficiently stringent that it is expected to act as a binding constraint, pushing automakers to electrify more than they would without the rule. When the GHG standard is the driver of electrification, the leakage question changes. Specifically, prior concerns about leakage were based on other policies (e.g.: California's ZEV policy, tax incentives) and consumers driving electric vehicle adoption and triggering an increase in permitted fleetwide emissions. When the GHG standard is a primary driver of electrification, this type of leakage is less relevant. [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

Both of these changes in the proposed rule reduce consequential emissions of PEV adoption. However, the proposed rule continues to exclude PEV charging emissions in compliance calculations, and thus the extent of consequential GHG reductions implied by the proposed rule hinges on reduced emissions from marginal generators in the power system. Ideally, regulation would be based on the full consequential life cycle emissions of each vehicle technology so that incentives and constraints would be directly aligned with the target externalities (National Academies of Sciences and Medicine, 2022). When practical and regulatory authority limitations restrict the scope of policy, it is important to assess the consequential implications of the restricted policy on overall emissions, which EPA does in the draft regulatory impact analysis. [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

Overall, with this proposed rule for vehicles together with EPA's proposed rule for limiting fossil fuel generator emissions, EPA is acting on two of the top three levers we identified for reducing life cycle emissions of PEVs during the transition to electric vehicles (and during the period of the proposed policy). We also note that EPA's regulatory impact analyses, which computes predicted emissions in scenarios both with and without the proposed policy to estimate the effect of the proposed policy, is (at least in this sense) consistent with [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

[See original attachment for: Figure 2: Range of estimates for consequential life cycle emissions externalities in our Base Case (ignoring policy interactions) and our Policy Interaction Case (including the effect of EV sales on permitted fleetwide emissions in the light duty GHG standard). From Bruchon et al. (2023)] [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

the National Academies report on methods for life cycle assessment of transportation fuels (National Academies of Sciences and Medicine, 2022). Specifically, from that report [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]:

Recommendation 3-2: Public policy design based on LCA should ensure through regulatory impact assessment that, at a minimum, the consequential life-cycle impact of the proposed policy is likely to reduce net GHG emissions and increase net benefits to society... –National Academies of Sciences and Medicine (2022) [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

We recommend citing the National Academies of Sciences and Medicine (2022) report and describing the regulatory impact analysis in consequential terms for clarity. [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

Supporting Information

We attach as supporting information both Bruchon et al. (2023) and National Academies of Sciences and Medicine (2022). [EPA-HQ-OAR-2022-0829-0514, pp. 4-6]

Organization: Minnesota Corn Growers Association (MCGA)

PERFOMANCE BASED/TECHNOLOGY NEUTRAL RULEMAKING NEEDED

A recent study4 by Argonne National Lab, in cooperation with coauthors from the automotive and energy industries, shows a BEV with 400-mile range (BEV400) has lifecycle GHG emissions of about 250 g/mi. This is an improvement from a conventional internal combustion engine vehicle (ICEV) which is about 430 g/mi. However, the lifecycle GHG emissions of a BEV are far from zero. In fact, lifecycle GHG emissions of a BEV400 are comparable to other low-emission options such as E85 or PHEV. Regulations based only on tailpipe emissions are clearly inadequate for comparing BEVs to other pathways for reducing GHG emissions. [EPA-HQ-OAR-2022-0829-0612, pp. 4-5]

4 Kelly et al., "Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies", report ANL-22/27, June 2022.

The Argonne report demonstrates that other “vehicle-fuel pathways” can compete with BEVs. For example, a conventional gasoline hybrid (HEV) achieves about 310 g/mi and E85 in a non-HEV FFV achieves 260 g/mi. The future potential of HEVs combined with FFV technology, utilizing E85, is comparable to future BEVs with wind and solar power. [EPA-HQ-OAR-2022-0829-0612, pp. 4-5]

The proposed rulemaking does not allow other vehicle-fuel pathways to compete with BEVs. By regulating only tailpipe emissions, and ignoring the rich literature of lifecycle analysis, EPA would create artificial incentives for auto manufacturers to pursue only BEVs. This could have disastrous impacts on both the cost and the GHG emissions of future vehicles. The same Argonne report found the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with 400-mile range is dramatically more expensive than one with 200-mile range, and its lifetime GHG emissions are substantially worse. In fact, a BEV with 400-mile range has only a slight GHG benefit compared to a HEV or an E85 FFV. But the proposed rule counts all BEVs as zero GHG emissions, regardless of battery size – and regardless of vehicle size and weight. [EPA-HQ-OAR-2022-0829-0612, pp. 4-5]

It is essential for EPA to utilize life cycle analysis to create a “level playing field” which encourages speedy adoption of HEVs, PHEVs, FFVs, and other technologies (in addition to BEVs) to achieve the most rapid, affordable, robust, and practical GHG emissions reductions in a wide range of vehicle segments, while satisfying diverse customer needs and preferences. Europe is already making progress towards regulation based on life cycle analysis.10 11 [EPA-HQ-OAR-2022-0829-0612, p. 6]

10 https://www.goldmansachs.com/intelligence/pages/briefly/from_briefings_21-Jan-2020/new-era-in-co2-regulation.pdf.

11 Sala et al., "The evolution of life cycle assessment in European policies over three decades", International Journal of Life Cycle Assessment, December 2021; https://doi.org/10.1007/s11367-021-01893-2.

UPSTREAM EMISSIONS

EPA's proposal continues to treat EVs as carbon neutral, without regard to the source of electricity powering the vehicles. Depending on the sources of electricity – whether coal, natural gas, wind or nuclear and the mix of those sources - full lifecycle emissions of EVs vary widely, masking the true GHG emissions from these vehicles. Without accounting for upstream emissions from these vehicles, full lifecycle emissions are not considered. Furthermore, EPA notes in the proposal that increases in electricity demand will result in increased non-GHG emissions for some upstream pollutants. EPA does a disservice to emissions reduction goals by accounting for upstream emissions from some fuels and vehicle technologies but not others, providing an advantage to the sources for which "wells-to- wheels" upstream emissions are excluded and concealing emissions from coal power generation, mineral extraction, and other high-carbon sources. [EPA-HQ-OAR-2022-0829-0612, p. 6]

Adopt Argonne's GREET Model

Argonne's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model is the federal government's most accurate tool for evaluating biofuel and energy lifecycle emissions. Adopting a true "wells-to- wheels" methodology will help to ensure an accurate accounting of total carbon intensity so that all low carbon fuels and technologies are compared on full and accurate lifecycle emissions on a technology and feedstock neutral basis. [EPA-HQ-OAR-2022-0829-0612, p. 13]

Organization: National Association of Convenience Stores (NACS) et al.

The Proposed Rule is also arbitrary and capricious because it fails to accurately and fairly account for the greenhouse gas emissions impacts of both EVs and biofuels. EPA should use the best available science to accurately account for the full lifecycle carbon intensity associated with each fuel and technology, but the Proposal ignores the significant upstream emissions from electricity generation associated with EVs. Incentives for alternative fuel technologies should be tied to those technologies' full lifecycle environmental attributes rather than a single segment of the lifecycle (i.e., tailpipe emissions). The Agency should revise the Proposal to adopt a more market-oriented, technology-neutral, and consumer-focused approach to decarbonizing light-duty vehicle transportation. [EPA-HQ-OAR-2022-0829-0628, p. 2]

III. The Proposed Rule Fails to Account for the Lifecycle Emissions of Electric Vehicles.

Under the Proposal, electric vehicles effectively serve as the only means of compliance with the standards in part because the Agency focuses solely on tailpipe emissions rather than the full lifecycle emissions of light- and medium-duty EVs. This is a flawed approach. To ensure an accurate accounting of the lifecycle carbon intensity associated with each technology, EPA should incorporate lifecycle emissions into its analysis. This will facilitate continued investment in all decarbonization technologies alongside deployment of electric vehicles. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

Though EVs do not directly have tailpipe emissions, other segments along the lifecycle of the EV do. The fuel source of an EV—a battery composed of carbon intensive minerals and the electricity generated to power the battery—produces meaningful emissions to which the Proposal turns a blind eye. Addressing the impact of climate change, however, requires mitigating emissions irrespective of whether they originate from a tailpipe, a mining operation, a power plant, or a battery plant. Consequently, emissions standards should account for the entire lifecycle emissions. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

EPA's analysis examines only logistical challenges to EV manufacturing and does not account for carbon impacts of critical mineral mining, the use of natural resources for refining and processing, engine and battery manufacturing, and other confounding variables such as prolonged ICE turnover rates and vehicle end-of-life consequences. Importantly, a lifecycle analysis of EV emissions impacts will better equip EPA to understand the varying costs and emissions reductions associated with all technologies and best inform manufacturers and consumers of their options. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

EPA also makes flawed assumptions regarding the total emissions impacts of the Proposal. Despite claiming that "upstream emissions impacts from fuel production at refineries and electricity generating units are considered in EPA's analysis of overall estimated emissions impacts and project benefits," 31 this analysis uses overgeneralizations and assumes cleaner and less expensive generation over time—incorrectly assuming as a certainty that the power sector will become cleaner through the increased use of wind and solar generation as well as electricity storage (e.g., batteries) despite opposition from the power sector.32 Although the Agency concedes these assumptions will still result in "some increases in ambient pollutant concentrations" and that "the specific locations of increased air pollution are uncertain," EPA fails to meaningfully engage with the consequences of even its own flawed analysis.33 [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

31 Proposed Rule at 29,252.

32 See, e.g., David Pomerantz, The New York Times, "Guess Who's Been Paying to Block Green Energy? You Have." (Jul. 5, 2023) available at https://www.nytimes.com/2023/07/05/opinion/utility-bills-clean-energy.html; Susan Cosier, "Why Electric Utilities Are Resorting to Dark Money and Bribes to Resist Renewables," Audubon, March 16, 2021, available at https://www.audubon.org/news/why-electric-utilities-are-resorting-dark-money-and-bribes-resist- renewables ("Many utility companies cling to old business models and dirty fuels rather than go through the tough energy transition that climate change demands.") Comment from Southern Company on EPA Proposed Rule, Docket No. EPA-HQ-OAR-2022-0723, Comment ID EPA-HQ-OAR-2022-0723-0029 (Dec. 21, 2022) available at https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0723-0029 (advocating for continued construction of new EGU infrastructure for fossil fuels and cautioning against unattainable limits for existing coal and natural gas EGUs); Valerie Volcovici and Nichola Groom, Reuters, "U.S. utilities want protection from Biden's tight timeline in clean energy mandate" (Apr. 14, 2021) available at https://www.reuters.com/business/sustainable-business/us- utilities-want-protection-bidens-tight-timeline-clean-energy-mandate-2021-04-14/.

33 Proposed Rule at 29,361.

The Proposed Rule fails to adequately evaluate local ambient air quality impacts from increased power generation. Though EPA modeled changes to power generation anticipated by the Proposed Rule as part of its upstream analysis, the Agency does not consider the potential degradation of air quality in areas in the direct vicinity of existing or new power plants.34 This is further complicated by the fact that emissions associated with electricity generation are not consistent across the U.S. In contrast to EPA's generalized emissions benefits, the emissions advantages of EVs are much lower in states with relatively high carbon profiles for electricity generation than those states with relatively low carbon profiles. Indeed, the Fuels Institute analyzed these differences and concluded that in states with high-carbon intensity electric generation, such as West Virginia, ICE vehicles produced decidedly less carbon emissions relative to EVs over the entire 200,000-mile life of the vehicles.35 Of course, the Report recognizes emissions advantages to EVs in those low-carbon states as well, but these differences further illustrate the importance of accurately accounting for full lifecycle emissions. Instead of comprehensively accounting for these emissions in compliance calculations, the Agency proposes to continue providing EVs with a discounted emissions rate by allowing these vehicles to be counted as producing 0 g/mile of CO2, and solidifying preferential treatment of one mode of technology: electric vehicles. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

34 Proposed Rule at 29,361.

35 Ricardo Inc., FUELS INSTITUTE, "Lifecycle Analysis Comparison" (Jan. 2022) available https://transportationenergy.org/wp-content/uploads/2022/10/FI_Report_Lifecycle_FINAL.pdf.

While ICE-powered vehicles generally emit more carbon dioxide during operation, the emissions associated with the manufacturing of ICE-powered vehicles are significantly lower than those emitted from battery-electric vehicles.36 There is no climate rationale for EPA to pursue this rulemaking from a state of willful blindness over these distinctions. A recent examination conducted by Volvo provides a directly applicable case study. Volvo concluded that the "accumulated emissions from the [m]aterials production and refining, [Lithium-ion] battery modules and Volvo Cars manufacturing phases of C40 Recharge are nearly 70 percent higher than for XC40 ICE."37 Volvo explains, "[e]lectrification of cars causes a shift of focus from the use phase to the materials production and refining phase."38 [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

36 See IEA, "The Role of Critical Minerals in Clean Energy Transition" (May 2021) available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions; see also David Biello, SCIENTIFIC AMERICAN, "Electric Cars Are Not Necessarily Clean,"(May 11, 2016) available at https://www.scientificamerican.com/article/electric-cars-are-not-necessarily-clean/ ("Your battery-powered vehicle is only as green as your electricity supplier"); see also Nina Lakhani, THE GUARDIAN, "Revealed: How US Transition to Electric Cars Threatens Environmental Havoc," the Guardian, (January 24, 2023) available at https://www.theguardian.com/us-news/2023/jan/24/us-electric-vehicles-lithium-consequences-research. ("The US's transition to electric vehicles could require three times as much lithium as is currently produced for the entire global market, causing needless water shortages, Indigenous land grabs, and ecosystem destruction.").

37 Elisabeth Evrard, et al., VOLVO, "Carbon footprint report – Volvo C40 Recharge," (2021), pg. 24, available at https://www.volvocars.com/images/v/-/media/Market-Assets/INTL/Applications/DotCom/PDF/C40/Volvo-C40- Recharge-LCA-report.pdf.

38 Id. at pg. 5.

Further, the Proposed Rule overlooks the emissions impacts from the substantial expansion of the electrical grid. While EPA credits emissions reductions from assuming the power sector will become cleaner over time using renewable generation and electricity storage (e.g., batteries), it ignores the impacts of building out that associated infrastructure. New power generation, renewable power generation, and energy storage require the same critical minerals necessary for manufacturing EV batteries. Increased electricity demand will only further compound the stress on critical minerals. Indeed, copper and aluminum—both needed for EVs—are also the two main materials in wires and cables. Battery storage equipment for solar and other renewable energy sources rely on similar battery chemistries as EVs.39 Again, EVs may be the most environmentally compelling solution, but it does neither the climate nor American consumers any favors for the Agency to pretend the solution is more compelling or achievable than it actually is. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

39 And, as described above, higher prices on these materials could have a major impact on future grid investments. INTERNATIONAL ENERGY AGENCY, The Role of Critical Minerals in Clean Energy Transitions (Mar. 2022), 77–80, available at https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a- 52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

The simultaneous spike in demand for materials such as copper and aluminum for both the grid and EV manufacturing will increase extraction and refining efforts globally, potentially exacerbating consequences on a regional level.40 By failing to consider geographic electricity generation differences and the potential benefits of a non-homogenized vehicle population, the Proposal misses the opportunity to most effectively respond to emissions concerns and, more importantly, could indirectly lead to increased emissions in certain regions. A full accounting of the relative advantages and disadvantages of the different vehicle technologies is necessary to ensure the Proposal harnesses the benefits of competition among different current and potential future vehicle technologies. [EPA-HQ-OAR-2022-0829-0648, pp. 10-12]

40 The U.S. is almost entirely dependent on other countries, especially China, for materials essential to manufacturing EVs, meaning the Proposal may potentially raise national security concerns.

Organization: National Corn Growers Association (NCGA)

NCGA urges EPA to advance a much-needed rulemaking addressing fuel quality to cut emissions from the millions of liquid fuel vehicles on the road now and the new vehicles that will be sold through the compliance period. Greater lifecycle emission reductions are available from sustainable, affordable low carbon ethanol through a clean, high-octane standard, by removing barriers to higher ethanol blends and by equitably incentivizing all alternative fuels and vehicles. [EPA-HQ-OAR-2022-0829-0643, p. 1]

A recent study 4 by Argonne National Lab, in cooperation with coauthors from the automotive and energy industries, shows a BEV with 400-mile range (BEV400) has lifecycle GHG emissions of about 250 g/mi. This is an improvement from a conventional internal combustion engine vehicle (ICEV) which is about 430 g/mi. However, the lifecycle GHG emissions of a BEV are far from zero. In fact, lifecycle GHG emissions of a BEV400 are comparable to other low-emission options such as E85 or PHEV. Regulations based only on tailpipe emissions are clearly inadequate for comparing BEVs to other pathways for reducing GHG emissions. [EPA-HQ-OAR-2022-0829-0643, p. 3]

4 Kelly et al., "Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies", report ANL-22/27, June 2022

The Argonne report demonstrates that other “vehicle-fuel pathways” can compete with BEVs. For example, a conventional gasoline hybrid (HEV) achieves about 310 g/mi and E85 in a non-HEV FFV achieves 260 g/mi. The future potential of HEVs combined with FFV technology, utilizing E85, is comparable to future BEVs with wind and solar power. [EPA-HQ-OAR-2022-0829-0643, pp. 3-4]

The proposed rulemaking does not allow other vehicle-fuel pathways to compete with BEVs. By regulating only tailpipe emissions, and ignoring the rich literature of lifecycle analysis, EPA would create artificial incentives for auto manufacturers to pursue only BEVs. This could have disastrous impacts on both the cost and the GHG emissions of future vehicles. The same Argonne report found the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with 400-mile range is dramatically more expensive than one with 200-mile range, and its lifetime GHG emissions are substantially worse. In fact, a BEV with 400-mile range has only a slight GHG benefit compared to a HEV or an E85 FFV. But the proposed rule counts all BEVs as zero GHG emissions, regardless of battery size – and regardless of vehicle size and weight. [EPA-HQ-OAR-2022-0829-0643, pp. 3-4]

It is essential for EPA to utilize life cycle analysis to create a “level playing field” which encourages speedy adoption of HEVs, PHEVs, FFVs, and other technologies (in addition to BEVs) to achieve the most rapid, affordable, robust, and practical GHG emissions reductions in a wide range of vehicle segments, while satisfying diverse customer needs and preferences. Europe is already making progress towards regulation based on life cycle analysis. 10 11 [EPA-HQ-OAR-2022-0829-0643, p. 4]

10 https://www.goldmansachs.com/intelligence/pages/briefly/from_briefings_21-Jan-2020/new-era-in-co2-regulation.pdf

11 Sala et al., "The evolution of life cycle assessment in European policies over three decades", International Journal of Life Cycle Assessment, December 2021; https://doi.org/10.1007/s11367-021-01893-2

EPA’s proposal continues to treat EVs as carbon neutral, without regard to the source of electricity powering the vehicles. Depending on the sources of electricity – whether coal, natural gas, wind or nuclear and the mix of those sources - full lifecycle emissions of EVs vary widely, masking the true GHG emissions from these vehicles. Without accounting for upstream emissions from these vehicles, full lifecycle emissions are not considered. Furthermore, EPA notes in the proposal that increases in electricity demand will result in increased non-GHG emissions for some upstream pollutants. EPA does a disservice to emissions reduction goals by accounting for upstream emissions from some fuels and vehicle technologies but not others, providing an advantage to the sources for which “wells-to-wheels” upstream emissions are excluded and concealing emissions from coal power generation, mineral extraction, and other high-carbon sources. [EPA-HQ-OAR-2022-0829-0643, p. 4]

Corn-based ethanol can reach net zero emissions with continued on-farm improvements and soil carbon sequestration, along with carbon capture technology and new efficiencies in ethanol production. Corn farmers are proud of our leadership in adopting conservation and best management practices. NCGA’s recently released Corn Sustainability Report 21 details corn farmers’ history of improvements and our commitment to further sustainability achievements by 2030. [EPA-HQ-OAR-2022-0829-0643, pp. 6-7]

21 National Corn Growers Association Corn Sustainability Report: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://dt176nijwh14e.cloudfront.net/file/392/NCGA%20Sustainability%20Report_final_digital_07_29_21.pdf

Sustainable production means corn farmers today are producing more corn using less land and fewer resources. For example, planted corn acres in 2022, at 88.6 million acres, were less than planted acres in 2007, the year the RFS was expanded, at 93.5 million acres. USDA data also shows the area planted to principal crops in the United States is not expanding overall. Corn production has increased primarily because crop yields have increased from an average of 150 bushels per acre in 2007 to 173 bushels in 2022. With the average yield in 1980 at just 91 bushels per acre, productivity growth is a long-term trend. [EPA-HQ-OAR-2022-0829-0643, pp. 6-7]

Using the expertise of Argonne's scientists and the U.S. Department of Agriculture's data, we believe Argonne's Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model is the federal government's most accurate tool for evaluating biofuel and energy lifecycle emissions. Because GREET is regularly updated, this model captures GHG emissions reductions from farmers' improved production practices and will incorporate the ongoing, voluntary climate-smart improvements in agriculture production this Administration supports, ensuring further carbon intensity reductions are accounted for in the LCA. [EPA-HQ-OAR-2022-0829-0643, pp. 6-7]

Corn production has improved across all measures of resource efficiency, including higher crop yields per acre, resulting in greater corn production using less land and fewer inputs, further fortifying ethanol as a sustainable, low-carbon renewable fuel. This progress is reflected in Argonne's most recent analysis, which builds on and is consistent with other recent reviews. [EPA-HQ-OAR-2022-0829-0643, p. 7]

For example, a 2018 USDA study shows that ethanol then resulted in 39 to 43 percent fewer GHG emissions than gasoline. 22 Building on this progress, additional improvements on farms and in ethanol production supported by expanding markets for low carbon fuels could result in ethanol with up to 70 percent fewer GHG emissions than gasoline, according to USDA's analysis. Furthermore, according to California Air Resources Board (CARB) data, the CI of ethanol is more than 40 percent lower than the CI of gasoline. 23 [EPA-HQ-OAR-2022-0829-0643, p. 7]

22 Lewandrowski, Jan, and et. al, "The Greenhouse Gas Benefits of Corn Ethanol - Assessing Recent Evidence," (202) Biofuels, 11:3, 361-375. https://www.tandfonline.com/doi/full/10.1080/17597269.2018.1546488

23 California Air Resources Board, Low Carbon Fuel Standard Reporting Tool Quarterly Summaries, based on data through Q3 2020 at https://ww3.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm

These increasing benefits have occurred without accounting for corn's ability to sequester carbon in the soil. Corn as a crop can serve as a carbon sink. As a photo-synthetically superior C4 plant, corn has an extraordinary ability to sequester carbon and move fertilizer nutrients back to the surface for plant growth rather than polluting ground water. Corn's extensive, deep root system makes it one of the few plants with this important capability to make crop production sustainable. [EPA-HQ-OAR-2022-0829-0643, p. 7]

High-yield corn—combined with the steady adoption of best practices such as reductions in tillage intensity—is sequestering carbon from the atmosphere into the soil. This sequestration is increasing soil carbon levels and reducing atmospheric CO2. Although GHG lifecycle models do not currently account for this direct GHG reduction from corn production, NCGA believes the effect of corn crops on soil carbon sequestration, among other considerations, should be incorporated into current lifecycle analysis. This increase in soil carbon from corn production, when included, could result in a 20 gram/MJ carbon credit for corn-based ethanol. 24 Fully accounting for corn's carbon sequestration would further demonstrate significant low-carbon advantages of a high-octane midlevel ethanol blend. [EPA-HQ-OAR-2022-0829-0643, p. 7]

24 American Coalition for Ethanol, The Case for Properly Valuing the Low Carbon Benefits of Corn Ethanol, 2018

Argonne's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model is the federal government's most accurate tool for evaluating biofuel and energy lifecycle emissions. Adopting a true "wells-to-wheels" methodology will help to ensure an accurate accounting of total carbon intensity so that all low carbon fuels and technologies are compared on full and accurate lifecycle emissions on a technology and feedstock neutral basis. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Organization: National Farmers Union (NFU)

Unfortunately, the large GHG benefits of ethanol and other low-carbon fuels are not adequately accounted for in the proposed rulemaking. EPA should use lifecycle analysis to properly account for and incentivize their use. [EPA-HQ-OAR-2022-0829-0581, p. 6]

Numerous studies have used lifecycle analysis to quantify GHG benefits of BEVs compared to other options including hybrid electric vehicles (HEVs) and renewable fuels. As these studies show, BEVs are not zero emissions. Further, they are not the most cost-effective way to reduce GHG emissions. [EPA-HQ-OAR-2022-0829-0581, p. 6]

For example, below is a plot from a study released by Argonne National Laboratory.12 It shows that a BEV with 400 mile range (BEV400) has lifecycle GHG emissions of about 250 gCO2e/mi. This calls into question the term "zero emissions vehicle." According to this study, lifecycle GHG emissions of a BEV400 are not much better than other options such as E85 or PHEV. Regulations based only on tailpipe emissions are insufficient to compare BEVs to other ways of reducing GHG emissions. The report found that "these results demonstrate that large GHG reductions for LDVs are challenging and require consideration of the entire life cycle, including vehicle manufacture, fuel production, and vehicle operation. Achieving a net life cycle reduction in GHG emissions is a challenging task and must overcome technological, cost, and market acceptance hurdles."13 [EPA-HQ-OAR-2022-0829-0581, pp. 7-8]

12 Jarod C. Kelly, et al., Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies, Argonne National Laboratory, ANL-22/27, at xxi (2022), available at https://publications.anl.gov/anlpubs/2022/07/176270.pdf.

13 Id.

[See original comment for Figure ES-1.C2G GHG emissions of various vehicle-fuel pathways for small SUVs assuming high technology progress. Analysis was performed using GREET2020] [EPA-HQ-OAR-2022-0829-0581, pp. 7-8]

The Argonne report shows that other "vehicle-fuel pathways" can compete with BEVs. For example, a conventional gasoline hybrid (HEV) achieves about 310 gCO2e/mi and conventional corn-based E85 in a non-HEV achieves 260 gCO2e/mi. The grey arrows in the plot indicate that the future potential of HEVs with advanced E85 or E-Fuels is comparable to future BEVs with wind and solar power. [EPA-HQ-OAR-2022-0829-0581, pp. 7-8]

The proposed rulemaking would not allow other vehicle-fuel pathways to compete with BEVs. By regulating only tailpipe emissions, EPA would create artificial incentives for only BEVs. This could have disastrous effects on both the cost and the GHG emissions of future vehicles. As shown in Figure 37 from the same Argonne report (reproduced below),14 the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with a 400-mile range is dramatically more expensive than one with a 200-mile range, and its lifetime GHG emissions are substantially worse. A 400-mile-range BEV has only a slight GHG benefit compared to a HEV or an E85 internal combustion engine vehicle (ICEV). But the proposed rule would count all BEVs as zero GHG emissions, regardless of battery size, vehicle size, or weight—all of which can have an impact on lifecycle GHG emissions and costs. [EPA-HQ-OAR-2022-0829-0581, p. 8]

14 Id. at 114.

[See original comment for graph of Lifetime Cost vs. GHGs, Current Tech] [EPA-HQ-OAR-2022-0829-0581, p. 8]

It is important that EPA utilize lifecycle analysis to create a "level playing field" which encourages speedy adoption of HEVs, PHEVs, flex-fuel vehicles, and other technologies (in addition to BEVs) to achieve the most rapid, affordable, robust, and practical GHG emissions reductions in a wide range of vehicle segments, while satisfying diverse customer needs and preferences. Europe is already making progress towards regulation based on lifecycle analysis.30 Furthermore, EPA should revise the proposed standards to a level which can be achieved using more realistic estimates for future penetration of vehicle technologies and that incorporates low carbon fuels. [EPA-HQ-OAR-2022-0829-0581, p. 13]

30 See Goldman Sachs, New era in CO2 regulation: EVs to be tested across life cycle, not only on running performance, Dec. 5, 2019, available at https://www.goldmansachs.com/intelligence/pages/briefly/from_briefings_21-Jan-2020/new-era-in-co2-regulation.pdf; Serenella Sala, et al., The evolution of life cycle assessment in European policies over three decades, The International Journal of Life Cycle Assessment 26, 2295-2314 (2021), available at https://doi.org/10.1007/s11367-021-01893-2.

Organization: Natural Gas Vehicles for America (NGVA)

Introduction

Natural Gas Vehicles for America (NGVAmerica) respectfully submits these comments in response to the above captioned notice. NGVAmerica supports EPA finalizing regulations that achieve needed emission reductions and incorporate a strong fuel- and technology- neutral performance standard. Future standards must incorporate realistic expectations about the pace, cost, and deployability of technology, and to ensure success must encourage engine makers and vehicle manufacturers to deploy a variety of available, scalable, and cost-effective technologies. To achieve these objectives and drive manufacturers toward zero-emission technology, EPA must incorporate well-to-wheel emission or life-cycle assessments into its regulations. We therefore request that EPA develop and approve a method of calculating and certifying emission reductions related to the use of low-carbon and carbon-negative biofuels. [EPA-HQ-OAR-2022-0829-0597, p. 3]

Two compelling developments have occurred in recent years that require EPA to reevaluate its past conclusion that only electric vehicle technology is a “game-changer” and therefore only electric vehicles warrant special regulatory incentives to assist in their development and commercialization. These developments are the certification and sale of low-NOx natural gas trucks, which achieve reductions surpassing the 2027 standards finalized by EPA1 and the increasing uptake of renewable natural gas as a transportation fuel. [EPA-HQ-OAR-2022-0829-0597, pp. 3-4]

1 See https://www.govinfo.gov/content/pkg/FR-2023-01-24/pdf/2022-27957.pdf

Renewable natural gas currently consumed in California achieves a lower carbon intensity score than electricity. In fact, based on the latest data submitted to CARB under the low- carbon fuel standard program, bio-CNG in 2022 had an average carbon intensity value of negative 99. [EPA-HQ-OAR-2022-0829-0597, pp. 3-4]

The time has come for EPA to fully embrace all low-carbon technologies and provide a level playing field in its regulations. EPA staff previously stated to NGVAmerica in meetings that the Renewable Fuel Standard Program already incentivizes low-carbon fuels like RNG and that its vehicle regulations are not intended for that purpose. EPA staff also has acknowledged in meetings with NGVAmerica that when it comes to greenhouse gas emissions, moving to a life cycle analysis (LCA) or well-to-wheels (WTW) approach would be preferable, and previously indicated as part of the proceedings for the 2012 light-duty GHG regulations that it would move away from the tailpipe only approach once automakers surpass sales of 200,000 vehicles. EPA under the Biden Administration, however, has abandoned that prior commitment. [EPA-HQ-OAR-2022-0829-0597, pp. 5-6]

There are ample studies that support the importance of evaluating well-to-wheel emissions. A September 2022 study published in the Journal Sustainable Energy & Fuels included the following: [EPA-HQ-OAR-2022-0829-0597, pp. 5-6]

The results show that in both the U.S. and EU markets, waste-streams-to-energy technologies, such as CNG production via AD of wet waste resources, offer the biggest opportunities to reduce WTW GHG emissions. …Drop-in renewable diesel fuels, produced from forest residues or wood waste feedstock via thermochemical conversion technologies, including FT and pyrolysis technologies, could potentially reduce GHG emissions more than 75% in both the U.S. and the EU, despite the varying energy efficiency of the conversion routes and feedstocks used.3 [EPA-HQ-OAR-2022-0829-0597, pp. 5-6]

3 Journal of Sustainable Energy & Fuels, Decarbonization potential of on-road fuels and powertrains in the European Union and the United States: a well-to-wheels assessment, (Published Sept. 1, 2022)(Decarbonization potential of on-road fuels and powertrains in the European Union and the United States: a well-to-wheels assessment - Sustainable Energy & Fuels (RSC Publishing).

This report looks at benefits in the U.S. and Europe, references numerous other studies, and its authors include several prominent experts on greenhouse gas emissions. A White Paper entitled Smart CO2 Standards for Negative Emissions Mobility published by the European Biogas Associations references nearly a dozen studies with similar findings regarding emission reduction benefits and cost-effectiveness of RNG reductions. A copy of that document is included in Appendix A. [EPA-HQ-OAR-2022-0829-0597, pp. 5-6]

Another excellent report on the importance of accounting for well-to-wheel emissions and life-cycle emissions was prepared in 2021 by Frontier Economics for NGVA Europe. That report was specifically prepared with the intention of highlighting the need for regulatory standards that account for well-to-wheel emissions. The frontier economics evaluation included a comparison based on conventional natural gas, 100 percent biomethane, and a mixture of 40 percent conventional natural gas and 60 percent biomethane. This study supports the contention that a mixture of biomethane of 60 percent biomethane is cost- competitive from a purchase perspective with electric vehicle technology while also delivering greater emission CO2 equivalent emission reductions. A copy of this report is included in Appendix B. [EPA-HQ-OAR-2022-0829-0597, pp. 6-7]

A report4 prepared by Ramboll US Consulting, Inc. for the Western States Petroleum Association provides additional evidence on the cost-effectiveness and well-to-wheel benefits of natural gas vehicles and other low-emission technologies. The report evaluated California's plans to focus almost exclusively on electrification as the solution to address transportation related emissions including NOx emissions and greenhouse gas emissions. [EPA-HQ-OAR-2022-0829-0597, pp. 6-7]

4 Ramboll Multi-Technology Pathways Study - Western States Petroleum Association (wspa.org)

The report's executive summary includes the following:

- Expanded implementation of zero-emission and Low-NOx vehicles, coupled with increased introduction of renewable liquid and gaseous fuels, can deliver (as shown in Figures ES-1) and more cost-effective benefits than a zero-emission vehicle (ZEV)-only approach. [EPA-HQ-OAR-2022-0829-0597, pp. 6-7]

- As advanced low-emitting trucks are commercially available (citation omitted) to deliver benefits to communities sooner, multi-technology pathways can help achieve emission reductions without reliance on infrastructure and technology upgrades that will take years to resolve. [EPA-HQ-OAR-2022-0829-0597, pp. 6-7]

- There is growing potential for renewable fuels, including those with negative carbon intensity, to [sic] achieve GHG reductions, which CARB has not acknowledged fully in the MSS nor assessed the potential for early and cost-effective GHG reductions through these multi-technology vehicle pathways. [EPA-HQ-OAR-2022-0829-0597, pp. 6-7]

- Low-emission heavy-duty trucks are cost-competitive with (or cheaper than) battery electric vehicles (BEVs). This is true even though battery technology promises (such as greater energy density/lower cost) have not been adequately demonstrated and related transmission/distribution infrastructure cost have not been included in the state's analyses. [EPA-HQ-OAR-2022-0829-0597, pp. 6-7]

In addition to the greenhouse gas emission benefits, it is important to note that virtually all new natural gas engines already achieve emission reductions of nitrogen oxides that surpass the reductions required by EPA recently finalized low-NOx rule for medium and heavy-duty vehicles. All new natural gas trucks and buses regardless of whether they operate on conventional natural gas or RNG therefore provide meaningful reductions of this important pollutant. EPA's regulations provide averaging, banking, and trading credits to manufacturers that exceed emission requirements (i.e., deliver lower emitting engines). [EPA-HQ-OAR-2022-0829-0597, p. 7]

The new regulations are expected to further encourage the development and sale of natural gas engines. The incentive for lower polluting natural gas engines however could be offset by this rulemaking if EPA does not amend its proposal to incorporate well-to-wheel, greenhouse gas emission benefits of NGVs. [EPA-HQ-OAR-2022-0829-0597, p. 7]

Two automakers opposed the use of 0 g/mi. Honda ‘‘believes that EPA should separate incentives and credits from the measurement of emissions. Honda believes that without accounting for the upstream emissions of all fuels, inaccurate comparisons between technologies will take place * * *. EPA's regulations need to be comprehensive and transparent. By zeroing out the upstream emissions, EPA is conflating incentives and credits with proper emissions accounting.'' EcoMotors International ‘‘encourages EPA to drop the 0 g/mile tailpipe compliance value.'' Environmental advocacy groups also opposed the 0 g/ mi compliance treatment. The Natural Resources Defense Council claimed that 0 g/mi ‘‘undermines'' the pollution and technology benefits of the program. Along with other environmental groups, the American Council for an Energy Efficient Economy also opposed 0 g/mi, but added that ‘‘[m]ost important, however, is that a zero-upstream treatment of plug-in vehicles not be continued indefinitely, and that full upstream accounting be applied to these vehicles by a date certain. EPA's proposed treatment of EVs largely accomplishes this, so we strongly support that aspect of the proposal.'' The American Petroleum Institute argued that ‘‘[i]gnoring the significant contribution of (and extensive compilation of published literature on) upstream CO2 emissions from electricity generation, defies principles of transparency and sound science and distorts the market for developing transportation fuel alternatives. It incentivizes the electrification of the vehicle fleet with a pre- defined specific and costly set of technologies whose future potential is not measured with the same well-to-wheels methodology against that of advanced biofuels or other carbon mitigation strategies.'' Organizations advocating fuels other than electricity also opposed the use of 0 g/mi. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

Despite the expressed views, EPA nevertheless retained the 0 g/mi standard. In defense of continuing to retain the 0 g/mi treatment and providing multiplier credits, EPA stated that:

EPA believes that it is both reasonable and appropriate to accept some short- term loss of emissions benefits in the short run to increase the potential for far- greater game-changing benefits in the longer run. The agency believes that these multipliers may help bring some technologies to market more quickly than in the absence of incentives. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

The European Biogas Association eloquently explained why the EU Commissions rules should account for well-to-wheel emissions and their explanation is worth including here:

The current “tank-to-wheel” approach does not compare the different technologies appropriately because it ignores emissions associated with the production of the fuel. It does not recognise the positive contribution of renewable fuels such as biomethane to climate protection, and thus biases one technology over others without a climate protection rationale. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

The revised CO2 regulation should propose technology-neutral solutions to reduce emissions in an accelerated and cost-effective way. It should avoid one-size-fits-all options that could prove insufficient in the long-term and may lead to a slow, unfair and costly emissions reduction process. [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

The CO2 regulation should be amended to ensure an integrated transition that picks no single green technology over others and leaves no-one behind. All alternative fuels are necessary if transport decarbonisation is to be delivered at pace.11 [EPA-HQ-OAR-2022-0829-0597, pp. 10-11]

11 SMART CO2 STANDARDS FOR LEAN MOBILITY (europeanbiogas.eu)

The Frontier Economics report similarly offers an excellent case for ensuring proper treatment and inclusion of biomethane.

Our analysis shows that gas mobility can help to contribute to reducing GHG emissions in road transport at comparably low system cost. As gas mobility – in contrast to other drivetrain technologies which are less mature – is readily available on vehicle, infrastructure and fuel supply levels and thus quickly scalable now, it can contribute to ambitious early GHG emission reduction by 2030 at low cost. [EPA-HQ-OAR-2022-0829-0597, pp. 11-12]

- Technological diversification. The immense challenge and high urgency for the mobility sector to achieve emissions reductions does not allow for cherry picking of individual technologies. Rather, we have to go “all-in” by enabling as many options to contribute as possible. [EPA-HQ-OAR-2022-0829-0597, pp. 11-12]

- Freedom of choice and competition of technologies. The heterogeneity of mobility applications with many individual factors determining the most efficient technology in each case rules out any central planning approach – there is no “one size fits all” solution. [EPA-HQ-OAR-2022-0829-0597, pp. 11-12]

- Keeping options open. There is a high degree of uncertainty around the optimal technology options in the future. Regulation therefore should avoid prematurely ruling out any pathway (e.g. by banning combustion engines which may in the future be fuelled by renewable or low-carbon fuels or gases). [EPA-HQ-OAR-2022-0829-0597, pp. 11-12]

We fervently believe that the Administration’s decarbonization and clean air goals will only be achieved by focusing on a multi-technology approach that includes cost-effective carbon-negative solutions like RNG trucks that can begin accruing and compounding significant clean air and carbon reductions right away. We, therefore, respectfully request that EPA provide credits for natural gas vehicles based on the well-to-wheel benefits of the consuming natural gas which increasingly includes larger amounts of RNG. We also believe that any additional incentives finalized in this rulemaking to offer aid in the commercialization of electric vehicles or fuel-cell vehicles should be extended to NGVs based on the extraordinary emission reduction potential of these vehicles. [EPA-HQ-OAR-2022-0829-0597, pp. 11-12]

Organization: Nebraska Corn Board (NCB) and Nebraska Corn Growers Association

On behalf of the nearly 2,500 Nebraska Corn Growers Association (NeCGA) dues paying members and the over 21,000 corn farmers in Nebraska who contribute to the state’s corn checkoff program through the Nebraska Corn Board (NCB), we appreciate the opportunity to comment on the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. [EPA-HQ-OAR-2022-0829-0583, p. 1]

Nebraska corn farmers and ethanol producers have worked diligently in reducing greenhouse gas emissions while supplying the fuels industry with a low carbon, high octane alternative. However, the EPA seemingly overlooks the contribution that biofuels, such as ethanol, can provide to reducing carbon emissions through tailpipes and internal combustion engines. [EPA-HQ-OAR-2022-0829-0583, p. 1]

This proposal gives EVs an unfair advantage when the EPA upstream emissions. [EPA-HQ-OAR-2022-0829-0583, p. 1]

As most Americans will continue driving their current vehicle, it is crucial to ensure they have access to an affordable and environmentally friendly product such as gasoline with 15% ethanol, known as E15. This is a fuel that is acceptable for vehicles 2001 and newer which are 97% of the vehicles on the road. If made available to every consumer in the country, this would reduce carbon emissions by 280 million tons in the next decade. We ask the EPA to consider the University of California, Riverside's study on the Comparison of Exhaust Emissions between E10 and splash blended E15 as it demonstrates the opportunity that E15 has at reducing emissions. This study states around 54% reduction in carbon emissions compared to E10. We strongly believe in the role biofuels have as a critical step in reducing carbon emissions and being a cost-effective fuel for consumers. [EPA-HQ-OAR-2022-0829-0583, p. 2]

Organization: North Dakota Farmers Union (NDFU)

Benefits of Renewable Fuels

NDFU continues to believe that high octanes fuels are the cheapest method for reducing GHG emissions. Improved engines and high octane fuels, specifically mid-level ethanol blends, are technologically feasible and economically reasonable means to achieve reduced GHG emissions. Increased ethanol volume increases the octane level of gasoline across grades. In addition to its higher octane level, ethanol also boosts engine efficiency.2 Higher ethanol blends can increase fuel octane without expensive refinery upgrades. [EPA-HQ-OAR-2022-0829-0586, p. 2]

2 Ricardo, Inc. (2016, September 20). The draft technical assessment report: Implications for high octane, mid- level ethanol blends, Final report. Prepared for Renewable Fuels Association. Retrieved from https://d35t1syewk4d42.cloudfront.net/file/1607/ATTACHMENT-A_Ricardo-TAR-Report-for-RFA_2016_09-20.pdf.

Ethanol is substantially cleaner than petroleum-based octane additives. It reduces emissions of particulate matter and air toxics, such as benzene, toluene, and xylene. Ethanol further provides GHG emissions reductions, which is increasingly important as the carbon intensity of gasoline is increasing with greater use of unconventional fossil fuels. "Emissions from fossil fuel combustion comprise the vast majority of energy-related emissions," with an increase in emissions from the transportation sector largely attributed to increased vehicle miles travelled and motor gasoline consumption by light-duty vehicles.3 At the same time, energy use in ethanol production and lifecycle GHG emissions have decreased with changes in farming practices and higher yields. As EPA has found, the land use, lang-use change, and forestry sector generated a net increase in carbon stocks.4 [EPA-HQ-OAR-2022-0829-0586, p. 2]

3 Environmental Protection Agency (2023). Inventory of U.S. greenhouse gas emissions and sinks: 1990-2021. U.S. Environmental Protection Agency, EPA 430-R-23-002. https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf.

4 Id.

EPA should not focus on one technology. While BEVs may be part of the solution, a balanced approach to emissions reductions using BEVs and other technologies is needed.11 It is important that EPA utilize lifecycle analysis to create a level playing field that encourages speedy adoption of flex-fuel vehicles, hybrid electric vehicles, plug-in hybrid electric vehicles and other technologies, to achieve the most rapid, affordable, robust, and practical GHG emissions reductions in a wide range of vehicle segments, while satisfying diverse customer needs and preferences. Furthermore, EPA should revise the proposed standards to a level which can be achieved using more realistic estimates for future penetration of vehicle technologies and that incorporates low carbon fuels. [EPA-HQ-OAR-2022-0829-0586, p. 5]

11 Pratt, G. (2021, August 23). (More) straight talk about Toyota's electric vehicle strategy. Medium. Retrieved from https://medium.com/toyotaresearch/more-straight-talk-about-toyotas-electric-vehicle-strategy- f0aba4be40.

Biofuels have an important role to play in supporting family farms and rural communities. Renewable fuels can also significantly contribute to EPA's emissions reduction goals. However, we are concerned that EPA's proposal is biased in favor of BEVs and against renewable fuels. [EPA-HQ-OAR-2022-0829-0586, p. 6]

NDFU believes EPA should take into account lifecycle analysis to provide a fairer and neutral comparison of technologies available to reduce emissions, including consideration of biofuels. BEVs are not zero emissions in this context and would not necessarily provide the most cost-effective, practical or fastest way to achieve EPA's emission reduction goals. [EPA-HQ-OAR-2022-0829-0586, p. 6]

Organization: Novozymes North America (Novozymes)

Novozymes' Innovative Technologies Result in Lower Biofuel Lifecycle Emissions

Novozymes' enzymatic catalyst solutions, also known as biocatalysts, make the production of biofuels more efficient and environmentally friendly. Enzymes increase yield, reduce waste, reduce raw material input, and produce higher energy savings. Enzymes enable biofuel producers to convert corn kernel, corn stover, wheat straw, wood chips, sawdust, waste, and sugarcane bagasse into fuel, while collectively increasing yield and energy efficiency throughout the sector. Our enzymes help biofuel producers get more energy out of every harvest. These technologies have already helped the U.S. replace about 10% of liquid fuels with renewable alternatives. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Fiberex is a platform designed by Novozymes to utilize waste cellulosic material found in agricultural products. These cellulase enzymes can convert the cellulosic fiber found in, for example, corn kernel fiber, into high-value, low-CI products including cellulosic ethanol and increases corn oil yield that may be utilized as a raw material for renewable diesel production. This process is critical in maximizing fermentation efficiency and generating the low carbon products the markets (and consumers) are demanding. This technology has been instrumental in generating the roughly 120 million gallons of cellulosic ethanol that is currently being shipped to

California every year. With a CI score 70 percent lower than gasoline, this cellulosic ethanol made from the corn kernel is helping to lower carbon emissions, drive sustainability in our transportation sector and create economic impacts from coast to coast. It is vital that, moving forward, this cellulosic technology can be applied not only to the production of low carbon ethanol, but increasingly to low carbon biochemicals as well as Sustainable Aviation Fuel (SAF). This includes supporting large-scale production of critical enzymes and yeast used in fiber conversion as well as ensuring that modeling (i.e. Argonne GREET) accurately accounts for the benefits being seen via this advanced technology. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Novozymes Innova yeast products deliver unparalleled robustness, help increase ethanol yield, and reduce fermentation time and operational costs. Novozymes launched its first yeast product in North America in 2018, and it has now launched 11 yeast products across the globe. Novozymes' yeast allows producers to consistently reduce corn and chemical inputs and power through the most challenging conditions. Most of Novozymes' yeast products express enzymes required to hydrolyze starch to produce glucose. Delivering enzymes via yeast decreases exogenous enzyme requirements resulting in a more sustainable, and lower CI fermentation process. Novozymes also developed the Cellerity® yeast platform for second generation biomass refineries. Cellerity enables increased ethanol yield and improved xylose conversion and inhibitor tolerance. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Above the inherent efficiencies and savings achievable with Novozymes' enzymes alone, the company's yeast technologies provide additional benefits. Many of our yeasts express critical enzymes needed for the lowest emissions biofuel production, in addition to converting available sugars to ethanol. These enzymes reduce the need for exogenous enzyme addition, further enabling overall lower CI values for today's biofuels. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

EPA Should Issue a Final Rule That is Technology Neutral and Promotes All Available Lower Emissions Transportation Fuels

Whether intended or not, the practical effect of the proposed rule in its current form would be to pick winners and losers and would fail to help encourage and facilitate the continued growth, production and use of vehicles that run on all lower emissions transportation fuels, including low CI biofuels. This effect would make it harder for the United States to attain its necessarily ambitious goal to achieve net zero emissions by 2050. This conclusion is especially true considering that many in the auto and other industries have predicted as overly ambitious and impractical the myriad policy goals to phase out the sale and production of light and medium duty vehicles with internal combustion engines by 2030 to 2040. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Although, through this proposal, EPA appears to be essentially directing the auto industry to sell approximately 67 percent of new cars and trucks as EVs by 2032, there are real questions whether that many consumers will want to buy them and whether the necessary infrastructure and grid enhancements to handle that many EVs on the road will be available by that time. Meantime, the federal government has formulated laws and policies to encourage the increased investment in and production and use of the cleanest biofuels that have been and continue to be responsible for massive emissions reductions in the transportation fuel sector over the last two decades. These policies and laws, including the federal Renewable Fuel Standard (RFS), have worked together to encourage these outcomes and the ongoing innovation within the biofuels industry that has and continues to improve the carbon and other GHG emissions reduction capabilities of the biofuels used in transportation fuel. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

We respectfully urge the EPA to revise the proposed rule, so that when it is issued in its final form, the regulation will not only help facilitate the wider production, sale and use of EVs, but will simultaneously recognize and build on the enormous emissions reduction success and potential of biofuels. Both of these outcomes will be needed to meet the transportation fuel need in this country at least over the next two decades. Moreover, they will be necessary for this country to achieve net zero emissions by 2050, especially given the realities of legacy ICE vehicles expected to be on the road at least through the 2040s. Put another way, to achieve this country's collective net zero by 2050 emissions reduction goals, U.S. policies and laws will need to recognize and encourage every potential source of clean energy. Biofuels must continue to be on top of this list for the foreseeable future, and the final rule must reflect this fact so as to avoid inadvertently leaving behind millions of tons of avoided emissions reductions, or discouraging the continued investment, innovation and use of low carbon and other GHG emissions fuels in this country. [EPA-HQ-OAR-2022-0829-0650, pp. 2-3]

Organization: Oryxe International Inc. (Oryxe)

Oryxe is a strong supporter of balanced environmental stewardship and shares the Biden Administration's commitment to increasing vehicle efficiency and reducing carbon dioxide and criteria pollutant emissions from the transportation sector. In fact, Oryxe built and operates its business in the pursuit of these goals. However, if finalized as proposed, the Proposed Rule would have a very significant negative impact on producers of low emission fuel additives such as Oryxe. For this reason, as discussed further below, Oryxe respectfully requests that EPA ensure that the final rule (1) recognizes the ability of vehicle manufacturers to use fuel additives to comply with the standards and (2) accounts for the upstream and lifecycle emissions impact of electrified vehicles in the light-duty and medium-duty vehicle sectors. Oryxe also offers comment in response to EPA's announcement that the Agency is considering proposing changes to the gasoline fuel property standards in order to further reducing PM emissions. [EPA-HQ-OAR-2022-0829-0752, p. 2]

2. EPA Should Account for the Upstream and Lifecycle Emissions Impact of Electrified Vehicles

Oryxe further urges EPA to fully account for the upstream and lifecycle emissions impact of electrified vehicles in the light-duty and medium-duty sectors. The Proposed Rule will effectively force a transition to electrified vehicles while disregarding the emissions impact associated with sourcing, production, and use of electrified vehicles. These include the carbon impacts associated with mineral extraction and battery manufacturing, fueling with electricity made from coal or natural gas, battery disposal and recycling, and potential higher tire and brake wear from electric vehicles. Manufacturing batteries for use in electric vehicles can contribute between 10 and 30 percent of lifecycle emissions due to the significant amount of energy needed to extract and process critical materials.3 [EPA-HQ-OAR-2022-0829-0752, p. 3]

3 See "Slow Down: The Case for Technology Neutral Transportation Policy," ConservAmerica, at 4-5, https://static1.squarespace.com/static/5d0c9cc5b4fb470001e12e6d/t/5fd1580999fe644e8a504a54/1607555090612/C A+Tech+Neutral+Paper+-+12.20+%281%29.pdf.

A national strategy that forces a dramatic transition from ICE vehicles to electrified vehicles in the domestic light-duty and medium-duty vehicle sectors deserves and demands that EPA undertake a lifecycle analysis for each vehicle technology. To determine the impact on emissions of each vehicle technology, EPA should conduct a lifecycle analysis to evaluate the manufacture, materials, disposal, and transport for all needed vehicle components and provide a grams/ton-mile comparison of the emissions of ICE vehicles and electrified vehicles. Accounting for the upstream and lifecycle emissions impact of electrified vehicles in any final rule will ensure a level playing field for all vehicles, including ICE vehicles using fuel additives. In addition, a technology-neutral strategy that supports multiple options will promote innovation and increase near-term carbon dioxide and criteria pollutant emission reductions. [EPA-HQ-OAR-2022-0829-0752, pp. 3-4]

Organization: Plains All American Pipeline, L.P. (PAAP)

In general, we have serious concerns about the Proposal. It will render America more dependent on foreign- controlled supply chains and create irreparable harm to our energy security, while missing the mark on well- intentioned emission reductions. By focusing solely on tailpipe emissions, the Proposal would only address certain transportation emissions and fail to quantify the full lifecycle of emissions for all vehicles, including materials resourcing, production, operation, battery replacement, recycling and end-of-life disposal. [EPA-HQ-OAR-2022-0829-0713, p. 1]

Organization: POET, LLC (POET)

POET thanks the Environmental Protection Agency ("EPA") for the opportunity to submit this comment on the proposed rule, "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles" (the "Proposed Rule"). POET generally supports standards, like those in the Proposed Rule, that will significantly curb greenhouse gas ("GHG") emissions from cars and light- and medium-duty trucks covered by the Proposed Rule. However, EPA must broaden the range of technologies the Proposed Rule relies upon to include renewable fuels, such as bioethanol, in setting standards for reducing GHG and other emissions. Renewable fuels will be critical to decarbonizing and reducing other air pollutant emissions from these vehicles. POET urges EPA to credit renewable fuels, including their significant lifecycle carbon emissions reductions, and adopt POET's other recommendations in these comments. [EPA-HQ-OAR-2022-0829-0609, p. 1]

I. Summary of Comments

A. Greenhouse Gas Emission Reductions.

Renewable fuels, such as bioethanol, significantly reduce lifecycle carbon emissions relative to fossil fuels and are a key pathway to achieving the Proposed Rule's goals. Yet, the Proposed Rule provides no mechanism for low-carbon fuels to contribute to decarbonizing the light- and medium-duty vehicle fleet. Bioethanol can achieve net-zero, or even net-negative, lifecycle emissions within the Proposed Rule's 2032 timeframe by employing technologies and methods such as carbon capture, climate-smart farming, and using renewable power or process energy and biomass for process heat at bioethanol plants. Renewable fuels will be particularly critical in decarbonizing internal combustion engines ("ICE") in light-duty vehicles ("LDVs") that will remain on the road for at least the next several decades. EPA's proposed GHG standards should credit vehicles that use renewable fuels to reduce their net GHG emissions. [EPA-HQ-OAR-2022-0829-0609, p. 4]

Renewable fuels are a proven technology. Expanding their use is consistent with federal and state programs. Many federal and state programs, such as the federal Renewable Fuel Standard ("RFS") and California's Low Carbon Fuel Standard ("LCFS"), support the production of significant quantities of low-carbon renewable fuels. Renewable fuels such as bioethanol receive congressionally approved funding and tax credits under the recently enacted Bipartisan Infrastructure Law ("BIL") and Inflation Reduction Act ("IRA").1 Renewable fuels are also key to the Administration's renewable energy policies. The U.S. National Blueprint for Transportation Decarbonization, which EPA co-authored, calls for more renewable fuels as one of its many decarbonization strategies.2 EPA's Proposed Rule must align with those policies by incentivizing vehicles that run on higher bioethanol blends and thus can achieve significant lifecycle GHG emissions reductions. [EPA-HQ-OAR-2022-0829-0609, p. 4]

1 135 Stat. 429 (2021); 136 Stat. 1818 (2022).

2 The U.S. National Blueprint for Transportation Decarbonization (Jan. 2023), available at https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf.

EPA's proposal to address reducing GHG emissions is arbitrary and capricious in only addressing tailpipe emissions and ignoring the real-world GHG lifecycle impacts of vehicles. EPA's approach could have significant adverse consequences with respect to GHG emissions because it inaccurately assumes that electric vehicles have no "upstream" emissions while failing to incentivize crucial technologies such as bioethanol with significant lifecycle GHG emissions benefits. EPA thus pushes out of the market highly beneficial but disincentivized bioethanol-compatible vehicles. To most efficiently reduce greenhouse gases, EPA must establish compliance crediting for the lifecycle GHG emissions reductions from bioethanol. [EPA-HQ-OAR-2022-0829-0609, pp. 4-5]

Even if EPA does not adopt the lifecycle approach to assess GHG emissions from all light-duty vehicles, its vehicle GHG program must still distinguish between biogenic and fossil carbon sources and credit the former (biogenic) as carbon neutral. This approach would recognize the carbon neutrality and significant benefits of replacing petroleum with renewable liquid fuels. As President Biden has correctly indicated, "you simply can't get to net zero by 2050 without biofuels."3 [EPA-HQ-OAR-2022-0829-0609, pp. 4-5]

3 See The White House, Remarks by President Biden on Lowering Energy Costs for Working Families (Apr. 12, 2022), available at https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/04/12/remarks-by-president- biden-on-lowering-energy-costs-for-working-families/.

Under EPA's own justification for the Proposed Rule, bioethanol is an essential strategy that must be recognized and given due credit under the GHG standards. EPA justifies the proposal based on (i) GHG emission reduction benefits, (ii) manufacturer cost and consumer cost, (iii) energy security, (iv) "criteria" and toxic air pollutant reductions, and (v) environmental justice.7 EPA inadequately addresses each of these key factors because EPA fails to consider the benefits of bioethanol for each. By taking this narrow approach that effectively pushes biofuels out of the market, EPA undermines its own criteria for undertaking the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, pp. 5-6]

7 See e.g., 88 Fed. Reg. at 29347.

The Proposed Rule's analytical gaps regarding the failure to credit real-world biogenic lifecycle emission benefits and BEV feasibility call into question the legality of the Proposed Rule as currently structured. As EPA knows, courts will invalidate rules if the agency has "entirely failed to consider an important aspect of the problem" or "offered an explanation for its decision that runs counter to the evidence before the agency."8 Additionally, the United States Supreme Court in West Virginia v. EPA faulted EPA for exercising Clean Air Act authority to "substantially restructure the American energy market" in a way that "Congress had conspicuously and repeatedly declined to enact itself."9 By pressing for the extraordinarily rapid deployment of light-duty BEVs without thoroughly evaluating the lifecycle drawbacks of BEVs and BEV feasibility, supply chain and infrastructure challenges, and by failing to credit the lifecycle benefits of biofuels, the Proposed Rule is similarly deficient. [EPA-HQ-OAR-2022-0829-0609, pp. 5-6]

8 Motor Vehicles Mfrs. Ass'n v. State Farm Mutual Automobile Ins. Co., 463 U.S. 29, 43 (1983).

9 142 S. Ct. 2587, 2610 (2022) (quotation omitted). Similarly, under the "major questions" doctrine, agencies may not construe a statute to authorize them to exercise powers of "vast economic and political significance" unless the statute does so in clear terms. Alabama Ass'n of Realtors v. HHS, 141 S. Ct. 2485, 2489 (2021) (quoting Utility Air, 573 U.S. at 324 (2014)).

Finally, POET strongly supports EPA's proposal to set gasoline fuel property standards to reduce particulate matter ("PM") emissions from gasoline-fueled LDVs and medium-duty vehicles.11 Bioethanol must play a major role in any future regulatory proposal. Bioethanol has been shown to significantly reduce PM and other toxic air emissions relative to alternative aromatics and other blending compounds. It will also boost octane levels in gasoline to make up for any loss in octane from standards requiring removal of certain high-boiling, heavy aromatics. Bioethanol also has the added benefit of significantly reducing lifecycle GHG emissions unlike other, carbon-intensive alternatives. EPA should propose standards that tackle two problems at once, by promoting increased bioethanol blends, such as E15, that both reduce PM emissions and help combat climate change. [EPA-HQ-OAR-2022-0829-0609, pp. 6-7]

11 See Proposed Rule at Section IX, 88 Fed. Reg. at 29397-29404.

III. EPA Must Revise the Proposed Rule to Credit Real-World Lifecycle Emissions Reductions from Renewable Fuels, including Bioethanol.

The Proposed Rule must credit renewable fuels such as bioethanol and their lifecycle GHG emissions reductions as an additional technology pathway for meeting EPA's emissions reduction standards. ICE vehicles are expected to remain on the road for decades. The Proposed Rule recognizes this. It states that "some portion of their light-duty sales will remain ICE-based for the foreseeable future, predominantly in large SUVs and pickup trucks."15 Other sources, such as the U.S. government's leading energy forecaster, show much larger numbers of ICE vehicles will be on the road for decades to come.16 Renewable liquid fuels offer one of the best solutions to decarbonizing those legacy ICE vehicles. [EPA-HQ-OAR-2022-0829-0609, p. 8]

15 See 88 Fed. Reg. at 29187.

16 U.S. Energy Information Administration, AEO2023 Issues in Focus: Inflation Reduction Act Cases in the AEO2023, at 11 (2023).

A. Incentivizing Renewable Fuels in the Vehicle GHG Program Will Have Myriad Benefits.

1. Renewable fuels significantly reduce carbon emissions on a lifecycle basis and may soon achieve net-zero or net-negative emissions.

The carbon-reducing benefits of renewable fuels are immense. Bioethanol, for instance, reduces lifecycle GHG emissions by at least 46 percent relative to fossil transportation fuels.17 POET and others are also pursuing ways to reduce lifecycle emissions of renewable fuels even further. By deploying carbon capture and storage technologies, switching to renewables such as wind and solar for process energy at production facilities, utilization of renewable biomass rather than natural gas for process heat, and encouraging farmers to implement climate-smart farming practices, renewable fuel producers are working to reduce the carbon footprint of their processes even further and may even achieve net-negative lifecycle emissions—removing carbon from the total atmospheric carbon load. [EPA-HQ-OAR-2022-0829-0609, pp. 8-9]

17 See Scully MJ, Norris GA, Alarcon Falconi TM, MacIntosh DL. 2021a. Carbon intensity of corn ethanol in the United States: state of the science. Environmental Research Letters, 16(4), pp. 043001. The 46 percent reduction figure relates to typical corn starch ethanol on an energy-adjusted basis. Cellulosic ethanol that is currently being produced is associated with even greater reductions, and corn starch ethanol may also have greater benefits when its octane value is accounted for.

By POET's calculations, bioethanol production could achieve significant emissions reductions from such measures, and could even achieve net-negative emissions. The latest scientific assessments assign bioethanol a carbon intensity of 51.4 gCO2/MJ.18 POET estimates that sequestering the biogenic carbon dioxide byproduct of bioethanol production would reduce bioethanol's carbon intensity by 30 gCO2/MJ. Switching to renewable electricity for process energy at bioethanol plants would reduce bioethanol's carbon intensity by another 5 gCO2/MJ. And climate-smart farming practices could lower bioethanol's carbon intensity by at least an additional 30 gCO2/MJ. The Proposed Rule should encourage these developments by crediting renewable fuels for vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 8-9]

18 Id. See also Lewandrawski et al., The greenhouse gas benefits of corn ethanol (March 2019), for a study with USDA input that while earlier nevertheless finds "opportunities to produce corn ethanol" with emissions that are 70% lower than gasoline, available at https://www.tandfonline.com/doi/full/10.1080/17597269.2018.1546488.

B. EPA Has the Authority to Set GHG Emissions Standards Based on Lifecycle GHG Emissions Reductions.

EPA has broad authority under Clean Air Action § 202 to set vehicle emissions standards that extends beyond tailpipe emissions reductions to other emissions in the fuel and vehicle manufacturing lifecycle. Clean Air Act § 202(a) requires EPA to set vehicle emissions standards for any air pollutant the Administrator determines may reasonably be anticipated to endanger public health or welfare. EPA may regulate emissions of such a pollutant "from any class or classes of new motor vehicles or new motor vehicle engines."30 The statute does not expressly limit EPA to regulating emissions only from vehicle tailpipes or the engines themselves. Instead, it is broadly worded to include emissions of any air pollutant that "cause[s], or contribute[s] to, air pollution."31 Lifecycle (upstream) emissions, especially for GHGs, fit that description.32 And in Massachusetts v. EPA, the Supreme Court confirmed EPA's broad authority to regulate additional, non-specified pollutants, provided the agency determines they endanger the public health or welfare.33 [EPA-HQ-OAR-2022-0829-0609, pp. 8-9]

30 42 U.S.C. § 7521(a)(1).

31 Id.

32 Other constraints in § 202(a) do not bar EPA from considering lifecycle emissions. The statute states that EPA's standards must apply to vehicles and engines during their useful life, cannot take effect until after a time that the EPA Administrator determines is necessary for the development and application of the technologies needed to meet EPA's standards, and must consider costs. Id. § 7521(a). None of those provisions prohibit EPA from crediting bioethanol vehicles for their positive lifecycle GHG emissions benefits.

33 See Massachusetts v. EPA, 549 U.S. 497, 506-07 (2007).

The best reading of Clean Air Act § 202(a) is that it mandates that EPA consider lifecycle GHG emissions as part of considering GHG emissions "from" motor vehicles. Otherwise, EPA would be failing "to consider an important aspect of the problem" in violation of U.S. Supreme Court precedent in Motor Vehicle Manufacturers Association v. State Farm.34 Emissions of GHGs, which are a globally mixed pollutant, from any phase of a LDV's lifecycle should be equally subject to § 202(a). Biofuels address the hazards caused by GHG emissions by reducing emissions on a lifecycle basis. As a result, the benefits generated by bioethanol in reducing lifecycle GHG emissions must be recognized through a crediting mechanism or other compliance flexibility benefits. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

34 See Motor Vehicle Mfrs. Ass'n v. State Farm, supra. If EPA considers accounting for upstream emissions inappropriate under 202(a), query if 202(a) is inappropriate for addressing GHGs at all since GHGs are a globally mixed pollutant not a "tailpipe" pollution issue. Such a question is timely now since EPA proposes in this rulemaking to affirmatively ignore EV upstream emissions (as opposed to temporarily excluding upstream emissions when EVs were only an emerging and de minimis share of the vehicle market).

Courts interpreting § 202 have also found that EPA has the type of discretion sufficient to allow crediting bioethanol compatible vehicles for their lifecycle benefits. The D.C. Circuit has observed that "[m]anufacturers produce a wide variety of motor vehicles of different sizes, some using different engine technologies resulting in unusual emission characteristics."35 If EPA's authority to set emissions standards is flexible enough to address those varying vehicle characteristics, it should be similarly flexible to allow EPA to credit lifecycle emissions reductions from bioethanol. Under a common sense reading of section 202(a), EPA's ability to regulate GHGs from vehicles includes those lifecycle emissions. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

35 Nat. Res. Def. Council, Inc. v. U. S. Envtl. Prot. Agency, 655 F.2d 318, 322 (1981).

EPA's statements in the Proposed Rule are consistent with the need for the vehicle GHG program to address lifecycle GHG emissions beyond a narrow focus on tailpipe emissions. EPA observes that, "[s]ince the earliest days of the CAA, Congress has emphasized that the goal of section 202 is to address air quality hazards from motor vehicles, not to simply reduce emissions from internal combustion engines to the extent feasible."36 While EPA is referring to electric vehicles, that sentiment also applies to the need for EPA to credit the lifecycle benefits of bioethanol. EPA's goal is to address air quality hazards from carbon dioxide emissions associated with classes of vehicles. One ton of GHG emissions causes the same harm whether it is released from a vehicle tailpipe or further upstream. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

36 88 Fed. Reg. at 29233.

The Proposed Rule's discussion of the legislative and regulatory history regarding automotive emissions under the Clean Air Act repeatedly refers to alternative power sources and fuels, which further supports EPA's authority to establish a crediting program that accounts for bioethanol's lifecycle emissions benefits.37 Nothing in the record suggests that alternative power sources exclude other low-carbon alternatives, such as liquid renewable fuels. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

37 Id.

The Proposed Rule, in fact, confirms that EPA believes it can regulate upstream emissions under § 202. EPA notes that its own current regulations would require "upstream emissions accounting for BEVs and PHEVs as part of a manufacturer's compliance calculation" to begin in MY 2027.38 EPA is now proposing, for the very first time, to permanently eliminate that upstream emissions accounting.39 But the fact that the current regulations do account for upstream emissions demonstrates that EPA knows it has the power to account for them in this Proposed Rule as well. [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

38 Id. at 29197.

39 Id.

Incorporating lifecycle emissions reductions into the Proposed Rule is the best reading of § 202 for carbon dioxide as an air pollutant, because, unlike other regulated substances, carbon dioxide (as a GHG) is a global, rather than a local, pollutant, meaning that it does not necessarily cause adverse effects in the specific places where emitted. GHGs instead result in adverse effects at a global scale, such as rising sea levels and eroding coastlines, flooding, more frequent and intense storms, melting polar icecaps, and droughts. A GHG emissions rule that focuses only on tailpipe emissions when emissions at all lifecycle stages have equal import is the very definition of arbitrary and capricious.40 [EPA-HQ-OAR-2022-0829-0609, pp. 12-13]

40 See Section III.e of these comments regarding absurd results in terms of emissions increases that may arise from the Proposed Rule as currently structured.

Speed and significance of GHG reductions. Bioethanol significantly reduces carbon emissions on a lifecycle basis and may soon achieve net-zero, if not or net-negative emissions, within the timeframe covered by the Proposed Rule.43 As described elsewhere in these comments, FFVs with low carbon bioethanol can derive significant GHG reductions on par or greater than BEVs, MLEB-compatible vehicles can provide a key means compliance alternative, and renewable gasoline can provide a key drop-in fuels and vehicle solution. Agencies are required, as part of reasoned decision making, to consider "significant and viable and obvious alternatives" to their proposed action.44 Here, EPA violates this basic requirement with respect to bioethanol. [EPA-HQ-OAR-2022-0829-0609, pp. 14-15]

- Cost effectiveness. Ethanol is a widely used, proven technology that can be cost effective in reducing GHGs. Again, EPA fails to assess ethanol as a "significant and viable and obvious alternative[]" including by incentivizing the lifecycle benefits of ethanol to obtain real-world emission reductions. [EPA-HQ-OAR-2022-0829-0609, pp. 14-15]

- Energy security. EPA acknowledges the energy security benefits of bioethanol in the technical support document for the proposed rule, noting the "U.S. is less dependent on imported oil … due in part to … increased production of renewable fuels such as ethanol and biodiesel."45 However, the Proposed Rules ignores bioethanol's significant energy security benefits, while failing to fully assess the supply chain and critical mineral drawbacks of the dramatically increased use of BEVs on which the Proposed Rule relies. [EPA-HQ-OAR-2022-0829-0609, pp. 14-15]

- Criteria pollutant reductions. Ethanol can replace toxic and PM-generating aromatics in gasoline blends, further reducing criteria and other toxic air pollutant emissions.46 [EPA-HQ-OAR-2022-0829-0609, pp. 14-15]

- Environmental justice. Bioethanol provides a proven solution for low-income communities compared BEVs, which, due to high costs, lack of charging infrastructure, and other factors, have yet to be successfully deployed at scale in those communities.47 Bioethanol also reduces air toxics emissions near roadways that disproportionately impact minority and low-income communities.48 [EPA-HQ-OAR-2022-0829-0609, pp. 14-15]

43 See generally, Section III.a.1 of these comments regarding the significant GHG emission reduction benefits of bioethanol.

44 See Dist. Hosp. Partners, L.P. v. Burwell, 786 F.3d 46, 59 (D.C. Cir. 2015); see Spirit Airlines, Inc. v. DOT, 997 F.3d 1247, 1255 (D.C. Cir. 2021) ("[T]he failure of an agency to consider obvious alternatives has led uniformly to reversal.").

45 Draft RIA, p. 11-4.

46 See Section VIII, supra, at 28; see also Attachment 3, EH&E Report (July 5, 2023).

47 See e.g., CalMatters, Who buys electric cars in California, supra, finding "Communities with high concentrations of electric cars are affluent, college-educated and at least 75% white and Asian" while "electric cars are almost nonexistent in Black, Latino, low-income and rural communities").

48 See Environmental Protection Agency, Environmental Justice and Transportation (last accessed July 5, 2023), available at https://www.epa.gov/mobile-source-pollution/environmental-justice-and-transportation; see also Kazemiparkouhi, F., Alarcon Falconi, T.M., Macintosh, D.L., and Clark, N. 2022a, Comprehensive U.S. database and model for ethanol blend effects on regulated tailpipe emissions, Sci. Total Environ., 812, at 151426; Kazemiparkouhi, F., Karavalakis, G., Alarcon Falconi, T.M., Macintosh, D.L., and Clark, N. 2022b, Comprehensive U.S. database and model for ethanol blend effects on air toxics, particle number, and black carbon tailpipe emissions, Atmospheric Environment: X, 16, 100185.

D. EPA Should Credit Renewable Fuels for Their Lifecycle Emissions Reductions or By Treating the Biogenic Emissions from Renewable Fuels as Zero-Emissions Sources.

Because carbon dioxide differs from other air pollutants, a different regulatory approach is warranted. The Proposed Rule should include a crediting program for liquid renewable fuels because they reduce fossil fuel use and the need to extract and burn fossil fuels. Although liquid renewable fuels emit carbon when burned, those emissions are biogenic: the carbon dioxide naturally recirculates when the plants and other biomass sources absorb the carbon dioxide as they grow. The result is no net increase in atmospheric carbon. The more we can rely on fuels utilizing biogenic carbon, the less we will need to use fossil fuels that increase the atmosphere's total carbon load. [EPA-HQ-OAR-2022-0829-0609, pp. 15-17]

The lifecycle benefits of biofuels, including bioethanol, are widely recognized by GHG models such as the GREET model developed and maintained by Argonne National Laboratory. EPA regularly utilizes lifecycle greenhouse gas modeling in its implementation of the RFS. EPA could utilize the Argonne GREET model and its own experience with lifecycle assessments to establish nationwide average carbon intensity scores for renewable fuels. Vehicles that utilize those fuels could be credited based on the degree of GHG reductions compared to fossil fuels and a factor that represents real-world use of renewable fuels in the vehicle—i.e., using an "F Factor" representing real world biofuel use similar to what EPA currently applies to FFVs, as discussed below. [EPA-HQ-OAR-2022-0829-0609, pp. 15-17]

The crediting mechanism POET recommends closely resembles the "Volumetric Conversion Factor" (VCF) that EPA established in the vehicle GHG program through model year 2015. Mathematically, the VCF multiplied the carbon compliance value for E85 by 0.15 to account for the fact that such fuel nominally contained only 15% petroleum.49 In 2012, EPA declined to extend use of a VCF beyond model year 2015, stating GHG compliance must be based on "demonstrated GHG emissions performance."50 However, EPA has learned much regarding lifecycle emissions in the ensuing 10+ years, and the VCF should be reinstituted for FFVs at 0.15 or some similar value that EPA considers appropriately represents the lifecycle benefits of ethanol using the latest GHG lifecycle models such as the widely used GREET model. Without the VCF (or some comparable crediting value) re-instituted in EPA's vehicle GHG regulations, automakers will stop making FFVs, thus eliminating a key pathway to compliance and real-world GHG emissions.51 [EPA-HQ-OAR-2022-0829-0609, pp. 15-17]

49 See National Academy of Sciences, Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light- Duty Vehicles (2015), p. 60, available at https://nap.nationalacademies.org/catalog/21744/cost-effectiveness-and- deployment-of-fuel-economy-technologies-for-light-duty-vehicles. This statutory .15 VCF derives from the Alternative Motor Fuels Act of 1988, Public Law 100-494, section 6.

50 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62624, 62823 (Oct. 15, 2012).

51 After EPA's GHG program VCF discontinuation in Model Year 2015, FFV production dropped from 20% of all 2014 light-duty vehicles to only 8% of 2016 vehicles. See EPA, 2020 EPA Automotive Trends Report (January 2021), pp. 83-84, available at https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1010U68.pdf. FFV production has dropped even further since 2016 due to EPA's failure to recognize the real-world lifecycle benefits of bioethanol used in FFVs.

If EPA does not wish to examine lifecycle emissions in detail, an alternative approach could be to assign zero tailpipe emissions to renewable fuels because their biogenic emissions are canceled out by the carbon intake of biofuels feedstocks. Such an approach would be consistent with EPA's lack of consideration of lifecycle emissions associated with electric vehicles. EPA already largely assumes zero tailpipe emissions for renewable fuels when determining whether to approve new RFS production pathways for biofuels.52 EPA also considers "biogenic CO2 emissions resulting from the combustion of biomass from managed forests at stationary sources for energy production as carbon neutral," per the agency's 2018 statement of policy.53 Similarly, the California Air Resources Board ("CARB") treats biogenic emissions as carbon neutral under its cap-and-trade regulations. Under CARB's regulations, CO2 emissions from certain biomass-derived fuels (biogenic solid waste; waste pallets, crates, dunnage, manufacturing and construction wood wastes, tree trimmings, mill residues, and range land maintenance residues; all agricultural crops and waste; and certain wood and wood wastes) do not count towards an entity's compliance obligations.54 If EPA fails to add any other incentives under its vehicle GHG program to credit the lifecycle benefits of biofuels, to avoid an arbitrary and capricious favoring of one technology over another EPA must apply the same assumptions of zero tailpipe emissions here for that component of a biofuels-compatible vehicle deemed to operate (per an F factor) on those biofuels. [EPA-HQ-OAR-2022-0829-0609, pp. 15-17]

52 See, e.g., ENVIA Energy, LLC, Landfill Biogas to Diesel, Naphtha for D-Code 3 or D-Code 7 RINs (May 8, 2015), available at https://www.epa.gov/sites/default/files/2015-08/documents/envia-energy-merged-deter-ltr.pdf; Oberon Fuels, Inc., Waste-derived Biogas to Demethyl ether ("DME") (Aug. 12, 2014), available at https://www.epa.gov/sites/default/files/2015-08/documents/oberon-fuels-determination.pdf.

53 EPA's Treatment of Biogenic Carbon Dioxide (CO2) Emissions from Stationary Sources that Use Forest Biomass for Energy Production at 6 (Apr. 23, 2018), available at https://www.epa.gov/air-and-radiation/epas-treatment- biogenic-carbon-dioxide-emissions-stationary-sources-use-forest.

54 Cal. Code Regs. tit. 17, § 95852.2.

E. Failing to Account for Lifecycle Emissions Would Lead to Absurd Results.

EPA risks implementing a rule that leads to absurd results if it omits the lifecycle emissions benefits of biofuels. The rule could end up incentivizing transportation fuels that greatly increase upstream carbon emissions in the near- and medium-term. Because electricity generation remains largely fossil-based, EPA concedes that increasing electricity demand in the near-term would drive up fossil fuel use while the country tries to solve the many challenges associated with developing renewable electric generating facilities and the transmission capacity to support them.58 BEVs will also require extracting certain metals at a far larger scale. That extraction can be energy-intensive and much of it occurs in countries where mining can severely degrade the environment, including by clear-cutting rainforests that store vast amounts of carbon.59 [EPA-HQ-OAR-2022-0829-0609, pp. 18-19]

58 EPA forecasts that "GHG and criteria pollutant emissions from EGUs would increase as a result of the increased demand for electricity associated with the proposal." 88 Fed. Reg. at 29198.

59 J. Emont, EV Makers Confront the 'Nickel Pickle,' Wall Street Journal (June 4, 2023), https://www.wsj.com/articles/electric-vehicles-batteries-nickel-pickle-indonesia-9152b1f (describing the EV makers shift from cobalt mining in the Democratic Republic of Congo to nickel mining by clear-cutting Indonesian rainforests) ; N. Lahkni, Reveaeled: how US transition to electric cars threatens environmental havoc, The Guardian (Jan. 24, 2023), available at: https://www.theguardian.com/us-news/2023/jan/24/us-electric-vehicles-lithium- consequences-research.

EPA concedes the absurd results of its regulatory approach by noting a "Fleet of all BEVs would emit 0 g/mi, regardless of their footprints."60 In other words, an electric Lincoln Navigator, GM Hummer, or "monster truck" has the same GHG emissions (zero) as a sub-compact Chevy Bolt. This is of course not the case. Larger BEVs have much larger battery packs (which significantly increase lifecycle emissions) and require much more electricity, which as discussed above, is still largely fossil-generated. Thus, larger BEVs have much higher upstream GHG emissions, but EPA's Proposed Rule considers all BEVs as equally having no emissions at all, regardless of size. Worse still, by granting a zero upstream benefit for BEVs while providing no credit for the lifecycle benefits of bioethanol or other biofuels, EPA would push real-word GHG solutions out of the marketplace in favor of potentially more carbon-intensive vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 18-19]

60 88 Fed. Reg. at 29235.

Incorporating renewable fuels could also shore up the rule against a challenge that it violates precedent of the U.S. Supreme Court in West Virginia v. EPA. That case overturned EPA's

Clean Power Plan because the Court determined that EPA's regulatory program went too far toward requiring a shift from conventional sources of electricity generation to renewables, which in the Court's view would have substantially restructured the American energy market.61 Crediting biofuels in the Proposed Rule would have the opposite effect. Biofuels are already a key component of the American transportation sector. This is not the case in which, as the Supreme Court stated in West Virginia v. EPA, the "history and the breadth of the authority that [EPA] has asserted, and the economic and political significance of that assertion, provide a reason to hesitate before concluding that Congress meant to confer such authority."62 Congress has given EPA plain authority to incentivize biofuels under the Clean Air Act and RFS. Those preexisting programs have encouraged producers to make billions of gallons of renewable fuels every year. Congress' mandate was clear. The RFS was meant to encourage the production of renewable fuels that are "used to replace or reduce the quantity of fossil fuel present in a transportation fuel."63 EPA must interpret its § 202 authority in a manner that is consistent with the other directives that Congress has imposed on the transportation sector. [EPA-HQ-OAR-2022-0829-0609, pp. 18-19]

61 See West Virginia, 142 S. Ct. at 2616.

62 Id. at 2595 (quotations omitted).

62 42 U.S.C. § 7545(o)(1)(J).

63 42 U.S.C. § 7545(o)(1)(J).

F. Plug-in Hybrid Electric FFVs (PHEV FFVs) Provide a Key Compliance Solution that Must be Incentivized.

EPA has recognized the need to incentivize emerging technologies under its vehicle GHG program. With the proper incentives, PHEVs can rapidly scale up to dramatically reduce GHGs while providing consumer friendly fuel flexibility to adjust low carbon fuel choices to market conditions. For instance, a PHEV FFV allows consumers to maximize the bioethanol blend used in a vehicle or rely more heavily on the vehicle battery, depending on the varying costs and availability of biofuels, electricity, and electric charging infrastructure. [EPA-HQ-OAR-2022-0829-0609, pp. 19-20]

Various technical analyses show that bioethanol flex-fuel paired with hybrid electric technology can reduce lifecycle emissions just as effectively as comparable BEVs.64 At a minimum, PHEVs provide a supplemental means to meeting the Proposed Rule's significant GHG reduction targets. [EPA-HQ-OAR-2022-0829-0609, pp. 19-20]

64 See ePure, New research confirms important role for renewable ethanol in reducing car emissions (September 1, 2022), finding that "plug-in hybrid vehicles running on E85 ethanol blend are at least as climate-friendly as battery electric vehicles," available at https://www.epure.org/press-release/new-research-confirms-important-role-for- renewable-ethanol-in-reducing-car-emissions/. See also, Mueller and Unnasch, High Octane Low Carbon Fuels: The Bridge to Improve Both Gasoline and Electric Vehicles (March 22, 2021), p. 1, available at https://erc.uic.edu/wp-content/uploads/sites/633/2021/03/UIC-Marginal-EV-HOF-Analysis-DRAFT- 3_22_2021_UPDATE.pdf. Here, this Mueller and Unnasch study found that "High octane fuel vehicles with ethanol provide very similar GHG savings compared to EVs (within 5 gCO2e/MJ of each other) for many states" and "E85 and HOF-plug-in hybrids are the lowest GHG emitting technology as these vehicles are both able to take advantage of the low carbon intensity of ethanol in their combustion engine and the low carbon intensity of the electricity grid in hybrid mode of operation."

The Proposed Rule correctly explains, “PHEVs may help provide a bridge for consumers that may not be ready to adopt a fully electric vehicle.”65 The Proposed Rule specifically “requests comment on the types of PHEVs EPA could consider in our analysis for the final rulemaking.”66 The same emissions credit for FFVs discussed above (e.g., the 0.15 Volumetric Conversion factor or a comparable incentive based on the real-world lifecycle benefits of bioethanol) could apply to PHEV FFVs for that portion of those hybrid vehicles that operate on bioethanol E85, MLEBs, or other higher-level ethanol blends. [EPA-HQ-OAR-2022-0829-0609, pp. 19-20]

65 See 88 Fed. Reg. at 29298.

66 Id.

Regarding PHEV pickup trucks, the Proposed Rule correctly notes that “PHEV pickup architecture would provide several benefits” including among others “zero-emission electric range,” “increased total vehicle range during heavy towing and hauling,” and “job-site utility with auxiliary power capabilities.”67 Also, pickup trucks have been a difficult-to-decarbonize class of vehicles. Even under the Proposed Rule’s extremely aggressive electrification scenarios, medium-duty pickup trucks only obtain a 19% BEV deployment rate in 2032.68 [EPA-HQ-OAR-2022-0829-0609, p. 20]

67 Id.

68 Id. at 29331.

EPA should specifically incentivize PHEV FFV pickup trucks with additional incentives, which could go even further beyond incentives for other FFVs. FFV architecture has been broadly used with pickup trucks, so consumers are familiar with the role biofuels can play. [EPA-HQ-OAR-2022-0829-0609, p. 20]

Pickup trucks are also broadly used in Midwestern states where bioethanol is readily available. Various precedent exists for specially incentivizing pickup trucks given the difficulties in decarbonizing pickup trucks and other work vehicles where consumers need high towing capacity, reliability and extended range. 69 [EPA-HQ-OAR-2022-0829-0609, p. 20]

69 California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (see more information at: https://californiahvip.org/); California Innovative Small E-Fleet Pilot (see more information at: https://californiahvip.org/purchasers/#isef); Oregon Advanced Clean Trucks Rule 2021, Permanent Administrative Order DEQ 17-2021 (available at: https://lpdd.org/wp-content/uploads/2022/01/DEQ_17-2021.pdf).

B. EPA Has Relied on Unreasonable and Unsupported Assumptions in Its Assessment of GHG Emissions Reductions.

The Trinity report also addresses certain unfounded assumptions in EPA’s assessment of GHG emissions reductions and has identified the following flaws. [EPA-HQ-OAR-2022-0829-0609, pp. 24-25]

First, EPA ignores upstream emissions from BEVs other than emissions from electricity generation.105 EPA’s assessment assigns 710 metric tons of GHG emissions from the increased electricity needed to power BEVs incentivized by the Proposed Rule. However, the Trinity report demonstrates that EPA’s assessment significantly undercounts those emissions. The report cites a recent study showing that between “56 to 494 kilograms of CO2eq emissions per kWh of battery pack capacity which translates to between about 5 and 50 metric tons of GHG emissions per 100 kWh battery pack."106 Using this study and EPA's estimate of 80 million BEVs on the road by 2055, Trinity calculates additional upstream emissions between 400 and 4,000 metric tons.107 That is in addition to the 710 metric tons EPA calculates for electricity generation. [EPA-HQ-OAR-2022-0829-0609, pp. 24-25]

105 Attachment 2 at 10.

106 Id.

107 Id.

Finally, the Proposed Rule overstates the GHG emissions reductions the Proposed Rule could achieve by failing to account for emissions reductions from bioethanol and other biofuels that are currently blended into transportation fuels for existing conventional vehicles.110 EPA must take those emission reductions into account in its baseline when calculating GHG emissions reductions attributable to the Proposed Rule. Lifecycle emission reductions are at the core of EPA's own RFS program incentivizing the production of biofuels. EPA should not consider those reductions in the RFS program only to ignore them here in order to inflate this Proposed Rule's GHG benefits. [EPA-HQ-OAR-2022-0829-0609, p. 25]

110 Id. at 12.

EPA should address these flawed assumptions in its GHG emissions assessment. [EPA-HQ-OAR-2022-0829-0609, p. 25]

V. OMEGA Modeling Highlights the Feasibility Challenges of EPA's Proposed Rule and How Biofuels Could Make the Rule More Workable.

After conducting a series of runs using EPA's OMEGA model, OnLocation in the attached report concludes that EPA's Proposed Rule on light-duty vehicle emissions "has significant shortcomings in achieving its stated goal of reducing GHG emissions."111 OnLocation finds that compliance with the Proposed Rule "can only be achieved through a narrow range of BEV vehicle penetration pathways."112 While EPA relies on BEV penetrations around 67% of new light-duty vehicle sales in 2032, OnLocation finds that if a production limit of 60% is imposed on BEVs in that general timeframe, compliance with the target emission goals is prevented through 2034.113 When a BEV production limit of 50% is similarly imposed, compliance is generally not achieved throughout the timeframe covered by the Proposed Rule and not even through the year 2050.114 Furthermore, ICE vehicles cannot make up the difference in GHG emissions reductions.115 This result occurs because EPA does not consider the lifecycle benefits of biofuels while artificially assigning zero emissions to BEVs (ignoring the upstream emissions of BEVs), and for other reasons that may include EPA assigning unduly low battery costs to BEVs. [EPA-HQ-OAR-2022-0829-0609, p. 26]

111 Attachment 1, at 2, 16.

112 Id. at 1.

113 Id. at 7 & Fig. 4.

114 Id. 4 & Fig. 1.

115 OnLocation found "no amount of technological improvements for ICE vehicles incorporated by EPA for their supporting analysis with the OMEGA model for ICE vehicles can compensate for even a relatively small reduction in the penetration rate of BEVs." See id. at 3.

OnLocation also finds that if BEV upstream emissions are considered, “real-world” emissions to the atmosphere from covered vehicles would be at levels significantly higher than the proposed compliance standards. More specifically, if upstream fuel production emissions are accounted for regarding BEVs, the Proposed Rule’s 86 gram per mile target in 2032 cannot be met when using electric grid GHG emission intensities from EIA, the leading U.S. governmental source for independent energy statistics and analysis.116 Note that OnLocation’s analysis does not seek to account for battery manufacturing lifecycle emissions, which is addressed in Trinity’s report, as described above. As Trinity has shown, “actual BEV lifecycle emissions would be even higher if battery manufacturing impacts are considered.”117 [EPA-HQ-OAR-2022-0829-0609, pp. 26-27]

116 Id. at 1, 10.

117 Id. at 10.

OnLocation further finds that “using only tailpipe emissions provides inconsistent incentives between BEV and ICE vehicles, while optimistic projections for the grid carbon intensity and BEV penetration could reduce the effectiveness of the Proposed Rule in reducing carbon.”118 Regarding electric grid intensity, OnLocation finds that EPA’s Draft Regulatory Impact Analysis (DRIA) using its model shows a 70% reduction of power sector-related CO2 emissions from current levels by 2055, while EIA’s reference case “shows closer to a 50% reduction from current levels and substantially less CO2 reduction if renewable costs do not decline as quickly as in the Reference scenario.”119 While ICE vehicles have incentives under the proposal to reduce their tailpipe GHG emissions, BEVs and the electric grid lack GHG reduction incentives since the Proposed Rule effectively assumes that all electricity used by BEVs is zero carbon.120[EPA-HQ-OAR-2022-0829-0609, pp. 26-27]

118 Id. at 14.

119 Id.

120 Id. at 16.

OnLocation also finds EPA considering the lifecycle benefits of biofuels (like bioethanol) would have various benefits. For instance, OnLocation considers a scenario where biofuels reduce ICE vehicle carbon intensity by 75%. In this scenario, “greater total emission reductions (i.e., those that consider upstream emissions) are achieved by deploying low-carbon ICE vehicles” and “with lower-carbon ICE fuels (such as low carbon bioethanol), and considering upstream emissions, compliance within the range of EPA’s proposed target is possible.”121 However, as OnLocation highlights, the OMEGA model is likely undercounting actual biofuel benefits for a number of reasons. [EPA-HQ-OAR-2022-0829-0609, p. 27]

121 Id. at 14.

Manufacturing emissions differ between EV and ICE

[See original attachment for Figure 14. Vehicle Manufacturing Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Emissions for BEV200, BEV300, and BEV400 compared with midsize gasoline ICEV. Source: Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A

Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies, Argonne National Lab, 2022 [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

As shown in Figure 14, compared with a midsize gasoline ICEV, a BEV has higher emissions from vehicle manufacturing under current technologies, ranging from approximately 10 gCO2e/mi in a BEV200, to 25 gCO2e/mi in a BEV300, and 35 gCO2e/mi in BEV400, according to the lifecycle analysis by the Argonne National Lab (battery emissions are embedded in Figure 14 within "vehicle" emissions, and are most significant in the data in Figure 14 labelled "Current Tech"). [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Relative to the ~80 gCO2e/mi EPA proposed compliance value, where the alternatives are +-10 gCO2e/mi, these are substantial incremental emissions that are neglected when upstream emissions are ignored. [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

VIII. POET Strongly Supports EPA's Suggestion in Section IX of the Proposed Rule to Institute a Future Regulatory Action to Further Limit PM Emissions from Vehicles and Nonroad Equipment.

POET strongly supports EPA's consideration of a possible future rulemaking aimed at further PM emissions reductions for vehicles and nonroad equipment.134 POET agrees with the EPA's assessment that reducing certain high-boiling compounds in gasoline could further reduce vehicle PM emissions.135 However, removing those heavy aromatic compounds will lower gasoline octane levels. To most effectively reduce tailpipe PM emissions while retaining high-octane gasoline, POET urges EPA to support a future rule that would limit the use of high-boiling compounds while encouraging those compounds to be replaced with higher bioethanol blends, such as E15. Bioethanol boosts octane while decreasing PM emissions. Bioethanol also significantly reduces lifecycle GHG emissions compared to more carbon-intensive alternative octane-boosting compounds, such as heavy aromatics.136 Bioethanol should be EPA's preferred solution because it both reduces toxic air pollutants and helps combat climate change. [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

134 88 Fed. Reg. at 29397.

135 Id. at 29398.

136 See generally Attachment 3.

In support of POET's position, POET retained Environmental Health & Engineering, Inc. ("EH&E"), who prepared a report on the potential changes to EPA gasoline fuel property and GHG standards for light- and medium-duty vehicles in the Proposed Rule, attached hereto as Attachment 3. EH&E's report confirms that heavy aromatics have significant negative impacts on PM emissions.137 The report assesses EPA's position that high boiling compounds are associated with increased tailpipe emissions, reviews the impact of removing high boiling compounds on gasoline and refineries, analyzes the suitability of EPA's Haverly model, studies the importance of octane for gasoline, and evaluates increased ethanol blending as an alternative for octane contributions in gasoline. [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

137 88 Fed. Reg. at 29398.

EH&E's report uses the particulate matter index, or "PMI," to predict the propensity of PM in various gasoline compounds. PMI values are correlated with emissions of PM: the higher a compound's PMI value, the higher the tailpipe PM emissions for gasoline containing that compound.138 Studies have found that high-boiling compounds—and particularly heavy aromatics—have significantly higher PMI values than other, lower-boiling compounds in gasoline blends.139 And while heavy aromatics are only a small portion of the compounds making up gasoline, about 2.4% of gasoline by volume, they contribute disproportionately to the PMI of gasoline, making up about 38 percent of gasoline's PMI value.140 In comparison, ethanol has proven to be the most favorable component in gasoline in terms of PMI contribution: it represents 10% of gasoline volume but contributes less than 1% to PMI.141 Because the PMI value of ethanol is so low, the PM emissions associated with gasoline blended with higher levels of ethanol are significantly lower than gasoline containing heavy aromatics.142 [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

138 Attachment 3 at 3.

139 Id. at 1, 3.

140 Id. at 6.

141 Id.

142 Id. at 3-8.

Despite the negative air quality impacts of heavy aromatics, they do serve to increase octane in gasoline. Sufficiently high octane levels are necessary for the efficient operation of vehicles with internal combustion engines.143 Specifically, octane supports high compression ratios, turbocharging, and advanced spark and valve timing and downsizing.144 If EPA moves forward with a rulemaking to limit heavy aromatics in gasoline, EPA should also identify an alternative to maintain octane levels and develop its standards with that alternative in mind. [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

143 Id. at 10-11.

144 Id. at 11.

Bioethanol's criteria pollutant emission benefits are well documented. Two studies published by EH&E's team, the Kazemiparkouhi et al. (2022a) and Kazemiparkouhi et al. (2022b) studies, establish the air quality benefits of adding increasing ethanol blends to E15 or higher. Those studies represent the "first large-scale analyses of data from light-duty vehicle emissions studies to examine real-world impacts of ethanol-blended fuels on air pollutant emissions, including PM, NOx, CO, and THC, as well as BTEX (benzene, toluene, ethylbenzene, xylene) and 1,3-butadiene."152 These significant benefits include: [EPA-HQ-OAR-2022-0829-0609, pp. 32-33]

152 EPA Docket EPA-HQ-OAR-2022-0513, comment submitted by POET LLC, Attachment 1 at 3; see also Kazemiparkouhi, F., Alarcon Falconi, T.M., Macintosh, D.L., and Clark, N. 2022a, Comprehensive U.S. database and model for ethanol blend effects on regulated tailpipe emissions, Sci. Total Environ., 812, at 151426; Kazemiparkouhi, F., Karavalakis, G., Alarcon Falconi, T.M., Macintosh, D.L., and Clark, N. 2022b, Comprehensive U.S. database and model for ethanol blend effects on air toxics, particle number, and black carbon tailpipe emissions, Atmospheric Environment: X, 16, 100185.

- Aromatic levels in market fuels decreased by ~7% by volume for each 10% by volume increase in ethanol content.

- PM emissions decreased by 15-18% on average for each 10% increase in ethanol content under cold-start conditions.

- Emissions of CO and THC generally decreased with increasing ethanol fuel content under cold running conditions, while NOx emissions did not change.

- Air toxic emissions showed lower BTEX, 1-3 butadiene, black carbon, and particle number emissions with increasing ethanol fuel content.153 [EPA-HQ-OAR-2022-0829-0609, pp. 32-33]

153 EPA Docket EPA-HQ-OAR-2022-0513, comment submitted by POET LLC, Attachment 1 at 3-4.

Using bioethanol blending as an alternative for octane in gasoline would also promote EPA's goal of reducing GHG emissions. As discussed above, bioethanol reduces lifecycle GHG emissions by at least 46 percent relative to fossil fuel.154 Thus, EPA's potential rulemaking could tackle two goals at once—decreasing tailpipe PM emissions and reducing lifecycle GHG emissions. [EPA-HQ-OAR-2022-0829-0609, pp. 32-33]

154 See Scully MJ, Norris GA, Alarcon Falconi TM, MacIntosh DL. 2021a. Carbon intensity of corn ethanol in the United States: state of the science. Environmental Research Letters, 16(4), pp. 043001. The 46 percent reduction figure relates to typical corn starch ethanol on an energy-adjusted basis. Cellulosic ethanol that is currently being produced is associated with even greater reductions, and corn starch ethanol may also have greater benefits when its octane value is accounted for.

EPA has broad authority under Section 211(c)(1)(A) of the Clean Air Act to issue regulations controlling fuels or fuel additives that cause and/or contribute to air pollution that may endanger public health.155 This authority permits EPA to limit high-boiling compounds/heavy aromatics because these fuel additives contribute to PM emissions which endanger public health. Pursuant to Section 211(c)(2)(A), EPA must consider all relevant scientific evidence available to the agency when setting these standards, including the significant evidence that bioethanol blending is the most practicable replacement for heavy aromatics, and that bioethanol has particularly significant emissions benefits for PM, other criteria pollutants, and GHGs.156 The further reduction of aromatics in gasoline would also be consistent with EPA's mandates and authority under the Mobile Source Air Toxics Program.157 [EPA-HQ-OAR-2022-0829-0609, p. 33]

155 42 U.S.C. § 7545(c)(1)(A).

156 Id. § 7545(c)(2)(A).

157 See Control of Hazardous Air Pollutants from Mobile Sources, 72 Fed. Reg. 8428 (Feb. 26, 2007).

Bioethanol does not receive the credit it deserves as a powerful tool in reducing both criteria pollutant and GHG emissions. Replacing heavy aromatics with bioethanol blending would maintain octane levels, reduce tailpipe PM emissions, and reduce lifecycle GHG emissions, furthering many of EPA's Clean Air Act mandates. EPA should carefully consider the benefits of bioethanol blending as a key solution in any potential rulemaking to further reduce tailpipe PM reductions. [EPA-HQ-OAR-2022-0829-0609, p. 33]

Introduction

Peter Whitman and Michael Schaal of OnLocation ("Authors") have been asked to review the assumptions and modeling in support of the U.S. Environmental Protection Agency's ("EPA's") proposed "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," under Docket ID No. EPA–HQ–OAR–2022–0829–0451 ("Proposed Rule"), that addresses standards for criteria pollutants and greenhouse gases (GHG) for light-duty vehicles and Class 2b and 3 (''medium-duty'') vehicles for model years 2027 through 2032. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

OnLocation's Analysis

In this analysis, we reviewed EPA's assumptions and then we performed a series of test scenarios to observe the robustness of the results obtained using EPA's OMEGA (Optimization Model for reducing Emissions of Greenhouse Gases from Automobiles) model. This OMEGA model is the same model that EPA used in the Proposed Rule for its analysis of compliance scenarios.1 [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

1 Available at https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions- greenhouse-gases

EPA's Assumptions

We focus on two interrelated aspects of the rulemaking: using only tailpipe emissions for compliance with the MY 2027 – 2032 standards and only a narrow range of BEV penetration trajectories that will allow compliance to be achieved. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

Our key insight is that compliance can only be achieved through a narrow range of BEV vehicle penetration pathways. We demonstrate this through a set of runs using EPA's OMEGA model described below. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

In addition, we note that upstream emissions are a significant contributor to GHG emissions and ignoring them has implications for aligning the incentives for compliance to the Proposed Rule with its intent, reductions in GHG emissions. This leads to the following observations: [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

- Should upstream emissions for all fuels, including electricity, be incorporated in compliance, projections of grid carbon emissions vary widely, and according to our modeling using the OMEGA model, EPA's proposed standard of 86 grams/mile in 2032 cannot be met when using EIA's projected electric grid carbon intensities. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

- Upstream manufacturing emissions are an important differentiator between vehicles but are not accounted for. Using only tailpipe emissions provides inconsistent incentives between BEVs and ICE vehicles, while EPA's optimistic projections for the grid carbon intensity and BEV penetration could reduce the effectiveness of the Proposed Rule in reducing carbon. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

- Because upstream emissions are ignored in the Proposed Rule, the shape of the GHG footprint-based compliance curve depends on the assumed BEV penetration, even though it is only applicable to ICE vehicles. If BEVs penetration is different than EPA projections, then EPA's proposed compliance curves are likely to be inconsistent with the analysis used in their development and penalize larger footprint vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

Per the Summary at the end of this report, our analysis of the EPA's Proposed Rule on light-duty vehicle emissions finds it has significant shortcomings in achieving its stated goal of reducing GHG emissions. [EPA-HQ-OAR-2022-0829-0609, pp. 35-36]

Finally, we look at three scenarios showing the effect of upstream emissions and low-carbon fuels on meeting the Proposed Rule.

Scenario 4: Adding Upstream Emissions to the Compliance Values Scenario 5: 10% Reduction in Carbon Intensity of Gasoline, Scenario 6: 75% Reduction in Carbon Intensity of Gasoline [EPA-HQ-OAR-2022-0829-0609, p. 37]

The first three OMEGA runs show a narrow range of BEV penetration pathways will allow sufficient reductions to support compliance with the Proposed Rule, and that reductions in BEV market share cannot be compensated for by ICE technology improvements. The latter three runs show that low carbon fuels could potentially play an important role in GHG emission reductions. [EPA-HQ-OAR-2022-0829-0609, p. 37]

Testing the Robustness of the Proposed Rule using OMEGA

OnLocation executed numerous runs of the OMEGA model to test the boundaries of its domain and the robustness of the supporting analysis. The following scenarios explore some of the limitations of the modeling and the lack of robustness of the Proposed Rule to changes in market assumptions. [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

Scenario 1: Production Limit on BEV Production [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

[See original attachment for Figure 1 Compliance Path with Production Limit]

[See original attachment for Figure 2 Market Shares]

In Scenario 1, only tailpipe emissions were included for compliance purposes, while potential BEV penetration was limited to 30% in 2025, 40% in 2030, and 50% from 2035 onwards. Figure 1 shows the effects of BEV production limits. From 2027 through 2051, the target is not reached. Figure 2 below shows the evolution of the market share of different vehicle categories for this scenario, where the BEV production limits are binding at 30%, 40%, and then 50%. It is clear that the BEV penetration constraints limit the ability of manufacturers to meet the target, as the fuel efficiency improvements available for ICE vehicles are insufficient to compensate for the zero tailpipe emissions of the BEV vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

In Figure 1 and in each of the following figures labeled "Compliance Path," the blue line indicates the target emissions while the red line indicates achieved emissions. Yellow circles indicate banked credits from previous periods, while the green lines indicate inter-temporal credit trades. The red circles indicate fleet does not reach compliance in that year. [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

Scenario 2: Relaxed Production Limit on BEV Production [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

[See original attachment for Figure 3 Compliance Path with Relaxed Production Limit]

[See original attachment for Figure 4 Market Shares with Relaxed Production Limit]

Scenario 2 follows the CO2 targets in the Proposed Rule, with no upstream emissions. In this scenario, production limits on BEVs were relaxed relative to Scenario 1. BEV penetration was initially limited to 40%, rising to 50% in 2030 and 60% in 2035 for the remainder of the scenario. Even these relaxed production limits on BEV market penetration were binding throughout the simulation (Figure 3), preventing compliance with the target emission goals through 2034 (Figure 4). [EPA-HQ-OAR-2022-0829-0609, pp. 37-41]

The effect of low-carbon fuels

The first three scenarios all identified the risks of developing a new set of rules which are highly dependent on a high BEV market share being achieved. In the next three scenarios, we examine the effect of upstream emissions and low-carbon fuels in achieving the targets of the Proposed Rule. The first scenario evaluated in this regard follows on the next page. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

Scenario 4: Adding Upstream Emissions [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

[See original attachment for Figure 7 Compliance Path with Upstream Emissions]

[See original attachment for Figure 8 Market Shares with Upstream Emissions]

In Scenario 4, upstream emissions were added to the compliance calculations for gasoline, diesel, and electricity (these upstream emissions for BEVs include grid impacts, but BEV battery manufacturing impacts are not included). The AEO2023 EIA Reference Scenario was used to calculate upstream emissions of grid electricity. As shown in Figure 7 and Figure 8, with the addition of upstream emissions, the BEV market share rises to over 80%, much greater than the 67% market share in the central case of the Proposed Rule. To achieve this BEV market share, the domestic infrastructure would have to grow at an accelerated rate. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

This figure shows that using the OMEGA model, EPA's proposed standard of 86 grams/mile in 2032 cannot be met if upstream emissions are also included. Furthermore, actual BEV lifecycle emissions would be even higher if battery manufacturing impacts are considered. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

In this scenario, the LDV fleet does not reach the modelled target emission until 2036, and compliance is intermittent throughout the model forecast. EPA's having such stringent target emission goals. which rely to such a degree on the implementation of BEVs into the market, ignores the importance of upstream emissions, as model runs indicate upstream emissions generally render any achievable fleet of BEVs and ICE vehicles (within the current technology packages of the model, which don't include biofuels carbon intensity reductions) out of compliance with EPA's proposed standard. [EPA-HQ-OAR-2022-0829-0609, pp. 42-44]

Scenario 5: Low Carbon Fuel [EPA-HQ-OAR-2022-0829-0609, pp. 45-46]

[See original attachment for Figure 9 Compliance Path with Low Carbon Fuel (gasoline with 10% lower Carbon Intensity)]

[See original attachment for Figure 10 Market Shares with Low Carbon Fuel]

In Scenario 5, starting in 2030, gasoline combustion emissions were reduced by 10% to represent the introduction of low-carbon biofuels such as bioethanol. No upstream emissions were included within the model. This scenario effectively provides compliance flexibility for the Proposed Rule, leading to a 0.2% to 0.4% reduction in the absolute market share of BEVs from 2035-2050. Greater reductions in the need for high BEV shares could potentially result if the model is revised to (i) assess a broader range of battery learning curve algorithms, and (ii) the "zero emissions" treatment assigned to BEVs is refined. Further evaluation of these issues is warranted by EPA to ensure that small changes in BEVs under this scenario 5 (e.g., lower carbon intensity gasoline) are not a result of artifacts of the modelling. [EPA-HQ-OAR-2022-0829-0609, pp. 45-46]

Scenario 6: Adding Low Carbon Fuel and Upstream Emissions [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

[See original attachment for Figure 11 Compliance Path with Low Carbon Fuel and Upstream Emissions]

[See original attachment for Figure 12 Market Shares with Low Carbon Fuel and Upstream Emissions]

Scenario 6 presents a 75% reduction in fuel carbon intensity for gasoline, though including upstream emissions including those for BEVs. Figure 11 and Figure 12 show that using the model compliance with the Proposed Rule's targets still could be achievable, though outside of 2027 – 2032 timeframe when considering both upstream emissions and the impact if biofuels reduce ICE vehicle carbon intensity by 75%. In this scenario, the market share of BEVs only changes slightly from the Proposed Rule, however in the model greater total emission reductions (i.e., those that consider upstream emissions) are achieved by deploying low-carbon ICE vehicles. This scenario shows that with lower-carbon ICE fuels (such as low carbon bioethanol), and considering upstream emissions, compliance within the range of EPA's proposed target is possible. [EPA-HQ-OAR-2022-0829-0609, pp. 47-48]

Ignoring Upstream Emissions is Inconsistent with Incentivizing GHG Emission Reductions

The following section demonstrates that using only tailpipe emissions provides inconsistent incentives between BEV and ICE vehicles, while optimistic projections for the grid carbon intensity and BEV penetration could reduce the effectiveness of the Proposed Rule in reducing carbon. [EPA-HQ-OAR-2022-0829-0609, p. 48]

Upstream Emissions are Uncertain

While EPA's Draft Regulatory Impact Analysis (DRIA) using its model shows a 70% reduction of power sector- related CO2 emissions from current levels by 2055. As shown in Figure 13, EIA's reference scenario shows closer to a 50% reduction from current levels and substantially less CO2 reduction if renewable costs do not decline as quickly as in the Reference scenario. If included in the CO2 targets, differences between grid emissions and projections used in the Proposed Rule could have a significant impact on the ability of manufacturers to achieve compliance. [EPA-HQ-OAR-2022-0829-0609, p. 48]

[See original attachment Figure 13. Grid Intensity]

Source: AEO 2023 Reference, High Technology Cost Tables 8, 18 [EPA-HQ-OAR-2022-0829-0609, p. 48]

Manufacturing emissions differ between EV and ICE

[See original attachment for Figure 14. Vehicle Manufacturing Emissions] [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Emissions for BEV200, BEV300, and BEV400 compared with midsize gasoline ICEV. Source: Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A

Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies, Argonne National Lab, 2022 [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

As shown in Figure 14, compared with a midsize gasoline ICEV, a BEV has higher emissions from vehicle manufacturing under current technologies, ranging from approximately 10 gCO2e/mi in a BEV200, to 25 gCO2e/mi in a BEV300, and 35 gCO2e/mi in BEV400, according to the lifecycle analysis by the Argonne National Lab (battery emissions are embedded in Figure 14 within "vehicle" emissions, and are most significant in the data in Figure 14 labelled "Current Tech"). [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Relative to the ~80 gCO2e/mi EPA proposed compliance value, where the alternatives are +-10 gCO2e/mi, these are substantial incremental emissions that are neglected when upstream emissions are ignored. [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Shape of footprint curve depends on BEV penetration rate

As noted in the Proposed Rule, "The slope that corresponded with a neutral response for ICE vehicles only (overall, no change in the average footprint of ICE vehicles) was 0.8 g/mi/square foot. This slope was then scaled down accordingly-for example, based on a nominal BEV sales penetration of around 50%, this 0.8 slope would be scaled down to 0.4 (based on the remaining 50% of ICE vehicles)."6 [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

6 Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles Draft Regulatory Impact Analysis, 1-7.

The targets defined in the Proposed Rule are a function of vehicle footprint. That is, the compliance target depends upon the footprint of the vehicle. Figure 15 shows the EPA's proposed footprint for cars. If the penetration of BEV is much below the proposal, the footprint target function is too flat relative to the actual market share of non-BEV vehicles, penalizing ICE vehicles. [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

[See original attachment for Figure 15] [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Source: "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Federal Register Vol. 88, No. 87, pg. 29237. [EPA-HQ-OAR-2022-0829-0609, pp. 49-50]

Ignoring upstream emissions has other negative effects on incentivizing reductions of GHG emissions from LDVs, including disregarding the substantially greater GHG manufacturing footprint of BEVs over conventional vehicles and decreasing incentives for clean electricity (since EPA assumes, under the Proposed Rule's compliance scheme, that all electricity used in EVs is effectively zero carbon). This analysis also shows that a rulemaking that also considers low-carbon ICE vehicles (such as enabled by low-carbon bioethanol) can facilitate compliance with EPA standards while decreasing the larger system emissions (including upstream emissions) in the atmosphere. [EPA-HQ-OAR-2022-0829-0609, p. 50]

The first of these concerns is that U.S. EPA has ignored upstream sources of GHG emissions other than electricity generation. This is of particular concern given that there are significant upstream emissions associated with the manufacturer of batteries for BEVs that do not occur with conventional vehicles. A paper published by ICCT4 notes that estimates of these GHG emissions range from 56 to 494 kilograms of CO2eq emissions per kWh of battery pack capacity which translates to between about 5 and 50 metric tons of GHG emissions per 100 kWh battery pack. Using U.S. EPA's assumption that the Proposed Rule will result in an additional 80,000,000 BEVs on the road in the U.S. by 2055 relative to the no- action case, and these estimates of GHG emissions from battery production, the cumulative increase in GHG emissions by would be between 400 and 4000 metric tons. This value can be compared to U.S. EPA's 710 metric ton estimate of the cumulative GHG emissions increase due to electricity generation for BEVs and the 8,000 ton reduction from conventional vehicles (see DRIA Table 9-21) to show the importance of accounting for battery production emissions. U.S. EPA might respond by noting that they have not accounted for upstream GHG emissions associated with the production of gasoline and diesel, but those are small compared to the GHG emissions from fuel combustion and accounting for them would assume a net global reduction in the use of those fuels which would likely, even with the Proposed Rule, still be used in other parts of the developing world. [EPA-HQ-OAR-2022-0829-0609, p. 62]

4 https://theicct.org/sites/default/files/publications/EV-life-cycle-GHG_ICCT-Briefing_09022018_vF.pdf.

U.S. EPA Fails to Account for the Potential of Increased Use of Ethanol to Achieve GHG Reductions as an Alternative to BEVs

Although BEVs have zero tailpipe emissions of CO2, they are still sources of CO2 emissions because of the emissions associated with fossil fuels used to produce the electricity used to power them. It then follows that the magnitude of the effective CO2 emissions from these BEVs will, in general, not be zero but will in fact vary depending on the source of that electricity. GHG emissions associated with the manufacture of batteries are another significant source of upstream emissions for BEVs. As noted above, based on a paper published by ICCT,7 upstream emissions associated with battery production vary considerably depending on the region in which they are manufactured as well as the size of the battery pack and selected a value on the order of 50 gCO2eq per mile as being representative. This value is obviously large when compared to the standards of the Proposed Rule (see Table 8) which range from 134 gCO2eq per mile in MY 2027 and 73 gCO2eq per mile in MY 2032 and thereafter. Despite the significant upstream emissions associated with BEVs, U.S. EPA is, as part of the Proposed Rule, planning to change existing requirements that would account for these "upstream" emissions in determining GHG associated with BEVs for purposes of regulatory compliance (FR Vol. 88, No. 87 at 29197). [EPA-HQ-OAR-2022-0829-0609, pp. 64-96]

7 https://theicct.org/sites/default/files/publications/EV-life-cycle-GHG_ICCT-Briefing_09022018_vF.pdf.

In contrast, while ICE vehicles fueled by ethanol-gasoline or neat ethanol will have tailpipe CO2 emissions, they may have lower overall effective CO2 emissions than BEVs. This is because there may be less fossil fuel used in their production and/or carbon capture and sequestration may be applied as well as the fact that the CO2 emitted at the tailpipe will ultimately be removed from the atmosphere by the growing of the next generation of feedstock plants. In addition, and unlike BEVs, the expanded use of ethanol would not result in any appreciable increase in upstream GHG emissions associated with vehicle manufacture. It is important to note that U.S. EPA claims that the purpose of the Proposed Rule is to generate "…substantial additional reductions in criteria pollutants and GHG emissions from the transportation sector" in order to achieve public health and welfare goals (FR Vol. 88, No. 87 at 29186). Given this, it is unclear why the Proposed Rule is effectively a mandate forcing automakers to produce and attempt to sell BEVs rather than a mechanism providing vehicle manufacturers with a range of options to reduce GHG emissions from new vehicles. Clearly, increased use of renewable ethanol as a direct substitute for petroleum-based gasoline would achieve this goal. For example, the widespread use of 20 percent gasoline-ethanol blends rather than the current 10 percent blends in new light-duty vehicles would double the associated GHG reductions. Further, the use of biofuels such as ethanol-gasoline which offer high octane ratings in combination with advanced combustion technologies that can offer substantial improvements in fuel efficiency as evidenced by the results of the U.S. Department of Energy's "Co-Optimization of Fuels & Engines" program8 and other research. [EPA-HQ-OAR-2022-0829-0609, pp. 64-96]

8 https://www.energy.gov/sites/default/files/2022-06/beto-co-optima-fy15-fy21-impact.pdf.

Overall, it is not clear why U.S. EPA has chosen to completely ignore the potential for the use of renewable biofuels to substantially reduce GHG emissions from light- and medium-duty vehicles in developing the Proposed Rule and instead myopically focused on a single unproven technology that will require a complete transformation of the vehicle industry – BEVs. U.S. EPA should consider the addition of provisions in the Proposed Rule that would lead to greater substitution of ethanol and other renewable fuels for gasoline and diesel used in conventional vehicles These provisions would include creating appropriate tailpipe GHG credit provisions for new vehicles designed to operate on ethanol blends above E10 and up to E99 that recognize the renewable nature of ethanol. An obvious advantage of this approach is that it would provide vehicle and engine manufacturers with compliance options other than overreliance on BEV technology that may or may not be available and/or accepted in the marketplace and help to ensure that substantial reductions in GHG emissions are actually realized by the Proposed Rule. [EPA-HQ-OAR-2022-0829-0609, pp. 64-96]

[See original attachment for James Lyon's resume] [EPA-HQ-OAR-2022-0829-0609, pp. 64-96]

[See original attachment (A3) for comments attributed to Environmental Health and Engineering and address proposed potential changes to EPA gasoline fuel property and greenhouse gas standards.] [EPA-HQ-OAR-2022-0829-0609, pp. 64-96]

Organization: Renewable Fuels Association (RFA)

To ensure the final tailpipe standards have the desired effect of truly reducing GHG emissions from transportation, RFA strongly urges EPA to adopt a full lifecycle GHG accounting approach for all vehicles in the final rule. [EPA-HQ-OAR-2022-0829-0602, pp. 6-8]

VI. EPA Should Adopt a Full Lifecycle Analysis Approach for All Vehicle Options that Includes Upstream GHG Emissions Associated with Vehicle Fuel/Energy Use

Vehicles and fuels operate together as integrated systems. This is true whether the system is a battery electric vehicle operating on electricity, or an ICE vehicle operating on liquid fuel. To effectively regulate emissions associated with the operation of light- and medium-duty vehicles, EPA must adopt approaches that most accurately assess the overall climate impacts of various transportation options. Specifically, EPA should examine the full scope of lifecycle GHG emissions associated with each vehicle/fuel system and allow automakers to use g/mile compliance values that reflect the overall GHG impacts of various vehicle/fuel options. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

In the proposal, EPA requests comments on its proposed treatment of electrified vehicles in manufacturer compliance calculations (i.e., the use of a 0 g/mile compliance value for EVs). As part of its rationale for proposing to maintain the 0 g/mile value for EVs, the Agency states that "[i]f EPA deviated from this tailpipe emissions approach [i.e., using 0 g/mile] by including upstream accounting, it would appear appropriate to do so for all vehicles, including gasoline-fueled vehicles."28 [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

28 88 Fed. Reg. 29252 (May 5, 2023).

RFA agrees with this statement by EPA and recommends that the Agency should indeed adopt an approach that accounts for full lifecycle emissions for all fuel and vehicle combinations. In fact, this is the only scientifically defensible approach for regulating emissions from light- and medium-duty vehicles. Implementing an approach that accounts for all lifecycle emissions would not only open the automotive market to greater competition and lower costs for consumers, but it would stimulate investment in lower- carbon technologies and practices across the entire fuel/vehicle supply chain. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

RFA believes the final rule should take a market-based approach that sets clear and predictable annual full lifecycle GHG reduction requirements for automakers (in g/mile values), then allows the marketplace to determine the most cost-effective means for achieving the reductions. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

Robust, peer-reviewed methodologies already exist for conducting full lifecycle emissions analysis for current and future vehicle and fuel options. Specifically, EPA should use the Department of Energy Argonne National Laboratory GREET model, which is accepted worldwide as the most robust and authoritative tool for lifecycle GHG accounting for a wide array of transportation fuels. The GREET model is also updated annually to incorporate the latest data. [EPA-HQ-OAR-2022-0829-0602, pp. 11-12]

EPA's proposed rule is also arbitrary and capricious because it fails to accurately account for the GHG emissions reductions achieved by both EVs and biofuels. EPA should use the best available science to accurately account for the lifecycle carbon intensity associated with particular fuels and technologies, but its proposed approach ignores the upstream emissions and emissions from electricity generation associated with EVs. Specifically, EPA proposes to assign a value of 0 grams/mile to EVs, which in effect assumes that electricity and battery minerals powering EVs are always 100% renewable and free of any CO2 emissions impacts. This assumption is flawed because the CO2 emissions associated with producing and transmitting electricity, as well as the emissions linked to critical mineral extraction and battery production, are significant. Indeed, lifecycle analysis studies show that some EVs (using coal-generated electricity and battery minerals from intensive mining practices) may have a larger carbon footprint than conventional vehicles using internal combustion engines. At the same time, EPA's proposal fails to recognize or account for the meaningful CO2 emissions savings that can be achieved through greater use of low-carbon ethanol in vehicles designed to accommodate higher blends (e.g., flex fuel vehicles). [EPA-HQ-OAR-2022-0829-0602, pp. 13-14]

In sum, we urge EPA to revise its proposal to create a technology neutral rule that accounts for all lifecycle emissions of the vehicles it regulates. A technology neutral rule will not only avoid some of the legal issues EPA's current proposal will face, but incentivizing multiple technologies is also the best way for EPA to achieve its ambitious goals. [EPA-HQ-OAR-2022-0829-0602, pp. 13-14]

b. Lifetime cost of the vehicle versus GHG reduction

The proposed rulemaking would not allow other vehicle/fuel pathways to compete with BEVs. By regulating only tailpipe emissions, and ignoring the rich literature of lifecycle analysis, EPA would create artificial incentives for auto manufacturers to pursue only BEVs. This could have disastrous effects on both the cost and the GHG emissions of future vehicles. As shown in the figure below from Argonne National Laboratory, the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with 400- mile range is dramatically more expensive than one with 200-mile range, and its lifetime [EPA-HQ-OAR-2022-0829-0602, pp. 15-16]

GHG emissions are substantially worse. In fact, a BEV with 400-mile range has only a slight GHG benefit compared to a hybrid EV or an FFV operating on E85. But the proposed rule would count all BEVs as "zero emissions," regardless of battery size – and regardless of vehicle size and weight. [EPA-HQ-OAR-2022-0829-0602, pp. 15-16]

[See original comment for Lifetime Cost vs GHG, Current Tech] [EPA-HQ-OAR-2022-0829-0602, pp. 15-16]

Organization: Specialty Equipment Market Association (SEMA)

While the draft rule will adversely impact automotive businesses, their employees, and the millions of automotive enthusiasts whose careers, businesses, and passions are threatened by this proposal, it will also have considerable unintended consequences for individuals and families who will have fewer choices when looking to purchase a new vehicle in the coming years. The agency's proposal is also problematic when digging into its actual environmental impact, as the draft rule considers only the emissions coming out of the tailpipe rather than the lifecycle emissions of producing and operating a vehicle. The move to a cleaner vehicle fleet is critical to our future, but it cannot be done in a way that picks winners and losers while also strengthening China and other geopolitical foes. It is imperative that the EPA factors-in automotive industry and consumer concerns and amend this proposed rule to help facilitate a technology-neutral transition to reducing vehicle emissions that thoughtfully positions multiple technologies to be part of a market-based solution. [EPA-HQ-OAR-2022-0829-0596, p. 2]

Tailpipe Emissions vs. Lifecycle Emissions

SEMA is disappointed that this proposal exclusively looks at tailpipe emissions and not the full carbon footprint surrounding the manufacture of BEVs, including their batteries and components. The EPA's calculations should include the environmental impacts associated with mining for battery minerals, manufacturing batteries, and the resources from the power grid to power a full fleet of BEVs. Of note, the U.S. Energy Information Administration reported that fossil fuels are the largest sources of energy for electricity generation in the United States with an estimated 61% of all the electricity generated in 2021 coming from a combination of coal, natural gas, and petroleum.4 While BEVs do not have tailpipe emissions, it is naï ve to assume that they are carbon neutral given the fossil fuels that the U.S. and other countries around the world rely upon to produce the power to operate these vehicles. An analysis from S&P Global Mobility found that for the sixth consecutive year in a row the average age of a vehicle on the road today is 12.5 years old. Conversely, the “average age of battery electric vehicles in the U.S. fell to 3.6 years down slightly from 3.7 years in 2022.”5 According to a 2022 EPA report on greenhouse gas emissions, new vehicle fuel economy has increased 32% since model year 2004.6 SEMA believes that tailpipe emissions can continue to be reduced without shifting to a zero-based tailpipe emissions model. A diverse approach to addressing GHG emissions through a multifaceted approach of cleaner fuels, alternative fuels and electrification provides consumers with a choice in how they reduce their carbon footprint. [EPA-HQ-OAR-2022-0829-0596, p. 4]

4 U.S. Energy Information Administration: Electricity in the United States (Link: https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php).

5 S&P Global Mobility: US consumers keep vehicles for a record 12.5 years on average (Link: https://www.reuters.com/business/autos-transportation/us-consumers-keep-vehicles-record-125-years-average-sp-2023-05-15/).

6 The 2022 EPA Automotive Trends Report (Link: https://www.epa.gov/system/files/documents/2022-12/420s22001.pdf).

Conclusion

While the automobile's roots are tied to the internal combustion engine, SEMA prides itself on maintaining a forward-looking vision that embraces innovative technology, including EVs and other zero-emissions vehicles. The specialty automotive aftermarket has led the way on alternative fuel innovations from replacing older engine technologies with newer, cleaner versions to converting older ICE vehicles to new electric, hydrogen, and other alternative-fuel vehicles. Sadly, the EPA's plans to reduce greenhouse gases and criteria pollutants do not factor this in. SEMA and its members have serious concerns with this proposal, which aggressively seeks to lower carbon emissions under timelines that effectively make electric vehicles the de facto choice for automakers to meet the requirements. [EPA-HQ-OAR-2022-0829-0596, p. 6]

Clean air and the reduction of greenhouse gases are goals everyone can acknowledge. That said, when governments arbitrarily pick technology winners and losers, the marketplace is deprived of choices and the public suffers. Instead of forcing this transition, the EPA should put in place incentives to support a diversified, zero-emissions approach that takes advantage of breakthrough technologies across the spectrum. [EPA-HQ-OAR-2022-0829-0596, p. 6]

Organization: Steven G. Bradbury (Bradbury)

Worsening air quality and increasing global carbon emissions. As the EPA touts the environmental benefits it hopes to achieve from the production of more EVs, it ignores the fact that as consumers turn away from new models and the overall U.S. fleet ages, the older cars left on America’s highways will produce more smog and other traditional air pollutants that degrade local air quality. And if there truly were an explosion in the sale of EVs, those EVs would need to be charged using elec- tricity produced mostly from fossil-fuel-fired power plants, increasing the national emissions of carbon dioxide.47 EPA largely dismisses this reality based on the wish-ful claim that America’s future power generation will soon shift en masse to wind and solar.48 [EPA-HQ-OAR-2022-0829-0647, p. 17]

47 See Roger Pielke Jr., “The Energy Transition Has Not Yet Started: Global fossil fuel consumption is still increasing,” The Honest Broker, June 29, 2023, https://rogerpielkejr.substack.com/p/the-energy-transition-has-not-yet; Robert Bryce, “The Energy Transition Isn’t: Despite $4.1 trillion spent on wind and solar, they aren’t even keeping pace with the growth in hydrocarbons,” July 1, 2023, https://robertbryce.substack.com/p/the-energy-transition-isnt.

48 See 88 FR at 29303-04.

Furthermore, EPA has deliberately left out of its cost-benefit equation entirely the upstream carbon dioxide emissions associated with EV production.49 The minerals and components used in EV batteries are mostly processed or manufactured in China using power generated from coal. While the U.S. has achieved huge reduc- tions in carbon dioxide emissions by converting coal-fired power plants to natural gas, China’s and other Asian nations’ carbon emissions are growing rapidly because of their heavy reliance on coal, and EPA’s rules will only accelerate that dynamic.50 An automotive engineering analysis published in 2022 estimated that the carbon dioxide emissions from producing the battery used in one small EV (the Nissan Leaf) were equivalent to driving an ICE vehicle 24,000 miles (two years of driving), and those from producing the battery used in a large EV (the Tesla Model S) were equivalent to driving an ICE vehicle 60,000 miles (five years of driving).51 In these rulemaking proposals, EPA has completely ignored the fact that EVs start out their lives on the road with such a huge head start (two to five years worth) in carbon dioxide emissions over their ICE counterparts. [EPA-HQ-OAR-2022-0829-0647, pp. 17-18]

49 See id. at 29197, 29254.

50 See Robert Bryce, “The Iron Law of Electricity Strikes Again as Vietnam Boosts Coal Burn,” June 17, 2023, https://robertbryce.substack.com/p/the-iron-law-of-electricity-strikes.

51 See Tristan Burton, et al., Convergent Science, Inc., “A Data-Driven Greenhouse Gas Emission Rate Analysis for Vehicle Comparisons,” SAE Int’l Journal of Electrified Vehicles, April 13, 2022, https://doi.org/10.4271/14-12-01-0006 (also available at https://www.sae.org/publications/technical-papers/content/14-12-01-0006/).

EPA’s benefits analysis is flawed and arbitrary.

On the benefits side of the ledger, EPA claims sky-high monetized benefits from the asserted reductions in carbon dioxide emissions—to the tune of upwards of a trillion dollars.64 These estimates are based on predicted reductions in the amount of gasoline and diesel fuel that would be burned if the U.S. auto fleet converts to EVs at the rates projected by EPA. But they completely ignore the very large increase in carbon dioxide emissions that would necessarily occur from the projected expansion in the production of EV batteries. They also ignore the upstream emissions of carbon dioxide from the increased electricity generation that would be needed to charge the projected fleet of EVs. [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

64 See id. at 29200, 29344.

EPA’s refusal to account for these huge offsetting emissions of carbon dioxide fundamentally distorts its analysis of net benefits in a manner that arbitrarily favors the Agency’s preferred regulatory outcome. It is, in fact, false and misleading to label EVs “zero-emission vehicles” when the production of EV batteries and the charging of the batteries over the life of the vehicles both generate enormous amounts of carbon dioxide. [EPA-HQ-OAR-2022-0829-0647, pp. 22-23]

Organization: Strong Plug-in Hybrid Electric Vehicle (SPHEV)

The chart below for light-duty PHEVs and BEVs show the benefit of PHEVs in reducing the use of critical minerals and accounts for the difference in electric miles between BEVs and different types of PHEVs. Strong PHEV battery utilization maximizes the value of battery manufacturing and materials capacities and helps address the need for fast scale up of battery manufacturing and mineral extraction by better utilizing resources. PHEV cars and trucks, especially, Strong PHEV cars and trucks, can electrify most daily commuting miles while occasionally using some gasoline, while BEVs have a lot of battery capacity that only gets "used" on very long trips. We assert that this could be considered wasted or underutilized lithium and other battery minerals. Thus, because PHEVs use their batteries more, the USA gets more EV miles per tonne of lithium by driving PHEVs and Strong PHEVs as shown in the chart below. PHEV's smaller batteries reduce the lifecycle environmental burdens associated with battery materials, production, and end-of-life.16 [EPA-HQ-OAR-2022-0829-0646, pp. 20-21]

16 Two studies. 1) Dunn, J.B., Gaines, L., Kelly, J.C., Gallagher, K.G. (2016). Life cycle analysis summary for automotive lithium-ion battery production and recycling. In: REWAS 2016: Towards Materials Resource Sustainability, R.E. Kirchain, B. Blanpain, C. Meskers, E. Olivetti, D. Apelian, J. Howarter, A. Kvithyld, B. Mishra, N.R. Neelameggham, and J. Spangenberger, eds. (Springer) pp. 73-79, https://doi.org/10.1007/978-3-319-48768- 7_11 2) International Energy Agency (IEA) (2022). Global Electric Vehicle Outlook 2022, https://www.iea.org/reports/global-ev-outlook-2022

[See original for graph titled "1 Million BEVs or 4-6.7 Million PHEVs?"] [EPA-HQ-OAR-2022-0829-0646, pp. 20-21]

[See original for graph titled "EV Miles per Year per Tonne of Lithium"] [EPA-HQ-OAR-2022-0829-0646, pp. 20-21]

Organization: TCW Inc. (TCW)

The current tunnel vision approach to ZEV's fails to consider the significant opportunities that are likely to come with hydrogen. Perhaps equally important is the recent use of R99, a renewable diesel fuel that is a direct replacement for petroleum based fuel. Studies have shown R99 emissions at 30-40% that of petroleum based fuel. When comparing the total lifecycle carbon footprint of a BEV (production, electricity generation, disposal), R99 has actually been shown to have less of a carbon footprint than BEV and does not rely on Russia, The Democratic Republic of Congo, or China to source materials for production. (Reference ATRI study at the link below) [EPA-HQ-OAR-2022-0829-0452, p. 1]

https://truckingresearch.org/2022/05/03/new-atri-research-quantifies-the-environmental-impacts-of-zero-emission-trucks/ [EPA-HQ-OAR-2022-0829-0452, p. 1]

Organization: Tesla, Inc. (Tesla)

EPA has long considered BEVs to be the most effective mobile source pollution mitigating technology, stating over a decade ago, "From a vehicle tailpipe perspective, EVs are a game-changing technology."38 Additionally, study after study shows BEVs are a superior technology for reducing air pollution and GHG emissions over their lifetime.39 On a well to wheels analysis including upstream emissions, the U.S. Department of Energy (DOE) has repeatedly found BEVs to be far superior in emission performance than internal combustion engine (ICE) technology.40 For example, a Tesla Model 3 or Model Y charging on the U.S. grid has average lifecycle emissions almost 3.5 times less than an average premium ICE vehicle.41 As a result, over a 17- year lifetime, a Tesla vehicle driver can avoid emitting over 55 tons of CO2e.42 [EPA-HQ-OAR-2022-0829-0792, pp. 6-7]

38 77 Fed. Reg.62624, 62815 (Oct. 15, 2012); See also, IPCC, AR6 Climate Change 2022: Mitigation of Climate Change (April 4, 2022) at 2-78 (Electric vehicles (EVs) powered by clean electricity can reduce GHG emissions and such policies are important for spurring adoption of such vehicles and GHG emission reductions); at 10-41 (BEVs manufactured and operated can lower emission by 85% compared to ICE vehicles) available at h ttps://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf (last visited Sept. 12, 2022).

39 See e.g., McKinsey, Battery 2030: Resilient, sustainable, and circular (Jan. 16, 2023) (In the worst case scenario, with no low-carbon electricity, total life-cycle emissions for BEVs are about 50 percent lower in Europe and 72 percent lower in the United States compared with ICE vehicles) available at h ttps://www.mckinsey.com/industries/automotive-and-a ssembly/our-insights/battery-2030-resilient-sustainable-and-c ircular?stcr=032392E457A548838A737BD614EB8B24&cid=other-eml-alt-mip-m ck&hlkid=38d0ad0585af40979275683ed8a9d167&hctky=10204926&hdpid=b8cb9677-a52c-48a1-b6ae-ded25e562aac; Environmental Research Letters, Mapping electric vehicle impacts: greenhouse gas emissions, fuel costs, and energy justice in the United States (Jan. 11, 2023) (finding that over 90% of vehicle-owning U.S. households would see reductions in both GHGs and transportation energy burden by adopting an EV) available at h ttps://iopscience.iop.org/article/10.1088/1748-9 326/aca4e6?utm_source=cbnewsletter&utm_medium=email&utm_term=2023-01-1 4&utm_campaign=Daily+Briefing+12+01+2023; ICCT, A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars (July 20, 2021) available at h ttps://theicct.org/publications/global-LCA-p assenger-cars-jul2021 ; National Academies of Science, Accelerating Decarbonization of the U.S. Energy System (Feb. 2, 2021) at 97 (“Further, light-duty trucks and buses should be electrified, particularly in urban areas. Over the next decade, the United States needs to ensure that electric vehicles become the predominant share of new purchases.”); available at h ttps://www.nap.edu/read/25932; Environment International, Assessing the health impacts of electric vehicles through air pollution in the United States (Nov. 2020) available at h ttps://www.sciencedirect.com/science/article/pii/S016041202031970X.

40 See, Department of Energy, Alternative Fuels Data Center, Emissions from Hybrid and Plug-In Electric Vehicles available at h ttps://afdc.energy.gov/vehicles/electric_emissions.htmlhttps://afdc.energy.gov/vehicles/electric_emissions.html.

41 Tesla, Impact Report 2022 at 31-34.

42 Tesla, Impact Report 2022 at 22, 149.

Further, California’s recent adoption of the ACC II rule, setting a 100 percent zero-emission vehicle (ZEV) sales standard by 2035, will also accelerate BEV adoption. As EPA recognizes, a number of states have already adopted ACC II and the list is growing.85 New research assessing the impact of additional states adopting California’s standards (accounting for the IRA’s tax credits) finds that adoption by California and 16 other states would accelerate electric vehicle adoption, cut 1.3 gigatons of carbon emissions (equivalent to closing 13 coal plants), create 300,000 new jobs, save households $230 per year, and prevent 5,000 deaths in 2050.86 [EPA-HQ-OAR-2022-0829-0792, pp. 12-13]

85 88. Fed. Reg. at 29344; Bloomberg Law, More States Join California’s Push to Phase Out Gas Cars by 2035 (May 16, 2023) available at h ttps://news.bloomberglaw.com/environment-and-energy/more-states-join-californias-push-to-phase-out-gas- c ars-by-2035

86 Energy Innovation, Nationwide Impacts Of California's Advanced Clean Cars II Rule (April 9, 2023) available at h ttps://energyinnovation.org/publication/nationwide-impacts-of-californias-advanced-clean-cars-ii-rule/

Furthermore, the seemingly sharp former distinctions between regulatory strategies to address criteria pollutant emissions and GHG emissions have continued to erode in view of the appropriate control strategies and technologies and the increasingly smaller margins for improvement from conventional ICE emissions. States have noted that zero emission vehicles (ZEVs) produce no tailpipe emissions, reduce brake wear PM emissions, and have lower upstream emissions to contribute to their State Implementation Plan (SIP) strategies.133 EPA's 2017 Tier 3 standards, for example, achieved reductions of methane (CH4) and nitrous oxide (N2O), each of which are GHGs that were part of EPA's endangerment finding.134 [EPA-HQ-OAR-2022-0829-0792, pp. 21-22]

133 See e.g., CARB, Staff Report: Initial Statement of Reasons (Oct. 22, 2019) at 5, Table ES-1: Expected Emission Reductions of Proposed ACT Regulation Calendar Year (NOx (tpd) PM2.5 (tpd) WTW GHG (MMT/yr.) 2031 5.0 0.16 0.4 2040 16.9 0.46 1.7 (Proposed Rule)) available at h ttps://ww3.arb.ca.gov/regact/2019/act2019/isor.pdf

134 79 Fed. Reg. at 23445.

EPA has previously recognized the importance of this harmonization. In promulgating its Tier 3 motor vehicle emissions standards, for example, the agency noted:

The Tier 3 program addresses interactions with the 2017 LD GHG rule in a manner that aligns implementation of the two actions, to achieve significant criteria pollutant and GHG emissions reductions while providing regulatory certainty and compliance efficiency. As vehicle manufacturers introduce new vehicle platforms for compliance with the GHG standards, they will be able to design them for compliance with the Tier 3 standards at the same time.135 [EPA-HQ-OAR-2022-0829-0792, pp. 21-22]

135 79 Fed. Reg. at 23417.

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth) (Heritage Foundation)

In order to produce supplies of renewables, China is increasing its construction of coal- fired power plants. This increases carbon emissions and reduces EPA's benefits from U.S. emissions reduction. America has 225 coal-fired power plants, and China has 1,118 (half of all the coal-fired plants in the world).31 That is one reason why China has increased carbon emissions by over 5,000 million metric tons over the past 16 years.32 In contrast, America's carbon emissions have declined by over 1,000 million metric tons over the same period due to the use of clean natural gas.33 (See Figure 1.) [EPA-HQ-OAR-2022-0829-0674, pp. 7-8]

31 Jessica Aizarani, Statista, "Global operational coal-fired power stations by country 2022," January 30, 2023, https://www.statista.com/statistics/859266/number-of-coal-power-plants-by-country/ (accessed April 28, 2023).

32 "International Emissions." International - U.S. Energy Information Administration (EIA), www.eia.gov/international/data/world/other-statistics/emissions-by-fuel?pd=40&p=0000000000000000000000000000000000000000000000000000b0001&u=0&f=A&v=column&a=-&i=none&vo=value&t=C&g=none&l=71-- 71&s=1104537600000&e=1609459200000& (accessed 21 June 2023).

33 Ibid.

China has not committed to reducing emissions until 2027. Research has shown that even completely eliminating all fossil fuels from the United States would result in less than 0.2 degrees Celsius in temperature mitigation by 2100.34 Americans, particularly poor and middle class, would be bearing major costs in higher electricity prices, higher food prices, and a forced switch to costly electric vehicles without benefits for the environment. They would pay the price for President Biden’s energy agenda. [EPA-HQ-OAR-2022-0829-0674, pp. 7-8]

34 Kevin D. Dayaratna, PhD, Katie Tubb, and David Kreutzer, “The Unsustainable Costs of President Biden’s Climate Agenda,” Heritage Foundation Backgrounder No. 3713, June 16, 2022, https://www.heritage.org/sites/default/files/2022-06/BG3713_0.pdf, (accessed May 1, 2023).

SEE ORIGINAL COMMENT FOR GRAPH CO2 Emissions Trends in Key Countries, 2005-2021 Figure 1 [EPA-HQ-OAR-2022-0829-0674, pp. 7-8]

Organization: Toyota Motor North America, Inc.

6.2. Technology Assessments Should Incorporate Critical Mineral Supply and Lifecycle Emissions

The modeling should also include a sensitivity analysis of BEV/PHEV mix on critical mineral usage for any assumed overall PEV penetration. PHEVs can make the most efficient use of the limited battery supply and constrained infrastructure network forecast through the period of the rulemaking. The below example compares different vehicle powertrain emissions for a mid-size SUV using peer-reviewed data from carghg.com. The same amount of lithium in the battery of one 300-mile plus BEV can be used for up to six PHEVs –or more than eighty conventional hybrids. See Figure 10 for the CO2 saved from replacing a mid-sized SUV powered by a conventional gasoline engine with electrified alternatives under a constrained lithium supply. This analysis assumes average US electric grid emissions for BEVs and the electric operation of PHEVs. [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

[See original for attachment for Figure 10 CO2 Saving from Replacing ICEs Under Constrained Mineral Supply]

PHEVs can rival the emissions performance of BEVs under many real-world operating conditions. PHEVs are not always the best-performing option but can have as good or better lifecycle performance because of lower manufacturing emissions for smaller batteries and lower well-to- tank emissions while still covering a significant fraction of daily trips in electric drive. Given most average daily trips are under 50 miles, this results in a significant portion of all-electric miles like a BEV. [EPA-HQ-OAR-2022-0829-0620, pp. 31-32]

Organization: Valero Energy Corporation

EPA should evaluate the merits of all fuels and vehicle technologies on a full lifecycle basis. For example, EPA states that “[i]n December 2022, Toyota announced plans to introduce 30 BEV models by 2030”.125 But EPA’s Proposed Rule should also meaningfully consider following statements from Toyota in the same announcement:126 [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

125 EPA's Proposed Rule at 29191 (citing to Toyota Motor Corporation, ''Video: Media Briefing on Battery EV Strategies,'' Press Release, December 14, 2021. Accessed on December 14, 2021).

126 Toyota Motor Corporation, "Video: Media Briefing on Battery EV Strategies,'' Press Release, December 14, 2021 (emphasis added).

- "We are living in a diversified world and in an era in which it is hard to predict the future. Therefore, it is difficult to make everyone happy with a one-size- fits-all option. That is why Toyota wants to prepare as many options as possible for our customers around the world." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

- "If the energy that powers vehicles is not clean, the use of an electrified vehicle, no matter what type it might be, would not result in zero CO2 emissions." [EPA-HQ-OAR-2022-0829-0707, pp. 25-27]

IV. The proposed rule should be technology- and fuel-neutral.

A. The proposed rule should evaluate all fuels and technologies on a lifecycle basis.

Although the preamble describes the proposed standards as being achievable by manufacturers using a variety of strategies that may include varying degrees of electrification among vehicle offerings, elements of the program have been skewed to favor electric vehicles. A glaring example of this is EPA's refusal to recognize the upstream emissions associated with EV power and battery production, on the one hand, or on the other hand, to provide a mechanism for appropriately quantifying and crediting reductions in GHG emissions attributable to low-carbon fuels used in ICE vehicles. [EPA-HQ-OAR-2022-0829-0707, pp. 61-62]

The National Bureau of Economic Research has acknowledged that "…despite being treated by regulators as 'zero emission vehicles', EVs are not necessarily emissions free."330 In fact, the Hummer EV using U.S. average grid electricity is reported as generating higher carbon dioxide emissions per mile than many smaller, more efficient gasoline-powered cars.331 [EPA-HQ-OAR-2022-0829-0707, pp. 61-62]

330 See http://www.nber.org/papers/w21291.

331 See https://qz.com/2154558/big-electric-trucks-and-suvs-are-the-new-gas-guzzlers.

A lifecycle analyses conducted by Southwest Research Institute finds that GHG emissions from a light-duty internal combustion engine ("ICE") vehicle that runs on renewable diesel with a carbon intensity of 25 g/MJ results in 25% fewer lifecycle GHG emissions when compared to a comparable battery electric vehicle ("BEV") using U.S. average grid electricity, as illustrated below. [EPA-HQ-OAR-2022-0829-0707, pp. 61-62]

[See original for graphic titled "Figure 2: U.S. Light-Duty Vehicle Lifecycle Emissions (Sept. 2022 Valero Investor Relations Presentation)"] [EPA-HQ-OAR-2022-0829-0707, pp. 61-62]

Organization: Western Energy Alliance

Further, it is not at all clear that the proposed rule will reduce GHGs as planned. Pure plug-in battery- powered vehicles can create more emissions than hybrid EVs (HEV) and even more than some traditional ICEVs for a variety of reasons including the fuel mix of the electrical grid where the EV is being charged and the large GHG footprint for producing the battery. The manufacture of a battery can produce GHGs equivalent to driving 24,000 miles, in the case of a Nissan Leaf up to 60,000 miles in the case of a Tesla Model S.4 Those numbers are before a single mile is driven by the supposed ZEV with its associated GHGs from the electricity used. When CO2 emissions linked to the production of batteries and the energy mix are considered, a study in Germany found EVs emit 11% to 28% more than their diesel counterparts.5 Volvo reports that in comparing a gas-burning model with its fully electric equivalent, with both vehicles built in the same factory, on the same assembly line, and sharing a large number of components, it found the electric version results in 70% more emissions.6 [EPA-HQ-OAR-2022-0829-0679, p. 3]

4 “A Data-Driven Greenhouse Gas Emission Rate Analysis for Vehicle Comparisons,” SAE International, Journal of Electrified Vehicles, V132-14EJ, April 13, 2022.

5 Kohlemotoren, Windmotoren und Dieselmotoren: Was zeigt die CO2-Bilanz?, Crhristoph Buchal et al., Ifo Institut, 2019.

6 “Building An EV Produces 70% More Emissions Than ICE, Says Volvo,” InsideEVs, Andrei Nedelea, November 20, 2021.

EPA needs better analysis of the GHG reductions by EVs. The assumption that they are “zero emission” must be tested using a more comprehensive analysis of full lifecycle emissions sources from EVs. [EPA-HQ-OAR-2022-0829-0679, p. 3]

EPA Summary and Response:

Summary:

A number of commenters maintained that lifecycle GHG emissions should be reflected in the emission standards themselves as well as in the compliance regime for the standards (i.e., certification) or within a GHG credit program. These commenters included fuel suppliers, fuel producers, several fleets and dealers, non-governmental organizations, and a few environmental groups. In addition, no commenter questioned the appropriateness of EPA considering upstream emissions as part of its overall assessment of CO_2 emission impacts, non-CO_2 emission impacts, or use in cost-benefit calculations.

The remainder of this section addresses exclusively the issue of life cycle analysis in the standard setting process and in determining compliance with standards. Comments relating to EPA’s consideration of upstream emissions in calculating emission impacts are addressed in sections 11.3 and 12.1.3 of this document.

A threshold issue addressed by some of the commenters is whether EPA has the legal authority to use some type of lifecycle approach in standard setting. Some of these commenters cited the broad discretion afforded by CAA section 202 (a) (1). Other commenters cited CAA sections 202 (a)(3)(A) and 202 (a)(4)(A) and (B).

Most of these commenters’ arguments were based on considerations of policy. They point out that PEVs in fact have greenhouse gas emissions associated with their production and their fuel source, i.e., emissions upstream of the vehicle tailpipe (and some commenters would consider downstream emissions as well, such as emissions attributable to battery disposal). Given these emissions, they maintain, it is more consistent with the Act’s emission reduction goals, and the technology-neutral basis of this rule, to account for those emissions in the standards. Certain proponents of alternative fuel use presented studies and other information which they characterized as showing that ICE vehicles powered by various types of biofuels would emit less than a comparable BEV vehicle, and, in any case, alleged that emission reductions from alternative fuel-powered vehicles would accrue immediately rather than after fleet turnover. Some commenters went further and argued that EPA would be acting arbitrarily by ignoring lifecycle impacts in the standards, since this would amount to just moving pollution around rather than reducing it, and would otherwise arbitrarily fail to solve the problem the rule is addressing.

Commenters were divided as to how a lifecycle approach could be reflected in the standards. Indeed, it was not always clear if the commenters intend for the approach only to apply to standards for PEVs, or for all vehicles. With respect to PEVs, suggestions ranged from accounting only for GHG emissions from the electricity generating source (potentially including an accounting for electricity lost in transmission and distribution), to emissions from battery manufacture, battery disposal, electricity supply chains, and mining of materials critical to battery production (including from overseas mining venues). Commenters were unclear as to whether their suggestions applied to GHG emissions only, or to other pollutants as well (although some pointed out that GHGs are exceptional, being global pollutants, such that a lifecycle accounting was justified).

Several commenters noted that EPA also did not consider emissions from mining and resource extraction processes as well as from battery production.

Response:

EPA is adhering to the approach for measuring compliance that every light and medium vehicle has used to date: compliance is based on emissions from the vehicle. As EPA stated in the Response to Comments in the 2021 final rule:

EPA disagrees that it is required to perform a life cycle analysis of vehicle and fuel production before setting vehicle standards, or to treat emissions of air pollutants attributable to electricity generation, or the mining, production or disposal of batteries for electric vehicles, as emissions "from" new motor vehicles. The Clean Air Act's entire structure evidences a clear divide between stationary sources (regulated under Title I) and mobile sources (regulated under Title II). There may be indirect impacts of stationary source regulation on mobile sources and vice versa, and it may be appropriate to consider those impacts in some circumstances, but it would be inappropriate and contrary to the plain text of the Clean Air Act to conflate the consideration of indirect impacts, when appropriate, with actually treating stationary source emissions as mobile source emissions. *Cf. Coal. for Responsible Regul., Inc. v. E.P.A.,* 684 F.3d 102, 128–29 (D.C. Cir. 2012), *aff'd in part, rev'd in part sub nom. Util. Air Regul. Grp. v. E.P.A.,* 573 U.S. 302 (2014), *and amended sub nom. Coal. for Responsible Regul., Inc. v. Env't Prot. Agency*, 606 F. App'x 6 (D.C. Cir. 2015) ("EPA was not arbitrary and capricious by not considering stationary-source costs in its analyses"). Congress directed EPA to address emissions from manufacturing fuels and vehicles under EPA's authority to reduce pollution from stationary sources and to address emissions from the operation of light duty vehicles under its authority to reduce pollution from mobile sources. It would be contrary to the purpose of the Clean Air Act if EPA declined to adopt otherwise-appropriate standards to reduce emissions from new light duty vehicles because additional reductions in pollution could be, but had not yet been, achieved by refineries, electric generating units, or vehicle manufacturers (due to vehicle production facilities). EPA interprets the Clean Air Act as directing EPA to consider regulation of emissions for each sector according to the applicable statutory requirements for each program. Congress has established and EPA intends to continue to undertake regulation of GHG consistent with those statutory requirements.[630]

Thus, EPA disagrees it is required to treat lifecycle emissions (such as those attributable to the production of vehicle fuel) as emissions “from” new motor vehicles or new motor vehicle engines for purposes of CAA 202(a), and even assuming EPA has authority to do so, EPA finds it would not be appropriate to do so.

EPA also finds that at this time there would be enormous, likely insuperable, practical difficulties in trying to incorporate a lifecycle approach into the standard setting process. As EPA has previously explained,[631] there are two fundamental problems with incorporating lifecycle analysis into standard setting: 1) having sufficient data for every technology; and 2) life cycle emissions are dependent on factors outside the scope of the rulemaking that may change in the future.

First, we doubt the data is adequate to undertake reliable life cycle analysis for any technology, but even if it is available for one technology, that is of little benefit unless it is available for every technology, or else there is no way to compare technologies. And as discussed elsewhere, sometimes the industry innovates in unforeseen ways and it is unclear how a lifecycle-based approach can be applied on an ongoing basis. Commenters advocating for life cycle analysis did not provide adequate data to support such an analysis. Although some commenters cited studies performing LCA for certain fuel or vehicle types, we also did not find those studies sufficiently robust for reasons we explain later in this section.

Second, this rule is not regulating manufacturing processes, distribution practices, or the locations of manufacturing facilities. And yet each of these factors could impact life cycle emissions. So while we could theoretically take a snapshot of life cycle emissions at this point in time for specific manufacturers, it may or may not have any relation to life cycle emissions in 2027 or a later year, or for other manufacturers.

With respect to comments from alternative fuel providers, EPA disagrees that it would be appropriate to provide a credit for renewable-fueled vehicles to reflect the lifecycle emissions of renewable fuels as compared to a baseline fuel. There already is a statutory program which encourages use of renewable fuels in transportation, including light- and medium-duty vehicles and heavy-duty engines, which moreover requires EPA to consider lifecycle greenhouse gas emissions. Id.; see also 76 FR at 57124 (Sept. 15, 2011) (Renewable Fuel Standards provisions, not section 202 (a)(1), are the appropriate means of evaluating and encouraging use of alternative fuels). The RFS program is the Congressionally mandated and appropriate means of evaluating

[630] 2021 Rule RTC at 16-41; see also Motor & Equip. Mfrs. Ass'n, Inc. v. E.P.A., 627 F.2d 1095, 1118 (D.C. Cir. 1979) (“there is no indication that Congress intended section 202's “cost of compliance” consideration to embody “social costs” of the type petitioners advance. Every effort at pollution control exacts social costs. Congress, not the Administrator, made the decision to accept those costs. Section 202's “cost of compliance” concern, juxtaposed as it is with the requirement that the Administrator provide the requisite lead time to allow technological developments, refers to the economic costs of motor vehicle emission standards and accompanying enforcement procedures. … It relates to the timing of a particular emission control regulation rather than to its social implications.”).

[631] 81 FR 73478, 73528 (Oct 25, 2016).

lifecycle implications of biofuels, and of encouraging their use, as appropriate.[632] There is no legal mandate or otherwise compelling reason to achieve the same purpose through Section 202 (a) (1) -- a provision directed at reducing emissions "from … motor vehicles." EPA notes that Congress established two distinct regimes for reducing pollution from vehicles—section 202, which is directed at vehicle and engine emissions, and section 211, which is directed at fuels. Congress was clearly aware that fuels and engines work in tandem to produce emissions[633] and yet the two sections, as discussed above, have very distinct structures and requirements. EPA finds that in light of this careful Congressional design, it would be inappropriate to adopt a fuels rule in the guise of a vehicle standard. Just as section 202 standards should be based on vehicle emissions, and not stationary source emissions, so too they should be based on vehicle emissions, as opposed to the lifecycle emissions of fuels.

Lifecycle emissions, especially those related to resource extraction, affect the total environmental footprint of all vehicles, including ICE vehicles with a range of electrification and BEVs. However, considering all such emissions in the context of modeling emission inventory impacts attributable to the final GHG standards is fraught and presents scope challenges. For example, resource extraction is a very large worldwide industry that supports many other manufacturing industries. Attributing any activity specifically to the standards is very difficult and highly uncertain. Another challenge is that the emissions from the mining sector are constantly changing as processes evolve, power grids become cleaner, and the areas of the mining itself change.[634] Therefore, calculating future emissions for this sector, especially in later years such as through the 2030s and 40s, is exceedingly difficult. These arguments also exist in the context of battery production itself. We note further that for a comparison to be valid, there would need to be an accounting of emissions associated with all aspects of petroleum extraction, all aspects of mineral extraction needed for catalytic converters (rhodium, palladium, platinum), and all aspects of lead acid battery production and subsequent management, which the commenters appear to disregard.

One commenter stated that EPA did not explain why, in assessing the air quality impacts of the rule, EPA limits its analysis of upstream emissions. It is true that, as discussed in RIA chapter 7.2, EPA's analysis of upstream emissions is limited to EGUs, refineries, and well sites and pipeline pumps for crude oil and natural gas production. EPA's judgment is that this approach represents a reasonable balance between considering indirect effects of the rule on air quality and limiting that consideration to reasonably proximate and predictable effects. Because we lack the data and capacity to predict every indirect effect of the rule throughout the supply chain and the broader economy, we judge that by examining the upstream emissions of EGUs and refineries we have taken into consideration the most significant indirect effects of the rule on

[632] To the extent the RFS statute is of any relevance in understanding section 202(a)(1), but see CAA section 211(o)(12) (savings clause), it indicates that when Congress wanted the agency to consider lifecycle emissions, it knew how to say that clearly. See also 26 USC 45V (providing a credit for clean hydrogen considering certain lifecycle emissions). Sections 202(a)(1)-(2) do not contain any such language, and particularly in light of the Act's overall division between mobile and stationary source regulation, any mandate to consider lifecycle emissions ought not to be implied.

[633] See, e.g., section 211(c)(1)(B) (authorizing EPA to regulate fuels that will impair emissions control devices); section 211(f)(1) (prohibiting the introduction into commerce of any fuel not substantially similar to the fuel used in certification testing of vehicles).

[634] Even the minerals being mined are likely to change as new battery chemistries are developed.

air quality, such that our air quality analysis is sufficiently complete for consideration in the rulemaking.

EPA also notes that accounting for these upstream emission processes in the context of an increase in PEV production while failing to do equivalent accounting for a reduction in the production of other vehicles, including ICE with a range of electrification, would unreasonably skew the emission impacts estimates. Many of the same metals that are in demand for PEV production would also be in demand for ICE production, so whether the standards would truly result in an increase in all mining, resource extraction, and production emissions is not clear. And, because such a broad accounting of these emission processes for the range of vehicles would include emissions from around the world, accounting for these emissions presents scope challenges.

EPA notes further that the emission benefits of certain alternative fuels are recognized at the tailpipe (in addition to whatever credit may be obtained under the RFS program). In response to comments that alternative fuel vehicles can provide CO_2 emission reduction benefits immediately and without the need for new supporting infrastructure, to the extent that is true, EPA notes that this potential compliance pathway remains an option.

EPA notes further that the commenters maintaining that use of alternative fuels producing GHG emission benefits sooner (on a lifecycle basis) than PEV deployment did not address the temporal issue of emissions associated with producing the additional quantities of agricultural biofuels. When crop production is expanded to produce more biofuels, a carbon debt is incurred through land use change emissions, by releasing carbon stored in vegetation and soil as one clears land and prepares it for cropping. That carbon debt must be "paid back" over time by displacing fossil fuel consumption with biofuels using the crops grown on that land. This 'debt' can require decades to pay back.[635]

Certainty of emission benefits (again, on a lifecycle basis) is by no means clear cut either. For example, in its recent RFS volume-setting rulemaking (the "Set Rule"), EPA analyzed the GHG-saving potential of soybean biodiesel, which is both the most widely used domestic biofuel in the diesel pool. EPA's analysis of the existing literature and comparison of biofuel modeling tools documented significant uncertainty regarding the GHG emissions profile of soybean oil biodiesel, including some uncertainty as to whether this fuel's GHG emission profile is favorable compared to diesel.[636]

EPA also notes the irony that many of the commenters raising concerns about lifecycle accounting are the same ones who claimed EPA's standards implicate the major questions doctrine because they represent a significant and novel expansion of EPA's regulatory

[635] For discussion of the carbon debt and payback time see for example: Fargione, J., Hill, J., Tilman, D., Polasky, S., & Hawthorne, P. (2008). Land clearing and the biofuel carbon debt. Science, 319(5867), 1235-1238. For more recent modeling of the temporal profile of biofuel GHG emissions see Sections 6.7 and 7.7 of the EPA Model Comparison Exercise Technical Document (EPA-420-R-23-017): https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017P9B.pdf

[636] See Chapter 4 of the Regulatory Impact Analysis (EPA-420-R-23-015) accompanying 88 FR 44468 and also EPA's Model Comparison Technical Document (EPA-420-R-23-017) accompanying this FRM. https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuels-standards-rule-2023-2024-and-2025

authority.[637] Despite their putative concern about the expansion of agency power, these commenters seem to suggest the agency should further extend its regulatory ambit under section 202(a)(1) to include a broad range of stationary sources, including not only major point sources, but area sources and agricultural operations, both domestic and foreign. A comprehensive lifecycle analysis of motor vehicle control technologies could be extraordinarily far ranging, including assessment of factors ranging from practices for clearing agricultural land for farming palm oil in Malaysia, to the environmental standards for cobalt mines in the Democratic Republic of Congo, to spills of diesel fuel at countless retailers across the United States. And while a lifecycle analysis could potentially be less far-reaching, the commenters requesting lifecycle accounting uniformly failed to advance a coherent basis for why the statute requires or permits the lifecycle accounting line to be drawn at a particular industry or degree of nexus. It would be remarkable if EPA's authority to regulate "the emissions of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines" encompassed consideration of emissions attributable to the manufacture of fertilizer for growing corn but excluded consideration of the emissions performance of BEVs. Regardless of whether the agency has authority to account for these or other lifecycle emissions in the manner advocated for by these commenters, we think that so extending the agency's authority is neither necessary nor appropriate for administering a statutory program focused on reducing vehicular emissions.

Finally, in response to comments suggesting that tailpipe emissions of biogenic and non-biogenic CO2 should be treated differently, we disagree. EPA notes that ever since the section 202 Endangerment Finding was made, it has considered GHG pollution as being comprised of six well-mixed gases (one of which is CO2), based on their properties and behaviors in the atmosphere that are relevant to the climate change problem, including characteristics and attributes related to radiative forcing, chemical reactivity, and atmospheric lifetime. As EPA stated, in reiterating this position in the 2016 Endangerment Finding for GHG Emissions from Aircraft, "[i]n the record for the 2009 Endangerment Finding, the Agency stated that 'all CO_2 emissions, regardless of source, influence radiative forcing equally once it reaches the atmosphere and therefore there is no distinction between biogenic and non-biogenic CO_2 regarding the CO_2 and the other well-mixed GHGs within the definition of air pollution that is reasonably anticipated to endanger public health and welfare.'"[638] EPA finds it appropriate to continue this policy of treating all tailpipe CO_2 emissions equivalently, since once they have been emitted to the atmosphere the CO_2 molecules have equivalent impacts on the climate, regardless of the origin and constitution of the fuel prior to combustion.

<u>Responses to specific comments:</u>

<u>Summary:</u>

EPA has legal authority to consider life cycle emissions in the standard setting process under CAA section 202 (a)(1) given the breadth of discretion afforded by that provision. Further, the provision does not specify regulation from vehicles. Rather, it refers to standards applicable to

[637] We explain in the RTC 2.3 why this rule is not an extraordinary exercise of agency power that would justify invocation of the major questions doctrine.

[638] 81 FR 54422, 54446.

emissions of air pollutants from a class or classes of motor vehicles which contribute to that air pollution.

Response:

First, these commenters' reading of section 202(a)(1) is problematic. The provision refers to emissions "from any class or classes of new motor vehicles" and EPA's endangerment determination identified new motor vehicles – specifically, passenger cars, light-duty trucks, motorcycles, buses, and medium and heavy-duty trucks – as the class contributing to the air pollution which endangers. EPA's contribution finding respecting this class considered only the emissions from the vehicles in the class. See 74 FR at 66537-540 (Dec. 15, 2009.)[639] Therefore, EPA does not perceive that the reference to 'class' in section 202(a) advances the commenter's argument.

If the provision is read as discretionary, as the commenters urge, EPA has explained above why it is inappropriate to exercise that discretion to include lifecycle-based standards. As noted and referenced above, there is both a clear demarcation in the CAA between stationary and mobile sources, and an entire statutory program devoted to consideration of alternative vehicular fuel use. There is no compelling reason to import all of those considerations into the section 202 (a)(1) standard setting process for light- and medium-duty vehicles. This would turn an emissions program into a fuel program, and obliviate the distinction between the two now codified in the Act.

Summary:

CAA sections 202(a)(3)(A)(ii) and 202(a)(4)(B) authorize or require consideration of lifecycle emissions in the standard setting process.

Response:

Section 202(a)(3)(A)(ii) does not compel EPA to establish standards based on lifecycle emissions. First, that provision only applies to certain criteria pollutant standards (including certain criteria pollutant standards for medium-duty vehicles established in this final rule), not to GHG standards or any light-duty standards. In any event, the reference to subcategorizing based on "type of fuel use" does not compel lifecycle standards. The natural meaning of that provision is that EPA may subcategorize based on the fuel used by a vehicle, for example, gasoline versus diesel, recognizing for example that vehicles of different fuel types may have different emissions characteristics. That provision does not mean that the Administrator must establish standards based on lifecycle emissions relating to fuel type. Moreover, section 202(a)(3) (A) (ii) is discretionary ("the Administrator *may* base such classes or categories"), and so cannot be read to compel any particular approach. Finally, given that the standard-setting provisions in section 202(a)(1) and 202(a)(3)(A)(i) speak to addressing emissions from classes of motor vehicles, we do not think a subsidiary provision on how such classes can be subdivided indicates that EPA is in fact compelled to establish standards based on lifecycle emissions from a wide range of stationary and agricultural sources. Congress does not hide elephants in mouseholes.

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[639] See, e.g. 74 FR at 55538/1 (contribution finding relates to the "emissions from the source category"); id. at 55540/2 (contribution finding relates to "[e]missions from the CAA section 202(a) source categories constitute the major part of the emissions from the transportation sector"); id. (showing transportation and electricity sector contributions separately).

Sections 202(a)(4)(A) and (B) are directed to whether emission control devices used to comply with the vehicular emission standards in vehicles might pose unreasonable risks. See section 202 (a)(4) (A) (“devices …used in a new motor vehicle”; “if such device … contributes to … unreasonable risk … in its operation or function”); and section 202(a)(4)(B) (“whether … the use of any device” affects emissions of unregulated pollutants, and whether any risk posed by “the use of such device” can be eliminated). These provisions consequently are directed at risks posed by devices used in the vehicle, not to upstream emissions. EPA has carefully evaluated the potential safety risks of PEV technologies in RTC 22. We note, moreover, the significant expansion of regulatory authority the commenter’s approach suggests: to conform to section 202(a)(4) EPA must evaluate the public health, welfare, and safety risks associated with gasoline refining and distribution, electricity generation and transmission, mining, and agriculture, in the US and in foreign nations. It would be odd, to say the least, for such a capacious command to lie hidden in an ancillary provision of the statute.

Summary:

Given that there are upstream and downstream emissions associated with BEVs, terming them zero emission vehicles is misleading. Without accounting for such emissions, EPA is improperly assessing the environmental impacts of its standards, and potentially just transferring pollution from one source to another. This can be demonstrated by an example: if a BEV were to be fueled by electricity from a stationary diesel generator, it would count as a zero emission vehicle, yet its overall impact would be the same as an ICE operating on diesel fuel. EPA’s distinctions are consequently arbitrary, and potentially counterproductive.

Response:

EPA is not ignoring emissions from upstream sources. See Preamble section VI and VII, and RTC section 11.3 and 12.1.3. These analyses show that the net GHG and criteria pollutant emission impacts of this rule are overwhelmingly positive, taking into account GHG emissions from both vehicles and upstream sources. We also find substantial positive $PM_{2.5}$ health benefits while accounting for both vehicular and upstream emissions. Thus, EPA does not accept the assertion in some of the comments that this rule fails to positively address the problem which prompts the need for the rule.

Second, the commenters ignore that upstream, and for that matter, downstream potential emission impacts from stationary sources are controlled via other EPA regulatory programs. Thus, electricity generation, battery manufacture, and recycling and disposal of spent batteries are all comprehensively regulated under other EPA programs. For example, EPA regulates electric generating units under many programs such as the Mercury and Air Toxics Standards (CAA), the Cross State Air Pollution Rule (CAA), the Cooling Water Intake Systems Rule (CWA), the Coal Combustion Residuals Rule (RCRA), the Steam Electric Power Generating Effluent Guidelines (CWA), as well as under various actions of particularly applicability such as State and Federal Implementation Plans to implement the National Ambient Air Quality Standards and the visibility protection program. See also 88 FR 24854 (proposing further controls on hazardous air pollutants emitted by steam electric power units), and 88 FR 33240 (May 11, 2023) (proposing GHG emission standards for existing coal- and oil-fired steam generating units, and for new and some existing gas fired steam electric generating units). With respect to the commenters’ example of PEVs being charged by electricity from a stationary source diesel generator, we note that notwithstanding some viral social media videos,[640] there is no evidence that this is happening in a way that significantly affects the emissions reductions achieved by the standards. Moreover, EPA notes that there are emission standards for such generators under the NESHAP for Reciprocating Internal Combustion Engines. 40 CFR subpart ZZZZ. Disposal of lithium-ion batteries is regulated comprehensively under EPA rules implementing the Resource Conservation and Recovery Act, see 40 CFR Part 173, and their transport is regulated comprehensively under DOT Hazardous Material Rules in 49 CFR Parts 171-180 (see RTC Section 22 "safety" responses, and RTC section 12.2.5 "recycling" responses.) Moreover, on October 23, 2023, EPA announced plans to propose further regulations adding to the safety standards for management of spent lithium-ion batteries.[641] Many of these same activities are regulated by other jurisdictions as well, including by U.S. states and foreign governments and their local jurisdictions. The preamble and RIA also discuss anticipated emissions reductions from the power sector attributable to the IRA.

As noted above, the delineation between mobile and stationary source standard setting is in keeping with the structure of the Act, whereby Congress directed EPA to control stationary sources under Title I of the Act, and mobile sources under Title II. For these reasons, EPA rejects the assertion of commenters that it has ignored these issues and consequently arbitrarily failed to consider an issue of importance in the rulemaking.

Summary:

Commenters had various suggestions as to which lifecycle emissions should figure into the standard setting process. All recommending the approach would include emissions associated with electricity generation. Others would include emissions associated with battery production. Commenters also mentioned inclusion of electricity supply chain-related emissions, associated with battery "disposal", and mining of materials critical to battery manufacture, including cobalt and other minerals presently supplied primarily from overseas.

Response:

The differing perspectives of commenters on where to draw the line for what is included in a lifecycle analysis illustrates the difficulties of importing a lifecycle approach into the section 202(a) GHG standard setting and compliance process, and reinforces EPA's long-established choice not to do so. Aside from the practical difficulties of making reliable accounting for emissions from overseas extractive activities, these commenters are not advocating consideration of emissions associated with extraction of precious and semi-precious metals used in ICE emission control systems, or extraction of lead used for lead-acid batteries.

As noted above, these commenters do not appear to be advocating a similar approach for fossil fuels, whereby all emissions and other impacts of locating, extracting, and processing fossil fuels, or all emissions associated with growing, harvesting, and transporting biofuels, would be accounted for in the vehicular standard setting process. Nor have the commenters

[640] See, e.g., https://www.usatoday.com/story/news/factcheck/2023/11/15/ev-charger-is-solar-and-diesel-powered-not-247-diesel-fact-check/71568937007/ (determining that video showing "EV charging station with diesel generator that 'runs 24 hours of the day, seven days a week'" was "false").

[641] The Unified Regulatory Agenda Entry reads, in relevant part, "EPA is proposing universal waste standards specially tailored for lithium batteries, separate from the existing general battery universal waste category. This change in the RCRA regulations would benefit those generating and managing waste lithium batteries by improving the safety standards and reducing fires from end-of-life lithium batteries, while continuing to promote recycling."

urging consideration of end-of-life battery disposal and recycling emission issues addressed emissions relating to disposal and recycling of lead acid batteries, or of wastes from petroleum refining. [642]

As noted above, EPA does not consider a partial life cycle analysis, which focuses only on certain technologies to be a sufficient analytical basis for standard setting.

Summary:

Various commenters submitted quantified analyses or cited journal papers, technical papers or reports purporting to show that ICE vehicles operating with biofuels, or HEVs, or PHEVs would actually emit less GHGs (or comparable amounts of GHGs) than comparable BEV vehicles when their respective lifecycle GHG emissions, including raw material extraction and processing, component and vehicle manufacturing, use-phase emissions, and end-of-life are accounted for.

Response:

None of the commenters citing journal papers, technical papers, or reports presented any evidence of having conducted a thorough literature review of automotive LCA in general, or for prospective/comparative LCA of BEV relative to other energy sources in particular. Commenters cherry-picked from among a small number of LCA studies, some extremely dated (e.g., a 2009 National Academies study) and that contain data and results that are of little or no relevance with respect to current or prospective life cycle emissions inventories (LCI) and LCA. In some cases, specific examples were then cherry-picked from within specific studies or generated from extreme cases among current automotive offerings using findings of a single study. For example, some commenters selected a single vehicle example from within a single study, e.g., an ICEV or HEV light-duty passenger car, and made direct comparisons to a BEV with substantially different use and capability, e.g., a 400-mile range BEV SUV; and then further attempted to apply conclusions from such a comparison to the broad diversity of the U.S. light- and medium-duty vehicle fleet. One commenter calculated emissions using a Hummer EV, as if a limited production, large, off-road-capable truck is somehow representative of the future U.S. vehicle fleet. Other commenters selected a single power sector scenario with higher carbon emissions from among the scenarios in the ICCT/Bieker et al (2021) LCA study instead of showing the full range of results.

In some cases, these studies pose methodological issues, or scope issues, that make them of limited value for comparison with this final rule, e.g., not referencing and adhering to international standards for conducting LCA (e.g., the ISO 14040 and ISO 14044 Standards) or not using transparent, traceable life-cycle inventories of sufficient data quality (see "Guidance on Data Quality Assessment for Life Cycle Inventory Data", EPA/600/R-16/096 June 2016). Since this rulemaking occurs in the future, the use of prospective LCA is key to understanding life-cycle emissions impacts at future dates. Some analyses included power sector and other analytical tools that are wholly unsuited for prospective LCA use, for example, Graham's use of EPA's own eGRID model for modeling prospective secondary power sector LCI.

[642] Among other things, petroleum refining results in the generation of a number of hazardous wastes, listed as hazardous wastes K048-K052 under the regulations (40 CFR Part 261.32) implementing subtitle C of the Resource Conservation and Recovery Act.

Even relatively recent and fully ISO compliant studies may have shortcomings with respect to prospective LCA if they do not include sensitivity analyses sufficient to cover the full range of fast-changing inputs. For example, battery cathode chemistries for automotive applications are rapidly evolving and different chemistries predominate to meet differing conditions and priorities in different regions of the world. Energy policies and policies to address the growing climate crisis are also rapidly evolving. The geographic regions for extraction and processing of raw materials, component manufacturing, battery manufacturing, and whole vehicle manufacturing are also evolving as new legislation such the BIL and IRA are put into place. Stationary emissions regulations, especially U.S. electric power sector emissions regulations, have evolved significantly over the past decade. One example of a recent study that did not, and frankly could not, account for the full range and rapid pace of changes impacting key LCI used for LCA was the ANL/Kelly et al. 2022 study cited by the Alliance, API, Chevron, Growth Energy, MCGA, NCGA, NFU, POET, RFA and others. The study relied on EIA 2017 power sector forecasting, which is now significantly out of date but was still fairly recent at the time that the work for the study was underway. The power sector analysis thus did not take into account implementation of recent EPA EGU emissions regulations or newer regulations finalized since 2017 (for example, the Mercury and Air Toxics or "MATS" rule or the Good Neighbor Plan's FIP requirements) that significantly impact coal thermoelectric retirement. Thus the prospective LCI from the study would reflect criteria pollutant emissions exceeding EGU standards implemented under the CAA. The study was also published just after and immediately prior to the BIL and the IRA, respectively, and thus includes none of the power sector investment in clean technologies encompassed within those laws. One of the primary reasons that EPA continues to use the Integrated Planning Model for developing prospective power sector LCI is that it incorporates all final EPA CAA actions impacting the power sector and it is regularly updated to incorporate new legislation. For example, EPA's Power Sector Modeling Platform Post-IRA 2022 Reference Case included updates to incorporate impacts from both the BIL and IRA.

To address some of these shortcomings with respect to the preponderance of LCA data and what it may say regarding comparative and prospective LCA of BEV relative to other energy carriers, EPA commissioned Eastern Research Group, Incorporated, (ERG) to conduct a thorough and comprehensive review of recently published (2019-2023 publication dates) automotive life cycle assessments (LCA) focusing on attributional LCA of battery electric vehicles (BEV) and competing technologies that included internal combustion engine vehicles (ICEV) as well as other electrified vehicles such as hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), and fuel cell electric vehicles (FCEV).

In addition to a thorough review of the literature, ERG conducted a meta-analysis of available automotive LCA studies. The final report for the literature review and meta-analysis identified approximately 10,000 potentially relevant automotive LCA studies for review. Of these studies, 91 studies were identified by ERG as relevant for detailed review, with 74 studies further identified as meeting acceptance criteria of both peer review and full compliance with ISO LCA standards. Of those 74 ISO-compliant studies, 31 studies were further identified as having sufficiently consistent assumptions and context, and sufficient level of detail regarding LCI and other parameters to allow intra-study comparison. A total of 23 LCA studies within the intra-study comparison found GWP impacts that were lower for BEVs relative to ICEVs, while 5 studies found that BEVs were higher than ICEVs. Those 5 studies represented a portion of the BEV use cases in parts of Asia and Eastern Europe that employ electricity grid mixes predominantly reliant on coal and/or natural gas to generate power. Results for U.S.-based use cases all found BEVs to have a lower GWP relative to ICEV, with a minimum of 20 percent GWP reduction, a maximum of 65% GWP reduction, and a median of 37% GWP reduction for BEV impacts relative to ICEV. While the Agency's analysis of upstream and tailpipe emissions for the final rule does not constitute a full LCA, the reduction in GWP reported after 2040 for the final rule (see RIA Chapter 8.6) falls within the bounds of ISO-compliant comparative automotive LCA literature for BEV GWP reductions. The preponderance of ISO-compliant LCA literature is supportive of GHG reductions for BEV when the full life-cycle is taken into account.

It should be noted, however, that there remain serious limitations to the use of LCA for determining life-cycle emissions from passenger cars and trucks. EPA received many comments with statements like "EPA should just use GREET". GREET is a major LCA platform that is frequently used by EPA for fuels and other analyses. It is important to take into consideration, however, that GREET is a platform that still must be populated with valid LCI input data in order to construct a valid LCA for prospective and comparative purposes. LCI for many key processes for both electrified and conventional automotive component and whole vehicle manufacturing, including LCI for extractive, manufacturing, and critical material recycling, lacks sufficient transparency and data quality, and may not be relevant for differing geographic locations and thus differing resulting energy/power sector LCI.

ERG's final report outlined a number of significant LCI data gaps and provided a summary of recommendations necessary for valid comparative and prospective automotive LCA. Please refer to the ERG report for a complete summary of the literature review, meta-analysis of BEV and other automotive energy carriers, data gaps, and recommendations. It is important to note that one key set of data gaps identified by ERG and also identified by the Automotive Life Cycle Assessment Informal Working Group of the United Nations Economic Commission for Europe World Forum for Harmonization of Vehicle Regulations[643] is with respect to component manufacturing processes (in particular batteries, semiconductors, and levels of automation), vehicle manufacturing processes, and their respective LCI.

Summary:

EPA itself has used a lifecycle approach for light-duty electric vehicles, whereby emissions associated with the source of electricity are considered for compliance once there is a given volume of sales in a model year. EPA should not ignore those upstream emissions, since doing

[643] EPA currently represents the U.S. as a contracting party to the United Nations Economic Commission for Europe World Forum for Harmonization of Vehicle Regulations (UN ECE WP.29). Recognizing the limitations and shortcomings of automotive LCA with respect to comparative and prospective LCA of different energy carriers, the UN ECE WP.29 established the Automotive Life Cycle Assessment Informal Working Group (A-LCA IWG). The role established for the A-LCA IWG is to serve as an international forum to develop common methodology and accepted practices for comparative and prospective automotive LCA for policymakers, LCA practitioners, and other stakeholders. The A-LCA IWG is currently working towards preparation of an initial set of draft recommendations tentatively scheduled for UN ECE WP.29 review by the end of 2025.

so dilutes the rule's benefits and exaggerates the difference in emission impacts of ICE and BEV vehicles. Nor is the zero emission needed any longer as an incentive.

Response:

The commenter notes correctly that past light-duty vehicle rules included a provision capping the number of BEVs whose tailpipe emissions count as zero. EPA adopted the cap to balance the competing concerns of promoting highly promising (then) relatively new technologies with concerns about decreasing overall emission reductions associated with the program at a time when neither the IRA nor EPA regulations were in existence to reduce upstream emissions. 77 FR at 62817, 62818 (Oct. 15, 2012). However, EPA postponed the implementation of the cap before any manufacturer became subject to it and returned to "its historical practice of basing compliance with vehicle emissions standards on tailpipe emissions." 85 FR 24174, 25208. As proposed, EPA is finalizing provisions that would continue to base manufacturer compliance calculations for tailpipe standards on tailpipe emissions. See preamble III.C.7 and section 3.1.5 of this RTC. With respect to accounting for electricity production emissions, EPA does so in its analysis of emissions impacts. Moreover, as the commenter notes, GHG emissions associated with electricity generation are decreasing with the increased use of renewables. Such a decline was a key factor for EPA in deciding to return to basing compliance on actual tailpipe emissions in 2020, 85 FR 25208, and confirms the reasonableness of the approach currently as well. EPA reiterates its view expressed above, and in the 2021 rule, that the appropriate means of addressing those emissions is through the Act's stationary source provisions.

Summary:

Several commenters said a lifecycle standard-setting approach was important for protecting disadvantaged communities.

Response:

EPA notes that BEVs not only have zero tailpipe GHG emissions, but zero tailpipe emissions of all other pollutants. Their operation consequently has very significant benefits, including for disadvantaged communities. See generally section 9 of this for addressing issues of environmental justice. As described in preamble section VI and VII, EPA has undertaken an analysis of the upstream and downstream emission impacts of the final rule's standards, which were set consistent with EPA's historic approach to standard setting, and EPA considers that analysis of the net impacts as supportive of the final standards.

Summary:

NGV America cites undocumented conversations with unspecified agency staff which the commenter characterizes as EPA staff support for a lifecycle approach to GHG vehicular standard setting.

Response:

Given the absence of documentation of these contacts – indeed, not even a year when the purported conversations occurred -- it is impossible to assess the accuracy of the commenter's characterization of them. In any case, agency staff are not the agency decisionmaker. The EPA Administrator is. For the commenter to speak of a 'breached commitment' by the administration is consequently both incorrect and inappropriate. Furthermore, as discussed in other comment responses, EPA's views have evolved as circumstances (e.g., the RFS program, power sector emissions, and PEV market development) have developed and changed. EPA has fully explained the basis for its decisions.

Summary:

Some comments suggest that EPA ignores the upstream emissions of CO_2 from the increased electricity generation that would be needed to charge the projected fleet of EVs and that it is false and misleading to label EVs "zero-emission vehicles" when the production of EV batteries and the charging of the batteries over the life of the vehicles both generate emissions, including CO_2.

Response:

This comment is incorrect. While EPA uses the name "zero-emission vehicle" to reference vehicles with no tailpipe emissions by convention, EPA never asserts or models the vehicles as having no emissions attributed to their activity. In this rulemaking, EPA largely uses the term "BEV" to denote battery electric vehicles. EPA's emission impacts analysis includes EGU emissions resulting from the charging demand in Chapter 5 of the RIA.

Summary and Response:

KALA Consulting ("KALA") filed a late comment.

KALA criticizes EPA for referring to BEVs as "zero emission vehicles" when there are upstream emissions associated with fueling them. As noted in the previous response, EPA has accounted for upstream emissions associated with both electricity generation and petroleum refining and has monetized those reductions in assessing the phase 3 rule's costs and benefits. In this regard, we note that KALA states mistakenly that EPA failed to account for electricity transmission losses in its analysis (Comment p. 13). See RIA chapter 5 noting that the 2022 post-IRA version of the Integrated Planning Model accounts for both energy generation and transmission. KALA is also incorrect in asserting that EPA has failed to consider issues associated with time-of-day recharging (Comment p. 34). Assessment of time-of-day charging is in fact is a critical part of EPA's analysis of both emission impacts and costs of this rule. See RIA Chapter 5.1 (load profiles reflecting total daily demand from BEV charging for each vehicle type).

Like a number of other commenters, KALA believes the section 202(a) GHG emission standards (although not standards for criteria pollutants or toxics) should reflect upstream emissions along with tailpipe emissions. KALA would draw the line at upstream GHG emissions associated with electricity generation, and it would do the same for gasoline and diesel-fueled vehicles. Comment p.14. Among the bases for the commenter's suggestion is its assumption that EGU GHG emission profiles are unlikely to improve (Comment p.10), failing to account for the effect of the IRA or any of the other factors reflected in EPA's IPM modelling showing renewables becoming an increasingly large portion of the EGU power-generating energy source. See RIA Chapters 5.4. Nor does KALA discuss why its upstream analysis stops at the EGU or refinery. For example, there is no discussion of whether to consider methane emissions associated with petroleum extraction.

KALA acknowledges EPA's statement that the Clean Air Act clearly delineates between mobile and stationary sources, but disagrees with EPA's further statement that stationary source GHG emissions can be and are being controlled by EPA regulatory programs addressing stationary sources. We respectfully disagree. KALA also does also does not speak to any potential legal impediments to including stationary source emissions as part of a mobile source section 202(a) standard (e.g., "from any class … of new motor vehicle").

20 - Employment

Comments by Organizations

Organization: Alliance for Automotive Innovation

1. Consideration of Labor Costs in Battery Cost Projections

EPA uses default BatPaC model labor costs. Presumably those costs reflect global production of batteries today. Yet given the agency's assumption that all batteries in all electric vehicles sold in the United States will be domestically produced, it seems likely that default labor values currently hard coded into the BatPaC model would need some degree of reconsideration. Neither of these issues, nor other potential issues pertaining to default assumptions applied elsewhere in the model, are addressed, or even acknowledged by the agency in its proposal. [EPA-HQ-OAR-2022-0829-0701, p. 56]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

First, EPA asserts that the proposed rule will likely have a net positive employment effect within the automotive industry by 2032—and even its worst- case scenario projects only a few thousand job losses. See 88 Fed. Reg. at 29,392. But a wealth of contrary research in recent years shows that a shift to electric vehicles is likely to have a substantial negative effect on employment in key automotive-related sectors. For instance, the Economic Policy Institute es- timates that "a rise in BEVs to 50% of domestic auto sales by 2030 could see losses of roughly 75,000 jobs by 2030." Jim Barrett & Josh Bivens, The Stakes for Workers in How Policymakers Manage the Coming Shift to All-Electric Vehicles, Econ. Pol'y Inst. (Sept. 22, 2021). Likewise, a Princeton analysis estimates that jobs in the fossil-fuel industry may decline by 131,000 to 210,000 jobs by 2030 as a result of the move to electric vehicles. See Net-Zero America: State-Level Health, Employment, and Land Use Impacts (Oct. 2021). And the California Air Resources Board projects that by 2040, nearly 32,000 (13.8 percent of baseline employment) auto-mechanic jobs will be lost in that State alone. See Advanced Clean Cars II Proposed Amendments to the Low Emission, Zero Emission, and Associ- ated Vehicle Regulations: Standardized Regulatory Impact Assessment (Mar. 29, 2022). Although EPA acknowledges some of this research, see 88 Fed. Reg. at 29,390, it has made no effort to distinguish it or explain why it is wrong—and thus failed to justify its optimistic employment predictions. [EPA-HQ-OAR-2022-0829-0683, pp. 61-62]

Worse, many of the jobs that are created by the shift to electric vehicles likely will not be located in the United States. Virtually all of the dominant battery producers that will need to ramp up production, for instance, are in Asia. Daniel Kupper et al., Shifting Gears in Auto Manufacturing, Bos. Consulting Grp. (Sept. 28, 2020), https://tinyurl.com/5a9w33ph. As EPA concedes, the proposed rule could well result in domestic "job loss" if "the United States does not become a major producer" of electric-vehicle components like "batteries, electric motors, regenerative braking systems and semiconductors." 88 Fed. Reg. at 29,390. [EPA-HQ-OAR-2022-0829-0683, pp. 61-62]

Organization: American Freedom and America First Policy Institute (AFPI)

EV Manufacturing Requires Fewer Workers

EVs are technologically different from conventional vehicles. They are significantly more expensive than gas-powered vehicles because their batteries require costly minerals (Mills, 2022, pp.7-8; Frazin, 2022) (Link: https://thehill.com/policy/3607123-heres-why-many-electric-vehicles-are-so-expensive/). Nonetheless, EVs are mechanically less complex. Conventional vehicles have many interconnected moving parts that convert the energy from burning gasoline to motion while processing exhaust. These parts include catalytic converters, gears, clutches, and torque converters. None of these parts are needed in electric vehicles, which consist of relatively simple motors and a battery. Ernst and Young report that conventional vehicles have 2,000 moving parts in their powertrains, while Tesla EV drivetrains have only 17 (Canis, 2019, p. 2) (Link: https://sgp.fas.org/crs/misc/IF11101.pdf). [EPA-HQ-OAR-2022-0829-0699, pp. 3-4]

Consequently, EVs require fewer workers to assemble. Automakers like Ford and Volkswagen report that EV manufacturing requires 30% to 40% less labor than gasoline-powered vehicles (United Auto Workers, 2020, p. 13; Bushey, 2022) (Link: https://www.ft.com/content/8df00b42-4e3f-4a45-b665-2726720105e0). Moreover, parts suppliers—not final assembly plants—employ almost three-quarters of auto manufacturing workers.3 About one- quarter of those parts workers produce gasoline engines and parts or powertrain and transmission parts—jobs that would be largely eliminated by a shift to EVs (U.S. Bureau of Labor Statistics, 2021) (Link: https://www.bls.gov/cew/data.htm). [EPA-HQ-OAR-2022-0829-0699, pp. 3-4]

> 3 As shown in Table 1, data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages shows that 219,000 employees worked in automobile and/or light-duty motor vehicle manufacturing facilities in 2021, while 539,000 workers were employed in motor vehicle part manufacturing facilities.

EV Mandates Will Eliminate Manufacturing Jobs

Auto industry analysts have accordingly noted that EV mandates will eliminate many existing auto manufacturing jobs. As Brett Smith, director of technology at the Center for Automotive Research, explained "[t]he industry is going through a transition unlike anything we've ever seen. There's a pretty strong chance that there will be fewer people building these cars, fewer people building the parts to these cars, and that will create challenges in some automotive communities" (Levin, 2022) (Link: https://www.yahoo.com/now/going-electric-could-cost-auto-105500604.html). [EPA-HQ-OAR-2022-0829-0699, pp. 3-4]

Analysts across the ideological spectrum project substantial job losses. In 2018, analysts projected EVs would account for about one-fifth of new U.S. vehicle sales by 2030 (International Energy Agency, 2018, p. 80; Cooper & Schefter, 2018, p. 2) (Link: https://www.edisonfoundation.net/-/media/Files/IEI/publications/IEI_EEI-EV-Forecast-Report_Nov2018.ashx). That year, the United Auto Workers (UAW) union estimated that the shift to electric vehicles would eliminate 35,000 of its members' jobs (Bogage, 2022) (Link: https://www.washingtonpost.com/business/2022/12/08/ev-union-gm/). That figure accounts for nearly 1 in 10 UAW members. [EPA-HQ-OAR-2022-0829-0699, pp. 3-4]

UAW research director Jennifer Kelly has publicly predicted that “[t]he workers who are making engines and transmissions today, their jobs will be eliminated when we make a transition to electric vehicles” (Beene & Coppola, 2018) (Link: https://www.ttnews.com/articles/electric-vehicles-seen-imperiling-us-jobs-uaw-says?itx%5bidio%5d=5856017&ito=792&itq=7d3aa1df-ab57-4b41-adf2-d079d9c1a42f). She warns that “electric, to me, is where the real risk is to our membership” (Dawson et al., 2019). [EPA-HQ-OAR-2022-0829-0699, pp. 3-4]

In 2021 President Biden set a target of EVs accounting for half of all new vehicle sales by 2030 (The White House, 2021) (Link: https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/). The left-wing Economic Policy Institute (EPI) estimated that, without substantial government intervention, hitting this target would eliminate 75,000 auto manufacturing jobs (Barrett & Bivens, 2021) (Link: https://www.epi.org/publication/ev-policy-workers/). EPA’s even stricter proposed new mandate—two- thirds of all vehicles sold by 2032—would cost even more jobs. [EPA-HQ-OAR-2022-0829-0699, pp. 3-4]

Foreign analysts similarly project that EV mandates will eliminate many auto-related jobs overseas. For example, the European Union has advanced aggressive EV mandates. The European Association of Automotive Suppliers estimated that, by 2040, these measures will eliminate a net of 275,000 jobs in automotive suppliers (Sigal, 2021) (Link: https://europe.autonews.com/suppliers/ev-transition-could-cost-500000-jobs-supplier-group-says). Japanese analysts expect EVs to eliminate more than 80,000 auto-related jobs in their country by 2050 (Yamada & Abe, 2021) (Link: https://asia.nikkei.com/Business/Automobiles/EV-shift-puts-engine-jobs-on-chopping-block-in-Japan-and-Germany). [EPA-HQ-OAR-2022-0829-0699, pp. 3-4]

Great Lakes Region Will Be Particularly Affected

EV mandates will particularly affect the industrial Midwest. The tri-state region of Indiana, Michigan, and Ohio is the heartland of U.S. automobile production, particularly for gas-powered vehicles, transmissions, and related parts manufacturing. More than two-fifths of U.S.-built vehicles and three-fifths of U.S.- built transmissions are manufactured in these three states (Massachusetts Institute of Technology, 2022, p. 2) (Link: https://energyjustice.indiana.edu/doc/2022-the-roosevelt-project-industrial-heartland-case-study.pdf). These states account for 43% of U.S. autoworkers, including more than 70,000 workers who produce parts for motor vehicle powertrains, transmissions, or gasoline engines (U.S. Bureau of Labor Statistics, 2021) (Link: https://www.bls.gov/cew/data.htm). [EPA-HQ-OAR-2022-0829-0699, pp. 4-5]

Industry analysts have noted that an EV transition will be particularly painful to the Midwest (Massachusetts Institute of Technology, 2022, pp. 21-22) (Link: https://energyjustice.indiana.edu/doc/2022-the-roosevelt-project-industrial-heartland-case-study.pdf) . As Lawrence Burns, former vice president for research and development at General Motors, told reporters, “If you play this out in a five- to 10-year time frame, employment ramifications for states like Michigan and regions like southeast Michigan and northwest Ohio are really going to be a big deal" (Grzelewski, 2020) (Link: https://www.govtech.com/fs/transportation/in-the-shift-to-evs-some-worry-workers-could-suffer.html). [EPA-HQ-OAR-2022-0829-0699, pp. 4-5]

Table 1 shows motor vehicle manufacturing employment in the tristate area and in the U.S. as a whole, including both employees on primary assembly lines and employees in parts production. Michigan, Ohio, and Indiana have significantly more jobs—and thus economic disruption—at stake from EV mandates than any other region of the country. [See original comment for Table 1: Motor Vehicle Manufacturing Employment in Indiana, Michigan, Ohio, and the Entire United States (2021) [EPA-HQ-OAR-2022-0829-0699, pp. 4-5]

Estimated Job Losses

While EV mandates are widely expected to eliminate existing auto manufacturing jobs—especially in the Midwest—few public estimates are available for how EV mandates will affect individual states. EPA did not project the economic impact of its proposed rule on individual states or look at how it would affect Midwest manufacturing employment. To fill this gap, AFPI used data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages to model the net national auto manufacturing job losses from EV mandates. [EPA-HQ-OAR-2022-0829-0699, pp. 5-7]

Based on the automaker and UAW estimates discussed above, the model assumes EVs require 30% less labor to assemble than conventional vehicles. It also assumes that positions in gas engines and parts manufacturing facilities do not have a role in producing EVs and that four-fifths of positions involved in producing transmission and powertrain parts are similarly unnecessary for EV production. The methodological appendix explains the model in detail. [EPA-HQ-OAR-2022-0829-0699, pp. 5-7]

This model focuses only on auto manufacturing jobs; it does not estimate jobs created or lost in other sectors, such as car dealerships, vehicle maintenance facilities, or battery manufacturing.4 Workers cannot easily transition between these sectors because they generally involve different skill sets (St. John, 2022) (Link: https://www.businessinsider.com/automakers-jobs-desperate-workers-fuel-electric-vehicle-transition-batteries-2022-12). As a European industry association explained, battery manufacturing "typically requires more academically schooled workers and less vocationally trained workers than the production of transmission systems, fuel tanks or other powertrain components" (European Association of Automotive Suppliers, 2022) (Link: https://clepa.eu/mediaroom/5-key-questions-answered/). [EPA-HQ-OAR-2022-0829-0699, pp. 5-7]

4 The North American Industrial Classification System (NAICS) classifies battery manufacturing in a different industrial sector than it does auto manufacturing. NAICS code 336—transportation equipment manufacturing— encompasses motor vehicle and motor vehicle parts manufacturing. Battery manufacturing is covered under NAICS code 335—electrical equipment, appliance, and component manufacturing.

In 2022, electric vehicles accounted for 5.6% of U.S. motor vehicle sales (Mihalascu, 2023) (Link: https://insideevs.com/news/653395/evs-made-up-5point6-percent-of-overall-us-car-market-in-2022-driven-by-tesla/). Table 2 shows estimated net national auto-manufacturing job losses—in both final assembly and parts manufacturing—for different levels of EV growth.5 [See original comment for Table 2: U.S. Auto Manufacturing Job Losses if Electric Vehicle Market Share Rises] [EPA-HQ-OAR-2022-0829-0699, pp. 5-7]

5 The model does not show a strictly linear relationship between job losses and EV market share, i.e. job losses at 20% market share are not two-fifths of the job losses at 50% EV market share. This is because EVs currently account for about 6% of the U.S. market, and the model takes that into account.

These national projections track those of other analysts. If EVs increase to one-fifth of the U.S. market, the model projects, 27,000 net auto-manufacturing jobs will be lost. This closely tracks the UAW's 2018 estimate that EVs would eliminate 35,000 auto manufacturing jobs—at a time when analysts expected EV market share to increase to only 20% over the decade.6 [EPA-HQ-OAR-2022-0829-0699, pp. 5-7]

6 The discrepancy between the AFPI model and the UAW's 2018 estimates is explained by EV market share growth and auto manufacturing job losses between 2018 and 2022. In 2018, EVs accounted for only 2 percent of all vehicle sales (McDonald, 2019) (Link: https://cleantechnica.com/2019/01/12/us-ev-sales-surpass-2-for-2018-8-more-sales-charts/). If the model were specified using employment data from 2018 and estimating job losses from EV market share rising from 2% to 20%, it would project 35,100 jobs lost nationally—almost exactly the UAW estimate.

If EVs rise to half of U.S. vehicle sales—President Biden's original policy—the model estimates almost 85,000 net auto-manufacturing jobs will be lost. This is similar to EPI's estimated 75,000 manufacturing jobs lost at 50% EV market share. [EPA-HQ-OAR-2022-0829-0699, pp. 5-7]

The model also shows that EPA's proposed stricter EV mandate would cost tens of thousands more jobs than its original policy. If EV sales rose to two-thirds of the market—the proposed new requirement—then 117,000 net auto-manufacturing jobs would be eliminated. About two-thirds of those job losses would come from parts manufacturers. The remaining third would be in final assembly positions. Overall, the proposed rule would substantially reduce auto-manufacturing employment. [EPA-HQ-OAR-2022-0829-0699, pp. 5-7]

Job Losses by State

Previous studies do not provide state-specific estimates of EV-induced job losses. EPA also did not consider the regional employment impact of its proposed rule. Table 3 presents "best-case cenario" estimates of auto-manufacturing job losses by state if EVs rise to two-thirds of new vehicle sales. The model assumes that existing auto manufacturers would retain their market share through the EV transition and that they would build these EVs at their existing facilities instead of closing some plants and opening new facilities in different states. Under these optimistic assumptions, total job losses are driven only by the aggregate labor efficiencies in EV assembly and by the elimination of engine and powertrain part manufacturing positions. [EPA-HQ-OAR-2022-0829-0699, pp. 7-8]

Table 3 presents the nine states that, under this best-case scenario, would experience the greatest auto manufacturing job losses under EPA's proposed rule. These states collectively account for almost 84,000 of the 117,000 jobs lost nationally. The model shows that the proposed rule would impose significant economic costs on Michigan, Ohio, and Indiana. These three states bear the brunt of job losses, although several southern states would also see significant losses. [See original comment for Table 3: Auto Manufacturing Job Losses by State under a 67% EV Mandate] [EPA-HQ-OAR-2022-0829-0699, pp. 7-8]

Michigan is projected to experience the worst job losses, with 25,000 jobs lost. About 8,000 of those jobs would occur in final assembly, while about 17,000 would be in parts manufacturing. Indiana (-16,000) and Ohio (-14,000) would suffer the next worst losses. Tennessee (-7,000), South Carolina (-5,600), and Alabama (-5,200) would also experience large job losses. [EPA-HQ-OAR-2022-0829-0699, pp. 7-8]

However, the Midwest is likely to see even greater job losses than these best-case estimates project. EV mandates are likely to push auto manufacturing jobs out of the Midwest. Telsa dominates EV manufacturing, accounting for almost two-thirds of EVs sold in 2022. It is accordingly likely that Tesla will take considerable market share from the other automakers if the government forces them to switch to EVs. This would mean higher employment in Tesla's California, Texas, and forthcoming Nevada manufacturing facilities, but even lower employment in Michigan, Ohio, and Indiana. Similarly, many of the traditional auto manufacturers are building their EVs in new facilities outside the tri-state area. Ford Motor Co., for example, has announced plans to create a large assembly plant for electric trucks in Tennessee (Ford, 2021) (Link: https://media.ford.com/content/fordmedia/fna/us/en/news/2021/09/27/ford-to-lead-americas-shift-to-electric-vehicles.html.) This shift would mitigate job losses in Tennessee but would result in even worse job losses for Michigan. [EPA-HQ-OAR-2022-0829-0699, pp. 7-8]

EPA's proposed rule, which did not analyze or consider potential regional economic effects, would impose heavy economic costs on the Midwest. The rule would directly eliminate tens of thousands of blue-collar jobs in what is currently the epicenter of U.S. automobile manufacturing. Forcing consumers to switch to electric vehicles would eliminate the jobs of many workers who produce those vehicles. To the extent the proposed EV mandate spurs labor reallocation in vehicle manufacturing, Midwest job losses will be even greater. These job losses would devastate many communities in Michigan, Ohio, and Indiana. The EPA should reject this proposed rule for this reason. [EPA-HQ-OAR-2022-0829-0699, pp. 7-8]

Methodological Appendix

The America First Policy Institute (AFPI) used motor vehicle manufacturing employment data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) to estimate net job losses from EV adoption. The QCEW is based on records derived from unemployment payroll tax payments. It is highly reliable administrative data, but it is produced with a lag. QCEW data from 2021 is the most recent annual data available. AFPI collected both national and statewide QCEW employment data for 2021 from four industry subsectors [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]:

- Automobile and light-duty motor vehicle manufacturing (NAICS code 33611); [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

- Motor Vehicle Parts Manufacturing (NAICS code 3363); [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

- Motor Vehicle Gasoline Engine and Engine Parts Manufacturing (NAICS code 336310); and [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

- Motor Vehicle Transmission and Power Train Parts Manufacturing (NAICS code 33635). [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

AFPI assumed the annual quantity of vehicles sold would remain constant throughout any transition to EVs. This is a somewhat strong assumption, as—even with substantial tax credits—EVs remain considerably more expensive than gas-powered vehicles. The average cost of vehicles consequently would rise considerably as EV market share increases, and higher prices reduce sales. To the extent that vehicle sales drop instead of remaining constant, the model will tend to underestimate job losses, as fewer workers would be needed to make fewer vehicles. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

Assuming constant production and constant market share, the model assumes job losses at the national and state level would be proportional to the reduction in conventional vehicle sales. Automakers report that EVs require 30% to 40% less labor to assemble than conventional vehicles (United Auto Workers, 2020, p.13; Bushey, 2022) (Link: https://region1d.uaw.org/system/files/ev-white-paper-revised-january-2020-final.pdf) (Link: https://www.ft.com/content/8df00b42-4e3f-4a45-b665-2726720105e0). AFPI used the lower end of this range, estimating that the reduction of employment in automobile and light-duty motor vehicle manufacturing ("Motor Vehicle Assembly" in Tables 2 and 3) is proportional to 30% of the reduction in conventional vehicle sales. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

This assumption implies that automakers would respond to the mandate by retooling their existing conventional vehicle assembly facilities to produce EVs, keeping the large majority of their current assembly workforces. This is an optimistic assumption. In reality, some facilities that assemble gas-powered vehicles are likely to close entirely, while new EV assembly facilities are likely to open. Those new EV facilities may not be in the same states as the conventional facilities, and they are unlikely to solely reemploy workers laid off from conventional vehicle production. Such shifts in domestic production have no impact on net national job loss estimates. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

However, as discussed in the text, they mean the state job loss figures are a "best-case scenario" for the Midwest. In reality, production shifts would mean the Midwest would likely experience even greater job losses. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

The model assumes that job losses for workers in motor vehicle gasoline engine and engine parts manufacturing would be fully proportional to decreases in conventional vehicle sales, i.e., none of these jobs would have a role in producing electric vehicles. The model further assumes that job losses in motor vehicle transmission and power train parts manufacturing would be proportional to 80% of the reduction in conventional vehicle sales, e.g., EV manufacturing would require 20% of current transmission and powertrain parts employees. This allows for the possibility that transmission and powertrain parts manufacturers will retool to provide parts for EV power trains, while recognizing that EV power trains are much simpler and require far fewer parts than gas-powered vehicles.7 [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

7 The UAW reports that an EV Chevy Bolt powertrain has 80% fewer moving parts than the gas-powered version, and predicted that design improvements would enable that figure to rise in the future (United Auto Workers, 2020, pp. 12-13) (Link: https://region1d.uaw.org/system/files/ev-white-paper-revised-january-2020-final.pdf).

The assumption that some current transmission and powertrain parts manufacturing employees will have a role in producing EVs is somewhat optimistic. As discussed above, the UAW's research director has predicted these jobs will be completely eliminated (Beene & Coppola, 2018) (Link: https://www.ttnews.com/articles/electric-vehicles-seen-imperiling-us-jobs-uaw-says?itx%5bidio%5d=5856017&ito=792&itq=7d3aa1df-ab57-4b41-adf2-d079d9c1a42f). If employment losses in transmission and powertrain parts manufacturing are fully proportional to the reduction in conventional vehicle sales, then job losses among powertrain and transmission parts manufacturing employees will be proportionately higher. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

Using these assumptions, the model calculated employment losses from increased EV market share at both the state and national levels as follows. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

The model first calculates the percentage decrease in conventional gas-powered vehicle sales implied by a given proportion of EV market share. For example, if EV market share rises from 5.6% (2022 levels) to 67% (the Biden Administration's proposed requirement for 2032), then the conventional vehicle market share will drop from 94.4% to 33%. This would be a 61.3 percentage point decrease in conventional vehicle market share, and—assuming vehicles sold remain constant—a 64.9% reduction in conventional vehicles sold (61.3 percentage point reduction in market share / 94.4% initial market share). [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

The model assumes that all employees in gasoline engine and parts manufacturing work on conventional vehicles. The model estimates job losses in this sector by multiplying the percentage reduction in conventional gas-powered vehicle sales by QCEW employment in that sector. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

The number of positions involved in assembling conventional gas-powered vehicles is estimated by multiplying QCEW employment for all automobile and light-duty motor vehicle manufacturing by the 2022 conventional vehicle market share (94.4%), as well as an adjustment factor to account for the fact that EVs require less labor to assemble. The estimated number of positions involved in assembling conventional motor vehicles is then multiplied by the percentage reduction in conventional vehicle sales and the 30% labor efficiency factor to estimate total job losses in motor vehicle assembly. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

The number of positions involved in manufacturing transmission and powertrain parts for conventional vehicles is estimated by multiplying QCEW employment for all transmission and powertrain parts by the 2022 conventional vehicle market share (94.6%), plus an adjustment factor to account for the 80% assumed reduced labor requirements for EV powertrains. The estimated number of positions involved in manufacturing conventional vehicle powertrains and transmission parts is then multiplied by the percentage reduction in conventional vehicle sales and the 80% labor efficiency factor to estimate total job losses in transmission and powertrain parts manufacturing. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

As discussed in the text, the model assumes that existing automakers maintain their current market share through the transition to EVs. This optimistic assumption seems unlikely to actually materialize. Tesla currently dominates EV production, accounting for almost two-thirds of new EV sales in 2022 (Mihalascu, 2023) (Link: https://insideevs.com/news/653395/evs-made-up-5point6-percent-of-overall-us-car-market-in-2022-driven-by-tesla/). Tesla's U.S. factories are primarily located in California and Texas, with a new facility under construction in Nevada. If Tesla continues to maintain its dominant EV position, the market share of the Detroit-based automakers—General Motors, Ford, and Stellantis/Chrysler—will fall. As long as domestic manufacturers maintain their collective market share, changes in market share will not affect the net national job loss figures. However, such shifts would produce even larger job losses in Michigan and other Midwestern states than the model projects. [EPA-HQ-OAR-2022-0829-0699, pp. 9-11]

Organization: BlueGreen Alliance (BGA)

Climate change, economic injustice, and racial inequity are the most fundamental challenges we face today—and we know they're inextricably intertwined. In the transportation sector, which accounts for nearly 30% of U.S. greenhouse gas emissions, this intersection is visible in the disproportionate impact of transportation emissions on non-white communities.1 It's visible in the disparities in access to cleaner vehicles and other mobility options across income levels. And it's visible in the economic impacts of decades of disinvestment in auto manufacturing communities, which have seen good jobs offshored and anchor facilities shuttered due to ill-conceived policies that gutted the middle class. That's why it is critical that regulators, policymakers, and advocates coordinate standards, policies, investments, and infrastructure projects that engage and benefit all people—from the manufacturing workers who build the vehicles of the future, to the people who drive them, to the communities they drive through. Strong vehicle emissions standards—accompanied by policies to rebuild manufacturing, protect and create good family supporting jobs, and revitalize communities—are critical to achieving these aims. [EPA-HQ-OAR-2022-0829-0667, p. 1]

1 U.S. EPA, "Study finds exposure to air pollution higher for people of color regardless of region or income," September 2021. Available Online: https://www.epa.gov/sciencematters/study-finds-exposure-air-pollution-higher-people-color-regardless-region-or-income

Strong, technology-forcing vehicle standards are essential to meet climate goals, advance environmental justice, and create good jobs in the clean economy. The transportation sector is the single largest contributor to climate-warming greenhouse gas emissions in the U.S., and the local air pollutants emitted by vehicles, including particulate matter (PM), nitrous oxides (NOx), and volatile organic compounds (VOCs) have disproportionate impacts on low-income and non-white communities. Meanwhile, the supply chains for light- and medium-duty vehicles and the manufacturing jobs within them—are critical to the economic health and stability of auto manufacturing communities across the country (See Figure 1). [EPA-HQ-OAR-2022-0829-0667, p. 2]

SEE ORIGINAL COMMENT FOR Figure 1: Light- and Medium-Duty Vehicle Assemblers and Component Manufacturers. Light and Medium Duty Vehicle Manufacturing.

Source: BGA [EPA-HQ-OAR-2022-0829-0667, p. 2]Contrary to the repeated threats of certain industry stakeholders opposing regulation, strong vehicle emissions standards do not have to come at the cost of good auto manufacturing jobs. In fact, they can support U.S. competitiveness in the global auto market, which protects and creates jobs. BGA analysis on the impact of former rounds of light-duty vehicle emissions standards has found that when they are well-designed and supported by worker protections and investments, standards can generate high-quality jobs, and position the domestic auto industry as a leader in a competitive global market.2, 3 [EPA-HQ-OAR-2022-0829-0667, pp. 3-4]

2 BlueGreen Alliance, Supplying Ingenuity II, May 2017: Available Online: https://www.bluegreenalliance.org/resources/supplying-ingenuity-ii-u-s-suppliers-of-key-clean-fuel-efficient-vehicle-technologies/.

3 BlueGreen Alliance, Tech@Risk, August 2019. Available Online: https://www.bluegreenalliance.org/resources/techrisk-the-domestic-innovation-technology-deployment-m anufacturing-and-jobs-at-risk-in-stepping-away-from-global-leadership-on-clean-cars/.

A 2021 Economic Policy Institute (EPI) report conducted in collaboration with BGA, the United Auto Workers, the United Steelworkers, and the AFL-CIO modeled how different timelines and scenarios of light-duty electrification in the U.S. would impact auto manufacturing and supply chain jobs.4 The report found that over 150,000 new auto manufacturing and supply chain jobs could be created under the assumption of 50%new EV sales by 2030—a timeline that closely matches the EPA's preferred proposal (See Scenario 2 in Figure 2). However, such job gains are contingent upon a significant onshoring of the EV supply chain such that 1) the domestic content of EVs at least matches that of ICEs, and 2) there is a 10% increase in the share of U.S.-made vehicles sold in the U.S. auto market. A tech-forcing rule that drives electrification of some share of the vehicle fleet, coupled with investments to ensure that the vehicles and their components are made here, can be a major economic boon to communities across the country. [EPA-HQ-OAR-2022-0829-0667, pp. 3-4]

4 Economic Policy Institute, The stakes for workers in how policymakers manage the coming shift to all-electric vehicles, September 2021. Available Online: https://www.epi.org/publication/ev-policy-workers/.

SEE ORIGINAL COMMENT FOR Figure 2: Potential Auto Manufacturing Job Growth at EV Deployment Scenarios [EPA-HQ-OAR-2022-0829-0667, pp. 3-4]

Onshoring powertrain production and boosting domestic share of vehicles sold would lead to large job gains. [EPA-HQ-OAR-2022-0829-0667, pp. 3-4]

Change in the U.S. auto jobs under various BEV penetration scenarios, if U.S. EV powertrain component production matched ICE average and the share of domestically produced vehicles sold in the U.S. increase by 10 percentage points. [EPA-HQ-OAR-2022-0829-0667, pp. 3-4]

Source: Economic Policy Institute [EPA-HQ-OAR-2022-0829-0667, pp. 3-4]

The fact that EPA's proposed standards address both GHG emissions and local pollutant emissions clearly broadens the scope of auto manufacturing supply chain communities that stand to grow from increased demand for a range of efficiency and pollution reducing technologies. It is essential that automakers achieve gains along both axes. [EPA-HQ-OAR-2022-0829-0667, pp. 5-6]

EPA must consider how the transition to clean vehicles will impact manufacturing workers and the communities they live in. This should be an essential part of the comprehensive analysis that EPA conducts to project its proposals' economic impacts. The map in Figure 1 plots approximately 1,300 facilities manufacturing light- and medium-duty vehicles and their components. Of these facilities, approximately 225 manufacture ICE light- and medium-duty vehicles and their components, like engines and transmissions, fuel efficiency technologies, and tailpipe pollution reducing technologies. These facilities in the ICE supply chain, the nearly 900 facilities making "fuel agnostic" components for light- and medium-duty vehicles, and other as yet unbuilt ZEV manufacturing facilities may experience employment impacts as ZEVs become increasingly cost competitive compared to ICE vehicles. [EPA-HQ-OAR-2022-0829-0667, pp. 5-6]

EPA already develops its proposed standards based on sophisticated economic analyses that model the impact of the proposal on total fuel cost savings, vehicle maintenance savings, and health cost savings from improved health outcomes. EPA's economic analysis should also seek to project the economic and employment impacts of the shift to clean vehicles on auto manufacturing communities. For each of EPA's proposals and alternatives, this analysis should, at minimum, identify light- and medium-duty vehicle manufacturing communities (as in Figure 1), quantify the share of each community's economy that is supported by jobs associated with light- and medium-duty vehicle manufacturing, and quantify the number of jobs associated with that sector. EPA should collaborate with the U.S. Department of Labor and the U.S. Department of Energy (DOE) to conduct this analysis. EPA may consider structuring its analysis to identify communities that are particularly reliant on a domestic vehicle manufacturing supply chain, potentially identified as those with light- and medium-duty vehicle manufacturing "clusters"—or geographic areas where there are at least two manufacturing facilities within a 50-mile radius that are producing light- and medium-duty vehicles, or components for them. BGA collects detailed supply chain data that can support this analysis. [EPA-HQ-OAR-2022-0829-0667, pp. 6-7]

Considering and quantifying the employment opportunities and risks associated with each of EPA's proposals is essential to ensuring that the regulations advance equity along economic axes, as well as climate and public health ones. The domestic auto manufacturing sector has historically been characterized by a higher unionization rate, community-supporting wages and benefits, the provision of pathways to the middle class (particularly for people without a four-year college education), and strong representation of Black workers. Research from EPI finds that "Black workers account for 12.5% of workers economy wide, but 16.6% of workers in the auto sector, while workers without a four-year degree account for 62.2% of workers economy wide, but 74.6% in the auto sector."5 The auto manufacturing sector represents a critical path to the middle class for the very workers and communities that have disproportionately borne the brunt of neoliberal economic and trade policies. It is therefore essential that EPA leverage available data to project how its proposals will shape the domestic auto manufacturing sector, and the workers and communities that comprise it. Such analysis would also help inform stakeholders weighing in on the proposals by projecting tangible, on-the-ground, economic impacts of the transition to cleaner light- and medium-duty vehicles, rather than limiting the scope of the economic analysis to fleet owners and automakers. [EPA-HQ-OAR-2022-0829-0667, pp. 6-7]

5 Economic Policy Institute, The stakes for workers in how policymakers manage the coming shift to all-electric vehicles, September 2021. Available Online: https://www.epi.org/publication/ev-policy-workers/.

[EPA must hold automakers and industry stakeholders accountable to workers and communities in their pursuit of regulatory compliance. In particular, this means collecting data to ensure that standards do not exacerbate the offshoring of the automotive supply chain, or facilitate rent-seeking behavior from automakers seeking to reduce their regulatory burdens and labor costs. BGA research demonstrates the significant economic footprint that the light- and medium-duty auto manufacturing sector has in the United States. This footprint represents both an opportunity and a risk, depending on whether or not the United States emerges as a global leader in the manufacturing of clean vehicles during this critical transitional period. The past two decades have seen significant offshoring of the automotive supply chain to other countries in Asia, Europe, and North America, where automakers have benefitted from lower labor costs, looser environmental regulations, and favorable tax regimes. Between 1998 and 2019, employment in the manufacturing of motor vehicles and motor vehicle components fell by more than 20%.6 A part of a larger globalization trend, this shift not only gutted auto manufacturing communities in the United States, but it also allowed auto suppliers to establish supply chains in other countries, often with minimal labor protections and loose environmental standards.7 [EPA-HQ-OAR-2022-0829-0667, p. 7]

6 Economic Policy Institute, Botched policy responses to globalization have decimated manufacturing employment with often overlooked costs for Black, Brown, and other workers of color, January 2022. Available Online: https://www.epi.org/publication/botched-policy-responses-to-globalization/.

7 Strategic Management Journal, Offshoring pollution while offshoring production, March 2017. Available Online: https://onlinelibrary.wiley.com/doi/10.1002/smj.2656.

EPA recently published a Request for Information (RFI) targeting automakers manufacturing clean school buses receiving funding through the Clean School Bus Program.10 This optional RFI asks bus manufacturers to provide information about worker voice (whether employees are covered by a collective bargaining agreement, whether the company is committed to maintaining union neutrality, etc.), employee benefits, inclusive hiring practices, training and advancement programs, and community partnerships. Such an RFI can be a powerful tool through which EPA can solicit information about how manufacturers interact with their employees and their communities, and facilitate a "race-to-the-top" for the quality of auto manufacturing jobs in the United States. EPA should create a new RFI for automakers regulated by the proposed light- and medium-duty standards that builds upon the data collected by the Clean School Bus RFI to illuminate the quality of jobs currently supported by the light- and medium-duty manufacturing sector. The new RFI should, at minimum, seek detailed information about worker voice, employee wages and benefits, inclusive hiring practices, training and advancement programs, and community partnerships. In order to improve upon the Clean School Bus RFI, automakers should be prompted to provide granular information that not only reveals whether workers receive healthcare benefits, for example, but also the quality of those benefits.11 This RFI could also apply to vehicle battery manufacturers, fuel efficiency technology manufacturers, tailpipe pollution reducing technology manufacturers, and other advanced materials and components manufacturers in the automotive supply chain, which will play a significant role in automakers' ability to meet increasingly stringent emissions standards. [EPA-HQ-OAR-2022-0829-0667, p. 8]

10 U.S. EPA, Request for information about OEM job quality and workforce development practices, April 2023. Available Online: https://www.epa.gov/system/files/documents/2023-04/fy23-csb-oem-workforce-req-info-2024-04.pdf.

11 EPA. Bus manufacturer job quality and workforce development practices, June 2023. Available Online: https://www.epa.gov/cleanschoolbus/bus-manufacturer-job-quality-and-workforce-development-practices

Ultimately, the transition to cleaner vehicles must function to raise the job quality and safety standards associated with all impacted workforces, including auto assembly workers, and supply chain workers. It is essential, but not enough, to create and protect auto manufacturing jobs in the United States. As increasingly stringent standards drive the transition to cleaner vehicles, we must also work to ensure that all jobs that will facilitate the transition are good, community-supporting jobs in safe and democratic work environments, where workers have the free and fair choice to join a union. The current landscape—wherein some new manufacturing jobs (especially in the battery sector) are low-paid contract roles in hazardous facilities, located in states where employers can evade union organizing—must be corrected.12 [EPA-HQ-OAR-2022-0829-0667, p. 9]

12 The Washington Post. "The unlikely center of America's EV battery revolution," April 2023. Available Online: https://www.washingtonpost.com/climate-environment/2023/04/17/georgia-evs-battery-belt/.

Deregulation, unfavorable trade policy, and the systematic undermining of labor laws have been chipping away at worker power in this country for decades. But as clean vehicle technologies continue to transform the auto industry—regulators, policymakers, advocates, and organizers have an important opportunity to determine what the jobs of tomorrow's auto industry will look like. EPA must leverage its regulatory power to set the industry on the right course, for the climate, for public health, and for workers. [EPA-HQ-OAR-2022-0829-0667, p. 9]

Organization: BorgWarner Inc.

BorgWarner is investing in our workforce and recommends increased public investment to upskill the U.S. talent pool to assist the industry's ZEV transition. [EPA-HQ-OAR-2022-0829-0640, pp. 7-8]

BorgWarner is committed to developing the workforce necessary to support our EV transition and a key facet of that strategy is evolving the skills of our existing talent. Our U.S. production facilities continue to invest in apprenticeships and technical workforce training. In addition, to support our industry-leading automotive engineers' transformation into cutting-edge teams responsible for developing our EV products, we created "Power to Evolve," a training program in partnership with leading universities in the U.S. and Europe. The program is designed to increase our talent's knowledge of, and skills for, electrical engineering by integrating hands-on skills required for productive work and learning modules on inverters, batteries, and motors. [EPA-HQ-OAR-2022-0829-0640, pp. 7-8]

For manufacturers and the broader industry, the need to train and certify workers is paramount. Similarly, for consumers, the lack of qualified BEV technicians is leading to increased costs for repairs, lengthy delays, and higher insurance premiums. These delays could have an impact on the decision-making process of future BEV purchasers who cannot afford to be without a vehicle for an extended period.7 [EPA-HQ-OAR-2022-0829-0640, pp. 7-8]

7 Tesla, insurers take different paths to deal with expensive repairs | Reuters

BorgWarner is also concerned about the shortage of certified automotive technicians trained to analyze and repair BEVs and EV charging stations. The National Institute for Automotive Service Excellence estimates that the U.S. currently has approximately 229,000 certified car technicians. Only about 3,100 (less than 1.4%) of these technicians, however, are certified to work on electric vehicles.8 [EPA-HQ-OAR-2022-0829-0640, pp. 7-8]

8 https://www.bostonglobe.com/2022/08/16/business/ev-sales-soar-its-back-school-car-techs/

We propose that EPA revisit how the lack of qualified technicians could impact the total cost of BEV ownership along with the maintenance and service needed to ensure reliable, consistent charging station operability as both could significantly impact consumer's purchasing decisions. [EPA-HQ-OAR-2022-0829-0640, pp. 7-8]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Beyond savings to individual consumers, the proposed standards, to the extent manufacturers use ZEVs to comply, present economic growth opportunities for many sectors in the United

States, especially auto manufacturing, electricity generation, and upstream ZEV supply chains as consumers direct more spending to ZEV technology and electricity for transportation fuel. Many manufacturers are already domestically producing ZEVs, providing tangible employment opportunities nationwide. 128 Provisions in the Inflation Reduction Act to support domestic production and materials sourcing will further shore up these benefits. [EPA-HQ-OAR-2022-0829-0780, pp. 65-66]

Even in the short time since U.S. EPA released its proposal, manufacturers have announced new investments in vehicle and battery manufacturing and assembly that will strengthen and expand the ZEV industry across the U.S. For example, Toyota announced that it will assemble its new battery electric sport utility vehicle at its Kentucky facility using batteries from a new battery plant in North Carolina. 129 General Motors and Samsung SDI are investing more than $3 billion to build a battery plan in Indiana, providing local jobs. 130 Hyundai Motor Group and LG Energy Solution announced that they will build a $4.3 billion electric battery plant in Georgia. 131 These are just a few examples of the tremendous economic opportunity this expanding industry can provide to support local jobs and build a resilient supply chain for ZEVs. [EPA-HQ-OAR-2022-0829-0780, pp. 65-66]

128 Blue Green Alliance. "The High Road to California EV Goals: Raising Ambition for High-Quality Domestic Manufacturing Jobs." July 2021. https://www.bluegreenalliance.org/wp-content/uploads/2021/07/Baum- Report-7121-FINAL-w-cover.pdf

129 Toyota. "Toyota Ramps Up Commitment to Electrification with U.S. BEV Production and Additional Battery Plant Investment." Toyota Newsroom. May 31, 2023. https://pressroom.toyota.com/toyota-ramps-up- commitment-to-electrification-with-u-s-bev-production-and-additional-battery-plant-investment/. Accessed June 22, 2023.

130 Shepardson, David. "GM, SDI will build $3 billion battery manufacturing plant in Indiana." Reuters. June 13, 2023. https://www.reuters.com/business/autos-transportation/indiana-confirms-gm-sdi-will-build-3-bilion-ev-battery-manufacturing-plant-2023-06-13/ Accessed June 22, 2023.

131 Amy, Jeff. "Hyundai and LG announce $4.3 billion plant in Georgia to build batteries for electric vehicles." Associated Press. May 26, 2023. https://apnews.com/article/hyundai-lg-electric-vehicles-batteries-georgia-db44d911b3dae0fbf454cb53503ce84c. Accessed June 22, 2023.

Complementary workforce development policies and programs to support job replacement in sectors that may see reduced demand can help ensure equitable participation in the clean technology economy. CARB commends the federal government for taking proactive steps to help support employment opportunities in clean technology sectors, particularly for workers impacted by anticipated reductions in fossil fuel industries associated with increased deployment of ZEV technology. 132 California has likewise recognized the need to support potentially displaced workers and is investing in workforce development strategies as an element of its pathway towards a zero-emission transportation system. For example, the California Workforce Development Board has identified several actions to help further development of robust and equitable ZEV industry in California. 133 CARB also notes an opportunity to support further workforce development and employment through its recommendation on ZEV assurance measures regarding serviceability. Enabling access to vehicle data increases the opportunity for independent repair shops to participate in the servicing and repair of ZEVs, ensuring these businesses benefit from increased ZEV deployment. [EPA-HQ-OAR-2022-0829-0780, pp. 65-66]

132 See, for example, Center for American Progress. September 14, 2022. “The Inflation Reduction Act Provides Pathways to High-Quality Jobs.” https://www.americanprogress.org/article/the-inflation-reduction-act-provides- pathways-to-high-quality-jobs/ Accessed May 26, 2023.

133 California Workforce Development Board. ZEV Agency Action Plan. January 2023. https://business.ca.gov/wp-content/uploads/2023/02/ZEV-Agency-Action-Plan-2023-CWDB.pdf

Organization: Clean Fuels Development Coalition et al.

- Elimination of American Jobs. EPA’s electrification goal would overhaul the American fuels industry, causing harm to both the petroleum industry and to those who, like commentors, help to supply clean and renewable fuels. Additionally, the proposal would reshape the American automobile industry, which “supports 10 million direct and indirect jobs” and “accounts for more than three percent of GDP.” See Comments of Securing America’s Future Energy (SAFE) on EPA’s Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards (Sept. 27, 2021), EPA-HQ-OAR-2021-0208-0527. [EPA-HQ-OAR-2022-0829-0712, p. 6]

Organization: Countymark

CountryMark is a small refiner that operates a small refinery in a rural area in Mt. Vernon, Indiana, with a capacity of 35,000 barrels per day (BPD). CountryMark is wholly owned by Countrymark Cooperative Holding Corp, a regional federated cooperative operating primarily in Indiana. CountryMark and its affiliates operate on a cooperative basis for the benefit of their members and patrons. Unlike most energy companies, CountryMark is completely American owned and controlled by its member local cooperatives. The member cooperatives are, in tum , owned and controlled by individual farmers within their trade territory. Over 100,000 farmers in Indiana, Illinois, Michigan, and Ohio participate in these local cooperatives. CountryMark's Board of Directors is comprised of farmers. Distributions of profit (if any) are distributed back to these farmers via the cooperative system, and these distributions remain in rural communities where the dollars support their local economies. [EPA-HQ-OAR-2022-0829-0665, pp. 1-2]

Although CountryMark is one of the smallest fuel refineries in the country, its local economic impact is significant, directly employing over 470 people whose wages and benefits exceed $40 million per year. Most of the Company's employees do not have college degrees but support their families and communities through well-paying jobs. CountryMark is the second largest employer in Mt. Vernon, a rural community of only about 6,500, and one of the five largest employers in Posey County, Indiana. The Company also partners with the local community onemergency response training, which includes funding fire schools for local firefighters, holding quarterly emergency response meetings, and hosting training exercises. [EPA-HQ-OAR-2022-0829-0665, pp. 1-2]

CountryMark is Indiana's only American-owned oil production, refining, and marketing company. The refinery uses 100% North American crude oil sourced predominantly from the Illinois Basin in southern Illinois, southwest Indiana, and western Kentucky. CountryMark supplies nearly 70% of the agricultural market fuels and 50% of school district fuels in Indiana. The Illinois Basin is a high-cost conventional oil basin abandoned by big oil companies decades ago that, due CountryMark's business, supports 20,000 well-paid industry workers and supplies royalties to over 40,000 landowners. CountryMark will spend over $500 million for crude oil in a typical year, most staying in the three-state area. [EPA-HQ-OAR-2022-0829-0665, pp. 1-2]

Organization: Daniel Hellebuyck

Costs and Job Losses: This "dartboard" approach to setting arbitrary standards like the one in this proposal does not take into account the enormous costs placed on automakers trying to reach the target. Companies- like Ford and General Motors- have tried to fund their EV ventures by laying off employees, sending American jobs to low-wage countries, and dramatically raising prices on ICE vehicles to pay for EVs that the market may not want or be ready for. Quality of ICE vehicles has suffered as car companies have shifted resources from quality control and design to development of EVs. [EPA-HQ-OAR-2022-0829-0526, p. 1]

Organization: Delek US Holdings, Inc.

VI. The Proposed Rule Fails to Holistically Consider Impacts Beyond the Automotive Industry

a. ZEV mandates will negatively affect domestic employment rates.

If EPA's Proposed Rule goes into effect, tens of thousands of high-paying, family- supporting jobs will be lost as refining capacity continues to decline. Indeed, EPA admits that its proposal may affect employment for firms providing fuels: "Reduced consumption of petroleum represents cost savings for purchasers of fuel, as well as a potential loss in value of output for the petroleum refining industry, fuel distributors, and gasoline stations, which could result in reduced employment in these sectors."38 But EPA also presumes that the Proposed Rule will not have a noticeable impact on aggregate net employment as labor will be reallocated from one product use to another and that the reduction in fuel consumption will be met through reduced petroleum imports rather than reductions in domestic production, shielding American jobs in the petroleum refining industry.39,40 Further, EPA's conjectural conclusions are made weaker by the Agency's failure to consider employment impacts in related sectors, including downstream businesses such as automotive dealerships and other small businesses like parts suppliers and auto mechanics.41 [EPA-HQ-OAR-2022-0829-0527, p. 8]

38 Id. at 29,393; DRIA at 4-59.

39 DRIA at 4-46–48 (citing external sources indicating that "although BEVs have fewer parts than their ICE counterparts, there is potential for job growth in electric vehicle component manufacturing, including batteries, electric motors, regenerative braking systems and semiconductors, and manufacturing those components in the US can lead to an increase in jobs… [but] if the US does not become a major producer for these components, there is risk of job loss.").

40 Id. at 4-59.

41 See, e.g., EDMUNDS, "Where Does the Car Dealer Make Money?" (June 13, 2019), available at https://www.edmunds.com/car-buying/where-does-the-car-dealer-make-money.html (automobile dealerships, for example, cannot recoup revenue or maintain employees by merely switching the types of vehicles it sells because parts and service accounts for 44% of revenue).

Organization: Environmental. and Public Health Organizations

H. EPA should expect significant employment opportunities associated with the installation and maintenance of charging infrastructure and related grid infrastructure.

Research conducted on behalf of EV Infrastructure Strike Force suggests that, if the Biden Administration's goal of deploying 500,000 EV charging stations is met with public fast charging stations, it will support about 30,000 job-years.355 [EPA-HQ-OAR-2022-0829-0759, p. 130]

355 Edward W. Carr, James J. Winebrake, and Samuel G. Winebrake, Workforce Projections to Support Battery Electric Vehicle Charging Infrastructure Installation, Energy and Environmental Research Associates, LLC (2021), https://etcommunity.org/assets/files/Workforce-ProjectionstoSupportBatteryElectricVehicleChargingInfrastructureIn stallation-Final202106082.pdf.

XXVIII. U.S. Employment in the Auto Sector is Likely to Increase as Electrification of the Vehicle Fleet Grows.

Finally, we turn to employment considerations. EPA is correct that the employment effects of environmental regulation "are difficult to disentangle from other economic changes (especially the state of the macroeconomy) and business decisions that affect employment, both over time and across regions and industries," 88 Fed. Reg. at 29390, and that there is some uncertainty in the data regarding specific job impacts of increased electrification, id. EPA notes that although BEVs have fewer parts than combustion vehicles, initial results of a vehicle tear-down study commissioned by the Agency and performed by FEV Consulting suggest that the labor hours needed to assemble BEVs and combustion vehicles are "very similar." 88 Fed. Reg. at 29392; DRIA at 2-57 to 2-58. The teardown study performed a side-by-side analysis of significant systems and subsystems to develop a projected cost model comparing a "relatively equivalent" BEV (2021 Volkswagen ID.4) and a combustion vehicle (2021 Volkswagen Tiguan). DRIA at 2-57.664 Although the full final results of EPA's commissioned study are not yet publicly available, the information provided in the docket indicates a well-designed peer-reviewed analysis that considered platform optimization, used an absolute costing approach, considered potential differences in incremental costs, and involved a detailed labor assessment for each component. Id. The docket includes detailed slides from FEV Consulting summarizing the preliminary cost results of the study, and EPA should further incorporate these and other relevant results from the FEV Consulting research into the Agency's support for the final rule.665 [EPA-HQ-OAR-2022-0829-0759, p. 201]

664 See also Michael Safoutin, Cost and Technology Evaluation, Conventional Powertrain Vehicle Compared to an Electrified Powertrain Vehicle, Same Vehicle Class and OEM, Memo to EPA Docket # EPA-HQ-OAR-2022-0829-0422 (Apr. 18, 2023).

665 See FEV Consulting, EPA FEV Cost and Technology Evaluation VW Tiguan and VW ID4, Attachment to Safoutin, Cost and Technology Evaluation, Memo to EPA Docket # EPA-HQ-OAR-2022-0829-0422 (Apr. 18, 2023).

EPA's DRIA notes two additional older teardown studies that the Agency considered in its analysis—a 2017 UBS teardown of the Chevy Bolt EV, and a 2017–2018 teardown study of several EV components performed for CARB—neither of which was as comprehensive or comparative as EPA's project with FEV Consulting, and neither of which specifically looked at total labor hours.666 See DRIA at 2–58. At least one other recent teardown study has considered labor hours and come to a conclusion similar to FEV Consulting's analysis—that "very similar" labor hours are needed between BEVs and combustion vehicles—finding that BEVs require 99% of the total labor hours per vehicle compared to combustion vehicles, primarily due to battery cell manufacturing, and PHEVs require more labor than combustion vehicles.667 As automakers have already begun taking significant steps toward on-shoring battery manufacturing and the rest of the PEV supply chain, supported by the significant funding incentives for domestic manufacturing in the BIL and IRA, the United States is well-positioned to capture battery-related and other PEV manufacturing jobs as the PEV sector grows. The positive impact on employment from this increase in vertical integration is illustrated in preliminary results from the Agency's FEV Consulting study, which finds nearly a 50% increase in labor hours in BEV compared to combustion engine manufacturing for a highly vertically integrated manufacturer.668 [EPA-HQ-OAR-2022-0829-0759, pp. 201-202]

666 The UBS project was an EV teardown only, and UBS did not conduct a side-by-side comparison with a similar combustion vehicle, and the CARB project involved only specific components from strong hybrids and plug-in hybrids, which have cost profiles very different from BEVs.

667 Daniel Kupper et al., Shifting Gears in Auto Manufacturing, Boston Consulting Group (Sept. 28, 2020), https://www.bcg.com/publications/2020/transformative-impact-of-electric-vehicles-on-auto-manufacturing.

668 FEV Consulting, Assembly Times Comparison Draft Report, EPA-HQ-OAR-2022-0829-0460, Slide 28 (May 9, 2023).

EPA cites reports by the Economic Policy Institute, Seattle Jobs Initiative, and Climate Nexus, all of which found that total U.S. employment in the auto sector could increase with electrification, in particular if the share of vehicles sold in the United States that are produced in the United States increases. 88 Fed. Reg. at 29390–92. In fact, Congress has recognized the benefits of ensuring that large shares of vehicles sold in the United States are produced in the United States. Through the on-shoring incentives in recent legislation, particularly the IRA, Congress has encouraged substantial growth in the domestic ZEV manufacturing and supply chain and has indicated congressional support for increasing numbers of ZEVs in the light-duty fleet in order to meet the nation's climate goals. These IRA incentives are having their intended effects of encouraging development of the domestic ZEV supply chain. As EPA notes, reports by the BlueGreen Alliance and the Political Economy Research Institute estimate that the IRA will create over 9 million jobs over the next decade, with about 400,000 attributed directly to the battery and fuel cell provisions. 88 Fed. Reg. at 29390–91. [EPA-HQ-OAR-2022-0829-0759, p. 202]

Other analyses have found similar positive employment impacts. A University of Massachusetts study of job creation resulting from the IRA found that the IRA's programs, including the law's transportation-sector funding programs that encourage ZEV development, could lead to overall job creation.669 The analysis estimated significant job increases in the transportation, electricity, and manufacturing sectors, both annually and in total job-years.670 Analysis of the IRA and BIL by the Boston Consulting Group found that the two laws would increase new U.S. ZEV industry jobs through 2030 from about 455,000 to about 680,000, "primarily due to domestic manufacturing incentives."671 And, supporting this post-IRA upward trend, EDF recently found that "46,400 announced jobs, representing approximately 32% of all EV job announcements, have occurred in the last 6 months since the passage of the IRA."672 [EPA-HQ-OAR-2022-0829-0759, p. 202]

669 Robert Pollin et al., Job Creation Estimates Through Proposed Inflation Reduction Act, University of Massachusetts Amherst Political Economy Research Institute 10-13 (Aug. 4, 2022), https://peri.umass.edu/publication/item/1633-job-creation-estimates-through-proposed-inflation-reduction-act.

670 Id. at 3, 13 (estimating 447,472 additional job-years in relevant transportation jobs due to IRA, along with 31,510 additional job-years due to IRA's EV manufacturing grants under Section 50143 and 114,592 additional job-years due to IRA's clean manufacturing investment tax credit under Section 13501).

671 Boston Consulting Group, Impact of IRA, IIJA, CHIPS, and Energy Act of 2020 on Clean Technologies 3 (April 2023), https://breakthroughenergy.org/wp-content/uploads/2023/04/EV-Cleantech-Policy-Impact-Assessment.pdf.

672 EDF, U.S. Electric Vehicle Manufacturing Investments and Jobs: Characterizing the Impacts of the Inflation Reduction Act after 6 Months 5 (March 2023), https://blogs.edf.org/climate411/files/2023/03/State-Electric-Vehicle-Policy-Landscape.pdf?_gl=1*1uxcnl5*_ga*M Tk3NDc4MzQ3NS4xNjMyODU4NDY0*_ga_2B3856Y9QW*MTY3ODgwMjg0Ny4xNTQuMC4xNjc4ODAyOD Q5LjU4LjAuMA..*_ga_Q5CTTQBJD8*MTY3ODgwMjg0Ny4xNTMuMC4xNjc4ODAyODQ5LjU4LjAuMA.

Other analyses in addition to those cited by EPA also have concluded that more stringent GHG standards can lead to positive job impacts. For example, several state-level analyses conducted by ERM using the Impact Analysis for Planning (IMPLAN) model found that state adoption of clean car standards would result in net job increases, assuming that incremental spending on PEV batteries and electric drivetrain components would be in the United States.673 Moreover, each of these analyses found that the jobs created would be high-quality, high-paying jobs, with average wages for the new jobs between 33% and 100% higher than average wages for the jobs being replaced.674 Similarly, a state-level analysis conducted by the World Resources Institute (WRI) on increased PEV penetration in Michigan found that the state "stands to gain tens of thousands of high-quality jobs," if it "seize[s] the opportunities" of the PEV sector.675 Because PEVs are cheaper to drive, the analysis found that "[s]witching to EVs will allow drivers to save money on vehicle purchases, maintenance, and gasoline, which will improve household finances and have positive employment impacts" as consumers spend their extra money throughout the rest of the economy.676 Analysis on the nationwide impacts of California's clean car policies also projects significant overall job gains resulting from increased production of ZEVs—with over 7.3 million full-time equivalent job-years of employment created through 2045.677 Another nationwide study found that, compared to a "no new policy" scenario, a scenario with high levels of ZEVs would result in a peak of over 2 million jobs created in 2035, even without accounting for the impact of any additional on-shoring incentives such as those in the IRA.678 [EPA-HQ-OAR-2022-0829-0759, p. 203]

673 Dave Seamonds et al., New York Advanced Clean Cars II Program, ERM 20 (Feb. 2023), https://www.erm.com/globalassets/documents/global-policies/new-york-advanced-clean-cars-program-report_2023. pdf (evaluating impacts of Advanced Clean Cars II adoption in New York); Sophie Tolomiczenko et al., The Benefits of the Colorado Clean Car Standard, ERM 19–20 (May 2023), https://www.erm.com/globalassets/foundation-annual-report-2023/co_acc_ii_final_report_15may2023.pdf (evaluating Colorado's Clean Car Standards); Sophie Tolomiczenko et al., New Jersey Advanced Clean Cars II Program, ERM 21 (April 2023), https://www.erm.com/contentassets/0ea3b193115448cd9dd5c7e3622373a0/new-jersey-advanced-clean-cars-ii-progr am.pdf (evaluating impacts of Advanced Clean Cars II adoption in New Jersey).

674 Id.

675 Devashree Saha et al., A Roadmap for Michigan's Electric Vehicle Future, World Resources Institute 3 (May 2023), https://files.wri.org/d8/s3fs-public/2023-05/roadmap-michigan-ev-future.pdf?VersionId=v0C1QYM5LrUtDymSBY zR_PGHpKMUmRju.

676 Id. at 10–11.

677 Austin L. Brown et al., Driving California's Transportation Emissions to Zero, University of California Institute of Transportation Studies 327 (April 2021), https://escholarship.org/uc/item/3np3p2t0.

678 University of California Berkeley Goldman School of Public Policy, The 2035 Report: Transportation ES-4 & 22–24 (April 2023), http://www.2035report.com/transportation/wp-content/uploads/2020/05/2035Report2.0-1.pdf?hsCtaTracking=544e8 e73-752a-40ee-b3a5-90e28d5f2e18%7C81c0077a-d01d-45b9-a338-fcaef78a20e7.

These new clean vehicle jobs are also poised to have positive environmental justice impacts as they bring significant new jobs to communities of color. Research by Climate Power has found that "[a] majority of new clean energy jobs and projects [resulting from IRA investments] are located in communities of color across America," with Arizona, Georgia, South Carolina, Nevada, and Michigan home to the largest number.679 Climate Power's report details numerous gigafactories, cathode manufacturing facilities, and ZEV factories that will bring jobs to communities of color nationwide. For example, Kore Power Gigafactory will bring 6,400 jobs to Arizona, in two counties that are 46.6% and 32% Hispanic/Latino, and Scout Motors will open an EV plant in South Carolina, bringing 4,000 jobs to two counties that are between 40% and 50% Black/African American.680 Climate Power's Clean Energy Jobs Tracker provides detailed data on new clean energy jobs since the passage of the IRA, showing large job growth in numerous states related to battery and ZEV manufacturing.681 [EPA-HQ-OAR-2022-0829-0759, p. 204]

679 Climate Power, The Clean Energy Boom in Communities of Color 1, 4, https://climatepower.us/wp-content/uploads/sites/23/2023/05/Clean-Energy-Boom-Communities-of-Color-Report.pd f (noting plans for 51 new battery manufacturing sites in places like Augusta, Georgia; Tucson, Arizona; and St. Louis, Missouri; and plans for 26 new or expanded EV manufacturing facilities in Pryor, Oklahoma; Montgomery, Alabama; and Detroit, Michigan).

680 Id. at 4–5.

681 Climate Power, The Clean Energy Plan, https://thecleanenergyplan.com/.

While certain employment sectors may be impacted over time by increased electrification, as EPA notes, 88 Fed. Reg. at 29392, we agree that this will "happen over a longer time span due to the nature of fleet turnover," see Table XVII.G-1 (L/MD PEVs as a Share of Total On-Road L/MD Fleet, 2020–2040), supra, with time to retrain workers for better, higher paying jobs, 88 Fed. Reg. at 29392. A World Resources Institute study considering Michigan's automotive industry noted that many new ZEV-sector jobs will require skill development, with opportunities to "re-skill, upskill, or shift to jobs of equal or greater quality," and that much of this "could be addressed as part of normal rates of retirement, given that 52% of all current auto manufacturing workers in Michigan will reach age 65 by 2040."682 Moreover, programs have already been implemented to train workers with the skills they will need for jobs within ZEV manufacturing. California's Energy Commission, for example, created the state's Clean Transportation Program to "invest[] in manufacturing and workforce training and development, working with a variety of public and private partners."683 Electric bus company Proterra and community colleges in California joined together to provide a nine-week training program to become electric bus manufacturing technicians, which workers have already used to transition from lower-paying restaurant jobs, for example, to higher-paying union jobs at Proterra.684 General Motors launched the Automotive Manufacturing Electrical College (AMEC) "to train current and future employees to work on evolving electrical systems in future GM vehicles."685 States are also funding training for ZEV-related jobs.686 [EPA-HQ-OAR-2022-0829-0759, p. 204]

682 Devashree Saha et al., A Roadmap for Michigan's Electric Vehicle Future at 8, 10.

683 California Energy Commission, Workforce Development, https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-fundin g-areas-4.

684 Jill Replogle, Training a New Workforce for California's Move to Electric Vehicles, Marketplace (June 28, 2021), https://www.marketplace.org/2021/06/28/training-a-new-workforce-for-californias-move-to-electric-vehicles/.

685 General Motors, Training Manufacturers for the Vehicles of Tomorrow, https://www.gm.com/stories/amec-electric-manufacturing-workforce.

686 See, e.g., State of Illinois, Illinois Drives Electric: Training and Degree Programs, https://ev.illinois.gov/grow-your-business/training-and-degree-programs.html (noting various job programs with state funding); State of Michigan, Gov. Whitmer Announces New EV Jobs Academy Website to Connect Michiganders to Careers in Electric Vehicle Industry (March 1, 2023), https://www.michigan.gov/leo/news/2023/03/01/gov-whitmer-announces-new-ev-jobs-academy-website-to-connect- michiganders-to-careers-in-ev-industry ("The EV Jobs Academy is designed to provide Michiganders with tuition assistance and supportive services, including "earn while you learn" opportunities through a Registered Apprenticeship, to support and streamline onramps to high-wage, in-demand careers. With more than 100 partners including employers, industry stakeholders and education institutions, the EV Jobs Academy is driving the state's advanced mobility talent development for the future.").

Organization: Environmental Defense Fund (EDF) (1of 2)

B. Protective standards will help to grow American jobs.

In addition to delivering significant health and environmental benefits, protective standards that help to ensure additional ZEV deployment will also bolster the economy and grow U.S. jobs. The U.S. is currently making historic investments in electric vehicle manufacturing and domestic job creation, both of which have been catalyzed by the IRA and BIL. According to a report by Environmental Defense Fund and WSP USA, more than $120 billion in EV manufacturing investments and 143,000 new U.S. jobs have been announced in the last eight years, with more than 40 percent of those announcements happening in the last six months, since passage of the IRA (Figure 1).5 Over $31 billion of those announced investments has been toward the manufacturing of electric passenger cars and trucks, providing over 55,000 new jobs and $65.3 billion in investment supporting over 60,000 jobs in battery manufacturing. Protective EPA standards that drive additional electrification of the transportation sector can help support and accelerate these important trends, promoting continued investment in zero-emitting vehicles, batteries and components and associated America jobs. [EPA-HQ-OAR-2022-0829-0786, pp. 7-8]

5 U.S. Electric Vehicle Manufacturing Investments and Jobs, Characterizing the Impacts of the Inflation Reduction Act after 6 Months, WSP for EDF, (March 2023). https://blogs.edf.org/climate411/files/2023/03/State-Electric- Vehicle-Policy-Landscape.pdf (Attachment E)

[See original attachment for Figure 1: New EV Job Announcements Accelerated by National Policy]

Source: WSP, U.S. Electric Vehicle Manufacturing Investments and Jobs [EPA-HQ-OAR-2022-0829-0786, pp. 7-8]

In addition to these sector-wide trends, EDF also commissioned a study by M.J. Bradley & Associates in 2021 that focused on the broader economic and employment effects associated with the production of electric F-Series light trucks, including the Ford F-150 Lightning, as a case study for the broader electric vehicle manufacturing sector within the U.S.6 The report shows that EV manufacturing in the U.S. has the potential to support significant positive job and GDP impacts. Specifically, the analysis, which was conducted prior to passage of the IRA, finds that a single direct job associated with the production of electric F-Series vehicles could support 13 to 14 jobs in the wider U.S. economy. And every 1,000 such direct electric F-Series production-related jobs would support $1 billion in direct, indirect, and induced labor income benefits and $1.6 billion in U.S. GDP. The results show that a plant supporting 3,300 jobs7 could result in 44,000 jobs in the wider economy, providing $319 million in direct income and over $3.2 billion in direct, indirect, and induced labor income benefits. [EPA-HQ-OAR-2022-0829-0786, pp. 7-8]

6 Amlan Saha, Miranda Freeman, Jane Culkin, and Dana Lowell, U.S. Light Truck Electrification: Economic and Jobs Impact Study, M.J. Bradley & Assoc. for EDF, Nov. 2021. (Attachment F).

7 Ford announcements suggest that its new EV plant in Tennessee would support between 3,200 and 3,300 direct jobs.

Organization: HF Sinclair Corporation

As discussed in further detail below, the Proposed Rule will have significant impacts beyond the traditional automotive market. It will eliminate American jobs in the refining sector, which directly employs more than 100,000 individuals across the United States – it is also widely accepted that every refinery job is a job multiplier of ten. It will significantly strain the electric grid, requiring utilities to rapidly increase generation, transmission, and distribution capacity to a degree not fully contemplated by EPA. [EPA-HQ-OAR-2022-0829-0579, pp. 3-4]

h. The EPA Fails to Properly Consider Employment Impacts

The Proposed Rule fails to appreciate the employment impacts, including those on lower income consumer that will result from rapid electrification. First and foremost, any mandate to replace conventional ICE vehicles with PEVs will have a direct impact on the 890,000 gas station employees around the country.83 A mandate will also have an impact on the 113,000 employees supporting the transportation fuels industry upstream of the pump as well as the many industries tangentially related to the production of ICE vehicles, including motor vehicle parts, automobile dealers, repair and maintenance services, and parts manufacturers.84 [EPA-HQ-OAR-2022-0829-0579, p. 17]

83 CEA Study at 12.

84 Id.

While EPA does mention employment impacts in the Proposed Rule, EPA cannot simply assume that because the U.S. economy is at full employment, the regulation “is unlikely to have a noticeable impact on aggregate net employment" as labor will be reallocated from one productive use to another.85 Even if true on a macro scale, "transitory" impacts of affected industries will be significant as there will not be a one-for-one job replacement – especially if jobs in the domestic transportation fuels industry are replaced with those in battery processing operations, which are largely conducted overseas. It cannot be assumed that trained workers in one field will be able to move to another (both physically and through re-training). Instead, EPA must consider the wholesale changes to the workforce that will come from mass adoption of PEVs. Entire industries may be eliminated, such as emission inspection services, third-party dealer networks, and aftermarket product tuning.86 EPA must fully address how the Proposed Rule will redefine the vast U.S. labor pool supporting the automotive industry. [EPA-HQ-OAR-2022-0829-0579, p. 17]

85 Proposed Rule at 29,390.

86 The Week, "How Tesla's direct sales model is roiling the car dealership industry," (June 21, 223 available at https://theweek.com/us/1024416/tesla-vs-car-dealerships (reporting on PEV manufacturer direct-sales allowances that bypass franchise dealer networks).

Organization: International Council on Clean Transportation (ICCT)

The shift to cleaner cars and trucks can strengthen domestic manufacturing and supply chains, increase industrial competitiveness, and create good-paying jobs.30 Research about the U.S. job potential from electric vehicle manufacturing finds that transitioning 50% of sales to battery electric vehicles (BEVs) can lead to 150,000 net job creation in the auto sector, including auto parts and auto assembly, if coupled with an increase in domestic content for vehicles sold in the U.S., and market share growth for U.S. made vehicles.31 The growth in electric vehicle charging infrastructure can also lead to domestic job creation. Research quantifying the number of jobs associated with EV infrastructure from assembly, deployment, and maintenance appears limited. Draft work by the ICCT is underway that quantifies the number of jobs needed to support this rapidly growing infrastructure network. [EPA-HQ-OAR-2022-0829-0569, pp. 11-12]

30 The White House (2023b). Fact sheet: Biden-Harris Administration announces new private and public sector investments for affordable electric vehicles. https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/17/fact-sheet-biden-harris-administration-announces-new-private-and-public-sector-investments- for-affordable-electric-vehicles/; Naimoli, S., Kodjak, D., German, J., and Schultz, J. (2017, May 23). International competitiveness and the auto industry: what's the role of motor vehicle emission standards? International Council on Clean Transportation. https://theicct.org/publication/international-competitiveness-and-the-auto-industry-whats- the-role-of-motor-vehicle-emission-standards/

31 Barrett, J., and Bivens, J. (2021, September 22). The stakes for workers in how policymakers manage the coming shift to all-electric vehicles. Economic Policy Institute. https://www.epi.org/publication/ev-policy-workers/

Table 1 shows the draft results of the number of infrastructure-related jobs created from the charging infrastructure sector in 2035: more than 183,000. The light-duty vehicle EV infrastructure industry would generate in total close to 160,000 jobs that involve the public, workplace, and home charging infrastructure assembly, deployment, and maintenance, and the MDHV EV infrastructure industry will generate close to 23,700 jobs. Around 36% of these jobs come from electrical work, followed by 29% from assembly, 17% from maintenance, 10% from planning and design, 6% from general labor, and 3% from administration and legal. These jobs would further support supply chain jobs in assembly components and materials for EV charging equipment, which are not included in our estimates but can be significant, especially with increase in domestic production. [EPA-HQ-OAR-2022-0829-0569, pp. 11-12]

SEE ORIGINAL COMMENT FOR Table 1. Estimate of light-duty and medium- and heavy duty vehicle charging infrastructure- related jobs in 2035 [EPA-HQ-OAR-2022-0829-0569, pp. 11-12]

The number of chargers needed for light-duty vehicles and the associated findings for U.S. job growth potential are based on an analysis of charging needs based on achieving Biden administration's goal of 50% EV sales by 2030, which is assumed to increase to 80% sales by 2035. For MHDV, the model a scenario where EV sales achieve 30% for tractor truck, 50% for buses and rigid truck by 2030, and 100% for all segments in 2040, which builds on the manufacturers' ambitions and existing legislation in California and several other states.32 The analysis is being updated based on the projections in EPA's new multi-pollutant standards proposal. Because the EPA proposal estimates that 60% of new light-duty vehicle sales would be battery electric by 2030 and 67% by 2032 – greater than Biden's 50% by 2030 target – updating our analysis for increased BEV penetration would increase the number of chargers needed and thus increase the estimates of the number of jobs in this industry through 2035 compared to what is shown in Table 1. [EPA-HQ-OAR-2022-0829-0569, pp. 11-12]

32 International Council on Clean Transportation. (2022a). ICCT comments on EPA proposed HDV rule. https://theicct.org/comments-epa-proposed-hdv-rule-may22/

Organization: International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)

Short Summary

The UAW fully supports the transition to a cleaner auto industry, and it must be done in a way that protects both good union jobs and the environment. We urge the EPA to reach a consensus-based standard for light- and medium-duty greenhouse gas emissions that avoids allowing the burden of compliance to fall heaviest on the workers who currently build ICE vehicles and those who will build ZEVs in the future. [EPA-HQ-OAR-2022-0829-0614, p. 1]

Regulations that push the industry to adopt cleaner technologies are important to creating a strong domestic union manufacturing base. We also know that the US auto industry does not have a perfect track record in keeping up with consumer interest. In the 1980s, we saw the decimation of US auto market share and with it of good union auto jobs in this country, in part due to the companies' misjudging the consumer market and failing to adapt. We cannot allow this pattern to repeat in the 21st century in case the existing US automakers fail to keep up with rising EV demand, further sacrificing market share to foreign, non-union, and low-road employers. There is a risk of US automakers focusing on short-term profit while non-union employers capture future generations of market share, with disastrous outcomes for the industry labor standards and union workers. [EPA-HQ-OAR-2022-0829-0614, p. 1]

However, we are also concerned the proposed standards do not adequately address the projected impact on an industry that balances ICE jobs with the quality of new EV jobs. Nor does it properly account for the role that the sale of ICE vehicles will play in the transition or the availability of charging infrastructure. The EPA must involve stakeholders to reach a mutual agreement. [EPA-HQ-OAR-2022-0829-0614, p. 1]

Discussion

I. Direct Impact on UAW Members

The auto industry is reaching a key inflection point with the rise of electrification. Policies and investment decisions made in the next few years will re-shape the industry for decades. There is an opportunity to get this transition right for workers and the environment. That means avoiding the mistakes of the past, adopting a strategy that reverses decades of off-shoring and declining unionization in the industry and ensuring the domestic auto industry keeps pace on the latest clean technologies. The UAW is leading the transition to a cleaner and greener auto industry. UAW members are building light, medium, and heavy- duty electric vehicles (EVs), batteries, and the next generation of efficient and zero-emission vehicles. We are also doing our part to ensure the EV transition is a just transition, organizing the country's first union battery cell manufacturing plant, securing neutrality agreements with firms along the EV supply chain, and negotiating investment commitments for the production of EVs and components in our collective bargaining agreements. Over 1 million people work in motor vehicle parts and manufacturing.2 While auto industry profitability has reached record highs in recent years, autoworker wages have not kept pace. Since 2000, inflation adjusted wages have declined by 25% in motor vehicle manufacturing and by 19% in motor vehicle parts manufacturing.3 [EPA-HQ-OAR-2022-0829-0614, p. 2]

2 See Bureau of Labor Statistics. Automotive Industry: Employment, Earnings, and Hours. Retrieved from: https://www.bls.gov/iag/tgs/iagauto.htm.

3 See Bureau of Labor Statistics. Average hourly earnings of production and nonsupervisory employees, motor vehicle parts manufacturing, not seasonally adjusted and Average hourly earnings of production and nonsupervisory employees, motor vehicle manufacturing, not seasonally adjusted. January 2000 to February 2023 wages adjusted usings Bureau of Labor Statistics CPI Inflation Calculator.

The standards must create economic security for workers in the industry, include safeguards that strengthen the domestic manufacturing supply chain, and require the EV transition to provide the same level of investment and quality jobs as the current ICE footprint, otherwise we will fail to build the popular support necessary to sustain policies for the EV transition and the continued competitive position of the U.S. auto industry. [EPA-HQ-OAR-2022-0829-0614, p. 2]

Despite planning to invest over a trillion dollars globally in electric vehicle production,4 major auto companies seek to use the transition to cleaner vehicles in order to roll back hard-fought gains, including by shuttering and offshoring manufacturing facilities, cutting wages, and fighting attempts to include new facilities under existing collective bargaining agreements. We cannot allow the transition to electric vehicles to continue the erosion of job quality in the auto industry. Yet, initial trends are quite troubling. As the White House notes in its report on domestic supply chains, "the automotive battery plants that are in existence or are advertising for production workers pay much less than existing powertrain plants, in the range of $17-21 per hour [emphasis added]."5 The realized and potential closure of Ford's Romeo Engine Plant, Stellantis's Belvidere Assembly Plant, and General Motors' Lordstown Assembly Plant demonstrate the risk facing autoworkers and our economy if business as usual is allowed to continue. Research indicates that by 2030 the domestic auto industry could add or lose jobs depending on whether EV assembly and parts production is expanded and onshored.6 [EPA-HQ-OAR-2022-0829-0614, pp. 2-3]

4 See Paul Lienert, Reuters, Exclusive: Automakers to Double Spending on EVs, Batteries to $1.2 Trillion by 2030 (Oct. 25, 2022).

5 See The White House. Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth (June 2021) at 120.

6 See Jim Barrett and Josh Bivens, Economic Policy Institute, The Stakes for Workers in How Policymakers Manage the Coming Shift to All-Electric Vehicles (Sept. 21, 2022) at 11.

"If policymakers ignore the opportunity to build the [auto] sector back stronger, large job losses and further degradation of job quality is the most likely outcome. If instead policymakers help meet this coming transformation with strong investment targeted at boosting the U.S. position in the electric vehicle market and in advanced vehicle technology manufacturing, and if these investments are accompanied by measures aimed at strengthening bargaining power for workers, then employment will expand in the U.S. auto sector and the number of unionized jobs will grow."7 [EPA-HQ-OAR-2022-0829-0614, pp. 2-3]

7 Id. at 15.

The UAW demands that the electric vehicle transition be a just transition, which prioritizes the creation and preservation of good union jobs, internal combustion engine (ICE)-comparable or better wages, collective bargaining, and the reshoring of vehicle and parts production. [EPA-HQ-OAR-2022-0829-0614, pp. 3-4]

UAW members work at 26 light-duty vehicle final assembly plants in 8 states building vehicles for a wide variety of applications – from sports cars to work pickups. Additionally, the UAW represents auto parts workers throughout the country making engines, transmissions, stampings, axles, drivelines, seats, interiors, and various other components. The shift to EVs presents a challenge to the employment of workers currently making ICE engines, transmissions, exhaust systems, and fuel systems. Tens of thousands of UAW members have high quality union jobs producing such components. If an increasing number of vehicles do not require these components, it could have a negative impact on employment levels at plants making these components. Employers must commit to re-tool plants and re-train workers to maintain employment levels and allow American workers to make advanced technology vehicles. The DOE should support reinvestment in these workforces and plants. Such support should be conditioned on employers maintaining employment levels, job quality standards, and freedom of association. [EPA-HQ-OAR-2022-0829-0614, pp. 3-4]

UAW-Represented Final Assembly Plants, Light-Duty Vehicles [EPA-HQ-OAR-2022-0829-0614, pp. 3-4]

	Automaker	Plant	City	State
1.	Stellantis	Warren Truck	Warren	MI
2.	Stellantis	Belvidere Assembly*(recently idled)	Belvidere	IL
3.	Stellantis	Jefferson North	Detroit	MI
4.	Stellantis	Mack Assembly	Detroit	MI
5.	Stellantis	Sterling Heights	Sterling Heights	MI
6.	Stellantis	Toledo North	Toledo	OH

7.	Stellantis	Toledo Supplier Park	Toledo	OH
8.	Ford	Chicago	Chicago	IL
9.	Ford	Dearborn	Dearborn	MI
10.	Ford	Flat Rock	Flat Rock	MI
11.	Ford	Michigan Assembly	Wayne	MI
12.	Ford	Kansas City	Kansas City	MO
13.	Ford	Kentucky Truck	Louisville	KY
14.	Ford	Louisville	Louisville	KY
15.	Ford	Ohio Assembly	Avon Lake	OH
16.	GM	Arlington	Arlington	TX
17.	GM	Bowling Green	Bowling Green	KY
18.	GM	Factory Zero	Detroit-Hamtramck	MI
19.	GM	Flint	Flint	MI
20.	GM	Lansing Delta	Lansing	MI
21.	GM	Lansing Grand River	Lansing	MI
22.	GM	Orion	Lake Orion	MI
23.	GM	Spring Hill	Spring Hill	TN
24.	GM	Fort Wayne	Fort Wayne	IN
25.	GM	Wentzville	Wentzville	MO
26.	GM	Fairfax	Kansas City	MO

[EPA-HQ-OAR-2022-0829-0614, pp. 3-4]

UAW members are proud to be building the vehicles of the future, including hybrids, plug-in hybrids (PHEVs), battery electric vehicles (BEVs), autonomous vehicles, and increasingly efficient gasoline vehicles. UAW members are building advanced technology vehicles across the country and many UAW-represented plants are slated to add electrified vehicles in the future. Current UAW-made BEVs and PHEVs include [EPA-HQ-OAR-2022-0829-0614, pp. 4-5]:

1. Ford F-150 Lightning - BEV Pickup (Dearborn, MI)
2. Ford Escape – PHEV SUV (Louisville, KY)
3. Lincoln Corsair – PHEV SUV (Louisville, KY)
4. Lincoln Aviator – PHEV SUV (Chicago, IL)
5. Cadillac Lyriq – BEV SUV (Spring Hill, TN)

6. GMC Hummer Pickup – BEV Pickup (Detroit, MI)

7. GMC Hummer SUV – BEV SUV (Detroit, MI)

8. Chevy Bolt & Bolt EUV – BEV CUV (Orion, MI)

9. Cruise Autonomous Vehicle – BEV CUV (Orion, MI)

10. Jeep Wrangler – PHEV SUV (Toledo, OH)

11. Jeep Grand Cherokee – PHEV SUV (Detroit, MI)

12. Ford E-Transit – BEV Commercial Van (Kansas City, MO)

13. Thomas Built Bus Saf-T-Liner C2 Jouley – BEV School Bus (High Point, NC)

14. IC Bus Electric CE – BEV School Bus (Tulsa, OK)

15. Mack LR – BEV Refuse Truck (Macungie, PA)

16. Volvo Truck VNR – BEV Class 8 Truck (Dublin, VA) [EPA-HQ-OAR-2022-0829-0614, pp. 4-5]

UAW members are also fighting to raise the standards in the emerging domestic EV battery cell industry. Workers at Ultium Cells' battery cell plant in Lordstown, OH, voted overwhelmingly to join the UAW by a vote of 710 to 16.8 The vote by Ultium workers sent a message that is loud and clear – the EV future must be powered by batteries that are union-made and provide wages, benefits, and workplace safety that is comparable or better than ICE powertrain jobs. Just as these workers are fighting for EV jobs that meet union industry standards, federally supported manufacturing projects should also be required to meet these standards. [EPA-HQ-OAR-2022-0829-0614, pp. 4-5]

8 UAW. December 9, 2022, "UAW Statement on Ultium Organizing Victory": https://uaw.org/uaw-statement-ultium- organizing-victory/.

UAW members produce internal combustion vehicles, engines, transmissions, and other ICE-exclusive components. Transmission and engine plants, like final assembly plants, help create economic ecosystems as the success of suppliers and local businesses often depend on the success of the transmission and engine plants. Therefore, the potential for economic displacement can be far greater than meets the eye. [EPA-HQ-OAR-2022-0829-0614, pp. 4-5]

Absent sufficient safeguards incorporated into the rule or revisions to the proposed standards, the burden of compliance is poised to fall heaviest on the workers who currently build ICE vehicles and those who will build ZEVs in the future. The proposed standards' uncertain disruption to ICE jobs and the uncertain quality of new EV jobs must be addressed as the EPA works to finalize the rule. Without this, we fear the proposed standards threaten to facilitate a race to the bottom, allowing manufacturers to pit EV jobs against ICE jobs, and ensuring the standards we fought for are absent for the next generation of vehicles and those who build them. [EPA-HQ-OAR-2022-0829-0614, pp. 4-5]

A. Uncertain Disruption to ICE Jobs

The EPA's proposed standards anticipate a dramatic change in the types of vehicles that will be driven on our roads. But the expedited transition to ZEVs that is required by the standards will not impact vehicles and drivetrains alone. The robust supply chain and domestic manufacturing base that has long supported the production of ICE vehicles will be placed in jeopardy. We are concerned that an impracticable regulatory environment will only encourage original equipment manufacturers (OEMs) to seek cost savings by placing the risk of the electric vehicle (EV) transition solely on autoworkers. The EV transition will not succeed if the workers building ICE vehicles are left behind. Rest assured, it is never a more efficient process, innovative technology, or greater market share that saves the industry. Autoworkers are always expected to sacrifice: [EPA-HQ-OAR-2022-0829-0614, pp. 5-6]

"We absolutely have too many people in certain places, no doubt about it... And we have skills that don't work anymore. We have jobs that need to change." (Ford CEO Jim Farley)9 [EPA-HQ-OAR-2022-0829-0614, pp. 5-6]

9 Neal Boudette, "Ford to Cut 3,000 Jobs to Reduce Costs in Transition to Electric Vehicles", (New York Times, Aug. 22, 2022), https://www.nytimes.com/2022/08/22/business/ford-motor-job-cuts.html.

The scores of workers who power the industry and rely on stable employment to provide for their families deserve a better path forward. Unfortunately, the EPA's projections of the proposed standards' impact on employment will fail to ease concerns about a major disruption to the workforce. The EPA projects that the proposed standards could have a dramatic impact on employment, ranging from a loss of 12,380 – 24,100 jobs per year or an increase in 30,800 – 81,500 job per year.10 We are highly skeptical of claims that the proposed standards will have minimal effect on employment. In the light-duty sector, automakers have used the cost of EVs as an excuse to cut jobs.11 Whether these claims by manufacturers are valid or a pretext to reduce costs should be interrogated, but in either case it is the workers building the vehicles that bear the brunt of these threats. And where EV battery jobs have been established domestically, job quality at these plants threaten to undermine standards in the entire sector. The only way to mitigate these concerns is to build out a completely unionized domestic supply chain for vehicles and batteries. The union workers who build ICE vehicles deserve a comprehensive assessment of the proposed standards' impact on their livelihoods. [EPA-HQ-OAR-2022-0829-0614, pp. 5-6]

10 Supra note 1 at 29392.

11 The Washington Post. April 26, 2023. "Auto giant Stellantis offers buyouts to 33,500 workers": https://www.washingtonpost.com/business/2023/04/26/auto-giant-stellantis-offers-buyouts-33500-workers/; Reuters. May 21, 2021. "Daimler Truck predicts engine job losses in transition to 'green' trucks": https://www.reuters.com/business/autos-transportation/daimler-truck-predicts-engine-job-losses-transition-green-trucks-2021-05-21/.

The EPA should recognize that the domestic vehicle manufacturing footprint relies substantially on the production of profitable ICE vehicles and that those profits will be necessary to fund the transition to cleaner technologies. By requiring increased ZEV adoption, and therefore fewer ICE vehicles, the proposed standards should be expected to disrupt ICE jobs. We urge the EPA to conduct additional analysis of the proposed standards' projected impact on employment, with particular focus on the union workforce that produces ICE vehicles. EPA's analysis should also consider the location, job quality, and unionization rates of workers manufacturing the batteries, fuel cells, and advanced ICE powertrain components that will be necessary to meet the regulations. Viewing employment in the aggregate is not sufficient. Not all jobs should be treated as equal. Vehicle manufacturing relies on a union workforce. Therefore, the preservation of standards, fought for and won by UAW members, in new EV jobs should receive significant attention in the EPA's economic impact analysis. [EPA-HQ-OAR-2022-0829-0614, pp. 5-6]

B. Uncertain EV Job Quality

Federal policy must ensure EV jobs are as good as or better than ICE jobs. Compliance with GHG emissions standards can never justify the offshoring of jobs, the slashing of wages, or the busting of unions. [EPA-HQ-OAR-2022-0829-0614, p. 6]

Unless and until we build a comprehensive domestic EV supply chain, the transition to EVs will risk trading dependency on fossil fuels for dependency on imported EVs, batteries, fuel cells, and materials, all while hollowing out quality union jobs in the process. Uncertainty around the build-out of the domestic EV supply chain is not recognized by the EPA and therefore does not play a significant role in altering the proposed standards' increased adoption of ZEVs.12 The EPA must craft its standards to hold manufacturers accountable to both environmental and labor concerns. [EPA-HQ-OAR-2022-0829-0614, p. 6]

12 For example, the EPA cites to 13 announced domestic battery plants, but does not indicate how many are operational or ready to help achieve compliance with the standards. See supra note 29317.

The EPA must recognize that the current domestic auto assembly footprint is heavily weighted towards the profitable light-duty truck and SUVs that are tasked with funding the EV transition.20 In 2022, nearly 60% of all vehicles produced by the unionized automakers in the U.S. were pickups or SUVs.21 The EPA must also consider the resiliency of the domestic manufacturing footprint that builds both ICEs and EVs. Federal regulation should be geared towards strengthening the domestic auto manufacturing supply chain and requiring that the EV transition provide the same levels of investment and quality jobs as the current ICE footprint. We fear the proposed standards are premature and risk disrupting the market that will make the EV transition possible. [EPA-HQ-OAR-2022-0829-0614, p. 8]

20 David Welch, "GM's Strong Truck Sales Are Funding This Year's EV Sales Blitz, Barra Says", (Bloomberg, Feb. 16, 2023), https://www.bloomberg.com/news/articles/2023-02-16/gm-s-strong-truck-sales-are-funding-this-year-s-ev-sales- blitz#xj4y7vzkg.

21 S&P Global. 2022. "Light Vehicle Production".

Organization: Job Creators Network Foundation (JCNF)

Finally, there are significant concerns regarding the use of child labor to cultivate these needed minerals. Seventy percent of cobalt needed for lithium-ion batteries comes from the Democratic Republic of the Congo,9 where children hand dig in crowded, primitive mines to try to service the West's insatiable demand.10 [EPA-HQ-OAR-2022-0829-0709, p. 3]

9 Id.

10 Terry Gross, "How 'modern-day slavery' in the Congo powers the rechargeable battery economy," (Link: https://www.npr.org/sections/goatsandsoda/2023/02/01/1152893248/red-cobalt-congo-drc-mining-siddharth-kara) npr (Feb. 1, 2023)

Organization: Matthew DiPaulo

This proposal will disrupt automotive industry supply chains and eliminate large numbers of jobs in vehicle manufacturing, parts production, and repair businesses. While small businesses are the lifeblood of the American economy, they will be hit the hardest by a premature rush to have electric vehicles dominate new vehicle sales. Small, internal-combustion engine-based businesses are not receiving the billions of dollars that large automakers are to make the conversion to electric. Thirty-three percent of automotive aftermarket products purchased by consumers last year were on upgrades and accessories for internal combustion engines and drive trains. That means as much as $17 billion of small business value will be wiped out by this proposal. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: MEMA, The Vehicle Suppliers Associated

The success of our industry is interwoven with the success of this proposal and the ability of the government to work with industry and other stakeholders to meet significant challenges. Therefore, the rule must address: [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- The need for regulatory certainty. The final rule must contain an effective mix of feasible, demonstrated technology along with emerging technology, leaving options to improve emissions reductions in today's advanced propulsion designs. This will foster innovation in a coordinated direction, aligned with U.S. policy, but not mandate application of a narrowly defined technology path to make a positive impact on the country's urgent environmental goals. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- The influence of other technologies - including internal combustion engines fueled by hydrogen and other renewable carbon-neutral fuels - which can impact measurable environmental improvements at scale technologies can provide immediate improvement to the environment. This is important not only for environmental improvements but for environmental justice in providing cleaner consumer vehicles immediately to communities living and working close to busy streets, highways, and other transportation networks. Inclusion of all technologies that can decarbonize the transportation sector will foster the necessary growth in manufacturing capacity, vocational performance, infrastructure improvements, and consumer acceptance. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Technology Neutrality and BEV Emissions. EPA should ensure that battery electric vehicles (BEV) are included in metrics for vehicle-to-vehicle comparison by assigning a metric that captures the pollutant emissions related to BEV operation, aligned with national electricity generation figures. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Challenges in our nation's infrastructure and power grid. MEMA appreciates the significant public investments being made to support clean transportation infrastructure. As these new investments in highways and main corridors are deployed, federal and state incentives are needed to further expand the EV charging and refueling infrastructure in areas that connect these major thoroughfares. Urban industrial centers will need focused buildout while rural areas will need thoughtful rollouts to achieve an effective EV charging infrastructure. These buildouts must include Direct Current Fast Charge (DCFC) and vehicle-to-grid (V2G) bidirectional charging. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Supply chain challenges. The proposed rule assumes that all materials advanced vehicles, which are not available today in the quantities needed to support the massive growth in vehicle construction, will become available within sufficient time. This places a significant and unnecessary risk on manufacturers and suppliers. Furthermore, once a company has converted production to new technology lines, that company cannot easily pivot its facilities and workforce back to the previous technology if EPA projections are not realized by the mid-to-late-2020s. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Workforce challenges. A significant increase in skilled workers will be needed to support the implementation of this rule and long-term success thereof [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

- Extended warranty. The necessity to clearly define the applicability of the extended warranty and the need to provide repair access to service these new vehicles. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

MEMA members are working to accelerate the performance and availability of clean-operating vehicle technologies and are directly contributing to their realization. Besides battery electric options, effective low- and zero-carbon technologies for future and current in-use vehicles also exist and can readily be put to use to reduce nationwide emissions and help EPA meet its climate goals. The success of this rule depends on greater inclusion of all available emissions reduction technologies, significant investment in infrastructure, careful understanding and investment in the domestic and global supply chain and ensured repair access to serve the improved and enhanced domestic vehicle fleet. [EPA-HQ-OAR-2022-0829-0644, pp. 2-3]

Organization: Senator Shelley Moore Capito et al.

Moving to BEVs will also result in a loss of domestic auto manufacturing jobs due to higher levels of automation and a reduction in the number of components that go into these vehicles. For example, Ford has estimated a 30-percent labor reduction in its transition to electric vehicles, with many more jobs to be lost in the specialty automotive aftermarket that has been built on the internal combustion engine. In Europe, more than a half-million jobs are expected to be lost in the auto sector if the European Union relies on an electric vehicle-only approach.13 Similar job losses can be expected in the United States based on these proposals. [EPA-HQ-OAR-2022-0829-5083, p. 4]

13 An Electric Vehicle-only approach would lead to the loss of half a million jobs in the EU, study finds, CLEPA (June 12, 2021)

Organization: Steven G. Bradbury

EPA fails to consider the negative societal consequences and second-order cost effects of its proposals. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

In putting forward regulatory proposals designed to force upon the American people a vast and rapid industrial transformation, EPA has an obligation to go further than just considering the direct cost effects of its proposals (which are themselves woefully under- estimated, as highlighted above); it must also consider the broader indirect economic con- sequences and negative societal costs that would follow if these rules are finalized as pro- posed. So far in these rulemakings, the Agency has either ignored or deliberately down- played these second-order effects. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

Some of the most consequential burdens and negative ramifications of the proposed rules that EPA hides, disregards, or minimizes include the following: [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

- Stifling consumer choice at the dealership. Many of the vehicle models most pop- ular with American families will no longer be sustainable under the EPA's proposed rules. Automobiles have long been America's favorite freedom machines. When the models of ICE vehicles Americans love the most disappear from dealerships, that will represent an enormous drop in consumer welfare (in basic happiness and well- being) for the average American family and for the U.S. economy as a whole. For many of these ICE vehicle models, there is no EV option likely to be available that could provide the same performance, utility, or recreational value at a comparable price (or at all). EPA makes no real effort to quantify this generational loss of con- sumer welfare. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

- Increasing the purchase price of all new vehicles. Notwithstanding EPA's gaming of the numbers, the true costs of the industrial transformation forced by the EPA's proposed rules will be spread across the automakers' fleets, resulting in a significant increase in the prices of all new vehicles, with greater price increases concentrated on those vehicles for which the demand is highest relative to supply. All Americans will be harmed by these price increases, but the biggest losers will be lower-income Americans who cannot afford to buy an EV or to pay more for a gas-powered vehicle at the dealership, as well as those who live in rural areas and need to drive longer distances and for whom EVs are impractical. [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

- Destroying jobs in the U.S. auto industry. The loss of popular new vehicle options and the significant price increases at the dealership will mean that fewer new vehicles will be purchased—almost certainly far fewer than EPA is predicting. This drop-off in demand will challenge the profitability of the auto industry and lead to a loss of jobs for tens of thousands of America's autoworkers, as well as a loss of jobs in the many U.S. companies that supply inputs for the production of automobiles and heavy trucks.40 The United Auto Workers union has warned of the potential for job losses from the transition to EVs,41 as automakers announce more plant closures and layoffs due to the costs of electrification.42 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

40 See Technality, "Ford Just Proved How Far Ahead Tesla Really Is: Profitability May Continue to Be a Struggle for All Legacy Automakers," May 10, 2023, https://medium.com/tech-topics/ford-just-proved-how-far-ahead-tesla-really-is-6a4d95cff519 ("Despite wanting to be a fully-electric brand by 2035, as of Q4 2022, Ford's average net margin on the Mustang Mach-E was -40.4%. Unfortunately, that's a figure that's only gotten worse since, to the point where Ford is now losing an average of $58,000 for every EV sold.").

41 See Press statement, United Auto Workers, "UAW Statement on Job Cuts at Stellantis," April 26, 2023, https://uaw.org/uaw-statement-job-cuts-stellantis.

42 See Michael Wayland, "Stellantis to indefinitely idle Jeep plant, lay off workers to cut costs for EVs," CNBC.com, December 9, 2022, https://www.cnbc.com/2022/12/09/stellantis-to-idle-jeep-plant-lay-off-workers-to-cut-costs-for-evs.html.

• Causing more deaths and serious injuries on America's highways. As new vehicle models become unaffordable or unappealing, many American families will be left driving older and older used cars, and the age of the nation's auto fleet will rise dramatically. Already, the average age of a car on the road in the United States is approaching 13 years, and many cars are on their fifth or sixth owners. The aging of the American fleet has very negative safety consequences, as NHTSA statistics show that older vehicles are much less safe than newer models in an accident.43 [EPA-HQ-OAR-2022-0829-0647, pp. 15-16]

43 See https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/newer-cars-safer-cars_fact-sheet_010320-tag.pdf.

Organization: United Steelworkers (USW)

As our union represents the majority of unionized workers in the auto supply chain and workers in the oil sector, we have grave concerns regarding this proposed rule's impact on their livelihoods, and the negative impact that the rapid implementation of ZEVs will have on our electric grid and domestic supply chain. [EPA-HQ-OAR-2022-0829-0587, p. 1]

As mentioned prior, USW represents the majority of workers in the auto supply chain and oil refinery workers. The auto supply chain has historically been characterized by high union density, family-supporting wages and benefits, and pathways to the middle class. However, the shift to low-emission vehicle deployment cannot leave these workers behind. Unfortunately, the EPA's proposal for multi- pollutant emissions standards does not address the impact on jobs. EPA must consider how the transition to low-emission vehicles will impact manufacturing workers and the communities they live in. This should be an essential part of the comprehensive analysis that EPA conducts to project its proposals' economic impacts. [EPA-HQ-OAR-2022-0829-0587, p. 2]

Due to the speed of the transition to electric vehicles in EPA's proposal, tens of thousands of America's best manufacturing jobs are at risk, devastating not only oil workers, but those who make catalytic converters, pistons, fuel lines, and numerous other materials, parts, and components for gasoline-powered vehicles. Research finds that there are 1,300 facilities manufacturing light- and medium-duty vehicles and their components. Of these facilities, approximately 225 manufacture ICE light- and medium-duty vehicles and their components, like engines and transmissions, fuel efficiency technologies, and tailpipe pollution reducing technologies. The facilities producing these components and fuel are the most likely to see near-term job loss from the increased deployment of low-emission and ZEVs. Additionally, there are nearly 900 facilities making "fuel agnostic" components for heavy-duty vehicles, such as glass and seat belts, and these components are a large part of the auto supply chain that will be disrupted with the proposed rapid transition to ZEVs.1 [EPA-HQ-OAR-2022-0829-0587, p. 2]

1 BlueGreen Alliance Foundation, (Link: https://www.bgafoundation.org/programs/visualizing-the-clean-economy-autos/) "U.S. Automotive Manufacturing: Motor Vehicles, Parts, and Materials", Accessed July 5, 2023.

The transition to low-emission vehicles must function to raise the job quality and safety standards associated with all impacted workforces, including manufacturing workers, drivers, and mechanics. We remain deeply concerned that workers manufacturing components for and assembling ZEVs earn lower wages and receive less benefits when compared with workers manufacturing components for ICE vehicles.2 The high quality of these jobs is attributable to the

ICE vehicle manufacturing sector's dense unionization. Union membership helps ensure that workers share in the benefits of the economic growth they help generate through collective bargaining, higher wages, increased access to healthcare, and improved retirement security. As a whole, union members earn approximately 20 percent more than their nonunion counterparts, helping to increase social mobility and improving workers' economic outcomes.3 [EPA-HQ-OAR-2022-0829-0587, p. 3]

2 Economic Policy Institute, (Link: https://www.epi.org/publication/ev-policy-workers/) "The stakes for workers in how policymakers manage the coming shift to all-electric vehicles," September 22, 2021.

3 U.S. Department of Labor, (Link: https://www.dol.gov/general/workcenter/union-advantage#%3A%7E%3Atext%3DWorkers%20who%20are%20union%20members%2CPartnership%20for%20Women%20and%20Families) The Union Advantage. Accessed July 5, 2023.

Additionally, it is imperative to highlight that Black workers account for 12.5 percent of workers economy wide, but 16.6 percent of workers in the auto sector, while workers without a four-year degree account for 62.2 percent of workers economy wide, but 74.6 percent in the auto sector.4 The auto manufacturing sector represents a critical path to the middle class for the very workers and communities that have disproportionately borne the brunt of neoliberal economic and trade policies. It is essential that EPA leverage available data to project how its proposals will shape the domestic auto manufacturing sector, and the workers and communities that comprise it. [EPA-HQ-OAR-2022-0829-0587, p. 3]

4 Economic Policy Institute, (Link: https://www.epi.org/publication/ev-policy-workers/) "The stakes for workers in how policymakers manage the coming shift to all-electric vehicles," September 22, 2021.

Fortunately, there is a way to ensure that a transition to low-emission vehicles is equitable for the workers significantly impacted – a gradual transition. An Economic Policy Institute (EPI) report, conducted in collaboration with BGA, the United Auto Workers, the United Steelworkers, and the AFL-CIO, found that a gradual transition to BEVs significantly reduced the amount of jobs lost in the auto sector. For example, one of the best scenarios configured in the report accounted for combustion vehicles taking up 50 percent, hybrid vehicles at 25 percent, and battery electric vehicles at 25 percent of the market share by 2030. This scenario could lead to the creation of over 154,000 new jobs in the auto supply chain and over 36,000 new jobs in auto assembly. However, such job gains are contingent upon a significant onshoring of the BEV supply chain, such that the domestic content of BEVs at least matches that of ICEs, and there being a 10 percent increase in the share of U.S.-made vehicles sold in the U.S. auto market. This report concludes that a more gradual and focused approach in transitioning to ZEVs is key.5 [EPA-HQ-OAR-2022-0829-0587, pp. 3-4]

5 Economic Policy Institute, (Link: https://www.epi.org/publication/ev-policy-workers/) "The stakes for workers in how policymakers manage the coming shift to all-electric vehicles," September 22, 2021.

In order to protect good-paying, union jobs and promote a safer environment, EPA should address the negative impacts on jobs and job quality that the proposed rule creates. Without well-rounded policy, good paying jobs are lost and communities are destroyed. [EPA-HQ-OAR-2022-0829-0587, pp. 3-4]

EPA relies heavily on the potential critical role and incentives from the manufacturing investments from the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA) for its proposed emissions standards. Programs related to the auto manufacturing sector include the Battery Manufacturing and Recycling Grants, the Battery Material Processing Grants, the Domestic Manufacturing Conversion Grants, the 48C Advanced Manufacturing Tax Credit, the Advanced Technology Vehicle Manufacturing Loan Program, the National Electric Vehicle Infrastructure Program, and the Charging and Fueling Infrastructure Grant Program. [EPA-HQ-OAR-2022-0829-0587, p. 4]

While the proposed rule is not wrong that the investments made by IRA and IIJA should spur investments in new technologies to lower emissions of vehicles, it does fail to consider the timeline and effectiveness of program implementation. Undoubtably, these manufacturing investments will take time to achieve their full production capacity. [EPA-HQ-OAR-2022-0829-0587, p. 4]

Organization: Volvo Car Corporation (VCC)

Many uncertainties remain (supply chains, tariffs, infrastructure, incentives) so it is very important that government pursue policies that encourage auto industry investment and jobs, development of the electric vehicle market and advancement of motor vehicle safety. With the right complementary government policies, this rulemaking presents an opportunity for government and industry to pursue these shared goals. [EPA-HQ-OAR-2022-0829-0624, pp. 5-6]

Organization: Zero Emission Transportation Association (ZETA)

Electrification will not only reduce emissions but it will also promote American economic competitiveness, create good-paying jobs, and improve local health outcomes. Private sector investments in the domestic EV supply chain total billions of dollars and support hundreds of thousands of American jobs. Moreover, research has indicated that without adequate regulation of vehicle emissions, U.S. communities would experience avoidable increases in mortality. [EPA-HQ-OAR-2022-0829-0638, p. 2]

4. Transportation Electrification Benefits Consumers and the Economy

Beyond health and environmental improvements, electrification will benefit the country's economic development and Americans' pocketbooks. The transition to EVs is already leading to new manufacturing jobs, improved property values, and new investments in communities.84,85,86 This trend should be expected to continue and accelerate in the coming years. The burgeoning EV industry will create new jobs for the manufacturing of components such as batteries, electric motors, and power electronics, as well as charging infrastructure. In addition, the manufacture of conventional vehicle component parts like brakes and windshields will continue to be a source of employment in the automotive industry. [EPA-HQ-OAR-2022-0829-0638, pp. 18-19]

84 Sklarz and Miller, "The Impact of Noise on Residential Property Value," (September 20, 2018) https://www.collateralanalytics.com/wp-content/uploads/2018/10/CA-RESEARCH-The-Impact-of-Noise-on-Reside ntial-Property-Values.pdf

85 "Electric Vehicle Investments Provide Benefits Across the U.S.," ZETA, accessed June 27, 2023 https://www.zeta2030.org/education-fund/investments

86 "U.S. Energy & Employment Jobs Report," U.S. Department of Energy, (June 2023) https://www.energy.gov/policy/us-energy-employment-jobs-report-useer

Electrification will also help ensure the United States maintains its economic competitiveness with the rest of the world. As discussed further below, governments around the world are establishing more ambitious electrification goals to align with recent announcements from global manufacturers. Ensuring U.S. regulations match or exceed these ambitions is vital to encouraging domestic investments and accelerated job creation in the industry. [EPA-HQ-OAR-2022-0829-0638, pp. 18-19]

a. Electrification Will Continue to Create Good-Paying American Jobs

EVs are the lynchpin to simultaneously tackling the climate crisis and restoring the United States as a global leader in automotive manufacturing. As of March 2023, more than 143,000 jobs in the EV industry had been created since the passage of the Bipartisan Infrastructure Law (BIL) in November 2021.90 Combined with the Inflation Reduction Act (IRA) of 2022 and stringent emissions standards from EPA, manufacturing investments and job creation will continue to grow. The IRA alone is projected to create around 9 million new clean energy jobs over the next decade.91 [EPA-HQ-OAR-2022-0829-0638, pp. 19-20]

90 "Report Finds Investments in U.S. Electric Vehicle Manufacturing Reach $120 Billion, Create 143,000 New Jobs," Environmental Defense Fund, (March 14, 2023) https://www.edf.org/media/report-finds-investments-us-electric-vehicle-manufacturing-reach-120-billion-create-143 000

91 "Job Creation Estimates Through Proposed Inflation Reduction Act," University of Massachusetts, (August 4, 2022) https://peri.umass.edu/publication/item/1633-job-creation-estimates-through-proposed-inflation-reduction-act

Researchers at the Goldman School of Public Policy found that a scenario with 100% electric LDV sales by 2030 and 100% MHDV by 2035 would result in 2 million more jobs than the current trajectory.92 This is a result of the new jobs in the charging infrastructure, electricity, and maintenance sectors. The manufacturing and installation of charging infrastructure alone is projected to create more than 29,000 jobs.93 In general, jobs in the EV industry are high-quality and high-paying and as a result, are attracting a new generation of workers who are eager to work in the sustainable transportation industry. [EPA-HQ-OAR-2022-0829-0638, pp. 19-20]

92 "Switching to Electric Cars and Trucks Would Support 2 Million Green Jobs in 2035," UC Berkeley School of Public Policy, accessed May 15, 2023, https://www.2035report.com/transportation/green-jobs

93 "The Commanding Heights of Global Transportation: Quantifying the Employment Effects," SAFE, (March 9, 2021) https://secureenergy.org/the-commanding-heights-of-global-transportation-quantifying-the-employment-effects/

EV charging infrastructure buildout similarly promises to generate substantial job creation throughout the country. The International Energy Agency (IEA) estimates that 12 new jobs are created for every $1 million invested in charging infrastructure.94 By comparison, ICE vehicle manufacturing creates an average of 7.2 jobs per million dollars invested. At this rate, the BIL's $5 billion allocations through the National Electric Vehicle Infrastructure (NEVI) formula program to build out a national EV charging network could create at least 60,000 direct jobs. [EPA-HQ-OAR-2022-0829-0638, pp. 20-21]

94 "Sustainable Recovery - Transport," IEA, accessed June 23, 2023 https://www.iea.org/reports/sustainable-recovery/transport

Beyond installation, ongoing electric vehicle supply equipment (EVSE) operations and maintenance will create thousands more jobs. This creates an entirely new occupation, that of an

EVSE technician, that goes beyond the role of a traditional electrician. EVSE technicians are responsible for the ongoing maintenance and operations of chargers and are specially trained to handle electrical and parts malfunctions, software upgrades, cell signal issues, damages, and more.95,96 [EPA-HQ-OAR-2022-0829-0638, pp. 20-21]

95 ChargerHelp Guiding Standards 2022, accessed June 23, 2023 https://www.chargerhelp.com/_files/ugd/30e128_0032898550534e609ce4188fa91bc926.pdf

96 “FACT SHEET: Biden-Harris Administration Announces New Standards and Major Progress for a Made-in-America National Network of Electric Vehicle Chargers,” The White House, accessed June 6, 2023 https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-a nnounces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/

As discussed further in section eight of these comments, the U.S. battery manufacturing industry is quickly scaling to meet demand driven by transportation electrification. Since January 2021, the U.S. private sector has announced nearly $82 billion in domestic battery manufacturing investments, translating to 96 new or expanded processing and manufacturing plants creating thousands of new jobs in the process.97 [EPA-HQ-OAR-2022-0829-0638, pp. 20-21]

97 New US Battery Manufacturing and Supply Chain Investments Announced Under President Biden, US Department of Energy, (February 13, 2023) https://www.energy.gov/sites/default/files/2023-02/Battery%20Supply%20Chains%20Investments%20Map.pdf

The average cost of electricity in the U.S. is 16.5 cents per kWh as of May 2023.104 If electricity costs 16.5 cents per kWh, charging an EV with a fully-depleted 100 kWh battery will cost about $16.50 to reach a full charge. While the range of a 100 kWh battery varies depending on a vehicle’s efficiency, a typical Tesla Model S can go up to 400 miles on a single charge.105 Comparatively, the average national gasoline price for regular grade was $3.685 in May 2023.106 Filling up a 12-gallon passenger vehicle with a 30 mpg fuel economy would cost $45.96 to move the vehicle 360 miles. At $16.50 for a full charge, fueling an EV cuts fuel prices by 64%. [EPA-HQ-OAR-2022-0829-0638, p. 22]

According to AAA, over the course of a year the cost of refueling an EV is around $546, compared to $1,255 per year when fueling a gasoline car.107 [EPA-HQ-OAR-2022-0829-0638, p. 22]

104 “Average energy prices for the United States, regions, census divisions, and selected metropolitan areas,” U.S. Bureau of Labor Statistics, accessed July 3, 2023 https://www.bls.gov/regions/midwest/data/averageenergyprices_selectedareas_table.htm

105 “Fuel Economy of the 2021 Tesla Model S Long Range,” U.S. Department of Energy, accessed July 3, 2023 https://www.fueleconomy.gov/feg/noframes/44051.shtml

106 Id. at footnote 104

107 “True Cost of Electric Vehicles,” AAA Automotive, accessed July 3, 2023, https://www.aaa.com/autorepair/articles/true-cost-of-ev

c. Electrification Promotes American Economic Competitiveness

Governments around the world are setting more stringent emissions standards to align with recent announcements from global manufacturers. Ensuring U.S. regulations match or exceed these ambitions is vital in allowing certainty and encouraging investment in the industry. If the U.S. does not move more aggressively on LMDEV deployment, it risks ceding market share to other countries and regions who are moving faster, such as China, the European Union, and others. [EPA-HQ-OAR-2022-0829-0638, p. 24]

Complimentary incentives embedded in the IRA will facilitate onshoring of the EV supply chain while robust EPA emission standards will help ensure the United States becomes and remains a leader in EV technology development and manufacturing. While more work remains to craft supportive policies in other areas of the supply chain, EPA emissions standards are crucial drivers of domestic EV supply. [EPA-HQ-OAR-2022-0829-0638, p. 24]

Many countries have made commitments to accelerate EV development and deployment in their borders. An increase in EV sales is taking place across the world, but has been dominated by the Chinese market, which accounts for the majority of all new EV registrations. As of 2022, China had 10.7 million BEVs on the road and the U.S. had 2.1 million.114 Part of this dominance is due to China's purchase incentives, high registration fees for ICEVs, a robust charging network, and national "new energy vehicle" targets.115 [EPA-HQ-OAR-2022-0829-0638, p. 24]

114 Id. at footnote 27

115 "An evaluation of government incentives for new energy vehicles in China focusing on vehicle purchasing restrictions," Energy Policy, (October 2017) https://doi.org/10.1016/j.enpol.2017.07.057

With its own emissions targets, countries in Europe are sending strong signals about the continent's future electric fleet. Europe is the second-largest market for EVs in the world, with 30% of the global share.116 With robust LMDV emissions standards, the U.S. would be encouraging quicker adoption of EV technology to ensure the country remains at the forefront of this global transition. Below is a list of regional and national goals for light-and medium-duty zero-emission vehicle deployment that further underscores the need for the U.S. via EPA to maintain pace with the rest of the world: [EPA-HQ-OAR-2022-0829-0638, p. 24]

116 Id. at footnote 27

EPA Summary and Response

Summary:

Some commenters state that the rule doesn't adequately explain why reports that claim jobs will be lost are wrong, or address the projected impact on jobs, or the role ICE vehicle sales or charging infrastructure will play in the transition. The UAW is skeptical of EPA's projections of small employment impacts, stating that union workers deserve a comprehensive assessment of the impact of the standards on livelihoods. The USW commented that the EPA should leverage data to project how the regulation will shape domestic auto manufacturing, its workers, and their communities. Steven Bradbury commented that EPA has to consider the broader indirect economic consequence of the rule.

Commenters, including the AmFree, AFPI, Dalek, Stephen Bradbury and others, commented that the rule will lead to job losses. AFPI and others mentioned that EVs have fewer parts than their ICE counterparts and will require less labor to assemble. A group of U.S. Senators commented that BEV production will lead to more automating, resulting in job loss. Commenters mentioned the auto industry, as well as jobs both upstream and downstream of the manufacturing sector. Some specific sectors mentioned include the petroleum industry, the refining sector, dealerships, repair and maintenance, oil workers, supply workers, and gas station employees. USW and others stated that the speed of the transition will put workers at risk, and that the standards will lead to a dramatic change in the type of vehicles driven, with some commenters stating that a gradual transition will ensure the transition to low or zero-emission vehicles is equitable. Some commenters stated that jobs will be reallocated overseas, or, similarly, that the success of the rule will depend on the onshoring of electric vehicles and their batteries and parts. The Alliance stated that the EPA analysis assumed that all EVs sold in the U.S. will be made in the U.S. BGA and others are particularly concerned that jobs will be offshored to countries with minimal labor protections and loose environmental standards. Others, including Steven Bradbury, BGA, and USW, commented on possible environmental justice implications of the rule including that the rule is critical to advancing EJ and equity, and that this rule disregards the impact that higher purchase prices will have on lower-income Americans.

Job Creators Network Foundation commented with concerns that battery production will promote child labor in lithium-ion production in foreign countries. MEMA commented that the proposal assumes materials for advanced materials will be available in sufficient time, which places risk on manufacturers and suppliers.

Some commenters stated that there is a lack of qualified technicians for BEVs and EV charging stations, which will lead to higher costs of ownership and impact purchase decisions. AFPI and others also commented on the costs of the rule. AFPI commented that costly minerals will make the cost of the rule higher than estimated. Daniel Hellebuyck commented that the standards don’t account for the costs of companies trying to fund EV ventures. Steven Bradbury commented that the proposal underestimated costs. Some commenters stated that the higher costs will lead to reduced vehicle sales, which will lead to job losses. Steven Bradbury further states that the rule will lead to reduced vehicle choice, with fewer ICE vehicle options and no EV option to replace them.

Some commenters stated that this rule must not mandate the application of specific technology, but contain options including demonstrated and emerging technologies. BGA commented that EPA should include a request for information to seek information on worker voice, employee wages and benefits, hiring practices, training and advancement programs and community partnerships.

UAW commented that the analysis for the rule should consider location, job quality and unionization rates of workers manufacturing batteries, fuel cells and advanced powertrain components that will be needed to meet the regulations. Both the UAW and USW commented that the rule will negatively impact job quality and safety, as well as that there will be localized effects, where some communities may see a decrease in number or quality of jobs even if some communities gain jobs. UAW and USW commented that BEV workers earn lower wages and get less benefits from ICE worker counterparts due to unionization in ICE manufacturing. The UAW also commented that the uncertain quality of new EV jobs must be addressed. BGA commented that the EPA should identify communities associated with manufacturing and quantify the share of the economy supported by auto manufacturing, as well as the number of jobs in the sector.

UAW also commented that not all jobs should be treated as equal, and EPA should pay attention to preserving workforce standards for UAW members in new EV jobs in the analysis for the rule. They commented that setting emissions standards should not justify offshoring, wage cuts or union busting, and that the government should ensure that EV jobs are as good as or better than ICE jobs. BGA and UAW commented that EPA needs to consider how the transition to EVs will affect workers and their communities, that there will be distributional/geographic differences in the effects of the rule on employment where some places will see reduced employment, and others may see increased employment, though the quality or quantity of those jobs may not be equal. AFPI commented that the shift to EVs would cost union jobs. UAW commented that EPA should conduct additional analyses on the impact on employment, focusing on the union workforce, and consider location, quality and unionization rates of workers manufacturing batteries, fuel cells, advances ICE powertrain components; an aggregate view is not sufficient.

Commenters including MEMA, AFPI and HF Sinclair focused comments on the skill sets of workers. AFPI commented that workers can't easily transition due to different skill sets are needed, while MEMA stated that the transitions to EVs will need significantly more skilled workers. HF Sinclair commented that EPA can't assume workers from one field can move to another through retraining, or physically. Commenters stated that there will be geographic impacts, and the rule will spur labor reallocation, with some commenters stating that the midwest will experience the strongest job losses. Commenters also stated that impacts will be felt differently in different industries, with HF Sinclair Corp stating that industries like emissions inspections, third party dealers, aftermarket tuning will disappear, and AFPI commented that production will shift even if there is no national level change in employment.

Some commenters stated that EPA must involve stakeholders, that EPA should collaborate with the Departments and Labor and Energy, and that Federal and State incentives are needed to expand EV charging and refueling infrastructure. Some commenters state that electrification, the IRA and BIL have already led to new jobs, creating incentives and investments in domestic battery manufacturing, Some commenters said that recent investment in EV and battery manufacturing, as well as the installation and maintenance of charging and grid infrastructure provide significant job opportunities. Comments by a collection of Environmental and Public health organizations stated that ZEVs can support good quality jobs and increase employment opportunities. ZETA commented that electrification will create jobs in battery production, electric motor, power electronics and charging infrastructure, as well as continue to employ people in industries like brakes and windshields. They also stated that the rule will help ensure the U.S. remains competitive and can be a crucial driver of domestic EV supply. The USW stated that the IRA and BIL will spur investments, though they stated that the EPA does not account for the time it will take for those investments to come to fruition. Commenters state that increased demand for new technology to meet GHG standards could lead to growth in supply chains, strengthen domestic manufacturing and supply chains, and create jobs in EV charging infrastructure. Commenters state that if EVs are built in the U.S., job gains can happen, and produced labor income effects would ripple through the wider economy, benefit economic development and the consumer pocketbook. BGA commented that strong emissions regulations and economic growth are not mutually exclusive.

Commenters stated that the policy should encourage investment and jobs, the development of the EV market and advancement of safety. Stephen Bradbury commented that the rule will lead to safety issues with older, less safe vehicles remaining on the road longer.

Some commenters stated that EPA should further incorporate the FEV study's labor impacts results into the final rule analysis.

Some commenters, including the USW and HF Sinclair Corp, stated that the rule will have a negative effect on the electric grid. MEMA commented that the rule will need clearly defined applicability of extended warranty and need to provide repair access. Matthew DiPaulo commented that small businesses will be hit hardest because they are not getting the investments that large autos get to convert to electric. They also commented that small businesses in the automotive aftermarket production sector will be negatively affected.

Response:

We acknowledge that the increasing penetration of zero-emission vehicles in the automotive industry will have an effect on employment, including ICE and PEV manufacturing sectors, infrastructure-related employment sectors, and upstream and downstream sectors. While EPA does not mandate a specific compliance pathway for this rule, we recognize that adoption of additional pollution control technologies in response to the rule can also affect employment. This rule provides regulatory certainty to support increased employment in many economic sectors, though we acknowledge that OEM compliance decisions in response to the rule may reduce employment in other sectors. Opposing impacts across many sectors (e.g., increasing employment in PEV and battery manufacturing, decreasing employment in ICE and ICE vehicle manufacturing) are normal, expected changes during periods of technological transition and are not specific to this rule. As is indicated by the partial employment results discussed in Chapter 4.5.4 of the RIA and Section VIII.I.4 of the preamble, we note that there is the potential for net positive employment as an effect of this rule. As also discussed, support from a peer-reviewed tear-down study of a battery electric car and a comparable internal combustion engine vehicle indicates that if production of plug-in vehicles and their power supplies are done in the U.S. at the same rates as ICE vehicles, employment may increase. In addition, as noted by ZETA, research from Goldman School of Public Policy indicates that electrification leads to increased job availability and provides benefits to the economy over other fleet compositions.

According to the U.S. Energy and Employment Report (USEER), jobs related to the energy sector increased from 2020 to 2021, and at a faster rate than the workforce overall.[644] These energy-sector-related jobs include electric power generation; transmission, distribution and storage; fuels; energy efficiency; and motor vehicles and component parts. The report states that employment in motor vehicles and component parts increased about 2.5 percent from 2020 to 2021, and jobs in clean energy vehicles increased by almost 21 percent, with jobs in BEVs increasing by 27 percent, and PHEVs increasing by 10 percent. Employment in producing, building and maintaining charging infrastructure needed to support the ever-increasing number of plug-in vehicles on the road is also expected to significantly increase with the increasing buildout of charging infrastructure and thereby affect the nature of employment in automotive and related sectors. A recent report from the World Resources Institute indicates that if the right investments are made in manufacturing and infrastructure, autoworkers and communities will

[644] https://www.energy.gov/sites/default/files/2022-06/USEER%202022%20Fact%20Sheet_0.pdf. The data in the USEER relies on a comprehensive survey of about 34,000 respondents across the U.S. and because it is a snapshot in time, current events may impact these results. For example, the report notes that COVID-19 and associated effects deeply impacted energy employment, leading the sector to lose jobs at a higher rate in 2020 than the economy as a whole, though the report indicates that the energy sector has recovered about 71% of the jobs lost during 2020. In addition, USEER notes that the conflict in Ukraine has impacted fuels industries leading to increased petroleum and wet gas exports from the U.S.

benefit from job growth, lower auto related costs, and reduced air pollution.[645] The report focused on effects that would be felt in Michigan, which, as of 2023 has the most clean energy jobs in the Midwest, and the ranks 5th nationally.[646] Michigan also ranks second, behind California, for the most hybrid and electric vehicle employment. Taking Michigan as an example, clean energy jobs grew by almost 4.6 percent in 2022, which was twice as fast as the overall economy. Electric vehicle-related jobs, specifically, grew by about 14 percent in the state in 2022. In addition to the 21 percent increase in employment in 2021 that USEER reported in clean energy vehicles, EDF also reports that the job growth and investment in the EV sector that has been seen nationally over the last eight years is expected to continue, with new factories or production lines for EVs, batteries, components and chargers supporting more than 125,000 jobs being announced across 26 states.[647] EDF reports that more than 140,000 new jobs have been announced in the U.S. since 2015, with 60,000 jobs being created in U.S. battery manufacturing.[648] They also point out that 66 percent of those job announcements were made in the time after BIL was passed, and 32 percent of those jobs were announced after the IRA was passed, and 86 percent of those jobs announcements were concentrated in ten states: Michigan, Tennessee, Georgia, Nevada, Kentucky, South Carolina, Ohio, North Carolina, Indiana and Kansas. DOE reports that more than 80,000 potential jobs in U.S. battery manufacturing and supply chain, and more than 50,000 potential jobs in U.S. EV component and assembly have been announced since 2020.[649]

EPA has considered input from labor groups and others in carefully designing the final rule, which includes a slower phase-in of the final standards compared to the proposed standards (as described in Section I.B of the preamble). In addition, EPA has consulted other federal partners, including the Department of Energy (DOE) and the Department of Labor (DOL), and engaged in significant dialogue with EJ and labor groups. Here in this RTC section, as well in the RIA and preamble, we note many of the ongoing efforts that labor-oriented groups, federal agencies and others are engaging in to support workers and their communities in providing opportunities for a just economic transition. The list of programs and other efforts discussed throughout this rulemaking not exhaustive, and there may be more programs available that are not included here. While EPA does not set standards for labor, the agency fully supports a just economic transition for workers in association with the transition to clean vehicle technologies, and we believe that the numerous Federal, State, and private efforts we have identified, as well as other efforts not included here, significantly support quality jobs for workers across the nation.

There is a DOE funding package which makes $2 billion in grants and up to $10 billion in loans available to support projects converting existing automotive manufacturing facilities to

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[645] https://www.wri.org/insights/michigan-electric-vehicle-job-creation, https://www.wri.org/research/michigan-ev-future-assessment-employment-just-transition

[646] https://www.governing.com/work/michigan-leads-electric-vehicle-jobs-but-lags-in-sales#:~:text=More%20than%2032%2C000%20Michigan%20workers,involved%20%E2%80%9Cin%20this%20ecosystem.%E2%80%9D

[647] EDF. (2023). New climate laws drive boom in electric vehicle jobs. Retrieved November 1, 2023 from https://vitalsigns.edf.org/story/new-climate-laws-drive-boom-electric-vehicle-jobs

[648] EDF. (2023). U.S. Electric Vehicle Manufacturing Investments and Jobs. https://www.edf.org/sites/default/files/2023-03/State-Electric-Vehicle-Policy-Landscape.pdf

[649] https://www.energy.gov/invest

support electric vehicle production.[650] This package is focused on the retention of high-quality, high-paying jobs in communities that currently host manufacturing facilities, and along the full supply chain for the automotive sector from components to assembly, and it gives priority to refurbishing and retooling manufacturing facilities, especially for those likely to retain collective bargaining agreements and/or an existing higher-quality, high-wage hourly production workforce.[651] DOE has also announced funding to support clean energy supply chains, with the funding going toward projects to support domestic clean energy manufacturing (including projects supporting battery production) in, or near, nine communities that were formerly tied to coal mining, and are expected to create almost 1,500 jobs.[652] The Joint Office of Energy and Transportation (JOET), created by the BIL, supports efforts related to deploying infrastructure, chargers and zero emission vehicles.[653] One example of a project from the JOET is the Ride and Drive grant program, which targets investments in EV charging resiliency, community-driven workforce development and EV charging performance and reliability. The ongoing actions discussed throughout this section supporting green jobs, including those by DOE, the Department of Labor (DOL), the Office of Energy Jobs, and others, are particularly focused on jobs with high standards and the right to collective bargaining.

In addition to the many programs at the federal level, states are making efforts to support increasing domestic production of electric vehicles and batteries, including support for the workforce. An Executive Order issued in South Carolina prioritized implementing a strategic initiative to explore opportunities related to ongoing economic development, business support and recruitment efforts with electric vehicle and automotive manufacturers.[654] A study from Ohio estimates that there will be more than 25,000 new jobs in EV manufacturing and maintenance, battery development and charging station installation and operations in the state by 2030.[655] California has a Workforce Development Board that has been focused on furthering the development of an equitable PEV industry, including high quality jobs and access to them, since at least 2021.[656] Illinois has invested in EV training programs, research and development in the EV industry, and in workforce development and community support in the clean energy sector.[657] The Nevada Battery Coalition is tasked with identifying gaps in, and developing

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[650] https://www.energy.gov/articles/biden-harris-administration-announces-155-billion-support-strong-and-just-transition

[651] U.S. Department of Energy Office of Manufacturing and Energy. 2024. "Supply Chains Inflation Reduction Act Domestic Manufacturing Conversion Grants Funding Opportunity Announcement DE-FOA-0003106_FOA_Doc_Amendment_000006_IRA 50143." https://infrastructure-exchange.energy.gov/Default.aspx#FoaIdf9eb1c8a-9922-46b6-993e-78972d823cb2

[652] EnergyTech. 2023. *DOE Announces $275M for 7 Projects to Strengthen Clean Energy Supply Chains adn Manufacturing in Former Coal Communities.* EnergyTech. https://www.energytech.com/energy-efficiency/article/21278185/doe-announces-275m-for-7-projects-to-strengthen-clean-energy-supply-chains-and-manufacturing-in-former-coal-communities

[653] More information on these programs, and other programs, can be found in the memo Labor/Employment Initiatives in the Battery/Vehicle Electrification Space located in the docket for this rule.

[654] SCpowersEV: State support - Driving the Future, https://scpowersev.com/state-support.

[655] Accelerating Ohio's Auto & Advanced Mobility Workforce, Auto and Advanced Mobility Workforce Strategy, 2023. https://workforce.ohio.gov/wps/wcm/connect/gov/2e9f6e52-a4bc-4ef6-9080-e6b06f067a1a/Ohio%27s+Electric+Vehicle+Workforce+Strategy.pdf?MOD=AJPERES.

[656] California Workforce Development Board, 2021. https://business.ca.gov/wp-content/uploads/2021/03/CWDB_ZEV-Plan.pdf

[657] Illinois Drive Electric: Abundant Workforce, https://ev.illinois.gov/grow-your-business/abundant-workforce.html.

solutions for, workforce and economic development supporting the lithium industry in Nevada.[658] Kentucky has been the location for at least two recent automotive sector development projects, and it is providing resources toward upgrading industrial sites throughout the state, with funding evaluated based on factors including workforce availability.[659] Tennessee is co-locating a new Tennessee College of Applied Technology with a new EV manufacturing facility Ford is building in the state to provide specialized technical training.[660] In Michigan, the Department of Labor and Economic Opportunity created the Electric Vehicle Jobs Academy to assist with tuition and other supportive services for those training to be in the advanced automotive mobility and electrification industry, and the University of Michigan contracted with the state to open the University of Michigan Electric Vehicle Center focusing on research and development and developing a highly skilled workforce.[661,662]

Regarding comments that EVs have fewer parts than ICE counterparts, and that BEV production will lead to automation, resulting in job loss, we first note that even if EVs have fewer parts, these analyses do not include the labor needs of battery manufacturing or infrastructure build out and maintenance. In addition, as discussed throughout this section, as well as in Section VIII.I.3 of the preamble and Chapter 4.5.4 of the RIA, research indicates that if PEV and PEV power supply production is done in the U.S. at the same rates as ICE vehicles, employment may increase, and this is even more likely if job creation related to infrastructure is included in the analysis. We also note that there will likely be a significant increase in demand for labor in sectors that manufacture, build and maintain charging stations associated with the increasing penetration of electric vehicles. To that end, the BIL is investing in the build out of EV chargers along America's major roads, freeways and interstates, focusing on domestically produced iron and steel, and domestically manufactured chargers.[663] The magnitude of all of these impacts depends on a variety of factors including the labor intensities of the related sectors, as well as the nature of the linkages (which can be reflected in measures of elasticity) between them and the regulated firms.

Regarding comments that there will be upstream and downstream job impacts, we refer to our discussions in RIA Chapter 4.5.5 and Section VIII.I.4 of the preamble where we discuss possible impacts in sectors such as petroleum refining, dealerships and more. As stated earlier in this section, according to the U.S. Energy and Employment Report, jobs related to the energy sector (including electric power generation; transmission, distribution and storage; fuels; energy efficiency; and motor vehicles and component parts) have increased at a faster rate than the workforce overall, from 2020 to 2021.[664] ZETA cites a study by the Goldman School of Public

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658 Nevada Battery Coalition: https://nevadabatterycoalition.com/about/

659 Kentucky: Leading the Charge, https://ced.ky.gov/Newsroom/Article/20230816_Leading_th.

660 Area Development: Tennessee: A growing Capital of Electric Vehicle Production, https://www.areadevelopment.com/ContributedContent/Q4-2021/tennessee-growing-capital-of-electric-vehicle-production.shtml

661 MI Labor and Economic Opportunity: Electric Vehicle Jobs Academy, https://www.michigan.gov/leo/bureaus-agencies/wd/industry-business/mobility/electric-vehicle-jobs-academy.

662 Michigan Engineering News, $130M Electric Vehicle Center launches at U-Michigan, https://news.engin.umich.edu/2023/04/130m-electric-vehicle-center-launches-at-u-michigan/.

663 The White house: Full Charge: The Economics of Building a National EV Charging Network, https://www.whitehouse.gov/briefing-room/blog/2023/12/11/full-charge-the-economics-of-building-a-national-ev-charging-network/.

664 https://www.energy.gov/sites/default/files/2022-06/USEER%202022%20Fact%20Sheet_0.pdf.

Policy indicating that as EV sales increase, reductions in auto repair and maintenance jobs are more than offset by increases in jobs in construction and maintenance in green sectors like wind, solar, and battery storage, and in electric grid infrastructure.[665] EDF noted that almost 60,000 jobs were added in the battery production and components sector over the last 8 years. The projects, agencies and efforts mentioned above will support the continued investment in domestic, quality jobs in a transition to cleaner transportation, which will happen slowly over time. Traditional gas stations and liquid fuel providers are already incorporating EV charging into their business strategies. Many retail gas stations are being outfitted with EVSE right now.[666,667,668] With respect to the effect a change in petroleum demand may have on employment, the petroleum refining industry is material intensive and not labor intensive, and we estimate that only part of the reduction in liquid fuel consumption will be met by reduced refinery production in the U.S.; therefore, we expect that any employment effect due to reduced petroleum demand will be small. With respect to possible employment effects at dealerships, we note that vehicle sales are affected by more than regulation, including macroeconomic conditions, and that dealers may be affected by more than just changing sales (for example, changing maintenance needs). We discuss this, and more, in RIA Chapter 4.5.5.

In response to comments that the standards will lead to a dramatic change in the type of vehicles driven, we first note that this rule is not a mandate and does not force manufactures to use any specific technology. Manufacturers can determine the best path of compliance for them. Allowing manufacturers to meet the standards in the most effective way for their fleet is expected to lead to the lowest cost path for each manufacturer, yet still achieve the environmental and health benefits associated with the reduced level of emissions set by the rule. In addition, as described in Section IV.F of the preamble, we demonstrate that there are multiple pathways to compliance, and that these pathways include a wide range of mixes of technologies in the fleet, including various mixes of ICE vehicles, strong hybrid vehicles, PHEVs and BEVs. See Sections 13 of the RTC for information on consumer considerations as part of this rule, and 14 of the RTC for more information on vehicle sales.

In response to comments on the speed of the transition to electrification, and that a slower phase in will support workers during the transition, as described in Section III.C of the preamble, EPA is finalizing standards for both light- and medium-duty vehicles that have a slower ramp rate in the early years of the program compared to the proposal. For the light-duty GHG standards, we have reduced the stringency of the standards from MYs 2027 through 2031 compared to the proposed standards and have also extended the phase-down of certain optional

[665] "Switching to Electric Cars and Trucks Would Support 2 Million Green Jobs in 2035," UC Berkeley School of Public Policy, accessed May 15, 2023, https://www.2035report.com/transportation/green-jobs

[666] Businesswire: Electric Era Announces Investment from Chevron Technology Ventures to Scale Adoption of it PowerNode Electric Vehicle Charging Stations. https://www.businesswire.com/news/home/20231003932625/en/Electric-Era-Announces-Investment-from-Chevron-Technology-Ventures-to-Scale-Adoption-of-its-PowerNode%E2%84%A2-Electric-Vehicle-Charging-Stations

[667] Shell Recharge: https://www.shell.us/business-customers/shell-fleet-solutions/shell-recharge?msclkid=b112711a7f16131508b614da1ed439cf&utm_source=bing&utm_medium=cpc&utm_campaign=US_RCG_EN_NB_PM_BNG_Fleet_Recharge_Product&utm_term=ev%20charging&utm_content=Recharge%20Solution#iframe=L0xlYWRfR2VuX0Zvcm0_SUQ9VUhKdlpIVmpkRDFUWld4bUlITmxiR1ZqZEdWa0preGxZV1JUYjNWeVkyVTlUM0puWVc1cFl3PT0

[668] Love's: Electrify America Announces Collaboration with Love's Travel Stops: https://www.loves.com/en/news/2020/august/electrify-america-announces-collaboration-with-loves-travel-stops

credit flexibilities. These changes were made in response to comments from labor groups and the auto industry that the pace of the standards was too fast, and that more lead time was needed to provide a more orderly transition that allowed for the scale up of battery supply chains and vehicle production. In turn, EPA believes that this slower pace of the final standards will further support workers and labor impacts during the transition to manufacturers building a range of vehicle technologies to meet the standards, as well as allow for increased opportunities for training, education and facility upgrades over time. This will also allow for continued investments from IRA, BIL and other programs, as described throughout this section.

Regarding comments that we do not adequately address the impact the rule may have on employment, and other comments that the supply chain supporting auto manufacturing will be affected in addition to domestic auto manufacturing, we first refer to our discussion on employment in RIA Chapter 4.5 where we discuss quantitative partial employment effects of this rule in auto manufacturing sectors, as well as possible qualitative employment impacts in related sectors. The partial employment effects we estimate indicate that the joint cost and demand effect of this rule will lead to an increase in employment for sectors related to the electrified portion of vehicle production that outweighs possible decreases in the ICE portion of vehicle production and possible decreases in sectors that are common to both ICE and electric portions of vehicle production. To estimate further effects of this final rule on employment would necessitate data which is not available to EPA, and quantifying employment effects in sectors upstream or downstream from the directly affected sector is dependent on more than just the effect of this final regulation, for example macroeconomic conditions in each state, as well for the country as whole. We note that in addition to the partial employment analysis described and presented in the RIA, in cooperation with DOE and DOL, we did qualitatively assess a number of employment initiatives currently underway pertaining to EVs and EV-related industries. These are discussed throughout Section VIII.I of the preamble, Chapter 4.5 of the RIA, and this RTC section. These initiatives support continued growth, training, and investment in workers and their communities throughout the automotive manufacturing and supply chain industries, as well as throughout industries related to charging infrastructure.

Regarding claims this rule will affect, and we should account for, job quality and safety as well as quantity, that there may be geographically localized effects even if there are not national net effects, and that jobs may look different in a market where vehicles are electrified, we acknowledge that different markets and different workers may be affected differently by a transition to clean vehicle technologies. If, as some commenters claim, the transition to EVs will require more skilled workers, we note that jobs that require a higher skill level generally provide a higher wage. In addition, we find that there are significant Federal, State, and private efforts to support quality jobs and training opportunities for workers across the nation, including those we summarized earlier in this section and more below. We point to work by the Departments of Energy (DOE) and Labor (DOL), as well as others, who are funding grants and initiating programs to support green jobs, including those related to electric vehicle battery production, training and apprenticeship programs, and more. JOET is responsible for executing funding from the Investing in America Agenda granted to 30 projects across 16 states and Washington D.C. to support EV charging performance, resiliency and reliability, support equitable access to clean transportation solutions, and to help grow the clean energy workforce.[669] DOE has an

669 https://www.energy.gov/articles/biden-harris-administration-announces-over-46-million-enhance-ev-charging-reliability-and

Office of Energy Jobs, focused on supporting the creation of jobs in the energy sector, with particular focus on jobs with high standards and the right to collective bargaining.[670] The office works with other federal agencies to support meaningful jobs in the transition to a zero-emission economy, including through:

- The 21st Century Energy Workforce Advisory Board to support current and future energy-sector labor needs, and to expand energy jobs and training opportunities
- A DOE Labor Working Group, a forum with labor unions and others to engage on key energy topics
- A Community Benefits Plan to account for labor and community engagement, quality jobs, worker investment and more
- The Battery Workforce Initiative established by the Department of Energy (DOE) in coordination with the Department of Labor (DOL), AFL-CIO and other organizations to bring together industry stakeholders, including employers and unions, to develop consensus on skills and training needed to support a growing domestic battery supply chain with the goal of accelerating the development of high-quality training

DOL's Employment and Training Administration oversees the DOL Building Pathways to Infrastructure Jobs Grant Program aimed at investing in the development and implementation of worker-centered strategies and training programs needed to support the transition to a zero-emissions economy.[671] These programs include support aimed at jobs in renewable energy, energy efficiency, broadband expansion, smart city grids, and jobs facilitating the design, construction, modernization and maintenance of infrastructure. DOL also provides grants to help community colleges provide skilled pathways to good jobs in the transportation and clean energy sectors. DOL is providing technical assistance to the Southeast EV Collaborative, which is made up of collection of state workforce agencies in the southeast region of the U.S. focused on identifying opportunities to work together to provide equitable access to good jobs across the region.

Research on domestic employment in the EV transition funded by the Department of Energy (DOE) indicates that a wide range of jobs in the ICE vehicle sector have a relatively high similarity in needed skill sets to jobs in the EV sector, as well as in other sectors, including the heat pump, solar panel manufacturing and transformer industry.[672] The research also indicates that higher-wage jobs with more specialized skills may be better positioned to transition their skill sets from ICE sectors to EV sectors, although they are more geographically concentrated and hence dependent on co-location of EV production capacity with automotive production for transition opportunities. This research is supported by comments provided by ZETA, indicating that the EV industry is attracting workers transitioning from other industries. At the same time, we note the considerable efforts to support workers with lower wages and lower skill levels, including, for instance, the targeting of IRA funds to economically disadvantaged counties

670 https://www.energy.gov/policy/energy-jobs
671
https://www.dol.gov/sites/dolgov/files/ETA/skillstraining/Building%20Pathways%20to%20Infrastructure%20Grantee%20Abstracts_12-4-2023.pdf
672 Workforce Analytic Approaches to Find Degrees of Freedom in the EV Transition; https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4699308

discussed below. Also, we point out that even though vehicle manufacturing and battery manufacturing may create more localized employment effects, infrastructure work is, and will continue to be, a nation-wide effort. We note that ICCT estimated that charging infrastructure growth in the U.S. could create about 160,000 jobs by 2032, in sectors ranging from electrical installation, maintenance and repair, charger assembly, general construction, software maintenance and repair, planning and design, and administration and legal.[673] We also note that JOET has funded initiatives related to job training for many sectors related to charging resiliency and performance, including those in the electrical industry.[674]

Regarding community-level effects, we note data at sub-national level is not consistent, nor consistently available, and subnational estimations are too precise compared to the uncertainty in estimating possible future effects for the nation as a whole. Regarding comments that we should quantify effects on job quality at existing ICE plants versus those at new or to-be-built electric vehicle or battery manufacturing plants, we point out that data related to job quality is not widespread or consistent enough and is too uncertain to rely on, in addition to the fact that we do not know where these plants may be in 2030, nor their size or employment capacity. We may be able to obtain data from a select few manufacturers, but this would ignore the possible effects at all vehicle and battery plants, leading to a high level of uncertainty. Also, we would need to determine a consistent measure of job "quality." Commenters who advocated for this kind of quantitative job quality analysis did not provide any such analysis themselves. Notwithstanding the technical difficulties with performing such an analysis, we find there is considerable support for quality jobs in association with the ongoing transition to clean vehicle technologies, as discussed throughout this section, as well as in comments by EDF, ZETA and others. And though crafting standards about labor concerns are not in the purview of EPA, we point out that these efforts, among others, support the workforce in the transition to cleaner vehicles, as well as supporting and encouraging domestic production of electric vehicles and battery manufacturing.

Regarding related comments that the rule will have possible environmental justice implications and the rule is critical to advancing environmental justice and equity, as well as the impact the higher purchase price will have on lower-income Americans, we refer to RTC Sections 9 (environmental justice) and 13 (consumer impacts). It is also important to note that investments from the IRA have, so far, been focused in more economically disadvantaged counties. The U.S. Department of Treasury states that as of November 2023, 70 percent of post-IRA investments in clean energy have happened in counties with a smaller share of the population employed than the U.S. average; almost 80 percent have happened in counties with below-average median household incomes; more than 80 percent of have happened in counties with below-average wages; and more than 85 percent have gone to counties with below-average college graduation rates.[675] We also note that during and after the comment period, several major U.S. automakers were negotiating new labor contracts, with an emphasis on workers in facilities

[673] ICCT: Charging Up America, https://theicct.org/wp-content/uploads/2024/01/ID-28-%E2%80%93-U.S.-infra-jobs-report-letter-70112-ALT-v6.pdf.
[674] JOET: New Funding Enhances EV Charging Resiliency, Reliability, Equity and Workforce Development, https://driveelectric.gov/news/workforce-development-ev-projects.
[675] The Inflation Reduction Act: A Place-Based Analysis: https://home.treasury.gov/news/featured-stories/the-inflation-reduction-act-a-place-based-analysis

that support the production of electrified vehicles.[676] The negotiations resulted in many workers in EV production, including EV battery workers, becoming newly eligible to join the union, as well as in raising wages for those employed by unionized automakers, and those employed by non-unionized automakers.[677]

Regarding comments that there is a lack of qualified technicians for electric vehicle and infrastructure manufacturing, repair and maintenance, As described throughout this section, there are many programs available to support training of electric vehicle repair and maintenance technicians, as well as technicians supporting ZEV infrastructure. We do not agree that there will be a significant lack of technicians in the timeframe of this rule given investments and programs focused on training for EV sector positions, including those discussed throughout this RTC section, as well as other programs, such as those at many community colleges supporting jobs related to EV technology, including technicians.[678] Additionally, the phase-in of this final rule, described in Section I.B of the preamble, will allow time for technicians to be trained. We do find that this rule provides regulatory certainty that supports significant job growth for qualified technicians that service electric vehicles..

Regarding comments that EPA should create a request for information (RFI) like the voluntary one EPA published targeting manufactures receiving funding in the Clean School Bus (CSB) Program to solicit information from affected parties, we disagree, noting that the CSB Program was not a regulation that limits pollution emissions from school buses, but instead is a program meant to help schools replace existing buses with zero- or low-emission models through grants and rebate funding opportunities. The RFI in the CSB was created to support the overall success of the CSB Program, and to help EPA, partners, and stakeholders understand how the CSB Program, with funds provided by the BIL, is contributing to the creation of high-quality jobs across the country. We appreciate the information provided by those OEMs who have already volunteered to participate, and those who might in the future.[679]

We note that comments suggesting EPA track and hold industry accountable for specific business practices such as offshoring or child labor are out of scope for this rulemaking. For comments specific to child labor said to take place in the supply chain for batteries, see the response to comments in RTC Section 15. While we set standards and prescribe test procedures to demonstrate compliance, and consider costs, employment impacts, and potential supply chain concerns in setting the standards, EPA's engine and vehicle regulations do not dictate how

[676] UAW: Bargaining 2023 UAW-GM, https://uaw.org/gm2023/; UAW: UAW National Negotiators Reach Tentative Agreement with Ford on Record Contract, https://uaw.org/uaw-national-negotiators-reach-tentative-agreement-with-ford-on-record-contract/#:~:text=Some%20of%20our%20lower-tier%20members%20at%20Sterling%20Axle,workers%20will%20receive%20an%20immediate%2011%25%20wage%20increase.; UAW: UAW reaches a Tentative Agreement with Stellantis, https://uaw-newsroom.prgloo.com/press-release/uaw-reaches-a-tentative-agreement-with-stellantis.

[677] Bloomberg: UAW Scores Victory in EV Worker Battle Even with Wage Compromise, https://news.bloomberglaw.com/daily-labor-report/uaw-scores-victory-in-ev-worker-battle-even-with-wage-compromise; The Washington Post: UAW members ratify record contracts with Big 3 automakers, https://www.washingtonpost.com/business/2023/11/20/uaw-contract-ford-general-motors-stellantis/.

[678] For a list of some of the community college and other programs that support the electric vehicle industry, see the Community College and Other EV Training Programs memo to the docket.

[679] For responses provided to the Clean School Bus RFI, see https://www.epa.gov/cleanschoolbus/bus-manufacturer-job-quality-and-workforce-development-practices. A copy of this webpage as of March 5, 2024 is provided in the docket for this rule.

manufacturers source their materials or staff their production to meet the standards. This approach allows each manufacturer to identify the business approach most appropriate for their company, yet still achieve the environmental and health benefits associated with the reduced level of tailpipe emissions allowed by the rule. Similarly, we do not account for business decisions regarding how to fund research and development, and therefore do not include costs such as the cost of funding EV ventures into the analysis for this rule.

Regarding comments that EPA should further incorporate FEV results into the final rule analysis, we refer to RIA Chapter 4.5, where we discuss the employment focused FEV results.

Regarding comments on a gradual phase-in of the standards, we refer to Section III.C and D of the preamble, where we describe how this final rule phases in over time, which will allow for training, education, and planning for workforces as the market transitions to BEVs. We also point out that there are many alternative pathways to compliance for this rule, and they include continued production of vehicles with IC engines (e.g., ICE, hybrids, PHEVs).

Regarding comments on the costs of the rule, we refer to RTC Section 8. Regarding comments about the impact of the rule on vehicle sales, we refer to RIA Chapter 4 and RTC Section 14. Regarding comments that this rule will result in reduced vehicle choice, we do not agree. See Section 13 of the RTC for more information. In addition, we do not agree that critical minerals will lead to higher costs than estimated. We present our analysis of critical minerals in preamble Section IV.C.7 and respond to comments in Section 15 of this document. Regarding comments that this rule will lead to safety issues, we refer to RTC Section 22, where we respond to comments on safety impacts associated with this rule. Regarding comments that this rule will have a negative effect on the electric grid, we refer to Section 18 of this RTC where we discuss the interaction between the electric grid and our regulation. Regarding comments that this rule will disproportionately affect small businesses, we refer to RTC Section 25.1 and RIA Chapter 11 where we discuss how we account for small businesses in our analysis. Regarding comments that this rule needs clearly defined applicability of extended warranty and need to provide repair access, we refer the reader to RTC Section 16.

21 - Energy security

Comments by Organizations

Organization: American Enterprise Institute

III. The Purported Energy Security Benefits of the Proposed Rule Are Illusory

EPA argues that the proposed rule would provide “energy security” benefits in the form of a reduction in the prospective costs “caused by U.S. petroleum consumption and imports.” EPA views such benefits as a reduction in the adverse effects of future disruptions in the supplies of crude oil, refined products, and other liquid fuels, a reduction in the costs of public preparation as embodied in the Strategic Petroleum Reserve (SPR), and a reduction in the defense costs of defending sea lanes and other dimensions of national security spending. Each of those arguments is incorrect. [EPA-HQ-OAR-2022-0829-0571, pp. 11-12]

Because there can be only one world market price for such fungible commodities as crude oil, abstracting from such second-order differences as transportation costs, exchange rate impacts, and the like, nations that import all of their oil (e.g., Japan) face the same prices and price changes as those importing none of their oil (e.g., the UK).32 Accordingly, the common view of “energy security” as a direct impact of the level or proportion of imports is incorrect. Japan is not less “energy secure” than the UK, and a U.S. that imports more oil is not less “energy secure” than a U.S. that imports less. [EPA-HQ-OAR-2022-0829-0571, pp. 11-12]

32 Natural gas is a somewhat different case, in that delivery through pipelines cannot be shifted quickly. Deliveries of liquified natural gas can be expensive, but analytically are similar to deliveries of crude oil, although the importation facilities are more complex and cannot be created quickly.

Note that the queues and market disruptions experienced in the U.S. in 1973 did not result from the oil “embargo” imposed by Arab OPEC and directed at the U.S., the Netherlands, and a few others. The targeted nations faced the same international prices, and the same changes in prices, as all other economies. Prices increased because of the production cutback in the Middle East in the Wake of the 1973 Middle East war; it was the imposition of price and allocation controls and other regulatory rigidities and constraints that yielded the market disruptions. Note that there was no “embargo” in 1979; but there was a production cutback in the wake of the Iranian revolution, higher international prices, the re-imposition of price and allocation regulations in the U.S. market, and resulting queues and market dislocations.33 “Energy security” — the risk of disruptions from a given source and the cost of obtaining substitute supplies over some (short) time horizon — is an attribute of liquid fuels reflected fully in market prices. “Insecure” — that is, unreliable — suppliers will command market prices lower than those enjoyed by suppliers more reliable. [EPA-HQ-OAR-2022-0829-0571, pp. 11-12]

33 See Benjamin Zycher at https://www.aei.org/wp-content/uploads/2016/06/14jun2016Zycher.pdf, https://www.aei.org/wp-content/uploads/2016/06/World-Oil-Prices.pdf, and https://www.econlib.org/library/Enc/OPEC.html.

The market is fully capable of anticipating supply disruptions, even if not the precise magnitudes and timing, and then stockpiling supplies for periods when supply disruptions yield higher prices.34 Market prices unconstrained by regulatory distortions provide efficient incentives for such preparation; it is the threat of price controls and “windfall profits” taxes and other such policies that are likely to yield investment in private sector preparation smaller than economically efficient in the aggregate.35 This means that the costs of the SPR are the direct result of adverse government policies anticipated with some nontrivial probability. [EPA-HQ-OAR-2022-0829-0571, pp. 11-12]

34 See the Energy Information Administration data on U.S. oil stocks at https://www.eia.gov/petroleum/data.php.

35 It is likely to be the case that the corporation income tax also, by forcing the private sector to use a before-tax discount rate higher than the after-tax return to investment, yields suboptimal investment.

Similarly, the defense cost argument is misguided. In a narrow context, the portion of the costs of the U.S. defense effort that can be attributed to defense of the sea lanes and the like is a hugely complex analytic calculation. More broadly, defense capital assets serve multiple functions; because national security needs and the physical and human force structures evolve only over decades, it is reasonable as a first approximation to assume that defense capital provides those multiple functions in more-or-less fixed proportions. It is axiomatic that the allocation of fixed costs across multiple functions in fixed proportions is arbitrary. Accordingly, the analysis of the purported benefits of a forced reduction in the consumption of transportation fuels in terms of an asserted reduction in (long-run) defense costs is illusory. [EPA-HQ-OAR-2022-0829-0571, pp. 11-12]

2. The Availability of North American Crude, Refining, and Biofuel Capacity Makes the United States Energy Secure

Unlike critical minerals, the U.S. is the largest producer of crude oil and petroleum products in the world. We are also home to the world's largest biofuels industry. Our refineries and petrochemical producers are the most competitive in the world, taking advantage of a sophisticated workforce, low-cost resources, refinery complexity, and scale to compete with even the largest state-owned enterprises in foreign markets. In 2022, the crude oil processed by U.S. refineries was 84 percent sourced from North America. The U.S. produces more crude and refined products than it consumes and became a net exporter of crude and refined petroleum products in late 2019, after being a net exporter of refined products for the past decade.22 EPA's DRIA undervalues the energy security aspects of the domestic petroleum industry, particularly by failing to distinguish between sources of imported crude oil, ignoring that 70 percent and 84 percent of imported and total crude oil, respectively, is sourced from North America. The proposal also ignores the significant pipeline connectivity between the U.S. and our North American trading partners, as well as the unique configurations of each U.S. refinery. For example, many U.S. refiners require heavier crude oils, which are not produced in the U.S. and must be sourced from Canada or other heavy crude producers. U.S. energy leadership means that the energy security impacts of reduced oil imports are not as significant as they historically had been. It also means that reduced U.S. demand for liquid fuels will impact U.S. oil producers as much, if not more so, than existing trading partners. This employment effect is not contemplated in EPA's analysis. [EPA-HQ-OAR-2022-0829-0733, p. 10]

22 EIA, "Oil imports and petroleum product explained" (Jun. 12, 2023) available at https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php.

U.S. refiners are also critical suppliers of fuel to the U.S. military. In the most recent contract year, U.S. refiners provided 750 million gallons of fuel on the West Coast alone, supporting force readiness for conflict in the Pacific. EPA did not assess the impact of likely refinery closures on military operations and readiness. Instead, the DRIA inexplicably focuses on a narrow aspect of energy security, choosing to describe the cost of protecting trade routes. [EPA-HQ-OAR-2022-0829-0733, p. 10]

Organization: American Petroleum Institute (API)

In ORNL's study, a significant portion of the estimated security premium is the potential reduction of "the transfer of U.S. wealth to foreign producers" which "can lead to macroeconomic contraction, dislocation, and GDP losses" during an oil supply disruption. In 2008, when ORNL calculated energy security premiums, net U.S. crude and product imports were over 50 percent of U.S. liquid petroleum consumption. However, since ONRL's calculations the U.S. has become, and is projected to be, a net oil and product exporter, thus an increase in global oil prices would likely lead to a net transfer of wealth to the U.S. not away from it. Without modifications that account for the transfer of wealth to the U.S. during a supply disruption, EPA's calculated energy security premium estimates are likely overstated and not meaningful. [EPA-HQ-OAR-2022-0829-0641, pp. 21-22]

Organization: California Air Resources Board (CARB)

In addition to individual cost savings and broader economic growth, U.S. EPA's proposal will provide economic benefits for the nation's energy systems. For example, increased ZEV deployment will reduce our reliance on foreign oil, providing economic resilience to global fuel supply chain disruptions and price shocks. With the integration of emerging vehicle-to- grid communication strategies, as CARB recommends, vehicles will be able to promote grid resilience through enabling demand response load management strategies, providing backup power during blackouts, and supporting storage of renewable energy. [EPA-HQ-OAR-2022-0829-0780, pp. 66-67]

Organization: Clean Fuels Development Coalition et al.

Even by its own logic, EPA's rule fails because it fails to account for decreased energy security owing to an increased demand for natural gas, which currently makes up 40 percent of our grid's electricity generation. This share—or at least the volume of energy generated—will need to grow dramatically to make up for the increased electricity demand.19 [EPA-HQ-OAR-2022-0829-0712, p. 36]

19 Of course, "[t]he United States is [also] the leading producer of natural gas," and so increasing reliance on natural gas does little to move the needle on energy security. C. Boyden Gray, American Energy, Chinese Ambition, and Climate Realism, 5 American Affairs Journal (Winter 2021), https://americanaffairsjournal.org/2021/11/3333tellant-energy-chinese-ambition-and-climate-realism/. But if the proposal intends to count decreases in petroleum in its favor it is completely unreasonable to ignore the concomitant increases in natural gas consumption.

Organization: Delek US Holdings, Inc.

II. EPA's Proposed Rule Will Increase Domestic Reliance on Foreign Supply Chains.

Today, the U.S. is virtually independent in terms of transportation fuels (i.e., petroleum- and ethanol-based liquid fuel products) for ICE-powered vehicles.9 Although EPA spends a not insignificant amount of space in its draft Regulatory Impact Analysis ("DRIA") assessing energy security, EPA limits itself to drawing broad conclusions regarding future projections for exports, imports, and consumption of crude oil and refined petroleum products—as well as relying on inflated support from potential funding mechanisms of the Bipartisan Infrastructure Law ("BIL") and the Inflation Reduction Act ("IRA").10,11,12 But this ignores the larger concern regarding energy and national security: an unfavorable transition from reliable, abundant, domestically-sourced fuels to a complex supply chain reliant on foreign-sourced critical minerals. [EPA-HQ-OAR-2022-0829-0527, p. 3]

9 While "energy independence" has varying definitions, we are using the term consistent with EPA's use in the Proposed Rule—"[t]he goal of U.S. energy independence is the elimination of all U.S. imports of petroleum and other foreign sources of energy, but more broadly it is the elimination of U.S. sensitivity to the variations in the price and supply of foreign sources of energy"). Proposed Rule at 26,077.

10 Public Law 117-58, Nov. 15, 2021.

11 Public Law 117-169, Aug. 16, 2022.

12 EPA, Draft Regulatory Impact Analysis for Proposed Rule, 3-19–29 (Apr. 2023) [hereinafter "DRIA"]. Notably, EPA concludes that U.S. oil consumption is projected to be fairly steady for the time period from 2027 to 2050" and will actually increase gradually over that time. Id. At 11-26 (Table 11-1). EPA also concludes that the Proposed Rule will result in a 90.7% reduction in oil imports.

Organization: Electrification Coalition (EC)

The national and economic security concerns that persist from our nation still exposed to a global oil market characterized by volatility and instability are critical to consider when considering a regulation such as the EPA's Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. The U.S.'s exposure is most recently exemplified by the global ramifications of Russia's invasion of Ukraine in February 2022, and of Russia's willingness to use petroleum resources as a weapon, which sent oil prices to their highest point since 2008. Despite the U.S.'s increased prominence in the world's oil markets – which includes a roughly six-fold increase in oil exports between 2015 and 2019 – the oil market is only as strong as its weakest links, which the U.S. must expend considerable resources to defend to minimize market disruptions. More broadly, the nation's costs to protecting the flow of oil includes the roughly $81 billion spent annually by the U.S. taxpayer – which proportionally represents 16 percent of the current defense budget – but also less quantifiable losses of global strength and leadership, and distorted American diplomacy goals which must prioritize the global flow of oil.3 [EPA-HQ-OAR-2022-0829-0588, p. 2]

In short, the underlying factors that led to record oil prices in 2008 and 2022 have not substantially changed, nor will they in the future as there are additional influencing factors for the global oil market. These influencing factors include a growing demand for oil from emerging markets, geopolitical instability that causes global oil shocks, market manipulation across many oil-producing nations, limited access to reserves owned by national oil companies, and the higher cost of production of fields that are available to international oil companies. While oil has facilitated the rise of the modern era, these persistent national and economic security threats indicate it is past time to shift to a better, more stable fuel source: electricity. [EPA-HQ-OAR-2022-0829-0588, p. 2]

Organization: Environmental and Public Health Organizations

XXVII. Stronger Standards Will Improve U.S. Energy Security.

Energy security considerations also support strong final standards. Reducing U.S. reliance on oil enhances U.S. energy security, and—with energy security in mind—Congress has specifically directed the U.S. to conserve energy. Energy Policy and Conservation Act of 1975, 42 U.S.C. § 32902(f). EPA defines energy security as "the uninterrupted availability of energy sources at affordable prices," 88 Fed. Reg. at 29388; DRIA at 11-1, and states that "[t]he goal of U.S. energy independence is the elimination of all U.S. imports of petroleum and other foreign sources of energy, but more broadly, it is the elimination of U.S. sensitivity to variations in the price and supply of foreign sources of energy." 88 Fed. Reg. at 29388. Despite increases in domestic oil production that have made the United States an energy exporter, EPA should continue to consider the energy security impacts of GHG standards. EPA notes that combustion vehicles continue to present an energy security risk because the United States remains vulnerable to "episodic oil supply shocks and price spikes." Id. U.S. refineries continue to import heavy crude oil from potentially unstable regions of the world, and sudden disruptions in supply pose a threat to U.S. financial and strategic interests. DRIA at 11-1. Moreover, EPA is correct that "oil exporters with a large share of global production have the ability to raise or lower the price of oil by exerting the market power associated with the Organization of Petroleum Exporting Countries (OPEC) to alter oil supply relative to demand," id., which would cause oil price shocks that have greater impacts when nations are heavily reliant on oil. Because the Proposed Standards will significantly reduce U.S. reliance on foreign oil, see 88 Fed. Reg. at 29388, Tbl.198 (showing decrease of 42,000 barrels of imported oil per day in 2027 and decrease of 2.3 million barrels of imported oil per day by 2055, and even greater import reductions under Alternative 1), EPA's Proposal and Alternative 1 both enhance U.S. energy security and make progress toward the goal of energy independence. [EPA-HQ-OAR-2022-0829-0759, p. 197]

For the Proposal, EPA has quantified the energy security risks using a macroeconomic oil security premium. 88 Fed. Reg. at 29389. Oil security premiums measure the extra cost of importing oil beyond the price paid for the oil itself (or, in the case of a reduction in demand, the extra benefit of reducing oil imports beyond the actual expenditures saved). The main input to calculating the oil security premium is the macroeconomic benefit, which measures the potential macroeconomic disruptions and increased oil import costs to the economy resulting from oil price spikes or "shocks," or the value of avoiding these costs due to less domestic reliance on oil. In estimating the macroeconomic benefit used to calculate oil security premiums, EPA has historically relied on research conducted by Oak Ridge National Laboratory (ORNL), and EPA again takes this approach in the Proposal.653 Id. EPA has estimated macroeconomic oil security premiums based on ORNL's methodology developed in 1997 and updated in 2008654 for a series of past rulemakings including the 2010, 2012, and 2021 Final Rules and the heavy-duty vehicle GHG and fuel economy Phase I and Phase II standards and Phase III proposal.655 In this Proposal, EPA reasonably utilizes the long-used ORNL methodology and applies the same values for the price elasticity of demand for oil and elasticity of GDP to oil price shocks as for the 2021 Rule. DRIA at 11-28 to 11-29. Similarly, EPA reasonably calculates the oil import reduction factor by the same method used for the most recent rulemaking. Id. At 11-25. [EPA-HQ-OAR-2022-0829-0759, p. 198]

653 In this Proposal, EPA reasonably calculates the macroeconomic oil security premiums using the same price elasticity of demand for oil and the same elasticity of GDP to an oil price shock as for the 2021 Rule. DRIA at 11-28 to 11-29.

654 Leiby, P.N., Estimating the Energy Security Benefits of Reduced U.S. Oil Imports, Final Report, ORNL/TM-2007/028, Oak Ridge National Laboratory (Rev. Mar. 14, 2008); Leiby, P.N. et al., Oil Imports: An Assessment of Benefits and Costs, ORNL-6851, Oak Ridge National Laboratory (Nov. 1997); see also R. Uria-Martinez, et al., Using Meta-Analysis to Estimate World Oil Demand Elasticity, ORNL Working Paper (2018).

655 The 2020 LDV GHG standards proposal also relied on the ORNL literature and methodologies for estimating oil security premiums, and only the 2020 Final Rule abandoned this research and methodology, instead relying on a single paper (Brown (2018)) to drastically reduce oil security premiums. Stephen A. Brown, New Estimates of the Security Costs of U.S. Oil Consumption, 13 Energy Policy 171-92 (2018). Reliance on Brown was inappropriate for two reasons: (1) EPA failed to provide adequate justification for departing from the established ORNL methodologies and research that had been used for over 20 years to instead rely on a single study; and (2) the 2020 Final Rule did not appear to have used Brown's best or most accurate estimates in setting oil security premiums, but rather used estimates that even Brown (2018) suspected to be inaccurate. Id. At 181 (noting that Brown's estimate of the "combined" value for oil

security premiums “might best reflect the uncertainty in what we know about oil security premiums,” and that the values derived from only the most recent research—which EPA used in the 2020 Final Rule—may not be the most reliable).

In addition to the macroeconomic oil security premium, military and monopsony benefits are considered energy security benefits of reduced U.S. oil demand. DRIA at 11-2, 11-30 to 11-32. While EPA has historically refrained from applying these values in any quantified way, it is important to recognize that energy security benefits that take into account only the macroeconomic oil security premiums could be low estimates. EPA’s Proposal correctly explains that one cost of oil use is “maintaining a military presence to help secure a stable oil supply from potentially vulnerable regions of the world,” id. At 11-30, and therefore, reducing domestic reliance on oil has the potential to result in some form of military benefit. EPA states that the Agency does not include these benefits because they are hard to quantify. Id. At 11-31 to 11-32. EPA is encouraged to consider methodologies for quantifying these benefits in the future, and to acknowledge that their existence makes EPA’s current estimations of energy security benefits conservative. [EPA-HQ-OAR-2022-0829-0759, p. 199]

Finally, EPA is correct that electricity used in PEVs will “improve the U.S.’s overall energy security position,” 88 Fed. Reg. at 29389, because electricity is more affordable and less price volatile than oil, a point that numerous sources support.656 Even more importantly, the electricity will be almost exclusively produced in the United States, “mov[ing] the U.S. towards the goal of energy independence.” Id. Additionally, PEVs offer significant energy security benefits in that “[e]lectric vehicles can be powered by any energy source because all energy sources can be converted to electricity.”657 Unlike combustion vehicles—which can be powered only by oil—PEVs can utilize solar, wind, hydroelectric, geothermal, or any other electricity resources available to the grid.658 [EPA-HQ-OAR-2022-0829-0759, p. 199]

656 See, e.g., Talor Gruenwald, Reality Check: The Myth of Stable and Affordable Natural Gas Prices, Rocky Mountain Institute (Nov. 17, 2021), https://rmi.org/the-myth-of-stable-and-affordable-natural-gas-prices/ (“Electricity prices, which are driven by the costs of a variety of fuels including renewables, are much less susceptible to individual commodity price shocks.”); Jeremy Martin, Why Are Gasoline Prices So Volatile?, Union of Concerned Scientists (Mar. 29, 2022), https://blog.ucsusa.org/3336tella-martin/why-are-gasoline-prices-so-volatile/ (explaining the price volatility of the oil market and noting that its global nature “means that U.S. consumers remain vulnerable to changes in oil prices across the globe” and that “electricity prices are far less volatile than gasoline.”); U.S. Department of Energy, Saving Money with Electric Vehicles (Sept. 28, 2022), https://www.energy.gov/energysaver/articles/saving-money-electric-vehicles (noting that “electricity is less expensive than gasoline,” and that “[p]etroleum prices are historically very volatile and change substantially over time,” while “electricity prices are much more stable.”).

657 Nicholas Brown, Evs Provide Energy Security, Aid Energy Transitions During Conflicts, Clean Technica (July 12, 2022), https://cleantechnica.com/2022/07/12/evs-provide-energy-security-aid-energy-transitions-during-conflicts/.

658 Id.; see also Lee F. Gunn, Electric Vehicles Improve Our National Security, Orlando Sentinel (June 9, 2023), https://www.orlandosentinel.com/2023/06/09/electric-vehicles-national-security-opinion/ (“Diversified energy resources and Evs are already beginning to reduce our dependence on unpredictable oil-exporting partners. Accordingly, Evs can reduce our exposure to energy supply shocks and, importantly, limit the risk of supply disruptions for military operations.”).

Organization: Fuel Freedom Foundation

Increase national and energy security. The decades-long strategic imperative to reduce petroleum dependence has not been inhibited by record-breaking U.S. domestic drilling, as succinctly laid out in the U.S. National Blueprint for Transportation Decarbonization (U.S. Blueprint): "More than 95% of transportation energy use comes from petroleum-based fuels, making it the least energy-diverse sector and subjecting the American economy to the volatility of global markets." Oil prices still regularly rise rapidly in response to world events or market manipulation, even after the U.S. surpassed Saudi Arabia as the world's largest producer. Americans remain subject to such price fluctuations, driven by geopolitics and market dynamics that reflect a lack of fuel alternatives. From a policy perspective, our national options remain inhibited by overwhelming petroleum dependence in transportation. We can only gain genuine energy and economic security by weakening petroleum's strategic consequence. The EPA can move us in the right direction by incentivizing the re-adoption of FFVs that can quickly enable displacement of large volumes of gasoline at little to no cost to consumers. [EPA-HQ-OAR-2022-0829-0711, p. 4]

Organization: Institute for Policy Integrity at New York University School of Law

Turning to energy security, EPA reasonably concludes that the Proposed Rule will benefit domestic energy security by shifting consumption from petroleum to electricity, which is cheaper, more price-stable, and more domestically-produced.110 In addition to a thorough qualitative analysis,111 EPA conducts a quantitative analysis of the Proposed Rule's oil security premium using a peer-reviewed methodology.112 In a nutshell, this analysis estimates the economic benefits resulting from reductions in oil imports.113 An important parameter in this analysis is the own-price elasticity of demand for oil. This parameter reflects the sensitivity of oil sales to oil price changes. More specifically, it represents the expected decline in oil demand (on a percentage basis) from a 1% increase in oil price. [EPA-HQ-OAR-2022-0829-0601, pp. 17-18]

110 Proposed Rule, 88 Fed. Reg. at 29,388–89.

111 RIA at 11-1 to 11-26.

112 Id. At 11-26 to 11-30.

113 Id. At 11-26; see also Proposed Rule, 88 Fed. Reg. at 29,389.

EPA should update the own-price elasticity of demand for oil to account for increased electrification over time. Specifically, EPA adopts a low own-price elasticity of demand for oil of -0.07—meaning that oil sales only marginally decline when prices increase, reflecting the fact that oil cannot be easily substituted with other products.114 But in the future, as electric vehicles become more prominent, this is likely to change as electricity becomes more easily substitutable for oil.115 Accordingly, the own-price elasticity of demand for oil is likely to increase in the future. EPA should thus use a higher absolute valuation of this parameter that is not based purely on historical data. One option is to apply a valuation between –0.175 and –0.33 as the research from Resources for the Future shows.116 Alternatively, EPA could recalculate the own-price elasticity of demand for oil within the NEMS model.117 [EPA-HQ-OAR-2022-0829-0601, pp. 17-18]

114 RIA at 11-28.

115 See infra p. 30 figs.1–2.

116 Id.

117 See Bureau of Energy and Ocean Management, Consumer Surplus and Energy Substitutes for OCS Oil and Gas Production: The 2021 Revised Market Simulation Model (MarketSim) Model Description 22 (2021) (describing similar methodology). Using this methodology, the elasticity of demand may still be too low because the latest version of NEMS only considers current policy and fails to consider the likely path of policy—such as the Proposed Rule—that could further increase electricity-to-oil substitution.

Organization: MEMA, The Vehicle Suppliers Association

Vehicles that use alternative, lower-carbon fuels can help advance EPA climate goals while also contributing to improved national security by lowering our dependence on foreign oil. Additionally, encouragement and investment in carbon-neutral fuels will also positively impact existing vehicles already on the road. [EPA-HQ-OAR-2022-0829-0644, p. 6]

Organization: Missouri Corn Growers Association (MCGA)

If the economic damages are not bad enough, the impact of EPA's forced change to BEVs may compromise our national security. Who is in favor of a move that would incentivize batteries and minerals produced and mined in countries that are hostile to the U.S. and have questionable labor standards over relying on homegrown renewable liquid fuels, along with our domestic energy sources found right here in America, much of it in the Midwest? [EPA-HQ-OAR-2022-0829-0578, p. 3]

18 Id. At 11-12.

Organization: Pearson Fuels

g. The use of E85 as a decarbonization strategy is a uniquely cost-efficient GHG strategy that reduces petroleum dependence and enhances energy security

As has been discussed, it is now clear that Californians are embracing E85 fuel with the second largest gasoline market in the country showing 66% year-on-year growth in E85 sales from 2021 to 2022. CARB has confirmed the rigor of its oversight program and the rate of E85 growth in a letter to Pearson Fuels that is attached as Exhibit 4 to this comment.24 The sustained growth in demand for E85 from FFVs in California is remarkable, surging from less than 6.5 MGY in 2006 to over 103 MGY in 2022. [EPA-HQ-OAR-2022-0829-0577, p. 13]

24 Letter from Alexander "Lex" Mitchell, Manager, Emerging Technologies Section, California Air Resources Board regarding E85 use, to Graham Noyes, Noyes Law Corporation. This CARB letter is attached as an exhibit to the comment of Pearson Fuels to this proceeding.

The primary reason E85 use is on the rise in California is a typical and crucial driver in the fuel market, price. At the retail level, California FFV owners can fill up on E85 and routinely save 10 percent or more compared to conventional unleaded on a price per mile basis. It is due to these favorable economics that FFV stations are flourishing in disadvantaged communities where spiking gasoline prices are most damaging to consumer budgets. FFV owners previously unable to fuel with E85 because of limited availability are just now being exposed to a robust network of E85 stations offering steep price discounts to gasoline, and providing a cleaner fuel that simultaneously boosts octane, the farm economy, and U.S. energy security. E85's rapidly growing market appeal is not limited to California and is part of a broader U.S. market transition toward higher ethanol blends. This rapid growth in E85 demand is occurring at the same time that diminished FFV crediting under the GHG program has undercut the incentive for automakers to manufacture FFVs. This deployment of FFVs utilizing E85 by U.S. consumers to save money and reduce GHG emissions would be greatly enhanced to the extent EPA establishes an appropriate GHG emissions factor for FFVs. [EPA-HQ-OAR-2022-0829-0577, p. 13]

Organization: Plains All American Pipeline, L.P.

In general, we have serious concerns about the Proposal. It will render America more dependent on foreign-controlled supply chains and create irreparable harm to our energy security, while missing the mark on well-intentioned emission reductions. By focusing solely on tailpipe emissions, the Proposal would only address certain transportation emissions and fail to quantify the full lifecycle of emissions for all vehicles, including materials resourcing, production, operation, battery replacement, recycling and end-of-life disposal. [EPA-HQ-OAR-2022-0829-0713, p. 1]

By 2032—less than 10 years from now—the EPA's Proposal would require nearly 70% of light-duty cars and trucks sold in the U.S. to be electric or "zero tailpipe emission." We have a number of concerns with this approach, a few include [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]:

- By focusing on tailpipe emissions alone, most internal combustion engine vehicles that run on gasoline, diesel and biofuels would be unable to meet the standards set forth in the Proposal. This overlooks critical efforts of the energy and automotive industries to pursue continued innovation and optimization of fuel/vehicle systems to improve efficiency and reduce emissions.1 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Effectively outlawing most liquid fuel-powered vehicles would undercut U.S. energy security,2 harm our domestic energy industry and leave the U.S. more dependent on foreign-controlled supply chains.3 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Transferring a significant amount of energy demand to electricity will strain already challenged electrical generation and transmission infrastructure. Without substantial additional investment and significant streamlining of electric transmission permitting, it's unclear whether the electrical grid could support charging new Evs at the level necessary to support the proposed emissions reductions.4 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Traditional energy sources are essential for ensuring effective evolution of the energy landscape-including the manufacture and growth of renewable energy sources and Evs. However, the Proposal would reduce energy investments and increase costs to consumers for all forms of energy. Furthermore, this policy risks the continued viability of critical domestic energy manufacturing infrastructure, which, if idled, would be very challenging to restore. [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

- Eliminating most new gasoline and diesel vehicles from the market limits consumer choice. Significantly fewer new affordable vehicles are available for sale today5 than a few years ago. Used cars are also increasing in price6 as some automakers warn that they will be forced to cut back on supplying popular gasoline models because of government regulations restricting sales of traditional vehicles.7 [EPA-HQ-OAR-2022-0829-0713, pp. 1-2]

1 https://www.afpm.org/newsroom/news/afpm-epa-vehicle-proposal-will-effectively-ban-gasoline-and-diesel-vehicles

2 https://www.visualcapitalist.com/chinas-dominance-in-battery-manufacturing/

3 https://www.nytimes.com/interactive/2023/05/16/business/china-ev-battery.html

4 https://www.reuters.com/investigates/special-report/usa-renewables-electric-grid/

5 https://www.marketwatch.com/story/are-we-witnessing-the-demise-of-the-affordable-car-automakers-have- all-but-abandoned-the-budget-market-a68862f0

6 https://www.consumerreports.org/cars/buying-a-car/when-to-buy-a-used-car-a6584238157/

7 https://www.reuters.com/business/autos-transportation/3340tellantis-may-limit-some-gas-powered-vehicles- states-adopting-california-2023-05-24/

Organization: The Heritage Foundation

Security benefits are overstated.

The study purports to find small energy security benefits by having less imported oil. See Table 200. The analysis ignores that United States can well be an oil-exporting, rather than an oil-importing country. For that reason alone, the stated energy security benefits are likely costs rather than benefits. [EPA-HQ-OAR-2022-0829-0674, p. 14]

Organization: Valero Energy Corporation

F. EPA fails to account for potential energy security impacts.

EPA acknowledges a lack of literature on the energy security implication of PEV charging: "Even though there is likely to be a substantial increase in the use of electricity from PEVs in the U.S., the literature on the topic of the energy security implications of wider use of PEVs is somewhat limited. We have not been able to identify any study that systematically quantifies the differential energy security risks of using electricity versus petroleum-based fuels to power vehicles in the U.S."276 While EPA focuses on the energy security benefits of reducing dependence on oil imports, its consideration of the energy security threats associated with PEV adoption is limited to the electricity consumption by PEVs277 – EPA fails to address the energy security threats of increasing dependence on imports for minerals and battery supply chains. [EPA-HQ-OAR-2022-0829-0707, pp. 50-51]

276 DRIA at 11-10.

277 DRIA at 11-1 to 11-40.

EPA refers to the 2021 ransomware attack of Colonial Pipeline278 but fails to consider cybersecurity threats associated with PEV charging.279 As published recently by Sandia National Laboratories in a study of EV charging infrastructure, [EPA-HQ-OAR-2022-0829-0707, pp. 50-51]

278 DRIA at 11-1, footnote 170.

279 See Cloete, Schalk, "Electric Cars and Energy Security: Out of the Frying Pan and Into the Fire", March 14, 2022, https://medium.com/a-balanced-transition/electric-cars-and-energy-security-out-of-the-frying-pan-and-into-the-fire-a3a27bfb54d5.

The breadth and complexity of EVSE connections create a large cybersecurity profile and raise concerns that bad cyber actors could use insecure chargers as an unauthorized access point to abuse charging equipment, vehicles, buildings, or grid resources. Each of these systems represents a set of interconnected attack vectors. Evs, for example, interface with dealerships, mobile phones, navigation, mapping, telemetry, entertainment, vehicle-based web browsers, other vehicles, driver assist systems, over-the-air software updates, and more [], using an array of protocols, including Bluetooth, GSM Mobile, and Wi-Fi. Autonomous-driving electric vehicles add further cybersecurity complexity []. Researchers have highlighted the manipulation of onboard, safety-critical electronic control units (ECUs) to interfere with braking, steering, engine and battery controls []. Vehicle data are also at risk, including telematics, tracking [], customer, dealer and insurance data []. EVSE interfaces with highly connected Evs and vendor systems, charger owners, and grid operator systems.280 [EPA-HQ-OAR-2022-0829-0707, pp. 50-51]

280 Johnson, Jay et al, "Review of Electric Vehicle Charger Cybersecurity Vulnerabilities, Potential Impacts, and Defenses", May 26, 2022, https://www.mdpi.com/1996-1073/15/11/3931.

C. EPA's action would undermine the Renewable Fuel Standard and Congress' goals for renewable fuels and energy security.

EPA's proposal and ZEV sales mandate are also inconsistent with the broader statutory scheme and Congress's plan for tackling climate change. When Congress sought to address greenhouse-gas emissions from the transportation sector, it did so by promoting renewable liquid fuels, which are used in conventional vehicles and which—unlike electric-vehicle components—are in abundant domestic supply. See, e.g., Inflation Reduction Act of 2022, Pub. L. No. 117-169. §§ 13202, 13404, 22003, 136 Stat 1818, 1932, 1966-69, 2020 (2022). Indeed, Congress has consistently legislated against the background expectation that conventional vehicles powered by liquid fuels will remain on the market. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

The Clean Air Act also includes the Renewable Fuel Standard (RFS) program, which "requires that increasing volumes of renewable fuel be introduced into the Nation's supply of transportation fuel each year." Americans for Clean Energy v. EPA (ACE), 864 F.3d 691, 697 (D.C. Cir. 2017). Two goals animate the RFS: (1) to "move the United States toward greater energy independence and security," and (2) to "increase the production of clean renewable fuels." Id. (quoting Pub. L. No. 110-140, 121 Stat. 1492, 1492 (2007)). To these ends, "Congress ordained the inclusion of 4 billion gallons of renewable fuel in the Nation's fuel supply" for calendar year 2006, and required that, "[b]y 2022, the number will climb to 36 billion gallons." HollyFrontier Cheyenne Refining, LLC v. Renewable Fuels Ass'n, 141 S. Ct. 2172, 2175 (2021). [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

In other words, through the RFS, which is also in the Clean Air Act, Congress mandated that "fuel sold or introduced into commerce in the United States" must contain increasing shares of renewable fuels and specifically increasing shares of advanced biofuel, cellulosic biofuel, and biomass-based diesel. 42 U.S.C. § 7545(o)(2)(A)(i). For these fuels, Congress called for not simply a percentage of the fuel market but mandated a minimum volume of biofuel in the market. The proposed standards, on the other hand, would reduce the use of renewable fuels, particularly renewable diesel and other advanced biofuels, cellulosic biofuels, and biomass-based diesel, and make it impossible to meet the mandates of the RFS. EPA is thus working at cross-purposes with Congress, which has required a move toward increases in liquid renewable fuels at the same time that EPA is seeking to eliminate vehicles that use such fuels. Congress has never mandated, nor authorized, that EPA issue regulations to phase out the use of liquid fuels. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

The congressional intent underlying these mandated obligations under the RFS was to incentivize liquid fuels with lower lifecycle greenhouse gas emissions. For example, renewable diesel generates credits under the RFS, whereas traditional diesel generates an obligation. Here, however, treating renewable diesel and traditional diesel the same—giving no recognition of or benefit to manufacturers based on use of liquid fuels with lower lifecycle greenhouse gas emissions— underscores EPA's failure to read its statutory authority as a whole and emphasizes the conflict between the proposal and the RFS. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

Congress also cited national energy security as one of the primary reasons for implementing the RFS. In the proposal, EPA deigns to resolve energy security concerns by reducing use of liquid fuels without accounting for the impact on renewable fuels. EPA has also not adequately accounted for increased energy security risks associated with battery production and use in the transportation of the nation's commerce and in all the industries that use and rely on LDVs and MDVs. See supra at XX. [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

With no apparent recognition that its proposed vehicle standards will reduce consumption of both nonrenewable and renewable fuels, EPA continues to mandate increasing volumes of renewable fuels consistent with its mandates under the RFS, proposing a 1.7 billion gallon increase in all renewable fuels by 2025 in its proposed "RFS Set" rule.368 [EPA-HQ-OAR-2022-0829-0707, pp. 86-]

368 Final Rule: Renewable Fuel Standard (RFS) Program: Standards for 2023-2025 and Other Changes, signed June 2023, pre-publication version available at https://www.epa.gov/renewable-fuel- standard-program/final-renewable-fuels-standards-rule-2023-2024-and-2025.

Organization: Western Energy Alliance

Energy Security: EPA makes the specious assertion that the energy security benefits of the rule will include, "…reductions in energy security externalities caused by U.S. petroleum consumption and imports…" p. 29199 Given the huge supply of American oil and the fact that the United States is the number one oil producer in the world, EPA strains its credibility by justifying the proposed rule in such a way. Unlike the ICEV fleet with its majority consumption of American oil, EV batteries are sourced from minerals largely mined unsustainably in China and Africa, as are the minerals required for wind turbines and solar panels. Further, the U.S. lacks copper and aluminum smelting capacity required to expand the grid and it takes years to develop new mines. Without expansion, the grid is susceptible to reliability issues. [EPA-HQ-OAR-2022-0829-0679, p. 4]

EPA's cost-benefit analysis regarding energy security is troublesome, finding that the proposed rule delivers $21 billion to $42 billion in energy security benefits from reduced oil imports, but ignoring the security implications of the huge foreign mineral needs arising from the proposed rule. With huge domestic reserves of oil and the fact that Canada is the primary exporter to the United States, our country enjoys an energy security benefit in terms of oil. [EPA-HQ-OAR-2022-0829-0679, p. 4]

Organization: Zero Emission Transportation Association (ZETA)

As EPA notes in the proposed rule, the light- and medium-duty GHG standards would reduce U.S. oil imports by 2.3 million barrels per day in 2055, meaning American consumers would be more insulated from foreign geopolitical turmoil and associated oil price volatility.87 Finalizing more stringent standards than Alternative One would reduce U.S. oil imports by more than 2.5 million barrels per day in 2055. Mark Zandi, chief economist at Moody's has noted that fossil fuels were a major cause of every period of inflation since World War II. "Every recession since World War II has been preceded by a jump in oil prices."88 As discussed further below, reducing exposure to such volatility that affects the transportation of goods, people and services, electrification can stabilize costs as these are often heavily affected by transportation fuel costs.89 [EPA-HQ-OAR-2022-0829-0638, p. 19]

87 See 88 FR 29388 (May 5, 2023)

88 "Fight climate change. End fossilflation. Here's how," Vox, (August 12, 2022) https://www.vox.com/science-and-health/2022/8/12/23290488/fight-climate-change-end-fossil-fuel-inflation

89 'Energy Price Stability: The Peril of Fossil Fuels and the Promise of Renewables,' Roosevelt Institute, (2022) https://rooseveltinstitute.org/wp-content/uploads/2022/05/RI_EnergyPriceStability_IssueBrief_202205.pdf

With the price of oil subject to a wide range of economic, geopolitical, and operational factors, Evs help protect consumers from rapid fuel price spikes. As shown in Figure 4 below, Evs are not only cheaper to drive per mile but their fuel costs are more consistent and predictable compared to similar ICEVs. Electricity prices tend to be less volatile and subject to fewer supply shocks than oil prices.108 Even when sourcing petroleum domestically, disturbances can have dramatic price consequences. For example, on December 24, 2022, Suncor shut down its 103,000-barrel per day (bpd) oil refinery in Commerce City, Colorado, just outside of Denver. [EPA-HQ-OAR-2022-0829-0638, pp. 22-23]

Suncor announced that extreme cold weather earlier in the month had damaged equipment and that the repairs would require a full shutdown of the facility and delay operations until the end of the first quarter of 2023. By February 2023 gasoline prices in the Rocky Mountain region had increased by 51%, considerably higher than the 9% national average.109 [EPA-HQ-OAR-2022-0829-0638, pp. 22-23]

108 Id. At footnote 89

109 "Colorado refinery outage is causing higher gasoline prices in Rocky Mountain region," U.S. Energy Information Administration, (February 28, 2023) https://www.eia.gov/todayinenergy/detail.php

[See original comment for Figure 4: A comparison of operating costs for electric and gas-powered vehicles from March 2022 to March 2023.]110 [EPA-HQ-OAR-2022-0829-0638, pp. 22-23]

110 "Electric vehicles are far cheaper to drive than gas-powered cars," ZETA, (March 2023) https://8829857.fs1.hubspotusercontent-na1.net/hubfs/8829857/ZETA-EV%20vs.%20Gas%20Report_V4.pdf

Reliance on petroleum for light- and medium-duty vehicles also exposes American consumers' wallets to geopolitical instability. The February 2022 Russian invasion of Ukraine resulted in rapid, significant spikes in the price of crude oil, which contributes about half the cost of finished gasoline.111 In June 2023, Saudi Arabia announced it would cut oil production by 1 million bpd, pushing up oil prices in the short term and causing them to be projected to remain high through at least summer 2023.112 This will ultimately result in higher prices for gasoline in the US per oil analysts at Rystad Energy who believe gas will become marginally more expensive for consumers. In addition to Saudi Arabia, other members of OPEC agreed on recent surprise cuts in oil production, adding to the ultimate uncertainty for consumers that relying on oil provides.113 [EPA-HQ-OAR-2022-0829-0638, pp. 23-24]

111 "Yes, Russia's War on Ukraine Did Raise the Price of Gasoline," Cato Institute, (April 6, 2022) https://www.cato.org/blog/yes-russias-war-ukraine-did-raise-price-gasoline-0

112 "Saudi Arabia is slashing oil supply. It could mean higher gas prices for US drivers," Associated Press, (June 4, 2023) https://apnews.com/article/opec-oil-prices-saudi-arabia-russia-8d70999cb8258aebc3edbfdfcae278b7

113 Id. At footnote 112

Americans are at the mercy of these decisions with the reliance of ICEVs. The shift to Evs is a hedge against this price volatility and will bring stability to the cost of transportation in the U.S. [EPA-HQ-OAR-2022-0829-0638, pp. 23-24]

As EPA accurately notes in the proposed rule, there is an important distinction between energy security and mineral security. Utilization of critical minerals is inherently different from the utilization of petroleum, in that petroleum is consumed as a fuel while minerals become a component of manufactured vehicles. Supply disruptions and fluctuating prices for critical minerals are felt differently and by different parties as opposed to petroleum which has an immediate impact on consumers through higher fuel prices, as discussed in section 3(b) of these comments. In contrast, supply disruptions or price fluctuations of minerals affect only the production and price of new vehicles. [EPA-HQ-OAR-2022-0829-0638, p. 33]

Moreover, critical minerals are not a single commodity but a number of distinct commodities, each having its own supply and demand dynamics, and some being capable of substitution by other minerals. Further, while petroleum is consumed as a fuel and thus requires continuous supply, minerals become part of the vehicle and have the potential to be recovered and recycled, as discussed further in section 8(b)(ii) of these comments. [EPA-HQ-OAR-2022-0829-0638, p. 33]

EPA Summary and Response

Summary:

Some commenters (Electrification Coalition, Zero Emission Transportation Association, Institute for Policy Integrity, Environmental and Public Health Organizations, California Air Resources Board) claimed that the proposed rule will improve the U.S.'s energy security and independence position by resulting in an increase in the use of plug-in electric vehicles (PEVs). According to two commenters (Institute for Policy Integrity, Environmental and Public Health Organizations), PEVs are cheaper to drive per mile than light- and medium-duty vehicles (LMDVs) that use petroleum-derived fuels such as gasoline. Also, according to the same commenters, electricity prices are more stable and are not subject to as much price volatility as oil-derived petroleum products such as gasoline. Finally, the same two commenters suggested that the electricity to power PEVs will likely be domestically produced. Since electricity used to power the PEVs will be produced in the U.S., the wider use of PEVs would move the U.S. to the goal of energy independence, the commenters claimed. In contrast, according to these commenters, the global oil market is subject to price volatility and price instability, which reduces the U.S.'s energy security.

Response:

EPA believes that the wider use of electricity in light- and medium-duty vehicles will increase the U.S.'s energy security and independence by reducing the U.S.'s petroleum consumption and imports. A reduction of U.S. petroleum consumption and imports reduces both financial and strategic risks caused by potential sudden disruptions in the supply of imported petroleum to the U.S., thus increasing the U.S.'s energy security. We agree with the commenters that electricity is generally a more affordable fuel for powering light- and medium-duty vehicles compared to petroleum-derived fuels. See Chapter 10, Section 10.3.1, of the RIA for more discussion on this topic. Also, electricity prices have been less volatile than petroleum-derived fuels used to power light- and medium-duty vehicles. See Chapter 10, Section 10.3.2, of the RIA for more discussion on this topic. Since it is anticipated that the electricity to power LMDVs will be produced in the U.S., the wider use of PEVs will likely increase the U.S.'s energy independence. See Chapter 10, Section 10.3.3, of the RIA for more discussion on this topic.

Summary:

Some commenters (Valero, Motor and Equipment Manufacturers Association, Fuel Freedom Foundation, Pearson Fuels, Missouri Corn Growers Association, Plains All American Pipeline, L.P.) suggested that since this proposed rule focuses on the promotion the wider use of PEVs, that the demand for renewable fuels will be reduced. These commenters suggested that EPA should instead focus upon achieving U.S. energy security and independence objectives with increasing use of renewable fuels and, more specifically, flexible-fueled vehicles/higher ethanol blends and the greater use of renewable diesel fuel. One result of this proposed rule, according to one commenter (Valero), is that it would be more difficult to meet the renewable fuel mandates of the Renewable Fuel Standards (RFS). When the U.S. Congress passed the RFS, one goal of the RFS was to promote U.S. energy security and energy independence. Thus, according to this commenter, the proposed rule is at odds with the Congressional intent of the RFS requiring renewable fuels to achieve energy security and independence objectives.

Response:

As explained in preamble Section V, EPA is setting the final LMDV GHG standards under our CAA section 202(a)(1)-(2) authority. EPA also evaluated the impacts of the final LDMV GHG standards on energy, in terms of oil conservation and energy security through reductions in fuel consumption. EPA considers this final rule to be beneficial from an energy security perspective and thus this factor was considered to be a supportive and not constraining consideration.

EPA agrees with the commenters that use of renewable fuels can further the U.S.'s energy security and energy independence since use of those fuels results in reduced consumption and reduced U.S. net imports of petroleum, but the use of renewable fuels are not the only available or appropriate strategies for reducing demand for petroleum-based fuels. A reduction of U.S. petroleum consumption and imports reduces both financial and strategic risks caused by potential sudden disruptions in the supply of imported petroleum to the U.S., thus increasing the U.S.'s energy security. EPA responds to issues about flexible-fueled vehicles in RTC Section 26. In addition, the wider use of renewable fuels increases the U.S.'s energy independence, since the renewable fuels used to meet the RFS requirements are expected to be almost exclusively produced in the U.S. We also note that renewable fuels also may have some energy security risks, for example, as a result of weather-related events (e.g., droughts that limit crop production used to make biofuels). As discussed further below, we view this rule and the recently finalized RFS rule as complementary strategies in promoting the U.S.'s energy security.

All energy sources, including petroleum-based fuels and renewable biomass-based fuels, have associated potential energy security risks that depend on their domestic availability, price volatility, and the regionality and global integration of their markets and associated vulnerabilities to market disruption events. However, EPA is aware of robust quantitative methods for estimating the energy security benefits of reductions in petroleum use only; we are not aware of any published estimates of the energy security risks associated with increased use of either electricity or renewable fuels. Thus, in this final rule we are not able to quantify any potential energy security risks associated with use of non-petroleum-based fuels in our method of estimating energy security impacts. In general, however, we consider the energy security risks of these fuels to be lower because they are less likely to have supply disruptions and include a diversity of energy sources.[680]

Additionally, EPA disagrees with the commenter regarding their claims on the interaction of this final rule with the RFS program. First, as we explain further in RTC Section 2, Congress specifically determined that the RFS provisions do not limit EPA's authority to regulate GHGs under any other provision of the Clean Air Act, including section 202(a)(1).[681] Second, the recently finalized RFS Set Rule, which established the highest RFS volumes in the history of the program, and the final LMDV GHG rule are complementary in achieving GHG reductions in the U.S. transportation sector. The RFS Set rule is relevant to renewable fuel volumes in the 2023–2025 timeframe, and this final rule sets GHG emissions standards for LMDV vehicles in the 2027–2032 timeframe. As a result, the RFS Set rule and the LMDV GHG rule's GHG emissions standards do not have overlapping timeframes. Finally, any impacts of the increasing use of advanced vehicle technologies, including EV technologies, in U.S. vehicle fleets on renewable fuel volumes can be taken into consideration in future RFS rules under the RFS program. Both

[680] Renewable Fuel Standard (RFS) Program: Standards for 2023–2025 and Other Changes. Federal Register / Volume 88, No. 132 / Wednesday, July 12, 2023.

[681] Notwithstanding the savings clause noted above, to the extent the RFS statute is of any relevance, we think it clearly is consistent with this rulemaking. For years after 2022, Congress authorized the Administrator to establish the standards based on his analysis of various factors. Congress mandated only a single numeric floor for renewable fuel use: the requirement that the minimum volume of biomass-based diesel (BBD) be not less than one billion gallons, CAA section 211(o)(2)(B)(v). This requirement can be met by BBD used in any kind of transportation fuel, including fuel used in motor vehicles, nonroad vehicles, jet fuel, and home heating oil. The commenters did not explain with any specificity how the proposed standards would be an impediment to meeting the one-billion-gallon statutory floor for BBD.

programs, vehicle standards and renewable fuel standards, support meeting our nation's GHG goals.

Summary:

One commenter (American Enterprise Institute) suggested that EPA's energy security analysis in this rule was inaccurate because it focuses on the level or proportion of U.S. oil imports, not changes in U.S. consumption. According to the commenter, there is only "one world price" for oil that influences every country in the world, so it is U.S consumption levels, and not U.S. imports, that influences the U.S.'s energy security. Since oil price shocks are transmitted globally, according to the commenter, countries that consume oil cannot be shielded from the change in world oil prices when world oil supply disruptions occur. Also, private markets are capable of anticipating oil supply disruptions and minimizing the disruption impacts. Thus, the energy security benefits estimated in this proposed rule are "illusory".

Response:

This final rule is anticipated to simultaneously reduce both U.S. oil consumption and U.S. net oil imports. Using the AEO 2023 with updated refinery throughput assumptions for this final rule, EPA estimates that approximately 94.8 percent of the change in fuel consumption resulting from these final standards will be reflected in reduced U.S. net oil imports. Reductions in U.S. product demand (i.e., gasoline and diesel fuels) and, in turn, reductions in U.S. net oil imports stemming from this final rule rebalance the pattern of oil supplies being produced worldwide, reducing the quantity of oil produced in countries that are likely to experience oil supply disruptions over the analytical timeframe of this final rule, 2027-2055. From this perspective, the impacts of any future world oil supply disruptions are lessened.

The ORNL oil security premium methodology acknowledges the availability of private market mechanisms that allow the U.S. economy to anticipate and prepare for oil supply disruptions. However, those private market mechanisms lead to less investment in insurance protection (through private stockholding, hedging in oil futures markets, investment in energy conservation etc) than would be socially optimal because private individuals generally only protect themselves from the economic costs they expect to bear directly. Private individuals do not necessarily take into account the external and non-market consequences of their oil production or consumption activities. As a result, market mechanisms mitigate, but do not eliminate, oil supply disruption costs to the U.S. economy. Thus, reductions in both U.S. oil consumption and net oil imports improve the U.S.'s energy security position.

Summary:

Two commenters (Electrification Coalition, Environmental and Public Health Organizations) asserted that the U.S. spends a considerable amount of its national defense budget to protect access to oil in regions of the world (i.e., the Middle East) which have significant oil supply disruption risks. If the U.S. could shift to the wider use of electricity to power light- and medium-duty vehicles and away from oil, these defense costs would be lower, which would be a benefit to the U.S. Another commenter (American Enterprise Institute) suggested that changes in military costs to secure oil from unstable parts of the world should not be counted as a benefit for this rule. According to this commenter, estimating the U.S. effort of providing defense for overseas sea lanes for oil shipments is a hugely complex analytical calculation, which cannot be reasonably calculated. Thus, according to this commenter, military cost savings from reduced U.S. oil use as a result of this proposed rule should be left unquantified.

Response:

We agree that the U.S. likely incurs defense costs in maintaining access to oil from regions of the world that have significant oil supply risks such as the Middle East. For this final rule, we are not quantifying avoided defense costs from decreased consumption of oil used in the U.S. transportation sector, which would be a benefit to the U.S. There is an ongoing literature on the measurement of this component of energy security, but methodological and measurement issues – attribution and incremental analysis – pose two significant challenges to providing a robust estimate of this component of energy security. The attribution challenge is to determine which military programs and expenditures can properly be attributed to oil supply protection, rather than some other objective (i.e., other strategic/geopolitical concerns). The incremental challenge is to estimate how much the petroleum supply protection costs might vary if U.S. oil use were to be reduced, but not eliminated. EPA has not been able to identify a robust methodology to quantify the U.S. military costs of securing overseas oil. Thus, our analysis for this final rule leaves this benefit, avoided military costs with reductions in U.S. oil imports, unquantified. From this perspective, the monetized energy security benefits presented in the RIA are conservative.

Summary:

One commenter (Environmental and Public Health Organizations) supported the use of the Oak Ridge National Laboratory (ORNL) energy security methodology being used by EPA to estimate the oil security premiums in the proposed LMDV rule. Another commenter (American Petroleum Institute) raised concerns that the ORNL oil security premium estimates that EPA is using in this proposed LMDV GHG rule are too high. According to this commenter, the estimated energy security benefits of the proposed rule are overstated and not meaningful. This commenter suggested that the energy security methodology developed by ORNL and entitled, *Estimating the Energy Security Benefits of Reduced U.S. Oil Imports* (2008), is outdated and no longer applicable to the current structure of global oil markets.[682] When the oil security model methodology was developed, net U.S. crude oil and product imports were roughly 50 percent of U.S. petroleum consumption, according to the commenter. Currently, the U.S. is, and projected to continue to be, a net crude oil and product exporter. Another commenter (Heritage Foundation) suggested that EPA's energy security methodology ignores that the U.S. is an oil-exporting country, rather than an oil-importing country. For this reason, according to this commenter, the stated energy security benefits are likely costs, rather than benefits. Another commenter (Western Energy Alliance) suggested that since the U.S. is a large supplier of oil, that the final rule would not result in energy security benefits.

Response:

Several of the commenters (American Petroleum Institute, Heritage Foundation, Western Energy Alliance) fundamentally misunderstand the ORNL model as well as how EPA is applying it in this final rule. The ORNL model is a flexible economic model that allows for changes in input parameters to account for the kinds of changes the commenters are describing. Specifically, the ORNL model accounts for the fact that the U.S. is a net crude oil and refined

[682] Leiby, P., Estimating the Energy Security Benefits of Reduced U.S. Oil Imports: Final Report. March 2008. Oak Ridge National Laboratory. ORNL/TM-2007/028.

product exporter, which reduces the oil security premium estimates used in both the proposal and final rule. The ORNL model also accounts for other key changes, such as oil price responsiveness and U.S. GDP sensitivity, to accurately model oil security premiums and energy security benefits. We further explain each of these points below.

The ORNL energy security model used to estimate oil security premiums in this final rule is structurally the same as the version of the model described in the 2008 documentation cited by one commenter. The ORNL energy security methodology calculates oil security premiums based upon the macroeconomic disruption/adjustment import costs, which are numerically estimated with a compact model of the oil market by performing simulations of market outcomes using probabilistic distributions for the occurrence of oil supply shocks, calculating marginal changes in economic welfare with respect to changes in U.S. oil import levels in each of the simulations, and summarizing the results from the individual simulations into a mean and 90 percent confidence intervals for the oil security premium estimates. The macroeconomic disruption/adjustment import cost component is the sum of two parts: the marginal change in expected import costs during disruption events and the marginal change in gross domestic product due to the macroeconomic disruption of an oil supply shock. While the U.S. is a net exporter of crude oil and refined products and a large producer of oil, the U.S. economy is also a large consumer of oil. When there is an oil supply disruption in the world, the supply disruption results in a loss of economic output in the U.S., measured in terms of a loss in U.S. gross domestic product (GDP). From this perspective, since this rule reduces U.S. oil consumption and U.S. oil imports, EPA believes that there are energy security benefits associated with the rule.

The ORNL energy security model was peer reviewed in March 2008 before it was utilized in EPA rules.[683] EPA's use of the ORNL energy security model underwent public comment and review in the in the LDV GHG rule (2012-2016) in 2010.[684] While the ORNL model structure is unchanged since 2010, ORNL has regularly updated data and other quantitative inputs to the model to account for new and emerging oil market trends. ORNL estimates revised oil security premiums based upon the most recent Annual Energy Outlooks (AEOs) used in support of each of the LDV rulemakings undertaken by EPA. As the U.S. has gone from a net importer to a net crude oil and refined product exporter, the oil security premiums have steadily declined over the timeframe of the different EPA LDV rules, in part, due to evolving oil market trends. The value of the oil security premium remains positive because of its GDP disruption cost premium component. It continues to hold that a reduction in U.S. imports results in a lower amount of "at risk" oil supply susceptible to disruption and mitigates the price increase during a supply shock and the resulting GDP losses. Moreover, a decrease in oil imports partly results in a decrease in consumption, and the GDP losses with respect to the disrupted oil price decrease with reductions in the level of oil consumption.

In addition, two key parameters that influence the size of the impacts of oil supply disruptions on U.S. GDP have been updated since the ORNL model was used in the EPA's LDV GHG rule

[683] Transmittal of the Peer Review Document and Peer Review Comments Document, both in support of the Oak Ridge National Laboratory Report, "*Estimating the Benefits of Reduced U.S. Oil Imports*", March 2008. ORNL/TM-2007/2008.

[684] Joint Technical Support Document, Final Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards. EPA-420-R-10-901. April 2010.

(2012-2016) in 2010.[685] The first parameter updated is the oil price responsiveness (i.e., the short-run price elasticity of demand for oil). In the LDV GHG rule (2012-2016), EPA used a short-run price elasticity of demand for oil of -0.045. In this current proposed and final LMDV GHG rule (2027-2032), we are using a short-run elasticity of demand for oil of -0.07, a 56 percent increase (in absolute value). The effect of the increase in the short-run price elasticity of demand is to lower the impacts of an oil price shock on U.S. GDP. It is thought that consumers of oil in the U.S. are likely to be more responsive and consume less oil when the price of oil rises than previously estimated in the older version of the ORNL model.

The second parameter that has been updated is the U.S. GDP sensitivity (i.e., the elasticity of GDP to an oil price shock). This parameter has been updated to be more inelastic, i.e., there is less sensitivity of U.S. GDP to an oil price shock. In other words, for a given oil price shock, there will be a smaller loss of U.S. GDP. In the LDV GHG rule (2012-2016), EPA used an elasticity of U.S. GDP to an oil shock of –0.032.[686] For the current proposed and final light- and medium-duty GHG rule (2027-2032), we are using an elasticity of U.S. GDP with respect to an oil price shock of –0.021, a 34 percent reduction (in absolute value). The paper by Oladosu et al., *Impacts of oil price shocks on the U.S. economy: a meta-analysis of oil price elasticity of GDP for net oil-importing economies*, provides the basis for the updated GDP elasticity.[687] Thus, for an equivalent oil price shock, there will be less adverse impacts on the U.S. economy than with the older version of the ORNL model.

A variety of factors that have occurred over the last decade are thought to have reduced the impacts of oil shocks on the U.S. economy. First, the U.S. is less dependent on imported oil than in the early 2000s due in part to the “fracking revolution” (i.e., increased U.S. production of tight/shale oil), and to a lesser extent, increased U.S. production of renewable fuels such as ethanol and biodiesel. As one commenter notes, the increase in U.S. tight oil production and the resulting expansion of the U.S.’s net oil export position over roughly the last decade, has resulted in less of a wealth transfer from the U.S. to foreigners during an oil price shock, lowering the oil security premium. In addition, it is thought that the U.S. economy is more resilient to oil shocks than in the earlier 2000s timeframe because of increased global financial integration and greater flexibility of the U.S. economy (especially labor and financial markets).

In summary, EPA believes that the ORNL model has been updated for this proposed and final rule to account for concerns raised by several of the commenters (American Petroleum Institute, Heritage Foundation, Western Energy Alliance). Even though the U.S. is a net oil exporter, EPA believes that there are energy security benefits, not costs, associated with the rule. EPA agrees with one of the commenters (Environmental and Public Health Organizations) that the ORNL model provides reasonable energy security benefits estimates of this final rule.

Summary:

One commenter (Institute for Policy Integrity) suggested that EPA should update the own-price elasticity of demand for oil in its energy security analysis to account for increased electrification over time. According to the commenter, EPA used an own-price elasticity of

[685] Ibid.

[686] Ibid.

[687] Oladosu et al., *Impacts of oil price shocks on the U.S. economy: a meta-analysis of oil price elasticity of GDP for net oil-importing economies*, Energy Policy, 2018.

demand for oil of -0.07 – meaning that oil sales only marginally decline when oil prices increase, reflecting the fact that oil cannot be easily substituted with other fuels. But in the future, as electric vehicles become more widely adopted, this is likely to change as electricity becomes more easily substitutable for oil.

Response:

We agree with the commenter that the own-price elasticity of demand for oil could change with increasing penetration of electric vehicles over the timeframe of this final rule, 2027-2055. Increased substitution between oil and electricity would likely first occur in multi-vehicle households that have both an electric and a gasoline-powered vehicle. But there could also be substitution of electricity for oil in the household purchase decision when choosing between buying an electric or a gasoline-powered vehicle. A higher own-price elasticity of demand for oil would lower the oil security premiums and the energy security benefits of this final rule. We are unaware of any study to date that has addressed this issue, how the own-price elasticity of demand for oil could change with the wider use of electric vehicles. It is a topic for further, future research in our view. Thus, EPA does not consider it appropriate to adjust its quantitative estimates of the energy security benefits of this final rule based upon changes in the own price elasticity of demand for oil with greater electric vehicle usage in the timeframe of this final rule.

Summary:

One commenter (Valero) suggested that EPA should consider cybersecurity threats associated with PEV charging infrastructure as part of its energy security analysis of this rule.

Response:

Cybersecurity threats are an increasing concern for all types of energy infrastructure in the U.S including oil and natural gas pipelines, electric transmission lines, electric vehicle supply equipment and PEV charging infrastructure. Currently, the magnitude and frequency of the disruption risks associated with cybersecurity threats to the U.S.'s PEV charging infrastructure is not well characterized. Until a better characterization of PEV charging infrastructure cybersecurity risks is developed, it is not possible to quantify the energy security impacts of this type of risk. The same is true for cybersecurity risks associated with petroleum production and distribution infrastructure, which EPA is also not quantifying in this rule. Further study is needed on this topic before it can be systematically included in EPA's energy security analysis of its GHG vehicle rules.

Summary:

One commenter (Clean Fuels Development Coalition et al.) suggested that the proposed rule does not address the U.S. energy security impacts of the greater use of natural gas in the U.S. electricity sector stemming from the wider use of PEVs from this proposed rule.

Response:

As discussed in Chapter 5.2 of the RIA, EPA used the IPM model to assess the impacts of this rule on U.S. electricity generation. In the IPM modeling, natural gas use for electricity generation declines by roughly 52 percent between 2028 and 2050 in the reference (no action) case, and 48 percent in the central case representing the standards in the final rule.[688] In other words, over the timeframe assessed in this rule and in either scenario, use of natural gas for electricity generation is projected to decline substantially in both absolute and relative terms.

The United States has been the world's largest producer of natural gas since 2011 and is a substantial net exporter of natural gas.[689,690] Proven U.S. reserves of natural gas substantially exceed projected U.S. demand in the coming decades, and are not expected to be a constraint on the ability of U.S. production to meet the marginally larger natural gas demand for electricity generation estimated to result from these standards in the IPM analysis.[691]

The IPM analysis does not provide estimated impacts of the rule on U.S. trade of natural gas, and specific quantitative estimates of this potential effect were not readily available for our analysis of this rule. While the magnitude of the effect of the final rule on natural gas trade remains uncertain without additional energy sector modeling specific to the reference case (no action) and central case, some insight can be drawn from considering differences in natural gas use and trade in different Annual Energy Outlook scenarios. When we consider the difference in consumption and net imports of natural gas between the AEO 2023 Reference and Low Economic Growth cases – the two cases compared in EPA's methodology for estimating its oil import reduction factor (see RIA section 10.4.1) – we calculate that cumulative differences in net imports (i.e., reduced net exports) account for only 18 percent of the cumulative difference in U.S. consumption of natural gas over the time period covered by the AEO (2022-2050).[692] In other words, a significant portion – more than 80 percent – of marginal increases in U.S. demand for natural gas demand may be expected to be met by increased domestic production.

While the effect of this rule on trade of natural gas is uncertain, based on the current domestic production, exports, proven reserves, the projected decline in natural gas as a proportion of overall U.S. electricity generation, and trends seen in AEO cases discussed above, we expect that any increase in net imports of natural gas (i.e., decrease in net exports) will be relatively small, on an energy equivalent basis, compared to the size of reduced U.S. net oil imports expected to result from this final rule. Additionally, we are not aware of, nor has the commenter provided, a methodology sufficient to quantify the energy security risks associated with trade of natural gas. We note that natural gas markets are more regionally distinct than oil markets, meaning prices and potential disruptions of natural gas markets outside of North America, are less correlated

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688 Because of the lead times necessary to complete our IPM modeling for the final rulemaking analysis, it was necessary to run IPM on interim versions of the reference and policy cases which we expect overestimate the impact of the final standards on energy demand. Therefore, these estimates of increased use of natural gas should be considered conservative; an updated IPM analysis aligned with the final standards would be expected to show a decline in natural gas use for electricity generation from 2028 to 2050 somewhere between 48 percent and 52 percent. The IPM modelling done for this final rule is described in RIA section 5.2.

689 U.S. Energy Information Administration (EIA). "Dry Natural Gas Production: International." Accessed January 23, 2024. Available online: https://www.eia.gov/international/data/world/natural-gas/dry-natural-gas-production.

690 U.S. Energy Information Administration (EIA). "Natural gas explained: Natural gas imports and exports." Last updated June 30, 2023. Available online: https://www.eia.gov/energyexplained/natural-gas/imports-and-exports.php

691 U.S. Energy Information Administration (EIA). "U.S. Crude Oil and Natural Gas Proved Reserves, Year-end 2021." December 30, 2022. Available online: https://www.eia.gov/naturalgas/crudeoilreserves/

692 U.S. Energy Information Administration (EIA). "Annual Energy Outlook 2023". March 16, 2023. Available online: https://www.eia.gov/outlooks/aeo/

with price impacts on U.S. consumers.[693] Thus, while we are not aware of existing estimates of probabilities of disruptions of North American natural gas supply – a necessary component of any extension of EPA's oil security premium methodology to natural gas – one might expect the probabilities of significant global events impacting U.S. natural gas supply to be smaller than the existing estimates for globally integrated oil markets. Lower disruption probabilities, all else equal, would result in lower potential energy security premia. In summary, while we are not able to quantify the potential energy security risks associated with an increased use of natural gas for electricity generation, for the reasons above, we believe these impacts would be relatively modest when compared with the energy security impacts of decreased use and net U.S. imports of petroleum.

Summary:

One commenter (American Fuel & Petrochemical Manufacturers) suggested that EPA's energy security analysis of the proposed rule does not account for the fact that there will likely be petroleum refinery closures in the U.S. According to the commenter, petroleum refinery closures in the U.S., in turn, will likely have an adverse impact on the supply of petroleum-derived fuels that are necessary for U.S. military operations and readiness. The availability of refined oil products for U.S. military use is an energy security issue.

Response:

EPA has updated its estimates of the impacts of this final rule on U.S. refinery output. Based upon comments EPA received on the proposed rule and in consultation with DOE and NHTSA, EPA is estimating that U.S. refineries will operate at higher production levels in this final rule. Given a reduction in U.S. refined fuel demand as a result of this final rule, U.S. refinery output will account for half (50 percent) of that reduced demand, while reduced U.S. net imports (i.e., increases in refined product exports) will account for the other half (50 percent) of that reduced demand. Using the AEO 2023 with updated refinery throughput assumptions for this final rule, EPA estimates that approximately 94.8 percent of the change in fuel consumption resulting from these final standards will be reflected in reduced U.S. net oil imports. See Chapter 8 of the RIA for more discussion on this topic.

Under the central case, manufacturers choose to comply with the final rule principally by producing more PEVs, and their operation is associated with a gradual, but steady reduction in the demand for petroleum-derived fuels from light- and medium-duty vehicles in the U.S. through the timeframe of analysis for this final rule, 2027-2055. Yet there is still anticipated to be significant, ongoing need for petroleum-derived fuels in the U.S. through 2055. Sources of petroleum-derived fuel demand in the U.S. include: new and existing gasoline and diesel powered light- and medium-duty vehicles, heavy-duty vehicles, nonroad equipment, and fuels for use in the aviation sector of the U.S. economy. Given the significant, future demand for petroleum-derived fuels in the U.S., it is not likely that there will be closures of U.S. refineries due to this final rule. In any case, it is widely expected that there will be sufficient U.S. refinery capacity to supply fully anticipated petroleum-derived fuels for U.S. military purposes through 2055. Also, EPA has not seen any economic study that suggests that its GHG vehicle rules will result in refinery shutdowns in the U.S.

[693] U.S. Energy Information Administration (EIA). "Natural gas markets remain regionalized compared with oil markets." April 29, 2020. Available online: https://www.eia.gov/todayinenergy/detail.php?id=43535

Summary:

According to this commenter (American Fuel and Petrochemical Manufacturers), EPA's energy security analysis of the proposed rule inaccurately characterized the U.S. oil industry's energy security situation. EPA's energy security analysis ignored that a significant percentage of total crude oil consumed in the U.S. is produced in the U.S. and a significant percentage of U.S. oil imports are from Canada. Also, the EPA analysis ignored the significant pipeline connectivity between the U.S. and Canada. Further, many U.S. oil refineries require heavy crude oils, which are likely to be imported from Canada. According to the commenter, reduced demand for petroleum-derived fuels will impact U.S. oil producers as much, if not more, than the U.S.'s existing oil trading partners.

Response:

EPA is in general agreement with the commenter's characterization of the U.S. oil industry and the links between the U.S. and Canadian oil supply industries. EPA's energy security analysis stems from the characteristics of the global oil market. Oil is bought and sold in a world market and there are periodic oil supply disruptions typically from foreign (i.e., non-North American) oil producers. Also, oil exporters with a large share of global production have the ability to raise or lower the price of oil by exerting the market power associated with the Organization of Petroleum Exporting Countries (OPEC) to alter oil supply relative to demand. World oil price instability and volatility are a result of these features of the global oil market.

EPA estimates that this final rule will reduce both U.S. oil consumption and U.S. net oil imports. For the final rule, using the AEO 2023 and updated refinery throughput assumptions, EPA estimates that approximately 94.8 percent of the change in fuel consumption resulting from these final standards is likely to be reflected in reduced U.S. net imports of crude oil and refined products over the timeframe of the analysis of this final rule, 2027-2055. See Chapter 8 of the RIA for more discussion on this topic. Reductions in U.S. oil demand and U.S. oil imports as a result of the final rule rebalance the pattern of oil supplies being produced worldwide, reducing the quantity of oil produced in countries that are likely to experience oil supply disruptions. This in turn mitigates oil supply disruptions and associated price shocks that affect the world market, including U.S. oil consumption, resulting in energy security benefits for the U.S. From this perspective, the impacts on the U.S. economy of any future world oil supply disruptions are lessened. Thus, the final rule provides energy security benefits to the U.S., even when the U.S. and North American oil supplies are relatively integrated and secure.

Summary:

Many commenters (Valero, Delk U.S. Holdings, Missouri Corn Growers Association, Western Energy Alliance, Plains All American Pipeline, L.P.) suggested that while EPA focuses on the energy security benefits of reduced dependence on U.S. oil imports, EPA failed to address the energy security threats of the U.S.'s increasing dependence on imports of critical minerals and PEV battery supply chains. One commenter (Zero Emission Transportation Association) agreed with EPA that the issues of energy security and mineral security are distinct and should be addressed separately.

Response:

For this final rule, EPA distinguishes between energy security and critical minerals, mineral security and security issues associated with the importation of PEV batteries and component parts. Energy security focuses on the impacts of the use of different fuels by light- and medium-duty vehicles, such as electricity and gasoline, on the U.S.'s energy security position. Critical minerals/mineral security, on the other hand, involves the risks associated with the reliance on different minerals used in the manufacturing and ultimate sale of the batteries in electric vehicles. Importation of PEV batteries and their component parts is an additional security issue that is associated with this final light- and medium-duty vehicle GHG rule. EPA addresses comments on the energy security impacts of this rule in this Section, Section 21, of this Response to Comment document. Critical minerals/mineral security/PEV supply chain issues are addressed in Section 15 of the Response to Comment document. We agree with Zero Emission Transportation Association that energy security and mineral security are two distinct issues that should be addressed separately.

22 - Vehicle safety

Comments by Organizations

Organization: Alliance for Automotive Innovation

In the past, customers who sought greater vehicle utility or higher performance did so through selection of optional engines with greater displacement. However, industry, driven in part by GHG and fuel economy regulations, has developed entire families of downsized engines that have proven capable of meeting customer demands for power while simultaneously increasing efficiency and lowering GHG emissions. This is exactly the strategy that EPA previously identified as the technological pathway to meeting increasingly stringent GHG emissions regulations while maintaining existing performance levels. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Enrichment is a critical strategy that has enabled this technological shift to lower displacement engines, ensuring their safe and durable operation in transient high-power demand situations. Manufacturers use enrichment to ensure that when customers demand high power, they can do so without the risk of costly damage or interrupted performance. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Customer needs for power include, but are not limited to, the ability to tow a large trailer up an occasional steep grade, to operate the vehicle with a full load of passengers and cargo, and to rapidly accelerate on a short freeway entrance ramp to safely merge into traffic. Other customers, for example those purchasing supercars, expect superior performance and racetrack i. In each case, the power requirement from the engine depends on the customer's usage, and if its "sufficient power" is inadequate to accomplish their task, then the customer may be exposed to potentially unsafe and inadequate operation and will be dissatisfied with their vehicle's utility. A sudden reduction or interruption of power in the midst of a driving maneuver (e.g., passing on a grade) could be disruptive to the driver and confusing to other drivers. In some cases, this may create an unsafe traffic condition if the vehicle suddenly loses power, forcing other drivers to take evasive actions. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Customers who seek specific power levels and are dissatisfied with the reduced power of downsized engines due to prohibitions on enrichment would likely revert to seeking out higher displacement engines or shift into larger vehicle segments. Worse yet, customers may simply reject new offerings and remain in older vehicles longer, further increasing the rising average age of vehicles on the road and delaying rollouts of other technologies. Any of these outcomes would detract from achieving the agency's overall goals of reduced emissions and improved fuel economy. [EPA-HQ-OAR-2022-0829-0701, p. 183]

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

Beyond critical minerals, the United States lacks adequate infrastructure for electric vehicle charging and hydrogen refueling. Developing the necessary infrastructure would cost billions of dollars in funding and require immediate planning and coordination. Even if enough new charging stations could be built, the Nation's electricity grids could not currently supply them with sufficient power. And batteries and fuel cells present an array of documented safety risks, including spontaneous fires and explosions that have resulted in death, injuries, and extensive property damage. All of these considerations would further stifle electric-vehicle adoption. [EPA-HQ-OAR-2022-0829-0683, pp. 4-5]

Finally, battery-electric vehicles implicate significant, well-documented safety concerns that could materially impede deployment of electric vehicles. [EPA-HQ-OAR-2022-0829-0683, p. 51]

Spontaneous fires involving battery-electric vehicles have been reported across the country, and major manufacturers have reported battery defects and issued recalls due to fire-related risks. See Joce Sterman et al., Ignition: Sponta- neous Electric Vehicle Fires Prompt Recalls, But Some Owners Stalled Waiting on Re- pairs, WBTV (Sept. 26, 2022), https://tinyurl.com/bddjbbw6. In addition, the National Transportation Safety Board conducted an investigation of electric-vehicle crashes and found that, "[i]n each case, emergency responders faced safety risks related to electric shock, thermal runaway, battery ignition and re- ignition, and stranded energy." Safety Risks to Emergency Responders from Lith- ium-Ion Battery Fires in Electric Vehicles, Nat'l Transp. Safety Bd. (Nov. 13, 2020), https://tinyurl.com/4b9bw869. Electric vehicles also are frequently heavier than conventional vehicles, and their greater weight could exacerbate injuries in the case of an accident. See Raul Arbelaez, As Heavy Evs Proliferate, Their Weight May Be a Drag on Safety, Ins. Inst. For Highway Safety (Mar. 9, 2023), https://tinyurl.com/txwb5wtn. [EPA-HQ-OAR-2022-0829-0683, p. 51]

EPA must consider these safety concerns as part of its feasibility analysis. See Sierra Club v. EPA, 325 F.3d 374, 378 (D.C. Cir. 2003) ("The statute also intends the agency to consider many factors other than pure technological ca- pability, such as costs, lead time, safety, noise and energy."). But there is no mention of them in the proposed rule. Cf. 88 Fed. Reg. at 29,387 ("[T]here is strong reason to believe that BEVs are at least as safe as conventional vehicles, if not more so." (footnote omitted)). The only material safety risk EPA even acknowledges is the possibility that declining fuel costs will cause drivers to drive more often, resulting "in an increase in accidents, injuries, and fatalities." Id. At 29,345. It offers no discussion of the unique safety risks posed by electric vehicles. That omission is striking because the agency does speculate on the unique safety benefits of such vehicles. See id. At 29,387 ("[T]he BEV architecture often lends itself to the addition of a 'frunk' or front truck. The frunk can pro- vide additional crush space and occupant protection in frontal or front offset impacts."); id. (claiming that electric-vehicles have a lower center of mass, which "provides additional vehicle stability and could reduce the propensity for vehicle rollover”). That cursory, cherry-picked analysis is insufficient given the safety problems that have arisen already, and the likely increase in similar incidents if use of electric vehicles substantially increases, as the proposed rule not only anticipates but affirmatively intends. [EPA-HQ-OAR-2022-0829-0683, pp. 51-52]

The safety concerns accompanying fuel-cell vehicles are at least as serious. Hydrogen leaks are reportedly common in fuel-cell vehicles and can lead to spontaneous combustion and explosions. See Hao Li et al., Safety of Hydrogen Storage and Transportation, 8 Energy Reps. 6258, 6259 (May 2022). Already, catastrophic accidents have occurred in the United States and abroad resulting in death, injury, and major property damage. See id. At 6259; see also Agnete Klevstrand, “Explosion After Explosion,” Hydrogen Insight (Feb. 7, 2023), https://tinyurl.com/ypea2at8; Report on the June 2019 Hydrogen Explosion and Fire Incident in Santa Clara, California, H2 Hydrogen Safety Panel, at 7 (June 2021), https://tinyurl.com/yeyu28bj; Norway Fines Nel Units $3 Million over 2019 Blast at Hydrogen Fuel Station, Reuters (Feb. 16, 2021), https://ti- nyurl.com/3twp99k4; CSB Releases AB Specialty Silicones Factual Update, U.S. Chem. Safety Bd. (Dec. 18, 2019), https://tinyurl.com/yc4pyz4c; Hyunjoo Jin & Jane Chung, Hydrogen Hurdles: A Deadly Blast Hampers South Korea’s Big Fuel Cell Car Bet, Reuters (Sept. 24, 2019), https://tinyurl.com/yx93d5c9; Luz Pena, Hydrogen Explosion Shakes Santa Clara Neighborhood, ABC7 NEWS (June 2, 2019), https://tinyurl.com/mr3r3yxe. Manufacturers are unlikely to pro- duce, and consumers are unlikely to buy, a vehicle technology that poses such substantial risk. [EPA-HQ-OAR-2022-0829-0683, pp. 52-53]

Organization: American Fuel & Petrochemical Manufacturers

2. EPA Fails to Adequately Evaluate ZEV Safety Risks as Required by Clean Air Act Section 202(a)(4)(B).

In setting new emissions standards, EPA must consider whether any technology used to comply with the requirements “will cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function.”102 The Proposed Rule’s health and safety assessment, however, is myopically limited to the health effects of tailpipe emissions and fails to fully account for all of the risks posed by ZEV mandates. Increased prices to the consumer resulting from EPA’s proposed rule (when purchasing a new vehicle) likely will delay the purchase of all vehicles subject to the rule and slow fleet turnover. For example, nowhere in the Proposal does EPA assess how slower fleet turnover impacts safety and the environment. Older vehicles have fewer safety features and higher emissions profiles than new vehicles. Other interested parties have raised safety issues that EPA has a duty to analyze.103 EPA must analyze and take comment on the safety issues associated with ZEV mandates prior to finalizing the Proposed Rule. [EPA-HQ-OAR-2022-0829-0733, pp. 24-25]

102 42 U.S.C. § 7521(a)(4)(A).

103 See, e.g., https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/12848-lithiumionsafetyhybrids_101217-v3-tag.pdf.

Organization: Anonymous

See attached files. Reducing pollution and emissions is a narrative. The pictures are of lithium mines and cobalt mines. Battery fires burn hotter and require more water than ICE fires. What are you going to do when there's a fire in an underground parking garage where the building gets condemned? [EPA-HQ-OAR-2022-0829-0627, p. 1]

[See original comment for image attachments A1 (cobalt image) and A2 (lithium image)]

Organization: Anonymous

National Bureau of Economic Research https://www.nber.org/papers/w17170 [EPA-HQ-OAR-2022-0829-0562, p. 3]

We show that, controlling for own-vehicle weight, being hit by a vehicle that is 1,000 pounds heavier results in a 47% increase in the baseline fatality probability. [EPA-HQ-OAR-2022-0829-0562, p. 3]

https://www.cnn.com/2021/06/07/business/electric-vehicles-weight/index.html [EPA-HQ-OAR-2022-0829-0562, p. 3]

The Ford F-150 Lightning will weigh about 1,600 pounds more than a similar gas-powered F-150 truck. Similarly, the electric Volvo XC40 Recharge weighs about 1,000 pounds more than a gas-powered Volvo XC40. [EPA-HQ-OAR-2022-0829-0562, p. 3]

Organization: Arconic Corporation (ARCO)

In the automotive industry, material engineers are increasingly turning to aluminum to improve vehicle performance, fuel efficiency and to enhance battery life and driving range in electric vehicles. Arconic's lightweight aluminum sheet and extruded solutions are found bumper to bumper in a variety of vehicles from doors and hoods to heat exchangers and structural parts. Aluminum sheet products are used in auto closures and body-in-white (BIW) components. Arconic also produces proprietary heat exchanger products like multilayer brazing sheet used in battery pack cooling systems and aluminum sheet used in truck cab structures and fuel tanks and plate products used in trailer applications. Additionally, the company produces a range of extruded products, including driveshafts, anti-lock brake housings, and components of turbo chargers. [EPA-HQ-OAR-2022-0829-0741, pp. 1-2]

Mass reduction utilizing advanced materials like aluminum is recognized as one of the technology options to achieve safe, fuel-efficient and cost-effective vehicles that meet or exceed consumer demands. As future standards are more and more reliant on Battery Electric Vehicle (BEV) implementation, lightweighting can provide improved vehicle range or reduced battery size for a given range and improve vehicle safety. [EPA-HQ-OAR-2022-0829-0741, pp. 1-2]

In general, Arconic urges EPA to consider a few key points as it moves to finalize this proposed rulemaking. [EPA-HQ-OAR-2022-0829-0741, p. 2]

- EPA should include a fixed electric generation emission value per kWh in the standard for calculation of vehicle emissions for battery electric vehicles (BEVs) based upon their energy efficiency. This would provide an incentive for improved vehicle efficiency, and it would also allow the EPA rules to easily equate to the DOT I standards. [EPA-HQ-OAR-2022-0829-0741, p. 2]

- Emissions standards should correlate with passenger and pedestrian safety imperatives. If all BEVs are counted as zero emission, irrespective of their size and weight, there is no incentive for vehicle manufacturers to continue seeking weight reductions that clearly improve safety. [EPA-HQ-OAR-2022-0829-0741, p. 2]

- Similarly, adding incentives for weight reduction for BEVs will correlate to reductions in electricity use, reduced embedded emissions and reduced use of critical minerals that can be difficult to produce in an environmentally friendly manner or recycle. [EPA-HQ-OAR-2022-0829-0741, p. 2]

2. Currently, a BEV version of a vehicle is 500 to 2000 pounds heavier than a comparable ICE model depending on the battery pack size. It is reasonable to assume that the adoption of BEVs will result in higher vehicle weights across the fleet compared to ICE vehicles. [EPA-HQ-OAR-2022-0829-0741, p. 3]

Over the past 17 years (2004-2021), the average weight increase was 178 pounds for the U.S. new vehicle fleet. In the current fleet comprised of mainly ICE vehicles, lightweighting has been applied predominantly in larger vehicles, which results in improved fleet crash compatibility. [EPA-HQ-OAR-2022-0829-0741, p. 3]

If the BEV share reaches 50% by 2032, the new vehicle fleet will be 500 to 800 pounds heavier on average than the current new vehicle fleet. This is an unprecedented weight increase, along with slightly smaller footprints. This results in reduced crash compatibility as many heavier vehicles will be introduced into the fleet over a very short time period resulting in higher percentages of accidents where heavier vehicles strike lighter vehicles. [EPA-HQ-OAR-2022-0829-0741, p. 3]

Moving the fleet to BEVs without lightweighting incentives will result in the largest weight increases occurring in the heaviest vehicles (due to the need for larger battery packs). If all BEVs are counted as zero emission, there is no incentive for weight reduction which will be detrimental to safety of the fleet. [EPA-HQ-OAR-2022-0829-0741, p. 3]

Organization: Arizona State Legislature

7. The proposed rule fails to consider safety issues. EPA does not sufficiently address the greater fire and explosion risk from electric and hydrogen vehicles or appreciate the increased fatality risk on impact from heavier electric vehicles. [EPA-HQ-OAR-2022-0829-0537, p. 3]VII. The proposed rule is arbitrary and capricious because it fails to consider safety issues.

EPA understands that when acting under Section 202(a) it should consider relevant factors such as impacts on safety. 88 Fed. Reg. 29,186. In fact, EPA interprets Section 202(a)(4) to "specifically prohibit[] the use of an emission control device, system or element of design that will cause or contribute to an unreasonable risk to public health, welfare, or safety." Id. at 29,387. [EPA-HQ-OAR-2022-0829-0537, pp. 24-25]

Stunningly, EPA accepts that the proposed rule will increase the number of traffic deaths. Id. at 29,345. Because EPA estimates that the proposed rule will cause people to drive more since driving will be less expensive, "EPA projects this will result in an increase in accidents, injuries, and fatalities." Id. Specifically, EPA estimates a proposed 0.2% increase in annual fatalities per billion miles driven, which results in an increase of 1,595 total fatalities from 2027 through 2055. Id. at 29,387. [EPA-HQ-OAR-2022-0829-0537, pp. 24-25]

EPA downplays the increased number of deaths in three ways. First, EPA claims the increase in fatalities per distance traveled is not "statistically significant." Id. at 29,345, 29,387. Tell that to the approximately 1,600 families who EPA projects will lose family members. Every life has significant value. [EPA-HQ-OAR-2022-0829-0537, pp. 24-25]

Second, EPA claims that the "only statistically significant increase in fatalities is due to consumers' voluntary choices to drive more." Id. But while EPA is blaming Americans for causing increased fatalities by driving more, EPA is separately calculating the benefits associated with "social and economic opportunities that become accessible with additional travel." Id. at 29,383. EPA estimates this "drive value" generates more than $300 million in benefits. Id. at 29,362. [EPA-HQ-OAR-2022-0829-0537, pp. 24-25]

Third and finally, EPA argues that more premature deaths will be avoided by the proposed rule reducing exposure to PM2.5 (between 730 and 1,400) and ozone (between 15 and 330). Id. at 29,345, 29,387. But that is only true if EPA's upper-end estimate is correct. Under EPA's lower- end estimates, the 1,595 increased traffic fatalities from the proposed rule would more than double the 745 deaths EPA projects will be avoided from exposure to PM2.5 and ozone. [EPA-HQ-OAR-2022-0829-0537, pp. 24-25]

EPA likely underestimates the serious safety issues presented by electric vehicles. Increased weight also may lead to increased fatalities. The head of the National Transportation Safety Board has expressed concern about the increased weight of electric vehicles: "I'm concerned about the increased risk of severe injury and death for all road users from heavier curb weights and increasing size, power, and performance of vehicles on our roads, including electric vehicles."30 The executive director of the Center for Auto Safety warned, "These bigger, heavier batteries are going to cause more damage. It's a simple matter of mass and speed."31 [EPA-HQ-OAR-2022-0829-0537, p. 25]

30 NTSB head warns of risks posed by heavy electric vehicles colliding with lighter cars, THE ASSOCIATED PRESS, Jan. 11, 2023, available at https://www.npr.org/2023/01/11/1148483758/ntsb-heavy-electric-vehicles-safety-risks.

31 Id.

Heavier electric vehicles increase the risk of fatal crashes. A 2011 study by the National Bureau of Economic Research found that "a 1,000-pound increase in striking vehicle weight raises the probability of a fatality in the struck vehicle by 47%."32 Converting this increased fatality risks into external costs, "total external costs of vehicle weight from fatalities alone are estimated at $93 billion per year."33 Electric vehicles can weigh more than 1,000 pounds more than their gas- powered counterparts.34 EPA does not estimate the cost from the increased fatalities or more severe injuries from crashes caused by electric vehicles. [EPA-HQ-OAR-2022-0829-0537, p. 25]

32 Michael Anderson and Maximilian Auffhammer, Pounds That Kill: The External Costs of Vehicle Weight, National Bureau of Economic Research Working Paper 17170, June 2011, 3, available at https://www.nber.org/system/files/working_papers/w17170/w17170.pdf.

33 Id.

34 Peter Valdes-Dapena, Why electric cars are so much heavier than regular cars, CNN, June 7, 2021, available at https://www.cnn.com/2021/06/07/business/electric-vehicles-weight/index.html.

Electric vehicles also increase safety risks from fires. The National Transportation Safety Board has warned that “[f]ires in electric vehicles powered by high-voltage lithium-ion batteries pose the risk of electric shock to emergency responders from exposure to the high-voltage components of a damaged lithium-ion battery.”35 The National Transportation Safety Board also found that “[t]hermal runaway and multiple battery reignitions after initial fire suppression are safety risks in high-voltage lithium-ion battery fires.”36 [EPA-HQ-OAR-2022-0829-0537, p. 25]

35 National Transportation Safety Board, Safety Risks to Emergency Responders from Lithium-Ion Battery Fires in Electric Vehicles, NTSB/SR-20/01, Nov. 13, 2020, viii, available at https://www.ntsb.gov/safety/safety- studies/Documents/SR2001.pdf.

36 Id at 63.

Neither the proposed rule nor EPA’s draft regulatory impact analysis discuss fire risk. EPA recognizes this risk elsewhere, hinting at it in its draft regulatory impact analysis for the companion emissions rule for heavy-duty vehicles. In that analysis, EPA notes that first responders need “large amounts of water”—2,600 gallons for a 600-pound lithium-ion battery—“to cool the batteries and eliminate the risk of fire.” Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles: Phase 3, Draft Regulatory Impact Analysis, 38. EPA also suggests that fire remains a risk days after a crash: “Safe storage of crashed vehicles is critical as internal battery failure reactions may occur days after the crash and reignite.” Id. EPA recommends standard maintenance and safety training to mitigate these risks. Id. EPA does not estimate the cost or timetable for the safety training or the potential cost from fires and other damage. [EPA-HQ-OAR-2022-0829-0537, pp. 25-26]

The risk is greater for hydrogen-powered vehicles. EPA recommends flame detectors since hydrogen flames are “almost invisible”; ventilation for vehicles stored indoors or under a roof to avoid hydrogen accumulation; safety training for first responders to turning the vehicle off or physically interrupting the power supply; and storage in “an isolated area” after a crash. Id. at 74-75. One study simulating a vehicle’s hydrogen tank explosion in an underground parking garage and road tunnel found fatality distances from 1-3.2 meters and 3-9.5 meters, respectively, depending on the size of the tank.37 Again, EPA does not estimate the cost or timetable for the safety training or the potential cost from fires, explosions, and other damage. [EPA-HQ-OAR-2022-0829-0537, pp. 25-26]

37 Jinouk Park et al., Study on the Explosion of the Hydrogen Fuel Tank of Fuel Cell Electric Vehicles in Semi-Enclosed Spaces, ENERGIES 2023 16(1), 241 (Dec. 2022), available at https://www.mdpi.com/1996-1073/16/1/241; see also Shaoqi Cui et al., Analysis of the fire hazard and leakage explosion simulation of hydrogen fuel cell vehicles, 41 THERMAL SCIENCE AND ENGINEERING PROGRESS 101754 (June 2023).

EPA’s failure to adequately consider safety issues is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0537, pp. 25-26]

Organization: Daniel Hellebuyck

Weight: An EV can weigh up to 1 ½ times a comparable internal combustion engine (ICE) vehicle. This creates more safety issues in a collision and more weight that our crumbling infrastructure has to absorb. Furthermore, insurance companies may be charging higher premiums to all customers to pay for the increased risk of injury and the larger costs involved in repairing EVs versus and ICE vehicle. [EPA-HQ-OAR-2022-0829-0526, p. 1]

Organization: Donn Viviani

Also not addressed is evidence that the increased weight of BEVs com- pared to comparable ICE vehicles, because of battery weight, will result in nonexhaust emissions (NEE) of particulate matter (PM) that will significant- ly lessen or even may exceed the proposal's anticipated reductions. While there is controversy as to whether NEE PM is as large as exhaust PM, with evidence on both sides. What is known for certain however, is that heavier vehicles produce more NEE PM and BEVs are significantly heavier than in-ternal combustion vehicles17. While it is true BEVs regenerative braking removes most brake-NEE, the greater torque of BEVs will cause some ag- gressive drivers to produce increased NEE PM18. This needs to be ac- knowledged and to the extent practicable included in the benefit assess- ment. In my view, the potential climate benefits of the necessary transi- tion to EVs is too important to risk with an inadequate analysis as to other effects. [EPA-HQ-OAR-2022-0829-0546, pp. 5-6]

17 Liu, Ye, et "l. "Comparative analysis of non-exhaust airborne particles from electric and in- ternal combustion engine vehic"es." Journal of Hazardous Materials 420 (2021): 126626.

18 Liu, Ye, et "l. "Impact of vehicle type, tyre feature and driving behaviour on tyre wear under real-world driving conditi"ns." Science of the Total Environment 842 (2022): 156950.

3) Recommendations for changes in the rule to decrease emissions further

What can be done under this rule to extract additional reductions in GHGs? Reducing the average weight of the fleet can address both the NEE issue and reduce carbon emissions further. Lighter EVs extend mileage and re- duce EGU emissions. Lighter IC vehicles will reduce fuel combustion. [EPA-HQ-OAR-2022-0829-0546, pp. 6-7]

Lighter vehicles result in less NWW PM.. Perhaps more importantly, lighter vehicles can reduce emissions in the manufacturing sector, especial- ly important in light of the quantity new BEVs EPA projects will penetrate the market. EPA should investigate regulatory options for reducing fleet gross vehicle weights (GVW). One way to require lower fleet average weight and decrease the emissions from manufacture of vehicles is to limit the embedded carbon allowed per ton of vehicle. [EPA-HQ-OAR-2022-0829-0546, pp. 6-7]

Savings promoted by weight reduction are immediate and do not depend on the pace of decarbonization of the electricity grid. The sooner the emis- sion reductions occur the better the chance of avoiding catastrophic non- linear feedback warming effects. [EPA-HQ-OAR-2022-0829-0546, pp. 6-7]

GHG emissions embedded in the production of vehicles is responsible for ~10% of vehicle carbon footprints. Slowly reducing down the allowable embedded carbon by class will have several outcomes. [EPA-HQ-OAR-2022-0829-0546, pp. 6-7]

Limiting the embedded carbon per ton would result in, e.g., more steel made with green hydrogen, less metal and more plastic parts (already these are replacing metal) which can require less energy to produce, and even parts made with bio-based plastics which count as negative carbon. [EPA-HQ-OAR-2022-0829-0546, pp. 6-7]

Lighter vehicles burn less fuel or draw less electrical power from EGUs, all these reduce carbon emissions. The lighter weight will produce less NEE PM as well. Weight is one driver of road friction and resuspension of PM. [EPA-HQ-OAR-2022-0829-0546, pp. 6-7]

Lastly, here, it is important to ensure that imports would be subject to any such embedded carbon restrictions, as that would serve to increase pres- sure on overseas EGUs to transition away from coal. [EPA-HQ-OAR-2022-0829-0546, pp. 6-7]

Organization: Dylan Ondek

Everyone thinks Tesla is the greatest electric vehicle but it is not. I have seen videos of these cars in wrecks and they just go up in flames. It can take four to five hours to extinguish the fire of a tesla that is not safe. If two cars have a head on collision and one is a tesla it could easily ignite the other vehicle on fire. There would be no possible quick way to get out of the vehicle already on fire after the head on collision. [EPA-HQ-OAR-2022-0829-5089]

Organization: Energy Innovation

ther research from the University of California, Berkeley, Grid Lab, and Energy Innovation, 2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future (April 2021), evaluated the technical and economic feasibility (and associated impacts and benefits) of achieving a future scenario where electric vehicles make up 100 percent of new sales of all vehicles by 2035, combined with a 90 percent clean grid (called the DRIVE Clean Scenario).[iv] Compared with the No New Policy scenario (which was pre-IRA and BIL), the total transportation sector pollutant[v] and carbon dioxide emissions reductions in the DRIVE Clean Scenario would reduce ground transportation sector CO2 emissions by 60 percent in 2035 and by 93 percent in 2050, relative to 2020 levels.9 See Figure 3. The DRIVE Clean Scenario would also avoid approximately 150,000 premature deaths and generate nearly $1.3 trillion in health and environmental savings through 2050.10 Compared to the No New Policy, the DRIVE Clean Scenario would also resIlt in approximately $2.7 trillion in consumer savings through 2050 compared—a household savings of about $1000 per year on average over 30 years.11 [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

9 Amol Phadke et al., “2035 2.0: Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future” (Goldman School of Public Policy, University of California, Berkeley, GridLab, April 2021), https://www.2035report.com/transportation/downloads/, iv.

10 Phadke et al., iii.

11 Phadke et al., ii.

iv In the Drive Rapid Innovation in Vehicle Electrification (DRIVE Clean) Scenario, EVs constitute 100 percent of new U.S. LDV sales by 2030 as well as 100 percent of MDV and heavy-duty truck sales by 2035. The grid reaches 90 percent clean electricity by 2035. More details and full study findings are available at https://www.2035report.com/transportation/.

v Namely, fine particulate matter, nitrous oxides, and sulfur oxides.

[See original attachment for line graph “CO2 Emissions in the Transportation Sector”] [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

Figure 3. Transportation sector CO2 emissions in the DRIVE Clean and No New Policy scenarios through 2050. Source: Phadke, Amol, et al., 2035 Report 2.0: Plummeting Costs & Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future, University of California Berkeley, Goldman School of Public Policy, Grid Lab, and Energy Innovation, April 2021, available at: https://www.2035report.com/transportation/. [EPA-HQ-OAR-2022-0829-0561, pp. 5-6]

Organization: Environmental. and Public Health Organizations

XXVI. BEV Safety Should Not Be a Constraining Factor in This Rulemaking.

We agree with EPA’s conclusion that, taking safety into consideration, the standards are appropriate under Section 202(a). 88 Fed. Reg. at 29347. While some have put forward misguided arguments about the safety of BEVs as a reason for EPA to set weak standards in this rulemaking, those claims miss the mark for many reasons. BEVs have been on the road in appreciable numbers for more than a decade already, and BEV sales will continue to grow due to market forces alone. OEMs, trade and professional associations, and safety authorities at all levels have long been studying, planning for, and responding to BEV safety matters.637 With or without this rulemaking, the number of BEVs will continue to grow, and safety research, planning, and design efforts will continue apace. Thus, safety should not act as a constraining factor in this rulemaking. [EPA-HQ-OAR-2022-0829-0759, p. 195]

637 Indeed, these efforts began more than a decade ago. For example, in 2010, the National Fire Protection Association and SAE International hosted a summit on EV safety standards. Am. Nat’l Standards Inst. (ANSI), U.S. National Electric Vehicle Safety Standards Summit Report Released (Jan. 5, 2011), https://www.ansi.org/news/standards-news/all-news/2011/01/us-national-electric-vehicle-safety-standards-summit-re port-released-05. And in 2011, ANSI convened a workshop on behalf of the U.S. DOE “to consider current and future U.S. domestic, regional, and international standards, codes, and conformity assessment activities needed to facilitate the introduction and widespread deployment of grid-connected electric vehicles.” ANSI, ANSI Workshop: Standards and Codes for Electric Drive Vehicles (Apr. 5-6, 2011), https://share.ansi.org/Shared%20Documents/Meetings%20and%20Events/EDV%20Workshop/EDVSponsorship.pdf

In the Proposal, EPA considered the impact of projected changes in vehicle weight on safety, including heavier BEV vehicles. See 88 Fed. Reg. at 29387-88; DRIA Ch. 9.4. EPA relied on analysis developed by the National Highway Traffic Safety Administration (NHTSA), which found no statistically significant impact on safety due to vehicle weight changes, holding vehicle footprint constant. 88 Fed. Reg. at 29387 n.796.638 EPA also considered the possible safety effects of changes in fleet composition due to changes in new vehicle sales and fleet turnover, also relying on underlying analysis by NHTSA. See DRIA Ch. 9.4. Based on these analyses, EPA concluded that “there are no changes to the vehicles themselves, nor the combined effects of fleet composition and vehicle design, that will have a statistically significant impact on safety.” 88 Fed. Reg. at 29387. [EPA-HQ-OAR-2022-0829-0759, p. 195]

638 In addition, the weight of future BEVs will be influenced by a variety of factors, including developments in battery chemistries and other technologies that could reduce weight. See generally Sebastian Blanco, The Future of Solid-State Batteries, J.D. Power (Apr. 3, 2023),

https://www.jdpower.com/cars/shopping-guides/the-future-of-solid-state-batteries; Chris Teague, What You Need To Know About Solid-State Batteries, Autoweek, https://www.autoweek.com/news/technology/a36189339/solid-state-batteries/ (last visited June 15, 2023); Michael Bull, Mass Reduction and Performance of PEV and PHEV Vehicles (undated), https://www-esv.nhtsa.dot.gov/Proceedings/22/files/22ESV-000346.pdf; Stanley, How Electric Vehicle Light-weighting is Changing the Automotive Industry, https://www.stanleyengineeredfastening.com/en/News%20and%20Stories/How%20Electric%20Vehicle%20Light-weighting%20is%20Changing%20the%20Automotive%20Industry (last visited June 15, 2023).

While EPA did not find any statistically significant impacts on safety from changes in vehicle weight and fleet turnover, EPA nonetheless quantified those impacts, based on NHTSA's underlying analysis, as well as the impacts of rebound driving (i.e., increased driving due to lower fueling costs). Id. at 29387. EPA's modeling projected that over the full period of 2027-2055, the Proposal would lead to an increase of 1,595 vehicle fatalities from all three sources (weight changes, fleet turnover changes, and rebound driving). Id. As EPA notes, this is of a similar scale to the expected reductions in premature deaths from air pollution in just a single year (2055) that would result from the Proposed Standards. Id. at 29388. [EPA-HQ-OAR-2022-0829-0759, pp. 195-196]

As EPA explained in its proposal for the Phase 3 Heavy-Duty GHG standards, numerous standards and codes govern BEV safety. 88 Fed. Reg. at 25962; Phase 3 DRIA Ch. 1.5.2. BEVs must meet the same federal safety requirements and undergo the same safety testing as combustion vehicles.639 Evidence shows that BEVs "are at least as safe" as combustion vehicles in terms of crashworthiness test performance, while "injury claims are substantially less frequent" for BEVs than for combustion vehicles.640 And on some safety metrics, BEVs perform substantially better than combustion vehicles. Due to their battery architecture, for example, BEVs typically have a lower center of gravity than combustion vehicles, which increases stability and reduces the risk of rollovers641 (the cause of up to 35% of accident deaths642). [EPA-HQ-OAR-2022-0829-0759, p. 196]

639 DOE, Maintenance and Safety of Electric Vehicles, Alternative Fuels Data Center, https://afdc.energy.gov/vehicles/electric_maintenance.html (last visited June 15, 2023).

640 Insurance Inst. for Highway Safety, With More Electric Vehicles Comes More Proof of Safety (Apr. 22, 2021), https://www.iihs.org/news/detail/with-more-electric-vehicles-comes-more-proof-of-safety.

641 DOE, Maintenance and Safety of Electric Vehicles.

642 CleanTechnica, The EV Safety Advantage 4 (2018), https://cleantechnica.com/files/2018/07/CleanTechnica-EV-Safety-Advantage-Report.pdf.

Fire risk and emergency response can also be managed effectively. BEVs are significantly less likely to catch fire than combustion vehicles in the first place.643 While BEVs can behave differently in fires than combustion vehicles, emergency responders have been gaining experience in BEV fire response as the number of BEVs on the road has grown. Numerous agencies and associations, including the National Transportation Safety Board,644 National Highway Traffic Safety Administration,645 and National Fire Protection Association,646 have established fire safety and emergency response recommendations for BEVs. The National Fire Protection Association and other organizations offer BEV fire response trainings,647 as do OEMs, which also produce emergency response guides for their vehicles.648 The National Institute for Automotive Service has also developed safety-related standards and a testing and certification program for automotive technicians who service BEVs.649 Expected future use of solid state batteries will further reduce BEV fire risk.650 Other research efforts have identified battery designs that can improve thermal management,651 as well as improved methods of extinguishing battery fires.652 [EPA-HQ-OAR-2022-0829-0759, pp. 196-197]

643 See Rachel Bodine, Gas vs. Electric Car Fires [2023 Findings], AutoinsuranceEZ (Nov. 11, 2022), https://www.autoinsuranceez.com/gas-vs-electric-car-fires/ (calculating rate of car fires using National Transportation Safety Board data).

644 See, e.g., NTSB, Risks to Emergency Responders from High-Voltage, Lithium-Ion Battery Fires Addressed in Safety Report (Jan. 13, 2021), https://www.ntsb.gov/news/press-releases/Pages/NR20210113.aspx.

645 See, e.g., NHTSA, Interim Guidance for Electric and Hybrid-Electric Vehicles Equipped With High Voltage Batteries (2012), https://www.nhtsa.gov/sites/nhtsa.gov/files/interimguide_emergencyresponse_012012_v3.pdf.

646 See, e.g., R. Thomas Long Jr., et al., Best Practices for Emergency Response to Incidents Involving Electric Vehicles Battery Hazards: A Report on Full-Scale Testing Results (2013), https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Electrical/EV-BatteriesPart-1.ash x.

647 See generally Nat'l Fire Protection Ass'n, Training that Helps Keep You Protected, https://www.nfpa.org/EV (last visited June 15, 2023).

648 DOE, Maintenance and Safety of Electric Vehicles.

649 FleetMaintenance, ASE unveils new EV standards, testing, and certification (May 4, 2023), https://www.fleetmaintenance.com/equipment/safety-and-technology/article/53059346/national-institute-for-automo tive-service-excellence-ase-ase-unveils-new-ev-standards-testing-and-certification.

650 Blanco, at 3; Teague, at 5.

651 See generally Chuanbo Yang et al., Compressible battery foams to prevent cascading thermal runaway in Li-ion pouch batteries, J. Power Sources, Sept. 1, 2022, https://doi.org/10.1016/j.jpowsour.2022.231666.

652 See, e.g., Int'l Ass'n Fire & Rescue Services, New revolutionary method tested extinguishes lithium-Ion EV fires in ten minutes with minimal water use (Mar. 22, 2023), https://www.ctif.org/news/new-revolutionary-method-extinguishes-lithium-ion-ev-fires-ten-minutes-minimal-water.

In sum, EPA properly considered the impact of the Proposal on safety, including by placing vehicle safety impacts "in the context of all projected health impacts from the rule including public health benefits from the projected reductions in air pollution." 88 Fed. Reg. at 29345. In addition, the public and private sectors have been working diligently to address BEV safety considerations; those efforts will continue as the number of BEVs on the road grows, regardless of EPA's regulatory actions. EPA is correct in not treating safety as a constraining factor in this rulemaking. [EPA-HQ-OAR-2022-0829-0759, p. 197]

Organization: HF Sinclair Corporation

g. EPA Failed to Evaluate PEV Safety Risks

In setting new emissions standards, EPA must consider whether any technology used to comply with the requirements "will cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function."79 The Proposed Rule's health and safety assessment, however, is limited to the health benefits of reduced tailpipe emissions and fails to fully account for all of the risks posed by more PEVs on the road. While EPA presumes that the heaver PEVs will not have a statistically-significant effect on safety, and particularly, fatalities, the data relied upon from EPA was based on crash studies for MY 2007-2011 vehicles, well before PEVs were on the road.80 As recognized by NHTSA Administrator Ann Carlson, "[b]igger is safer if you don't look at the communities surrounding you and you don't look at the other vehicles on the road . . . [i]t actually turns out to be a very complex interaction."81 [EPA-HQ-OAR-2022-0829-0579, pp. 16-17]

79 42 U.S.C. § 7521(a)(4)(A).

80 88 Fed. Reg. at 29,387.

81 Reuters, "U.S. NTSB chair raises safety concerns about heavy electric vehicles," David Shepardson (January 11, 2023) available at https://www.reuters.com/business/autos-transportation/us-ntsb-chair-raises-safety-concerns- about-heavy-electric-vehicles-2023-01-11/. EPA also fails to recognize that PEVs are heavier than equivalent ICE vehicles and, therefore, may present result in more severe accidents given the additional mass of the battery. PEVs, as compared to ICE vehicles, are quieter and prone to rapid acceleration, making them 37% more likely to cause accidents involving pedestrians and 57% more likely to cause accidence involving cyclist.82 Yet EPA has not considered this interaction, on safety directly or the associated increase in insurance costs.

82 NHTSA report DOT HS 811 526, "Incidence Rates of Pedestrian And Bicyclist Crashes by Hybrid Electric Passenger Vehicles: An Update," (October 2011), available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811526.

Organization: Institute for Policy Integrity at New York University School of Law

F. EPA Should Work With NHTSA to Incorporate Electric Vehicles Into the Safety Analysis

To measure the Proposed Rule's safety impacts, EPA relies on two safety models developed by the National Highway Traffic Safety Administration (NHTSA).130 First, the safety-trend model uses regression analysis to determine the impact of the model year on safety (fatalities and injuries) and property damage, and then estimate an underlying trend in baseline safety. Second, the safety-weight model identifies the impact of weight on crash fatalities by each vehicle type. EPA then combines the results of the two models and considers the effect of total vehicle miles traveled (including the Proposed Rule's rebound effect) to measure the rule's total safety impacts. Through this safety analysis, EPA concludes that the Proposed Rule could increase traffic fatalities by 1,595 compared to the No Action case.131 This total increase in traffic fatalities is comparable to one year of avoided premature deaths from the Proposed Rule due to reductions in particulate matter.132 [EPA-HQ-OAR-2022-0829-0601, pp. 20-21]

130 RIA at 9-7; see also National Highway Traffic Safety Administration, Technical Support Document: Final Rulemaking for Model Years 2024-2026 Light-Duty Vehicle Corporate Average Fuel Economy Standards 646–83 (2022) ("NHTSA 2022 TSD") (describing impact of weight reduction, vehicle scrappage and sales response, and rebound effect on fatalities).

131 Proposed Rule, 88 Fed. Reg. at 29,387.

132 See, e.g., id. at 29,345.

EPA does not monetize these traffic fatalities as part of its benefit-cost analysis for two distinct reasons. First, because some of the projected fatality increase (approximately 19%133) is due to "consumers' voluntary choices to drive more when operating costs are reduced" (i.e. the rebound effect), EPA concludes that the cost of these fatalities are offset by the benefit of additional driving.134 Second, because the majority (approximately 81%135) of the projected fatality increase is due to a statistically insignificant change in the estimated risk of fatalities per distance traveled due to the change in the vehicle mix,136 EPA reasonably chooses not to incorporate that risk into its benefit-cost analysis because it cannot be distinguished from zero.137 [EPA-HQ-OAR-2022-0829-0601, pp. 20-21]

133 See id. at 29,387 (projecting increase of 300 fatalities attributable to increased driving).

134 Proposed Rule, 88 Fed. Reg. at 29,345.

135 Id. at 29,387 (projecting increase of 1,265 fatalities due to non-statistically significant increase in fatality risk from driving on a per-mile basis).

136 EPA projects that of the 1,595 increased fatalities from the Proposed Rule, 300 are attributable to increased driving and 1,265 are attributable to the non-statistically significant increase in fatality risk. Id. at 29,387.

137 Id. at 29,345.

In either this rule or future standards, EPA should work with NHTSA to incorporate electric vehicles into both safety models. While NHTSA's safety modeling accounts for various changes in the vehicle mix such as model year and age,138 it does not account for electrification as part of the vehicle mix and instead appears to assume constant safety trends regardless of whether a vehicle is electric or gas-powered. But due to their distinct engineering, electric vehicles present unique safety implications that EPA and NHTSA should explore further. Some of these safety implications are positive. For instance, electric vehicles have additional crumple space due to a lack of a combustion engine, which improves crash safety.139 Additionally, the typical placement of the heavy electric powertrain under the vehicle lowers the car's center of gravity and thus improves handling and reduces the risk of dangerous rollover accidents. In fact, current electric- vehicle models are associated with some of the lowest rates of rollover accidents.140 But some of these safety implications are negative. For instance, the additional acceleration of electric vehicles could increase safety risks to electric-vehicle passengers, passengers in ICE vehicles, and pedestrians.141 Because electric vehicles present both safety benefits and risks, it is not clear how accounting for electric vehicles in the safety modeling would affect EPA's results. [EPA-HQ-OAR-2022-0829-0601, pp. 20-21]

138 NHTSA 2022 TSD, supra note 130, at 681; see also id. at 598.

139 Zachary Shahan, EV Safety Benefits—Crumple Zones, Rollover Results, Vehicle Control, CleanTechnica, https://cleantechnica.com/2018/12/30/ev-safety-benefits-crumple-zones-rollover-results-vehicle-control/ (Dec. 30, 2018).

140 Id.

141 Chao Gong et al., Safety of Electric Vehicles in Crash Conditions: A Review of Hazards to Occupants, Regulatory Activities, and Technical Support, 8 IEEE Transactions on Trasp. Electrification 3870, 3872 (2022).

Including electrification in the safety analysis can admittedly be challenging given the limited information available about the relative safety of electric versus ICE vehicles.142 Nonetheless, a few principles are helpful. First, because NHTSA's safety-weight model already accounts for the impact of vehicle weight on safety, weight (and any features of electric vehicles associated with it) should be run through regression to avoid double-counting. Specifically, weight may be correlated with other safety features, such that the regression suffers from omitted variable bias. Second, the safety-trend model should control for horsepower, which may have a negative safety externality in both electric and ICE vehicles.143 And third, the safety-trend model should control for vehicle type more generally such as cars, crossovers, and minivans (which the weight model already does). [EPA-HQ-OAR-2022-0829-0601, pp. 20-21]

142 See generally id.

143 See Insurance Institute for Highway Safety & Highway Loss Data Institute, Flexing Muscle: Sports Car Ratings Show Range of Performance, 51 Status Report, no. 5 (2016), at 4–5, https://www.iihs.org/iihs/sr/statusreport/article/51/5/2 (explaining how “high-horsepower vehicles are more likely to exceed the speed limit, particularly by 10 mph or more, and have higher mean speeds than vehicles with less powerful engines”).

Organization: Kentucky Office of the Attorney General et al.

The Proposed Rule also fails to consider the adverse safety impacts of its mandate. EPA represents that fatality risk will increase “0.2% per distance travelled” under the Proposed Rule, a value it deems is “non-statistically significant.” 88 Fed. Reg. at 29,345. EPA also argues that while there will be a projected “increase in accidents, injuries, and fatalities,” this increase will stem from “personal decisions[s] by consumers to drive more due to the reduced cost of driving.” Id. [EPA-HQ-OAR-2022-0829-0649, p. 16]

The National Transportation Safety Board (“NTSB”)—one of the federal agencies actually charged with regulating vehicle safety—disagrees with EPA’s assertions. The Chair of NTSB recently stated “I’m concerned about the increased risk of severe injury and death for all road users from heavier curb weights and increasing size, power, and performance of vehicles on our roads, including electric vehicles.” NTSB Head Calls Out Heavy EVs As A Safety Risk, Autoweek (Jan. 13, 2023), https://bit.ly/464YR0j. She noted that a “GMC Hummer EV weighs over 9000 pounds,” with a “gross vehicle weight rating [of] a staggering 10,550 pounds” and a battery pack that “weighs over 2900 pounds—about the weight of a Honda Civic.” Id. Likewise, a Ford F-150 Lightning weighs between 2000 and 3000 pounds more than non-electric versions, while battery- powered SUVs are roughly 33% heavier than non-battery options. Id. According to the Chair of NTSB, these factors have “a significant impact on safety for all road users.” Id. So while EPA may be sanguine about added safety risks, consumers may have good reason not to be. The Proposed Rule does not adequately account for these concerns, either. [EPA-HQ-OAR-2022-0829-0649, p. 16]

Organization: National Farmers Union (NFU)

Another concern with BEVs is increased vehicle weight. Chair of the National Transportation Safety Board has expressed concerns “about the increased risk of severe injury and death for all road users from heavier curb weights and increasing size, power, and performance of vehicles on our roads, including electric vehicles.”20 [EPA-HQ-OAR-2022-0829-0581, pp. 10-11]

20 The Honorable Jennifer Homendy, Chair, National Transportation Safety Board, Remarks as Prepared for Delivery Before the Transportation Research Board, January 11, 2023, 102nd Annual Meeting, https://www.ntsb.gov/Advocacy/Activities/Pages/Homendy-20230111.aspx.

A GMC Hummer EV weighs over 9,000 pounds, up from about 6,000 pounds. Its gross vehicle weight rating is a staggering 10,550 pounds. The battery pack alone weighs over 2,900 pounds—about the weight of a Honda Civic. [EPA-HQ-OAR-2022-0829-0581, pp. 10-11]

The Ford F-150 Lightning is between 2,000 and 3,000 pounds heavier than the non-electric version. The Mustang Mach-E, Volvo XC40 EV, and RAV4 EV are all roughly 33% heavier. That has a significant impact on safety for all road users.21 [EPA-HQ-OAR-2022-0829-0581, pp. 10-11]

21 Id.

Organization: Renewable Fuels Association (RFA)

d. Vehicle weight: Safety concerns and increased PM emissions

Another concern with BEVs is increased vehicle weight. The chair of the National Transportation Safety Board testified that "the Ford F-150 Lightning is between 2,000 and 3,000 pounds heavier than the non-electric version. The Mustang Mach-E, Volvo XC40 EV, and RAV4 EV are all roughly 33% heavier. That has a significant impact on safety for all road users."38 EPA should not artificially incentivize heavy BEVs by counting them as "zero emissions," when lighter weight solutions can provide similar GHG emissions benefits and better safety. [EPA-HQ-OAR-2022-0829-0602, pp. 18-19]

38 https://www.ntsb.gov/Advocacy/Activities/Pages/Homendy-20230111.aspx

Organization: Senator Shelley Moore Capito et al.

Further, the proposals lack coordination with the US Department of Transportation (DOT) to address safety issues that increased vehicle weight will introduce on our roadways. Safety should always come first. The National Transportation Safety Board recently warned that the heavier weight of electric vehicles pose increase risks of severe injury or death to passengers in lighter vehicles. The increased weight of BEV s not only calls into question safety impacts during vehicle-to-vehicle collisions and vehicle-to-pedestrian or bicyclist collisions, but also the overall design and safety standards of our roads, bridges, and roadside safety hardware such as guardrails. [EPA-HQ-OAR-2022-0829-5083, p. 3]

The DOt has a responsibility to research and ensure vehicle and roadway design and safety standards meet the challenges and demands of our future transportation system. This Administration continues to push policies that will result in more BEV s on our roadways, but has failed to plan from a safety and infrastructure perspective. The sequence of proposals is misguided; vehicle and roadway design and safety standards should have been under development and deployed well before the EPA proposed a rule to force consumer adoption of heavier EV s. This type of research and development, including vehicle, roadway lifespan, and guardrail and work zone safety equipment testing all will require years to undertake. If these proposals move forward without the appropriate safeguards in place, backed by sound science, the vehicle and infrastructure investments being made today may miss the mark on safety and longevity in the years to come. [EPA-HQ-OAR-2022-0829-5083, p. 3]

Organization: Steven G. Bradbury

In the current rulemaking, EPA is downplaying and minimizing the loss of lives on U.S. highways that its proposals will cause by estimating them on a per-distance- traveled basis, and is ignoring altogether the many more serious injuries that will be attributable to these regulations.44 In contrast, NHTSA was more candid in acknowledging these negative safety effects just last year when it promulgated stringent fuel economy standards through model year 2026 in lockstep with EPA's 2021 emissions rule.45 Meanwhile, EPA is playing up and magnifying the economic value of the lives it claims will be saved in the long run from the reduction of toxic pollutants.46 EPA's starkly different accounting treatment for the lives lost from less safe vehicles versus those saved by improved air quality is telling. [EPA-HQ-OAR-2022-0829-0647, pp. 16-17]

44 See 88 FR at 29345, 29386.

45 See 87 FR 25710, 25895, https://www.govinfo.gov/content/pkg/FR-2022-05-02/pdf/2022-07200.pdf.

46 See 88 FR at 29345, 29379-82.

Organization: The Aluminum Association

Efficiency is not the only consideration that supports assigning a carbon emission value to BEVs. Safety is also an important factor supporting this conclusion. In the proposed rule, EPA states that it placed emphasis on the level of risk of injury per mile traveled, considered the projected change in injuries in that context, and concluded that, with the proposed rule, the increase in fatalities per distance traveled is not statistically significant11. However, with the expected acceleration of the transition to BEV's an additional factor arises that has not been adequately addressed. This is the net increase in weight projected for BEV's versus equivalent internal combustion engine vehicles.12 This increased weight increases the differential weights in both vehicle-to-vehicle impact collisions as well as in vehicle to pedestrian impact collisions. Because lightweighting is of most value as applied to larger/heavier ICE vehicles and BEV's, it plays an important role in these areas in terms of reducing the weight differential between vehicles and in vehicle to pedestrian impacts. EPA devotes considerable attention to safety factors in this rulemaking (88 FR 29344) and should not lose sight of the significant safety benefits that will come from lightweighting when BEVs are assigned an accurate emission level above zero g/mile. [EPA-HQ-OAR-2022-0829-0704, pp. 8-10]

11 88 FR 29345

12 This can be 500-2000 lbs. depending on the vehicle size and battery configuration.

In a broad context, the Association has long focused on the relationship between vehicle size, mass, and societal safety,13 and aluminum-intensive vehicles have a long history of achieving 5-star ratings, either from NHTSA or the EU's analogous new car assessment program (NCAP). Notably, the economic value of mass reduction is most recognized in larger, heavier vehicles such as pickup trucks and SUV's, and lightweighting these vehicle classes also helps improve the differential weight safety concerns referenced above. Moving the fleet to BEVs without lightweighting incentives will result in the largest weight increases occurring in the heaviest vehicles due to the need for larger battery packs. If all BEVs are assigned zero g/mile GHG emissions, there is no incentive for vehicle weight reduction with this ultimately being detrimental to overall societal safety. [EPA-HQ-OAR-2022-0829-0704, pp. 8-10]

13 Clearly Identifying the Relationship Between Vehicle Size, Mass, and Societal Safety, https://drivealuminum.org/wp-content/uploads/2022/05/Size-Mass-Safety.pdf (Accessed June 23, 2023)

Organization: The Heritage Foundation (Kevin Dayaratna and Diana Furchtgott-Roth)

Almost 43,000 people died on the roads in 2022,21 the equivalent of 215 plane crashes a year killing 200 people each time. EPA's tailpipe emissions proposal would, if implemented, make Americans even less safe on the road. EPA does not sufficiently analyze these effects. The prior 2022 fuel economy proposal22 from the National Highway Transportation and Safety Administration (NHTSA) raises the 2026 Corporate Average Fuel Economy standard to 49 miles per gallon (MPG) from the current standard of 40 MPG. The rule sets a new minimum standard of 59.4 MPG for passenger cars and 42.4 MPG for light trucks made in the United States by model year 2026, with fines for non-compliant carmakers. NHTSA concludes that the higher price of cars would increase fatalities because fewer people would be able to afford the safer, newer, cars, "The slowing of fleet turnover due to higher vehicle prices has the largest impact of the three factors on fatalities."23 [EPA-HQ-OAR-2022-0829-0674, p. 5]

21 National Highway Transportation Safety Administration. "Early Estimate of Motor Vehicle Traffic Fatalities in 2022", Apr. 2023, Crash Stats: Early Estimate of Motor Vehicle Traffic Fatalities in 2022 (dot.gov) (accessed 22 June 20.

1 22 Federal Register, Vol. 87, No. 84, (May 2, 2022), pp. 25710-26092, https://www.govinfo.gov/content/pkg/FR-2022-05-02/pdf/2022-07200.pdf (accessed May 1, 20.

1 23 Ibid., p. 25896.

NHTSA estimates that the decline in new vehicle sales would result in up to 812 additional deaths on the road each year, 16,206 more injuries, and almost 50,000 more crashes involving property damage.24 This is because fewer people would be able to afford new and later-model used cars, which are safer than old cars. EPA's proposed regulations would make the situation worse. EPA does not account for this in the rule. [EPA-HQ-OAR-2022-0829-0674, pp. 5-6]

This increase in prices caused by successive reductions in emissions contradicts NHTSA's core values,25 namely leading "the Nation by setting the motor vehicle and highway safety agenda," and serving "as the catalyst for addressing critical safety issues that affect the motor vehicle and highway safety communities." Deaths and injuries from the new rules would be concentrated among low-income Americans, disproportionately minorities, who would pay the price of the new rule: due to the price increases, they would buy fewer new cars and fewer later-model used cars. [EPA-HQ-OAR-2022-0829-0674, pp.]

1 24 Ibid., pp. 25894-5.

25 U.S. Department of Transportation, National Highway Traffic Safety Administration, "'HTSA's Core Values," https://www.nhtsa.gov/about-nhtsa/nhtsas-core-values (accessed May 1, 2023).

There is no mention of additional equipment, training, or hazards mentioned regarding the increased number of EVs on the road. The risk of toxic exposure in the event of an EV on a public roadway should be a profoundly serious consideration and yet is not mentioned.36 [EPA-HQ-OAR-2022-0829-0674, p. 10]

Organization: Transfer Flow, Inc

The National Transportation Safety Board has raised concerns about the safety of electric vehicles in automobile accidents due to the increased weight associated with carrying a heavy electric vehicle battery,18 and the British Parking Association published a report outlining the dangers associated with the increased weight of electric vehicles causing older parking structures to collapse,19'20 which we recently saw in New York City where one person died.21 [EPA-HQ-OAR-2022-0829-0496, pp. 3-5]

18 https://www.autoweek.com/news/green-cars/a42486843/ntsb-heavy-electric-cars-trucks-suvs-safety/

19 https://all-car-news.com/en/british-parking-association-weight-of-electric-cars-causes-collapse-of-parking- garages/

20 https://www.curbed.com/2023/04/parking-garage-collapse-heavier-electric-vehicles-suvs.html

21 https://nypost.com/2023/04/19/electric-vehicles-could-put-pressure-on-parking-garages/

1. Organization: Valero Energy Corpora EPA has failed to address the on-road safety implications of its proposed rule which would require 67% of all LDV and MDVs to be zero emission by 2032.

EPA has placed the cart before the horse by promulgating a rule that fails to address the on-road implications of its proposed rule; including the impact of the increased risk of crash related fatalities to the motoring public and the disproportionate impact of the fatality risk born by low-income and other environmental justice commuters. [EPA-HQ-OAR-2022-0829-0707, p. 29]

In promulgating the LDV and MDV rule EPA has failed to address the safety issues surrounding the real-world implications of requiring 67% of the LDV and MDV to be significantly heavier battery electric vehicles (BEV). In fact, Jennifer Homendy, the head of the National Transportation Safety Board recently warned that the heavier weight of electric vehicles pose increased risk of severe injury or death to passengers in lighter vehicles.143 Her comments center around the multi-thousand-pound weight differential between BEV's and their much lighter conventional internal combustion engine (ICE) LDV counterparts. In work performed by the National Bureau of Economic Research, Pounds that Kill: The External Cost of Vehicle Weight, showed that "controlling for own-vehicle weight, being hit by a vehicle that is 1,000 pounds heavier results in a 47% increase in the baseline fatality probability".144 Unfortunately, the weight of the BEV battery packs alone can weigh as much as an entire ICE vehicle, putting the overall weight difference between BEV's and their ICE counterparts at double, or even triple that of an ICE vehicle. Take for example GM's new 9,000-pound Hummer EV, which touts a massive 3,000- pound battery.145 In fact the weight of the Hummer battery pack alone is approximately equal to the total curb weight of a new 2023 Honda Civic Sedan.146 [EPA-HQ-OAR-2022-0829-0707, p. 29]

143 NTSB head warns of risks posed by heavy electric vehicles colliding with lighters cars, NPR, January 11, 2023

144 National Bureau of Economic Research, Pounds That Kill: The external costs of Vehicle Weight, June 2011

145 The 2022 GMC Hummer EV's Battery Alone Weighs 2,923 Pounds, That's roughly a third of its 9,63-pound curb weight, The Drive, Feb 15, 2022

146 https://automobiles.honda.com/civic-sedan#trims-specs

Finally, EPA's proposal disproportionately exposes middle-and lower-income commuters to increased on-road dangers as they are left behind in lighter weight ICE LDV's as more affluent consumers purchase significantly heavier BEV's. Further, EPA's proposal lacks coordination with the National Transportation Safety Board and the U.S. Department of Transportation (DOT) to address safety issues created directly from EPA's proposed LDV and MDV rule. "The DOT has a responsibility to research and ensure vehicle and roadway design and safety standards meet the challenges and demands of our future transportation system. This Administration continues to push policies that will result in more BEVs on our roadways, but has failed to plan from a safety and infrastructure perspective. The sequence of proposals is misguided; vehicle and roadway design and safety standards should have been under development and deployed well before the EPA proposed a rule to force consumer adoption of heavier EVs. This type of research and development, including vehicle, roadway lifespan, and guardrail and work zone safety equipment testing all will require years to undertake. If these proposals move forward without the appropriate safeguards in place, backed by sound science, the vehicle and infrastructure investments being made today may miss the mark on safety and longevity in the years to come."320 [EPA-HQ-OAR-2022-0829-0707, p. 58]

320 Letter from the United States Senate to EPA Administrator, May 25, 2023

Organization: Western Energy Alliance

Safety: It does not appear that EPA is taking into consideration the added weight of EVs. With their large batteries, they are generally one third heavier than a similarly sized vehicle of a similar body style. Section 9.4.2 of the DRIA dealing with vehicle weight does not take the increased battery weight into account, and therefore, needs to be updated before it can make the conclusion that "there is no statistically significant change in the estimated risk of fatalities per distance traIed..." and "…virtually no change in fatality risk as a result of the proposed standards…" (p. 29345) [EPA-HQ-OAR-2022-0829-0679, p. 5]

Likewise, it does not appear that EPA has considered the risk of EV battery fires. It is well known that EVs carry an increased risk of fire because of the nature of their batteries and that these chemical fires are extremely hot and hard to put out.7 Firefighters have reported the difficulty of extinguishing EV fires, which burn much more intensely than ICEV fires because of the batteries and require 40 times the amount of water needed to contain an ICEV.8 Firefighters report that that there is no obtainable extinguishing agent available to them. EPA's analysis on safety is deficient in failing to consider the impact of battery fires on safety. [EPA-HQ-OAR-2022-0829-0679, p' 5]

7 "' We're not putting t'is out:' F-150 Lightning fire melts EV trucks," Detroit Free Press, April 21, 2023.

8 "F irefighters have to blast 40 times more water at burning Tesla than other cars," The Hill, August 17, 2021.

EPA Summary and Response

EPA appreciates the range of comments that were submitted related to safety. The majority of these comments can be categorized into one of two different topics related a future shift in the vehicle stock towards more PEVs. The first comment topic of mass-safety is one that EPA has analyzed quantitatively in this and previous light- and medium-duty GHG rulemakings (and in consultation with NHTSA as it has also analyzed safety effectsIits CAFE rulemakings). This rulemaking's analysis of the impacts on societal crash safety due to mass changes (including mass changes associated different powertrains and PEV batteries) was conducted using the same methodology as previous rulemakings, which is based on a statistical analysis of empirical crash data. The second group of comments was on the topic of fire safety, for which detailed responses are provided below. Additional comments related to coordination with other relevant agencies, fleet turnover, and the proposed elimination of enrichment for ICE vehicles are also summarized and discussed below.

Valero commented that EPA did not coordinate with the National Transportation Safety Board and the U.S. Department of Transportation (DOT) on the topic of safety when developing these standards. EPA disagrees with this comment. EPA has engaged in a long-standing process spanning multiple rulemakings of continuous coordination with DOT, specifically the National Highway Traffic Safety Administration (NHTSA), on safety issues relevant to vehicle emissions standards. EPA has continued this coordination during the development of this rulemaking, with technical meetings and exchanges of data and information continuously throughout the rulemaking process. See, for example, Memorandum from Michael Landgraf "Response from Shashi Kuppa, Director, Office of Crashworthiness Standards Rulemaking Office, Department of Transportation, National Highway Safety Administration" (Dec. 8, 2022). Specifically, throughout this rulemaking process, EPA and NHTSA have exchanged information on the best available data and information to inform our assessment of the safety impacts of this rule. In fact, as describe further below, in both the proposed rule and this final rule, EPA has used NHTSA's recommended mass-safety coefficients in our statistical analysis of historical crash data, and our methodology is consistent with that used by NHTSA in its most recent proposal for CAFE standards.Amfree, Arizona State Legislature and Valero commented that the additional weight of batteries for PEVs may negatively impact crash safety due to an increased risk to drivers of lighter vehicles and other road users. In response, EPA cannot conclude based on the available evidence that the final standards will have any impact on societal fatality rates. More detailed information on EPA's crash safety analysis is provided in RIA Chapter 8.4 and Preamble VIII.K. Summarizing briefly here: EPA has conducted an analysis of crash safety for these final standards, using the same methodology as the NPRM analysis, and similar to prior light-duty GHG rulemakings. The projected mass of each vehicle is estimated by EPA's OMEGA compliance modeling (including the mass of PEV batteries), and any associated changes in societal fatality rates are then calculated based on mass-safety coefficients that were developed by NHTSA's statistical analysis of historical crash data. Consistent with the NPRM, the results of this societal safety analysis show that the final GHG standards are projected to result in a small increase in the societal fatality rate. From a statistical standpoint, EPA cannot conclude that the effect is different from zero (i.e., the effect is not statistically significant).

Several commenters cited statements by Jennifer Homendy, the head of NTSB, as evidence that BEVs create increased safety risks, particularly due to the increased vehicle weight of BEVs. EPA carefully reviewed the statement,[694] which the NTSB website identifies as advocacy activity by Chair Homendy. The statement lacks any technical findings regarding BEV safety. In addition, commenters selectively omit to cite the remainder of the statement, which says "We do have a climate crisis that needs to be addressed. The U.S. transportation sector accounts for the largest portion of U.S. greenhouse gas emissions, and I firmly believe it is a human right to breathe clean air. But we have to be careful that we aren't also creating unintended consequences: more death on our roads. Safety, especially when it comes to new transportation

[694] https://www.ntsb.gov/Advocacy/Activities/Pages/Homendy-20230111.aspx

policies and new technologies, cannot be overlooked. Ever." We agree with Chair Homendy that safety risks should not be overlooked. As discussed above and in the preamble and RIA, EPA has conducted a thorough analysis of safety associated with the standards, including specifically with increased vehicle weight of PEVs. We find that PEVs are as safe as ICE vehicles and that the final standards actually result in a slight (statistically insignificant) decrease in fatalities per mile driven.

ARCO commented that the additional weight of PEV batteries can be offset to some extent with the expanded use of lightweight materials, and that will help address concerns about crash compatibility between heavier PEVs and lighter ICE vehicles. EPA appreciates these comments, and notes that in our compliance modeling, we account for the compounding effect where lightweighting technologies will enable smaller (and lighter) batteries for a given electric range. As a result, many of the future PEV models projected for this rulemaking's compliance and safety analyses include lightweighting strategies as part of manufacturers' cost effective compliance plans. Beyond our modeling results, EPA believes that manufacturers have an incentive to pursue strategies to reduce the weight of PEVs to improve efficiency, which could allow for smaller batteries or to meet customer demands for longer range.

Arizona State Legislature, Amfree commented that there is an increased safety risk from PEV battery fires, and that EPA did not fully account for that safety impact in the NPRM. EPA agrees that different kinds of fires have different properties. Vehicle fires involving large capacity batteries have different properties than the types of vehicle fires that have been more common to-date, which involve low-voltage electrical systems and liquid fuels. However, EPA does not agree that the safety risk, in terms of the rate at which harm occurs, is necessarily higher than for other non-PEV vehicles. Data available today from NTSB indicate that BEV fire rates after a crash may be lower than from HEV and ICE vehicles. While the number of occurrences may be too low to draw a definitive conclusion, there is also no statistically significant finding that shows the safety risk of PEV fires is higher than non-PEVs. See AutoinsuranceEZ: Gas vs. Electric Car Fires [2023 Findings], Nov. 11, 2022 (rate of fires from BEV light duty vehicles is nearly two orders of magnitude less than rate for gasoline or hybrid vehicles). EPA recognizes that battery fires are of a different character, and can pose different and more difficult challenges to extinguish, and the vehicles may have stranded electrical power, such that first responder training is desirable. The standard practice for putting out fires involving large batteries today involves the use of large amounts of water, and first responders can and should be trained to deal with fires of electrical origin (as they are trained to deal with fires from other chemical, ignitable, or flammable origins).

Several commenters expressed concern that the high-voltage PEV batteries will pose a shock hazard, especially for mechanics and first responders. In response, EPA concludes that appropriate repair and emergency response procedures have been and will continue to be developed, refined, and applied to manage shock risk effectively. There has been extensive activity to date by governmental and non-governmental organizations to update the protocols and guidance for first responders. And EPA expects that information will be frequently reviewed and updated as the best practices from field experience are communicated and refined.

The Alliance asserted that EPA's proposal to eliminate enrichment operation for ICE vehicles would potentially expose consumers to a sudden reduction or interruption of power during a driving maneuver, and result in an unsafe condition. EPA is not finalizing the proposed elimination of enrichment for this final rulemaking. At the same time, EPA does not agree that elimination of enrichment will impact the manufacturer's ability to continue to produce ICE vehicles that can be safely operated over the full range of conditions. EPA does not agree that enrichment is a necessary prerequisite for safe vehicle operation. Specifically, EPA disagrees with the commenters assertion that vehicles without enrichment will inherently exhibit unpredictable interruptions in power. Through proper design and calibration, EPA is confident that it's possible to deploy stoichiometric powertrains which operate predictably, even during aggressive driving maneuvers. Indeed, there are many vehicles in the fleet today that operate at stoichiometric with no evidence of safety issues.

In response to comments on safety and reliability of EVs, and electrical safety and fire risk, EPA finds no evidence that the nature of an electric vehicle necessarily leads to lower reliability, greater safety risk to service or emergency personnel, or a greater probability of a fire. The smaller number of moving parts in an EV is consistent with a potential for greater reliability and lower maintenance costs. Regarding electrical safety, all vehicles sold in the U.S. are required to pass Federal Motor Vehicle Safety Standard (FMVSS) standards. For example, this includes FMVSS No. 305, "Electric-powered vehicles: Electrolyte spillage and electrical shock protection." In addition, for all commercially produced vehicles, manufacturers routinely publish guides to emergency responders to show where mechanical means may be used to access the interior of the vehicle after a crash without disturbing airbags or other hazardous components, including high voltage pathways. In regard to fire safety, EPA sees no evidence that EV fires are more frequent on a per-vehicle or per-mile basis than for gasoline powered vehicles. While some manufacturers have recalled electric vehicles due to specific fire risks, there is also evidence that these were caused by specific defects in manufacturing, that are being recognized and addressed by the manufacturers. EPA also disagrees with comments that batteries are inherently unsafe, that they contain all of the reactants necessary to combust, or that they generate large amounts of heat during operation sufficient to jeopardize the safety of the vehicle. Electric vehicles and their battery systems are designed to maintain appropriate temperature operation and are safeguarded against usage that would cause excessive heat generation. Battery chemistries being used in electrified vehicles lack the necessary oxygen to combust without exposure to air.

23 - Economic concerns from industries that are not directly regulated under this rule

Note that Section 25.2 contains comments regarding industries that are directly regulated under this final rule.

<u>Comments by Organizations</u>

Organization: Darius

The large-scale shift to electric vehicles, which would comprise two-thirds of all new-car sales in the U.S. by 2032 under this proposal, will hurt workers, small businesses, and consumers while doing little to help the environment. The proposed rule would lead to fewer vehicle choices for individuals and families, reducing the selection of vehicles that fit their household budgets and unique needs. [EPA-HQ-OAR-2022-0829-0519, p. 1]

This proposed rulemaking will disrupt automotive industry supply chains and eliminate large numbers of jobs in vehicle manufacturing, parts production, and repair businesses. While small businesses are the lifeblood of the American economy, they will be hit the hardest by a premature rush to have electric vehicles dominate new vehicle sales. Small, internal-combustion engine-based businesses are not receiving the billions of dollars that large automakers are to make the conversion to electric. Thirty-three percent of automotive aftermarket products purchased by consumers last year were on upgrades and accessories for internal combustion engines and drive trains. That means as much as $17 billion of small business value will be wiped out by this proposal. [EPA-HQ-OAR-2022-0829-0519, p. 1]

Organization: Energy Marketers of America (EMA)

EMA is conce’ned over EPA's tailpipe emission standards for light-duty and medium-duty vehicles for model year 2027 and later which will effectively discourage investment in lower carbon liquid fuels. EPA projects that a potential outcome of the rule would require nearly 70 percent of all new light duty vehicle sales to be battery electric vehicles (EVs) by 2032. Unfortunately, the focus on EV production will fundamentally eliminate an opportunity to provide clean green liquid fuels such as renewable diesel, biodiesel, renewable gasoline, clean hydrogen and ethanol that immediately lower emissions not only for new vehicles, but for the vehicles currently on the road. In addition, the rule will limit consumer choice on cleaner internal combustion engines and threaten the viability and jobs of small business energy marketers around the country. [EPA-HQ-OAR-2022-0829-0616, pp. 1-2]

Organization: Kentucky Office of the Attorney General et al.

Furthermore, the Proposed Rule implicates “question[s] of deep economic and political significance,” King v. Burwell, 576 U.S. 473, 486 (2015), due to the huge “number of people affected,” United States Telecom Ass’n v. Fed. Commc’ns Comm’n, 855 F.3d 381, 423 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from the denial of rehearing en banc). Because “Americans place a high value on car ownership,” almost 92% of households have at least one vehicle, and over 22% have access to at least three. Car Ownership Statistics 2023, Forbes (May 8, 2023), https://bit.ly/3NnPXnn. A regulation affecting so many people is bound to collide with “a significant portion of the American economy,” West Virginia, 142 S. Ct. at 2608 (cleaned up), and require “billions of dollars in spending by private persons or entities,” id. at 2621 (Gorsuch, J., concurring) (quoting King, 576 U.S. at 485). By EPA’s own estimate, technology increases “through 2055 are estimated at $260 billion to $380 billion.” 88 Fed. Reg. at 29,344. [EPA-HQ-OAR-2022-0829-0649, pp. 6-7]

Organization: Matthew DiPaulo

This proposal will disrupt automotive industry supply chains and eliminate large numbers of jobs in vehicle manufacturing, parts production, and repair businesses. While small businesses are the lifeblood of the American economy, they will be hit the hardest by a premature rush to have electric vehicles dominate new vehicle sales. Small, internal-combustion engine-based businesses are not receiving the billions of dollars that large automakers are to make the conversion to electric. Thirty-three percent of automotive aftermarket products purchased by consumers last year were on upgrades and accessories for internal combustion engines and drive trains. That means as much as $17 billion of small business value will be wiped out by this proposal. [EPA-HQ-OAR-2022-0829-1514, p. 1]

Organization: Missouri Corn Growers Association (MCGA)

The impact on small businesses will be far-reaching as well. According to Mike Spagnola, president and CEO of Specialty Equipment Markets Association (SEMA), “this large-scale shift would significantly disrupt automotive industry supply chains and potentially eliminate large numbers of jobs in vehicle manufacturing, parts production, and repair shops. Ford alone estimates a 30% labor reduction in its transition to electric vehicles. Small businesses would be the most vulnerable to the disruptions caused by a seismic shift to battery-electric vehicles. According to the most recent Census Bureau tally of the almost 1,200 auto engine and transmission parts suppliers in the U.S., more than 60% had 20 or fewer employees. These companies often make specialized components, operate on tight margins, and rely on long-term contracts. They employ American workers with technical skills and create the often politically celebrated blue-collar jobs.”1 [EPA-HQ-OAR-2022-0829-0578, pp. 2-3]

1 SEMA President and CEO Mike Spagnola, “New EPA Emissions Proposal Puts Automotive Supply Chains, Small Businesses at Risk”, https://www.sema.org/EPA-Proposed-Greenhouse-Gas-Rules

Organization: Specialty Equipment Market Association (SEMA)

On behalf of our more than 7,000 member companies, SEMA has significant concerns regarding the impact of the EPA’s proposed regulations on automotive small businesses. The specialty automotive aftermarket industry supports more than one million U.S. automotive jobs. Thousands of small businesses and their employees will be adversely impacted by this proposal’s overly aggressive push to electrify America’s automotive sector. SEMA supports the EPA’s intent to reduce greenhouse gas emissions, but the American people must have the ability to choose the vehicle technology that works best for their families. It is crucial for government policy to remain technology neutral in pursuit of decarbonizing motor vehicles. There are many options on the road to zero emissions. American-grown biofuels, carbon capture, and innovations in engine production are all aimed at this shared goal. The specialty automotive aftermarket has also led the way in fuel innovations and conversions of old vehicles into new and cleaner technologies and is committed to playing a central role in the evolution of automotive technology, including the parts and products that power our vehicles. However, this proposal embraces electrification as the technology of choice to the detriment of many of our members and their innovations. [EPA-HQ-OAR-2022-0829-0596, p. 1]

This proposal’s large-scale transition to Battery Electric Vehicles (BEV) over a truncated timeline will significantly disrupt automotive supply chains and potentially eliminate many jobs in vehicle manufacturing, parts production, and repair shops. As drafted, it would adversely impact small business innovators and the hundreds of thousands of men and women their companies employ. SEMA members want to continue to be part of the solution to making vehicles more efficient and reducing emissions. The best way to accomplish this goal is to let the market and innovation drive solutions to the environmental challenges we all seek to solve. [EPA-HQ-OAR-2022-0829-0596, pp. 1-2]

Impact on Small Business

This proposal is effectively a far too fast mandate for automakers to transition their production to BEVs in order to avoid being fined. It will produce a seismic shift for automotive aftermarket businesses who don't have the capacity to make the transition to zero-emissions vehicle technology this quickly, especially when they're not receiving billions in federal and state grants and incentives to support those transitions. [EPA-HQ-OAR-2022-0829-0596, p. 3]

The specialty automotive aftermarket has leI technology innovation, making vehicles more fuel efficient, safer, and more appealing to consumers. According to SEMA's data, 55% of our manufacturing businesses produce internal combustion engine (ICE) components, including parts for air and fuel, ignition, emissions controls, engine parts, and exhaust systems. To put this in perspective, 33% of consumer spending on performance and accessory products goes toward upgrading ICE engines and dri'etrains. That's nearly $17 billion dollars of the $51 billion specialty aftermarket industry and disproportionately impacts small businesses. [EPA-HQ-OAR-2022-0829-0596, p. 3]

Government policies should support the work of small business innovators that employ nearly a million American workers by letting the market and innovation drive solutions to the environmental challenges that we all seek to solve. [EPA-HQ-OAR-2022-0829-0596, p. 3]

It is no secret that large automakers' BEV programs are losing billions each year despite the massive financial infusion of taxpayer dollars they receive from the government and subsidies to purchase EVs. If the largest automakers are struggling right now, how are small automotive businesses, including specialty aftermarket, repair and replacement parts businesses, and local garages, expected to survive? [EPA-HQ-OAR-2022-0829-0596, p. 3]

Organization: United Steelworkers (USW)

Also, small and medium manufacturers in the auto supply chain must be informed, encouraged, and assisted in utilizing these investment opportunities in order to prevent job loss. At this time, outreach to these companies is limited. [EPA-HQ-OAR-2022-0829-0587, p. 4]

EPA Summary and Response

Summary:

Commenters including Darius, Matthew DiPaulo, MCGA, SEMA and EMA commented that the proposal would lead to loss in small business value and eliminate jobs. Some commenters noted that small businesses are not receiving the investments to support the transition to zero-emission vehicles that the large auto manufacturers are. Some commenters specifically pointed out these effects for the specialty automotive and automotive aftermarket industries. Darius also commented that the rule will reduce vehicle choice. SEMA and EMA commented that this rule will lead to reduced vehicle choice. Kentucky Office of the Attorney General noted that this rule will affect many people.

EMA noted that the proposed rule will discourage investment in lower carbon fuels and eliminate opportunities to provide clean green liquid fuels. SEMA commented that there are other options to zero emission vehicles, and that this rule is a "far too fast mandate." They also stated that the market and innovations should be allowed to drive solutions to environmental challenges. USW commented that more outreach is needed to small and medium manufacturers in the auto supply chain to prevent job loss.

Response:

Regarding comments that this rule will lead to loss in small business value, including in aftermarket and specialty automotive markets, we first note we address small business impacts related to the Regulatory Flexibility Act in RTC Section 25.1. In addition, commenters asserting that this rule will lead to a loss of small business value generally do not make specific assertions beyond claims that PEVs will be disruptive. This rule is not a mandate and does not force manufactures to use any specific technology. Manufacturers can determine the best path of compliance for them. In addition, as described in Section IV.F and G of the preamble, we demonstrate that there are multiple pathways to compliance, and that these pathways include a wide range of mixes of technologies in the fleet, including various mixes of ICE vehicles, strong hybrid vehicles, PHEVs and BEVs. In the central modeling case for the final rule, results show that over 80% of the onroad fleet will still be ICE vehicles, and over 50% will still be ICE vehicles in 2050. As the vast majority of the onroad fleet will continue to be ICE vehicle in 2032, they will continue to provide business opportunities for small businesses that service ICE vehicles. In addition, there are considerable opportunities for small businesses to play a role in the EV supply chain. RTC Section 20 discusses many training and investment opportunities for jobs along the EV supply chain, including for jobs in high demand like BEV technicians.

Regarding comments that this rule is a “far too fast mandate” we disagree. First, we note that, as described in Section III.C of the preamble, EPA is finalizing standards for both light- and medium-duty vehicles that have a slower ramp rate in the early years of the program compared to the proposal. For the light-duty GHG standards, we have reduced the stringency of the standards from MYs 2027 through 2031 compared to the proposed standards and have also extended the phase-down of certain optional credit flexibilities. These changes are responsive to comments from labor groups and the auto industry that the pace of the standards was too fast, and that more lead time was needed to provide a more orderly transition that allowed for the scale up of battery supply chains and vehicle production. In turn, EPA believes that this slower pace of the final standards will further support workers and labor impacts during the transition to manufacturers building a range of vehicle technologies to meet the standards, as well as allow for increased opportunities for training, education and facility upgrades over time.

Regarding comments that more outreach is needed to small and medium manufacturers to prevent job loss, we note that EPA engaged stakeholders, including labor groups, small volume manufactures, and others, throughout the proposal and final rule making processes. After the publication of the proposed rule, EPA held three days of public hearings to provide oral presentation of data, views and arguments, and held an open comment period during which all members of the public were encouraged to submit comments on the proposed rule. In addition, RTC Section 20 discusses some of the programs and investments that may be available to small and medium manufacturers to support a transition to green sector jobs.

Regarding comments that this rule will discourage investment in lower carbon fuels, refer to RTC Section 19.1, where other fuels related comments are discussed.

Regarding comments that the rule will hurt workers or eliminate jobs, we refer to our discussion in RTC Section 20.

Regarding comments that this rule will reduce vehicle choice, we refer to our discussion in RTC Sections 13 and 14.1.

24 – [Reserved]

25 - Statutory provisions and Executive Orders

Comments by Organizations

Organization: American Fuel & Petrochemical Manufacturers

Ignoring actual ZEV production costs, including credit trading costs, is arbitrary and capricious. [EPA-HQ-OAR-2022-0829-0733, p. 54]

The Administrative Procedure Act requires opportunity for meaningful public input, and Executive Order 12866 states that, in most cases, agencies should provide a comment period "of not less than 60 days." Even counting the handful of additional days afforded by EPA's pre-publication release of the preambles, this period is not sufficient to adequately address the sweeping scope of EPA's proposals to force electrification of the nation's transportation fleet. Considerable time is required simply to read and respond to the sheer volume of material covered in each rulemaking docket, particularly given EPA's evident lack of rigor and discipline in its citation and characterization of underlying sources. As illustrated in these comments, our review identified numerous instances in which examination of sources cited by EPA as support for its conclusions indicated that characterization of these sources is inaccurate, incomplete, or misleading. Thus, to meaningfully respond to EPA's proposal, the public must fact-check EPA's work. There are 1,040 footnotes in the text of the HDV rule preamble and 908 in the LD/MDV rule. Assuming it takes an average of one hour to identify, locate or acquire and read the underlying reference work cited, and draft a meaningful comment in response, that equates to 130 eight- hour workdays that would be required just to fact-check the HD rule (65 days if one assumes this work takes only half an hour per cite on average). For the LD/MDV rule, which would equate to 113.5 eight-hour workdays (or 57 based on assuming 30 minutes per citation). This analysis does not include the time required to verify sources cited in the DRIAs, much less the 1,420 supporting and related materials posted to the HDV docket and the 429 posted to the LD/MDV docket. [EPA-HQ-OAR-2022-0829-0733, pp. 62-63]

Further, the short and concurrently running comment periods on these closely related rules are exacerbated by EPA's unduly narrow identification of industries affected by this rule. Under the heading "Does this action apply to me," EPA limits its identification of affected industries to entities with direct compliance obligations: motor vehicle manufacturers, commercial importers of vehicles and vehicle components, alternative fuel vehicle convertors, and medium duty engine & vehicle manufacturers.283 Although EPA notes that "this table is not intended to be exhaustive…other types of entities could also be affected," EPA understands many entities necessarily rely on regulatory screening tools based on search terms tied to their own NAICS codes to alert them to new proposed rules that may impact them. [EPA-HQ-OAR-2022-0829-0733, p. 63]

283 Proposed Rule at 29,184.

By narrowly limiting the identification of industries affected based on this extremely short and incomplete list of NAICS codes and by its arbitrary refusal to extend the comment periods, EPA has unreasonably constrained the number and types of entities that will find out about these proposed actions in time to comment. EPA appears to be counting on closing the comment period before consumers, retailers, farmers, fleet operators, bio and renewable fuel producers, small businesses, emergency response providers, local governments, or any of the host of other interests who will be affected by the profound changes in how light and medium duty vehicles are sold or even realize what is at stake. This sort of gamesmanship is at odds with EPA's responsibility under the Administrative Procedures Act and the Due Process clause of the U.S. Constitution. [EPA-HQ-OAR-2022-0829-0733, p. 63]

Organization: Arizona State Legislature

VIII. The proposed rule is arbitrary and capricious because it relies on non-final reports.

On at least two occasions, EPA identifies reports that are not yet final because they are undergoing peer review. [EPA-HQ-OAR-2022-0829-0537, p. 26]

First, EPA reports that it "commissioned a new full-vehicle teardown study" to compare manufacturing cost and assembly requirements between gas-powered and electric-powered vehicles. 88 Fed. Reg. 29,303. "The report was delivered to EPA in February 2023 and will undergo a contractor-managed peer review process to be completed by mid-2023." Id. EPA even plans to rely on the report for the final rule: "The results of this study will be used to inform the analysis for the final rulemaking where appropriate." Id. EPA later admits, "We hope to use this information in additional analytical discussions in the final rule." Id. at 29,391. [EPA-HQ-OAR-2022-0829-0537, p. 26]

Second, as discussed in Section IV, significant issues exist with EPA's current social cost of greenhouse gas methodology. However, EPA apparently is working on an update: "Most recently, EPA has developed a draft updated SC-GHG methodology within a sensitivity analysis in the regulatory impact analysis of EPA's November 2022 supplemental proposal for oil and gas standards that is currently undergoing external peer review and a public comment process." After it published the proposed rule, on May 11, 2023, EPA announced that it had received the peer review and was "taking the peer reviewers' recommendations under advisement."38 [EPA-HQ-OAR-2022-0829-0537, p. 26]

38 U.S. EPA, Peer Review of EPA's Draft 'Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances' Concludes, May 11, 2023, available at https://www.epa.gov/environmental- economics/scghg-tsd-peer-review.

Commenters do not know the conclusions and analysis contained in the final versions of these reports. Presumably, EPA will make changes after receiving the peer-review comments. Commenters cannot provide fully informed comments on the proposed rule without having the opportunity to review the final versions of these reports. [EPA-HQ-OAR-2022-0829-0537, p. 27]

EPA should reopen the public comment process for the proposed rule after it has received the final versions of these reports. This should occur whether or not EPA intends to make revisions to the final rule based on the reports or to rely on the reports to support the final rule. If EPA intends to make revisions of the final rule based on the final versions of these reports, commenters should have the opportunity to comment on all revisions. The same is true with any other reports or data that EPA does not cite in the proposed rule. [EPA-HQ-OAR-2022-0829-0537, p. 27]

Failure by EPA to reopen the public comment process would be arbitrary and capricious. See, e.g., Texas v. United States Env't Prot. Agency, 389 F. Supp. 3d 497, 506 (S.D. Tex. 2019) ("However, the Agencies' decision not to reopen the Proposed Rule for comment after the publication of the Final Connectivity Report prejudiced the ability of interested parties to (1) provide meaningful comments regarding the Final Rule's continuum-based approach to connectivity and (2) 'mount a credible challenge' to the Final Rule."); Ctr. for Biological Diversity, Defs. of Wildlife v. Kelly, 93 F. Supp. 3d 1193, 1207 (D. Idaho 2015) (granting partial summary judgment and ordering an additional public comment period after federal agency relied on peer review comments not discussed or cited in the proposed rule). [EPA-HQ-OAR-2022-0829-0537, p. 27]

Organization: Environmental. and Public Health Organizations

EPA should set strong emissions standards to meet its obligations under presidential directives on environmental justice. Under Executive Order 12,898, EPA "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." 59 Fed. Reg. 7629 (Feb. 11, 1994). And Executive Order 14,008 directs EPA to develop "programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.'' 86 Fed. Reg. 7619, 7629 (Jan. 27, 2021). It also establishes the Administration's policy ''to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution.'' Id. [EPA-HQ-OAR-2022-0829-0759, p. 18]

Organization: Environmental Defense Fund (EDF) (1of 2)

The IRA and BIL both include myriad provisions that seek to support a transition to ZEV technology through funding of credits for vehicles, components, and critical infrastructure. These laws were passed with the knowledge that EPA was already setting standards under Section 202(a) that would increase ZEV proliferation and an intent to support those regulations.15 Congress' aim with the funding was to "combine[] new economic incentives to reduce climate pollution with bolstered regulatory drivers that will allow EPA to drive further reduction under its CAA authorities,"16 with the expectation that "future EPA regulations will increasingly rely on and incentivize zero-emission vehicles as appropriate."17 [EPA-HQ-OAR-2022-0829-0786, pp. 10-11]

15 The BIL was passed after EPA's 2023-2026 light-duty GHG standards, which rely on ZEV technology, had been proposed and the IRA was passed 9 months after they were finalized. Brief of Senator Thomas R. Carper and Representative Frank Pallone, Jr. as Amici Curiae in Support of Respondents, Texas v. EPA, No. 22-1031, 29 (D.C. Cir, Mar. 2, 2023), https://www.edf.org/sites/default/files/2023-03/Texas%20-%20Members%20of%20Congress%20%28Sen.%20Carper%20and%20Rep.%20Pallone%29.pdf (Attachment J).

16 168 Cong. Rec. E868-02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone discussing the IRA).

17 168 Cong. Rec. at 880-02 (daily ed. Aug. 12, 2022) (statement of Rep. Pallone); see also Greg Dotson and Dustin J. Maghamfar, The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act, 53 ENV'T L. REP. 10017, 10030 (2023) ("The IRA directs EPA to support zero

emission technologies for heavy-duty vehicles and port equipment, to reduce emissions in low-income and disadvantaged communities, as well as to support state ZEV requirements. This is a recognition of the evolving importance and availability of zero emission technologies."), https://www.eli.org/sites/default/files/files-pdf/53.10017.pdf (Attachment K).

The BIL is another source of considerable federal investment in infrastructure development. Through its National Electric Vehicle Infrastructure (NEVI) and Charging and Fueling Infrastructure (CFI) discretionary grant programs, the law allocates $7.5 billion in funding explicitly towards building out ZEV charging and refueling infrastructure.130 The NEVI program directs the Federal Highway Administration (FHWA) to provide funding to states to deploy EV charging stations to build an interconnected and reliable charging network. The FHWA has already announced its first set of plans under the program, which includes investment in all 50 states plus the District of Columbia and Puerto Rico.131 This first round of NEVI investment is set to bring EV charging to 75,000 miles of highway across the country.132 The CFI program provides additional funding for FHWA administered grants to state and local authorities for development of publicly accessible charging infrastructure.133 [EPA-HQ-OAR-2022-0829-0786, pp. 52-53]

130 Infrastructure, Investment and Jobs Act of 2021, P.L. 117-58, 135 Stat. 445, 1421. Infrastructure, Investment and Jobs Act of 2021, P.L. 117-58, 135 Stat. 445, 1421.

131 U.S. Department of Transportation, Historic Step: All Fifty States Plus D.C. and Puerto Rico Greenlit to Move EV Charging Networks Forward, Covering 75,000 Milles of Highway (Sep. 27, 2022), https://www.transportation.gov/briefing-room/historic-step-all-fifty-states-plus-dc-and-puerto-rico-greenlit-move- ev-charging.

132 U.S. Department of Transportation, Historic Step: All Fifty States Plus D.C. and Puerto Rico Greenlit to Move EV Charging Networks Forward, Covering 75,000 Milles of Highway (Sep. 27, 2022), https://www.transportation.gov/briefing-room/historic-step-all-fifty-states-plus-dc-and-puerto-rico-greenlit-move- ev-charging.

133 U.S. Department of Transportation, Biden-Harris Administration Opens Applications for First Round of $2.5 Billion Program to Build EV Charging in Communities & Neighborhoods Nationwide, https://www.transportation.gov/briefing-room/biden-harris-administration-opens-applications-first-round-25-billion- program-build.

On top of these programs, the BIL authorized more than $40 billion combined for the Congestion Mitigation & Air Quality Improvement Program, National Highway Performance Program, and Surface Transportation Grant Block Program.134 These programs are not dedicated exclusively to charging, but constructing and installing charging infrastructure is an eligible activity under each of them. Additional funding from the BIL provides grants to states and local governments for reducing transportation carbon pollution, which will fund additional infrastructure investments.135 [EPA-HQ-OAR-2022-0829-0786, pp. 52-53]

134 Infrastructure, Investment and Jobs Act, P.L. 117-58, § 11115.

135 Infrastructure, Investment and Jobs Act, P.L. 117-58, § 11403.

Organization: HF Sinclair Corporation

III. The Proposed Rule is Arbitrary and Capricious

[EPA-HQ-OAR-2022-0829-0579, pp. 16-17]

Organization: Travis Fisher

2. Does not comply with Executive Order 12866; and [EPA-HQ-OAR-2022-0829-0655, p. 1]

3. Violates the Unfunded Mandates Reform Act. [EPA-HQ-OAR-2022-0829-0655, p. 1]

2. THE PROPOSED RULE DOES NOT COMPLY WITH EXECUTIVE ORDER 12866

EPA states that it sought review by the Office of Management and Budget and that “[a]ny changes made in response to Executive Order 12866 review have been documented in the docket.”19 Notwithstanding whatever review EPA sought, there remain numerous omissions regarding the Proposed Rule’s compliance with Executive Order 12866. Specifically, section 1 of Executive Order 12866 offers a list of “Principles of Regulation.” EPA violates several of the principles listed. Specifically, the Proposed Rule does not conform with principles 6, 7, 8, nor 10, and thus fails to comply with Executive Order 12866. Before moving forward with a final rule (or a new proposed rule), EPA should address these areas of non-compliance. [EPA-HQ-OAR-2022-0829-0655, p. 7]

19 Proposed Rule, 88 FR 29184 at 29404.

Principle 6 states:

“Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs.” [EPA-HQ-OAR-2022-0829-0655, pp. 7-8]

EPA fails to comply with Principle 6 because it has not undertaken a reasonable assessment of the cost of the Proposed Rule. As discussed above, EPA does not fully account for the Proposed Rule’s impacts on the electricity system, which include increasing the cost of electricity and harming electric grid reliability. [EPA-HQ-OAR-2022-0829-0655, pp. 7-8]

EPA also overstates the benefits of the Proposed Rule by claiming unreasonably high benefits from reductions in emissions of fine particulate matter (PM2.5).20 A more accurate estimate of “co-benefits” from PM2.5 reduction would improve cost-benefit assessments for EPA rules across the board, including in this Proposed Rule.21 Given the requirement in principle 6 of Executive Order 12866 for an agency to “adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs,” EPA should revisit its cost-benefit analysis using more accurate estimates of PM2.5 impacts before it can determine that the benefits of the Proposed Rule in fact outweigh the costs.22 [EPA-HQ-OAR-2022-0829-0655, p. 8]

20 Comments to EPA Re: Reconsideration of the National Ambient Air Quality Standards for Particulate Matter. Travis Fisher. 2023. Available at: https://thf_media.s3.amazonaws.com/2023/PM25comments.pdf (accessed July 2, 2023).

21 Will EPA Stop Its Abuse of Costly Pollution-Control ‘Co-Benefits’ Assessments? Daren Bakst. October 4, 2018. Available at: https://www.heritage.org/agriculture/commentary/will-epa-stop-its-abuse-costly-pollution-control-co- benefits-assessments (accessed July 2, 2023).

22 EPA unreasonably treats all species of PM2.5 as equally toxic. This is an incorrect assumption and should be remedied if EPA moves forward with a final rule. A recent study in the journal Nature (available at: https://www.nature.com/articles/s41598-018-35398-0) explains the variability in toxicity among different chemical species of PM2.5 (and even among combustion temperatures and engine sizes for the same fuel). Noting the wide range of toxicity of the various chemical components and sources of PM2.5 pollution, EPA should tailor its estimates of PM2.5 co-benefits to match the toxicity of the various forms of PM2.5. Not all PM2.5 is equally toxic, and therefore not all exposure to PM2.5 is equally costly.

Principle 7 states:

"Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation." [EPA-HQ-OAR-2022-0829-0655, p. 8]

EPA fails to comply with Principle 7 because, as detailed above, it has not availed itself of the ample scientific and technical information—well known and published by leading sources such as NERC, FERC, and PJM—regarding the consequences of EPA regulations on the cost and reliability of the electricity system. [EPA-HQ-OAR-2022-0829-0655, p. 8]

Principle 8 states:

"Each agency shall identify and assess alternative forms of regulation and shall, to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt." [EPA-HQ-OAR-2022-0829-0655, p. 8]

EPA fails to comply with Principle 8 because the Proposed Rule is a de facto mandate for PEVs. Much like the unlawful Clean Power Plan,23 the thrust of the Proposed Rule is to force a shift away from internal combustion engine vehicles and toward PEVs. Indeed, the performance objectives outlined in the Proposed Rule are only viable if the regulated entities—drivers in the U.S.—behave as specified by EPA. [EPA-HQ-OAR-2022-0829-0655, p. 8]

23 See https://archive.epa.gov/epa/cleanpowerplan/clean-power-plan-existing-power-plants-regulatory-actions.html (accessed July 2, 2023).

Principle 10 states:

"Each agency shall avoid regulations that are inconsistent, incompatible, or duplicative with its other regulations or those of other Federal agencies." [EPA-HQ-OAR-2022-0829-0655, p. 9]

EPA fails to comply with principle 10 because, as outlined in the section on electric grid reliability above, the Proposed Rule is incompatible with the suite of existing and new EPA regulations that are forcing a large reduction in electricity supply. Although a minor conflict with an obscure rule from a different agency might be forgivable, EPA's Proposed Rule unreasonably conflicts with a concurrent proposed rule issued by EPA—the Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants, issued in May of 2023.24 In fact, it appears that the DRIA fails to reference or otherwise acknowledge the power plant rule. [EPA-HQ-OAR-2022-0829-0655, p. 9]

24 New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 FR 33240; May 23, 2023. Available at: https://www.federalregister.gov/documents/2023/05/23/2023-10141/new-source- performance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed (accessed July 2, 2023).

3. THE PROPOSED RULE VIOLATES THE UNFUNDED MANDATES REFORM ACT

The Proposed Rule must satisfy section (a)(3)(B) of the Unfunded Mandates Reform Act (UMRA).25 The UMRA establishes that "before promulgating any general notice of proposed rulemaking that is likely to result in promulgation of any rule that includes any Federal mandate that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100,000,000 or more (adjusted annually for inflation) in any 1 year … the agency shall prepare a written statement" containing five categories of analysis, including "any disproportionate budgetary effects of the Federal mandate upon any particular regions of the nation or particular State, local, or tribal governments, urban or rural or other types of communities, or particular segments of the private sector," and "a description of the extent of the agency's prior consultation with elected representatives … of the affected State, local, and tribal governments." [EPA-HQ-OAR-2022-0829-0655, p. 9]

25 2 U.S.C. 1532. Available at: https://www.law.cornell.edu/uscode/text/2/1532 (accessed July 2, 2023).

The Proposed Rule acknowledges that it would have major financial impacts but claims the provisions of the UMRA regarding State, local, or Tribal governments do not apply. EPA states: [EPA-HQ-OAR-2022-0829-0655, p. 9]

This action contains no unfunded Federal mandate for State, local, or Tribal governments as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. This action imposes no enforceable duty on any State, local or Tribal government.26 [EPA-HQ-OAR-2022-0829-0655, p. 9]

26 Proposed Rule, 88 FR 29184 at 29405.

If the EPA moves forward with a final rule, it should explain why it finds that the federal mandates included in the Proposed Rule would not significantly affect State, local, or Tribal governments. As drafted, the Proposed Rule does not detail how it has satisfied the above procedural requirements of the UMRA and does not indicate that the EPA has undertaken the required analysis of the impacts on states and local governments and tribes of compliance with the Proposed Rule. For example, some electric utilities are owned and operated by State, local or Tribal governments.27 The Proposed Rule will significantly impact the cost of the distribution systems of those publicly owned utilities, and the DRIA should be amended to evaluate the extent of the cost increases and the impact of the Proposed Rule on the budgets of State, local or Tribal governments. [EPA-HQ-OAR-2022-0829-0655, pp. 9-10]

27 Navigating the EV Market: Trends and Changes for Public Power to Know. American Public Power Association. Available at: https://www.publicpower.org/system/files/documents/Navigating-the-Electric-Vehicle-Market.pdf (accessed July 2, 2023).

CONCLUSION

Thank you for the opportunity to comment on the Proposed Rule. For the foregoing reasons, the EPA should not move forward with this rule without first correcting the many dire flaws in the Proposed Rule: its violation of section 202 of the Clean Air Act and Executive Order 12866, its faulty cost-benefit analysis, and its woeful misunderstanding of the U.S. electricity sector as reflected in the DRIA. [EPA-HQ-OAR-2022-0829-0655, p. 10]

EPA Summary and Response

Summary:

The American Fuel & Petrochemical Manufacturers, as well as the Alliance for Consumers, expressed that the comment period for this rule was not sufficiently long to adequately read and respond to the material covered in EPA's rulemaking docket. American Fuel & Petrochemical Manufacturers also expressed that EPA's proposal listed an incomplete list of NAICS codes of the number and types of entities that will find out about these proposed actions in time to comment.

Response:

EPA believes that the time for public comment allowed a meaningful opportunity for comment, as illustrated by the detailed comments submitted by the American Fuel & Petrochemical Manufacturers and hundreds of thousands of members of the public. The proposal was announced on April 12, 2023, and the pre-publication version of the notice of proposed rulemaking was posted to the EPA's website on that same day. The notice was published in the Federal Register on May 5, 2023, and the public comment period was open until July 5, 2023. In addition to the written public comment period, the EPA offered a multi-day virtual public hearing for the public to provide oral comments to the Agency on the proposed rule in May 2023. The EPA considers this a fully adequate amount of time for commenters to provide comments to the Agency regarding the proposed standards for MY 2027 through MY2032 light and medium duty vehicles, and we note that EPA received more than 250,000 public comments on the proposed rulemaking. EPA also considered comments received after the close of the comment period to the extent practicable.

With respect to identifying the industries that EPA anticipates will be affected by this rule, EPA identified entities with direct compliance obligations: motor vehicle manufacturers, commercial importers of vehicles and vehicle components, alternative fuel vehicle convertors, and medium duty engine & vehicle manufacturers. The corresponding table of NAICS codes is not intended to be exhaustive, and other types of entities could also be affected, as stated in the rule text.

Summary:

The Alliance for Consumers commented that the rationale for the proposal and its justification in the context of the tailpipe emissions program is "pretextual," for replacing nearly all gas-powered cars with EVs.

Response:

EPA neither proposed nor is adopting any mandates for EVs. EPA's standards are performance-based, meaning that manufacturers choose the mix of technologies they believe best suited for their fleet to meet the standards, and EPA has demonstrated in this final rule a wide range of example pathways that manufacturers might choose which include various mixes of ICE vehicles, hybrids, PHEVs and BEVs.

Summary:

The Alliance for Consumers comments that this rule is arbitrary and capricious under the APA because it has failed to properly consider the rising price of electric vehicles in the wake of the Inflation Reduction Act, the limits on credits and subsidies that have resulted from this surge in electric vehicle pricing, and the true cost of repairing electric vehicles over a relevant time horizon. The HF Sinclair Corporation also commented that the proposed rule is arbitrary and capricious. The American Fuel and Petrochemical Manufacturers commented that this rule is arbitrary and capricious because it ignores actual ZEV production costs, including credit trading costs.

Response:

EPA considers in its analysis of the proposed rule in Sections IV.D.4 and VIII of the Preamble the vehicle technology costs for manufacturers to meet the final standards with a range of technologies including electric vehicles; we also include estimates for maintenance/repair in Section VIII. As well, EPA considers a sensitivity case with no credit trading in Section IV.F.5 of the Preamble.

Summary:

The Arizona State Legislature commented that the proposed rule is arbitrary and capricious because it relies on non-final reports through its commissioned, new full-vehicle teardown study and social cost of greenhouse gas methodology. Commenters cannot provide fully informed comments on the proposed rule without having the opportunity to review the final versions of these reports. EPA should reopen the public comment process for the proposed rule after it has received the final versions of these reports. Failure by EPA to reopen the public comment process would be arbitrary and capricious.

Response:

Regarding the full-vehicle teardown study, in the proposal, we described a new full-vehicle teardown study comparing a gasoline-fueled vehicle and a comparable BEV conducted for EPA by FEV of America.[695] We also indicated in the proposal that we may rely on the information from this work for the final rule. For example, we indicated that component costs for the BEV and ICE vehicle might be used to support or update our battery or non-battery costs for electrified vehicles, or our costs for ICE vehicles; assembly labor data might be used to further inform the employment analysis; and any other qualitative or quantitative information that could be drawn from the report might be used in the analysis. Therefore, EPA believes we provided the public with ample notice about the types of information we were considering for, and in fact now have applied in, the final rule analysis. The project report was delivered to EPA in February 2023 and underwent a contractor-managed peer review process that has now been completed.[696]

Regarding social cost of greenhouse gas benefits, EPA noted in the light/medium-duty vehicle proposal that in the December 2022 Oil and Gas NSPS/EG Supplemental Proposal the Agency included a sensitivity analysis of the climate benefits of the Supplemental Proposal using a new set of SC-GHG estimates that incorporates recent research addressing recommendations of the National Academies in addition to using the interim SC-GHG estimates presented in the Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim

[695] FEV Consulting Inc., "Cost and Technology Evaluation, Conventional Powertrain Vehicle Compared to an Electrified Powertrain Vehicle, Same Vehicle Class and OEM," prepared for Environmental Protection Agency, EPA Contract No. 68HERC19D00008, February 2023.

[696] Memo to Docket ID No. EPA-HQ-OAR-2022-0829, titled "External Peer Review of Cost and Technology Evaluation, Conventional Powertrain Vehicle Compared to an Electrified Powertrain Vehicle, Same Vehicle Class and OEM."

Estimates under Executive Order 13990[697] that the IWG recommended for use until updated estimates that address the National Academies' recommendations are available. EPA believes this provided sufficient notice for commenters about the updated SC-GHG values that EPA was considering for, and in fact has decided to apply in, this final rule. A full discussion of the SC–GHG estimates and the important considerations and limitations associated with its use are provided in the RIA in Chapter 10. In addition, EPA presents the IWG SC-GHG values as a comparison in the Appendix to RIA Chapter 9.

Summary:

Environmental and Public Health Organizations commented that EPA should set strong emissions standards to meet its obligations under Executive Order 12898, which says that EPA "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Additionally, Executive Order 14008 directs EPA to develop "programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts."

Response:

As noted in Section IX.J of the preamble that accompanies this final rule, EPA believes that this action is likely to reduce existing disproportionate and adverse effects on many communities with EJ concerns. The air pollutant emission reductions that will be achieved by this rule will improve air quality for the people who reside in close proximity to major roadways and who are disproportionately represented by people of color and people with low income. We expect that localized increases in criteria and toxic pollutant emissions from EGUs and reductions in petroleum-sector emissions could lead to changes in exposure to these pollutants for people living in the communities near these facilities. Analyses of communities in close proximity to these sources (such as EGUs and refineries) have found that a higher percentage of communities of color and low-income communities live near these sources when compared to national averages. We also note that people of color, low-income populations and/or indigenous peoples may be especially vulnerable to the impacts of climate change. The GHG emission reductions from this action will contribute to efforts to reduce the probability of severe impacts related to climate change.

Summary:

The Environmental Defense Fund commented that the IRA and BIL were passed with the knowledge that EPA was already setting standards under Section 202(a) that would increase ZEV proliferation and an intent to support those regulations. Congress' aim with the funding was to "combine[] new economic incentives to reduce climate pollution with bolstered regulatory drivers that will allow EPA to drive further reduction under its CAA authorities," with the expectation that "future EPA regulations will increasingly rely on and incentivize zero-emission vehicles as appropriate."

[697] Interagency Working Group on Social Cost of Carbon (IWG). 2021 (February). Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990. United States Government.

Response:

EPA acknowledges that Congressional passage of the BIL and IRA represent pivotal milestones in the creation of a broad-based infrastructure instrumental to the expansion of clean transportation, including light- and medium-duty zero-emission vehicles, and we have taken these developments into account in our assessment of the feasibility of the standards (see e.g., preamble section I.A.3).

Summary:

Travis Fisher commented that EPA's proposal does not comply with Executive Order 12866, because it has not undertaken a reasonable assessment of the cost of the Proposed Rule, overstates the benefits of the Proposed Rule by claiming unreasonably high benefits from reductions in emissions of fine particulate matter (PM2.5), has not availed itself of the consequences of EPA regulations on the cost and reliability of the electricity system, is a de facto mandate for PEVs, and is incompatible with the suite of existing and new EPA regulations that are forcing a large reduction in electricity supply. Travis Fisher further comments that EPA's proposal does not detail how it has satisfied the requirements of the UMRA and does not indicate that the EPA has undertaken the required analysis of the impacts on states and local governments and tribes of compliance with the Proposed Rule.

Response:

Regarding the comment claiming that EPA did not comply with EO 12866, EPA disagrees. EPA notes that, consistent with CAA section 202, in evaluating potential standards we carefully weigh the statutory factors, including the emissions impacts of the standards, and the feasibility of the standards (including cost of compliance in light of available lead time). We monetize benefits of the standards and evaluate other costs in part to enable a comparison of costs and benefits pursuant to E.O. 12866, but we recognize there are benefits that we are currently unable to fully quantify. EPA's practice has been to set standards to achieve improved air quality consistent with CAA section 202, and not to rely on cost-benefit calculations, with their uncertainties and limitations, as identifying the appropriate standards. Nonetheless, our conclusion that the estimated benefits exceed the estimated costs of the program reinforces our view that the standards are appropriate under section 202(a).

Comments regarding PM health benefits are addressed in RTC section 8.5. Comments regarding potential impacts on the electric grid are addressed in RTC section 18. Comments that this rule is a de facto BEV mandate are addressed in the first response in this section and elsewhere (e.g., RTC section 3.3.1).

In response to the comment that EPA's proposal did not satisfy the requirements of UMRA, this action contains no unfunded Federal mandate for State, local, or Tribal governments as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. This action imposes no enforceable duty on any State, local or Tribal government. This action contains Federal mandates under UMRA that may result in expenditures of $100 million or more for state, local, and Tribal governments, in the aggregate, or the private sector in any one year. Accordingly, the EPA has prepared a written statement of the costs and benefits associated with action as required under section 202 of UMRA. This action is not subject to the requirement of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. This issue is further discussed Section IX.D of the Preamble.

25.1 - Regulatory Flexibility Act

Comments by Organizations

Organization: Ad Hoc Tier 4 Light-Duty Small Manufacturer Group

B. Overview

US vehicle sales by Small OEMs have no meaningful environmental impact:

-The above companies as a group represent a tiny fraction of the US automobile market. The fraction is so small that the companies have a minuscule impact on US air pollution. Together the companies accounted for about 4000 car sales in the US in CY 2022, which represents 0.15% of the total 2.9 million US passenger car sales for that year. If we just look at the Small Businesses in the Ad Hoc Group, they collectively sold about 100 cars in the US in 2022 -- a mere 0.003% of the 2.9 million volume. [EPA-HQ-OAR-2022-0829-0509, pp. 1-2]

-The vehicles of the Ad Hoc Group's members are not "daily drivers" but rather "occasional use" cars. As a result, the average annual mileage driven by these vehicles is drastically less than-- perhaps 25% of -- the average annual mileage of a typical passenger car. Fewer miles driven is one way to reduce vehicular pollution. [EPA-HQ-OAR-2022-0829-0509, pp. 1-2]

- EPA's apparent misunderstanding of what Small OEMs are selling in the US [EPA-HQ-OAR-2022-0829-0509, p. 3]

Neither with regard to criteria emissions nor GHG does EPA explain its thinking behind the elimination of Small OEM flexibility. But a misstatement in the NPRM preamble may shed light on the absence of necessary and proper Small OEM additional leadtime / flexibility in the NPRM: on page 596 of the preamble of the NPRM document, EPA incorrectly states (as it does the Draft Regulatory Impact Analysis) that the "proposed NMOG+NOx standards should have no impact on the existing Small Business manufacturers, which currently produce only electric vehicles." This is simply not so. There most certainly are Small Businesses that produce internal combustion engine (ICE) vehicles for the US market. Four of the seven members of the AD Hoc Group preparing this report are Small Businesses who are, or soon will be, selling ICE vehicles in the US market.[2] [EPA-HQ-OAR-2022-0829-0509, p. 3]

2 At least one of these Small Businesses tried in 2022 to participate in EPA's Regulatory Flexibility Act SBREFA process, but for some unexplained reason was not included by EPA.

3 EPA has mistakenly indicated that the SBREFA process is only open to US small businesses. This is not correct. In a 2021 US District Court (DC) case, plaintiffs challenged the Internal Revenue Service's alleged failure to conduct a small business impact analysis under the Regulatory Flexibility Act ("RFA") when it promulgated a set of rules. The court stated as follows: Defendants [government] argued that because [plaintiffs] did not have a place of business in the United States and did not make any showing as to the economic effects of the business in the United States, it had failed to establish itself as a "small business concern" under the Small Business Act and thus was not a "small entity" under the RFA. ... To complete the record, the court now rejects that argument. The court is unconvinced that the supplemental definition contained in 13 C.F.R. § 121.105 applies to the definition of "small entities" for purposes of the RFA. The Small Business Act allows the SBA Administrator to supplement the Act's statutory definition with criteria "by which a business concern may be determined to be a small business concern for purposes of this chapter or any other Act. " 15 U.S.C. § 632(a)(2)(A) (emphasis added). The regulation on which Defendants rely, 13 C.F.R. § 121.105, on its face only provides a further definition of "small business

> concern" for purposes of "eligib[ility] for assistance from SBA"—which is not at issue here. Section 121.105 does not purport to supply additional definitional terms for "any other Act," including the RFA. So, the court cannot conclude that because [plaintiffs do] not meet the supplemental defining terms contained in section 121.105 it does not qualify as a "small entity" for purposes of filing suit under the

-EPA is requesting comment on the idea of imposing on Small Business manufacturers an annual production cap (e.g., 200-500 vehicles per year) on vehicles eligible for the Small Business GHG exemption. The Small Business members of the AD Hoc Group oppose any such cap on the grounds that setting a cap at a given level is totally arbitrary, and the environmental benefits of any such cap are virtually nonexistent and are vastly outweighed by the potential burden. [EPA-HQ-OAR-2022-0829-0509, pp. 7-8]

Organization: Job Creators Network Foundation (JCNF)

In addition to being unconstitutional, EPA also improperly certifies the proposed rule as not having a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act. That is false. Millions of small businesses use a car or light-duty truck for their work. Cars are an integral part of certain industries, like limousine or other car service providers. But the local landscaper, caterer, interior designer, or even the hairdresser who sees clients at their homes, will use a car for all or a significant part of their business. [EPA-HQ-OAR-2022-0829-0709, p. 2]

Electric cars are at least $10,000 more than the equivalent gas-powered car. For the small business owner operating on razor-thin margins, $10,000 is a significant increased expense. And that is just the cost represented to purchase the vehicle. It does not include the cost of lost time waiting forty-five minutes for an electric car to charge. Or the fact that if the battery pack of an electric vehicle is damaged in an automobile accident, it likely means the car is totaled and would have to be replaced. [EPA-HQ-OAR-2022-0829-0709, p. 2]

EPA should certify that its proposed rule has a significant impact on a substantial number of small entities under the RFA, prepare the required Initial Regulatory Flexibility Analysis, and conduct the required Small Business Advocacy Review Panel. [EPA-HQ-OAR-2022-0829-0709, p. 2]

Organization: National Association of Convenience Stores (NACS) et al.

VI. The Proposed Rule Is Contrary To The Small Business Regulatory Enforcement Fairness Act of 1996.

Finally, EPA's certification that the Proposed Rule will not have a significant economic impact on a substantial number of small entities is unsupported by the record.72 Our industry is one of small businesses. More than 60 percent of convenience stores are single-store operators. Less than 0.2 percent of convenience stores that sell gas are owned by a major oil company and about 4 percent are owned by a refining company, meaning that independent businesses comprise more than 95 percent of the industry. Though small, our members in the industry process more than 165 million transactions every day. While EPA considered effects to manufacturers it considered small businesses, EPA did not fairly assess the potential impacts of the Proposed Rule to non-manufacturer small businesses like our members—contrary to Congress's intent. [EPA-HQ-OAR-2022-0829-0648, p. 18]

72 Proposed Rule at 29,404.

The Regulatory Flexibility Act, as amended by the Small Business Regulatory Enforcement Fairness Act ("SBREFA"), requires agencies like EPA to determine, to the extent feasible, the rule's economic impact on small entities, explore regulatory options for reducing any significant economic impacts on a substantial number of such entities, and explain their ultimate choice of regulatory approach. But the Proposed Rule is accompanied by little to no information on potential impacts on these small businesses. There is no formal or informal analysis of the adverse economic impacts to small businesses, no SBREFA screening analysis, no analysis, advice, and no recommendation from a Small Business Advocacy Review ("SBAR") Panel. As reiterated throughout these comments, the impacts on our members are far from inconsequential. Thus, we urge EPA in any future rulemaking to further engage in a thorough review of adverse effects to small businesses like our members consistent with their charge under the SBREFA. [EPA-HQ-OAR-2022-0829-0648, p. 18]

EPA Summary and Response

Summary for JCNF and NACS:

EPA received two comments on the draft Regulatory Flexibility Act analysis performed for this rule, one on behalf of small businesses and one on behalf of fuel providers. JCNF, an organization founded by entrepreneurs, commented that the proposed rule would affect small businesses that use cars or light-duty trucks, such as limousine or other car service providers, landscapers, caterers, interior designers, and hairdressers. This commenter believed that these small companies should have been included in EPA's RFA analysis because the cost of purchasing and using EVs would be a significant increase in costs for them. NACS, NATSO, and SIGMA, which represent the convenience store industry (NACS), travel centers and truck stops (NATSO), and independent chain retailers and marketers of motor fuel (SIGMA) commented that many of their members are single-store operators. They stated that these non-manufacturer small businesses, which together represent 9 percent of the motor fuel sold in the United States, should be included in EPA's Regulatory Flexibility Act analysis for this rule. The commenters stated that the proposed rule had little to no information on potential impacts on these small businesses, and there is no formal or informal analysis of the adverse economic impacts to small businesses, no SBREFA screening analysis, and no recommendation from a Small Business Advocacy Review ("SBAR") panel.

Summary for Ad Hoc Tier 4 Light-Duty Small Manufacturer Group:

The Ad Hoc Tier 4 Light-Duty Small Manufacturer Group stated the EPA wrongly excluded small gasoline vehicle producing OEMs that they believed should have been included in EPA's consideration of the NMOG+NOx standards. They also responded to EPA's request for comment on limiting the number of vehicles exempted from the GHG standards stating that they thought this limitation was arbitrary and provided no environmental protection.

Response for JCNF and NACS:

Our assessment of small business impacts prepared to support EPA's certification that the rule will not have a significant economic impact on a substantial number of small entities was appropriately, as required under the Regulatory Flexibility Act, limited to small entities that would be regulated under the proposed rulemaking (i.e., vehicle manufacturers, alternative fuel converters and independent commercial importers). Other than those entities, this rule does not impose any requirements on small businesses. Other small entities, such as small convenience store operators, are not regulated entities under the final rule. The impacts on small businesses to which the commenters refer would not be effects of the rule on regulated entities, and thus are not impacts that EPA is required to analyze per the RFA. See *Cement Kiln Recycling Coal. v. EPA*, 255 F.3d 855, 869 (D.C. Cir. 2001) (noting that "this court has consistently rejected the contention that the RFA applies to small businesses indirectly affected by the regulation of other entities"), *Mid-Tex Elec. Coop. v. FERC*, 773 F.2d 327, 342-43 (D.C. Cir. 1985) ("An agency may properly certify that no regulatory flexibility analysis is necessary when it determines that the rule will not have a significant economic impact on a substantial number of small entities that are subject to the requirements of the rule. . . . Congress did not intend to require that every agency consider every indirect effect that any regulation might have on small businesses in any stratum of the national economy."); see also *Coalition for Responsible Regulation v. EPA*, 684 F. 3d 102, 129 (D.C. Cir. 2012).

Even though EPA is not required in our Regulatory Flexibility Act analysis to include effects on non-regulated small businesses since they are not regulated entities under the rule, the Agency nonetheless considered issues such as vehicle affordability, charging time, and effects on employment. These are discussed in the RIA for this rule in chapters 4, 5 and 10 as well as in Sections 8, 13, 14, 17, and 21 of this RTC document.

Response to the Ad Hoc Tier 4 Light-Duty Small Manufacturer Group:

EPA recognizes that small entity manufacturers make up a small portion of total vehicle fleet sales. As for the commenter's concern that EPA did not consider small gasoline vehicle manufacturers, EPA did assess these potential manufacturers and determined that none of them qualified under the RFA for various reasons. One of the potential manufacturers has never certified a vehicle or initiated the vehicle certification process. EPA believes it is not appropriate to consider companies that may hypothetically at some future date apply to certify a vehicle. EPA also cannot consider foreign companies that do not meet all of the requirements for the RFA. There are specific requirements for a foreign company to qualify under the RFA and none of the potential gasoline vehicle manufacturers we evaluated met those qualifications. The RFA defines "small business" as having the same meaning as "small business concern" under section 3 of the Small Business Act. Section 3 of the Small Business Act, in turn, provides that "the Administrator may specify detailed definitions or standards by which a business concern may be determined to be a small business concern for the purposes of this Act..." 15 U.S.C. § 632(a)(2)(A). The Small Business Administration has issued regulations with a detailed definition of a "business concern" as a "a business entity organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor." 13 C.F.R. § 121.105.[698] This is a longstanding definition which applies broadly to SBA programs under the Small Business Act.[699] Indeed one

[698] See also, US Small Business Administration, Small Business Compliance Guide, (March 2023), at 7 (same requirements). A small agricultural cooperative has distinct requirements but those are not relevant here.
[699] This provision has been recodified several times. See e.g., 54 FR 52634 (Dec. 21, 1989) (promulgating a prior recodification to "define 'business concern or concern' for the purpose of Small Business Administration (SBA) programs"), id. at 52636 ("This section restates SBA's definition of 'concern' previously found at 13 CFR 121.3(b) and applies to all small business programs, except SBA's Small Business Innovation Research (SBIR) Program") (rejecting proposal to add a requirement of US ownership as well).

of the central purposes of the Small Business Act is to "to maintain and strengthen the overall economy of the Nation" and to achieve that purpose Congress directed the SBA to assist small business by "enhancing their ability to compete effectively and efficiently against imports." Public Law 85–536, section 2. It would be directly contrary to Congressional purpose to ignore the SBA's regulatory definition pursuant to the Small Business Act, which is incorporated by reference in the RFA, and instead interpret the statutory definition of "business concern" in the Small Business Act to require agencies to make it easier for businesses with no presence in the United States and which make no contribution to the United States economy to compete with businesses, including small businesses, that do contribute to the US economy.

Under this final rule, EPA exempted small entity manufacturers from complying with the GHG standards, subject to a limitation as described in the next paragraph. As for the NMOG+NOx standards, EPA is finalizing an alternate phase-in which delays compliance for small entities. Details are available in section III.C.10 of the preamble.

EPA disagrees with the comments claiming there is no environmental protection from limiting the number of vehicles exempted from the GHG standards. The comments didn't provide any data or analysis or offer a specific basis for these claims. Limiting the number of exempt vehicles will create a cap on the number of vehicles that can be sold with potentially extremely high GHG emissions compared to other vehicles in the fleet subject to our final fleet-average standards, which EPA believes is necessary to provide an important safeguard for both environmental protection and a level playing field for manufacturers. Moreover, EPA's evaluation shows that existing small entities sell volumes of vehicles well below this limit, and thus the cap is expected to have no material adverse impact on small entities.

26 - Coordination/harmonization between EPA's GHG standards, NHTSA's CAFE standards, and state regulations

Comments by Organizations

Organization: Alliance for Automotive Innovation

4. NHTSA Car and Truck Definitions

EPA intends to continue to use the NHTSA car and truck definitions for its light-duty GHG program. We generally support this approach. However, because NHTSA has yet to propose its CAFE rules for MY 2027 and beyond, we do not know for certain whether NHTSA will maintain the existing definitions that EPA has based its proposal upon. Additionally, our understanding is that NHTSA is developing test procedures that may have the effect of changing the classification of some vehicles regardless of the present definitions. [EPA-HQ-OAR-2022-0829-0701, pp. 110-111]

There is also the potential for misalignment between EPA and NHTSA in the definition of medium-duty passenger vehicles. EPA is proposing to modify the definitions of medium-duty vehicles / medium-duty passenger vehicles. It is unclear what NHTSA may or may not do to align with EPA's proposal. [EPA-HQ-OAR-2022-0829-0701, pp. 110-111]

We urge EPA to coordinate with NHTSA in developing its final rule to ensure that the proposed greenhouse gas standards in the NPRM are not in conflict with changes NHTSA may propose in its CAFE rulemaking, or through later test procedure changes. [EPA-HQ-OAR-2022-0829-0701, pp. 110-111]

Organization: Alliance for Vehicle Efficiency (AVE)

AVE requests that EPA provide the automotive industry with greater certainty.

AVE is concerned that EPA and National Highway Traffic Safety Administration's (NHTSA) decision to proceed independently of the other with new LD and MD vehicle standards will create additional regulatory uncertainty for the automotive industry. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

One National Program

In 2010, EPA and NHTSA touted the benefits of joint rulemaking under the umbrella of a National Program. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

The National Program will deliver additional environmental and energy benefits, cost savings, and administrative efficiencies on a nationwide basis that would likely not be available under a less coordinated approach. The National Program also represents regulatory convergence by making it possible for the standards of two different Federal agencies and the standards of California and other states to act in a unified fashion in providing these benefits. The National Program will allow automakers to produce and sell a single fleet nationally, mitigating the additional costs that manufacturers would otherwise face in having to comply with multiple sets of Federal and State standards.1 [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

1 Federal Register / Vol. 75, No. 88 / Friday, May 7, 2010, at 25326

This approach was not an isolated occurrence. EPA and NHTSA proceeded in 2012 to finalize joint standards for LD vehicles starting in 2017 and beyond.2 The agencies then worked jointly again in 2017 and issued a Final Determination on the Appropriateness of the Model Year 2022-2025 Light- Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation.3 [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

2 Federal Register / Vol. 77, No. 199 / Monday, October 15, 2012, at 62624

3 https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100QQ91.pdf

Although EPA states that the Agency has consulted with NHTSA on the Proposal, no explanation is given as to why the two agencies have changed course after more than a decade of working jointly. The reasoning stated in earlier rulemakings for one National Program remains relevant. Without full coordination, the U.S. will emerge with vastly different standards for greenhouse gas (GHG) emissions and fuel economy that will vary from state to state. More importantly, automakers may be forced to choose between compliance with one agency's program and non-compliance with another. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Organization: American Fuel & Petrochemical Manufacturers

Relatedly, Congress established the need to consider technology feasibility in establishing fuel economy regulations under the Energy Policy and Conservation Act ("EPCA"). Here, the National Highway Traffic Safety Administration ("NHTSA") "may not consider" the fuel economy of EVs in setting Corporate Average Fuel Economy (CAFE) standards.107 Conducting joint EPA- NHTSA rulemakings for complementary GHG and CAFE requirements helps OEMs comply with both agencies' standards. But in forgoing joint rulemaking, EPA ignores Congress' determination that EVs cannot be considered when determining what is the maximum feasible fuel economy level from which to develop regulations. Allowing EPA to consider EVs and, in turn, establish de facto ZEV mandates (and de facto average fuel economy standards) ultimately skews the new vehicle market and impede NHTSA's ability to establish its own CAFE standards that comport with EPCA. Most importantly, such an approach directly contravenes the underlying premise of the Supreme Court's holding in Massachusetts v. EPA that "[EPA and NHTSA] obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency."108 After implementing GHG standards jointly with NHTSA's fuel economy standards since 2012, and despite Government Accountability Office recommendations to the contrary,109 EPA separated the rulemaking to undo previously established MY 2023-2026 standards and, in this case, to avoid the direct statutory prohibition on consideration of EVs when establishing fuel economy standards. [EPA-HQ-OAR-2022-0829-0733, pp. 25-26]

107 49 U.S.C. § 32902(h). Here, NHTSA may not consider the fuel economy of "dedicated automobiles," which are defined as those that operate only on "alternative fuel." Alternative fuel, in turn, includes electricity. 49 U.S.C. § 32901(j).

108 549 U.S. 497, 532 (2007).

109 GOVERNMENT ACCOUNTABILITY OFFICE, "NHTSA and EPA's Partnership for Setting Fuel Economy and Greenhouse Gas Emissions Standards Improved Analysis and Should be Maintained" (February 2010) available at https://www.gao.gov/assets/gao-10-336.pdf

Organization: Arconic Corporation (ARCO)

In general, Arconic urges EPA to consider a few key points as it moves to finalize this proposed rulemaking. [EPA-HQ-OAR-2022-0829-0741, p. 2]

Organization: BMW of North America, LLC (BMW NA)

With regard to the Agency's Proposed Rule, we respectfully submit that coordination between NHTSA and EPA during the rulemaking process is critical toward establishing harmonized standards. In light of differing statutes and regulations between NHTSA's CAFE program and EPA's GHG program, the Agencies have historically recognized and accounted for these differences in the standard setting process. However, as of this date, NHTSA has not publicized an NPRM for CAFE MY27+, and we therefore share the concern of the Alliance of Automotive Innovators, that the decoupling of the rulemaking timeline of both regulations may lead to material inconsistencies. [EPA-HQ-OAR-2022-0829-0677, p. 1]

BMW NA therefore would like to encourage the agencies to continue to work closely together, to enable manufacturers to abide by both sets of regulations with one single fleet. [EPA-HQ-OAR-2022-0829-0677, p. 1]

Organization: Competitive Enterprise Institute

Second, the Supreme Court in Massachusetts v. EPA (2007) directed the EPA and the National Highway Traffic Safety Administration (NHTSA) to “avoid inconsistency” between future corporate average fuel economy (CAFE) standards and GHG motor vehicle standards.51 Accordingly, in 2010, 2012, 2016, and 2020, the EPA and NHTSA engaged in joint rulemakings, simultaneously promulgating coordinated fleet-average GHG and fuel economy standards. Coordination is readily achieved because fleet-average tailpipe CO2 emissions and fuel economy standards are mathematically convertible. For example, NHTSA’s CAFE standards are calibrated in both miles per gallon and grams of CO2 per mile:52 [EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

51 Massachusetts v. E.P.A., 549 U.S. 497, 532 (2007).

52 NHTSA, Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks, 87 FR 25710, 25735-25736, May 2, 2022, https://www.govinfo.gov/content/pkg/FR-2022-05-02/pdf/2022- 07200.pdf.

Table II-4 – Estimated Average of CAFÉ Levels *MPG Required under Final Rule [EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

Fleet	2024	2025	2026	2027	2028	2029
Passenger Cars	49.2	53.4	59.4	59.4	59.3	59.3
Light Trucks	35.1	38.2	42.4	42.4	42.4	42.4
Overall Fleet	40.6	44.2	49.1	49.1	49.2	49.3

[EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

Table II-6 – Estimated CO2 Levels Equivalent to Average of CAFÉ Levels Required Under Final Rule (Gram per Mile CO2 Levels) [EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

Fleet	2024	2025	2026	2027	2028	2029
Passenger Cars	181	166	150	150	150	150
Light Trucks	253	253	210	210	210	210
Overall Fleet	219	201	181	181	181	180

[EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

As the EPA and NHTSA’s proposed 2018 joint rulemaking put it, “Basic chemistry makes fuel economy and tailpipe CO2 emissions two sides of the same coin.”53 [EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

53 NHTSA and EPA, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for 2021-2026 Passenger Cars and Light Trucks, 83 FR 42937, 43209, 43327, August 24, 2018, https://www.govinfo.gov/content/pkg/FR-2018-08- 24/pdf/2018-16820.pdf.

Although the agencies no longer conduct joint rulemakings, they profess a continuing “commitment” to coordinate their respective standards.54 The seriousness of that commitment may well be questioned. NHTSA’s passenger car target in 2029 is 150 grams CO2 per mile. The EPA’s target for 2029 is 99 grams CO2 per mile55—51 percent more stringent. [EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

54 86 FR 74434, 74457; 87 FR 25710, 25730.

55 88 FR 29201.

Table 8 – Comparison of Proposed Car Standards to Alternatives [EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

Model Year	Proposed stds CO2 (g/mile)	Alternative 1 CO2 (g/mile)	Alternative 2 CO2 (g/mile)	Alternative 3 CO2 (g/mile)
2026 Adjusted	152	152	152	152
2027	134	124	144	139
2028	116	106	126	126
2029	99	89	108	112

[EPA-HQ-OAR-2022-0829-0611, pp. 13-14]

Congress Prohibits NHTSA, the Only Agency Authorized to Establish Fleetwide-Average Standards, from Regulating Gasoline-Powered Vehicles Out of the Market.

In 1992, Congress prohibited NHTSA from considering the fuel economy of EVs and other alternative vehicles when promulgating CAFE standards. The clear intent was to ensure that NHTSA does not set fleet-average standards that no gasoline-powered vehicle can meet. Petitioners explain: [EPA-HQ-OAR-2022-0829-0611, p. 18]

In the Energy Policy Act of 1992, Congress directed NHTSA to set fuel-economy standards based on averages, but prohibited NHTSA from setting fuel-economy standards that average in the fuel economy of electric vehicles. See Pub. L. No. 102-486 §§ 302,403, 106 Stat. 2776, 2870-2871, 2876 (later codified at 49 U.S.C. § 32902(h)). [EPA-HQ-OAR-2022-0829-0611, p. 18]

Petitioners spotlight the key point:

This prohibition bars NHTSA from doing exactly what EPA is doing here: misusing its regulatory authority to force a transition from conventional vehicles to electric vehicles by artificially tightening the “average” standard a fleet must meet. Of course, when Congress finalized the language of Section 202(a)(l) in 1977, it had no need to explicitly block EPA from considering electric vehicles, because it did not contemplate that EPA would set emission standards using averaging in the first place (or that EPA would be setting standards for greenhouse gases). The prohibition on NHTSA nevertheless underscores just how far EPA is reaching here: it is straining statutory language to seize a power that Congress expressly denied to a sister agency that actually has authority to promulgate fleetwide-average standards.71[EPA-HQ-OAR-2022-0829-0611, p. 18]

71 Petitioners' Initial Brief, pp. 61-62.

Organization: Cummins

- A harmonized national program for criteria pollutant, GHG, and fuel efficiency standards by EPA, the California Air Resources Board (CARB), and the National Highway Traffic Safety Administration (NHTSA) is essential to assure the greatest improvements are achieved in the most cost-efficient manner and to provide vehicle and engine manufacturers, suppliers, and end-users with the certainty necessary for investment in technologies to improve emissions. We urge the agencies to work together towards a single, nationwide program. [EPA-HQ-OAR-2022-0829-0645, pp. 2-3]

Organization: Ford Motor Company

Finally, beyond the regulation proposed here, we encourage EPA, National Highway Traffic Safety Administration, and California to harmonize their GHG standards, fuel economy standards, criteria emissions, testing protocols and ZEV requirements. Each of these requirements is ultimately regulating the same aspects of the same vehicles and fleets, at the same time. During this extraordinary period of transition, automakers need harmonization between these programs. We are concerned that well-intentioned but technically contradictory rules from different agencies—especially those designed to continue to eke out marginal improvements on internal combustion vehicles—will divert resources from electrification. [EPA-HQ-OAR-2022-0829-0605, p. 4]

Organization: Fuel Freedom Foundation

Harmonize NHTSA and EPA policies. FFVs are credited under the CAFE program, but not in EPA's own GHG Standards. From the beginning of the unified National Program, the agencies have committed to harmonizing the requirements to minimize the regulatory burden on OEMs. The current disharmony between the programs can be easily addressed by incorporating equivalent credit for the manufacture of FFVs within the GHG Standards program, to not only enable more widespread use of lower-carbon E85, but to spur vehicle technology innovation for high-performance spark ignition engines that can be coupled with electrification in plug-in hybrid vehicles. Toyota is already leading the way on developing flex-fuel hybrids with its Hybrid Flex Corolla that is being pioneered by Toyota of Brazil and exported to India.13 [EPA-HQ-OAR-2022-0829-0711, pp. 3-4]

13 ET Auto, "Toyota launches pilot project on flex-fuel strong hybrid EVs in India," at https://auto.economictimes.indiatimes.com/news/toyota-launches-pilot-project-on-flexi-fuel-strong-hybrid-electric-vehicles- ffv-shev-in-india-signs-mou-with-iisc-bengaluru/94786626, and Nikkei Asia, "Toyota to invest $334m to make compact biofuel hybrids in Brazil, Carmaker seeks to provide consumers with

cheaper, eco-friendly vehicles," at https://asia.nikkei.com/Business/Automobiles/Toyota-to-invest-334m-to-make-compact-biofuel-hybrids-in-Brazil

There are significant public policy reasons to justify further harmonizing the GHG Standards and CAFE Standards with a commensurate FFV credit: 1.) maximize the cost effectiveness of GHG reductions in light-duty transportation, 2.) realize GHG emissions reductions sooner rather than later, 3.) increase national and energy security by reducing petroleum dependence, and 4.) achieve GHG Standards program goals while minimizing consumer disruption and cost. [EPA-HQ-OAR-2022-0829-0711, pp. 5-6]

In light of these rationales, to both fully realize the ambitious GHG reductions in the GHG Standards Proposed Rule and ensure the program's long-term success in progressing to Net-Zero GHG emissions in transportation, Fuel Freedom strongly encourages the EPA to re-adopt credit for the production of FFVs within the GHG Standards program. [EPA-HQ-OAR-2022-0829-0711, pp. 5-6]

[See original attachment for Appendix A: Photo of prices at a fueling station in Costa Mesa, California in April 2022] [EPA-HQ-OAR-2022-0829-0711, pp. 5-6]

Organization: General Motors, LLC (GM)

GM supports and encourages whole-of-government coordination between the applicable federal and
state agencies to achieve them. In particular, we encourage the Environmental Protection Agency (EPA), the Department of Transportation's National Highway Traffic Safety Administration (NHTSA), Department of Energy (DOE), and California Air Resource Board (CARB) to work together to ensure a fleet that complies with the finalized EPA greenhouse gas (GHG) programs (light-duty, medium-duty) also complies with EPA's criteria pollutant (light-duty, medium-duty), NHTSA's light-duty Corporate Average Fuel Economy (CAFE), NHTSA's medium-duty Corporate Average Fuel Consumption (CAFC), CARB's criteria pollutant Low Emission Vehicle IV (LEV IV), and CARB's GHG regulations. Coordination across the US federal government and with CARB will best ensure that communities, workers, consumers, and industry can successfully achieve this decarbonization transition [EPA-HQ-OAR-2022-0829-0700, p. 4]

Including the proposed EPA standards, that makes six regulations with varying sub-level averaging sets for classes within each (e.g., for cars, trucks, and within given weight thresholds). These regulations could require each automaker to exceed 50% EVs in at least a dozen vehicle averaging sets in the approximate 2030 timeframe. GM is confident in its approach to transition to 50% EVs by 2030, and towards 100% in 2035, but our ability to meet such precise EV shares in every applicable averaging set in each model year is less clear. As a result, we are concerned that either a potential lack of clarity or a lack of coordination across the agencies may hinder an automaker's ability to remain in compliance, year-after-year, across each of these regulatory programs even while meeting EPA's overall EV targets. Worse, regulatory misalignment can lead to unanticipated consequences that can include higher emissions through OEM- specific settlement agreements and added costs for OEMs that will impact jobs, capital investments, and ultimately the success of the transition. [EPA-HQ-OAR-2022-0829-0700, p. 4]

GM fully supports GHG regulations in line with the Executive Order goals (i.e., 50% EV share 2030, 60% GHG reduction from model year 2021 to 2030) and believes it's critical that all the other associated regulations also allow that same federal GHG-compliant fleet to comply without paying penalties, restricting product, or purchasing credits. We urge EPA, NHTSA, and CARB to base their regulations, and their analyses of industry compliance, on the same level of EV deployment and internal combustion engine (ICE) criteria pollutant and efficiency improvement. Any mismatch in these assumptions could lead to de facto stringency that supersedes the technology deployment projected by any of the agencies individually. Any such mismatches, as mentioned above, have the potential to slow progress on the industry's EV transition and the nation's decarbonization journey. Finalizing aligned regulations ensures industry's ability to meet our collective EV transition and climate goals. [EPA-HQ-OAR-2022-0829-0700, p. 4]

For the agencies to navigate this coordination across regulations, we have four primary recommendations: First, we recommend the federal agencies develop a "Leadership Pathway" (described below) which reduces duplicative requirements across the regulations for any automaker that exceeds national-level EV goals (e.g., 50% EVs by 2030, 67% by 2032). Second, we recommend that regulators continue their due diligence to ensure that one fleet of vehicles simultaneously complies across the six regulations with the deployment of the same set of vehicles. Such an analysis for each automaker would be applicable to each one of the agencies' final rule regulatory analyses, including how the modeled EPA-, NHTSA-, and CARB-regulated fleets each maintain a consistent level of EVs and ICE improvement compliant with each of the regulated classes in the six separate regulations. Third, we recommend that the agencies fully and completely align their vehicle class definitions. Fourth, we recommend that each agency allow full fungibility of credits across regulated vehicle classes or otherwise adjust standard stringency, if vehicle classes have constraints that prevent alignment. [EPA-HQ-OAR-2022-0829-0700, pp. 4-5]

Considering that the transition to EVs can successfully achieve the objectives of each regulation, we see great potential for EPA, in collaboration with the other agencies, to steer the regulations to be fully aligned. As vehicle manufacturers move toward all EVs, and the regulations are each dependent on this same underlying EV trend, the above recommendations are all warranted and fitting to ease the duplicative burdens in this transformative and unprecedented industry-wide EV transition to which we are committed. [EPA-HQ-OAR-2022-0829-0700, pp. 4-5]

We urge EPA to coordinate with NHTSA and DOE to ensure the agencies have a common set of assumptions for how companies can comply with the various rules, and also that the relative compliance value for EVs be aligned across the regulations. If DOE's Petroleum- Equivalent Fuel Economy Calculation is adopted as published, there is the potential for the NHTSA CAFE regulation to effectively require much greater EV shares and/or greater internal combustion improvements than the EPA GHG rule. Such unaligned EV compliance ratings could create mixed market signals, with some automakers complying with the GHG rule and not CAFE, and vice versa for other companies, with no deliberate environmental benefit in either case. [EPA-HQ-OAR-2022-0829-0700, p. 5]

Organization: Governing for Impact and Evergreen Action (GFI)

Finally, suggestions by some opponents that the EPA must promulgate its emissions standards in coordination with the National Highway Traffic Safety Administration ("NHTSA"),75 which sets fuel- economy standards but is prohibited from taking EVs' fuel economy into account in setting those standards, are wrong. While it is true that the two agencies have jointly promulgated GHG and fuel economy regulations in the past, there is no statutory requirement that they do so—and the agencies did not do so in 2021 when the EPA promulgated 202(a) GHG regulations for MYs 2023-2026.76 In fact, the Supreme Court has described the EPA's authority to regulate carbon emissions from motor vehicles as "a statutory obligation wholly independent" from NHTSA's energy efficiency mandate regarding mileage requirements.77 [EPA-HQ-OAR-2022-0829-0621, pp. 9-10]

75 See, e.g., Private Petitioners' brief, Texas v. E.P.A., D.C. Cir. No. 22-1031.

76 "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards," 86 Fed. Reg. 74434 (Dec. 2021), https://www.federalregister.gov/documents/2021/12/30/2021-27854/revised-2023-and-later-model-year- light-duty-vehicle-greenhouse-gas-emissions-standards.

77 Massachusetts v. E.P.A., 549 U.S. 497, 532 (2007). See also Coal. for Responsible Regul., Inc. v. E.P.A., 684 F.3d 102, 127 (D.C. Cir. 2012) (explaining why NHTSA's regulatory obligations do not affect the EPA's obligations under the CAA); Proposed Rule at fn. 388; Dan Farber, "The Car Rule and the Major Questions Doctrine," Legal Planet (April 24, 2023), https://legal-planet.org/2023/04/24/the-car-rule-and-the-major-questions-doctrine/; Proof Brief of the Institute for Policy Integrity at 10–11.

Organization: HF Sinclair Corporation

c. The Proposed Rule Runs Afoul of the Energy Policy and Conservation Act

Under the Energy Policy and Conservation Act ("EPCA"), Congress provided that NHTSA "may not consider" the fuel economy of EVs in setting Corporate Average Fuel Economy (CAFE) standards.25 Doing so puts an important restriction on how NHTSA evaluates the technological feasibility of fuel economy standards. Conducting joint EPA-NHTSA rulemakings for complimentary GHG and CAFE requirements ensures that OEMs can comply with both agencies' standards with the same fleet. But in forgoing a joint rulemaking, EPA seeks to ignore Congress' determination that EVs cannot be taken into account when considering what is the maximum feasible fuel economy level from which to develop regulations. Allowing EPA to consider EVs and, in turn, establish de-facto EV mandates will ultimately skew the market of new vehicles and impede NHTSA's ability to establish its own CAFE standards that comport with EPCA. Most importantly, such an approach directly contravenes the underlying premise of the Supreme Court's holding in Massachusetts v. EPA—"[EPA and NHTSA] obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency."26 [EPA-HQ-OAR-2022-0829-0579, p. 7]

25 49 U.S.C. § 32902(h). Here, NHTSA may not consider the fuel economy of "dedicated automobiles," which are defined as those that operate only on "alternative fuel." Alternative fuel, in turn, includes electricity. 49 U.S.C. § 32901(j).

26 549 U.S. 497, 532 (2007).

Organization: Kentucky Office of the Attorney General et al.

EPA first regulated GHG emissions from motor vehicles following the Supreme Court's decision in Massachusetts v. EPA, which held that EPA had certain authority under the CAA to regulate greenhouse gas emissions from new motor vehicles. 549 U.S. 497 (2007). Following the Massachusetts decision, EPA issued an endangerment finding for "six well-mixed greenhouse gases," including carbon dioxide ("CO2"). 74 Fed. Reg. 66,496 (Dec. 15, 2009). EPA then promulgated its initial standards for these gases through joint rulemaking with the National Highway Traffic Safety Administration ("NHTSA"). NHTSA is authorized to set corporate average fuel economy standards under the Energy Policy and Conservation Act, Pub. L. No. 94-163, 89 Stat. 871 (1975). [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

The first of these joint EPA-NHTSA rulemakings occurred in 2010. At that time, EPA and NHTSA set initial CO2 emissions standards for model years 2012–2016 and later. 75 Fed. Reg. 25,234 (May 7, 2010). In 2012, EPA and NHTSA set new, more stringent CO2 emissions standards for model years 2017–2025 and later. 77 Fed. Reg. 62,624 (Oct. 15, 2012). In 2020, EPA and NHTSA issued a rule ("the 2020 Rule") that revised the standards for model years 2022– 2025, making those standards less stringent and setting a new standard for model years 2026 and later. 85 Fed. Reg. 24,174 (Apr. 30, 2020). [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

Then President Biden took office and began instituting his climate agenda. By executive order, he required the whole of the federal government to commit the full extent of its authority to reducing GHG emissions. Executive Order on Tackling the Climate Crisis at Home and Abroad, Exec. Order No. 14008 of January 27, 2021 ("[W]e must combat the climate crisis with bold, progressive action that combines the full capacity of the Federal Government with efforts from every corner of our Nation, every level of government, and every sector of our economy."). In response, EPA revised the CO2 emissions standard for model years 2023 and later (the "2021 Rule"). 86 Fed. Reg. 74,434 (Dec. 30, 2021). [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

The 2021 Rule fundamentally changed EPA's approach to the regulation of motor vehicle emissions. Previously, emissions standards occurred via joint rulemaking with NHTSA and were set in concert with its promulgation of fuel economy standards. This approach made sense because emissions and fuel economy standards are inextricably linked. But the President's climate agenda made joint rulemaking with NHTSA problematic. NHTSA is statutorily prohibited from considering the fuel economy of EVs when setting fuel economy standards. 49 U.S.C. § 32902(h)(1). Consequently, to avoid legal impediments to the President's climate agenda, the 2021 Rule decoupled EPA emissions standards from NHTSA fuel economy standards. The State of Texas, the Commonwealth of Kentucky, and other state and private petitioners challenged the 2021 Rule in the United States Court of Appeals for the D.C Circuit. Texas, et al. v. EPA, et al., Case No. 22-1031. Those challenges remain pending. [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

In December 2021, President Biden issued yet another executive order, stating that "America must lead the world on clean and efficient cars and trucks" by "bolstering our domestic market by setting a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles." Strengthening American Leadership in Clean Cars and Trucks, Exec. Order 14037 of August 5, 2021. In support of this policy, the President specifically dictated that "[t]he

Administrator of the Environmental Protection Agency (EPA) shall, as appropriate and consistent with applicable law, consider beginning work on a rulemaking under the [CAA] to establish new multi-pollutant emissions standards, including for greenhouse gas emissions, for light- and medium-duty vehicles beginning with model year 2027 and extending through and including at least model year 2030." Id. [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

The Proposed Rule is the result of the President's mandate. The Proposed Rule sets "increasingly stringent" standards for CO2. 88 Fed. Reg. at 29,240. For light-duty passenger cars, the proposal would require a reduction in emissions from 152 grams of CO2 emitted per mile traveled ("g/mile") for model year 2026 to 73 g/mile for model years 2032 and later—a reduction of 52%. 88 Fed. Reg. at 29,239. For light-duty trucks, the Proposed Rule would require a reduction from 207 g/mile for model year 2026 to 89 g/mile for model years 2032 and later—a reduction of 57%. Id. Fleet-wide for all light-duty vehicles, the Proposed Rule would require a reduction in emissions from 186 g/mile for model year 2026 to 82 g/mile for model years 2032 and later—a reduction of 56%. Id. at 29,239-29,240. For medium-duty vehicles, the Proposed Rule would require a reduction in CO2 emissions from 438 g/mile for model year 2027 to 275 g/mile for model years 2032 and later—a reduction of 37%. Id. at 29,243. In addition to the revised CO2 standards, EPA's proposal establishes more stringent emissions standards for non-methane organic gases plus nitrogen oxides, particulate matter, carbon monoxide, and formaldehyde. [EPA-HQ-OAR-2022-0829-0649, pp. 2-3]

The Proposed Rule also generates tension with the regulatory efforts of agencies in other areas. As described above, the Department of Transportation, through NHTSA, has the authority to set average fuel economy standards for automobiles. 49 U.S.C. § 32902(a). EPA and NHTSA have previously acted in concert. Now that those efforts have been bifurcated, EPA's proposals could limit dramatically not just the effect of NHTSA's regulatory scheme, but also automakers' ability to comply with the suite of regulations. It seems this may have been the plan all along. See Private Pet'r Opening Br., Texas v. EPA, No. 22-1031 (D.C. Cir. Apr. 27, 2023), ECF No. 1996915, at 9-10 ("Before joining the administration, the heads of the Council on Environmental Quality and EPA's Office of Air and Radiation (which wrote this rule) advocated this 'decoupling' precisely so that EPA could take 'a bolder approach on light duty vehicle electrification.'" (quoting Climate 21 Proj., Transition Memo: Environmental Protection Agency 11 (2021))). But EPA has no authority to wield this kind of power and reduce NHTSA's role in this way, especially considering that Congress has spoken clearly that NHTSA "may not consider" EV fuel economy in setting its own standards. 49 U.S.C. § 32902(h)(1). EPA's apparent attempt to expand its own authority under the CAA ignores the broader statutory context. [EPA-HQ-OAR-2022-0829-0649, p. 5]

Organization: Kia Corporation

Kia continues to support the long-standing goal where EPA, National Highway Traffic Safety Administration (NHTSA), and the California Air Resources Board (CARB) work together to coordinate emissions regulations, strive to align stringency, and reduce unnecessary testing burdens. [EPA-HQ-OAR-2022-0829-0555, p. 3]

Kia Supports Coordinated Programs

Kia continues to support the long-standing goal where EPA, NHTSA, and the California Air Resources (CARB) work together to coordinate emissions regulations, strive to align stringency, and reduce unnecessary testing burden. Harmonization and consistency are even more critical as technology investments need to be focused on shifting to electrification. Closely coordinated programs will provide the stability and predictability that automakers need during this important transition toward vehicle electrification. [EPA-HQ-OAR-2022-0829-0555, p. 4]

Unfortunately, NHTSA’s proposal on Corporate Average Fuel Efficiency (CAFE) for MYs 2027 - 2032 has not yet been released and there is no overlap between the EPA and NHTSA comment periods. It is critical that the industry understands how these programs interact and align. Kia is concerned that these two programs could require conflicting fleet compositions, include unnecessary testing burden, and affect compliance planning. [EPA-HQ-OAR-2022-0829-0555, p. 4]

Coordination and alignment between all three programs are of the utmost importance as the industry pursues a rapid transition to electrification while working towards one of the most aggressive regulations in history. [EPA-HQ-OAR-2022-0829-0555, p. 4]

Organization: Mazda North American Operations

As a member of the Alliance for Automotive Innovation we strongly support the comments that they have submitted; we have also highlighted some specific areas of the proposed regulation that will be particularly problematic below. [EPA-HQ-OAR-2022-0829-0595, p. 2]

While noting the massive shift that this proposal would require, we also recognize that other US federal laws and regulations are also in play. More and better coordination between federal agencies is desired as various requirements impact the overall market. [EPA-HQ-OAR-2022-0829-0595, p. 2]

First, while these comments are on the EPA proposal, a CAFE proposal from NHTSA is also coming soon. It's imperative that the CAFE proposal align as much as possible to the final EPA rule. It's untenable to consider different requirements in similar areas, or the possibility that Mazda could comply with EPA's requirements, but not with NHTSA's (or vice-versa). [EPA-HQ-OAR-2022-0829-0595, p. 2]

Organization: MEMA, The Vehicle Suppliers Associated

EPA must also closely align the final rule for LD/MD Multi-Pollutant Emissions with the emerging National Highway Traffic Safety Administration (NHTSA) Corporate Average Fuel Economy (CAFE) standards so neither creates confusion or unnecessary burdens. [EPA-HQ-OAR-2022-0829-0644, p. 4]

The aggressive pace and scope of the proposed rule obliges EPA to work to ensure success throughout the course of this rule's implementation. EPA must follow through on all assumptions in the regulatory impact analysis (RIA), and act accordingly to help make them a reality and reassure manufacturers and consumers along the way. [EPA-HQ-OAR-2022-0829-0644, p. 4]

MEMA urges:

- the Biden Administration to align regulations and priorities in concert with the Joint Office of Energy and Transportation throughout the implementation period of this rule to identify shared concerns and solutions for the many moving parts of the rule. EPA needs this broad support to follow through on all assumptions regarding critical materials, infrastructure, and timing of milestones identified in the rule's analyses. [EPA-HQ-OAR-2022-0829-0644, p. 4]

- EPA work closely with NHTSA to align the CAFE standards rule with the LD/MD Multi-Pollutants rule. [EPA-HQ-OAR-2022-0829-0644, p. 4]

Organization: Mercedes-Benz AG

The EPA should also strive for regulatory consistency with the National Highway Traffic Safety Administration ("NHTSA") and California to minimize redundancies and look for opportunities to extend program credits, like air conditioner and off-cycle. [EPA-HQ-OAR-2022-0829-0623, p. 2]

Organization: Mitsubishi Motors North America, Inc. (MMNA)

C. Potential Effect of UF and PEF on CAFE Standard

The development of the proposed utility factor by EPA considers the impact of changes within the context of the light-duty GHG standard. However, the utility factor is also used in developing fuel economy compliance values for the NHTSA CAFE standard. There is little mention of the utility factor's influence on CAFE compliance, despite the direct effect it has on PHEV CAFE compliance values. Unlike the GHG standard, which correctly treats electric operation as zero emissions, the CAFE regulation assigns PHEVs and BEVs a petroleum-equivalent fuel economy. The disconnect between the GHG and CAFE programs results in different weighting of compliance benefits for PHEVs and BEVs relative to conventional ICE vehicles. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

Expanding on this issue, the Department of Energy (DOE) is proposing changes to the Petroleum Equivalency Factor (PEF) starting with MY27. The PEF is used to estimate the mile per gallon equivalent (MPGe) of BEV and PHEV electric mode operation. The DOE is proposing a 72% reduction of the PEF resulting in a significant reduction of the BEV and PHEV CAFE compliance value. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

The combined effect of the changes to the UF and PEF on the CAFE standard are difficult to assess considering the proposed CAFE standard for MY27 through MY32 has not been published. For now, we can only assume that the structure of the current CAFE standard will remain unchanged. Based on this assumption, the combined effect of the UF and PEF will result in certain PHEVs having less compliance benefit than comparable Strong Hybrid-Electric Vehicles (SHEVs). Figure 1 is an example of the effects the proposed UF and PEF would have on the CAFE compliance of small SUV PHEVs relative to comparable SHEVs. In Figure 1 (left), the current Utility Factor and PEF means most PHEVs correctly have fuel economy greater than all comparable SHEVs. For Figure 1 (center), the proposed PEF with current UF results in a CAFE compliance value reduction of all PHEVs, in addition, several PHEVs would have a CAFE compliance value less than many SHEVs. For Figure 1 (right), the proposed changes to the UF are added resulting in further reductions in PHEVs compliance values and additional reductions in performance relative to SHEVs. Despite the real-world petroleum reduction advantage of PHEVs, the reduced UF and PEF will result lower CAFE compliance values for several PHEVs relative to comparable SHEVs. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

[See original for graph titled "Figure 1. Comparison of PHEV and SHEV CAFE Compliance Value with Current and Proposed PEF and UF"] [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

In addition, Mitsubishi recommends EPA coordinate with DOE and NHTSA to ensure the combined effects of the proposed UF, PEF and structure of the NHTSA CAFE standard ensure CAFE compliance reflects the real-world petroleum reduction benefit of PHEVs. [EPA-HQ-OAR-2022-0829-0682, pp. 5-6]

It is important to note that NHTSA's CAFE program in the past has mirrored EPA's GHG approach to these flexibilities. Since it is not possible to comment on a proposed CAFE regulation that has not yet been published, it is only reasonable to assume that NHTSA will follow previous precedent regarding flexibilities and adopt the same structure as EPA. However, there is a significant deviation with regard to the treatment of EV compliance under the CAFE and GHG programs. Where EVs are rightly considered zero g/mi under the GHG program, the CAFE program requires EVs to be assign a mile per gallon equivalent compliance value based on the PEF. Increasing this discrepancy in the GHG and CAFE programs, DOE has proposed reducing the PEF by 72% compared to the current value. The PEF reduction will lead to a substantial decrease in the CAFE compliance value of BEVs and PHEVs. The elimination of air conditioning and off- cycle credits for EVs combined with changes to the PEF, and UF within the CAFE program could put BEVs and PHEVs at a distinctive compliance disadvantage relative to some Strong Hybrid-Electric Vehicles (SHEVs). Keeping these flexibilities in the GHG program for electric vehicles should reduce potential harmonization issues between the GHG and CAFE regulations. For this reason and the reasons stated by Auto Innovators, Mitsubishi supports Auto Innovators proposed approach to apply all available credits at the vehicle level regardless of propulsion, but ensure fleet-wide average emissions are not allowed to go below a value equivalent to zero g/mi. [EPA-HQ-OAR-2022-0829-0682, pp. 8-9]

Organization: National Automobile Dealers Association (NADA)

IV. A Single Set of National Fuel Economy/GHG Emissions Standards Are Needed.

EPA asserts that it coordinated with NHTSA in developing its proposed standards and concluded that, despite EPA and NHTSA jointly adopting fuel economy and emissions standards on several prior occasions, it is not necessary to do so in this instance.73 NADA disputes EPA's assertion with respect to GHGs and contends, as it has in prior comments, that a single national fuel- economy/GHG emissions program, administered principally by NHTSA, is not only needed, but consistent with the structure designed by Congress in the Energy Policy and Conservation Act.74 [EPA-HQ-OAR-2022-0829-0656, pp. 16-17]

73 88 Fed. Reg. at 29293.

74 Pub. L. 94–163, 89 Stat. 871 (Dec. 22, 1975).

The regulation of motor vehicle fuel economy and tailpipe GHG emissions is largely duplicative. The physics and chemistry involved establish a direct relationship; controlling fuel economy controls GHG emissions and vice versa. Two federal agencies independently regulating essentially the same thing raises government inefficiency and waste concerns, results in unnecessary regulatory burdens and complexities, inevitably leads to higher vehicle costs for households and businesses. [EPA-HQ-OAR-2022-0829-0656, pp. 16-17]

By acting on its own and in advance of NHTSA, EPA may be rendering irrelevant any forthcoming NHTSA fuel economy proposal for the same timeframe, and arguably usurps NHTSA's authority to set fuel economy standards. NADA supports harmonized federal fuel economy/GHG emissions standards that are technologically feasible and economically practicable and that will result in cars and trucks that are attractive and affordable to prospective new motor vehicle consumers. NADA urges EPA to reconsider the unilateral issuance of GHG emissions standards and to issue standards that are harmonized with the fuel economy standards expected to be issued by NHTSA. [EPA-HQ-OAR-2022-0829-0656, pp. 16-17]

Organization: Nissan North America, Inc.

Moreover, Nissan encourages EPA to continue its efforts to coordinate the Federal greenhouse gas ("GHG") emission standards and Criteria Emission standards ("Tier 4") with the National Highway Traffic Safety Administration's ("NHTSA's") corporate average fuel economy ("CAFE") program and California Air Resources Board's ("CARB's") emission programs (GHG standards and LEV III/IV criteria emission standards). Manufacturers should be able to design one cohesive fleet that meets all Federal and state standards. Close coordination between these three regulatory entities would ensure that manufacturers can focus on developing the cleanest, most fuel efficient, and most affordable vehicles rather than expend excessive resources on compliance with uncertain and unnecessarily fragmented regulatory programs. [EPA-HQ-OAR-2022-0829-0594, p. 1]

VI. Continued Support for a Coordinated National Approach

Nissan strongly encourages EPA, NHTSA, and CARB to develop a coordinated national approach to automotive regulation. A patchwork of different federal and state GHG, CAFE, and criteria pollutant programs is neither effective nor efficient. In contrast, a harmonized national program maximizes both GHG, CAFE, and criteria pollutant benefits on a nationwide basis while also providing regulatory certainty and minimizing unnecessary compliance burdens for the industry. Such an approach would allow automakers to develop a single, unified fleet that meets all federal and state requirements while maintaining a full range of vehicle options for consumers. More importantly, a harmonized approach also would allow manufacturers to focus their planning and investments on achieving fuel economy improvements and emissions reductions rather than on tracking compliance with unnecessarily fragmented regulatory standards and programs. Under a harmonized approach, environmental benefits can be achieved at a lower cost to manufacturers and consequently a lower cost to consumers. Lower costs will help address social equity concerns related to EV accessibility and also encourage faster fleet turnover, replacing older vehicles with more efficient, cleaner, and safer vehicles. [EPA-HQ-OAR-2022-0829-0594, pp. 8-9]

As EPA and NHTSA consider potential changes to the federal GHG, and criteria pollutant programs, Nissan believes it is essential that the agencies work together to maximize compatibility and coordination of the programs. Nissan understands that, due to statutory limitations, certain programmatic elements of the GHG and CAFE programs may not be identical. Nissan encourages EPA and NHTSA to make the standards as equivalent and complementary as possible, however, by adopting appropriate regulatory adjustments where available. Nissan also encourages EPA to coordinate with NHTSA and the Department of Energy ("DOE") regarding DOE's proposal for a permanent petroleum equivalency factor ("PEF") for use in calculating petroleum-equivalent fuel economy values of EVs in the CAFE program. [EPA-HQ-OAR-2022-0829-0594, pp. 8-9]

Nissan also urges the Administration to work with California regulators to harmonize the federal and CARB programs to the fullest extent possible. This could be accomplished by reinstating California's "deemed-to-comply" measures, under which vehicles that meet federal standards are "deemed-to-comply" with CARB standards. Nissan is also open to new alternative approaches for harmonizing federal and California standards, as well. Nissan encourages EPA to work proactively with CARB to clarify the relationship between federal and California standards and harmonize them to the extent possible. [EPA-HQ-OAR-2022-0829-0594, pp. 8-9]

- Support coordination and harmonization between EPA, NHTSA, and CARB. One fleet should meet all programs with a common goal. [EPA-HQ-OAR-2022-0829-0594, p. 9]

Organization: Pearson Fuels

On behalf of Pearson Fuels, thank you for the opportunity to submit comments on the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (the "Proposed Standards"). These comments are focused on the light-duty greenhouse gas emissions standards (the "GHG Standards"). As the leading supplier of E85 fuel in California, Pearson Fuels' primary interests in this proceeding are to ensure that: 1) the tremendous policy value of flex fuel vehicles (FFVs) that utilize E85 fuel is recognized as an important GHG mitigation strategy, and 2) this policy value is reflected programmatically by EPA re-integrating a commensurate level of FFV crediting into the EPA's GHG Standards. Through precisely calibrated FFV crediting, EPA will revitalize FFV manufacturing by some automakers and facilitate the development of hybrid FFVs like the Toyota Hybrid Flex Corolla that is being pioneered by Toyota of Brazil.1 This revitalization will not impede EPA's aggressive goal of rapid light-duty electrification but will diversify EPA's portfolio of decarbonization strategies for internal combustion engines thereby catalyzing more rapid and comprehensive decarbonization of the light-duty sector. [EPA-HQ-OAR-2022-0829-0577, pp. 1-2]

1 See ET Auto, "Toyota launches pilot project on flex-fuel strong hybrid EVs in India," at https://auto.economictimes.indiatimes.com/news/toyota-launches-pilot-project-on-flexi-fuel-strong-hybrid-electric- vehicles-ffv-shev-in-india-signs-mou-with-iisc-bengaluru/94786626, and Nikkei Asia, "Toyota to invest $334m to make compact biofuel hybrids in Brazil, Carmaker seeks to provide consumers with cheaper, eco-friendly vehicles," at https://asia.nikkei.com/Business/Automobiles/Toyota-to-invest-334m-to-make-compact-biofuel-hybrids-in-Brazil.

FFVs are a proven, robust, cost-saving and energy security enhancing GHG reduction tool that the U.S. Environmental Protection Agency ("EPA") integrated into the 2012-2016 light-duty GHG standards in a manner that aligned with the methodology of the Corporate Average Fuel Economy ("CAFE") program and facilitated extensive FFV manufacturing. Beginning in 2016, EPA eliminated its use of the 0.15 multiplier in the EPA's GHG Standards which triggered the rapid decline of FFV manufacturing. EPA explained its elimination of the multiplier based on the distinct goals of the CAFE program wherein the use of E85 achieves an 85% reduction in petroleum use thereby justifying the multiplier as compared to the EPA's GHG program which is focused on GHG reduction with no comparable justification for a multiplier.2 [EPA-HQ-OAR-2022-0829-0577, pp. 1-2]

2 77 FR 62816.

I. EPA SHOULD ESTABLISH AN APPROPRIATE GHG EMISSIONS FACTOR FOR FFV CREDITING THAT RECOGNIZES THE GHG BENEFITS OF E85 USAGE

a. EPA harmonized the GHG program with the CAFE program on FFV crediting during MY 2012-2015 then eliminated the 0.15 multiplier in the GHG program.

The CAFE and GHG programs are distinct programs in terms of history, objectives and underlying legal authority. The 2021 GHG Rulemaking characterizes the key distinctions between the programs on the multiplier (termed a "divisor" in the rulemaking) issue as follows: [EPA-HQ-OAR-2022-0829-0577, p. 4]

"Congress provided the 0.15 divisor for CAFE compliance because a vehicle that operates on a nonpetroleum fuel (like CNG) consumes zero or near-zero petroleum, and petroleum conservation is a primary objective of the CAFE program."6 [EPA-HQ-OAR-2022-0829-0577, p. 4]

6 77 FR 62816.

(…)

"The primary focus of the GHG standards is GHG emissions."7 [EPA-HQ-OAR-2022-0829-0577, p. 4]

7 Id.

(…)

"We also disagree with those commenters who argued that EPA must adopt the 0.15 divisor in order to not ''negate the Congressional mandate'' for CAFE credits. (…)"8 [EPA-HQ-OAR-2022-0829-0577, p. 4]

8 Id.

b. During the period of harmonized CAFE and GHG crediting, the U.S. FFV fleet grew rapidly. Now, at a critical time for climate change mitigation, the U.S. FFV fleet is in dramatic decline.

On April 22, 2021, President Biden announced a "nationally determined contribution" pledge under the 2015 Paris climate agreement to cut U.S. GHG emissions in half by 2030 at a virtual climate summit attended by dozens of world leaders. In his remarks about the pledge from the White House, the President stated, "These steps will set America on a path of net zero emissions economy by no later than 2050."10 Thus the President has re-established aggressive GHG reduction as a priority policy of the federal government and set a goal of carbon neutrality by 2050. While there has been a significant expansion of BEVs, internal combustion engines continue to dominate the market and roads of America and are anticipated to maintain this dominant role for the next decade and potentially longer. The following illustrative graphics were developed by the Alliance for Automotive Innovation. [EPA-HQ-OAR-2022-0829-0577, pp. 5-6]

10 Josh Lederman and Denise Chow, "Biden Commits to cutting U.S. emissions in half by 2030 as part of Paris climate pact," (April 22, 2021), available at https://www.nbcnews.com/politics/white-house/biden-will-commit- halving-u-s-emissions-2030-part-paris-n1264892.

SEE ORIGINAL COMMENT FOR PIE CHART for the Role of Liquid Fuels and BAR GRAPH of EPA-Projected Cumulative U.S. Sales 2023-2032 [EPA-HQ-OAR-2022-0829-0577, pp. 5-6]

During the period of harmonized GHG crediting, when both the GHG and CAFE programs utilized the 0.15 divisor, there was a substantial expansion of the FFV fleet peaking with the manufacture of 2.8 million total light-duty vehicles in MY 2014. The total registered fleet of FFVs in the U.S. continued to grow incrementally until 2020, but from 2015-2020 automakers sharply reduced the number of vehicle offerings. The attached Exhibit 1 developed by the Renewable Fuels Association details vehicle offerings by model and engine type and shows the massive reduction of models that occurred due to the near total elimination of light-duty GHG program crediting. During the peak period of manufacturing, Chrysler, Ford and General Motors manufactured 76 different models of FFVs. This scale of manufacturing has since been decimated with only 8 FFV models offered in 2023 with 5 of these being limited to fleet models. [EPA-HQ-OAR-2022-0829-0577, pp. 5-6]

Restoring more harmonized FFV crediting between the CAFE and GHG programs would benefit automakers, consumers, and marketers by affording all a choice in the market and by establishing a diversified technology portfolio approach to decarbonization. FFVs deliver a wide array of real-world benefits when fueled with E85 or other gasoline-ethanol blends, including improved U.S. energy security, support for the U.S. farm economy, as well as significant reductions in GHG emissions. FFV consumers can respond to fuel market signals by utilizing high blend E85 ethanol when the fuel is at the greatest discount to petroleum and conventional gasoline when ethanol prices are relatively high as compared to gasoline (which has rarely been the case in the past five years). [EPA-HQ-OAR-2022-0829-0577, p. 6]

These are all vital flexibilities to a successful evolution of the vehicle market and to achieving the goals of the GHG rulemaking – increased efficiency, improved energy security, reduced costs to consumers, and reduced GHG emissions from the transportation sector. [EPA-HQ-OAR-2022-0829-0577, p. 6]

i. EPA established a new methodology for calculating FFV crediting for MY 2016 and later in its joint rule with NHTSA for MY 2012-2016.

In the joint NHTSA Final Rule for MY 2012-2016 ("Joint 2012 Final Rule"), EPA established first the approach for FFV crediting for 2012-2016: [EPA-HQ-OAR-2022-0829-0577, pp. 14-15]

(1) The assumption that the vehicle is operated 50% of the time on the conventional fuel and 50% of the time on the alternative fuel, (2) that 1 gallon of alternative fuel is treated as 0.15 gallon of fuel, essentially increasing the fuel economy of a vehicle on alternative fuel by a factor of 6.67, and (3) a ''cap'' provision that limits the maximum fuel economy increase that can be applied to a manufacturer's overall CAFE compliance value for all CAFE compliance categories

(i.e., domestic passenger cars, import passenger cars, and light trucks) to 1.2 mpg through 2014 and 1.0 mpg in 2015.28 [EPA-HQ-OAR-2022-0829-0577, pp. 14-15]

28 75 FR 25432.

The Joint 2012 Final Rule also established the methodology for FFV crediting for MY 2016 and subsequent years as being distinct from the 2012-2016 methodology as follows: [EPA-HQ-OAR-2022-0829-0577, pp. 14-15]

Starting with model year 2016, as proposed, EPA will no longer allow manufacturers to base FFV emissions on the use of the 0.15 factor credit described above, and on the use of an assumed 50% usage of alternative fuel. Instead, EPA believes the appropriate approach is to ensure that FFV emissions are based on demonstrated emissions performance.29 [EPA-HQ-OAR-2022-0829-0577, pp. 14-15]

29 Id. at 25433.

II. EPA SHOULD TAKE THE OPPORTUNITY IN THIS RULEMAKING TO RECOGNIZE THE TRUE GHG POLICY VALUE OF FFVS BY RESTORING MEANINGFUL GHG CREDITING FOR FFVs

We encourage the Agency to re-affirm the policy value of FFVs and American ethanol production and use by restoring meaningful GHG crediting for the manufacture of FFVs by modifying the methodology for determining GHG crediting for FFVs beginning MY 2027. EPA has authority to better harmonize crediting between the GHG and CAFE standards and thereby expand FFV manufacturing through two alternative means both of which are supported by Pearson Fuels. [EPA-HQ-OAR-2022-0829-0577, p. 16]

a. EPA should re-integrate the methodology that continues to exist in the CAFE program by re-establishing its use of the 0.15 multiplier in the EPA's GHG Standards, or, [EPA-HQ-OAR-2022-0829-0577, p. 16]

b. EPA should establish a new GHG Emissions Factor for the GHG Standards that recognizes the lifecycle emissions reductions of E85 as compared with conventional gasoline. [EPA-HQ-OAR-2022-0829-0577, p. 16]

Crediting based on lifecycle GHG emissions reductions can be accomplished simply by establishing a GHG Emissions Factor that is based on the average GHG emissions reduction provided by ethanol as compared to petroleum gasoline on a lifecycle basis. This GHG Emissions Factor would be subject to adjustment based on a determination by Argonne National Laboratory regarding the average lifecycle emissions of U.S. used as a transportation fuel as compared to the average lifecycle emissions of the U.S. gasoline used as a transportation fuel. [EPA-HQ-OAR-2022-0829-0577, p. 16]

Organization: POET, LLC

3. Renewable fuels crediting would give vehicle manufacturers more options to comply and make for a more durable emissions reduction program.

Adding a renewable fuel crediting mechanism would make it more feasible for automakers to meet EPA's stringent standards. Renewable fuels would further diversify the pathways for manufacturers to comply with the proposed standards. This would be especially important in places, particularly rural areas with lower population densities, where BEV infrastructure will be difficult to develop at scale and may not be cost-effective. Renewable fuels would serve as a viable alternative to attain significant light-duty vehicle emissions reductions. [EPA-HQ-OAR-2022-0829-0609, p. 10]

EPA and the National Highway Traffic Safety Administration ("NHTSA") have experience with exactly this type of bioethanol crediting that POET proposes. In prior iterations of EPA's § 202 standard through model year 2015, and in the existing NHTSA fuel economy standards, FFVs receive compliance benefits because they can run on alternative fuels such as E85.23 This ability to utilize lower GHG fuels is adjusted by an "F Factor" that represents how much renewable fuel is used in the real world.24 EPA should re-introduce crediting for vehicles that can utilize higher blends of renewable fuels, and should expand the program to include technologies other than just FFVs. [EPA-HQ-OAR-2022-0829-0609, p. 10]

23 See EPA regulations at 40 CFR 600.510-12(j)(2)(iv)(B) providing FFV crediting through Model Year 2015. Regarding currently applicable NHTSA regulations at 49 CFR 523.2 (definition of dual-fuel vehicle includes flexible fuel vehicles); 49 CFR 536.10 (indicating that dual-fuel vehicles can earn credits under the standards); 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62624, 62829-30 (Oct. 15, 2012) (providing that FFVs could generate credits under the standards). See the discussion in section III.d below for additional details.

24 40 CFR 600.510-12(k).

Organization: Porsche Cars North America (PCNA)

Porsche notes that EPA's proposed update to the PHEV utility factor will also influence CAFE compliance calculations due to the allowance within statute and regulation for manufacturers to optionally select weighted operation. EPA did not provide analysis as to how this change would affect CAFE compliance especially considering Department of Energy (DOE) recent NPRM to reduce the Petroleum Equivalence Factor (PEF) by 72% for electric vehicles. This dramatic proposal from DOE to undercut the incentive for electric vehicles within CAFE is premature given that proposed CAFE standards for model years 2027 and later have not yet been released by NHTSA. Porsche recommended in comments to DOE for their NPRM that DOE include the assessment of EPA's proposed change in the utility factor to better understand the combined effect of lower PEF and lower utility factor. DOE did not acknowledge, or was unaware of, the proposed reduction in utility factor from EPA. The PEF statutory basis requires DOE, as it has done for over 40 years, to incentivize electrified vehicles in CAFE. This statute also requires DOE, NHTSA and EPA to consult on changes related to PEF and CAFE. Neither the EPA MPR NPRM nor the DOE PEF NPRM appear to discuss the mutual impacts that each other's proposed updates could have on future CAFE compliance. As NHTSA has yet to release their CAFE proposal, it is unclear if NHTSA will address both the EPA and DOE proposals and how both could impact CAFE compliance. To Porsche, it is unclear as to why these NPRMs appear disjointed and so far, have failed to discuss the impacts of each other's proposals on the other regulations. Porsche recommends EPA provide analysis of the impact of the reduced utility factor on the PEF and CAFE compliance in coordination with DOE and NHTSA. Ideally, all the proposals would have been released together to provide manufacturers with the ability to understand how each of the agency's actions would interact with each other and continue to support and incentivize technologies such as PHEV. This is especially relevant considering the overarching goal to achieve a dramatic increase in light-duty electrification. [EPA-HQ-OAR-2022-0829-0637, pp. 21-23]

Organization: Stellantis

EPA must take a more realistic outlook on the policy enablers initiated that are only partially scoped to grow the EV market EPA predicts and set standards that promote a feasible transition to electrification without distracting with unnecessary ICE development. The proposed rule and draft Regulatory Impact Analysis (RIA) include projections of numerous variables (such as benefits and costs) out to 2055 (i.e., well beyond the time period of this rulemaking), which exacerbates the uncertainties that underlie multiple assumptions contained in the NPRM. Stellantis agrees with Auto Innovators' concern raised that the NPRM fails to adequately coordinate and harmonize the stringency between EPA's, NHTSA's, and CARB's standards. Given the significance of electrification, it is more important than ever that there is consistency between agencies to ensure multiple sets of standards do not work at cross-purposes with each other but instead are harmonized allowing automakers to build one fleet that efficiently and effectively meets all requirements. [EPA-HQ-OAR-2022-0829-0678, p. 24]

Stellantis recommends that EPA should:

- Include a provision that compliance with EPA's GHG standards would constitute compliance with CAFE standards [EPA-HQ-OAR-2022-0829-0678, p. 24]

Organization: Steven G. Bradbury

EPA may not use carbon dioxide regulation to displace DOT's exclusive authority over fuel economy standards.

Setting limits on carbon dioxide emissions for gas-powered vehicles and prescribing fuel economy standards for those vehicles are two sides of the same regulatory coin. They cannot be separated, because there is a direct and consistent relationship between the amount of carbon dioxide a vehicle's internal-combustion engine will generate per mile traveled and the number of miles the vehicle will go on a gallon of gas. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

The problem for the EPA is that ever since enactment of the Energy Policy and Con- servation Act (EPCA) in 1975, which created the fuel economy program, Congress has given the Secretary of Transportation, not the EPA, the sole authority to establish fuel economy standards for new motor vehicles offered for sale to private buyers in the United States8—authority delegated by the Secretary to the National Highway Traffic Safety Administration (NHTSA), a component of DOT. NHTSA consults with EPA and the Energy Department in setting the standards, and EPA is tasked with measuring the auto- makers' compliance with the standards NHTSA sets, but neither EPA nor any other agency has authority to supersede or interfere with NHTSA's mandate under EPCA. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

8 See 49 U.S.C. § 32902, https://www.law.cornell.edu/uscode/text/49/32902.

Congress assigned to DOT the exclusive authority to set fuel economy standards, rather than EPA under the Clean Air Act, because the fuel economy program is not about environmental regulation. Congress wanted to prod the automakers toward the production of more fuel-efficient vehicle models to help lessen America’s strategic dependence on foreign oil in the wake of the Arab oil embargoes of the 1970s. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

Congress’s delegation of authority over the fuel economy program has always been carefully limited.

Initially, Congress specified mileage targets by statute and put a tight collar on DOT’s regulatory authority: Any proposed fuel economy standard that fell outside the collar was subject to veto by either House of Congress—a restraint that was nullified when the Supreme Court held legislative vetoes unconstitutional in INS v. Chadha (1983). And from time to time, Congress has put statutory caps on the mileage standards through appropriations riders. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

Ultimately, when it allowed broader standard-setting discretion to DOT under EPCA, Congress still did so in a manner designed to ensure that NHTSA’s regulatory power would never be used to frustrate Americans’ love affair with the automobile or impose disruptions in the traditional automotive industry. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

In administering the fuel economy program, NHTSA must (i) respect the practical needs and desires of American car buyers; (ii) take into account the economic realities of supply and demand in the auto markets; (iii) protect the affordability of vehicle options for American families; (iv) preserve the vitality of the domestic auto industry, which sustains millions of good-paying American jobs; (v) maintain highway traffic safety for the country; (vi) consider the nation’s need to conserve energy; and (vii) advance the goal of reducing America’s strategic dependence on foreign supplies of critical inputs. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

And, significantly, EPCA expressly prohibits NHTSA from considering the fuel economy of electric vehicles in setting or amending its standards.9 [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

9 See id. § 32902(h); see also 49 U.S.C. § 32901(a)(1), (8), (9) & (10), https://www.law.cornell.edu/uscode/text/49/32901.In sum, NHTSA has no authority to compel the phaseout of internal-combustion engines or to require automakers to use new technologies that are not responsive to con- sumer demand or that fail to align with the industry’s existing production realities.

In Massachusetts v. EPA,10 the Supreme Court concluded that, in theory, there is no necessary conflict between the control of carbon dioxide emissions under section 202 of the Clean Air Act and NHTSA’s authority to prescribe fuel economy standards under EPCA.11 But, in practice, whenever EPA actually proposes to impose such emissions controls, it must do so in a manner that avoids displacing NHTSA’s authority over fuel economy. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

10 549 U.S. 497 (2007), https://www.oyez.org/cases/2006/05-1120.

11 See id. at 532 (“The two obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.”).

EPA may not use carbon dioxide regulation to displace DOT’s exclusive auth- ority over fuel economy standards. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

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Ultimately, when it allowed broader standard-setting discretion to DOT under EPCA, Congress still did so in a manner designed to ensure that NHTSA's regulatory power would never be used to frustrate Americans' love affair with the automobile or impose disruptions in the traditional automotive industry. [EPA-HQ-OAR-2022-0829-0647, pp. 4-5]

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phaseout of internal-combustion engines or to require automakers to use new technologies that are not responsive to con- sumer demand or that fail to align with the industry's existing production realities.

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10 549 U.S. 497 (2007), https://www.oyez.org/cases/2006/05-1120.

11 See id. at 532 ("The two obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.").

It is a basic principle of law that when there is a potential for inconsistent application of two federal statutes, the statutes must be interpreted and applied in harmony, if reason- ably possible. The agencies charged with faithfully carrying out those statutory mandates are required to respect and preserve the roles and priorities assigned by Congress. [EPA-HQ-OAR-2022-0829-0647, pp. 5-6]

The Obama administration was the first to confront this issue when it launched the EPA into the business of regulating carbon dioxide emissions from new motor vehicles in 2012. Both the Obama administration and later the Trump administration addressed the requirement for harmonization by having NHTSA and EPA conduct joint rulemakings in the setting of common fuel economy standards and carbon dioxide emissions limits. [EPA-HQ-OAR-2022-0829-0647, pp. 5-6]

But the present administration has broken that mold, and the current proposed tailpipe rules are an egregious example. By acting on its own, in advance of NHTSA, to dictate draconian new reductions in carbon dioxide emissions limits for future model years of vehicles, EPA would render entirely irrelevant NHTSA's judgment about the appropriate fuel economy standards for those same vehicle fleets. If finalized in their current form, the proposed limits on carbon dioxide emissions from new motor vehicles (both for light- and medium-duty vehicles and for heavy-duty trucks) would be an unlawful usurpation by EPA of NHTSA's exclusive statutory role. Any determination by NHTSA to establish fuel eco- nomy standards for gas-powered vehicles that would allow for greater carbon dioxide emis- sions than EPA's proposed rules would have no regulatory effect—it would be a nullity. [EPA-HQ-OAR-2022-0829-0647, pp. 5-6]

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Organization: The Aluminum Association

This disregard for vehicle efficiency distinction across BEV's in the proposed rule conflicts with the existing and historic approaches of the Corporate Average Fuel Economy (CAFE) program and is a potential disruption to harmonization. [EPA-HQ-OAR-2022-0829-0704, pp. 7-8]

Organization: U.S. Chamber of Commerce

Moreover, we note that a forthcoming rulemaking by the National Highway Traffic Safety Administration (NHTSA) addressing fuel economy standards has potential to conflict with EPA's proposal, adding costly and unnecessary compliance burdens on the auto industry. Accordingly, the Chamber reiterates its longstanding recommendation that EPA and NHTSA cooperate to ensure a unified set of federal standards that minimize conflicting regulatory requirements between the overlapping rulemakings. [EPA-HQ-OAR-2022-0829-0604, p. 3]

Organization: Valero Energy Corporation

D. EPA should neither align the proposed rule with the Advanced Clean Cars programs (ACC), nor rely on ACC or any other state standards.

To the extent EPA is considering extending the model years at issue and increasing the stringency of the proposed standards in the final rule to align with and/or reflect California's Advanced Clean Cars programs or any other state greenhouse gas emission standards or ZEV sales mandates, or is otherwise relying on any such state standards or mandates, such changes would be unlawful. State greenhouse gas emission standards and ZEV sales mandates are preempted by both EPCA and the RFS, making any reliance on such standards by EPA equally unlawful. Moreover, such a radical departure from the proposed rule would require EPA to reopen the comment period to allow for meaningful public comment on these issues and their related impacts. [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

EPCA prohibits States from adopting or enforcing "a law or regulation related to fuel economy standards or average fuel economy standards for automobiles." 49 U.S.C. § 32919(a) (emphasis added). The Supreme Court has described "related to" preemption provisions like this one as "deliberately expansive," Pilot Life Ins. Co. v. Dedeaux, 481 U.S. 41, 46 (1987), and "conspicuous" in their breadth, FMC Corp. v. Holliday, 498 U.S. 52, 58 (1990). As the Court has explained, a state requirement "relate[s] to" a federal law or regulation as long as it has a “connection with,” or contains a “reference to,” the regulated topic. Rowe v. New Hampshire Motor Transport Ass’n, 552 U.S. 364, 370 (2008) (quoting Morales v. Trans World Airlines, Inc., 504 U.S. 374, 384 (1992)). [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

State electric-vehicle mandates have a clear “connection with” fuel economy. Electric-vehicle mandates like California’s require manufacturers to make a certain number of “vehicles that produce zero exhaust emissions of any criteria pollutant (or precursor pollutant) or greenhouse gas, excluding emissions from air conditioning systems.” Cal. Code Regs. tit. 13, § 1962.2(a). Because emissions of the greenhouse gas carbon dioxide are “essentially constant per gallon combusted of a given type of fuel,” the fuel economy of a vehicle and its carbon-dioxide emissions are two sides of the same coin. 75 Fed. Reg. at 25,324, 25,327 (May 7, 2010). Accordingly, “any rule that limits tailpipe [greenhouse gas] emissions is effectively identical to a rule that limits fuel consumption.” Delta Constr. Co., 783 F.3d at 1294 (citation omitted). EPA has previously found California’s ZEV mandates are expressly and impliedly preempted by EPCA. 83 Fed.Reg. 42,986, 43,238-39 (Aug. 24, 2018). That is consistent with the court’s finding in Central Valley Chrysler-Plymouth v. California Air Resources Board, No. CV-F-02-5017 REC/SMS, 2002 WL 34499459 (E.D. Cal. June 11, 2002), that “Plaintiffs have shown that the 2001 ZEV amendments “relate to” fuel economy standards because they “clearly have the purpose of regulating the fuel economy performance of ... the advanced technology hybrids that the Executive Officer predicts the industry will sell in California....” Id. at *3. As a result of that litigation, CARB has “removed all references to fuel economy or efficiency,” Fact Sheet: 2003 Zero Emission Vehicle Program Changes, California Air Resources Board (Mar. 18, 2004),370 in its ZEV mandates, but removal of the reference does not equate to removal of the fact that these regulations relate to fuel economy standards. [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

> 370 The Fact Sheet clarifies that the changes made were a direct result of the EPCA preemption finding: “In June 2002, due to a lawsuit against the ARB, a federal district judge issued a preliminary injunction that prohibited the ARB from enforcing the 2001 ZEV amendments with respect to the sale of new motor vehicles in model years 2003 or 2004. The lawsuit was focused on the assertion that AT PREV provisions pertaining to the fuel economy of hybrid electric vehicles were preempted by the Energy Policy and Conservation Act of 1975 – the law directing the National Highway Traffic Safety Administration to establish corporate average fuel economy (CAFE) standards. Since adopting the 2003 Amendments to the ZEV regulation, the parties to the lawsuit have agreed to end the litigation…. ¶ In order to address the preliminary injunction … staff proposed additional modifications to the ZEV regulation in March 2003.”. Id. at 1.

Separately, electric-vehicle mandates also relate to “average fuel economy” because they restrict manufacturers’ choices as to how to meet those standards. EPCA allows manufacturers to meet NHTSA’s fuel-economy standards by producing any combination of vehicles that the national market will bear, using whatever technological approach to fuel economy they think best. State electric-car mandates, by contrast, require automakers to comply in a specific way: either by selling a certain percentage of zero-emission vehicles or purchasing credits from competitors. The state mandates thus relate to federal fuel-economy standards because they “force [a manufacturer] to adopt a certain scheme” and “restrict its choice” of compliance, and are thus preempted. New York State Conf. of Blue Cross & Blue Shield Plans v. Travelers Ins. Co., 514 U.S. 645, 668 (1995); accord Ophir v. City of Boston, 647 F. Supp. 2d 86, 93 (D. Mass. 2009). [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

State electric-vehicle mandates are also impliedly preempted by a separate statutory provision, the RFS. State laws are impliedly preempted when they “stand[] as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress." Arizona v. United States, 567 U.S. 387, 406 (2012) (citation omitted). A "conflict in technique can be fully as disruptive to the system Congress erected as conflict in overt policy." Id. (citation omitted); see Geier v. American Honda Motor Co., 529 U.S. 861, 881 (2000). [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

Here, state electric-vehicle mandates conflict with Congress's objectives in enacting the RFS. The RFS reflects Congress's policy decision to "move the United States toward greater energy independence and security" in a specific way: by "increas[ing] the production of clean renewable fuels" to be blended with fossil fuels. ACE, 864 F.3d at 697 (citations omitted). Mandating electrification—in other words, eliminating vehicles that use liquid renewable fuels—puts severe pressure on regulated entities' ability to comply with the RFS by reducing the percentage of vehicles that use those renewable fuels. [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

By contrast, Congress has never included electric-vehicle mandates in its energy-security plans and in fact has rejected several bills that would have imposed such mandates. See, e.g., Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018). State electric-vehicle mandates wreak havoc on Congress's carefully crafted scheme in favor of an option that Congress has consistently rejected. Cf. West Virginia v. EPA, 142 S. Ct. 2587, 2614 (2022). [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

Because these state standards and mandates are themselves preempted and unlawful, any reliance on, or consideration of, such standards by EPA would be equally unlawful. Any such change(s) at this juncture without reopening the public comment period would also deny stakeholders an opportunity for meaningful comment, particularly because EPA has not made available for review the factual or legal basis for any such proposed changes or its analysis of their economic impact and related policy considerations. Moreover, the final rule would constitute a radical departure from the proposal without fairly apprising stakeholders of the standards or their underlying bases. [EPA-HQ-OAR-2022-0829-0707, pp. 89-91]

Organization: Volkswagen Group of America, Inc.

Harmonization with CAFE program – "Deemed to Comply"

Volkswagen supports EPA's goal of transitioning to zero emission mobility. The NPRM includes ambitious GHG reductions. In recognition of this, Volkswagen asks that GHG regulations be harmonized with the future NHTSA CAFE targets, or that a "Deemed to Comply" mechanism be made available, where compliance to the EPA GHG regulations also satisfies compliance to the CAFE program. [EPA-HQ-OAR-2022-0829-0669, p. 3]

Organization: Volvo Car Corporation (VCC)

Harmonization

Unfortunately, US has multiple federal and state agencies regulating auto emissions and this has created various competing and overlapping rules. The EPA differs significantly from the CARB ACCII and we are awaiting an NPRM from NHTSA on fuel economy. The Department of Energy also has a pending proposal that will determine the energy efficiency of EVs. VCC encourages EPA to harmonize with the other programs as much as possible. [EPA-HQ-OAR-2022-0829-0624, p. 5]

VCC has consistently stated that the goal of achieving one single national harmonized program (California, EPA and NHTSA) is the preferred path forward to increase fuel economy and lower emissions year over year. However, VCC believes regulatory consistency, and a clear federal framework are necessary to effectively and efficiently enable the auto industry to develop more efficient vehicles and to advance the market for advanced technology vehicles. Multiple vehicle regulatory programs at the Federal and State level that require separate and duplicative reporting, accounting, and testing are inefficient and increase uncertainty in the market. [EPA-HQ-OAR-2022-0829-0624, p. 5]

The US should work to minimize disparities between EPA (GHG) and NHTSA (CAFE) regulations and California regulations. The program should reduce reporting requirements by allowing manufacturers to demonstrate compliance at the end of the year for all programs. [EPA-HQ-OAR-2022-0829-0624, p. 5]

Compliance reporting should be consolidated so that it is one report for one agency and that agency determines compliance (so reciprocal recognition). Currently, there are separate assessments for each program, and this is unnecessary and especially burdensome for smaller manufacturers like VCC. [EPA-HQ-OAR-2022-0829-0624, p. 5]

EPA Summary and Response

Many commenters urged EPA to coordinate with NHTSA to ensure the GHG program is not in conflict with changes NHTSA may propose in its CAFE rulemaking.[700] Other commenters questioned why EPA and NHTSA were issuing separate and not joint rules for their respective GHG and fuel economy standards as had been done for certain past rules. We discuss in Section III.I of the preamble issues of consultation and coordination between the EPA and NHTSA programs and the decision to issue separate and not joint rulemakings. Executive Order 14037 directs EPA and DOT to coordinate, as appropriate and consistent with applicable law, during consideration of this rulemaking. EPA has coordinated and consulted with DOT/NHTSA, both on a bilateral level during the development of this rule as well as through the interagency review of the EPA rule led by the Office of Management and Budget. EPA has set some previous light-duty vehicle GHG emission standards in joint rulemakings where NHTSA also established CAFE standards. Most recently, in establishing standards for model year 2023-2026, EPA and NHTSA concluded that it was appropriate to coordinate and consult but not to engage in joint rulemaking. EPA has similarly concluded that it is not necessary for this EPA rule to be issued in a joint action with NHTSA. In reaching this conclusion, EPA notes there is no statutory requirement for joint rulemaking and that the agencies have different statutory mandates and their respective programs have always reflected those differences. As the Supreme Court has noted "EPA has been charged with protecting the public's 'health' and 'welfare,' a statutory obligation wholly independent of DOT's mandate to promote energy efficiency."[701] Although there is no statutory requirement for EPA to consult with NHTSA, EPA has consulted

[700] Note that since EPA received these public comments, NHTSA has since issued a proposed rulemaking, "Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027–2032 and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030–2035." 88 FR 56128, August 17, 2023.
[701] *Massachusetts* v. *EPA*, 549 U.S. at 532.

significantly with NHTSA throughout the development of this rule and closely coordinated with NHTSA on a full range of issues related to feasibility, modeling and stringency

The Alliance for Automotive Innovation and many auto manufacturers and suppliers (e.g., BMW, Mazda, MEMA) encouraged the agencies to continue to work closely together, to enable manufacturers to abide by both sets of regulations with one single fleet. Some commenters (e.g., Ford, GM, Kia, Mercedes Benz, Nissan, Volvo) raised this issue of harmonization across programs to include the California program as well, noting their goal of a coordinated national approach to automotive regulations, and further noting that to the extent there are contradictions among rules from different agencies this could divert resources away from electrification. Another automaker (Volvo) urged the agencies to consolidate reporting requirements, which they believe can be burdensome for smaller manufacturers.

In response, EPA notes that since the beginning of the light- and medium-duty GHG programs we have worked together with NHTSA to harmonize program elements, testing and reporting requirements where appropriate (e.g., emissions and fuel economy testing). We also note there have been differences between certain features of the two programs, stemming from different statutory authorities for the two agencies. For example, EPA's program allows credits for air conditioning leakage which impacts GHGs but not fuel economy. To the extent that there remain programmatic differences across the GHG and CAFE programs, due to differences in statutes, we do not believe that such differences will cause difficulties with or be disruptive to manufacturers' strategies to comply with both the GHG standards and the CAFE standards. As we have done for almost 14 years since the EPA GHG program first became effective, we will continue to coordinate with NHTSA during the implementation phase of the final standards. With regard to comments regarding harmonization with California, EPA notes that EO 14037 also directs EPA to coordinate with California and other states that are leading the way in reducing vehicle emissions. EPA has engaged with the California Air Resources Board on technical issues in developing this rule. EPA has considered certain aspects of the CARB Advanced Clean Cars II program, adopted in August 2022, and in some cases, where appropriate, our program is consistent with aspects of the ACC II program, as discussed in the preamble (e.g., see light-duty vehicle criteria pollutant provisions section III.D. 7; on-board diagnostics section III.H; battery durability section III.G.2.). As is our long-standing practice, EPA will continue to coordinate with NHTSA and CARB as we implement the GHG final standards.

Volkswagen similarly urged harmonization including that CAFE compliance be allowed to be determined based on an automaker being "deemed to comply" with the EPA GHG standards. EPA notes that this issue is out of scope for the EPA rulemaking, as such a determination of CAFE compliance would need to be made by NHTSA under its own authority.

GM and a few other commenters recommended the federal agencies develop a "Leadership Pathway" which would reduce duplicative requirements across the regulations for any automaker that exceeds national-level EV goals. EPA responds to this comment in section 3.4 of this RTC.

Auto industry commenters noted EPA's proposed revised definition of "medium-duty passenger vehicle" and questioned how such a change in regulatory classes might be coordinated with the NHTSA CAFÉ program. EPA responds to this comment in section 3.1.1 of this RTC.

A few commenters (e.g., Fuel Freedom Foundation, Pearson Fuels) urged EPA to adopt provisions for flex fueled vehicles (FFVs), which can be fueled on gasoline or E85, in a way that is harmonized with FFV treatment under CAFE. Poet suggested that EPA establish a renewable fuels credit mechanism as part of the GHG standards. EPA did not reopen provisions for the treatment of FFVs in this rulemaking, and did not propose or seek comment on a renewable fuels credit mechanism, and thus considers these comments out of scope. EPA notes that nothing in our performance-based standards precludes automakers from choosing FFVs, or producing renewable fueled vehicles, as part of its mix of technologies for compliance with the final standards. EPA has existing provisions to calculate the emissions weighting of FFVs, based on our projection of actual usage of gasoline vs. E85, referred to as the F-factor (see 40 CFR 600.510–12(k); 40 CFR 86.1819–14 (d)(10)(i)).

Some commenters (e.g., Mitsubishi) noted that, unlike the GHG standard, which treats electric operation as zero emissions, and weights PHEV emissions through use of the utility factor, the CAFE regulation assigns PHEVs and BEVs a petroleum-equivalent fuel economy, or Petroleum Equivalency Factor (PEF). These commenters further note that this will lead to different weightings between the two programs of compliance benefits for PHEVs and BEVs. Several commenters noted NHTSA's restriction for considering BEVs in their standard setting process and seem to conclude that that one limitation in NHTSA's statutory authority would automatically result in a single fleet not being able to comply with both EPA and NHTSA's standards. Another commenter (Aluminum Association) believes that the CAFE program's treatment of BEVs (through the use of the PEF) accounts for improved efficiency whereas EPA's program does not explicitly. In response, EPA recognizes that this final rule's compliance treatment of BEVs (0 grams CO2/mile) and PHEVs (utility factor weighting of electric operation at 0 g/mi vs. gasoline emissions value) is different than that proposed by NHTSA for the CAFE program which relies on the DOE PEF, pursuant to the CAFE statute. Importantly, this difference across the program is not new -- it has existed in the programs since the beginning of EPA's GHG program first established in 2010 for the 2012 MY. EPA and NHTSA have had, and will continue, extensive technical coordination on these issues. Our goal continues to be that each agency can implement its respective statutory authority while avoiding inconsistency, and that auto manufacturers will be able to comply with both sets of standards with a single fleet, as has been the case since the GHG and CAFE programs have existed alongside each other since MY 2012.

Comments about EPA's statutory authority to issue greenhouse gas standards are addressed in section 2 of this RTC. Comments about NHTSA's statutory authority are beyond the scope of this action.

27 - Other comments related to the proposed rule

Comments by Organizations

Organization: Ad Hoc Tier 4 Light-Duty Small Manufacturer Group

The Ad Hoc Group intends to file a Supplemental Comment before the July 5, 2023 comment due date providing additional details [EPA-HQ-OAR-2022-0829-0509, p. 1]

Organization: Alliance for Automotive Innovation

6. CO2 Credits for Advanced Technology Vehicles

EPA proposes changes to the method for calculating MY 2022-2024 caps on multiplier-based advanced technology vehicle credits in the proposed 40 C.F.R. § 86.1866-12.195 Given the limited comment period and the denial of our request to extend it, Auto Innovators did not have sufficient time to evaluate the proposed change. Additionally, we were unable to locate a description of the proposed change in the preamble of the NPRM, so it is difficult to know what the intent of the proposed change is. Following the formal comment period, we may revisit this issue and request a meeting with EPA staff if there is a concern. [EPA-HQ-OAR-2022-0829-0701, pp. 108-109]

195 NPRM at 29438.

To reduce costs while still providing similar (and substantial) environmental benefits, the EPA regulations should seek to align with criteria emissions regulations already adopted by California in ACC II. We worked closely with the California Air Resources Board (CARB) and with EPA staff in attendance and participating,255 for the past several years to develop standards that substantially reduce real-world criteria emissions (including NMOG+NOx and PM), as rapidly as possible without stranding technology or diverting resources from electrification. [EPA-HQ-OAR-2022-0829-0701, pp. 141-142]

255 At no time did EPA staff indicate a different or more stringent pathway was under development federally, while the auto industry provided input, feedback, and technical data to CARB. The California process provided an ideal forum for alignment, even if EPA could not commit to alignment at that stage.

Organization: Alliance for Consumers (AFC)

Failure To Provide Meaningful Opportunity For Public Comment]

Because of substantive oversights in the proposal, including the failure to adequately address EV maintenance and repair costs, the future of cross-subsidization between ICE and EV models at traditional automakers, and the potential for producers to limit sales of ICE vehicles despite limited consumer appetite for EVs (resulting in a vehicle shortage for many everyday consumers), and because of EPA's intended reliance on studies that have yet to published/finalized and the short time provided for public comment overall, the Agency has failed to provide a meaningful opportunity for the public to comment. See S.C. Coastal Conservation League v. Pruitt, 318 F. Supp. 3d 959, 967 (D.S.C. 2018). [EPA-HQ-OAR-2022-0829-0534, p. 5]

Organization: Alliance for Vehicle Efficiency (AVE) Should any of these assumptions be inaccurate, automotive manufacturers will likely assume significant financial risks as they modify their operations and production. The Proposal also assumes that consumers will purchase enough of these new vehicles for manufacturers to meet sales volumes for compliance levels. To reduce these risks, EPA should re-evaluate the ZEV marketplace to determine the new standards' feasibility prior to the effective date. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Political uncertainty

AVE supports a technology-neutral approach to decarbonizing the LD and MD fleets to avoid looming political and litigation challenges. Suppliers do not need to look too far back to recall that federal support for a stringent standard may not always continue as planned. Any future reductions of the subsidies now being promised under the Inflation Reduction Act (IRA) will impact future feasibility. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

As recent events have shown, the threat of regulatory ping-pong resulting in changing GHG regulations is real and costly. In under four years, the automotive industry was required to respond to the EPA and NHTSA's midterm evaluation, the freezing of those standards in early 2017, the re- issuing of new standards under the Safer Affordable Fuel-Efficient Vehicles Rule (SAFE), the repeal of SAFE a mere 12-months later, and new standards issued at the end of 2021. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

With sizable opposition to EPA's recent rulemakings in Congress,4 suppliers cannot have reasonable assurance of the future standards that will be applicable, and this uncertainty can impact investment in new advanced technologies. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

4 See H.R.2811 - Limit, Save, Grow Act of 2023 and S.J.Res.11 - A joint resolution providing for congressional disapproval of EPAs "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards".

This very real "political" uncertainty will bring significant risk to the investments made by manufacturers and suppliers. We realize that EPA cannot, and should not, account for political reasoning when planning future standards. EPA can, however, aim to repeat the success of previous rulemakings that brought together numerous industry and regulatory stakeholders. Doing so will produce standards that are supported by those that need to make the investments for future standards to be successful. Without broad support from manufacturers and fleet owners, technology providers could face stranded investments. [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

Review of the ZEV marketplace

For the reasons stated above, we urge EPA to commit to an assessment of the Proposal's feasibility in a manner similar to the Agency's midterm evaluation in 2017. The Agency should re-evaluate the ZEV marketplace, including the cost of manufacturing, the pervasiveness of charging infrastructure, and consumer acceptance. The basis for doing so is as relevant as it was when EPA committed to the process in 2012.8 [EPA-HQ-OAR-2022-0829-0631, pp. 2-4]

8 Federal Register / Vol. 77, No. 199 / October 15, 2012 / at 62628

Organization: American Chemistry Council Product Approval Protocol Task Group (PAPTG)

The American Chemistry Council's Petroleum Additives Product Approval Task Group (PAPTG) is pleased to provide this comment on the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles. The PAPTG, a task group of the Petroleum Additives Panel, is comprised of lubricant additive manufacturers. [EPA-HQ-OAR-2022-0829-0666, p. 1]

Engine and driveline lubricants are an important component of light duty and medium duty vehicle design and have been demonstrated to impact fuel economy and durability performance. Lubricants are important in both improving fuel efficiency and enabling fuel efficient engine technology including hybrids. To help ensure that vehicle performance remains as close to the design and certification level as possible, ACC suggests that EPA include language in the proposed standard which recognizes and highlights the importance of using the appropriate OEM or industry certified lubricants in factory fill and service fill (aftermarket) applications. [EPA-HQ-OAR-2022-0829-0666, p. 1]

Organization: American Council for an Energy-Efficient Economy (ACEEE)

Complementary elements of EPA's LDV program should be extended to MDVs

Two other areas in which MDVs could benefit from being folded into the LDV program are compliance reporting requirements and consumer labeling. EPA's compliance report for heavy-duty vehicles24 does not include heavy-duty pickups and vans, and we are not aware of any other source for this data. This situation has hampered our ability to make informed judgments on the current proposal for MDV standards, as data on matters such as compliance credit balances and rates of ICEV technology adoption are not currently available for these vehicles. These vehicles should be incorporated into EPA's Trends report no later than MY 2027. [EPA-HQ-OAR-2022-0829-0642, p. 11]

24 https://www.epa.gov/system/files/documents/2023-05/420r22028A.pdf

MDVs also should have a consumer label, and the label should provide a basis for comparison with LDVs. This could be an important element, along with the reclassification of vehicles for purposes of the standards, of EPA's effort to discourage the upward creep in size and performance attributes of light-duty trucks. California began labeling MDVs on January 1, 2021.25 While the MDV scores are not directly comparable to California's LDV scores, CARB provides a comparison table with LDV GHG scores. We urge EPA to create a meaningful consumer label for MDVs in time for MY 2027. [EPA-HQ-OAR-2022-0829-0642, p. 11]

25 https://ww2.arb.ca.gov/our-work/programs/greenhouse-gas-standards-medium-and-heavy-duty-engines-and-vehicles/ep-label

Organization: American Fuel & Petrochemical Manufacturers

For starters, we are disappointed with the 60-day comment period you allocated for this major rulemaking. Given the enormous stakes of this proposal, which effectively bans new internal combustion engine vehicles, the length of the proposal (262 Federal Register pages), the size of the docket (10,000 plus pages of supporting documents), and the other, related rulemakings with concurrent comment deadlines, there is no reasonable justification for such an abbreviated comment period. No doubt this proposal took EPA many months, if not years, to prepare. Yet, you're asking the public to make the herculean effort to read, analyze, and provide constructive, detailed comments in just a matter of eight weeks (and on July 5th no less). The question this begs is, why? Why would you stifle public feedback on such an important rule? [EPA-HQ-OAR-2022-0829-0733, p. 1]

EPA also failed to provide a meaningful opportunity for public comment by limiting the comment period to 60 days, denying requests form AFPM and other stakeholders to extend the comment period, and concurrently proposing heavy-duty standards and other significant rulemakings related to vehicle electrification, fuels, and electricity generation. Significant time is required to read and respond to the voluminous material in each rulemaking docket, particularly given EPA's evident lack of rigor in its analysis, and lack of discipline in citing and characterizing underlying sources. [EPA-HQ-OAR-2022-0829-0733, p. 3]

A. Advanced Clean Cars II ("ACC II") Cannot be a Basis for this Rulemaking

EPA points to California's ACC II program and adoption by Section 177 states to support its projections of increased PEV penetration,122 but the ACC II has not received a waiver, and EPA did not even have the waiver application when the Proposed Rule was published.123 The CAA requires EPA to evaluate California's waiver request to ensure that California did not arbitrarily determine that it needs "ZEV mandates" to address compelling and extraordinary circumstances. As Principal Deputy Administrator for the Office of Air and Radiation Joe Goffman testified on June 21, 2023, EPA just received the waiver request. Given that the EPA official responsible for overseeing the California waiver request publicly acknowledged that EPA has not determined whether it will grant a waiver for ACC II, the Agency cannot rely on ACC II as a basis for this Proposal. Moreover, because California concedes that ACC II will not meaningfully address the impacts of climate change in California and ACC II will slow fleet turnover and retard California's progress toward meeting the NAAQS, California is NOT eligible for a waiver and ACC II is preempted. EPA's reliance on ACC II as support for this rule is pre-decisional and another example of arbitrary and capricious decision-making. [EPA-HQ-OAR-2022-0829-0733, p. 28]

122 Proposed Rule at 29,118.

123 88 Fed. Reg. 29,189; See, e.g., Initial Br. For Private Petitioners, State of Ohio, et al. v. Envt'l Prot. Agency, et al., No. 22-1081 (D.C. Cir. Oct. 24, 2022). V. The Proposal Fails to Provide Meaningful Opportunity for Public Comment

AFPM welcomes the opportunity to meaningfully engage with regulators to discuss cost-effective, efficient, and feasible measures to reduce the carbon intensity of, and criteria emissions from, the transportation sector. Unfortunately, the concurrent comment periods for this rule and EPA's proposed heavy-duty vehicle GHG emissions standards are insufficient to provide fully informed comments on either proposal. [EPA-HQ-OAR-2022-0829-0733, pp. 61-62]

Although AFPM was one of several entities requesting that EPA extend the comment period for both rules, the agency declined, claiming that its pre-publication release of material meant that the public in fact had 83 days to comment on the Proposed Rule and 66 days to comment on the heavy-duty GHG rule.280 Contemporaneously with these proposals were two related rules addressing electric vehicles: (1) DOE published a proposal to revise its regulations regarding calculating a value for the petroleum-equivalent fuel economy of EVs for use in determining compliance with the CAFE program;281 and (2) the IRS proposed regulations regarding the IRA's New Clean Vehicle Credit. The table below illustrates that in the span of 88 days (April 11 – July 5), interested parties were required to analyze 531 pages of proposed rules in the Federal Register and more than 30,000 pages of supporting material to understand the basis for each proposed rule. The page estimate excludes the voluminous amount of data supporting EPA's two proposed vehicle rules. [EPA-HQ-OAR-2022-0829-0733, pp. 61-62]

280 June 2, 2023, letter from Joseph Goffman, EPA Principal Deputy Assistant Administrator, responding to Patrick Kelly, AFPM; see also letters from Alliance for Automotive Innovation, National Automobile Dealers Association, Hyundai-Kia America Technical Center, Inc., Hyundai Motor America, and National

Center for Public Policy Research, available at https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-multi-pollutant-emissions-standards-model.

281 88 Fed Reg. 21,525, 21,526 (Apr. 11, 2023).

Proposed Rule: Petroleum-Equivalent Fuel Economy Calculation [EPA-HQ-OAR-2022-0829-0733, pp. 61-62]

No. of Federal Register Pages: 15

Publication Date: April 11, 2023

Comments Due: June 12, 2023

Comment Period (including pre- publication days): 61 days

Estimated Pages of Supporting Documents: More than 500

Proposed Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3 (“HDV Rule”)

No. of Federal Register Pages: 236

Publication Date: April 27, 2023

Comments Due: June 16, 2023

Comment Period (including pre- publication days): 66 days

Estimated Pages of Supporting Documents: More than 20,000

Proposed Rule: Proposed Rule (Light- Duty Vehicles—Multi- Pollutant) (“LD/MD Rule”)

No. of Federal Register Pages: 263

Publication Date: May 5, 2023

Comments Due: July 5, 2023

Comment Period (including pre- publication days): 83 days

Estimated Pages of Supporting Documents: More than 10,000

Proposed Rule: 30D New Clean Vehicle Credit

No. of Federal Register Pages: 17

Publication Date: April 17, 2023

Comments Due: June 16, 2023

Comment Period (including pre- publication days): 60 days

Estimated Pages of Supporting Documents: ~30 [EPA-HQ-OAR-2022-0829-0733, pp. 61-62]

EPA’s refusal to grant additional time to respond to the Proposal and the heavy-duty GHG rule denied the public ample time to formulate meaningful comments responsive to the underlying information in support of the Agency’s proposal. The Agency’s action is an arbitrary departure from its typical practice of granting reasonable extensions of time—often thirty days, but frequently sixty or even ninety—to provide meaningful input from the public on proposed rules.282 [EPA-HQ-OAR-2022-0829-0733, pp. 61-62]

282 Around the same time AFPM's extension request was denied, EPA saw fit to grant an extension of time to submit comments on the "Commercial Sterilization Facilities NESHAP." See EPA Docket EPA-HQ-OAR-2019-0178-0154.

Further, the short and concurrently running comment periods on these closely related rules are exacerbated by EPA's unduly narrow identification of industries affected by this rule. Under the heading "Does this action apply to me," EPA limits its identification of affected industries to entities with direct compliance obligations: motor vehicle manufacturers, commercial importers of vehicles and vehicle components, alternative fuel vehicle convertors, and medium duty engine & vehicle manufacturers.283 Although EPA notes that "this table is not intended to be exhaustive…other types of entities could also be affected," EPA understands many entities necessarily rely on regulatory screening tools based on search terms tied to their own NAICS codes to alert them to new proposed rules that may impact them. [EPA-HQ-OAR-2022-0829-0733, p. 63]

283 Proposed Rule at 29,184.

By narrowly limiting the identification of industries affected based on this extremely short and incomplete list of NAICS codes and by its arbitrary refusal to extend the comment periods, EPA has unreasonably constrained the number and types of entities that will find out about these proposed actions in time to comment. EPA appears to be counting on closing the comment period before consumers, retailers, farmers, fleet operators, bio and renewable fuel producers, small businesses, emergency response providers, local governments, or any of the host of other interests who will be affected by the profound changes in how light and medium duty vehicles are sold or even realize what is at stake. This sort of gamesmanship is at odds with EPA's responsibility under the Administrative Procedures Act and the Due Process clause of the U.S. Constitution. [EPA-HQ-OAR-2022-0829-0733, p. 63]

Organization: American Highway Users Alliance

Feasibility of the proposal is highly questionable and benefits are likely overestimated

Further, the two lengthy NPRMs and the lengthy draft Regulatory Impact Analysis (RIA) for each of them do not appear to include any consideration of the adverse impacts of the proposal on revenues flowing to the Highway Trust Fund (HTF) and resulting Federal highway infrastructure investment. The proposed rules in the two dockets seek to accelerate a shift from the public's use of ICE vehicles to EVs. A substantial erosion of revenue into the HTF would result,3 placing major downward pressure on needed highway and bridge investment, which already faces an investment backlog of $786 billion per USDOT's latest "Conditions and Performance Report." Moreover, that $786 billion estimate was developed before recent significant inflation. [EPA-HQ-OAR-2022-0829-0696, pp. 3-4]

3 The draft RIA for the heavy-duty vehicle NPRM includes a brief reference (page 429) that, under the proposed rule, fuel consumption would be "reduced." Fuel sales, which are subject to a Federal excise tax, generate the largest share of HTF revenue.

Organization: American Petroleum Institute (API)

g. Program Review.

i. Assessment of both vehicle and infrastructure development/deployment progress.

The design of a program with heavy reliance on infrastructure that may not be widely available on the timeline proposed is optimistic at best. The proposal appears premature on the stated timeline, and essentially in conjunction with the HD GHG Phase 3 program, which would be competing for the same resources. If EPA is not willing to adjust the timeline and/or standards of the proposed programs, API requests that the agency consider incorporating a pre- program assessment as well as a program progress assessment. It is imperative that EPA provide a real-world evaluation, with an honest assessment provided to the public, regarding progress on infrastructure readiness and ZEV technology deployment. The opportunity for stranded investments by all stakeholders impacted by this program is just too great not to incorporate pre- and mid-program reviews. [EPA-HQ-OAR-2022-0829-0641, p. 23]

For a mid-program assessment, EPA could consider something akin to the Midterm Evaluation that was finalized in the 2012 joint agency rulemaking establishing the MY 2017-2025 LD GHG standards.77 Further, we recommend that EPA engage a broad stakeholder community to identify necessary elements to incorporate into such an assessment. [EPA-HQ-OAR-2022-0829-0641, p. 23]

77 "Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emissions Standards for Model Years 2022-2025." https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle- greenhouse-gas.

ii. Future program incentives and program adjustment of standards.

In the development of the program, EPA needs to consider future program incentives such as adoption of a lifecycle approach, combined with fuel carbon intensity reductions. Such an approach would provide a broad spectrum of industries that power the transportation system (e.g., OEMs, petroleum refiners, power generators, and renewable fuel manufacturers) with incentives to reduce emissions. [EPA-HQ-OAR-2022-0829-0641, p. 23]

In addition, we also request that the agency report on the findings following review with enough time to adjust the standards if needed. Adequate lead time must be provided to the regulated community to allow for necessary adjustments to regulatory compliance strategies, and to avoid stranded investments as much as possible. A proposal based on stretch goals must incorporate an "offramp" or some opportunity to pivot if the essential elements of the program, such as charging/fueling infrastructure, do not materialize. [EPA-HQ-OAR-2022-0829-0641, p. 23]

Organization: Arconic Corporation (ARCO)

Arconic appreciates the opportunity to provide input to EPA as it considers revisions to vehicle emissions standards for MY 2027 and beyond. Arconic also generally supports the technical comments submitted by the Aluminum Association. [EPA-HQ-OAR-2022-0829-0741, p. 4]

Organization: Arizona State Legislature

8. The proposed rule does not allow comment on key final documents. EPA discusses at least two documents that have not been finalized after a peer review, and EPA should reopen the public comment process once the final versions of these documents are available. [EPA-HQ-OAR-2022-0829-0537, p. 3]

Commenters do not know the conclusions and analysis contained in the final versions of these reports. Presumably, EPA will make changes after receiving the peer-review comments. Commenters cannot provide fully informed comments on the proposed rule without having the opportunity to review the final versions of these reports. [EPA-HQ-OAR-2022-0829-0537, p. 27]

EPA should reopen the public comment process for the proposed rule after it has received the final versions of these reports. This should occur whether or not EPA intends to make revisions to the final rule based on the reports or to rely on the reports to support the final rule. If EPA intends to make revisions of the final rule based on the final versions of these reports, commenters should have the opportunity to comment on all revisions. The same is true with any other reports or data that EPA does not cite in the proposed rule. [EPA-HQ-OAR-2022-0829-0537, p. 27]

Failure by EPA to reopen the public comment process would be arbitrary and capricious. See, e.g., Texas v. United States Env't Prot. Agency, 389 F. Supp. 3d 497, 506 (S.D. Tex. 2019) ("However, the Agencies' decision not to reopen the Proposed Rule for comment after the publication of the Final Connectivity Report prejudiced the ability of interested parties to (1) provide meaningful comments regarding the Final Rule's continuum-based approach to connectivity and (2) 'mount a credible challenge' to the Final Rule."); Ctr. for Biological Diversity, Defs. of Wildlife v. Kelly, 93 F. Supp. 3d 1193, 1207 (D. Idaho 2015) (granting partial summary judgment and ordering an additional public comment period after federal agency relied on peer review comments not discussed or cited in the proposed rule). [EPA-HQ-OAR-2022-0829-0537, p. 27]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Lastly, as part of the California Phase 2 GHG program, CARB requires manufacturers to display environmental performance labels to provide buyers with important vehicle information when they are considering purchasing a new medium-duty vehicle. CARB recommends that U.S. EPA establish a similar labeling requirement for medium-duty vehicles as it does for light-duty vehicles. [EPA-HQ-OAR-2022-0829-0780, p. 17]

Serviceability

Vehicle serviceability is the ability for a driver to be able to repair their vehicle at any repair shop of their choosing and is key to sustaining driver use and maintaining emission benefits from ZEVs. If consumers cannot find suitable repair shops for their ZEVs, there is a risk that they will revert to conventional vehicles, limiting the emission benefits. To service vehicles, repair shops need access to on-board vehicle data and service information defining how to diagnose, repair, and maintain the vehicle, which not only requires some data standardization but also a way to access the data on the vehicle through a standardized means, such as the SAE J1962 compliant diagnostic connector. With the ACC II regulations, CARB added ZEVs to its service information regulation 56 to require the same access and disclosure of repair information and tooling, as well as the requirement that each vehicle be equipped with a standardized data set and equipped with a SAE J1962 diagnostic connector. 57 This regulation requires manufacturers to provide the same information to independent repair shops as they provide to their dealerships as is done for internal combustion engine vehicles today. 58 CARB strongly recommends that U.S. EPA include serviceability requirements for ZEVs in its proposal and, at minimum, a way to access that data through a standardized SAE J1962 compliant diagnostic connector. [EPA-HQ-OAR-2022-0829-0780, p. 42]

56 Cal. Code Regs., title 13, section 1969.

57 Cal. Code Regs., title 13, section 1962.5.

58 For additional background on CARB's inclusion of ZEVs in the service information regulation as part of ACC II, see ACC II Final Statement of Reasons for Rulemaking (FSOR), Including Summary of Comments and Agency Response Appendix D Summary of Comments to ZEV Assurance Measures and Agency Response, pp. 59 – 65 https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/fsorappd.pdf and ACC II ISOR, Appendix F-7, pp. 1, 10-13, 16.

Direct Current Fast Charging Standardization

CARB agrees with U.S. EPA's findings that the increased deployment of ZEVs will require more charging infrastructure to be installed. For this infrastructure to be most effective, CARB recommends that U.S. EPA require manufacturers to standardize vehicle charging inlets. In particular, direct current fast charging (DCFC) will play a key role in charging away from home both for longer travel trips and for those without convenient access to home or workplace charging. Making sure that consumers can easily access charging and that all BEVs are DCFC capable can help increase uptake of ZEVs, better ensure they can be effectively used by second and third owners, and help fully realize emission benefits from U.S. EPA's proposed standards. Currently, three distinct DCFC inlets exist on BEVs deployed in the U.S.: CHAdeMO, SAE Combined Charging System (CCS1) Type 1 (SAE J1772), and Tesla's North America Charging Standard connector. Having three different DCFC inlets, standards, and communication protocols can lead to inconsistent and unnecessarily complex charging experiences for consumers, including interoperability and charging reliability concerns. [EPA-HQ-OAR-2022-0829-0780, pp. 45-46]

Most manufacturers are already utilizing the SAE J1772 CCS1 standard in current vehicle production. In 2020, the CCS1 inlet was on 13 available BEV models and only 2 BEV models came with the CHAdeMO inlet. For the 2022 MY, 45 BEV models have the CCS1 inlet, with only 2 vehicle models remaining with the CHAdeMO inlet. 71 The federal government is also already investing in CCS1 infrastructure through the NEVI program, which requires that each funded DCFC port have at least one CCS1 connector. 72 However, in Spring 2023, Ford and General Motors both announced partnership with and future implementation of Tesla's North America Charging Standard on their vehicles. 73, 74 These moves by industry electric vehicle leaders are significant and continued lack of standardization could lead to more confusion in the market and decentralization of resources toward solving those issues that most plague reliable charging for electric vehicles. [EPA-HQ-OAR-2022-0829-0780, pp. 45-46]

71 ACC II ISOR. Chapter III, Sect C.3. ACC II ISOR (ca.gov)

72 23 CFR §680.106(c) (2023).

73 Ford. “Ford EV Customers To Gain Access To 12,000 Tesla Superchargers; Company To Add North American Charging Standard Port In Future EVs.” May 25, 2023. https://media.ford.com/content/fordmedia/fna/us/en/news/2023/05/25/ford-ev-customers-to-gain-access-to- 12-000-tesla-superchargers--.html. Accessed June 15, 2023.

74 General Motors. “General Motors Doubles Down on Commitment to a Unified Charging Standard and Expands Charging Access to Tesla Supercharger Network” June 8, 2023. https://news.gm.com/newsroom.detail.html/Pages/news/us/en/2023/jun/0608-gm.html. Accessed June 15, 2023.

Certification Data Collection for Improved ZEV Fuel Economy Labels

Based on experience gained to date, CARB has identified several shortcomings in the current fuel economy labels for ZEVs that could be improved to communicate more relevant data to consumers. Internal combustion engine vehicles have a long history with the label and its refinements over the years to present the most meaningful data in a concise format for consumers. For ZEVs in general, and especially for BEVs, however, the current label is insufficient in communicating useful information in an understandable metric to consumers regarding the most important BEV attributes. While modifications to the required label information and format may be out of scope for the current rulemaking proposal, CARB recommends that U.S. EPA include requirements with this proposal to require vehicle manufacturers to disclose additional information that could be used for such an improved label that could be adopted by separate rulemaking in the future. Specifically, CARB recommends that U.S. EPA require that manufacturers report additional test data and vehicle information regarding the vehicle’s range and charging time at the time of certification. [EPA-HQ-OAR-2022-0829-0780, p. 46]

Improved Electric Driving Range Information

Currently, the existing BEV label highlights vehicle efficiency in units of miles per gallons of gas equivalent (MPGe) based on testing across five defined drive cycles. The current label also uses this efficiency for the reported electric vehicle driving range. However, driving range based on city cycle usage or the combined cycle usage is not relevant to drivers who are primarily concerned about range for long distance travel which, by definition, is typically conducted at highway-like speeds. CARB notes that some third parties (including AAA, 75 InsideEVs, 76 and a recent SAE paper 77) have also previously assessed BEV range and noted a mismatch between label reported range and what a typical driver would likely experience in-use. [EPA-HQ-OAR-2022-0829-0780, pp. 46-47]

75 American Automobile Association, Inc. ”AAA Electric Vehicle Range Testing.” NewsRoom.AAA.com. February 2019. AAA-Electric-Vehicle-Range-Testing-Report.pdf.

76 Moloughney, T., “What's The Real World Highway Range Of Today's Electric Cars? We Test To Find Out.” InsideEVs.com. April 22, 2023. https://insideevs.com/reviews/443791/ev-range-test-results/. Accessed June 15, 2023.

77 Pannone, G. and VanderWerp, D., "Comparison of On-Road Highway Fuel Economy and All-Electric Range to Label Values: Are the Current Label Procedures Appropriate for Battery Electric Vehicles?," SAE Technical Paper 2023-01-0349, 2023, https://doi.org/10.4271/2023-01-0349.

CARB recommends that U.S. EPA require manufacturers to collect and report some higher speed highway relevant energy consumption information during ZEV certification to supplement the highway drive cycle information currently submitted. To minimize added test burden to vehicle manufacturers, this data could be collected during the constant speed cycle portion of the already required SAE J1634 certification testing procedure to capture energy consumption rates at 65 mph and perhaps 75 mph to sufficiently bracket expected usage and ensure sufficient data exists to inform a future label. [EPA-HQ-OAR-2022-0829-0780, pp. 46-47]

Additionally, based on experience to date as to information consumers are seeking, CARB recommends U.S. EPA require collection and reporting of additional data to enable calculation of range under cold and hot weather conditions. As an example, collection of both highway-speed energy consumption and total usable battery energy while carrying out required testing for the 20-degree Fahrenheit cold temperature cycle could provide sufficient information to derive a consistent cold temperature estimated driving range. Likewise, during the required supplemental test known as SC03 that represents hot weather driving with high solar load and air conditioning usage, collection of this data could provide the necessary information to allow a more meaningful future label that transparently presents range information to a consumer. Many consumers are aware of battery limitations in cold or hot weather but lack accurate information when making purchase decisions as to the likely magnitude of that impact on any particular vehicle. [EPA-HQ-OAR-2022-0829-0780, pp. 46-47]

Organization: California Attorney General's Office, et al.

Across the country, states have also adopted laws, regulations, and policies that mandate or encourage zero-emission vehicle adoption. These state actions range from state fleet acquisition requirements to zero-emission vehicle purchase incentives and price relief to grants and financial assistance for public and private fleets. For example: [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

Examples of State Fleet Acquisition Requirements

- In Maine, 50% of all light-duty vehicles acquired by the state shall to the extent practicable be plug-in hybrid electric or zero-emission by 2025, and that requirement increases to 100% by 2030. Maine Revised Statutes, title 5, § 1830(12). [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

- In Hawai'i and Maryland, 100% of passenger vehicles in the state's fleet must be zero- emission vehicles by 2031, and other light-duty vehicles must be zero-emission by 2036. Hawai'i Revised Statutes § 196-9(c)(11); Maryland Statutes, State Finance & Proc. Code 14-418. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

- In Texas, as of 2010, state agency fleets with more than 15 vehicles may purchase only alternative fuel motor vehicles (including electric vehicles), and these fleets must consist of at least 50% alternative fuel vehicles and use those fuels at least 80% of the time they are driven. Texas Statutes, Gov. Code 2158.004-2158.009. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

- In Utah, at least 50% of new or replacement light-duty state vehicles must be propelled to a significant extent by alternative fuels, including electricity and hydrogen. Utah Code §§ 63A-9-401, 63A-9-403. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

• In Missouri, 50% of new vehicles purchased by state agency fleets in a two-year period must be alternative fuel vehicles. Missouri Revised Statutes §§ 414.410. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

• In Connecticut, 100% of all cars and light duty trucks purchased or leased by the state must be battery electric vehicles by 2030. Connecticut Public Act No. 22-25. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

• In Rhode Island, 25% of light-duty vehicles purchased and leased by the state must be zero-emission vehicles by 2025. Rhode Island Executive Order 15-17. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

• In Pennsylvania, state agencies under the Governor's jurisdiction must replace 25% of the passenger cars in the state fleet with battery electric and plug-in electric hybrid cars by 2025. Pennsylvania Executive Order 2019-01. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

• In Washington, state agencies are ordered to electrify their fleets and establish a State Fleets Zero Emission Vehicle Implementation Strategy. Washington Executive Order 21- 04. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

Examples of Purchase Incentives

• In Oregon, rebates are available for electric vehicles and plug-in hybrid electric vehicles, including for income-qualified state residents.116 Oregon Revised Statutes §§ 468.422-468.444. [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

116 Oregon.gov, Requirements for Charge Ahead Applicants, available at https://www.oregon.gov/deq/aq/programs/Pages/Charge-Ahead-Rebate.aspx.

• In California, the Clean Vehicle and Rebate Project for Fleets offers rebates for the purchase of light-duty zero-emission and plug-in hybrid electric fleet vehicles.117 [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

117 See California Fleet Rebate Project, Fleet Overview, available at https://cleanvehiclerebate.org/en/fleet.

• In Colorado, the Clean Fleet Vehicle and Technology Grant Program offers grants to business and government fleets for the purchase of new electric or fuel cell vehicles, or conversions of vehicles into battery or fuel-cell electric vehicles.118 [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

118 See Colorado Department of Public Health and Environment, Clean Fleet Vehicle & Technology Grant Program, available at https://cdphe.colorado.gov/clean-fleet-vehicle-technology-grant-program.

• Vermont recently approved a pilot program to subsidize EV purchases by gasoline "superusers"—i.e., drivers who consume over 1,000 gallons of gasoline per year— maximizing GHG reductions from the switch to EVs and saving these drivers significant fuel costs. 2020 Vt. Acts and Resolves No. 151, § 1.119 [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

119 S. 137, Act Relating to Energy Efficiency Modernization, available at https://legislature.vermont.gov/bill/status/2024/S.137

• In New York, the Drive Clean Rebate for Electric Cars offers rebates for the purchase or lease of eligible plug-in hybrid or battery electric vehicles.120 [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

120 See New York State Energy Research and Development Authority, Drive Clean Rebate for Electric Cars, available at https://www.nyserda.ny.gov/All-Programs/Drive-Clean-Rebate-For-Electric-Cars-Program.

• In Massachusetts, the recently enacted Electric Vehicle Adoption Incentive Trust Fund requires creation of a rebate and incentive program to provide individual consumer rebates of not less than $3,500 and not more than $5,000 for purchase of zero-emission car and light duty trucks, with additional rebates for low-income individuals.121[EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

121 An Act Driving Clean Energy and Offshore Wind, 2022 Mass. Acts, ch. 179, § 41; Mass. Gen. Laws ch. 25A § 19(b), (c), available at https://malegislature.gov/Laws/SessionLaws/Acts/2022/Chapter179; https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section19.

• In Arizona, drivers of alternative fuel vehicles, including electric vehicles, may obtain a special license plate allowing them to use high-occupancy vehicle freeway lanes at any time.122 [EPA-HQ-OAR-2022-0829-0746, pp. 19-21]

122 See Arizona Department of Transportation, Alternative Fuel Vehicle, available at https://azdot.gov/mvd/services/vehicle-services/vehicle-registration/alternative-fuel-vehicle.

Organization: CALSTART

4. Lock in a rapid transition to a zero-carbon transportation system, while sending a clear market signal. [EPA-HQ-OAR-2022-0829-0618, p. 2]

Organization: Charles Gordon

REQUEST for EXTENSION of TIME and MEETING

The 2 1\2 months that EPA gave for comments on this massive and complex rulemaking is far too short for anyone who does not have the resources of EPA to add detail to their comments. [EPA-HQ-OAR-2022-0829-0747, p. 2]

I also request a meeting with EPA staff on this rulemaking. That is legally permissible as long as notes are taken and placed in the record. The one group that EPA did not say they met with are private citizens who are most effected by the propose rule [EPA-HQ-OAR-2022-0829-0747, p. 2]

ATTACHMENTS to COMMENTS

I request that the cover to this comment and the attached book be considered as part of these comments. Both make important substantive points. The book is "Unsettled" by Steven E. Kooning. [EPA-HQ-OAR-2022-0829-0747, p. 2]

ALTERNATIVES to DRASTIC REDUCTIONS in CO2

Research is going forward on carbon sequestration with some operations already working. It is true the activists oppose this for no apparent reason. It would be easy to add more sulfur compounds into the atmosphere by burning more soft coal to cool the atmosphere. The power plants would also have to emit a basic substance to prevent lake acidification. That is a challenge, but not Impossible to implement. [EPA-HQ-OAR-2022-0829-0747, pp. 7-8]

Rising sea levels an be contained by sea walls as the Dutch have been doing for centuries. Beach front residences can be moved back. Alternating droughts and torrential rains may not be caused by global warming. But it can be controlled by better water management. Forest fires can be controlled by better forest management. [EPA-HQ-OAR-2022-0829-0747, pp. 7-8]

ACTIVIST ORGANIZATIONS are NOT UNBIASED

Nowadays activist, nonprofit organizations are an industry. They provide well paid jobs for their officers and employees. They lie with statistics just as much as industry. They are never satisfied with regulatory actions that seem to carry out most of their goals because there would be no more grants and jobs for their employees. [EPA-HQ-OAR-2022-0829-0747, pp. 7-8]

When OSHA was considering limiting smoking in the workplace, the antismoking organizations wanted OSHA to regulate based on secret data. When the administration did much to reduce global warming through the IRA and other actions, activist organizations bitterly criticized the administration for permitting a 300-mile pipeline which was necessary to save the IRA and extend the debt ceiling. [EPA-HQ-OAR-2022-0829-0747, pp. 7-8]

Consequently, regulatory agencies need to be as skeptical of activist, non-profit organizations as they are of industry. They certainly should not consider their views as beyond reproach. [EPA-HQ-OAR-2022-0829-0747, pp. 7-8]

Organization: Chevron

It is important for EPA to plan for uncertainty in the feasibility and timing of meeting the standards proposed in the light and medium duty rule. We endorse the recommendation from API in their written comments to implement an interim program review, with provisions for adjustment of the standards if adequate progress is not being demonstrated. These important program elements should be incorporated into any final regulatory action. [EPA-HQ-OAR-2022-0829-0553, p. 6]

Organization: Competitive Enterprise Institute

The proposal purports to give automakers a nudge in the direction the market is already going. However, political coercion is a major factor driving the trend. As the EPA acknowledges:

In 2022, California finalized the Advanced Clean Cars II rule that will require, by 2035, all new light-duty vehicles sold in the state to be zero-emission vehicles, with New York, Massachusetts, and Washington state following suit, likely to be followed by Oregon and Vermont as well. Several other states may adopt similar provisions as members of the International Zero-Emission Vehicle Alliance.73 [EPA-HQ-OAR-2022-0829-0611, p. 19]

73 88 FR 29188.

Consumers now face the real risk that much of the new-car market will be off-limits to gasoline- powered vehicles in the near future. The EPA does not merely ride the EV wave. It launched the wave in January 2013 by withdrawing Clean Air Act preemption of California’s

ZEV program,74 propelled it forward by repealing preemption in March 2022.75 [EPA-HQ-OAR-2022-0829-0611, p. 19]

74 EPA, California State Motor Vehicle Pollution Control Standards; Notice of Decision Granting a Waiver of Clean Air Act Preemption for California's Advanced Clean Car Program and a Within the Scope Confirmation for California's Zero Emission Vehicle Amendments for 2017 and Earlier Model Years, 78 FR 2112, January 9, 2013, https://www.govinfo.gov/content/pkg/FR-2013-01-09/pdf/2013-00181.pdf.

75 EPA, California State Motor Vehicle Pollution Control Standards; Advanced Clean Car Program; Reconsideration of a Previous Withdrawal of a Waiver of Preemption; Notice of Decision, 87 FR 14332, March 14, 2022, https://www.govinfo.gov/content/pkg/FR-2022-03-14/pdf/2022-05227.pdf.

In so doing, the EPA ignored the Energy Policy and Conservation Act's preemption of State laws or regulations "related to" fuel economy standards. ZEV mandates are substantially related to fuel economy standards. As ZEV mandates tighten, fleetwide-average fuel economy increases. Conversely, as the current rulemaking demonstrates, at a certain level of stringency, fleet-average CO2 standards, which are fuel economy standards by another name, function as ZEV mandates. [EPA-HQ-OAR-2022-0829-0611, p. 19]

Organization: Consumer Reports (CR)

8. EPA Should Improve Consumer Information on the Window Sticker for EVs

If enacted, EPA's GHG rule will help support continued growth in EV sales. To help support consumers as they make the transition to EVs, CR asks that EPA open a separate rulemaking to update the consumer information that is provided on the window sticker for EVs. The EV market has evolved immensely in the years since the window sticker was last revised. Updating the sticker with more relevant information can help improve the EV buying experience. CR would suggest the following improvements to the data that is provided to consumers. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

8.1. More Useful EV Range Information

As Car and Driver has recently highlighted, EPA's current testing for EV range does not always match with real world vehicle performance.52 A big portion of the problem is the fact that EPA only publishes a combined city/highway EV range number. However, EVs tend to achieve shorter range at real world highway speeds, which is when range is most often relevant to consumers. Also, range is only estimated under ideal weather conditions, leaving consumers with no information about how their vehicle might perform in hot or cold weather. While a single combined number is generally useful in comparing different vehicles against each other, providing consumers with more information including highway range in both hot and cold weather would be most useful in helping consumers understand the true performance they can expect from their vehicle, and better determine if it will meet their needs. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

52 Comparison of On-Road Highway Fuel Economy and All-Electric Range to Label Values: Are the Current Label Procedures Appropriate for Battery Electric Vehicles?, SAE International, April 11, 2023, https://www.sae.org/publications/technical-papers/content/2023-01-0349/.

8.2. Consider Alternatives to Mile Per Gallon Equivalent (MPGe)

While MPGe is somewhat useful in helping consumers understand how EVs compare with gas and hybrid vehicles in terms of efficiency, it's not a very useful metric for vehicle owners. EPA should reconsider the use of MPGe on the window sticker and explore replacing or supplementing it with a more useful efficiency metric. In general most modern EVs present efficiency in terms of miles per kilowatt hour on their trip odometers, which is more consistent with how consumers are used to thinking about efficiency in terms of miles per gallon. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

8.3. Provide EV Battery Size Information

While manufacturers may choose to include battery size information on the window sticker, it is not required. CR would recommend that manufactures provide the usable battery capacity of the vehicle on the window sticker. This also provides useful information for comparison between vehicles. Two separate vehicles might both have the same rated range, but achieve it with wildly different battery sizes. Providing that information to consumers can help them potentially consider more efficient options. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

There may also be some value in manufacturers also providing the basic battery chemistry details as well given that certain types of batteries may perform differently under different conditions. This type of information may become even more important as the market explores more diversity in battery chemistries. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

8.4. Develop and Present Standard Metrics for Charging Speeds

Charging speed is becoming an increasingly important differentiator in terms of the convenience of driving an EV longer distances. While the range of EVs is still important, it is charging speed that can most affect how convenient longer trips in EVs will be. CR suggests that EPA develop standardized testing and metrics for EVs' DC-fast charging speeds. Currently automakers provide consumers with cherry-picked charging speeds, often based upon narrow slices of the vehicle's charging curve under ideal conditions. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

CR would suggest a standardized test for fast charging speed measuring the time to charge from 10% to 80% state of charge. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

However, that metric is only part of the story because it doesn't tell how many miles of range are gained over that time. A separate metric should also be included that measures the average numbers of miles of range gained over a set period of time, potentially average miles per 10 minutes of charging or average miles per minute gained from 10%-80% state of charge. This will give consumers a more standardized way to understand how long they will have to spend charging to cover a specific distance using public fast charging. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

Level 2 charging speeds can also be important information, but more information should be provided to consumers about the conditions under which the test was performed. At a minimum EPA should require the amperage of the charger needed to achieve the presented level 2 charging times be provided. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

Organization: DENSO Corporation

Appendix 2

DENSO GREEN Technology Examples: ZEV Energy Consumption Reduction

1. Internal Heat Exchanger (SCX): An Internal Heat Exchanger reduces load on the compressor by transferring heat from the high-pressure liquid entering the expansion valve (TXV) to the low- pressure gas exiting the evaporator. [EPA-HQ-OAR-2022-0829-0651, p. 9]

2. Motors Generator (MG): A MG is essential for driving hybrid vehicles/BEVs and generating electricity. It serves as the main power source when starting and driving a vehicle and assists the engine during acceleration. The regenerative energy generated when applying the brakes is used to charge the battery. An MG plays a key role in improving the dynamic performance and fuel efficiency of hybrid vehicles/BEVs. [EPA-HQ-OAR-2022-0829-0651, p. 9]

3. Invertor w/Silicon Carbide (SiC): Inverters convert DC power from the battery to AC power controlling/operating the motor generator for traction/propulsion. During regenerative braking, the inverter converts AC power from the MG to DC (regenerative braking) to recharge the battery. SiC power semiconductors consist of silicon and carbon that significantly reduce power loss compared to silicon (Si) power semiconductors. A cruising test conducted under specific conditions by BEV using SiC semiconductor inverters demonstrated inverters with SiC power semiconductor reduce power loss less than half of ones with Si semiconductor. As a result, the energy efficiency of BEVs is improved and cruising range is extended. [EPA-HQ-OAR-2022-0829-0651, p. 9]

4. Heat Pump System: Highly Efficient Heat Pump Systems extract heat from the air and vehicle systems, and uses it as a heat source for the vehicle battery and climate control system. [EPA-HQ-OAR-2022-0829-0651, p. 9]

5. Radiant Heating System: This technology helps to extend electric driving range when the heating is on. In combination with the heat pump system, the highly heated surface efficiently warms occupants only and reduces the energy required. [EPA-HQ-OAR-2022-0829-0651, p. 9]

6. Battery Management System with Integrated Circuit (IC): This new generation battery- monitoring integrated circuit (IC) for lithium-ion batteries increases the efficiency with which electric and hybrid vehicles use their batteries, improves fuel efficiency and extends driving range. DENSO's was the first IC that can accurately detect battery voltage while monitoring multiple cells, a new capability compared to conventional ICs. [EPA-HQ-OAR-2022-0829-0651, p. 9]

Organization: District of Columbia Department of Energy and Environment (DOEE)

Advanced Clean Cars 2

Given the health and environmental concerns affiliated with vehicle emissions and climate change, DOEE is taking action to mitigate those health and environmental effects. As allowed for under Clean Air Act § 177, DOEE is finalizing efforts to adopt California's Advanced Clean

Cars 2 (ACC2), which will require vehicles to be zero emission by 2035. By adopting ACC2, DOEE takes a crucial step toward improving the health and wellness of District residents. DOEE has also finalized a robust roadmap for transportation electrification, an essential step towards having the capacity to charge vehicles as would be required in the rulemaking.18 Using the roadmap as a guide DOEE and its partners at the District Department of Transportation are working to secure funds through the National Electric Vehicle Infrastructure (NEVI) and Charging and Fueling Infrastructure (CFI) programs. [EPA-HQ-OAR-2022-0829-0550, p. 6]

18 DOEE. Transportation Electrification Roadmap. September 2022. https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/Final%20DC%20Roadmap%20sm.pdf

While DOEE is finalizing ACC2 and will see improvements following this regulatory change, most of the vehicle traffic in the District of Columbia originates from outside of the District. A DC Travel Pattern Analysis comparing pre-covid and post-covid travel patterns indicated that each day during the work week (Monday through Friday) in 2019, over one million vehicles traveled into the District. In 2022, these numbers dropped to around 700,000 vehicles traveling daily into the District Monday through Friday.19 Ultimately, vehicles traveling from outside of the District also contribute to the pollution traveling to the District from out-of-state. EPA modeling indicates that 95% or more of the District's ozone pollution comes from outside of our borders. Even though the District and other states are electing to adopt ACC2, the District and states which approve ACC2 will still experience the adverse effects of vehicle pollution from the states choosing not to implement ACC2 which travel in and out of the state. [EPA-HQ-OAR-2022-0829-0550, p. 6]

19 D.C. Travel Pattern Analysis. https://perkinsandwill.github.io/ggwash-travel-pattern/analysis_vehicle.html#2_Trip_Pattern

Organization: Elders Climate Action

Commenters understand that additional rulemaking will be required to establish a zero emission standard and phase-in schedule for L/MDV classes not addressed by this rule. However, the current proposal can be revised to incorporate this approach for the L/MDV classes and categories addressed by this proposal. We ask that the Administrator not delay completion of the current proposed rule so that it can apply to 2027-29 MY vehicles. We ask that the Administrator open a rulemaking for the additional vehicle classes to promulgate a zero emission standard and a phase-in schedule that begins with the 2027 MY. [EPA-HQ-OAR-2022-0829-0737, p. 11]

C. Petition for Finding --

Based on these data and other available evidence, we petition the Administrator to find that – climate warming already caused by GHG emissions harms the public health and is causing unacceptable adverse impacts on public welfare and the human environment, and the expected increase in the severity and frequency of harms to health and the public welfare that will be caused by more extreme events that will occur as the global mean temperature advances toward and above the 1.5°C level resulting from growing GHG concentrations in the atmosphere, establish the need for a zero GHG emissions standard for L/MDVs pursuant to section 202(a)(1) and (3)(A) of the Clean Air Act. [EPA-HQ-OAR-2022-0829-0737, p. 20]

We petition the Administrator to make this finding as the predicate for re-opening this rulemaking for the purpose of promulgating a zero emission standard for L/MDVs, and a phase-in schedule that prescribes for each automaker a share of total L/MDV sales that must be ZEVs beginning with the 2027 MY. [EPA-HQ-OAR-2022-0829-0737, p. 20]

Organization: Electric Drive Transportation Association (EDTA)

The Administration has a portfolio of policy initiatives that are essential to accelerating the transition, including the National Electric Vehicle Infrastructure (NEVI) program, the consumer and manufacturing incentives in the Inflation Reduction Act, the Congestion Mitigation and Air Quality program, the Low and No Emissions program, DOE's Loan Programs, Clean Cities, and research and development programs. The broad approach reflects the need for an all-of-government approach to building the EV ecosystem. [EPA-HQ-OAR-2022-0829-0589, p. 1]

Organization: Environmental. and Public Health Organizations

XI. Revisions to Elements of the Compliance and Enforcement Program Are Warranted.

We also urge EPA to revise certain elements of its compliance and enforcement program, as detailed below.

A. Clarifications of EPA's existing enforcement authority are appropriate.

As noted in the Proposal, EPA has the authority to remedy non-compliance with its GHG emissions regulations by correcting credit balances.223 Such action is appropriate under the Clean Air Act, and EPA has utilized such remedies on occasion in the past, including when manufacturers were found to be improperly certifying vehicles to lower emissions.224 [EPA-HQ-OAR-2022-0829-0759, p. 92]

223 88 Fed. Reg. at 29288

224 See "Correction of Greenhouse Gas Emission Credits" in Consent Decree, United States & CARB v. Hyundai Motor Company et al., 14-cv-1837 (D.D.C. Jan. 9, 2015), ECF No. 8, at 9.

EPA's in-use testing program is a critical part of ensuring that the regulatory program yields the reductions anticipated in the real world. Should a manufacturer's in-use testing illustrate deviations from the fleet level certification, particularly those of a systematic nature resulting in higher real-world emissions, it is appropriate for EPA to adjust the manufacturer's regulatory credit balance to reflect this real-world increase. We support EPA's clarification and believe EPA should act swiftly should a need for such enforcement arise. [EPA-HQ-OAR-2022-0829-0759, p. 92]

Unlike other emissions programs, GHG certification is granted at the precise certified test, rather than as a bin, where there is some inherent compliance margin. While EPA has some allowance for in-use values that fall within 10% of the certified value, as discussed in the section immediately below, EPA is proposing to allow manufacturers to voluntarily certify to a higher emissions level to better reflect the range of anticipated in-use emissions from the full configurations of the certified fleet. We support this voluntary approach. [EPA-HQ-OAR-2022-0829-0759, p. 92]

These two actions are complementary to each other, and we support EPA finalizing both together in the final rule. EPA is proposing to allow manufacturers to create their own compliance margin to reflect the full range of plausible in-use emissions from vehicle configurations covered under a given certification level. If, after in-use testing is completed, EPA still determines that the in-use test values do not reflect the emissions levels certified by the manufacturer, EPA is making clear that it has the authority to remedy the manufacturer's balance after the fact. This provides adequate opportunity in advance of the sale of vehicles to preemptively address any concerns about systematic deviation without relinquishing EPA's ultimate authority to ensure that credits for the regulatory program reflect in-use performance. [EPA-HQ-OAR-2022-0829-0759, p. 92]

Organization: Environmental Defense Fund (EDF) (1of 2)

iii. State leadership further supports the feasibility of protective standards.

Along with this market dynamism, state policy leadership has played an important role in advancing ZEV deployment and strongly supports EPA's proposal. As part of California's overall approach to accelerate a large-scale transition to light-, medium- and heavy-duty ZEVs, the state adopted the ACC II rule in November 2022, which requires the sale of an increasing share of new passenger ZEVs starting with MY 2026, ensuring that all new passenger cars, trucks and SUVs sold in California will be zero emission by 2035.62 The program relies on currently available advanced vehicle technologies, including battery-electric, hydrogen fuel cell electric and plug-in hybrid electric vehicles and will help meet the state's air quality and climate change goals. Figure 10 below shows ZEV and PHEV sales percentages required by ACC II.63 [EPA-HQ-OAR-2022-0829-0786, pp. 26-29]

62 https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii; California's ZEV regulation was first adopted in 1990 as part of LEV I standards and has undergone significant periodic modifications since that time. In January 2012, the state formally adopted the Advanced Clean Cars I program that set requirements for the deployment of electric vehicles at over 10% of new vehicle sales by 2025. Seventeen additional states have since adopted the ACCI regulations. California Air Resources Board, States that Have Adopted California's Vehicle Standards Under Section 177 of the Federal Clean Air Act (May 13, 2022), https://ww2.arb.ca.gov/sites/default/files/2022-05/%C2%A7177_states_05132022_NADA_sales_r2_ac.pdf.

63 ACC II allows manufacturers to sell PHEV50s for up to 20% of the required ZEVs. . Using EPA's updated PHEV utility factors, PHEV50s equal 0.67 of a BEV. When including PHEV50s as two-thirds of a BEV in the calculation to compare EPA's proposal to ACC II, ACC II requires a higher percentage of ZEVs. E.g., in 2030, ACC II requires 68% of vehicles to be ZEVs, with PHEV50s constituting up to 20% of that 68%. Assuming 20% are PHEVs, the true ZEV share drops to 54%, lower than EPA's modeled 60%. When the PHEV50 share is included back at two- thirds, this raises ACC II ZEV share to 64%, higher than EPA's modeled 60%.

[See original attachment for Figure 10: California ACC II ZEV and PHEV Sales] [EPA-HQ-OAR-2022-0829-0786, pp. 26-29]

Source: California Air Resources Board, Advanced Clean Cars II Regulation

The program is expected to provide public health benefits of at least $12 billion over the life of the regulations by reducing premature deaths, hospitalizations and lost workdays associated with exposure to air pollution. Six other states – Massachusetts, New York, Oregon, Vermont, Virginia and Washington – have already adopted ACC II and a number of others are currently considering it. In February 2023, New Jersey Governor Phil Murphy announced a commitment to initiate the process to adopt ACC II.64 And in March 2023, Maryland Governor Wes Moore announced the state would adopt ACC II.65 In December 2022, the District of Columbia released a notice of proposed rulemaking and public hearing for the adoption of California's clean car standards.66 Rhode Island's Department of Environmental Management held a virtual public listening session on May 18, 2023 to review the draft release of the "Rhode Island's Low-Emission and Zero-Emission Vehicle Programs" regulation, which is modeled on ACC II.67 Colorado Governor Jared Polis' administration is also proposing a modified version of ACC II.68 [EPA-HQ-OAR-2022-0829-0786, pp. 26-29]

64 Governor Murphy Announces Comprehensive Set of Initiatives to Combat Climate Change and Power the "Next New Jersey", (February 15, 2023). https://nj.gov/governor/news/news/562023/approved/20230215b.shtml.

65 The Office of Governor Wes Moore, Governor Moore Announces Maryland Adoption of the Advanced Clean Cars II Rule to Combat the Effects of Climate Change (Mar. 13, 2023), https://governor.maryland.gov/news/press/pages/Governor-Moore-Announces-Maryland-Adoption-of-the-Advanced-Clean-Cars-II-Rule-to-Combat-the-Effects-of-Climate-Change.aspx.

66 DC Department of Energy & Environment, Notice of Comment Period for Proposed Rulemaking – Adoption of California Vehicle Emission Standards (Dec. 9, 2022), https://doee.dc.gov/release/notice-comment-period-proposed- rulemaking-adoption-california-vehicle-emission-standards.

67 State of Rhode Island Department of Environmental Management, DEM Announces that Rulemaking Process to Implement Draft Clean Car & Truck Emissions Standards is Set to Start at May 18 Public Listening Session (May 10, 2023), https://dem.ri.gov/press-releases/dem-announces-rulemaking-process-implement-draft-clean-car-truck- emissions-standards.

68 CPR News, Colorado Updated EV Plan Boosts Incentives but Avoids California-Style Ban on Gas Vehicles (Dec. 8, 2022), https://www.cpr.org/2022/12/08/colorado-updated-evs-plan/.

States are also providing significant additional policy support to accelerate deployment of ZEVs, including billions of dollars in grants and incentives to produce and sell electric vehicles, batteries and components. WSP's EV investments analysis identified more than $15 billion in state and local incentives.69 For example, California's ACC II regulations are backed by Governor Newsom's $2.4 billion dollar investment in vehicle incentives, charging infrastructure and public outreach.70 Figure 11 shows the announced private investment and added jobs by state and indicates the contribution of state and local incentives toward that investment. [EPA-HQ-OAR-2022-0829-0786, pp. 26-29]

69 U.S. Electric Vehicle Manufacturing Investments and Jobs, Characterizing the Impacts of the Inflation Reduction Act after 6 Months, WSP for EDF, (March 2023). https://blogs.edf.org/climate411/files/2023/03/State-Electric- Vehicle-Policy-Landscape.pdf (Attachment E).

70 California Air Resources Board, Advanced Clean Cars II Regulations: All New Passenger Vehicles Sold in California to be Zero Emissions by 2035, https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars- program/advanced-clean-cars-ii.

[See original attachment for Figure 11: 86% of Announced EV Investment is in 10 States] [EPA-HQ-OAR-2022-0829-0786, pp. 26-29]

Source: WSP, U.S. Electric Vehicle Manufacturing Investments and Jobs

Together, these state programs and incentives further support the feasibility of strong multipollutant emissions standards that drive the deployment of ZEVs. [EPA-HQ-OAR-2022-0829-0786, pp. 26-29]

Organization: General Motors, LLC (GM)

Following EPA's August 2021 GHG regulation proposal, GM submitted comments supporting the environmental benefits of EPA's historically stringent proposed GHG program for the 2023 to 2026 model years.7 [EPA-HQ-OAR-2022-0829-0700, p. 3]

7 EPA-HQ-OAR-2021-0208-0234 (September 2021). https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0208-0234

-In March 2022, GM, as a member of the Alliance for Automotive Innovation, filed a motion to intervene in support of EPA against petitioners that have challenged the 2023-2026 GHG regulation.8 [EPA-HQ-OAR-2022-0829-0700, p. 3]

8 U.S. Court of Appeals for the District of Columbia Circuit, Case #22-1031. Document #1941280 (March 2022). https://www.edf.org/sites/default/files/2022-09/Alliance%20for%20Automotive%20Innovation-motion%20to%20intervene.pdf

Due to the complex nature of this rulemaking, we encourage continued dialogue in the months ahead as EPA and the other agencies assess and develop their final rules. In addition to the detailed technical comments in the attached appendices, GM is open to sharing further confidential business information in areas that may help the agencies in any areas of the rulemakings. Especially considering the interactions between the EPA, NHTSA, DOE, and CARB standards, we welcome future opportunities to discuss how various alternatives might impact future compliance as we all strive toward our collective EV goals. We remain optimistic about EPA's ability to develop and finalize an achievable and successful set of regulatory programs to address climate change, ensure local air quality, and strengthen Am erican manufacturing. [EPA-HQ-OAR-2022-0829-0700, p. 6]

Organization: GROWMARK, Inc.

The proposed rules, by EPA's own estimates, would require 67 percent of light-duty vehicles and 46% of medium-duty sold in the United States by the 2032 model year to be electric vehicles (EVs).1 [EPA-HQ-OAR-2022-0829-0560, p. 1]

1 EPA. (2023, April 12). Biden-Harris administration proposes strongest-ever pollution standards for cars and trucks to accelerate transition to a clean-transportation future. https://www.epa.gov/newsreleases/biden-harris- administration-proposes-strongest-ever-pollution-standards-cars-and

Organization: Hyundai Motor America

A Federal Advisory Committee Should Be Convened to Help Assess Key Enablers Needed to Support BEV Penetration Requirements.

The Proposed Rule's BEV penetration forecast assumes that all elements critical to the rule's success – such as infrastructure and grid resiliency – come together to support BEV adoption, directly impacting automaker compliance. However, as described above there is much work needed in short order to grow infrastructure and grid capacity. We envision a final rule that includes specific assumptions about infrastructure growth and grid capacity improvements necessary to enable the MY 2030 standards. We recommend the formation of a Federal Advisory Committee ("FAC") to include equitable private and public representation. Starting January 1, 2029 and completed by July 1, 2030, the FAC would assess the state of infrastructure development and grid resiliency against the rule's assumptions and make a recommendation to EPA about the feasibility of the BEV penetration targets. For example, if the assessment concludes that the assumptions are correct, then the final rule could continue as-is. However, if the findings show a shortfall, then EV multipliers would activate for MY 2029 through MY 2032. EV multiplier values should correspond appropriately to the shortfall identified. As a simplified example, a FAC finding of a ten percent infrastructure shortfall compared to the final rule's MY 2030 assumptions would trigger an EV multiplier recommendation of 1.1. In this way, automakers are not penalized for compliance shortfalls directly dependent on enablers necessary for the rule's success. An automaker's compliance shortfall, after accounting for the EV multipliers, would be subject to EPA's normal enforcement protocols. [EPA-HQ-OAR-2022-0829-0599, pp. 8-9]

Recommendations

In summary, we support AFAI's proposal as it aligns with Executive Order 14037. In addition, the final rule should include a: [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Revised No Action case to more adequately account for infrastructure and grid capacity constraints, challenges related to IRA-related supply chain restructuring, and significantly reduced consumer access to EV tax incentives in the near and medium term, [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Confidential and aggregated industry survey to understand real costs associated with supply chain and manufacturing changes caused by the 30D tax credit requirements, [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Off-cycle credit provision consistent with current rules through MY 2030, with a phasedown beginning MY 2031[EPA-HQ-OAR-2022-0829-0599, p. 9]

- Credit incentive for automakers to reduce tailpipe emissions within in disadvantaged communities, and [EPA-HQ-OAR-2022-0829-0599, p. 9]

- Federal Advisory Committee to, by July 1, 2030, assess and issue recommendations regarding the status of key enablers necessary to support the final rule's BEV penetration requirements [EPA-HQ-OAR-2022-0829-0599, p. 9]

Organization: Institute for Policy Integrity at NYU School of Law et al.

Moreover, during the April 2021 "Leaders' Summit on Climate" hosted by the United States, following the announcement of a new U.S. commitment to reduce emissions to 50–52% below 2005 levels by 2030, multiple other countries reciprocally increased the ambition of their own climate targets. Notably, Japan accelerated its reduction goal from 26% to 46–50%; Canada strengthened its target from 30% to 40–45%; South Korea strengthened its target to achieve net zero emissions by 2050; China promised to peak coal use by 2025 and phase down coal consumption after that, and to join the Kigali Amendment to reduce hydrofluorocarbon emissions; Argentina pledged to strengthen its goal by 2.7% and make previously "conditional" targets "unconditional" instead; Brazil committed to a net zero target by 2050 (ten years earlier than its previous 2060 goal) and pledged to end illegal deforestation by 2030; South Africa shifted its emission peak ten years earlier, to 2025; and New Zealand, Bhutan, and Bangladesh all committed to submit more ambitious plans in the near future.45 [EPA-HQ-OAR-2022-0829-0743, pp. 7-8]

45 U.S. Dept. of State, Leaders' Summit on Climate: Day 1, Apr. 22, 2021, https://perma.cc/3X8A-KF4G; Climate Action Tracker, Warming Projections Global Update: May 2021 at 3 (2021), https://perma.cc/7JYN-N2DU.

This flurry of activity is just the latest evidence of reciprocity in international climate actions. Some past reciprocity has been explicit. The Kigali Amendment, for example, is the latest internationally negotiated climate treaty, with more than 120 parties so far committing to common but differentiated responsibilities to phase down hydrofluorocarbons.46 Previously, under the Copenhagen Accord and the Paris Agreement, some parties, including the European Union and Mexico, have at times explicitly made conditional pledges, promising to ratchet up their efforts if other countries make comparable reductions.47 By contrast, when the United States "failed to take action to reduce greenhouse gas emissions during the George W. Bush Administration and during . . . the Trump Administration," as economist Michael Greenstone has testified before the U.S. House of Representatives, "both periods were characterized by little [international] progress, and indeed many instances of backsliding, in reducing emissions globally."48 By failing to take international climate damages into account, in other words, EPA and other U.S. agencies would incentivize other countries to do the same, which in turn would cause greater greenhouse gas pollution originating in other countries that causes climate damage within the United States. [EPA-HQ-OAR-2022-0829-0743, p. 8]

46 See U.N., Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (2016), https://perma.cc/SEX3-HAQA (last visited June 8, 2021).

47 See Eur. Comm'n, Expression of Willingness to Be Associated with the Copenhagen Accord and Submission of the Quantified Economy-Wide Emissions Reduction Targets for 2020 at 2, Jan. 28, 2010, https://perma.cc/77DD- M4LS (committing to a 20% reduction but "reiterat[ing] its conditional offer to move to a 30% reduction by 2020 compared to 1990 levels, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities"); Gov't of Mex. Ministry of Env't & Nat. Res., Nationally Determined Contributions: 2020 Update at 22, https://perma.cc/VF4A-K5HK (making an unconditional pledge of 22% reduction of GHGs and 51% of black carbon by 2030; and making a conditional pledge of up to 36% reduction GHGs and 70% black carbon, conditioned on "an international price for carbon trading, adjustment of tariffs for carbon content" as well as technology transfers and financial resources).

48 Economics of Climate Change: Hearing before the U.S. H. Comm. on Oversight & Reform's Subcomm. on Env't at 6 (Dec. 19, 2019) (testimony of Michael Greenstone), https://perma.cc/H5JS-V4H6.

On several prior occasions—again outside the context of climate change—courts have upheld EPA's authority to consider effects on international reciprocity and cooperation due to domestic pollution standards. In one case, for instance, the D.C. Circuit upheld EPA's decision to set an interim tolerance for the chemical ethylene dibromide under the Food, Drug, and Cosmetic Act (FDCA)—rather than ban the chemical altogether—after EPA concluded that a ban "could damage cooperative [food-safety] efforts," reasoning that "[s]ince effective enforcement of food safety laws depends upon such cooperation, a ban might increase the risk that fruit and vegetables would enter the U.S. treated with unsafe levels of pesticides or infested with pests or diseases."100 The D.C. Circuit similarly upheld EPA's consideration of international harmonization in setting NOx emissions standards for commercial aircraft gas turbine engines, after EPA issued a standard under the Clean Air Act to align U.S. standards with international standards.101 [EPA-HQ-OAR-2022-0829-0743, pp. 15-16]

100 National Coalition Against the Misuse of Pesticides v. Thomas, 815 F.2d 1579, 1582 (D.C. Cir. 1987).

101 National Ass'n of Clean Air Agencies v. EPA, 489 F.3d 1221 (D.C. Cir. 2007).

Organization: International Council on Clean Transportation (ICCT)

At the state level, policymakers are charging ahead with their own zero-emission vehicle regulations, investments, consumer incentives, planning, and infrastructure deployment. California's Advanced Clean Cars II (ACC II) regulations will require dramatic reductions in light- duty vehicle emissions to 100% zero-emissions by 2035 through the Zero-Emission Vehicle Regulation and the Low-emission Vehicle Regulations. Many other U.S. states follow California's leadership on automotive emissions regulations. As of May 2023, 7 states have adopted ACC II and it is likely that others will follow. By adopting its proposal, EPA can build on ACC II and expand access to cleaner vehicles more broadly across the U.S. [EPA-HQ-OAR-2022-0829-0569, p. 3]

Globally, automakers have already announced over $1.2 trillion in investments in electrification. These investments will lead to greatly expanded model line-ups and production volumes, technological advancements, and reduced costs. [EPA-HQ-OAR-2022-0829-0569, p. 3]

In parallel, states are also adopting their own zero-emission vehicle regulations, investments, consumer incentives, planning, and infrastructure deployment. California's Advanced Clean Cars II (ACC II) regulations will require dramatic reductions in light-duty vehicle emissions to 100% zero-emissions by 2035 through the Zero-Emission Vehicle Regulation and the Low- emission Vehicle Regulations.6 Many other U.S. states follow California's leadership on automotive emissions regulations. As of May 2023, California, Massachusetts, New York, Oregon, Vermont, Virginia, and Washington have adopted ACC II. It is likely that many other states will continue to follow California's leadership and adopt the new ACC II Program to benefit from the anticipated emissions reduction and health benefits of the program.7 Many additional states currently follow the Advanced Clean Cars regulations through model year 2026; as of May 13th, 2022, 17 U.S. states have adopted all or part of California's low-emission and zero-emission vehicle regulations, and about 37% of national new light-duty vehicle sales meet California's emission standards.8 [EPA-HQ-OAR-2022-0829-0569, pp. 7-8]

6 California Air Resources Board. (2023). Advanced Clean Cars II Regulations: All new passenger vehicles sold in California to be zero emissions by 2035. https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars- program/advanced-clean-cars-ii

7 Houk, J., Huang, J., and Sussman. (2023). Benefits of adopting California's Advanced Clean Cars II standards in sixteen U.S. states. Sonoma Technology Inc. Retrieved from https://theicct.org/publication/benefits-of-state-level- adoption-of-california-acc-ii-regulations/

8 California Air Resources Board. (May 13, 2022). States that have adopted California’s vehicle standards under Section 177 of the Federal Clean Air Act. https://ww2.arb.ca.gov/sites/default/files/2022-05/%C2%A7177_states_05132022_NADA_sales_r2_ac.pdf

The U.S. share of global automaker electric vehicle investments is increasing, largely driven by these state and federal policies and investments. Research from January 2023 estimates that $210 billion in automaker electric vehicle manufacturing and $54 billion in battery production investments had been announced for the U.S.9 These electric vehicle and battery manufacturing investments will lead to greatly expanded model line-ups and production volumes, technological advancements, and reduced costs [EPA-HQ-OAR-2022-0829-0569, pp. 7-8]

9 Gabriel, N. (2023, January 12). $210 billion of announced investments in electric vehicle manufacturing headed for the U.S. Atlas EV Hub. https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric- vehicle-manufacturing-headed-for-the-u-s/

MDV data and transparency

EPA’s fuel economy guides, annual certification data, and automotive trends reports are invaluable resources for detailed information on light-duty sales, emissions, fuel consumption, vehicle attributes, and applied technologies. This level of detail is absent for medium-duty vehicles. Public access to this data is necessary for many reasons, including the ability to identify trends in pickup and van sales, possible shifts from light-duty to medium-duty, and technology penetration and effectiveness. ICCT recommends EPA collect and make public these data for MDV as it does for LDV. [EPA-HQ-OAR-2022-0829-0569, pp. 62-64]

Organization: Jaguar Land Rover NA, LLC (JLR)

JLR strongly supports efforts to reduce emissions from passenger cars and light trucks, alongside improving fuel economy and advancing the transition to low emission vehicles. JLR would welcome the opportunity to continue its constructive dialogue with the relevant Government agencies in order to agree a balanced solution based on our unique position. [EPA-HQ-OAR-2022-0829-0744, p. 1]

Additionally, JLR supports the Alliance for Automotive Innovation (Auto Innovators) comments, including those on criteria pollutants emission standards. In this submission, we comment further on regulation stringency and EPA NPRM modeling assumptions in relation to the greenhouse gas (GHG) emission standards. [EPA-HQ-OAR-2022-0829-0744, p. 1]

Relationship to Other Regulations

The targets proposed by EPA are extremely ambitious and the projected BEV penetrations required to meet the standards exceed that of the California Air Resources Board (CARB) Advanced Clean Cars II regulation, with a trajectory to achieve 100% ZEV by 2035MY (as shown in Figure 3 below). [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

In 2022, California’s ZEV market share was over three times higher than the federal US BEV share.9 It is important that EPA acknowledges the inequality between California and non- S177 states. CARB are a world leader in the pursuit of the 100% ZEV goal, with years of incentives and effort involved to get to this point. EPA cannot assume that all states will follow a similar route and the regulation must balance the various adoption curves across the country. [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

9 Office of Governor Gavin Newsom - California ZEV Sales Near 19% of All New Car Sales in 2022(Jan 2023) https://www.gov.ca.gov/2023/01/20/california-zev-sales-near-19-of-all-new-car-sales-in-2022/

[See original for graph, Figure 3, titled “EPA Predicted BEV Mix vs California BEV Requirement”] [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

10 Advanced Clean Cars II (ACC II) Regulations - Section 1962.4, Title 13, California Code of Regulations - https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/2acciifro1962.4.pdf

Targets imposed on the automotive industry must be linked to and contingent on the successful roll-out of a comprehensive and accessible charging infrastructure network. The current ratio of public chargers in the US is around 1 charger for every 24 EVs11. While we recognize progress made to date in the roll-out of charging infrastructure, it is vital that this grows proportionally with the increase in uptake of EVs to remain within the EU recommended ratio of 1 public charger per 10 vehicles12 especially as these ratios are based on countries with a much greater population density compared to the United States. With more than 131,200 public chargers across the US, half (65,300) of them are concentrated across five states. (California, New York, Florida, Texas and Massachusetts)13 [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

11 IEA (2023), Global EV Outlook 2023, IEA, Paris Trends in charging infrastructure - https://www.iea.org/reports/global-ev- outlook-2023/trends-in-charging-infrastructure, License: CC BY 4.0

12 Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure -https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0094

13 US Department of Energy (Alternative Fuels Data Center (Feb 2023) - U.S. Private Electric Vehicle Charging Infrastructure - https://afdc.energy.gov/data

JLR urges EPA to re-evaluate the proposed stringency of the regulation so that the required BEV share does not exceed CARB’s targets. [EPA-HQ-OAR-2022-0829-0744, pp. 7-8]

Organization: John Graham

Or maybe EPA is suggesting to manufacturers that the agency does not approve of HEV offerings; California has already proposed to ban most hybrids by 2035 and has requested an EPA waiver to move forward with that plan. If it is EPA’s intent to restrict HEVs by regulation, the agency should say so explicitly rather than spread a fiction that HEVs are not cost effective compared to BEVs. [EPA-HQ-OAR-2022-0829-0585, p. 15]

Organization: Kari Ostlie

I am concerned that not enough time is being given for important stakeholders to properly review and adequately comment on these new proposed tailpipe rules. I have read in this docket that the American Petroleum Institute (API), the American Fuel & Petroleum Manufactures (AFPM), and the Alliance for Automotive Innovation’s (AFAI) all requested a time extension be given to do a proper review of this proposed new EPA tailpipe rules. These are important organizations that represent a lot of important companies in the industry, and I believe it is only fair to allow the organizations representing these companies the proper time it takes to adequately give informed responses to all the complex issues in this proceeding.

In their requests the API & AFAI said "we request that EPA grant an additional 90 days for public comment for each proposal. For rules of this scope and complexity, 50 and 60 days for each proposal running concurrently are insufficient. API and AFPM respectfully assert that a 50-day and a 60-day comment period violate EPA's obligation to provide public notice and an opportunity to comment…" The AFAI stated "Moreover, EPA is proposing GHG regulations and criteria regulations for both light- and medium-duty vehicles. Historically, this would have been four separate rulemakings with a combined comment period approaching 250 days."

Recently learning that the EPA denied AFPM's request to extend the comment period in this proceeding is disturbing in light of the fact all these organization felt they needed more time to review the extensive material and provide meaningful comment in this proceeding. If given the proper among of time to analyze and respond, these organizations may have brought up some important points to consider that may have positively affected the outcome of this proceeding. As a citizen of this country, I am shocked that this request for extended time would not be granted. Not giving these organizations the proper time to comment means important perspectives will not even be brought up for discussion before the comment period ends due to time constraints. With such a significant proposal all perspectives should be given the time to bring up the points they need and to be fully heard as the points these organizations bring up may positively affect the outcome of this case for the American public. As it is important to balance all the concerns in this proposal for the best outcome in this proceeding. Thank you for taking my concerns into consideration. [EPA-OAR-HQ-2022-0829-1049]

Organization: Kia Corporation

Kia strongly supports comments submitted by the Alliance for Automotive Innovation (AFAI) on the Multi-Pollutant Emissions Standards proposed rule. Kia incorporates AFAI comments here by reference. Kia also fully endorses comments made by the Hyundai-Kia America Technical Center, Inc. (HATCI). Kia incorporates HATCI's comments here by reference and attaches them as Appendix A. [EPA-HQ-OAR-2022-0829-0555, p. 1]

- Kia continues to support the long-standing goal where EPA, National Highway Traffic Safety Administration (NHTSA), and the California Air Resources Board (CARB) work together to coordinate emissions regulations, strive to align stringency, and reduce unnecessary testing burdens. [EPA-HQ-OAR-2022-0829-0555, p. 3]

Kia supports continuing to collaborate with all levels of the government to ensure complementary policies continue to be implemented so we can work together to meet the goal of fully transitioning to vehicle electrification. The electric renewable identification number (eRIN) component of the Renewable Fuel Standard (RFS) program in 2024 is an example of a policy vital to support the administration's mission of rapidly deploying EVs. It would provide a strong incentive to produce renewable energy that will decarbonize the energy system that supports those vehicles. The eRIN program is unique in its ability to directly support automakers like Kia in its efforts to meet these ambitious goals. However, this program is seemingly in jeopardy and its omission would make it even more difficult to achieve EPA's proposal. [EPA-HQ-OAR-2022-0829-0555, p. 7]

EPA's Program Should Include Mechanism to Adjust Standards if Necessary

EPA's proposal does not include any mechanism to adjust standards or correct course if the various assumptions in the model do not materialize. Market assumptions in EPA's model include adequate charging infrastructure, consumer acceptance and demand, critical mineral supply, manufacturing capacity, power capacity, power rates, and low cost discrepancy between ICE and EVs. All of these elements – market realities and external challenges – are outside the control of automakers. There needs to be a mechanism that allows or requires EPA to revise standards if certain market conditions do not materialize at the level necessary to increase demand for EVs. [EPA-HQ-OAR-2022-0829-0555, p. 7]

Organization: Mass Comment Campaign sponsoring organization unknown (118 signatures)

Additionally, I am concerned about how these new standards could negatively impact the Highway Trust Fund. If implemented without addressing the funding structure, these proposed regulations could strain the already precarious state of transportation funding. It is crucial to consider additional solutions, such as a Low Carbon Fuel Standard, to address the revenue lost by having fewer internal-combustion engines on the road. [EPA-HQ-OAR-2022-0829-1701]

In conclusion, I strongly urge the EPA to reconsider the proposed tailpipe emissions rules. It is crucial that the EPA engage in meaningful collaboration with Congress, automotive manufacturers, and other stakeholders to develop a comprehensive approach that accounts for the current limitations in charging infrastructure, safeguards consumer choice, promotes domestic energy security, and ensures the continued funding of our vital transportation infrastructure. [EPA-HQ-OAR-2022-0829-1701]

Organization: MECA Clean Mobility

EPA should consider incentives and potential future requirements that advance efficiency of electric vehicles.

MECA requests that EPA explore additional incentivization structures that would allow consumers to make informed choices when purchasing electric and fuel cell vehicles. For example, EPA could institute a labeling requirement for electric vehicles with similarities to Energy Star and displaying how an electric vehicle compares to other similar electric vehicles in its class. The simplified Energy Star graphic is recognizable and understood by the majority of consumers who might not be able to interpret the value of an electric vehicle efficiency in kilowatt-hours per 100 miles, which is currently on the window sticker. [EPA-HQ-OAR-2022-0829-0564, pp. 31-32]

Organization: MEMA, The Vehicle Suppliers Associated

The aggressive pace and scope of the proposed rule obliges EPA to work to ensure success throughout the course of this rule's implementation. EPA must follow through on all assumptions in the regulatory impact analysis (RIA), and act accordingly to help make them a reality and reassure manufacturers and consumers along the way. [EPA-HQ-OAR-2022-0829-0644, p. 4]

MEMA urges:

• the Biden Administration to align regulations and priorities in concert with the Joint Office of Energy and Transportation throughout the implementation period of this rule to identify shared concerns and solutions for the many moving parts of the rule. EPA needs this broad support to follow through on all assumptions regarding critical materials, infrastructure, and timing of milestones identified in the rule's analyses. [EPA-HQ-OAR-2022-0829-0644, p. 4]

• EPA work closely with NHTSA to align the CAFE standards rule with the LD/MD Multi-Pollutants rule. [EPA-HQ-OAR-2022-0829-0644, p. 4]

Immigration Reform will Help Address Need for More Skilled Workers

The manufacturing industry continues to invest in solutions to our workforce needs. As the largest employer of manufacturing jobs in the United States, our industry expects to have 2.1

million unfilled jobs by 2030.11[EPA-HQ-OAR-2022-0829-0644, p. 13]

11 Wellener, Paul; Reyes, Victor; Ashton, Heather; Moutray, Chad. "Creating pathways for tomorrow's workforce today". Deloitte Insights, 4 May 2021 https://www2.deloitte.com/us/en/insights/industry/manufacturing/manufacturing-industry-diversity.html

Immigration reform is crucial to the United States developing a new pipeline of talent. MEMA recommends increasing annual quotas for employment-based immigrant and nonimmigrant visas, expanding the scope of essential worker programs, and creating new visa options for international students and other high-demand workers. Immigration reform with a focus on our workforce needs is crucial for our industry to continue its growth and advancement. [EPA-HQ-OAR-2022-0829-0644, p. 13]

MEMA urges:

• EPA to work with other agencies to enable sufficient skilled labor to support national EV deployment and infrastructure transformations. [EPA-HQ-OAR-2022-0829-0644, pp. 14-15]

Organization: Missouri Corn Growers Association (MCGA)

The rule is discriminatory to all farmers and rural America whose economies and way of life depend on agriculture, as well as cars and trucks powered by internal combustion engines (ICE). The impacts of this rule will negatively impact hard-working farmers, their families, and rural communities. But the pain won’t stop with agriculture. [EPA-HQ-OAR-2022-0829-0578, p. 1]

Organization: National Corn Growers Association (NCGA)

Despite the GHG and criteria pollution reduction benefits of FFVs, as well as the low cost to purchase and fuel these vehicles, automakers have cut back on FFV models and now offer very few choices to consumers. Well-structured vehicle credit programs remain an impactful, cost-effective means for the government to encourage the introduction and adoption of new products and technologies. To encourage introduction of a wider range of low emission vehicle choices, NCGA believes EPA must provide equitable crediting across the spectrum of low emission vehicles, including FFVs. [EPA-HQ-OAR-2022-0829-0643, p. 9]

NCGA also urges EPA to take steps to update the F-factor in the fuel economy formula to a forward-looking F-factor of at least 0.2, as we outlined in 2020 comments in response to Docket EPA–HQ–OAR–2020-0104. Furthermore, we urge EPA to reinstate the 0.15 volumetric conversion factor for FFVs. EPA should reharmonize the 0.15 factor for FFVs in these standards, and, if not, in future standards. This change would accurately reflect the significant carbon emissions reductions from FFVs using E85 because the carbon emissions from the fuel are the release of carbon taken up through crop growth. [EPA-HQ-OAR-2022-0829-0643, p. 9]

Organization: Natural Gas Vehicles for America

(2) EPA to the extent it incorporates other technology advancement credits in its vehicle regulations should extend these incentives to natural gas and natural gas hybrid- electric vehicles based on the demonstrated benefits of these vehicles and the need to accelerate the introduction of a diverse mix of cleaner vehicle technologies; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(3) EPA should provide enhanced SmartWay designations for trucks powered by low-NOx engines and fueled by carbon-neutral or even carbon-negative renewable natural gas; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(4) Federal agencies should fund pilot programs and infrastructure development that demonstrate the ways in which natural gas can be used to fuel a variety of different transportation sectors by supporting the purchase of vehicles and equipment at multimodal facilities such as ports and rail facilities; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(5) Federal agencies should ensure that federal funding provided under the CMAQ Program and the DERA Program and other programs enacted as part of the Bipartisan Infrastructure Law and Inflation Reduction Act are competitively awarded for projects that provide the most cost-effective emission reductions and offer increased funding levels for engines and vehicles that are certified to more demanding standards in advance of EPA's adoption of such standards; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(6) Federal agencies should work with state authorities to ensure that transportation policies include performance metrics and consider a variety of different technologies as opposed to only promoting specific technologies regardless of their cost; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(7) The Administration should work with Congress to amend the federal excise tax on new trucks to reduce the impediment to fleets and businesses purchasing cleaner new trucks by either eliminating the tax altogether since it discourages new purchases or amend the tax so that it does not penalize more costly, lower polluting technologies (i.e., eliminate the excise tax on the incremental cost). [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

California's Advanced Clean Cars (ACC) regulations require manufacturers of light-duty cars and trucks to sell increasing percentages of ZEVs. The regulations also include LEV standards to reduce criteria pollutants and GHG emissions from new internal combustion engine (ICE) vehicles. To date, in addition to California, 17 states have adopted the LEV standards, and 15 states have adopted both the LEV standards and ZEV sales requirements.11 [EPA-HQ-OAR-2022-0829-0584, p. 4]

11 A key focus of NESCAUM's clean transportation work is to advise and assist states with respect to adoption and implementation of California's new motor vehicle emissions standards. Through its Mobile Sources Committee, NESCAUM helps the Section 177 states to collaborate and coordinate on shared mobile source regulatory issues.

California's ACC II program, finalized in 2022, requires manufacturers of passenger vehicles (designed to transport 12 persons or less) and light-duty trucks (gross vehicle weight rating less than 8,500 pounds) to produce and deliver for sale an increasing percentage of ZEVs over time and 100 percent ZEVs by 2035. ACC II also establishes increasingly more stringent exhaust and evaporative emission standards for light- and medium-duty ICE vehicles. To date, California, Massachusetts, New York, Oregon, Vermont, Virginia, and Washington have adopted ACC II. These seven states represent over 20 percent of the LDV market.15 Six more jurisdictions—Colorado, Delaware, the District of Columbia, Maryland, New Jersey, and Rhode Island—have announced their intentions to adopt ACC II. More are expected to follow given the anticipated climate, air quality, and economic benefits of the program.16 [EPA-HQ-OAR-2022-0829-0584, p. 5]

15 Recent modeling for select Section 177 states shows that adopting ACC II will result in even greater cumulative NOx and GHG emissions reductions than EPA's proposed standards between 2025 and 2040. Across all of the states modeled, ACC II achieved 30 percent greater well-to-wheel CO2 equivalent reductions and 75 percent greater NOx reductions than EPA's proposed standards. Some states modeled saw even greater reductions. In Connecticut and New Jersey, for example, ACC II would provide an incremental benefit of roughly two times more than EPA's proposal. See Sonoma Technology, ACC II Program – EPA 2027 Proposal Comparison (June 8, 2013), [LINK TO NESCAUM WEBSITE WHEN POSTED].

16 National Automobile Dealers Association, NADA Data 2021 (2022), https://www.nada.org/media/4695/download?inline.

California's Advanced Clean Trucks (ACT) regulation requires manufacturers of Class 2b-8 on- road medium- and heavy-duty vehicles to sell increasing percentages of ZEVs. By model year 2035, 55 percent of sales of Class 2b-3 vehicle sales, 75 percent of class 4-8 vehicle sales, and 40 percent of Class 7-8 truck tractor sales must be ZEVs. In addition to California, seven states— Colorado, Massachusetts, New Jersey, New York, Oregon, Vermont, and Washington—have adopted the ACT regulation. These states have also adopted California's Heavy-Duty Low NOx and Phase II GHG regulations, which are designed to reduce emissions from new diesel fueled heavy-duty vehicles while the market transitions to ZEVs. Many more states are expected to follow. Like the ACC II regulation, state adoption of the ACT regulation creates economies of scale, lowers costs, promotes job creation, and provides the regulatory certainty needed to drive investment in ZEVs and infrastructure. [EPA-HQ-OAR-2022-0829-0584, p. 5]

B. Multi-State Collaboration

The NESCAUM and OTC states have long understood the benefits of a coordinated approach to transportation electrification policy development and implementation. Many are signatories to the 2013 Multi-State Zero-Emission Vehicle Memorandum of Understanding,17 which set light-duty ZEV sales targets for ten states to achieve by 2025; memorialized their commitment to work together to develop policies and programs to achieve those targets; and created the Multi-State ZEV Task Force, facilitated by NESCAUM, to enable states to collaborate and coordinate on ZEV policy. NESCAUM and the Task Force have developed two action plans with recommendations for states to accelerate light-duty ZEV adoption18 and policy guidance on a wide range of related issues and topics. [EPA-HQ-OAR-2022-0829-0584, pp. 5-6]

17 Multi-State Zero-Emission Vehicles Program Memorandum of Understanding (Oct. 2013), https://www.nescaum.org/documents/zev-mou-10-governors-signed-20191120.pdf/.

18 See, e.g., Multi-State ZEV Task Force, Multi-State ZEV Action Plan 2018-2021: Accelerating the Adoption of Zero Emission Vehicles (June 2018), https://www.nescaum.org/topics/zero-emission-vehicles/multi-state-zev-action- plan-2018-2021-accelerating-the-adoption-of-zero-emission-vehicles; Multi-State ZEV Action Plan (May 2014).

Most of the NESCAUM and OTC states are also signatories to the 2020 Multi-State Medium- and Heavy-Duty ZEV Memorandum of Understanding,19 now signed by a diverse coalition of 17 states, the District of Columbia, and the Canadian province of Quebec. Collectively, the U.S. signatories represent 43 percent of the U.S. population, 49 percent of the U.S. economy, and 36 percent of the nation's medium- and heavy-duty vehicles.20 The 2020 MOU commits the signatories to collaborate to accelerate the market for zero-emission trucks, vans, and buses, and sets targets to achieve at least 30 percent medium- and heavy-duty ZEV sales by 2030 and 100 percent ZEV sales by no later than 2050. Some of the signatories have established more ambitious targets. In July 2022, NESCAUM and the Task Force released an action plan with more than 65 strategies and recommendations for state policymakers to support the rapid, equitable, and widespread electrification of MHD vehicles.21 The signatories and other Task Force states are currently working to implement these recommendations. [EPA-HQ-OAR-2022-0829-0584, pp. 5-6]

19 Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Memorandum of Understanding (July 2020), https://www.nescaum.org/documents/mhdv-zev-mou-20220329.pdf/.

20 Collectively, the U.S. signatories represent 43 percent of the U.S. population, 49 percent of the U.S. economy, and 36 percent of the nation's MHD vehicles. See Census Bureau, 2020 Population and Housing State Data (Aug. 12, 2021), https://www.census.gov/library/visualizations/interactive/2020-population-and-housing-state-data.html; Bureau of Economic Analysis, GDP and Personal Income, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=1&isuri=1 (visited June 23, 2022) (2021 Real GDP); Atlas Public Policy, EV Hub, https://www.atlasevhub.com/materials/medium-and-heavy-duty-vehicle- registrations-dashboard/#06f2a5dfc39daf9cc (visited June 23, 2022) (2019 IHS market data).

21 See Multi-State ZEV Task Force, Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan: A Policy Framework to Eliminate Harmful Truck and Bus Emissions (July 27, 2022), https://www.nescaum.org/documents/multi-state-medium-and-heavy-duty-zero-emission-vehicle-action-plan/.

Like ZEV sales regulations, the shared ambition memorialized in these multi-state agreements sends strong and consistent signals to industry and investors and promotes public and private investment in zero-emission technologies and infrastructure. For example, the public utility commissions in the U.S. signatories to the 2022 MOU have already approved more than $2 billion dollars of utility funding for medium- and heavy-duty ZEV infrastructure planning and deployment.22 [EPA-HQ-OAR-2022-0829-0584, pp. 5-6]

22 U.S. Department of Energy, Alternative Fuels Data Center, Alternative Fueling Station Counts by State, https://afdc.energy.gov/stations/states (visited June 9, 2023).

Organization: Our Children's Trust (OCT)

There is also no justification, no compelling interest, and no rational basis for not aligning EPA’s rule with California and other states that require 100% of light-duty vehicle sales to be ZEVs by 2035. [EPA-HQ-OAR-2022-0829-0542, p. 1]

Please include all cited evidence in the administrative record. We are also happy to provide any of the cited evidence on request. All Juliana v. United States evidence are in the files of the Department of Justice, which represents EPA and the Administrator in the case, as its clients. Thus, you have access to all of those documents and evidence, along with the legal bases for the comments made herein. However, if you have not been provided with those documents, we are happy to provide them. We would be pleased to meet with you and/or you and your counsel to discuss the constitutional use of EPA’s statutory authority to redress the climate crisis and protect the Nation’s children. Please send us a response to our comments, notification of further comment opportunities, and all analyses and decision documents to the address and email listed below. [EPA-HQ-OAR-2022-0829-0542, p. 6]

Organization: POET, LLC

The complications associated with EPA’s modeling underpinning its Proposed Rule shows the inadequacy of EPA’s 60-day comment period for the Proposed Rule. OnLocation raises significant questions regarding the robustness of EPA’s proposed vehicle GHG regulations and with “more time allowed than the short comment period provided by EPA on the proposal, a more comprehensive analysis of LDV policies using the OMEGA module could be performed leading to a more complete understanding of the consequences of this Proposed Rule.”126 [EPA-HQ-OAR-2022-0829-0609, p. 28]

126 Id. at 16.

Organization: Roy Littlefield IV

Additionally, I am concerned about how these new standards could negatively impact the Highway Trust Fund. If implemented without addressing the funding structure, these proposed regulations could strain the already precarious state of transportation funding. It is crucial to consider additional solutions, such as a Low Carbon Fuel Standard, to address the revenue lost by having fewer internal-combustion engines on the road. [EPA-HQ-OAR-2022-0829-0793, p. 1]

Organization: Stellantis

Target Adjustment Mechanisms Needed Based on Market Enablers

Stellantis fully supports the Auto Innovators’ comments proposing a target adjustment mechanism based on key EV market enablers. This mechanism is in addition to making the other revisions needed to address concerns raised with the standards. There is a great deal of uncertainty with how critical mineral and raw material supplies, battery cost improvements, and charging/refueling infrastructure will develop over the next decade. In particular, charging/refueling infrastructure and supply of critical minerals and raw materials from non-countries of concern are well outside the control of either EPA or automakers. We understand

EPA must use projections in its modeling. However, given the uncertainty around these items, large inaccuracies can lead to a final rule that is grossly misaligned with the market. The Auto Innovators' proposal of a market-based target adjustment system would allow for year-by-year adjustments to be made within the framework of a rule that can be finalized on EPA's desired timeline and will minimize the need to be reopened to react to real-world market conditions. [EPA-HQ-OAR-2022-0829-0678, p. 7]

This proposal contains three individual adjustment mechanisms of roughly equivalent magnitude. The first is based on the percentage of the entire U.S. light-duty fleet qualifying for the full $3,750 30D retail tax credit which is tied to extracting and processing critical minerals in the U.S. or a country with a free trade agreement. This is the most simple and direct way to assess whether or not raw material supplies are developing adequately. The second adjustment mechanism is based on actual EV battery costs that could be confidentially disclosed to the EPA by each automaker every model year and compared with EPA's projected battery costs used in the development of this rule. The third mechanism is simply tracking the ratio of public charging/refueling points to the number of light-duty EVs registered and on the road. As the total size of the on-road EV fleet grows, so does the amount of charging/refueling infrastructure. If these three key market enablers develop as envisioned by EPA in this rule, then the impact of these adjustments will be negligible. But if one or more of these key enablers do not develop quickly enough, then this proposed system will allow for simple, objective, and transparent metric-based adjustments to be applied equally to all of industry. These are industry-wide issues and thus should be resolved on an industry-wide basis. [EPA-HQ-OAR-2022-0829-0678, p. 7]

At a House Committee on Energy and Commerce hearing on driving affordability held on June 22, 2023, Rep. Dingell (D-MI) raised concerns with EPA Principal Deputy Administrator Goffman on what happens under the NPRM if companies cannot reach BEV as 67% of new vehicle sales in 2032, consumers cannot afford EVs, the charging stations aren't there, and the assumptions and forecasting EPA relies upon are not viable. Mr. Goffman's response included a reference to a possible market assessment review. Stellantis believes the Auto Innovators' recommended ongoing market-based target adjustment system to be the best embodiment of a direct market review. However, Stellantis could support an additional market-based review that is both objective and transparent in reaching the necessary adjustments to allow this rule to be reasonable and achievable given the large amount of uncertainty with how these key market enablers will develop over the next decade. At a minimum, Stellantis supports EPA adding modules to its annual EPA Automotive Trends Reports that capture important metrics such as the number of public EV charging stations deployed and percent of EVs purchased. [EPA-HQ-OAR-2022-0829-0678, p. 7]

Lastly, this rule is broad in scope and high in complexity, proposing many changes to long-standing processes (i.e., a variety of new phase in requirements). Stellantis would welcome EPA providing industry training on implementation details when the rule is finalized. Stellantis requests that EPA offer classes/training, similar to the material and concise overview provided after the HD GHG Phase 1 rule was published. EPA's simplified slides provided more straight-forward rule interpretation and understanding. It would also be helpful for the training to include compliance calculation examples to resolve any potential ambiguity from the regulation. [EPA-HQ-OAR-2022-0829-0678, p. 25]

Organization: Steven G. Bradbury

Introduction

With these rules, EPA is proposing to interfere with and displace market forces on a massive and unprecedented scale, and the effects of these regulatory edicts on the American people and the U.S. economy will be disastrous if even one of the EPA's many key supporting assumptions turns out to be incorrect. [EPA-HQ-OAR-2022-0829-0647, p. 3]

It seems apparent that the EPA's primary goal is not to improve environmental per- formance of new motor vehicles, but rather to force the industry to transform its production processes and to achieve an artificially rapid transition to zero-emission-vehicle platforms, such as fully electric vehicles, to the extent and on the schedule that President Biden and the California Air Resources Board (CARB) have announced as their goals. Thus, the EPA's proposed rules seem to be guided by and aimed at hitting goals that are more aspira- tional and political in nature; they are not legitimate standards based on an accurate and objective assessment of technological and marketplace realities. [EPA-HQ-OAR-2022-0829-0647, p. 3]

And through these rulemakings, the Agency is proposing to align its regulatory objec- tives with the zero-emission vehicle, or ZEV, mandates recently issued by CARB, the Cali- fornia Air Resources Board, which are designed to phase out the sale of all gas-powered passenger cars and light trucks by 2035 and all medium- and heavy-duty trucks by 2045. The EPA now appears to be committed to a similar trajectory. [EPA-HQ-OAR-2022-0829-0647, p. 6]

It is not surprising the Agency would act to conform its policies to CARB's, since CARB was able to issue its mandates only because the EPA has granted California a special waiver from preemption under the Clean Air Act. Both sets of rules flow from the policy decisions of the EPA in accordance with directions from the White House. [EPA-HQ-OAR-2022-0829-0647, p. 6]

Putting the Highway Trust Fund at risk. The Highway Trust Fund, which covers a large percentage of the costs of state and local highway improvements and main- tenance in the U.S., is currently funded through a gas tax. The gas tax is relatively easy to administer because it is paid at the level of wholesale gasoline and diesel fuel distribution by a small number of large distributors. If more than half of new vehicles sold in the U.S. were EVs, as contemplated in the EPA's proposals, the gas-tax revenues for the Fund would drop dramatically, and the solvency and utility of the Fund would collapse. That would threaten the viability of the national high- way system and the capacity of states to maintain highways in good repair. [EPA-HQ-OAR-2022-0829-0647, p. 19]

If the Fund were to be retained in some form, it would require a new source of revenue, such as a tax on all vehicle miles traveled, or VMT. The idea behind a VMT tax is that it would equitably capture the VMT of EVs, just as well as ICE vehicles. However, a VMT tax is likely to be more complicated and costly to ad- minister than the gas tax. There are significant questions about the design and ad- ministrability of a VMT tax that would need to be worked out and proven—for example, through one or more state-wide pilot programs—before implementation. Since EPA is proposing to adopt rules that would cause a national shift to EVs, which in turn would undermine the revenue basis for the Highway Trust Fund, EPA should recognize and consider as part of these rulemakings the upfront costs and dislocations that would be involved in transitioning to a new revenue basis for the Highway Trust Fund, as well as the ongoing higher costs of administering such an alternative tax. [EPA-HQ-OAR-2022-0829-0647, p. 19]

Increasing highway infrastructure costs. Similarly, the cost of increased wear and tear on highway infrastructure, including the cost of increased frequency of required repairs, should also be recognized in the proposals. If, as EPA envisions, EVs were to comprise more than half of new light-duty vehicle sales, and if a large percentage of new medium- and heavy-duty trucks were battery powered, that would have a definite negative impact on highway infrastructure. The batteries in EVs are heavy, and, as a consequence, EVs tend to be considerably heavier than comparably sized ICE vehicles. The greater weight of EVs would cause faster wear and tear on high- ways if the number of EVs on the road were to increase significantly. [EPA-HQ-OAR-2022-0829-0647, pp. 19-20]

- Increasing the costs and burdens of first responders. There is no mention in EPA's NPRMs or in the accompanying DRIAs of the impact these rules would have on first responders. If EVs come to comprise a greatly increased percentage of the nation's auto fleet, as EPA's proposals are intended to achieve, state and local first responders will inevitably incur significantly higher costs and burdens in the form of specialized fire-suppression chemicals and equipment and additional hazardous- response training requirements. Lithium-ion battery fires are a common occurrence with EVs, and these fires generate intense heat and toxic fluoride gas emissions, making them more difficult to extinguish than conventional vehicle fires and increasing the costs and management challenges of maintaining effective first responder capabilities.56 [EPA-HQ-OAR-2022-0829-0647, pp. 19-20]

56 See Fredrik Larsson, et al., "Toxic fluoride gas emissions from lithium-ion battery fires," Scientific Reports, Nature, August 30, 2017, https://www.nature.com/articles/s41598-017-09784-z (corrected March 22, 2018) (also available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5577247/).

EPA should withdraw and reconsider these rulemaking proposals.

In light of the deficiencies in the cost analyses and underlying assumptions laid out above, EPA should withdraw and reconsider both of its proposed tailpipe rules. If EPA had more carefully considered its legal authorities under the Clean Air Act and more thoroughly accounted for the market realities and facts relevant to these proposals, I am confident EPA would not have proposed the radical and far-reaching approach to emissions control reflected in the current proposals. [EPA-HQ-OAR-2022-0829-0647, pp. 21-22]

Even if EPA persists in proposing something along the same lines, at a minimum, it should put these concepts out for public comment in a much more preliminary form—for example, in an advanced notice of proposed rulemaking, or ANPRM. By setting out the general ideas it plans to consider in an ANPRM, EPA could suggest its own preliminary supporting analysis and view of the relevant facts and considerations and then ask for meaningful input on all aspects of the issues, seeking recommendations for alternative approaches from interested parties and the public. That would be more respectful of the American people and all interested stakeholders and would be more accommodating of the need for and the value of greater public input and deliberation. [EPA-HQ-OAR-2022-0829-0647, pp. 21-22]

Such an alternative process would provide the opportunity for EPA to receive deeper and broader information on all sides of the issues raised by these regulatory proposals, as well as a more probing analysis of the scope of EPA's authority to set emissions limits for automobiles and commercial trucks. In that way, an ANPRM process would help redirect EPA's thinking about the true costs, market disruptions, and secondary consequences of its preferred approach and about its authority to undertake these transformational proposals. [EPA-HQ-OAR-2022-0829-0647, pp. 21-22]

Organization: T. Becker Power Systems

5- Both US EPA and California Air Resources Board (CARB) have illegally blocked the study of localized emission reduction strategies that would achieve EPA air quality standards without the need for increasingly stringent motor vehicle emission standards. Those alternative strategies include reducing VMT in California by 55% from a 2019 baseline by 2040, and reducing Port of Los Angeles/Long Beach activity (tonnage) by 75% by 2030 from a 2019 baseline. [EPA-HQ-OAR-2022-0829-0567, p. 1]

Organization: Tesla, Inc.

Additionally, Tesla notes that the 10 MB size limitation on appending supporting documents has prevented the attachment of some supporting materials. As a result, Tesla requests EPA include the following documents in the administrative record: [EPA-HQ-OAR-2022-0829-0792, p. 1]

• Tesla, Impact Report 2022 (Apr. 24, 2023) (full report) available at https://www.tesla.com/impact

• Tesla, 2023 Investor Day Presentation (March 1, 2023) available at https://digitalassets.tesla.com/tesla-contents/image/upload/IR/Investor-Day-2023-Keynote

• Tesla, Battery Day Presentation (Sept. 22, 2020) available at https://tesla-share.thron.com/content/?id=96ea71cf-8fda-4648-a62c-753af436c3b6&pkey=S1dbei4 [EPA-HQ-OAR-2022-0829-0792, p. 1]

Further, California's recent adoption of the ACC II rule, setting a 100 percent zero-emission vehicle (ZEV) sales standard by 2035, will also accelerate BEV adoption. As EPA recognizes, a number of states have already adopted ACC II and the list is growing.85 New research assessing the impact of additional states adopting California's standards (accounting for the IRA's tax credits) finds that adoption by California and 16 other states would accelerate electric vehicle adoption, cut 1.3 gigatons of carbon emissions (equivalent to closing 13 coal plants), create 300,000 new jobs, save households $230 per year, and prevent 5,000 deaths in 2050.86 [EPA-HQ-OAR-2022-0829-0792, pp. 12-13]

85 88. Fed. Reg. at 29344; Bloomberg Law, More States Join California's Push to Phase Out Gas Cars by 2035 (May 16, 2023) available at h ttps://news.bloomberglaw.com/environment-and-energy/more-states-join-californias-push-to-phase-out-gas- c ars-by-2035

86 Energy Innovation, Nationwide Impacts Of California's Advanced Clean Cars II Rule (April 9, 2023) available at h ttps://energyinnovation.org/publication/nationwide-impacts-of-californias-advanced-clean-cars-ii-rule/

Further, as a growing number of states seek to adopt more robust ZEV requirements, enhancing the ZEV contribution to the establishment of multi-pollutant standards has the potential to significantly enhance nationwide regulatory and market uniformity. Tesla, as do many other manufacturers, strongly supports furthering as much national uniformity as is possible while still acknowledging California and the Section 177 States' innovation and leadership.140 [EPA-HQ-OAR-2022-0829-0792, p. 23]

140 See 42 U.S.C § 7507.

Organization: Valero Energy Corporation

G. EPA has not adequately considered the consequences of the proposed rule with regard to byproducts and coproducts of petroleum refining.

In its consideration of demand destruction on domestic petroleum refining, EPA fails to consider the full breadth of products made from petroleum that are consumed every day in the United States. A partial list of more than 6,000 products made from oil and gas is provided in Table 6. [EPA-HQ-OAR-2022-0829-0707, pp. 51-54]

EPA fails to consider how the U.S. will source asphalt to pave its roads, tires to support its electrified transportation sector, and a multitude of other consumer products and pharmaceuticals that are integral to day-to-day life of Americans if domestic petroleum refining is phased out or disrupted.281 For example, the amount of asphalt produced is in direct correlation to the amount of liquid transportation fuel refined. Asphalt is a co-product and cannot be independently manufactured.282 The loss of domestic asphalt production would force rail transport of higher volumes and from further distances, driving up costs and GHG emissions, and compounding the burden on communities already impacted by excessive train lengths that in some cases have resulted in fatalities.283 If the United States' asphalt needs were to exceed the potential for railed supplies, incremental asphalt would need to be imported by marine vessel, likely from Asia. EPA's proposal neither accounts for the GHG burdens being outsourced by EPA's policies nor the logistics-related increases in GHG emissions. [EPA-HQ-OAR-2022-0829-0707, pp. 51-54]

281 See Table 6, below.

282 https://www.wsj.com/articles/you-cant-build-roads-without-oil-fossil-fuel-refining-asphalt-renewables-synthetic- materials-consumer-products-biden-11664982934.

283 https://www.washingtonpost.com/nation/interactive/2023/long-trains-block-intersections-paramedics/.

Further, the proposed rule fails to account for how the amount of sulfur available in the United States will be adversely impacted. The chemical can be used in "construction materials, traditional batteries, rubber (vulcanization), pharmaceuticals, paper bleaching, water treatment, cosmetics/skin care, detergents,…and most importantly fertilizers."284 Most of the world's sulfur is now produced through the Claus Recovery Method, which is used at oil and natural gas refineries to keep sulfur dioxide from escaping into the atmosphere.285 On average, this process in the U.S. alone creates 8 million tons of sulfur every year.286 Without this product, there would be a sulfur deficiency in many crops throughout the U.S.287 It is a key ingredient in phosphate fertilizers with nearly 50% of sulfur supply worldwide being used in this manner.288 Total U.S. economic impact is about $130 billion with 487,330 fertilizer industry related jobs in the U.S. with wage earnings of $34.31 billion.289 [EPA-HQ-OAR-2022-0829-0707, pp. 51-54]

284 Glossary, The Sulphur Institute, https://www.sulphurinstitute.org/about-sulphur/glossary/#uses (last visited June 2, 2023).

285 B. Gene Goar, Sulphur Recovery Technology, Conference abstract from the American Institute of Chemical Engineers Spring National Meeting (Apr. 1986), available at https://www.osti.gov/biblio/5599326.

286 Mineral Commodity Summaries 2023, United States Geological Survey, at p. 170-71, https://pubs.usgs.gov/periodicals/mcs2023/mcs2023.pdf.

287 The Sulphur Cycle, The Sulphur Institute, https://www.sulphurinstitute.org/pub/?id=30177057-bc30-5bd9-0719- 6380f37c76f9.

288 Chemical Economics Handbook, S&P Global Commodity Insights, https://www.spglobal.com/commodityinsights/en/ci/products/sulfur-chemical-economics-handbook.html.

289 Fertilizer Grows Jobs: Feeding Crops While Growing the U.S. Economy, The Fertilizer Institute (2020), http://economicimpact.tfi.org/.

Sulfur is also used in manufacturing copper and lithium for batteries. For copper smelting in the U.S., “approximately 1.4 million tons of [sulfur] is required.”290 For the electric vehicle future that some agencies anticipate, an additional 85,000 tons of sulfur would be needed in only two years for copper production alone.291 For lithium, the “crushed ore is leached for several days with diluted [sulfuric] acid.”292 With current projections for the lithium need, it is possible 21% of current sulfur will be used in the process.293 [EPA-HQ-OAR-2022-0829-0707, pp. 51-54]

290 Brief for the Sulfur Institute as Amici Curiae Supporting Petitioner at 13, Nat’l Res. Def. Council v. National Highway Traffic Safety Admin. (2022) (No. 22-1080).

291 Id.

292 Id.

293 Id. at 14. For more information on the impacts of EVs on sulfur supply, see Brief for the Sulfur Institute as Amici Curiae Supporting Petitioner at 4, Nat’l Res. Def. Council v. National Highway Traffic Safety Admin. (2022) (No. 22- 1080).

Table 6 – Partial list of Products made from Oil and Natural Gas294 [EPA-HQ-OAR-2022-0829-0707, pp. 51-54]

294 U.S. DOE, “Products Made from Oil and Natural Gas,” https://www.energy.gov/sites/prod/files/2019/11/f68/Products%20Made%20From%20Oil%20and%20Natural%20G as%20Infographic.pdf

Adhesives	Deodorant	Kayaks	Safety glasses
Air mattresses	Detergents	Laptops	Shampoo
Ammonia	Dice	Life jackets	Shaving cream
Antifreeze	Dishwashing liquid	Lightweight aircraft	Shoe polish
Antihistamines	Dog collars	Lipstick	Shoes/ sandals
Antiseptics	Drinking cups	Loudspeakers	Shower curtains
Artificial limbs	Dyes	Lubricants	Skateboards
Artificial turf	Electric blankets	Luggage	Skis

Asphalt	Electrical tape	Model cars	Soap dishes
Aspirin	Enamel	Mops	Soft contact lenses
Awnings	Epoxy paint	Motorcycle helmets	Solvents
Backpacks	Eyeglasses	Movie film	Spacesuits
Balloons	Fan belts	Nail polish	Sports car bodies
Ballpoint pens	Faucet washers	Noise insulation	Sunglasses
Bandages	Fertilizers	Nylon rope	Surf boards
Beach umbrellas	Fishing boots	Oil filters	Swimming pools
Boats	Fishing lures	Packaging	Synthetic rubber
Cameras	Floor wax	Paint brushes	Tennis rackets
Candies and gum	Food preservatives	Paint rollers	Tents
Candles	Footballs	Pajamas	Tires
Car battery cases	Glue	Panty hose	Tool boxes
Car enamel	Glycerin	Parachutes	Tool racks
Caulking	Golf bags	Perfumes	Toothbrushes
CD’s and DVD’s	Golf balls	Permanent press	Toothpaste
Cell phones	Guitar strings	Petroleum jelly	Transparent tape
Clothes/clothing	Hair coloring	Pharmaceuticals	Trash bags
Clothesline	Hair curlers	Pillows	Truck and automotive parts
Coffeemakers	Hand lotion	Plastic toys	Tubing
Cold cream	Hearing aids	Plastics	TV cabinets
Combs	Heart valves	Plywood adhesive	Umbrellas
Computer keyboards	House paint	Propane	Unbreakable dishes
Computer monitors	Hula hoops	Purses	Upholstery
Cortisone	Ice chests	Refrigerants	Vaporizers
Crayons	Ice cube trays	Refrigerator linings	Vinyl flooring
Credit cards	Ink	Roller skate wheels	Vitamin capsules
Curtains	Insect repellent	Roofing	Water pipes
Dashboards	Insecticides	Rubber cement	Wind turbine blades
Denture adhesives	Insulation	Rubbing alcohol	Yarn

Dentures iPad/ iPhone [EPA-HQ-OAR-2022-0829-0707, pp. 51-54]

This list above from the U.S. DOE makes clear that "car battery cases," "car enamel" and "automotive parts" are "products made from oil and natural gas." Petroleum products have been key components of EV innovation, making vehicles lighter and more efficient through the application of plastics, engineered polymers, and fiber-reinforced composites integral to EV design.295 EVs need petrochemicals, and petrochemicals will continue to play a critical role in further reducing the weight of EVs, which will help increase their range.296 The HD Phase 3 GHG Rule should not only account for leakage associated with the production of petrochemicals necessary to produce EVs, but also analyze the impact discontinued oil and refining production will have on the U.S.'s ability to encourage EV production to scale with its proposals. [EPA-HQ-OAR-2022-0829-0707, pp. 51-54]

295 https://www.visualcapitalist.com/how-much-oil-electric-vehicle/

296 Id.

Organization: Western Energy Alliance

Foreign Justification: Further, EPA cites to other countries as justification for the proposed rule:

"Globally, at least 20 countries, as well as numerous local jurisdictions, have announced targets for shifting all new passenger car sales to zero-emission vehicles in the coming years, including Norway (2025); Austria, the Netherlands, Denmark, Iceland, India, Ireland, Israel, Scotland, Singapore, Sweden, and Slovenia (2030); Canada, Chile, Germany, Thailand, and the United Kingdom (2035); and France, Spain, and Sri Lanka (2040)…In addition, in February 2023 the European Union gave preliminary approval to a measure to phase out sales of ICE passenger vehicles in its 27 member countries by 2035." (p. 29188) [EPA-HQ-OAR-2022-0829-0679, pp. 8-9]

Fundamentally, the fact that foreign countries are dictating EVs is not legitimate justification for U.S. rulemaking. But even were we to concede any relevance to this rulemaking, EPA surely should acknowledge the backtracking on these initiatives as many countries recognize the impracticality of such mandates. While politicians like to decree certain things far into the future, that does not mean such diktats will become reality. There are many examples throughout history of centrally planned economies and nationalized industrial sectors failing, with Venezuela providing the most recent sad example. [EPA-HQ-OAR-2022-0829-0679, pp. 8-9]

EPA has referenced, in footnotes 28 and 29, Reuters articles discussing European Union legislation to ban ICEV sales and mandate new EV car sales goals. In the final rule, EPA must likewise reference the Reuters article shortly thereafter discussing how quickly this legislation was overturned by seven member companies.19 Germany joined France, Italy, Poland, and others in demanding the EU scrap the plan to ban ICEVs and mandate EVs. Insofar as EPA relied on the actions of other countries and the EU in particular to justify this rule, such justification must be reversed in the final rule and references to the EU mandate removed or at least supplemented by the fact that the mandate was nullified. We provide a reference for convenience. [EPA-HQ-OAR-2022-0829-0679, pp. 8-9]

19 “Germany rejects EU plan for ban on new fossil-fuel cars from 2035,” Reuters, June 21, 2023; “E U was set to bani nternal combustion engine cars. Then Germany suddenly changed its mind,” CNN, March 27, 2023.

Organization: Zero Emission Transportation Association (ZETA)

We also encourage EPA to consider standards for MYs 2033-2035 that would result in the same level of emissions reductions as California’s Advanced Clean Cars II regulation. In doing so, we urge the agency to undertake a separate final rulemaking under a different OMB Regulatory Information Number to ensure such standards are severable from these proposed standards for MYs 2027-2032. ZETA notes that there may be useful parallels between the ongoing transition to EVs and EPA’s phaseout of leaded gasoline from 1973 to 1996130 and we encourage the agency to apply any potential lessons learned from that phaseout, recognizing that reducing GHG emissions requires a similar sense of urgency to eliminating lead in gasoline. [EPA-HQ-OAR-2022-0829-0638, p. 26]

130 “EPA History: Lead,” U.S. Environmental Protection Agency, accessed June 20, 2023 https://www.epa.gov/history/epa-history-lead

We also encourage EPA to finalize MDV GHG and multipollutant emissions standards for MY 2033-2035 that align with the stringency of California’s Advanced Clean Trucks regulations for class 2b-3 vehicles. In doing so, we urge the agency to undertake a separate final rulemaking under a different OMB Regulatory Information Number to ensure such standards are severable from these proposed standards for MYs 2027-2032. We recommend finalizing MY 2033-2035 emissions standards for both LDVs and MDVs in the same rulemaking. [EPA-HQ-OAR-2022-0829-0638, p. 28]

Enabling Cleaner Service Calls Through Bucket Truck Technology

Xcel is also taking immediate action on other high-impact emission reduction opportunities, using technologies such as electric power take-off, idle mitigation, and solar systems to power jobsite tools. [EPA-HQ-OAR-2022-0829-0638, pp. 60-61]

- Electric power take-off (ePTO) - An ePTO system is a device that uses battery power. It’s similar to an EV, but instead of moving the vehicle down the road, it powers equipment and tools to avoid engine idling at the job site. These devices are recharged by plugging into the same chargers that EVs use. [EPA-HQ-OAR-2022-0829-0638, pp. 60-61]

- Idle mitigation - An idling truck can consume 1.5 gallons of gas each hour. Idle mitigation on Xcel Energy’s utility bucket trucks works by automatically shutting down the gas-powered engine when the vehicle is not in use or when the engine is idling for too long. This helps to reduce emissions and conserve fuel. [EPA-HQ-OAR-2022-0829-0638, pp. 60-61]

Fleet Electrification Solutions for Customers

Xcel Energy’s experience and expertise with fleet electrification doesn’t stop with their own fleet. They have developed a mix of customer programs across service areas to support fleet electrification for businesses and communities. These customer-centric solutions enable sophisticated planning, lower upfront costs with various rebates and incentives, and minimize impacts to the grid. [EPA-HQ-OAR-2022-0829-0638, p. 61]

Xcel's approach for commercial EV fleet development includes:

- Advisory services: Xcel offers a "white-glove service" to meet customers where they are on their electrification journey by guiding them through customized planning for their infrastructure needs. For fleet operators, this includes a free assessment to help them determine the best path to electrify their fleet and advise them on future electric fleet considerations such as charging best practices. [EPA-HQ-OAR-2022-0829-0638, p. 61]

- Infrastructure installation: Xcel designs and builds EV supply infrastructure to support charging station installations at minimal to no cost to customers. [EPA-HQ-OAR-2022-0829-0638, p. 61]

- Equipment recommendations and rental options: Xcel also provides recommendations for charging equipment and offers customers the option to purchase their own qualifying vehicle chargers or rent them at a monthly fee that includes installation and maintenance. [EPA-HQ-OAR-2022-0829-0638, p. 61]

- Grid continuity: Xcel designs long-term clean energy resource and distribution plans to consider the future impact of new EV load to ensure ongoing grid stability, reliability and affordability. [EPA-HQ-OAR-2022-0829-0638, p. 61]

- Equitable opportunities: Xcel supports EV adoption in higher emissions communities and income-qualified neighborhoods through rebates and incentives. This includes facilitating the electrification of carshare, refuse trucks, school buses, paratransit vehicles, and other fleets operating in these disproportionately impacted communities. [EPA-HQ-OAR-2022-0829-0638, p. 61]

Fleet electrification is a key component of Xcel Energy's larger vision, which includes enabling zero-carbon transportation by 2050 across our eight-state service footprint. This long-term strategy balances affordability with sustainability across the entire grid. It's why Xcel is dedicated to assisting fleet managers across the ecosystem in providing fleet electrification solutions that empower and inspire a clean energy future while also leading by example. [EPA-HQ-OAR-2022-0829-0638, p. 61]

EPA Summary and Response

Summary:

EPA appreciates all the comments received regarding ancillary topics for the proposed rulemaking. By the nature of this section, EPA is summarizing and responding to topics which are related to the proposal and not captured in the other topic specific sections. It also means that the breadth of the comments summarized in this section is wide and somewhat disparate in nature.

Comment:

EPA received comments from the Alliance for Consumers (AFC), Charles Gordon, Kari Ostlie, POET, LLC, and the American Fuel and Petrochemical Manufacturers (AFPM) regarding the length of the comment period.

Response:

Regarding the length of the comment period for EPA's proposal, the proposal was announced on April 12, 2023, and the pre-publication version of the notice of proposed rulemaking was posted to the EPA's website on that same day. The notice was published in the Federal Register on May 5, 2023, and the public comment period was open until July 5, 2023. In addition to the written public comment period, the EPA offered a multi-day virtual public hearing for the public to provide oral comments to the Agency on the proposed rule in May 2023. The EPA considers this a fully adequate amount of time for commenters to provide comments to the Agency regarding the proposed standards for MY 2027 through MY2032 light and medium duty vehicles, and we note that EPA received more than 250,000 public comments on the proposed rulemaking. EPA also considered comments received after the close of the comment period to the extent practicable.

Comment:

The Arizona State Legislature commented that EPA had indicated that it intended to rely on two updated reports for the final rule, following external peer review, a new vehicle tear down study and updated estimates for the social cost of greenhouse gases (SC-GHG) and that EPA should reopen the public comment period to allow commenters the opportunity to comment on the final versions.

Response:

EPA did indicate in the proposal that it was in the process of obtaining updated information on these topics. As part of our efforts to ensure that we use the most accurate, up to date information we often have to update our information in the course of the rulemaking. This information simply expands on the information we included in the docket. We were transparent both in our intention to use updated information and in docketing the vehicle tear down study in Fall, 2023. Moreover, we present benefit-cost analyses for the rule using the same SC-GHG estimates as we used at proposal and, as discussed elsewhere, because of the limited role benefit-cost analysis plays in adoption of the standards (i.e., it is not used for identifying the standards, but rather a positive net benefit is used to confirm the reasonableness of the selection of the standards under section 202), we believe it was reasonable to present benefit-cost figures using both sets of estimates and we do not believe any commenter was prejudiced by our decision not to reopen the comment period to allow further comment.

Comment:

ICCT, Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC), EDF, Tesla, and the Institute for Policy Integrity at New York City School of Law, the Environmental Defense Fund all pointed towards policies and regulations made at the state and international level that support EPA's proposal. Commenters expressed that state and international policies support both the feasibility of the proposed standards but also could be used by EPA as the basis for regulations. Our Children's Trust (OCT) and Zero Emission Transportation Association (ZETA) commented similarly and with the former commenting that there was no reason for EPA not to adopt the CARB ACC II program and ZETA recommending that EPA initiate a new rulemaking for MY's 2033 to 2035. On the other hand, commenters such as Jaguar Land Rover and the Western Energy Alliance recommended that EPA not adopt standards that resulted in BEV penetrations beyond those adopted by CARB or commented that EPA was wrong to point to international regulations to support our feasibility analysis. The California Attorney General's office also took the opportunity to note various fleet purchase requirements and incentives.

Response:

EPA appreciates the comments regarding ways to address state and regulatory programs in the final rule. While references to state and international programs are certainly helpful in informing the public of similar efforts to reduce vehicle emissions, EPA has not based the final standards on state and international programs. We only note that EPA's final rule, while not based on state and international programs, is similarly attempting to address emissions from light- and medium-duty vehicles and, as noted in EDF's comments, such programs help to support our feasibility conclusions.

Comment:

EPA received comments from the American Council for Energy-Efficiency (ACEEE) and Consumer Reports that vehicle labeling should be improved, both for BEVs and MDVs. ACEEE, ICCT and CARB specifically commented on the need for a consumer label for MDVs, while the Manufacturers of Emission Controls Association (MECA) and CARB both commented on the need for improved labeling in general. In addition to labeling, CARB commented on the need for standard serviceability requirements, standard DC fast charging, and standardized charging inlets. CARB also suggested that EPA collect and report additional data for BEVs in cold weather operation. Consumer Reports added recommendations regarding improved range estimates, alternative metrics other than miles per gallon, providing battery size information and for EPA to develop standards for battery charging speed metrics.

Response:

EPA appreciates the comments received regarding labeling, serviceability, and charging. While EPA recognizes the importance of each of these provisions, however, we did not propose changes or other reopen any provisions regarding the MDV or BEV labeling, serviceability, and charging, issues raised by the commenters. Therefore these topics are out of scope for this FRM.

Comment:

EPA received comments regarding a mid-rulemaking check-in and/or tying the standards to the development of infrastructure from the Alliance for Vehicle Efficiency (AVE), the American Petroleum Institute (API), Chevron, and Stellantis. API and Stellantis both suggested that the final rule includes provisions for adjustments with API also recommending that we base the standards on life-cycle analysis (LCA). AVE also noted that due to political uncertainty, suppliers were lacking in assurance. Hyundai commented in a related fashion and recommended that a Federal Advisory Committee should be convened to help assess key enablers.

Response:

EPA appreciates comments received regarding a midterm evaluation and tying standards to infrastructure development, with potential provisions for standard adjustments. EPA is not finalizing a midterm evaluation or provisions for monitoring infrastructure development. The Administrator has the authority to initiate a new rulemaking if he or she finds that there is an appropriate need to do so without establishing midterm evaluation provisions. Note that similar comments are addressed in RTC section 3.4. Additional detail on the request for tying standards to infrastructure can be found in RTC section 17. Comments on LCA are addressed in RTC 19.2.

Regarding AVE's comment on political uncertainty, EPA has closely engaged with stakeholders in formulating this rulemaking, consistent with AVE's comment. AVE claims there is opposition to EPA's "recent rulemakings in Congress." EPA addresses this topic in RTC 2.

Comment:

EPA received several comments regarding the Highway Trust Fund and the potential changes to fuel revenues that support road maintenance and construction. Commenters included American Highway Users Alliance, a mass comment campaign, and citizens Ray Littlefield IV and Steven G. Bradbury. Mr. Bradbury also used the opportunity to note potential increases in costs for first responder training that might be required for emergencies involving electric vehicles. Commenters had pointed out that EPA had failed to consider these costs.

Response:

Please see Section 8.3 regarding comments on fuel revenue changes. Regarding comments that training costs for first responders may increase, we first note that even in the absence of this rule, PEVs are being purchased at used at increasing rates. With respect to the costs of training first responders, we note that this is out of scope for this rule.

Comment:

EPA also received several comments on a broad range of topics. The American Chemical Council Product Approval Protocol Task Group recommended that EPA consider the benefits of improved lubricants. CALSTART encouraged EPA to "lock in" a rapid transition to zero carbon transportation while sending a clear signal to the market. Denso Corporation provided a list of technologies which could be applied to improve EV efficiency while Elders Climate Action encouraged EPA to initiate a zero-emission rulemaking. The Electric Drive Transportation Association (EDTA) recommended an all-government approach to for EPA's FRM. Environmental and Public Health Organizations took the opportunity to recommend improvements to enforcement of emission standards and improvements for in-use testing. General Motors encouraged the agency to maintain a strong dialogue between stakeholders and EPA. The Zero Emissions Transportation Association (ZETA) recommended that EPA consider electric bucket trucks.

Response:

EPA appreciates all the comments received on these topics. EPA has considered a broad array of technologies in its technical assessment for this FRM. Technologies, such as improved lubricants, are part of our ALPHA simulation, and while electric bucket trucks are not specifically covered, electrification is certainly well captured in our analysis for the light- and medium-duty vehicle sectors. EPA appreciates the comments which support this rulemaking as a clear signal to the market. At this time EPA is not able to respond to the nature of future rulemakings for the light and medium duty vehicle sector.

Comment:

Several fuel interests also provided comments related to a variety of topics. Valero commented on that EPA had not considered what impact a reduction in refining may have on other products that depend on refined petroleum. Valero also noted the potential reduction in the availability of sulphur as the result of reduced petroleum refining. The Missouri Corn Growers Association (MCGA) commented that the proposed rule was discriminatory against farmers that depend on ICE-based powertrains and that the agency had not considered the negative impacts on farmers. The National Corn Growers Association recommended that EPA update the F-Factor, used for flex fuel vehicle compliance, to 0.2 and to re-establish the 0.15 divisor for fuel economy calculations. Natural Gas Vehicles of America provided a variety of suggestions regarding natural gas incentives and distribution.

<u>Response:</u>

EPA appreciates the comments received regarding these topics. Regarding Valero's comment that EPA has erroneously failed to consider the alleged broader impacts of petroleum refining on sulphur, asphalt, and other more than 6,000 other products, we disagree. As we discuss in RTC 2, given the global nature of today's supply chain, any significant action, whether by the government or industry, may have indirect impacts on other entities. EPA acknowledges that the petroleum industry, along with the motor vehicle industry and numerous other industries, is a significant part of the global supply chain. This does not mean, however, that prior to issuing any regulation that potentially and indirectly affects the petroleum sector, EPA must evaluate the impacts on 6,000 different products. As we explain in preamble III.B and RTC 2, CAA section 202(a) directs EPA to promulgate emission standards based on the statutory criteria, including the costs of compliance on regulated entities. While EPA may consider other factors, the agency is certainly not obligated to evaluate economic impacts on 6,000 different products, particularly where the commenter has failed to adduce with reasonable specificity what are the actual impacts of the regulation on those products.

Moreover, the commenter's concern appears highly exaggerated. While the final rule is estimated to reduce demand for refined petroleum products in the US, much of that reduction is associated with reductions in US net oil imports, that is reductions in oil imports from foreign countries or increases in exports of US oil. Further, as Valero itself notes, refineries produce many different kinds of products, including gasoline, diesel fuel, aviation fuels, and other products, that are used by many sectors of the economy, further mitigating the possible refinery impacts associated with the rule. We further discuss the uncertainty surrounding how changes in domestic demand for liquid fuel may or may not impact domestic refining of liquid fuel in RIA 8 and preamble VI.

Further, even assuming impacts on domestic refining, it is entirely unclear there will be any impact on availability of the 6,000 products alleged by Valero. For example, while Valero claims the rule will adversely impact the amount of sulphur available in the US, it provides no data or analysis to show that this is likely to happen. As Valero itself acknowledges, there are multiple methods to produce sulphur, including methods that are unrelated to petroleum refining, for example the refining of natural gas.

Regarding standards discriminating against farmers, EPA is establishing performance-based standards for both GHG and criteria pollutant emissions. EPA expects that ICE-based powertrain equipped vehicles will remain available throughout the timeframe of this rulemaking. EPA did not propose any changes to the F-factor or the fuel economy calculation, as it relates to the use of E85, and flex fuel vehicles, therefore changes to the F-factor and 0.15 divisor are out of scope. EPA is not finalizing any revised provisions regarding natural gas vehicles, and the commenters requests regarding natural gas incentives and distribution are beyond the scope of the rulemaking.

Comment:

Stellantis recommended that EPA conduct an industry training event after the rulemaking is finalized.

Response:

EPA appreciates this suggestion. We agree that an industry training event may be valuable in ensuring the regulated industry understands the scope and details of the regulations, and will consider establishing such an event.

Comment:

The Motor and Equipment Manufacturers Association commented on the need for immigration reform to address skilled worker availability.

Response:

This comment is out of scope for this vehicle emission regulation, though we note that issues concerning the labor work force are further addressed in RTC Section 20.

Comment:

John Graham commented on the future of HEVs in EPA regulations.

Response:

HEVs are in no way restricted under this rulemaking. Under EPA's performance-based GHG standards, manufacturers are free to build HEVs as part of their compliance strategy.

28 - Out of scope

Comments by Organizations

Organization: A. Longo

Thank you for considering my detailed comments on this matter of great importance. By adopting a balanced and evidence-based approach, I believe we can develop effective regulations that address environmental concerns without unduly burdening the transportation sector and jeopardizing economic stability. Further, I recommend the EPA evaluate incentive-based programs, which accelerate the adoption of technology and serve to lower the cost of implementing such technology providing greater benefits in the achievement of improvements to air quality versus the imposition of regulations that mandate arbitrary timelines and force increased manufacturing cost, which can cascade into most areas of the economy. A great example of this would be the use of tax credits in the industry. The brownfield redevelopment tax credit program and the alternate fuel vehicle rebates and incentives programs are examples of successful implementations. The Alternate Motor Fuels Act (AMFA) or 1988 successfully promoted the use of ethanol and natural gas, a similar stimulus to the industry could serve to accelerate electronic vehicle production targeting the light to medium-duty vehicle segments. The EPA should invest more in industry-wide tax credit programs incenting both manufacturers and consumers to achieve the desired outcome of cleaner air quality. [EPA-HQ-OAR-2022-0829-0517, p. 2]

Organization: Alex Stavis

[*From Hearing Testimony, May 9, 2023*] I employ you good people to do whatever is needed to meet the climate change requirements that have been met by international and national requirements. As the President just said we are the leader and must set the best example possible for which we have the tools to do, be it with a cash for clunkers buy back program, be it with education, be it with sanctioning, be it with more electric vehicles made in a clean way and disposed of when finished in a clean way and in a way that the public will buy into, i.e., getting the public to say yes, this is what I want, not only do I want it, I can afford it. It is up to all of us, the government setting the standards, the EPA setting the standards to do such. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 1]

Organization: American Fuel & Petrochemical Manufacturers

Finally, EPA also ignored the advances being made in carbon capture and sequestration (CCS) as an alternative means of reducing GHG emissions. While EPA touts available incentives for ZEVs in federal legislation, it overlooks federal incentives and private sector support for CCS technology. Many AFPM members are investing heavily in CCS technology to reduce their GHG emissions.192 This promising technology has the potential to decrease emissions. EPA arbitrarily ignored the promise of this technology. [EPA-HQ-OAR-2022-0829-0733, pp. 41-42]

192 AFPM members ExxonMobil, Chevron, Valero, and INEOS have been at the forefront of CCS. ExxonMobil invested in CCS for more than 30 years and maintains an equity stake in roughly one-fifth of all carbon capture projects worldwide. These projects "captured approximately 40 percent of all the captured anthropogenic carbon dioxide (CO2) in the world." Exxon's current carbon capture capacity of about nine million metric tons annually is the equivalent of planting 150 million trees every year.

Organization: Brian Russo

[*From Hearing Testimony, May 10, 2023*] I want to speak a little bit about vehicle manufacturers. The first vehicle was made to runoff of peanut oil. Ford made a vehicle that ran off of hemp biofuel and was made with hemp body panels. So at some point we started burning fossil fuels and became dependent on fossil fuels and seems it's by design because vehicles could have been made to be powered by alternatives. You may be familiar with some of the alternative lower emission fuels. Some states are using biofuels to mix with our gasoline for the purposes of lowering emissions and they have been successful. Diesel vehicles can be powered with hemp biofuel -- bio diesel without any modifications so I can't help but wonder if it would be easier to power these vehicles with hemp bio diesel rather than replace fleets of vehicles. So I worked in the auto industry for over ten years and I can tell you that vehicle manufacturers have no regard for their waste. During the Obama administration when vehicle manufacturers were required to lower emissions, they introduced composite materials that are not going to be biodegradable or recyclable. When I asked the engineer if there was any consideration for the environmental impact, they say no. I say what's the point. We can no longer be burying batteries or tires in the ground, it's contaminating our soil. I live in the land of Lenape where Ford has contaminated our land and killed many people. They may have paid a small lawsuit but it's nowhere near the destruction they caused to the environment and the death of the Lenape people. So I support strong limits on emissions but I don't think it goes far enough. I think we need to be regulating the vehicle manufacturers as far as the overall environmental impact when it comes to the sourcing of the materials and produce a responsibility when it comes to their waste. They could be making the vehicles with hemp body panels and using -- they could be powered off of biofuel and everything should be recyclable rather than ending up in a junkyard. So I became a climate activist when I realized I would not be able to retire and most likely die from catastrophic climate events. So I am asking the EPA to support a strong emission standard but also take it one step further and protect us from the vehicle manufacturers. [From Hearing Testimony, EPA-HQ-OAR-2022-0829-5115, Day 2]

Organization: California Air Resources Board (CARB) (Part 1 of 5)

Running Loss Standards

Running loss emissions are a type of evaporative emissions that occur when fuel vapors escape from the vehicle during driving. Manufacturers are required to certify vehicles to the running loss standard by driving a vehicle over a prescribed drive cycle on a dynamometer and measuring the resulting evaporative emissions as captured in a sealed enclosure around the vehicle during testing. Under ACC II, California lowered the running loss standard from 0.05 g/mi to 0.01 g/mi. Based on manufacturers' 2021 MY California certification data, 92 percent were certified as already emitting at or below 0.01 g/mi of hydrocarbons. 46 To ensure vehicles continue to perform at those levels and to further reduce emissions from the small proportion of vehicles that are currently certifying at higher emission levels, CARB recommends that U.S. EPA align with CARB by tightening its current running loss standard from 0.05 g/mi down to 0.01 g/mi. [EPA-HQ-OAR-2022-0829-0780, p. 35]

46 CARB. ACC II. Attachment O - Additional Documents or Incorporated Documents Added to the Record, MY2021 Evaporative Running Loss Emission Certification Data. July 2022. This is a spreadsheet of the data which was used to support the proposed new running loss standard of 0.01 g/mi, CARB 2022j. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/atto.pdf.

Certification Data Collection for Improved ZEV Fuel Economy Labels

Based on experience gained to date, CARB has identified several shortcomings in the current fuel economy labels for ZEVs that could be improved to communicate more relevant data to consumers. Internal combustion engine vehicles have a long history with the label and its refinements over the years to present the most meaningful data in a concise format for consumers. For ZEVs in general, and especially for BEVs, however, the current label is insufficient in communicating useful information in an understandable metric to consumers regarding the most important BEV attributes. While modifications to the required label information and format may be out of scope for the current rulemaking proposal, CARB recommends that U.S. EPA include requirements with this proposal to require vehicle manufacturers to disclose additional information that could be used for such an improved label that could be adopted by separate rulemaking in the future. Specifically, CARB recommends that U.S. EPA require that manufacturers report additional test data and vehicle information regarding the vehicle's range and charging time at the time of certification. [EPA-HQ-OAR-2022-0829-0780, p. 46]

Organization: Consumer Reports (CR)

8. EPA Should Improve Consumer Information on the Window Sticker for EVs

If enacted, EPA's GHG rule will help support continued growth in EV sales. To help support consumers as they make the transition to EVs, CR asks that EPA open a separate rulemaking to update the consumer information that is provided on the window sticker for EVs. The EV market has evolved immensely in the years since the window sticker was last revised. Updating the sticker with more relevant information can help improve the EV buying experience. CR would suggest the following improvements to the data that is provided to consumers. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

8.1. More Useful EV Range Information

As Car and Driver has recently highlighted, EPA's current testing for EV range does not always match with real world vehicle performance.52 A big portion of the problem is the fact that EPA only publishes a combined city/highway EV range number. However, EVs tend to achieve shorter range at real world highway speeds, which is when range is most often relevant to consumers. Also, range is only estimated under ideal weather conditions, leaving consumers with no information about how their vehicle might perform in hot or cold weather. While a single combined number is generally useful in comparing different vehicles against each other, providing consumers with more information including highway range in both hot and cold weather would be most useful in helping consumers understand the true performance they can expect from their vehicle, and better determine if it will meet their needs. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

52 Comparison of On-Road Highway Fuel Economy and All-Electric Range to Label Values: Are the Current Label Procedures Appropriate for Battery Electric Vehicles?, SAE International, April 11, 2023, https://www.sae.org/publications/technical-papers/content/2023-01-0349/.

8.2. Consider Alternatives to Mile Per Gallon Equivalent (MPGe)

While MPGe is somewhat useful in helping consumers understand how EVs compare with gas and hybrid vehicles in terms of efficiency, it’s not a very useful metric for vehicle owners. EPA should reconsider the use of MPGe on the window sticker and explore replacing or supplementing it with a more useful efficiency metric. In general most modern EVs present efficiency in terms of miles per kilowatt hour on their trip odometers, which is more consistent with how consumers are used to thinking about efficiency in terms of miles per gallon. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

8.3. Provide EV Battery Size Information

While manufacturers may choose to include battery size information on the window sticker, it is not required. CR would recommend that manufactures provide the usable battery capacity of the vehicle on the window sticker. This also provides useful information for comparison between vehicles. Two separate vehicles might both have the same rated range, but achieve it with wildly different battery sizes. Providing that information to consumers can help them potentially consider more efficient options. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

There may also be some value in manufacturers also providing the basic battery chemistry details as well given that certain types of batteries may perform differently under different conditions. This type of information may become even more important as the market explores more diversity in battery chemistries. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

8.4. Develop and Present Standard Metrics for Charging Speeds

Charging speed is becoming an increasingly important differentiator in terms of the convenience of driving an EV longer distances. While the range of EVs is still important, it is charging speed that can most affect how convenient longer trips in EVs will be. CR suggests that EPA develop standardized testing and metrics for EVs' DC-fast charging speeds. Currently automakers provide consumers with cherry-picked charging speeds, often based upon narrow slices of the vehicle's charging curve under ideal conditions. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

CR would suggest a standardized test for fast charging speed measuring the time to charge from 10% to 80% state of charge. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

However, that metric is only part of the story because it doesn't tell how many miles of range are gained over that time. A separate metric should also be included that measures the average numbers of miles of range gained over a set period of time, potentially average miles per 10 minutes of charging or average miles per minute gained from 10%-80% state of charge. This will give consumers a more standardized way to understand how long they will have to spend charging to cover a specific distance using public fast charging. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

Level 2 charging speeds can also be important information, but more information should be provided to consumers about the conditions under which the test was performed. At a minimum EPA should require the amperage of the charger needed to achieve the presented level 2 charging times be provided. [EPA-HQ-OAR-2022-0829-0728, pp. 25-27]

Organization: Dylan Ondek

Dirt track Racing is a sport that a lot of people love. There is nothing better than going to the dirt track on a saturday night in the summer. Racing is in the blood of a lot of people and you can't take it away. The smell of racing alcohol is amazing; it is not hurting the environment in any way. If you try to take it away there will be a lot of people very angry. Racing is a sport like soccer, football, etc.

Organization: Fuel Freedom Foundation

The EPA's rationale for phasing out FFV credits within the GHG program was to defer to the Renewable Fuel Standard (RFS) for upstream decarbonization.5 While the GHG requirements under the RFS have indeed driven down lifecycle carbon intensity of ethanol to between 44 and 52% of the gasoline it replaces according to the GREET model and recent independent research, the RFS program does not extend to incentivizing the vehicles that enable greater displacement of petroleum fuels with a lower-carbon alternative.6 Consequently, OEM automakers have no incentive to incorporate FFVs within their product plans. Incorporating an FFV credit within the GHG Standards program will amplify the progress in reducing CI upstream by enabling wider use of lower carbon ethanol as a substitute for high-carbon gasoline for the in-use phase. [EPA-HQ-OAR-2022-0829-0711, p. 2]

5 75 FR 25434, "EPA recently finalized its RFS2 rulemaking which life cycle emissions from ethanol and the upstream GHG benefits of E85 use are already captured by this program."

6 Environmental Research Letters, "Carbon intensity of corn ethanol in the United States: state of the science" (2021) accessed at https://iopscience.iop.org/article/10.1088/1748-9326/abde08

Encouraging the production of FFVs will not impede EPA's aggressive goal of rapid light-duty electrification. Instead, promoting the use of lower-carbon liquid fuels will diversify EPA's portfolio of decarbonization strategies to more quickly, broadly, and cost-effectively decarbonize the light-duty transportation sector. [EPA-HQ-OAR-2022-0829-0711, p. 2]

There are multiple public policy rationales for crediting FFVs within the GHG program:

Maximize cost effectiveness of GHG reductions. As GHG reduction targets are strengthened over time to achieve Net Zero carbon emissions in transportation, economic costs will inevitably increase. However, the total economic burden can be lessened, and the social benefits maximized, by keeping the door open to the most cost-effective fuel pathways. Fuel Freedom funded a study by Lifecycle Associates to evaluate possible scenarios for achieving an 80% fuel cycle reduction in light-duty vehicle GHG emissions for the U.S. and for California by 2050.7 The analysis used government estimates8 of fuel carbon intensity, vehicle efficiency improvements, and incremental costs for each fuel-vehicle combination, to develop feasible market penetrations for various pathways, including high-octane fuels with high-compression-ratio ICEs coupled with electrification, biofuels used in ICEs with and without hybridization, hybrid and plug-in hybrid vehicles, fuel cell EVs, and battery electric vehicles, to compare both feasibility and relative cost effectiveness for carbon reductions.9 Long-term results to 2050 show that it is critical to provide market flexibility for both electrification and liquid pathways in the near term to promote long-term feasibility and cost-effectiveness of GHG reductions. Regulations should therefore encourage and/or facilitate all feasible vehicle-fuel pathways that can 1.) immediately reduce carbon intensity in the transportation sector and, 2.) maximize long-term GHG reductions by transitioning to renewable sources, including electricity, hydrogen, and increasingly lower-carbon and advanced biofuels. [EPA-HQ-OAR-2022-0829-0711, pp. 2-3]

7 Life Cycle Associates, "Assessing Greenhouse Gas Emission and Petroleum Reduction Scenarios for the U.S. and California Transportation Sectors Final Report" (March 2019) – Submitted in conjunction with previous comments at Docket EPA–HQ– OAR–2021–0208

8 EIA Annual Energy Outlook 2016; Argonne National Laboratory (ANL), Greenhouse Gasses, Regulated Emissions and Energy Use in Transportation (GREET) Model, VISION2015, and Cradle-to-Grave Lifecycle Analysis of U.S. Light Duty Vehicle Fuel Pathways (2016);); National Academies of Science Transitions report (2013); EPA-NHTSA Draft Technical Assessment Report, EPA Fuel Economy Guide; CARB VISION2.1 and CA-GREET2 models

9 Each pathway centered on a dominant vehicle technology, constrained by practical limitations and the attributes of cars versus trucks or SUVs. Vehicles not suitable for battery electric propulsion were assumed to be ICEs.

Realize GHG reductions sooner rather than later. Given the urgency to forestall the increasing effects of climate change, the EPA should not foreclose pathways that can immediately reduce GHG emissions. With a signal from EPA that FFVs will be recognized for their decarbonization value, higher blends of low-carbon ethanol can be made quickly available in the marketplace to immediately displace higher-carbon gasoline. Today, more than 20 million FFVs are already on the road, compared to 3.8 million plug-in EVs. FFVs are a mature vehicle technology that can quickly be reintegrated into OEM offerings at virtual price parity to existing internal combustion engine (ICE) vehicles. E85 also has widely available distribution and dispensing infrastructure to deliver the fuel to retailers and consumers. Another key finding of the Lifecycle Associates analysis is that policies accelerating a decrease in the carbon intensity of fuels reduce total GHGs sooner. As EPA has noted, "future [GHG] emissions are expected to produce larger incremental damages as physical and economic systems become more stressed in response to greater climatic change."10 Given the uncertainties in measuring the long-term impacts of GHG emissions,11 and the accumulated impacts of carbon emissions,12 EPA should not discount the benefits of pathways with significant promise to reduce emissions more quickly in the near-term. [EPA-HQ-OAR-2022-0829-0711, p. 3]

10 Preliminary Regulatory Impact Analysis (PRIA) for the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021 – 2026 Passenger Cars and Light Trucks, p.10768

11 SAFE PRIA, p. 1069

12 National Academies of Sciences, Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide, (2017)

Organization: Growth Energy

One way to recognize the GHG benefits of biofuels would be to reinstate the Vehicle Conversion Factor ("VCF") for FFVs. Through 2015, EPA used the following formula through which the carbon emissions of FFVs were multiplied by the VCF to reflect the lifecycle greenhouse gas benefits of ethanol use. The formula, which was phrased in terms of Carbon Related Exhaust Emissions ("CREE"), was:

CREE = (F x CREEE85 x VCF) + ((1 −F) x CREEgas)

[EPA-HQ-OAR-2022-0829-0580, p. 11]

40 CFR 600.510-12(j)(2)(iv)(B). Through model year 2015, the VCF was established at .15. This is appropriate given that the tailpipe emissions from the ethanol portion of E85 (nominally 85% of the fuel) can be considered to net out with the carbon sequestered by the corn used to produce the ethanol. As noted above, RFS calculations have assumed no tailpipe GHG emissions for ethanol when calculating lifecycle emissions for that reason. EPA should therefore use a VCF of .15 (based on the Congressional level set under the CAFE standards) or such other level as EPA considers reflects the lifecycle greenhouse gas benefits of ethanol. [EPA-HQ-OAR-2022-0829-0580, p. 11]

Reinstating VCF for FFVs would be only one potential step. EPA should ensure that it accounts for the GHG emissions reductions of all biofuels, including those used in lower blends like E10, E15, and E30. The best way to do that would be to conduct a lifecycle analysis for EVs and a lifecycle analysis for ICE vehicles that examines the impact of different blends of biofuels, including projecting an increase in biofuel blending in future years. [EPA-HQ-OAR-2022-0829-0580, p. 11]

VI. EPA Should Establish or Expand Credits for Biofuels and Should Consider Other Measures to Encourage Greater Biofuel Use.

A. Credits and Other Measures Under Section 202

Simply addressing EPA's errors regarding the lifecycle emissions of biofuels and EVs will not sufficiently drive biofuel use in a manner consistent with Section 202 and the RFS. EPA should also establish credits that specifically reward auto manufacturers for taking measures to incentivize increased biofuel use. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

EPA clearly has authority to issue such credits under Section 202. It has for years issued credits for various measures that reduce emissions that are not reflected in tailpipe emissions, including credits for efficient air conditioning and off-cycle credits. 88 Fed. Reg. at 29,246. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

The simplest type of credits to incentivize biofuels are those that allow greater biofuel use in vehicles, such as flex-fuel vehicles ("FFVs") that can use E85 and higher blends of ethanol. EPA, along with the National Highway Traffic Safety Administration ("NHTSA"), has already established credits both under CAFE and Section 202 that provide an incentive for E85 use. 77 Fed. Reg. at 62,829. Those credits were initially awarded to FFVs regardless of the fuel they actually used, but were later adjusted to account for the amount of fuel actually used. In its 2012 rulemaking for MY 2017 and later years, EPA explained that: [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

In the final rulemaking for MYs 2012-2016, EPA promulgated regulations for MYs 2012-2015 ethanol FFVs that provide significant GHG emissions incentives equivalent to the long-standing "CAFE credits" for ethanol FFVs under EPCA, since many manufacturers had relied on the availability of these credits in developing their compliance strategies. Beginning in MY 2016, EPA ended the GHG emissions compliance incentives and adopted a methodology based on demonstrated vehicle emissions performance. This methodology established a default value where ethanol FFVs are assumed to be operated 100 percent of the time on gasoline, but allows manufacturers to use a relative E85 and gasoline vehicle emissions performance weighting based either on national average E85 and gasoline sales data, or manufacturer-specific data showing the percentage of miles that are driven on E85 vis-[a]-vis gasoline for that manufacturer's ethanol FFVs. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

EPA should, at a minimum, extend and expand upon existing credits for FFVs. Existing credits are limited in several ways—they do not provide an incentive for other technologies that facilitate biofuel use in vehicles, they do not incentivize investments in blending infrastructure or other non-vehicle equipment for biofuel use, and they do not incentivize greater use of biofuels in standard, non-FFV engines. EPA therefore should also develop additional credits that can further reduce GHG emissions by incentivizing greater biofuel use. To begin with, EPA could expand credits to include technologies that facilitate different biofuel blends, like E30, and investments that help facilitate fueling of vehicles with higher blends. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

An even better system of credits would be to provide credits based on overall biofuel use in the manufacturer's fleet, regardless of whether the manufacturer manufactures FFVs or any specific technology. That type of credit would give manufacturers incentives to increase biofuel use in their fleet in any way possible—everything from making more FFVs, to making it easier for non-FFVs to run on higher blends, to facilitating investments in fueling with higher blends. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

Given the discussion of various credit programs in the proposal and past FFV incentive programs, EPA can finalize a credit program based on biofuel use in this rule. But to the extent that EPA believes it would require an additional rulemaking proposal, EPA should propose and finalize such an incentive program as quickly as possible—it need not wait until the end of its currently proposed standards to develop an important additional mechanism for reducing greenhouse gas emissions while continuing to maintain options for multiple types of vehicles in our transportation system. [EPA-HQ-OAR-2022-0829-0580, pp. 15-16]

Organization: Jim Hays

America, awaken and pay attention - socialism is communism – it destroys individual excellence and eliminates private property. [EPA-HQ-OAR-2022-0829-0497, p. 1]

If you have not read and understood that the Constitution of the United States ordained by We the People did vest limited powers to its Congress, and We the People must claim the Blessings of Liberty secured in that charter, then you will lose when they infringe your property and freedom. [EPA-HQ-OAR-2022-0829-0497, p. 1]

Democracy is one step from dictatorship. Russian Premier Nikita Khrushchev said we will fall from internal contention. [EPA-HQ-OAR-2022-0829-0497, p. 1]

a. “Every law enacted by Congress must be based on one or more of its powers enumerated in the Constitution” U.S. v. Morrison, 529 U.S. 598, 607; 120 S.Ct. 1740; 146 L.Ed. 2d 658 (2000). [EPA-HQ-OAR-2022-0829-0497, p. 1]

b. In the interpretation of statutes levying taxes it is the established rule not to extend their provisions, by implication, beyond the clear import of the language used, or to enlarge their operations so as to embrace matters not specifically pointed out. In case of doubt they are construed most strongly against the Government, and in favor of the citizen. UNITED STATES v. Wigglesworth, 2 Story 369, Gould v Gould, 245 U.S. 151 (1917) [EPA-HQ-OAR-2022-0829-0497, p. 1]

c. And a statute which either forbids or requires the doing of an act in terms so vague that men of common intelligence must necessarily guess at its meaning and differ as to its application, violates the first essential of due process of law. Connally et al. v. General Construction Co. 269 U.S 385, 391 (1926) [EPA-HQ-OAR-2022-0829-0497, p. 1]

d. ... [K]eeping in mind the well settled rule, that the citizen is exempt from taxation, unless the same is imposed by clear and unequivocal language, and that where the construction of a tax law is doubtful, the doubt is to be resolved in favor of those upon whom the tax is sought to be laid .... Spreckels Sugar Refining Co. v. McLain, 192 US 397, 416 (1904) [EPA-HQ-OAR-2022-0829-0497, p. 1]

If you depend exclusively on government they own you like inventory. [EPA-HQ-OAR-2022-0829-0497, p. 1]

Do not let politicians infringe the 2nd amendment or the 9th and 10th will follow. [EPA-HQ-OAR-2022-0829-0497, p. 1]

Federal officers, employees, and all Administrative agencies have no right, authority, or power Congress has not been vested by the pre-existing limitations of The Constitution of the United States of America. All rights not delegated are reserved to the people of the several States. The people are the sovereign power administering government by their agents. RE: U.S. v. Morrison, 529, U.S. 598, 607; 120 S.Ct. 1740; 146 L.Ed. 2d 658 (2000). Bond v. U.S. 529 US 334 (2000). Officers enforcing unlawful acts against the people are liable personally for their actions. Power corrupts and absolute power corrupts absolutely. The sworn oath of officers and employees of the United States is to support the Constitution for the United States. Any law or act repugnant to the Constitution is an act of war and treason against the States and the people of the States, from the beginning. Marbury v. Madison, 5 U.S.,137,174,176 (1803). [EPA-HQ-OAR-2022-0829-0497, p. 1]

Organization: Lillian Davey

Tax credits would be the best incentive for this type of program as more people would be more likely to make the switch. In my city, Littleton, Colorado, we have incentives to switch to solar energy for a tax write-off, this made me more likely to switch. This incentive cannot be little either, you are asking people to change their vehicle in for something more expensive, and potentially less suitable. In this link: https://www.littletonco.gov/Business/Incentives-Financing/State-Incentives-Tax-Credits , you can see the incentives and the buzz around them. [EPA-HQ-OAR-2022-0829-0489, p. 2]

Organization: Minnesota Corn Growers Association (MCGA)

LOW CARBON ETHANOL: MOVING TO NET ZERO

The Renewable Fuel Standard (RFS) has already resulted in more 1 billion metric tons of cumulative GHG savings from 2008-2021, exceeding original projections largely due to the reduced carbon intensity of corn ethanol, highlighting the importance of using biofuels like ethanol to enhance the GHG emissions reductions from transportation with the right policies.18 [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

18 Unnasch, S. & Parida, D., Healy, B. "GHG Emissions Reductions due to the RFS2: A 2022 Update," February 2023; chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://d35t1syewk4d42.cloudfront.net/file/2424/GHG%20Emissions%20Reductions%20due% 20to%20the%20RFS2%20-%20Feb%202023.pdf.

The most recent assessment from the Department of Energy's Argonne National Laboratory concludes corn ethanol's carbon intensity decreased 23 percent from 2005 to 2019 due to increased corn yield, reduced fertilizer intensity and improved ethanol production efficiency, with corn ethanol now between 44 and 52 percent lower in carbon intensity (CI) than the gasoline it replaces.19 Argonne's conclusions are similar to analysis from Environmental Health and Engineering finding ethanol now results in 46 percent fewer GHG emissions compared to gasoline, due to improved corn production, ethanol production efficiencies and land productivity.20 [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

19 Lee, Uisung & et al. ANL, "Retrospective Analysis of the U.S. Corn Ethanol Industry for 2005–2019: Implications for Greenhouse Gas Emission Reductions," (2021). https://onlinelibrary.wiley.com/doi/10.1002/bbb.2225.

20 Scully, Melissa J., et al, "Carbon intensity of corn ethanol in the United States: state of the science," (2021) Environmental Research Letters 16 043001. https://iopscience.iop.org/article/10.1088/1748-9326/abde08.

Corn-based ethanol can reach net zero emissions with continued on-farm improvements and soil carbon sequestration, along with carbon capture technology and new efficiencies in ethanol production. Corn farmers are proud of our leadership in adopting conservation and best management practices. NCGA's recently released Corn Sustainability Report21 details corn farmers' history of improvements and our commitment to further sustainability achievements by 2030. [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

21 National Corn Growers Association Corn Sustainability Report: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://dt176nijwh14e.cloudfront.net/file/392/NCGA%20Sustainability%20Report_final_digital_ 07_29_21.pdf.

Sustainable production means corn farmers today are producing more corn using less land and fewer resources. For example, planted corn acres in 2022, at 88.6 million acres, were less than planted acres in 2007, the year the RFS was expanded, at 93.5 million acres. USDA data also shows the area planted to principal crops in the United States is not expanding overall. Corn production has increased primarily because crop yields have increased from an average of 150 bushels per acre in 2007 to 173 bushels in 2022. With the average yield in 1980 at just 91 bushels per acre, productivity growth is a long-term trend. [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

Using the expertise of Argonne's scientists and the U.S. Department of Agriculture's data, we believe Argonne's Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model is the federal government's most accurate tool for evaluating biofuel and energy lifecycle emissions. Because GREET is regularly updated, this model captures GHG emissions reductions from farmers' improved production practices and will incorporate the ongoing, voluntary climate-smart improvements in agriculture production this Administration supports, ensuring further carbon intensity reductions are accounted for in the LCA. [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

Corn production has improved across all measures of resource efficiency, including higher crop yields per acre, resulting in greater corn production using less land and fewer inputs, further fortifying ethanol as a sustainable, low-carbon renewable fuel. This progress is reflected in Argonne's most recent analysis, which builds on and is consistent with other recent reviews. [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

For example, a 2018 USDA study shows that ethanol then resulted in 39 to 43 percent fewer GHG emissions than gasoline.22 Building on this progress, additional improvements on farms and in ethanol production supported by expanding markets for low carbon fuels could result in ethanol with up to 70 percent fewer GHG emissions than gasoline, according to USDA's analysis. Furthermore, according to California Air Resources Board (CARB) data, the CI of ethanol is more than 40 percent lower than the CI of gasoline.23 [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

22 Lewandrowski, Jan, and et. al, "The Greenhouse Gas Benefits of Corn Ethanol - Assessing Recent Evidence," (202) Biofuels, 11:3, 361-375. https://www.tandfonline.com/doi/full/10.1080/17597269.2018.1546488.

23 California Air Resources Board, Low Carbon Fuel Standard Reporting Tool Quarterly Summaries, based on data through Q3 2020 at https://ww3.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm.

These increasing benefits have occurred without accounting for corn's ability to sequester carbon in the soil. Corn as a crop can serve as a carbon sink. As a photo-synthetically superior C4 plant, corn has an extraordinary ability to sequester carbon and move fertilizer nutrients back to the surface for plant growth rather than polluting ground water. Corn's extensive, deep root system makes it one of the few plants with this important capability to make crop production sustainable. [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

High-yield corn—combined with the steady adoption of best practices such as reductions in tillage intensity—is sequestering carbon from the atmosphere into the soil. This sequestration is increasing soil carbon levels and reducing atmospheric CO2. Although GHG lifecycle models do not currently account for this direct GHG reduction from corn production, NCGA believes the effect of corn crops on soil carbon sequestration, among other considerations, should be incorporated into current lifecycle analysis. This increase in soil carbon from corn production, when included, could result in a 20 gram/MJ carbon credit for corn-based ethanol.24 Fully accounting for corn's carbon sequestration would further demonstrate significant low-carbon advantages of a high-octane midlevel ethanol blend. [EPA-HQ-OAR-2022-0829-0612, pp. 7-9]

24 American Coalition for Ethanol, The Case for Properly Valuing the Low Carbon Benefits of Corn Ethanol, 2018.

FLEX FUEL VEHICLES and CREDITING

Beyond ethanol's utility in all gasoline engines to reduce GHG emissions, other alternative vehicle technologies can also harness the GHG reductions and air quality benefits of ethanol, such as Flex Fuel Vehicles (FFVs). FFVs utilizing higher blends of low carbon ethanol, such as E85, can provide immediate emissions reductions without tangibly altering the price of the vehicle and reducing fuel costs. In fact, E85 is typically sold at a substantially lower price than gasoline, translating to monetary savings in addition to the significant air pollution savings. [EPA-HQ-OAR-2022-0829-0612, p. 11]

Compared to gasoline, E85 leads to significant reductions in NOx and GHG emissions. E85 avoids use of toxic hydrocarbon aromatics in gasoline that are precursors to secondary organic aerosols that result in harmful fine particulate matter emissions that cause serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. [EPA-HQ-OAR-2022-0829-0612, p. 11]

Incentivized to reduce emissions through the state's Low Carbon Fuel Standard (LCFS), in California some FFVs are even powered by a blend of 15 percent renewable naphtha with 85 percent ethanol. These vehicles use zero fossil fuels, have improved air emissions profiles, and have an extremely low carbon intensity. [EPA-HQ-OAR-2022-0829-0612, p. 11]

Despite the GHG and criteria pollution reduction benefits by use of FFVs, as well as the low cost to purchase and fuel these vehicles, automakers have cut back on FFV models and now offer very few choices to consumers. Well-structured vehicle credit programs remain an impactful, cost-effective means for the government to encourage the introduction and adoption of new products and technologies. To encourage introduction of a wider range of low emission vehicle choices, NCGA believes EPA must provide equitable crediting across the spectrum of low emission vehicles, including FFVs. [EPA-HQ-OAR-2022-0829-0612, p. 11]

NCGA also urges EPA to take steps to update the F-factor in the fuel economy formula to a forward-looking F-factor of at least 0.2, as we outlined in 2020 comments in response to Docket EPA–HQ–OAR–2020-0104. Furthermore, we urge EPA to reinstate the 0.15 volumetric conversion factor for FFVs. EPA should reharmonize the 0.15 factor for FFVs in these standards, and, if not, in future standards. This change would accurately reflect the significant carbon emissions reductions from FFVs using E85 because the carbon emissions from the fuel are the release of carbon taken up through crop growth. [EPA-HQ-OAR-2022-0829-0612, p. 11]

Organization: Natural Gas Vehicles for America

NGVAmerica believes that by its own admission EPA has sought to create an unlevel and anti-competitive advantage for electric vehicles over other technologies including NGVs. Natural gas vehicles involve significant cost due to their low-volume and the cost of the storage vessels and systems. Like electric vehicles, natural gas vehicles when powered by RNG deliver significant greenhouse emission reductions and therefore should have been similarly encouraged. Thus, EPA has every reason to treat natural gas vehicles like electric vehicles when providing regulatory incentives – moreover, since natural gas vehicles have largely not qualified for these incentives, it is reasonable to extend similar size incentives for natural gas technology at least for a short-period of time to allow natural gas trucks to increase in market share. [EPA-HQ-OAR-2022-0829-0597, p. 13]

Thus, in addition to proposing a mechanism for crediting biofuels based on their upstream emissions, EPA must provide equal treatment with respect to any future incentives offered to manufacturers to assist them in overcoming market hurdles, and, moreover, EPA should take corrective action to address the harm that has been done by its past actions. [EPA-HQ-OAR-2022-0829-0597, p. 13]

Developing a Credit Mechanism for Biofuels

For greenhouse gas emissions, NGVAmerica previously requested that EPA use the 0.15 factor for greenhouse gas emissions to give credit to manufacturers for RNG use and to create an efficient method of calculating the benefit of renewable natural gas until EPA moves to adopt a well-to-wheels regulatory approach for all fuels, or until EPA can develop a detailed assessment and emission factor specific to RNG use. A benefit of the 0.15 factor is that it is consistent with the fuel efficiency credits and has been used in the past in EPA's regulations. [EPA-HQ-OAR-2022-0829-0597, pp. 13-14]

Given the recent state of developments and based on the increasing amount of carbon negative RNG that is being used in transportation, a factor of 0.15 may not adequately represent the credit that is warranted for RNG use. A factor of 0.15 would represent an 85 percent reduction and therefore is not carbon neutral or carbon negative. Developing a precise factor based on WTW comparisons of different fuels is complicated for various reasons: moving baseline targets; year-over-year changes in fuel mix; truck lifetimes, etc. That is probably part of the reason that EPA decided to abandon developing factors for electric vehicles and retained the 0 g/mi factor. [EPA-HQ-OAR-2022-0829-0597, pp. 13-14]

One solution might be to adopt a similar approach for NGVs as has been adopted for electric vehicles. Such a concept has been developed and is explained in the attached European Biogas and NGVA Europe documents. NGVA Europe has proposed using a carbon correction factor (CCF) that treats biomethane as having a carbon content of zero, and then providing an emission offset related to the percentage of biomethane distributed in a country. In the example provided in the NGV Europe document, 10 percent displacement with biomethane equates to a CCF discount of 10 percent that is applied to a vehicle's tailpipe emissions of CO2. In the case of the U.S., the CCF for 2022 would be 69 percent if the national average were used or 97 percent if the

California average were used and credits were assigned based on state registration of motor vehicles. [EPA-HQ-OAR-2022-0829-0597, pp. 13-14]

One limitation of this approach is the fact that if RNG levels go up in the future manufacturers selling trucks today would not receive the full benefit of future increases, and thus the credit or CCF used would underrepresent the benefit of their trucks. This could be addressed by periodically revising the levels of RNG use projected to occur during a vehicle's lifetime and using that level of displacement to offset emissions. EPA previously proposed a similar concept for electric vehicles that would have based emissions on future EIA forecasts of renewable electricity. [EPA-HQ-OAR-2022-0829-0597, pp. 13-14]

(1) EPA should amend its greenhouse gas regulations for all types of vehicles including light-, medium-, and heavy-duty motor vehicles and incorporate the well-to-wheel benefits of natural gas and renewable natural gas as part of the engine and vehicle certification regulations; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(2) EPA to the extent it incorporates other technology advancement credits in its vehicle regulations should extend these incentives to natural gas and natural gas hybrid- electric vehicles based on the demonstrated benefits of these vehicles and the need to accelerate the introduction of a diverse mix of cleaner vehicle technologies; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(3) EPA should provide enhanced SmartWay designations for trucks powered by low-NOx engines and fueled by carbon-neutral or even carbon-negative renewable natural gas; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(4) Federal agencies should fund pilot programs and infrastructure development that demonstrate the ways in which natural gas can be used to fuel a variety of different transportation sectors by supporting the purchase of vehicles and equipment at multimodal facilities such as ports and rail facilities; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(5) Federal agencies should ensure that federal funding provided under the CMAQ Program and the DERA Program and other programs enacted as part of the Bipartisan Infrastructure Law and Inflation Reduction Act are competitively awarded for projects that provide the most cost-effective emission reductions and offer increased funding levels for engines and vehicles that are certified to more demanding standards in advance of EPA's adoption of such standards; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(6) Federal agencies should work with state authorities to ensure that transportation policies include performance metrics and consider a variety of different technologies as opposed to only promoting specific technologies regardless of their cost; [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

(7) The Administration should work with Congress to amend the federal excise tax on new trucks to reduce the impediment to fleets and businesses purchasing cleaner new trucks by either eliminating the tax altogether since it discourages new purchases or amend the tax so that it does not penalize more costly, lower polluting technologies (i.e., eliminate the excise tax on the incremental cost). [EPA-HQ-OAR-2022-0829-0597, pp. 14-15]

Organization: National Association of Clean Air Agencies (NACAA)

NACAA supports … lower[ing] the running loss standard from the current 0.05 gm/mi to the ACC standard of 0.01 gm/mi.

Organization: National Corn Growers Association (NCGA)

NCGA also urges EPA to take steps to update the F-factor in the fuel economy formula to a forward-looking F-factor of at least 0.2, as we outlined in 2020 comments in response to Docket EPA–HQ–OAR–2020-0104. Furthermore, we urge EPA to reinstate the 0.15 volumetric conversion factor for FFVs. EPA should reharmonize the 0.15 factor for FFVs in these standards, and, if not, in future standards. This change would accurately reflect the significant carbon emissions reductions from FFVs using E85 because the carbon emissions from the fuel are the release of carbon taken up through crop growth. [EPA-HQ-OAR-2022-0829-0643, p. 9]

As NCGA recommended to EPA in 2020 comments on Docket EPA–HQ–OAR–2016-0604, actual tailpipe carbon emissions, regardless of the test fuel, must continue to be the only measure of vehicle emissions performance in vehicle testing. CO2 test adjustments would needlessly complicate vehicle test procedures. Relying solely on test results eliminates uncertainty, averaging and potential for inaccuracies in procedures to adjust emission test results for the fuel. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Lower GHG emissions from vehicles benefit consumers, our environment, and our energy security. Just as updating the test fuel from E0 to E10 reduced GHG emissions by blending cleaner, renewable ethanol with gasoline, E15 and future clean, high-octane fuels that blend more ethanol will further reduce emissions and improve fuel economy when used with optimized engines. Vehicle test procedures for Tier 3 fuel, or any future certification fuel, must not create impediments to low carbon fuels such as E15 and higher blends and the vehicle technologies that help reach our mutual goal of lower GHG emissions. Stringency of the standards is best maintained through the Administrator’s authority to adjust the standards, as EPA is using in this proposal, not by adjusting emission test results. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Update the F-factor in the fuel economy formula to a forward-looking F-factor of at least 0.2. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Reinstate the 0.15 volumetric conversion factor for FFVs. [EPA-HQ-OAR-2022-0829-0643, p. 10]

Organization: Pearson Fuels

h. Argonne National Laboratory has studied the lifecycle GHG emissions of ethanol extensively and found an average carbon intensity reduction of 44- 52% compared to gasoline in 2019, and that this represented a 23% carbon intensity reduction between 2005 and 2019 [EPA-HQ-OAR-2022-0829-0577, pp. 13-14]

A study conducted by researchers at the U.S. Department of Energy’s (“DOE”) Argonne National Laboratory (“Argonne”) determined that corn ethanol is reducing its carbon footprint and diminishing greenhouse gases as compared to gasoline. The study analyzed corn ethanol production in the United States from 2005 to 2019, when production more than quadrupled.

Scientists assessed corn ethanol's GHG emission intensity (also referred to as carbon intensity, or CI) during that period and found a 23% reduction in CI.25 The study found that U.S. corn ethanol has 44%–52% lower GHG emissions as compared to conventional gasoline. [EPA-HQ-OAR-2022-0829-0577, pp. 13-14]

25 Kathryn Jandeska, Argonne National Laboratory, "Corn ethanol reduces carbon footprint, greenhouse gases," (May 24, 2021), at https://www.anl.gov/article/corn-ethanol-reduces-carbon-footprint-greenhouse-gases. See also Valerie Sarisky-Reed, Director DOE Bioenergy Technologies Office, "Ethanol vs. Petroleum-Based Fuel Carbon Emissions," (June 23, 2022), at https://www.energy.gov/eere/bioenergy/articles/ethanol-vs-petroleum-based-fuel- carbon-emissions.

The time has come for EPA to revisit this decision based on several recent developments in the international campaign to mitigate climate change [EPA-HQ-OAR-2022-0829-0577, p. 2]:

- the increasing lifecycle GHG reductions that modern U.S. ethanol provides as compared to petroleum-based gasoline that now constitute a sound policy basis for the integration of a GHG emissions factor,

- the significant and rapidly increasing GHG reductions that California has achieved by leveraging its existing FFV fleet to rapidly scale E85 use,

- the potential of advanced feedstocks, carbon capture and sequestration and climate smart agriculture to enable production of carbon neutral ethanol, and,

- the clear need to deploy strategies that can further decarbonize internal combustion engines ("ICE") given the long useful life and expensive costs of vehicles. [EPA-HQ-OAR-2022-0829-0577, p. 2]

With the support of EPA, California has instituted a comprehensive program to decarbonize its economy to achieve 40% GHG reduction below 1990 levels by 2030, and to achieve carbon neutrality by 2045. President Biden has announced similar goals for the nation and has succeeded in passing sweeping laws including the Inflation Reduction Act to begin to achieve these goals. Regarding FFVs, California's Low Carbon Fuel Standard ("LCFS") recognizes the tremendous value of GHG reductions from biofuels as well as reductions achieved by battery electric vehicles ("BEVs"). As a result, E85 use in California FFVs has been growing at an average annual rate of 33% with a usage rate in FFVs of 16% in 2022. California's E85 use in 2022 grew over 65% and exceeded 100 million gallons, as determined by the California Air Resources Board ("CARB"). [EPA-HQ-OAR-2022-0829-0577, p. 2]

In the GHG rulemaking for model years ("MY") 2012-2016, EPA explained its decision to phase down FFV crediting as attributable to the utility of the Renewable Fuel Standard program ("RFS2") as an effective upstream decarbonization policy.3 While RFS2 does recognize the life cycle emissions reductions that ethanol and other low carbon fuels provide, RFS2 does not provide any direct or indirect incentive for automakers to manufacture FFVs. To enable these potential GHG emissions reductions, EPA must reintegrate FFV crediting into the GHG policy framework at a level commensurate with the GHG reductions achieved. Specifically, EPA should establish a GHG emissions factor for E85 utilized in FFVs that is derived from the most recent determination of the carbon intensity of ethanol used in the United States, as determined by Argonne National Laboratory's Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies ("GREET") model. [EPA-HQ-OAR-2022-0829-0577, p. 2]

3 See 75 FR 25434, “EPA recently finalized its RFS2 rulemaking which life cycle emissions from ethanol and the upstream GHG benefits of E85 use are already captured by this program.”

Given the current and future devastating impacts of climate change that EPA foretold in its 2009 Endangerment Finding, U.S. federal policy must immediately leverage the GHG reducing benefits of all viable transportation fuels and technologies including FFVs that can utilize E85. [EPA-HQ-OAR-2022-0829-0577, p. 2]

f. An analysis of the current scale and rate of growth of E85 in California establishes that the use of E85 is a highly effective GHG reduction strategy that could be deployed nation-wide to provide a new and annually expanding source of GHG reductions from ICE vehicles.

Utilizing the Argonne GREET lifecycle analysis of corn starch ethanol, the carbon intensity of ethanol is 45 gCO2e/MJ.16 This compares with a 100.82 gCO2e/MJ carbon intensity for California gasoline blendstock, and a 90 gCO2e/MJ carbon intensity for E10.17 Thus, each gallon of corn starch ethanol utilized in E85 provides approximately 55% GHG reduction compared to California gasoline blendstock. Consistent with California regulations, E85 marketers in California supply at an actual blend rate of 83% ethanol with 17% California gasoline blendstock such that a blended gallon of California E85 from corn starch ethanol has a carbon intensity of 54.9 gCO2e/MJ carbon intensity. [EPA-HQ-OAR-2022-0829-0577, pp. 10-11]

16 Lee, U., Kwon, H., Wu, M., Wang, M., Retrospective analysis of the U.S. corn ethanol industry for 2005-2019: implications for greenhouse gas emission reductions, Biofuels, Bioprod. Bioref. 15:1318–1331 (2021), at 1, available at https://onlinelibrary.wiley.com/doi/epdf/10.1002/bbb.2225.

17 Rosenfeld, J., Kaffel, M., Lewandrowski, J. and Pape, D. The California low carbon fuel standard: Incentivizing greenhouse gas mitigation in the ethanol industry. (2020). https://www.usda.gov/sites/default/files/documents/ CA- LCFS-Incentivizing-Ethanol-Industry-GHG-Mitigation.pdf.

However, Pearson Fuels does not limit its supply to corn starch ethanol-based E85 blended with gasoline. Instead, Pearson Fuels has pioneered the use of 100% renewable E-85 fuel into the California marketplace as well as sourcing ethanol produced from cellulosic feedstocks. Wherever possible, Pearson replaces the 17% gasoline blendstock for its E85 with renewable naphtha. Thus the only remaining fossil-based product supplied is the de minimus portion of denaturant.18 Some of the renewable naphtha is produced by World Energy in its Paramount, California facility that also produces renewable diesel and sustainable aviation fuel from a variety of feedstocks including rendered animal fat. Pursuant to the California LCFS, World Energy’s renewable naphtha from rendered animal fat fuel pathway is certified at 25.08 gCO2e/MJ.19 Utilizing the Argonne GREET CI score for the corn starch ethanol of 45g gCO2e/MJ and the CARB score of 25 gCO2e/MJ for the renewable naphtha, Pearson Fuels’ E85 provides approximately 60% GHG reduction as compared to California gasoline blendstock. [EPA-HQ-OAR-2022-0829-0577, pp. 10-11]

Pearson Fuels’ E85/ renewable naphtha blend produced with cellulosic ethanol performs even better in terms of GHG reduction. [EPA-HQ-OAR-2022-0829-0577, pp. 10-11]

18 Biomass Magazine, “Pearson Fuels blends ethanol, renewable naphtha into advanced E85,” (October 23, 2019), at http://biomassmagazine.com/articles/16560/pearson-fuels-blends-ethanol-renewable-naphtha-into-advanced-e85.

19 California Air Resources Board, LCFS Pathway Certified Carbon Intensities access page at https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities, download of Current Fuel Pathways spreadsheet at https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/current- pathways_all.xlsx, see pathway #B004503 (AltAir Paramount).

II. EPA SHOULD TAKE THE OPPORTUNITY IN THIS RULEMAKING TO RECOGNIZE THE TRUE GHG POLICY VALUE OF FFVS BY RESTORING MEANINGFUL GHG CREDITING FOR FFVs

We encourage the Agency to re-affirm the policy value of FFVs and American ethanol production and use by restoring meaningful GHG crediting for the manufacture of FFVs by modifying the methodology for determining GHG crediting for FFVs beginning MY 2027. EPA has authority to better harmonize crediting between the GHG and CAFE standards and thereby expand FFV manufacturing through two alternative means both of which are supported by Pearson Fuels. [EPA-HQ-OAR-2022-0829-0577, p. 16]

a. EPA should re-integrate the methodology that continues to exist in the CAFE program by re-establishing its use of the 0.15 multiplier in the EPA's GHG Standards, or,

b. EPA should establish a new GHG Emissions Factor for the GHG Standards that recognizes the lifecycle emissions reductions of E85 as compared with conventional gasoline.

Crediting based on lifecycle GHG emissions reductions can be accomplished simply by establishing a GHG Emissions Factor that is based on the average GHG emissions reduction provided by ethanol as compared to petroleum gasoline on a lifecycle basis. This GHG Emissions Factor would be subject to adjustment based on a determination by Argonne National Laboratory regarding the average lifecycle emissions of U.S. used as a transportation fuel as compared to the average lifecycle emissions of the U.S. gasoline used as a transportation fuel. [EPA-HQ-OAR-2022-0829-0577, p. 16]

As previously noted, utilizing the Argonne GREET lifecycle analysis of corn starch ethanol, the carbon intensity of ethanol is 45 gCO2e/MJ.33 This compares with a 93 gCO2e/MJ carbon intensity for the U.S. average petroleum gasoline blendstock.34 Thus, utilizing only corn starch ethanol as an example, the CI Reduction Factor would be 0.48. To date, there does not appear to be a comprehensive analysis of the average CI of U.S. ethanol but the Alternative Fuels Data Center states that 94% of ethanol produced in the U.S. is corn ethanol.35 For illustrative purposes, if one were to assume that the other 6% share of U.S. ethanol consisted solely of cellulosic ethanol with a carbon intensity score of 20 gCO2e/MJ, that would reduce the average CI score of U.S. ethanol to 44 gCO2e/MJ. This would reduce the GHG Emissions Factor to 0.47, and will be utilized for illustrative purposes. [EPA-HQ-OAR-2022-0829-0577, pp. 16-17]

33 Lee, U., Kwon, H., Wu, M., Wang, M., Retrospective analysis of the U.S. corn ethanol industry for 2005-2019: implications for greenhouse gas emission reductions, Biofuels, Bioprod. Bioref. 15:1318–1331 (2021), at 1, available at https://onlinelibrary.wiley.com/doi/epdf/10.1002/bbb.2225.

34 Id. at 1328.

35 U.S. Department of Energy, Alternative Fuels Data Center, "Ethanol Fuel Basics," at https://afdc.energy.gov/fuels/ethanol_fuel_basics.html#:~:text=In%20the%20United%20States%2C%2094,any%20r aw%20feedstock%20into%20ethanol.

Pearson Fuels would request that EPA consider modifying the equation for measuring the CO_2 emissions of FFVs for light-duty GHG program purposes as follows [EPA-HQ-OAR-2022-0829-0577, pp. 16-17]:

CO_2 = (E85 Tailpipe GHG Emissions x F Factor x E85 GHG Emissions Factor) + [Gasoline Tailpipe GHG Emissions x (1- F Factor)]

E85 GHG Emissions Factor (2021) = 0.47 (illustrative based on above parameters) [EPA-HQ-OAR-2022-0829-0577, pp. 16-17]

Organization: Porsche Cars North America (PCNA)

Policy makers and the auto industry must also continue to find wins in other regulatory programs. EPA's recently finalized Renewable Fuel Standard for 2023-2025 regrettably was unable to finalize the innovative and robust proposal for "eRINs". This proposal that was supported by Porsche could have opened the door for continued growth in electricity derived from biogas and used transportation fuel and to further incentivize growth in the electric vehicle market. Porsche appreciates the need for EPA to consider the wide range of input they received on this proposal and will work proactively to support near-term regulatory actions to finalize this valuable, supportive policy. [EPA-HQ-OAR-2022-0829-0637, p. 3]

Organization: Renewable Fuels Association (RFA)

VII. If EPA Maintains its Zero Gram per Mile Incentive for EV Production, the Agency Should Allow for a Similar Incentive for FFV Production

For the reasons described in detail above, RFA objects to the continued use of a 0 g/mile compliance value for EVs for the purposes of calculating fleet averages. However, if EPA ultimately finalizes a permanent incentive of 0 g/mile for EVs, then it must consider applying a similar incentive for other low-carbon vehicle technologies, including FFVs that can operate on E85 and other higher ethanol blends. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

EPA's proposed approach for BEVs (i.e., using a value of 0 grams/mile) essentially assumes every BEV produced by automakers will only use zero-carbon renewable electricity over the entire lifespan of the vehicle. In other words, EPA's proposal credits all BEVs for their maximum potential CO_2 benefit, without requiring any evidence that such a benefit is actually achieved. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

In order to create an equitable opportunity for biofuels to contribute to the effort to decarbonize light-duty transportation, EPA should institute a CO_2 emissions compliance value that similarly recognizes the potential carbon benefits of light-duty vehicles designed to operate on liquid fuels containing high levels of renewable ethanol. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

EPA's final rule should adopt an assumption that FFVs operate on E85 all the time, just as the proposed 0 g/mile value effectively assumes BEVs operate on zero-carbon electricity all the time. Automakers who manufacture FFVs should be allowed to use a CO_2 emissions compliance value that reflects the lifecycle CO_2 savings from using E85. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

According to the latest Argonne National Laboratory GREET model results, E85 made with average corn ethanol reduces full lifecycle CO2-equivalent GHG emissions by 31% per mile compared to gasoline.29 This estimate includes hypothetical/potential emissions from direct and indirect land use changes. Accordingly, for the purposes of calculating fleet averages, EPA should allow automakers to use a CO2 compliance value for an FFV that is 31% lower than the compliance value for a corresponding non-FFV model. As an example, if a non-FFV car is determined by the automaker to have a CO2 value of 181 g/mile, the automaker should be allowed to use a compliance value of 125 g/mile for an FFV version of that same car. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

29 The GREET2022 model shows that E0 gasoline results in fleet average full lifecycle GHG emissions of 421 g/mile, compared to fleet average emissions of 291 g/mile for the use of E85 in an FFV. Results verified via personal communication between RFA and Longwen Ou of Argonne National Laboratory.

This approach to incentivizing FFVs would be no different than the approach EPA has used historically, and is proposing to continue, for incentivizing EV production. This FFV mechanism would create a more level playing field for low-carbon liquid fuels and would provide a meaningful incentive for automakers to manufacture FFVs in addition to BEVs. Increased production of FFVs would unlock increased use of lower-carbon liquid fuel blends containing higher levels of ethanol, such as E85 and E30. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

Alternatively, EPA could allow auto manufacturers to use the same 0 g/mile compliance value for ethanol's portion of FFV operation, given that the ethanol-related "tailpipe" CO2 emissions from an FFV are biogenic in nature and fully offset by atmospheric CO2 removal by the biomass feedstock at the beginning of the lifecycle. That is, if EPA remains committed to focusing only on tailpipe emissions (and ignoring upstream fuel production and supply chain emissions), then biofuels like ethanol should be treated as "zero emissions" fuels because CO2 emissions from the vehicle are fully offset by CO2 uptake by the feedstock. [EPA-HQ-OAR-2022-0829-0602, pp. 12-13]

Organization: Sandra Thomas

I applaud the new regulations on EV cars and trucks. However one essential thing is missing for me. As a middle class person with low income I have no use for a $7500 tax credit – or any tax credit. In order to owe that much in taxes a person has to be very wealthy, which excludes most residents of the United States. Seven year ago when I paid off my current car, I continued saving the payment amount and now I have enough saved to buy one of the cheaper EV's with cash – but I will get no tax credit deduction if I do. So I am not buying an EV although I would VERY much like to help our planet survive.

I hope that you would re-consider a refundable tax credit – or purchase credit, so that this benefit extends to the average American. We want to do our part for the climate along side the rifh, but the current policy makes that impossible. Please respond. [EPA-HQ-OAR-2022-0829-5088]

Organization: South Coast Air Quality Management District

3. Set a minimum range for ZEVs. ACC II requires a minimum certification range of 200 miles for zero emission vehicles. This is to ensure that new ZEVs will provide useful EV miles

to meet the everyday needs of consumers, which will lead to higher acceptance and uses, and greater reductions of emissions from on-road vehicles. This range is also easily achievable with technologies that are currently available. We concur with the need for a minimum range requirement and recommend a similar range limit for the proposed rule. Setting a 200-mile range minimum threshold will prevent manufacturers from producing ZEVs with limited ranges simply for the sake of compliance with State and federal regulations, including the Corporate Average Fuel Economy (CAFÉ) standards. [EPA-HQ-OAR-2022-0829-0659, p. 3]

Organization: Toyota Motor North America, Inc.

Therefore, it is disappointing that EPA removed the e-RIN proposal from the RFS set rule as it is one of the few measures for which EPA has direct authority to provide at least some level of assistance in supporting the EV shares required in the GHG proposal. After a muti-year collaboration with the auto industry, a valuable policy tool for establishing PEV markets and promoting clean energy has been lost. [EPA-HQ-OAR-2022-0829-0620, pp. 25-26]

Organization: Volvo Car Corporation (VCC)

Many uncertainties remain that are critical to implementing the proposal. The impact of the new separate Department of Energy proposal on the methodology for determining energy consumption of an EV is pending. This creates uncertainty about the number of EVs that VCC would need to sell prior to 2030. [EPA-HQ-OAR-2022-0829-0624, p. 2]

Organization: Wisconsin Automobile and Truck Dealers Association

The EPA predicts unprecedented increases in non-hydro renewable energies. This is identified as primarily wind and solar. Northern Wisconsin has vast expanses of trees and forests making the non-hydro renewable energies debate the benefits of trees and forests versus the benefits wind and solar. [EPA-HQ-OAR-2022-0829-0494, p. 2]

EPA Summary and Response

Summary:

Commenters described various concerns and suggestions which were on topics that EPA did not specifically propose or seek comment on in the light-duty and medium-duty vehicle proposal.

Response:

Comments describing additional incentives, other programs, and other considerations are unrelated to anything we proposed or analyzed in developing the proposed rule, and we have determined they are outside the scope of the rule.

28.1 - Directed to the heavy-duty Phase 3 proposal

Comments by Organizations

Organization: Ceres Corporate Electric Vehicle Alliance (CEVA)

- Heavy-duty vehicle phase 3 GHG emissions standards that are at least as strong as those proposed, but ideally are stronger to ensure at least 50% zero-emissions vehicle (ZEV) sales across all market segments by 2032. California's Advanced Clean Trucks (ACT) rule,4 manufacturer commitments,5 and the Inflation Reduction Act (IRA) funding are all consistent with such a goal.6 [EPA-HQ-OAR-2022-0829-0511, p. 1]

5 https://theicct.org/wp-content/uploads/2023/04/hdv-phase3-ghg-standards-benefits-apr23.pdf

6 https://theicct.org/wp-content/uploads/2023/01/ira-impact-evs-us-jan23-2.pdf

Heavy-Duty Vehicle Standards:

Similarly, strong heavy-duty vehicle standards that lead to 50% ZEV sales across all market segments by 2032 will drive the electrification of the heavy-duty sector by building on the momentum created by state regulations, manufacturers' commitments, and IRA and Infrastructure Investment and Jobs Act funding. Taken together (in concert with modal shifts) these actions will spur rapid decarbonization of the sector and ensure a diverse supply of ZEVs that meets the needs of commercial fleets and carriers.8 [EPA-HQ-OAR-2022-0829-0511, p. 2]

8 https://www.atlasevhub.com/data_story/210-billion-of-announced-investments-in-electric-vehicle-manufacturing-headed-for-the-u-s/#:~:text=Vehicle%20manufacturers%20and%20battery%20makers,than%20in%20any%20other%20country.

While medium- and heavy-duty trucks represent only 5% of vehicles on the road, their GHG emissions represent 23% of the transportation sector's carbon footprint, which grew 75% over the last three decades.9 They are also largely responsible for the harmful pollutant emissions that disproportionally impact historically low-income and BIPOC communities located near fleet depots, major transportation corridors, distribution centers, and ports.10
In fact, the American Lung Association found that one in three Americans live in places with unhealthy air pollution, largely due to transportation sector emissions. As such, vehicle emissions standards serve as a crucial mechanism to protect public health and advance environmental justice.11 Further, with many major companies aiming to deploy 50-100% zero-emission trucks by 2030, EPA's proposed standards fail to stimulate the rate of commercial electric truck production that commercial fleet operators seek.12 By strengthening the proposed Phase 3 standards to ensure at least 50% ZEV sales across all market segments by 2032, EPA will accelerate the industry's necessary investments in heavy-duty ZEV manufacturing and the accompanying investments in charging infrastructure. [EPA-HQ-OAR-2022-0829-0511, pp. 2-3]

9 https://www.epa.gov/system/files/documents/2023-04/US-GHG-Inventory-2023-Main-Text.pdf (p.2-35, 3-25)

10 BIPOC: Black, Indigenous, People of Color

11 https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf

12 https://theicct.org/wp-content/uploads/2023/04/hdv-phase3-ghg-standards-benefits-apr23.pdf (p.i-19).

Organization: GreenLatinos et al.

For Greenhouse gas (GHG) Phase 3 HDV standards, we urge the U.S. EPA to finalize the strongest possible cleaner trucks standards. The standards must require tighter limits on diesel vehicles, so that we're making diesel trucks increasingly cleaner as manufacturers transition to zero pollution vehicles. [EPA-HQ-OAR-2022-0829-0789, p. 1]Organization: Mayor Becky Daggett, City of Flagstaff, Arizona et al.

On behalf of the 52 undersigned local officials, we urge the EPA to protect the health of our cities' residents and fight climate change by finalizing the strongest clean car and truck vehicle emission standards before the end of 2023. [EPA-HQ-OAR-2022-0829-0732, p. 1]

EPA should finalize the most stringent standards possible for the Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (LDV) and the Greenhouse Gas Emissions Standards for Heavy-Duty Engines and Vehicles Phase 3 (HDV). We recommend these car and truck standards: [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Be aligned on rulemaking timelines; [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Account for technological advances and cost-savings in zero-emission technologies, including those made possible by recent legislation; [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Achieve critically necessary reductions in greenhouse gases (GHGs) and other pollutants; and [EPA-HQ-OAR-2022-0829-0732, p. 1]

- Be developed with thorough stakeholder involvement that ensures all affected communities can engage in the rulemaking process. [EPA-HQ-OAR-2022-0829-0732, p. 1]

Ambitious federal standards, coupled with actions we are taking in our cities and towns to accelerate the use of clean vehicles, will enable our localities to more quickly cut transportation pollution and help ensure our residents and businesses have access to zero-emission technologies. [EPA-HQ-OAR-2022-0829-0732, p. 1]

Organization: Senator Shelley Moore Capito et al.

In addition, there remains a lack of support infrastructure capacity to implement the sweeping transition envisioned in these proposals, particularly for the heavy-duty vehicle category. While the Infrastructure Investment and Jobs Act provides states funding for electric vehicle charging infrastructure, charging technology and deployment continues to focus on passenger and commercial vehicles, not on heavy-duty vehicles. The White House has noted that 72 percent of goods in this country are moved by truck, placing the industry and the center of our critical supply chains and economic competitiveness.5 Efficient and reliable charging infrastructure for heavy-duty vehicles is essential for the sort of transition to electric trucks that the EPA has proposed. However, the technology is nowhere near ready to meet the demand necessary to keep our supply chain moving at the same rate it is today. Charging heavy-duty vehicles requires significantly more expensive conduits and transformers, and consumes vastly more electricity, than what is necessary for charging light- and medium-duty vehicles. Heavy-duty vehicle charging takes longer and is required more frequently than liquid fueling due to electric trucks having reduced range compared to conventional diesel vehicles. This proposal will result in increased curb weight for heavy-duty vehicles due to the significant weight of batteries, leading to reduced payload capacity and ultimately more heavy-duty vehicles on our roadways to move the same amount of freight. This shift may have highway safety implications and create increased congestion on our nation's roadways. In short, the charging technology for heavy-duty vehicles is not readily available and it will take many more years to develop and deploy if it is even economically feasible, making compliance with the EPA' s proposal for heavy-duty vehicles unattainable for the foreseeable future. [EPA-HQ-OAR-2022-0829-5083, p. 2]

5 The Biden-Harris Administration Trucking Action Plan to Strengthen America's Workforce, The White House (Dec. 16, 2021).

Organization: South Dakota Department of Agriculture and Natural Resources (DANR)

Public Safety

This past year South Dakota had a long, harsh winter. During the previous two winters the South Dakota Department of Transportation (DOT) maintenance crews covered about 1.4 million miles and used about 540,000 gallons of diesel fuel. This past winter, DOT totaled 3.2 million miles, used about one million gallons of fuel, and clocked approximately 178,000 man-hours to keep our roads safe. DANR is concerned the proposed emissions standards and push to heavy-duty vehicle EV use could significantly limit DOT's and South Dakota municipalities' ability to keep our roads safe during winter conditions. [EPA-HQ-OAR-2022-0829-0523, p. 2]

Organization: TCW Inc.

We currently operate 320 day cab tractors in the southeast, with 434 drivers. So, we "slip-seat" trucks, assigning a day shift and night shift driver in many trucks. With BEV's, we would need down time to charge, so we would need to purchase an additional 114 trucks to provide a tractor for every driver. Most of the freight we haul is international intermodal, with gross weight ranging from 70,000 to 90,000. With current electric truck capacity, we would have a service radius of 125 miles vs. a current radius of 250+ miles. Additional relay points would be required, and with the 50% reduction in service radius, we would need twice the number of trucks to service lanes that exist today. Electric trucks cost in excess of three times the amount we currently pay for a new Peterbilt day cab. Those additional expenses would be passed along in transportation expenses, astronomically impacting our already existing inflation issues related to supply chain constraints. [EPA-HQ-OAR-2022-0829-0452, p. 1]

Organization: Texas Public Policy Foundation (TPPF)

The HD Tailpipe Rule Will Devastate Trucking

Former Supreme Court Justice Breyer stated in Whitman v. Am. Trucking, 531 U.S. 457 (2001), that the Clean Air Act “does not require the EPA to eliminate every health risk, however slight, at any economic cost, however great, to the point of ‘hurtling’ industry over ‘the brink of ruin.’” Id. at 494. In the Whitman case the Supreme Court vacated the 1997 NAAQS because of the poor science and lack of discernable criteria underlying them. Likewise here, no scientific data requires the EPA to enact the most stringent tailpipe emission limits conceivable. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

Electric trucks typically have a higher upfront purchase price compared to traditional diesel trucks. The HD Tailpipe Rule will effectively bar diesel trucks from sale, forcing trucking companies seeking to replace their fleet to take on more costs to do so. This will strain the financial resources of some companies, especially smaller ones. Shifting from diesel trucks to electric ones will also require adapting to new technologies and training drivers to effectively operate electric vehicles. This transition period will likely lead to disruptions in the supply chain and additional costs — both temporal and monetary — for trucking companies. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

Moreover, the availability of charging stations for electric trucks is currently poor and still developing. It is certainly not as extensive as refueling stations for diesel trucks, and retrofitting existing truck stops for electric charging will place immense strain on electrical infrastructure and the national grid, especially in rural communities often frequented by truckers traveling the nation's highways, causing prices to skyrocket for average Americans. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

The resulting chaos will limit the range and flexibility of electric trucks for long-haul journeys. Electric trucks already have limited range compared to diesel trucks, particularly when fully loaded. This will mean more frequent charging, adjustment to trucking routes, and overall shipping delays, negatively affecting operational efficiency. And even if the myriad infrastructure issues involved in getting power to truck refueling stations were solved or mitigated, the electricity used to charge electric trucks would still primarily come from America's most reliable and abundant power source: fossil fuels. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

In effect, the HD Tailpipe Rule will force truckers to spend substantial financial and human resources to comply with ultra vires government regulations that fail to make even a marginal dent in global issue of changing climate. [EPA-HQ-OAR-2022-0829-0510, pp. 4-5]

EPA Summary and Response

Summary:

Commenters provide ideas and observations related to the electrification of heavy-duty vehicles and related issues such as charging infrastructure.

Response:

This rule is limited to light-duty and medium-duty vehicles. As a result, the comments related to heavy-duty vehicles are outside the scope of this rule. Interested readers should refer to the Agency's action, *Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles - Phase 3*, which can be found at https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-commercial-trucks. Note that some of the comments included in this section were also submitted to the docket for the heavy-duty vehicle rulemaking (EPA-HQ-OAR-2022-0985).

29 - Additional comments

The Agency has been, is, and will continue to be committed to considering timely comments received on proposed rules. Although the comment period for this rule closed on July 5, 2023, EPA was able to also consider late comments received through December 15, 2023 for this final action. Comments received that provide specific information and feedback about particular data or assumptions used in EPA's analysis supporting the proposal or other aspects of the program and that were received after the end of the comment period through August 27, 2024, are included in the various sections of this RTC document. Additional comments received after that date and up to December 15, 2023, and that provide detailed information are included in this section. Comments received after the close of the comment period that express general support for or opposition to the proposal and/or contain opinions or statements about issues but without detailed data, information, or comment relating to specific provisions of the proposal or EPA's supporting analysis are not included in this RTC document. In the interest of transparency, we have included all comments we received after the close of the comment period in the docket; however, we were not able to consider comments received after December 15, 2023 and do not consider them part of the administrative record for this rulemaking.

<u>List of Additional Comments</u>

Index	Document Number	Commenter Name
1	EPA-HQ-OAR-2022-0829-5106	AESI et al.
2	EPA-HQ-OAR-2022-0829-5085	Alliance for Automotive Innovation
3	EPA-HQ-OAR-2022-0829-5107	American Free Enterprise Chamber of Commerce
4	EPA-HQ-OAR-2022-0829-5087	Center for Biological Diversity et al.
5	EPA-HQ-OAR-2022-0829-5084	Environmental Defense Fund (EDF)
6	EPA-HQ-OAR-2022-0829-5116	Environmental Defense Fund (EDF)
7	EPA-HQ-OAR-2022-0829-5118	Environmental Defense Fund (EDF)
8	EPA-HQ-OAR-2022-0829-5119	Environmental Defense Fund (EDF)
9	EPA-HQ-OAR-2022-0829-5102	Hyundai Motor America
10	EPA-HQ-OAR-2022-0829-5100	Toyota Motor North America, Inc.

Organization: AESI et al.

The 29 undersigned organizations write to express our strong support for the Environmental Protection Agency's (EPA) proposal to strengthen standards for harmful particulate matter (PM) emissions within the Agency's proposed Multi-Pollutant Emissions Standards for Model Year 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29184 (May 5, 2023).

Many of our organizations previously submitted comments to EPA in support of the multipollutant standards during the open comment period of the proposed rulemaking. Finalizing strong PM standards that drive the deployment of off the shelf, low-cost gasoline particulate filters (GPFs) will save lives and reduce asthma attacks and cancer risk, all while saving our nation billions of dollars in avoided healthcare costs.

Exposure to PM can affect both the lungs and the heart. Numerous peer-reviewed scientific studies have linked particle pollution exposure to significant heath harms, including premature death in people with heart or lung disease, nonfatal heart attacks, aggravated asthma, decreased lung function, and increased respiratory symptoms.1 People with heart or lung diseases, children, and older adults are especially vulnerable to particle pollution exposure.

1 https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm

Strong standards will also protect vulnerable communities. People of color in the United States are exposed to disproportionately high levels of ambient PM pollution, including from motor vehicle emissions. One study finds that on a national level, people of color are exposed to 46 percent more ambient PM2.5 from light-duty gasoline vehicles than white people.2

2 Tessum, C et al. (2021). PM2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States, Science Advances 7, no. 18: eabf4491, https://doi.org/10.1126/sciadv.abf4491.

EPA's proposed PM limit of 0.5 mg/mile would greatly reduce particulate emissions from new gasoline vehicles. These proposed standards are critical as there is growing evidence of increases in particulate emissions from recent model year gasoline vehicles. A June 2023 ICCT analysis looking at remote sensing data shows that recent model year light-duty vehicles (2015-2020) show a marked increase in UV smoke, a proxy for particulates, while other pollutants, like carbon monoxide and ozone-forming nitrogen oxides, showed clear and consistent downwards trends.3 The issue of elevated particulate emissions from some gasoline vehicles and the need for more protective PM standards was identified before EPA finalized its Tier 3 standards nearly a decade ago.4

3 Meyer, M., Khan, T., Dallmann, T., Yang, Z. Particulate matter emissions from U.S. gasoline light-duty vehicles and trucks: TRUE Initiative U.S. remote sensing database case study. ICCT, June 2023. https://theicct.org/publication/true-pm-emissions-jun23/

4 Gladstein, Neandross & Associates. (2013). Ultrafine Particulate Matter and the Benefits of Reducing Particle Numbers in the United States. https://cdn.gladstein.org/pdfs/MECA_UFP_White_Paper_0713_Final.pdf.

EPA states that the strengthened PM emissions limit will likely be met through the installation of gasoline particulate filters (GPFs).5 GPFs are a mature technology and studies have demonstrated they can reduce particulate emissions by 97% to 100% compared to vehicles without filters.6 According to EPA they have been used in series production on new gasoline vehicles in Europe since 2017 and are now being used by U.S., European, and Asian manufacturers, with several manufacturers currently assembling vehicles equipped with GPFs in the U.S. for export to other markets.7 GPFs are also cost-effective devices – EPA estimates per vehicle manufacturing costs of $51–$166.8 Other independent studies conducted over a decade ago found similar GPF costs of $50–$184, indicating that current costs could be significantly lower.9

5 88 Fed. Reg. at 29264 (May 5, 2023).

6 Felix Leach et al. (2021). A Review and Perspective on Particulate Matter Indices Linking Fuel Composition to Particulate Emissions from Gasoline Engines," SAE International Journal of Fuels and Lubricants 15, no. 1: 3–28, https://doi.org/10.4271/04-15-01-0001; Jiacheng Yang et al. (2018). Gasoline Particulate Filters as an Effective Tool to Reduce Particulate and Polycyclic Aromatic Hydrocarbon Emissions from Gasoline Direct Injection (GDI) Vehicles: A Case Study with Two GDI Vehicles. Environmental Science & Technology 52, no. 5: 3275–84. https://doi.org/10.1021/acs.est.7b05641

7 88 Fed. Reg. at 29268 (May 5, 2023); See also MECA presentation to OMB, March 6, 2023 (showing that

U.S.-manufactured models (Ford Mustang and Jeep Grand Cherokee) that are exported to Europe and China have GPFs installed). https://www.reginfo.gov/public/do/eoDownloadDocument?pubId=&eodoc=true&documentID=210843

8 88 Fed. Reg. at 29270 (May 5, 2023).

9 Minjares, R and Posada Sanchez, F. (2011). Estimated cost of gasoline particulate filters. International Council on Clean Transportation. https://theicct.org/publication/estimated-cost-of-gasoline-particulate-filters/; Steininger. (2011). Particle number emission limits for Euro 6 positive ignition vehicles. https://www.nanoparticles.ch/archive/2011_Steininger_PR.pdf

A June 2023 report from the Manufacturers of Emission Controls Association (MECA) found tremendous health benefits of GPFs, even with significant deployment of zero-emission vehicles projected by EPA.10 According to the analysis, the health benefits of more protective PM standards would effectively double the benefit of electrification alone. The cumulative benefits of standards that drive more GPF use in the combustion vehicle fleet through 2050 include:

- 58,000 to 112,000 tons of particulate matter emissions eliminated;
- 42,000 to 81,000 tons of climate-forcing black carbon emissions eliminated;
- $18 to $163 billion in healthcare cost savings;
- Up to 22,000 premature deaths prevented; and
- Up to 314,000 asthma attacks avoided.

10 MECA Clean Mobility. Impacts Analysis of a Revised Federal Light-Duty On-Road Particulate Matter Standard. June 2023, https://www.meca.org/wp-content/uploads/2023/06/LDV_PM_Standard_Final_Report_06272023.pdf. See also MECA presentation to OMB, March 6, 2023. https://www.reginfo.gov/public/do/eoDownloadDocument?pubId=&eodoc=true&documentID=210843

By finalizing the proposed standards, EPA will bring the U.S. in line with other major vehicle markets. According to MECA, by 2023, four years ahead of EPA's proposed particulate standard implementation, two-thirds of the automotive manufacturing markets, including Europe, India and China, will be meeting tighter PM emission standards similar to those now proposed by EPA.11

[11] *Id.*

EPA's proposed updated standard would provide cost-effective and much needed health benefits through reduced particulate matter emissions. We urge the Administration to finalize its Multi- Pollutant Emissions Standards, including the strong health-protecting particulate standards, without delay. [EPA-HQ-OAR-2022-0829-5106]

Organization: Alliance for Automotive Innovation

The Alliance for Automotive Innovation submitted comments to EPA on the subject rulemaking.1 In those previous comments we noted concerns with the availability of adequate critical mineral supplies to support the market share of electric vehicles that would effectively be required under EPA's proposed light-duty vehicle greenhouse gas and criteria pollutant regulations, particularly given global demand for such materials. We now bring to EPA's attention recently updated analysis from Benchmark Minerals Intelligence (BMI) on lithium supplies in the context of automaker production goals and global regulatory policies. Please consider this a supplemental comment on the proposed rule and update to the section in our comments that compared an earlier BMI study with EPA's projected lithium ion battery cell demand to its proposed standards,2 and place this letter in the rulemaking docket.

1 See Alliance for Automotive Innovation Comments, available at Docket Id No. EPA-HQ-OAR-2022-0829-0701.

2 Id. at pp. 10-16.

In an article titled "Lithium industry needs over $116 billion to meet automaker and policy targets by 2030",3 Benchmark Minerals Intelligence (BMI) describes its analysis of lithium needs to meet its "high case" demand under vehicle electrification targets set by automakers and governments across the world, including a 50% electric vehicle share in the United States by 2030. BMI raises the following points that we feel are potentially informative to the subject rulemaking.

3 Benchmark Source, "Lithium industry needs over $116 billion to meet automaker and policy targets by 2030" (August 4, 2023). Available at https://source.benchmarkminerals.com/article/lithium-industry-needs-over-116-billion-to-meet- automaker-and-policy-targets-by-2030 by subscription.

- "The lithium industry needs to invest $116 billion by 2030 if the world is to meet the ambitions targets set by governments and the largest automakers.
- "Even if every asset in the pipeline came online on time and hit their projected lithium production capacities, the world would still need 1.8 million tonnes on top of that to meet the high case demand."
- "The high case scenario, which encompasses data from Rho Motion on automakers' passenger EV targets as well as data from the International Energy Agency on enacted country-level policies, would require 5.3 million tonnes of lithium carbonate equivalent (LCE). This is compared to the 915,000 tonnes LCE production in operation today."
- According to a BMI analyst, "It's almost impossible, and definitely a race against time . . . The players with skin in the game are the least likely to rush their spending . . . They don't want to flood the market with lithium too quickly. They want to release it slowly to maximise their return . . . As a carmaker, consumer, or EV policy maker, should I be alarmed? Yes."

The article described above is available by subscription. Much of the content of that article may also be obtained from Green Car Congress.4

4 Green Car Congress, “Benchmark: Lithium industry needs more than $116 billion to meet automaker and policy targets by 2030” (August 5, 2023). Available at https://www.greencarcongress.com/2023/08/20230805-benchmark.html.

EPA projects that its proposed light-duty vehicle greenhouse gas standards will be met with a 60% battery electric vehicle market share in 2030,5 10 percentage points higher than the “high case” demand scenario examined by BMI (which includes PHEVs), and beyond the goals of President Biden’s Executive Order 14037.6 EPA’s proposal also projects that BEV sales will continue to grow to 67% by 2032. As detailed in our original comments, the proposed greenhouse gas targets far exceed the capabilities of internal combustion engine vehicles.7 Therefore, failing to achieve the EPA-projected BEV market share, whether due to battery material availability or other issues, will have serious consequences for automakers and consumers alike. Data such as that highlighted above casts serious doubts on the feasibility of EPA’s proposed rule and is significantly different from assumptions EPA made in its proposal. EPA should take a deeper look into these supply chain challenges, including on-going efforts by other federal agencies responsible for carrying out President Biden’s Executive Order 14037 pertaining to vulnerabilities in our nation’s critical mineral and battery supply chains. EPA needs to address these significant shortcomings as it develops a final rule, rely on data from respected expert analysts such as Benchmark Minerals Intelligence, and use this data in reassessing the feasibility of the proposed greenhouse gas standards.

5 88 Fed. Reg. 29333 (May 5, 2023), Table 99.

6 We also note that EPA’s projections are premised on only battery electric vehicles, excluding plug-in hybrids, whereas Executive Order 10437 was inclusive of battery electric, plug-in hybrid electric, and fuel cell electric vehicles.

7 See comments of the Alliance for Automotive Innovation at Regulations.gov, Docket ID EPA-HQ-OAR-2022-0829-0701, at 90.

[EPA-HQ-OAR-2022-0829-5085]

Organization: American Free Enterprise Chamber of Commerce

This letter supplements the American Free Enterprise Chamber of Com- merce (“AmFree”) July 5, 2023 comment on EPA’s notice of proposed rule- making “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles,” 88 Fed. Reg. 29,184 (May 5, 2023).

Since our previous comment, there have been several developments that affect the validity of the proposed rule’s estimate of compliance costs. Of note is Toyota’s announcement that Model Year 2025 and later Camrys—the best- selling passenger car in the United States—will be exclusively hybrids. Joseph White, Toyota’s Camry, best-selling car in US, goes all-hybrid, Reuters (Nov. 15, 2023), https://www.reuters.com/business/autos-transportation/toyotas- camry-best-selling-car-us-goes-all-hybrid-2023-11-15. David Christ, the head of the Toyota brand in North America, explained that the decision to move to an all-hybrid vehicle line, dropping four- and six-cylinder combustion models that made up about 85% of sales in the current model year was motivated primarily by the need to comply with tougher U.S. fuel economy rules. Id. And because “any rule that limits tailpipe [greenhouse gas] emissions is effectively identical to a rule that limits fuel consumption,” they presumably had EPA’s proposal in mind as well. Delta Constr. Co. v. EPA, 783 F.3d 1291, 1294 (D.C. Cir. 2015).

But this isn't a cost-free shift: the cheapest Camry hybrid model currently sells for about $2,400 more than the most inexpensive combustion Camry. Toyota Camry, Toyota, https://www.toyota.com/camry/ (last accessed Nov. 20, 2023) (showing the Camry LE Hybrid costing $2,435 than its conventional counterpart, the Camry SE Hybrid costing $2,430 more than its conventional counterpart, and the Camry XLE costing $2,575 more than its conventional counterpart.).

As discussed in our previous comments, Section 202(a) requires EPA to consider whether compliance with the proposed emissions standards is feasible, giving appropriate consideration to the cost of compliance. 42 U.S.C.

§ 7521(a)(2) ("Any regulation prescribed . . . shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of com- pliance within such period."). The agency must explain why its projections are "reason[able]" and defend "its methodology for arriving at numerical esti- mates." Id.

In undertaking this task, EPA implausibly calculates that achieving its in- credibly aggressive greenhouse gas standards will raise the average cost of pas- senger cars by only $844 per vehicle in 2032, as compared to the no-action al- ternative, and that Toyota's new vehicles are projected to be hundreds of dollars cheaper than in the no-action alternative in Model Years 2027 through 2030. DRIA at 13-26. As we emphasized in our initial comments, these numbers were highly implausible when EPA calculated them. Now, just six months later, they have already been proved incorrect.

As our initial comments explained, EPA's vehicle cost estimates are flawed in many ways, and failing to account for these costs violates the agency's stat- utory obligations and at the very least renders the rule arbitrary and capricious. Because of these errors, EPA's proposed standards must be withdrawn. [EPA-HQ-OAR-2022-0829-5107]

Organization: Center for Biological Diversity et al.

Center for Biological Diversity, Clean Air Task Force, Environmental Law & Policy Center, National Parks Conservation Association, Public Citizen, and Sierra Club respectfully submit these comments in response to the Environmental Protection Agency's (EPA) Proposed Rule titled Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 88 Fed. Reg. 25926 (Apr. 27, 2023). As additional support for a strong final rule, we are providing EPA with important materials that were published after the close of the comment period:

1. Attachment 1: Electric Power Research Institute, *EVs2Scale2030 Program Overview*, https://publicdownload.epri.com/PublicAttachmentDownload.svc/AttachmentId% 3D84807
    a. EVs2Scale is a data-driven, multi-stakeholder initiative to help prepare the electric grid for expanded deployment of EV charging infrastructure, including for heavy-duty vehicles. Participants include fleet operators, truck manufacturers, electric utilities, charging infrastructure providers, government institutions, and national laboratories. Among other

projects, the initiative will provide a secure data exchange platform to help utilities efficiently plan grid investments, and will identify location-specific EV loads, grid impacts, lead times, workforce needs, and costs across the 50 states.

b. Further information on EVs2Scale2030 is available at https://msites.epri.com/evs2scale2030.

2. Attachment 2: Calstart, *Phasing in U.S. Charging Infrastructure* (Aug. 22, 2023), https://calstart.org/wp-content/uploads/2023/08/Phasing-in-U.S.-infrastructure-bri ef-082223.pdf

   a. This report presents a model and roadmap for a geographically-targeted, phased approach to heavy-duty charging infrastructure buildout, showing that the charging needs of those vehicles (in volumes even higher than associated with the Phase 3 proposal) can be met feasibly and cost-effectively.

We urge the Agency to consider these materials and include them in the record for this rulemaking. [EPA-HQ-OAR-2022-0829-5087]

Organization: Environmental Defense Fund (EDF)

Environmental Defense Fund (EDF) respectfully submits the attached report, "U.S. Electric Vehicle Manufacturing Investments and Jobs: Characterizing the Impacts of the Inflation Reduction Act after 12 Months," as supplemental comments on EPA's Proposed Rule, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29184 (May 5, 2023), and on EPA's Proposed Rule, Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles, 88 Fed. Reg. 25926 (April 27, 2023). The attached analysis, released by EDF and WSP in August 2023, focuses on the impacts of the Inflation Reduction Act in dramatically accelerating U.S. investments in EV manufacturing and job growth.

The analysis finds:

- Investments in the EV manufacturing ecosystem over the last eight years total more than $165 billion with 56% of that investment occurring since the passage of the IRA.
- These investments support 179,000 direct jobs and are expected to create more than 800,000 additional jobs in the broader economy.
- By 2026, U.S. manufacturing facilities will be able to make 4.7 million new EVs annually (36% of new vehicles sold last year) and by 2027, enough batteries to supply 12.1 million new passenger vehicles (95% of new vehicles sold last year).

[Two PowerPoint attachments:

- U.S. Electric Vehicle Manufacturing Investments and Jobs Characterizing the Impacts of the Inflation Reduction Act after 1 Year August 2023

- EDF Meeting on EPA's Proposed Multipollutant Standards for New Light-, Medium-, and Heavy-Duty Vehicles, August 23, 2023]

[EPA-HQ-OAR-2022-0829-5084]

Organization: Environmental Defense Fund (EDF)

Environmental Defense Fund submits the following information for inclusion in the docket for EPA's Proposed Rule, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29184 (May 5, 2023).

On Friday, October 20, the Colorado Air Quality Control Commission voted unanimously to adopt the Advanced Clean Car II (ACCII) standards – second-generation safeguards that will expand sales of new zero-emitting cars and passenger trucks in Colorado. The standards will be implemented beginning in 2027 and run through 2032. During that time, the standards will require increasing sales of new zero-emitting vehicles and will strengthen protections against emissions from internal combustion engine vehicles. Under the new standards, 82% of new passenger vehicles sold in Colorado will be zero-emission in 2032.

The Colorado Air Quality Control Commission also voted to require a state agency to bring a proposal no later than July 31, 2029 for the Commission to consider extending the standards through 2035. Colorado joins eight other states that have now adopted the Advanced Clean Car II standards – California, Maryland, Vermont, Washington, Oregon, Massachusetts, Virginia, and New York – and becomes the first state in the Mountain West to adopt them. New Mexico and Connecticut are among the states now considering adopting the standards.

The standards will expand consumer choice in the state, furthering current trends. Colorado saw a 55% increase in electric vehicle sales between 2021 and 2022. New data released by the Colorado Automobile Dealers Association shows that the YTD market share of electric vehicles (BEV + PHEV) in the state is 14.5%, up from 10.1% this time last year, and a record 17.1% of total vehicle purchases were electric the last full quarter of 2023. [EPA-HQ-OAR-2022-0829-5116]

Organization: Environmental Defense Fund (EDF)

We wanted to share an analysis EDF did on alternative pathways OEMs could use to comply with the LD proposed standards using a low level of or no BEVs. We have also submitted this document to the docket.

The analysis finds that EPA's proposed LD standards can be met with zero BEVs and still result in significant net benefits ($770B-$900B). The analysis also looks at compliance pathways with low-BEV baselines ranging from 7% (roughly today's BEV sales) to 40% (EPA's No Action Case BEV sales in 2032). We find no additional BEVs are needed to comply with the standards and these compliance pathways result in significant net benefits. [EPA-HQ-OAR-2022-0829-5118]

[Attached study:]

Environmental Defense Fund (EDF) respectfully submits supplemental comments on EPA's Proposed Rule, *Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles*, 88 Fed. Reg. 29184 (May 5, 2023) ("Proposal" or "Proposed Standards"). Since the close of the comment period, EDF evaluated additional alternative technology pathways for manufacturers to meet the Proposed Standards. Our analysis reinforces and expands on findings submitted in our earlier comments and concludes that there are numerous additional pathways that are technologically feasible and cost beneficial even in counterfactual scenarios of very low and no baseline deployment of battery electric vehicles (BEVs). The analysis underscores the technology neutrality of the standards and further demonstrates that there is no single technology necessary to meet the standards (though certainly not a requirement for standards established under section 202 of the Clean Air Act).

EPA has long established performance-based light-duty vehicle greenhouse gas standards that allow manufacturers to comply with a range of emissions-improving technologies. The Proposed Standards are no exception – they are performance-based and can be met using a range of internal combustion engine vehicle (ICEV) improvements and/or electrification technologies.

In our comments submitted on July 5, 2023, EDF evaluated 3 pathways – in addition to those that EPA modeled – to demonstrate that EPA's proposed standards can be met with a range of technologies, including battery BEVs, plug-in hybrid electric vehicles (PHEVs) and ICEV improvements.[1] EDF contracted with Roush to project the relative cost of PHEVs and BEVs in the 2024-2035 timeframe.[2] EDF then used Roush's cost projections for PHEVs in conjunction with EPA's costs for BEVs and ICEVs to conduct an analysis of compliance costs under possible scenarios in which PHEV and ICEV sales represent a greater proportional share of manufacturers' sales than EPA modeled while still meeting the emissions targets set in EPA's Proposal. The original alternative pathways EDF modeled included:

- Pathway 1 (ICEV Pathway): assumed the greatest possible GHG control from ICEVs using EPA's OMEGA 2 model; assumed no PHEV technologies
- Pathway 2: set PHEV and BEV sales to roughly equivalent levels leaving ICEV emissions at the level projected in EPA's compliance simulation of its Proposed Standards
- Pathway 3: held ICEV sales at the level found in Pathway 2; increased PHEV sales further than Pathway 2 by maximizing ICEV emission controls as in Pathway 1

1 Comments of the Environmental Defense Fund, EPA-HQ-OAR-2022-0829-0786, https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0829-0786.

2 Vishnu Nair, Himanshu Saxena, Sajit Pillai, Alternative Powertrain Pathways for Light-Duty and Class 3 Vehicles for MYs 2024, 2027, and 2035 to Meet Future CO2 Emission Targets, Roush for EDF (June 2023).

Each of these pathways provided a viable example of compliance pathways automakers could choose to take—one relatively more reliant on ICEVs, one more so on PHEV controls and the third on both—all of which demonstrating the flexibility afforded manufacturers to cost-effectively reduce emissions using a mix of technologies with lesser reliance on BEV sales than was shown in EPA's cost-minimizing modeling.

Since our original analysis and comment submission, some stakeholders have asserted or implied that the Proposed Standards could not be met without significant BEV sales.3 EDF has performed a follow-up detailed analysis, set forth below, assessing additional pathways to compliance through fuller reliance on PHEVs, hybrids, and ICE efficiency improvements with zero to moderate levels of battery electric vehicles (BEVs). Our analysis concludes that EPA's proposed standards can be met with varying levels of technology and that no particular technology is required – in whole or in part – to meet the fleet-average standards. This is true even in exceedingly unrealistic low- and no-BEV baseline scenarios. Our analysis also finds that even a zero-BEV pathway would result in significant net benefits, and as BEV sales increase so do the net benefits.

3 See, e.g., Comments of the Alliance for Automotive Innovation at i-ii, EPA-HQ-OAR-2022-0829-0701, https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0829-0701; Comments of the Kentucky Office of the Attorney General et al. at 4, EPA-HQ-OAR-2022-0829-0649, https://www.regulations.gov/comment/EPA-HQ- OAR-2022-0829-0649; Comments of Valero Energy Corporation at 65, EPA-HQ-OAR-2022-0829-0451, https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0829-0707.

Analysis: Feasibility of low- to zero-BEV pathways

This analysis investigates manufacturers' ability to comply with EPA's standards with fewer BEVs compared to EPA projections or even no BEVs at all, substituting further ICEV emissions control and PHEVs compared to our previous pathways analysis. Starting with four different levels of BEV sales, we evaluate the PHEV sales required to comply with the standards under two levels of ICEV emissions control—a MY2022 average level of control as estimated by the National Highway Traffic Safety Administration (NHTSA) in its recent proposed rule,[4] and an advanced level of emissions control for a vehicle powered entirely by gasoline. This analysis included calculations for two model years, MY2027 and MY2032. The different levels of BEVs included are 0% BEVs, 7% BEVs - roughly the share of BEV sales in the US today, 17% BEVs – EPA's projection in the final rulemaking for its MY 2023-2026 standards, and finally the level of BEV sales projected under the current EPA Proposal No Action Case, 27% in 2027 and 40% in 2032. In all the scenarios presented below, no additional BEVs are deployed beyond the above-stated baseline sales levels.

[4] Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027–2032 and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030–2035, 88 Fed. Reg. 56128 (August 17, 2023).

MY2022 ICEV Technology Scenario:

The MY2022 ICEV control scenario reflects the ICEV performance of the current fleet. In its modeling for the Proposal, EPA projected that minimal ICEV improvement would occur and compliance with vehicle emission standards would be mostly achieved using BEVs. As a result, MY2022 ICEVs are consistent with all the ICEVs used in EPA's modeling for MY2027 through MY2032. For reasons described below, we decided to use the level of MY2022 vehicle emissions as estimated by NHTSA and obtained from the CAFE Compliance and Effects Model (CCEM) used in NHTSA's recent proposed rule.[5] Over half of these vehicles had advanced engines (turbocharged, with cylinder deactivation, or high compression ratio). Nearly half had transmissions with more than 8 speeds or continuously variable. Just under 7% and 2% were strong hybrids or PHEVs.

[5] We did not use EPA's OMEGA 2 model to estimate the emission impact of advanced ICEV emission control technology because the OMEGA 2 model does not include P2 strong hybrid technology.

Advanced ICEV Technology Scenario:

We also evaluated an advanced level of emission reductions available from ICEV technologies, which includes nearly complete conversion to strong hybrid technology and is also taken from a CCEM run. EDF conducted a run of CCEM in which BEV and PHEV technologies were strictly limited resulting in all ICEV emission control technology available in the model being applied, converting 94% of ICEV sales to strong hybrids. The use of the CCEM to estimate the benefit of ICEV technology necessitated the use of 2022 MY emissions from the CCEM to maintain technical consistency. These strong hybrids include advanced engines, high or continuously variable transmissions and additional weight reduction in glider mass. Fleetwide, the application of all ICEV technologies present in CCEM has a significant impact on emission reductions, reducing carbon dioxide (CO_2) emissions for passenger cars by 30% and light trucks by 28% compared to MY 2022 ICEV control levels. Together, the two ICEV control scenarios are intended to bookend the realistic and feasible emissions from ICEVs in the near term.

Methodology and Assumptions

In this analysis we assume PHEVs to have an onroad range of 50 miles. Per EPA's Proposal, PHEV50s have a utility factor of 0.68.[6] PHEVs also must have a minimum range over the two-cycle test of 70 miles (equivalent to an onroad range of 50 miles) to qualify as ZEVs under California's Advanced Clean Cars II program. Therefore, we assumed that a manufacturer intending to comply with EPA's proposed standards using PHEVs would aim for an onroad range of roughly 50 miles.[7] PHEV50s are assumed to have the same CO2 emissions as an ICEV with advanced emissions control technology when they are operating on gasoline.

[6] Fed. Reg. 88 at 29441 (May 5, 2023), Tables 1 and 2.

[7] Even those PHEVs sold outside of California and the states that have adopted California's ACC2 program.

We separate new vehicle sales into their two regulatory classes - cars and light trucks - and apply ICEV technology and conversion to PHEV and BEV technology proportionately to both vehicle classes.[8] In this portion of our analysis, we focus on compliance with EPA's standards in MYs 2027 and 2032, the first and last model years covered under the Proposed Rule.

[8] While EPA allows unrestricted trading of CO2 credits from one category to the other, their emissions need to be tracked separately due to differences in assumed lifetime mileages.

Manufacturer sales projections for MY 2027 and 2032 are available from both EPA's and NHTSA's modeling supporting their respective proposed rules. We use EPA's sales projections for each manufacturer's total sales of cars and light trucks to maintain consistency with the focus on compliance with EPA's emission standards.

Manufacturer-specific compliance with EPA's proposed CO_2 standards is accomplished with a spreadsheet model. Neither OMEGA 2 nor the CAFE model are designed to allow the user to specify the mix of technology to be applied as an input to the model. This model is very accurate in projecting compliance in MY 2032 with a BEV-heavy strategy.[9]

[9] The model indicates that BEV sales in 2032, assuming 2022 ICEV technology, would need to be 66%. EPA, using OMEGA 2, projected BEV sales of 67% to meet the proposed standards with 1% strong hybrid sales (i.e., ICEV emissions essentially consistent with the 2022 ICEV fleet).

Results

The first two tables below show the level of PHEV sales in 2027 that would be required to meet EPA's proposed standards given various levels of assumed BEV baseline penetration and the two ICEV technology scenarios described above (2022 ICEV technology and advanced ICEV control). Table 1 assumes ICEVs with 2022-levels of emission control technology, while Table 2 assumes advanced application of technology to ICEVs, including strong hybridization.

Our analysis shows that there are many feasible pathways to compliance and no particular technology is required to meet the standards. Column one in both tables shows that meeting the proposed standards in 2027 with baseline BEV sales at 0% would require the incremental sale of 36% to 61% PHEVs on a fleetwide basis, depending on the level of ICEV control technology applied. At a 7% BEVs baseline sales rate, only a quarter to a half of all sales would need to be PHEVs to meet the proposed 2027 vehicle standards. And assuming BEV sales of 17%, manufacturers could meet the proposed 2027 vehicle standards with PHEV sales of 11-39%.

Finally, our analysis shows that if BEV sales reach 27% in 2027, then manufacturers would only need to sell 3% PHEVs if they choose to adopt advanced control technology on all ICEVs and a quarter PHEVs if they do not. We recognize that 0% and 7% baseline ZEV sales are either counterfactual (0%) or overly pessimistic (7%) given the current rate of ZEV sales and their upwards trend. In our earlier comments to EPA, EDF included an analysis that indicates EPA's projection of high BEV adoption over the next decade is justified and likely an underestimate greatly lessening the likelihood that any of the low-BEV scenarios would occur.[10] We have nonetheless included them to demonstrate that the same conclusions that no additional BEV sales are required to meet the standards hold under the full range of possible assumptions regarding baseline ZEV deployment, including for lower assumed baseline levels that are not reasonably likely to occur.

[10] See supra fn 1.

Table 1: PHEV Sales Enabling Compliance with EPA's 2027 Emission Standards at Four Baseline Levels of BEV Sales and 2022 ICEV Technology

	MY 2022 ICEV Technology			
	0% BEVs	7% BEVs	17% BEVs	27% BEVs
Fleet	61%	52%	39%	26%
BMW	67%	58%	45%	32%
Mercedes-Benz	67%	58%	45%	32%
Stellantis	68%	59%	47%	34%
Ford	63%	54%	41%	28%
GM	64%	55%	42%	29%

Honda	57%	48%	34%	21%
Hyundai	52%	43%	30%	17%
Kia	57%	48%	36%	23%
JLR	69%	60%	47%	34%
Mazda	56%	47%	35%	22%
Mitsubishi	56%	48%	35%	23%
Nissan	56%	47%	34%	22%
Subaru	57%	49%	36%	23%
Toyota	56%	47%	34%	21%
Volvo	62%	53%	40%	27%
VWA	65%	56%	43%	30%

Table 2: PHEV Sales Enabling Compliance with EPA's 2027 Emission Standards at Four Baseline Levels of BEV Sales and Advanced ICEV technology				
	Advanced ICEV Technology			
	0% BEVs	7% BEVs	17% BEVs	27% BEVs
Fleet	36%	26%	11%	3%
BMW	49%	38%	24%	9%
Mercedes-Benz	53%	42%	28%	13%
Stellantis	46%	35%	21%	6%
Ford	42%	32%	17%	2%
GM	46%	35%	21%	6%
Honda	33%	23%	8%	0%
Hyundai	23%	13%	0%	0%
Kia	27%	17%	2%	0%
JLR	52%	41%	27%	12%
Mazda	24%	14%	0%	0%
Mitsubishi	16%	5%	0%	0%
Nissan	26%	16%	1%	0%
Subaru	24%	14%	0%	0%
Toyota	26%	16%	1%	0%
Volvo	38%	28%	13%	0%
VWA	42%	32%	17%	2%

Tables 3 and 4 below show the level of PHEV sales that would be required to meet EPA's proposed standards in 2032 at varying levels of baseline BEV sales and ICEV technology adoption. The tables show that on average, manufacturers could meet the proposed 2032 standards by selling zero BEVs if they instead sell somewhere between 86% and 91% PHEVs, depending on the degree of ICEV control technology. Alternatively, if just 7% of sales are BEVs in 2032 (roughly today's current rate of BEV sales), PHEV sales could drop to 76% if advanced ICEV technology is used (Table 4) or 82% if 2022 ICEV technology is assumed (Table 3). And assuming BEV sales of 40%, in line with EPA's "No Action" projections for 2030-2032,[11] fleet average PHEV sales could be as low as 28% to 40% in 2032. As above, we underscore that the zero and seven percent BEV baselines are unrealistic; we include them to demonstrate the robustness of our conclusions.

[11] The BEV sales under the No Action Case are 40% in 2030 and 2031 and 39% in 2032. 88 Fed. Reg. 29184 (May 5, 2023) Table 81.

Table 3: PHEV Sales Enabling Compliance with EPA's 2032 Emission Standards at Four Baseline Levels of BEV Sales and 2022 ICEV Technology

	MY 2022 ICEV Technology			
	0% BEVs	7% BEVs	17% BEVs	40% BEVs
Fleet	91%	82%	69%	40%
BMW	96%	86%	73%	43%
Mercedes-Benz	97%	87%	74%	44%
Stellantis	95%	86%	73%	44%
Ford	94%	85%	72%	42%
GM	95%	86%	73%	43%
Honda	90%	81%	68%	38%
Hyundai	87%	78%	65%	36%
Kia	89%	80%	67%	38%
JLR	98%	89%	76%	46%
Mazda	88%	79%	67%	38%
Mitsubishi	87%	78%	65%	37%
Nissan	89%	80%	67%	38%
Subaru	88%	79%	67%	38%
Toyota	89%	809%	67%	37%
Volvo	92%	83%	70%	41%
VWA	93%	85%	72%	42%

Table 4: PHEV Sales Enabling Compliance with EPA's 2032 Emission Standards at Four Baseline Levels of BEV Sales and Advanced ICEV Technology				
	Advanced ICEV Technology			
	0% BEVs	7% BEVs	17% BEVs	40% BEVs
Fleet	86%	76%	61%	28%
BMW	93%	83%	68%	34%
Mercedes-Benz	95%	85%	70%	36%
Stellantis	91%	81%	66%	32%
Ford	91%	809%	66%	32%
GM	92%	82%	67%	34%
Honda	85%	74%	60%	26%
Hyundai	80%	69%	55%	21%
Kia	81%	71%	56%	22%
JLR	96%	86%	71%	38%
Mazda	80%	709%	55%	21%
Mitsubishi	74%	64%	49%	15%
Nissan	81%	71%	56%	22%
Subaru	79%	68%	54%	20%
Toyota	81%	71%	56%	22%
Volvo	88%	77%	63%	29%
VWA	89%	79%	64%	30%

Analysis: Costs and benefits of low- to zero-BEV pathways

In addition to evaluating the feasibility of meeting EPA's Proposed Standards through different technology pathways, we estimated the net benefits of compliance for the lowest (0% BEV sales) and highest (40% BEV sales in 2032) BEV scenarios presented above. As shown in Table 7 below, all of the alternative scenarios evaluated are projected to produce significant net benefits compared to a No Action scenario, with net benefits ranging from $767 billion to $1.4 trillion.

Methodology

To estimate net benefits, we assessed the differences in the cost of compliance technology, adjusting the No Action scenario to be consistent with the compliance strategy to which it was being compared. Vehicle technology is the largest cost associated with the Proposal. The largest savings or benefits, in order of magnitude, are from reduced fuel costs, health and climate change impacts, and reduced maintenance and repair costs.

Alternative Scenarios for No Action Case and Proposal

To estimate net benefits, EDF evaluated the costs and benefits of EPA's Proposal in three alternative compliance scenarios with corresponding No Action cases. The scenarios are summarized in Table 5 below. We considered the two Proposal scenarios with the lowest and highest levels of ZEVs described above and shown in Table 4. In the Zero-BEV sales scenario we assess the net benefits of compliance with the Proposal using higher sales of PHEVs and ICEVs with advanced emissions control technology (Scenario 2). In the 40% BEV sales scenario we assess the net benefits where BEV sales are 40%, and the remaining sales are a combination of PHEVs and ICEVs with advanced technology (Scenarios 3 and 4).

Table 5: Alternative Scenarios Evaluated

	Scenario	No Action Case				Proposal			
		BEV	PHEV	MY2022 ICEV	Adv. ICEV Tech	BEV	PHEV	MY2022 ICEV	Adv.ICEV Tech
1	EPA Proposal	40%	0%	60%	0%	67%	0%	33%	0%
2	Zero BEV	0%	33%	67%	0%	0%	86%	0%	14%
3	No Incremental BEVs	40%	0%	60%	0%	40%	28%	0%	32%
4	Proportional BEVs	16%	11%	73%	0%	40%	28%	0%	32%

For Scenarios 2, 3 and 4 we assumed different starting points (No Action Case) from that assumed by EPA (line 1of Table 5). We assume that a manufacturer would use a similar strategy to comply with the current standards under the No Action case as with the Proposed Standards. For example, as shown in row 1 of Table 5, EPA projected that manufacturer's will use BEVs to comply with both the current standards and the Proposed standards, in their evaluation of the Proposal's costs and benefits. Consistent with this approach, in our Zero-BEV scenario as shown in row 2 of Table 5, in which we assume manufacturers use only PHEVs and ICEVs to comply with the Proposal, EDF also assumes that these manufacturers will use only PHEVs and ICEVs to comply with the current standards.[12]

[12] For the purposes of evaluating the net benefits of the zero-BEV compliance pathway, we use a zero-BEV reference case as well, though extremely unlikely given current BEV sales, and though the 40% BEV scenario uses a different reference case.

For the 40% BEV scenarios (rows 3 and 4 in Table 5), we used two separate No Action cases for comparison. These two cases allow for an evaluation of the net benefits of compliance with the Proposed Standards following manufacturers' compliance with the current standards using two possible fleet mixes. In the "No Incremental BEVs" scenario at row 3 of Table 5, we assume the same No Action case that EPA used for the Proposal, with the Proposal leading to increased sales of PHEVs and improved ICEVs. In the "Proportional BEVs" scenario at row 4, we assume that manufacturers would sell a mix of BEVs and PHEVs under the No Action case in a similar ratio to that projected for the Proposal.

Calculation of Costs and Benefits

To calculate the costs and benefits of these alternative pathways EDF started with EPA's Proposal and No Action Case costs and benefits to account for the differences. The primary driver of the differences in benefits from these alternative compliance pathways is the change in vehicle costs due to the different fleet technology mix.

Emission Benefits

Both tailpipe CO_2 emissions and fuel costs are the same whether PHEVs and cleaner ICEVs or BEVs are used to comply with the GHG standards.[13][14] We assumed that criteria pollutant emissions under the Zero-BEV scenario are also the same as under EPA's Proposal. This is a conservative assumption as a higher use of PHEVs will result in lower overall criteria pollutant emissions.[15]

[13] While all the scenarios modeled use the same amount of gasoline, scenarios with a higher level of strong hybrids or PHEVs use slightly less electricity than a scenario of all BEVs and conventional ICEVs like the ones EPA projected. This means the assumption that the alternative compliance scenarios modeled here have the same level of emission reductions is conservative since they will have lower EGU emissions.

[14] This analysis used a discount rate of 3%. OMB recently released a revised version of Circular A-4 which lowers the recommended discount rate to be used by agencies in the cost benefit analyses. If this analysis used the new values, the benefits would likely be higher. Circular No. A-4, Office of Management and Budget, November 9, 2023. https://www.whitehouse.gov/wp- content/uploads/2023/11/CircularA-4.pdf.

[15] EPA's current non-methane organic gases plus nitrogen oxides (NMOG+NOx) emission standards do not adjust PHEV emissions through use of the utility factor. One result of this is PHEVs must have the same emission control technology as ICEVs. This is consistent with Roush's approach to estimating the cost of a PHEV, which includes the same aftertreatment system costs for PHEVs as ICEVs. Thus, any PHEV travel using electricity will reduce NMOG+NOx emissions relative to those resulting from a BEV strategy to GHG compliance.

Maintenance Costs

We also assume that maintenance costs would be the same under all the alternative scenarios evaluated in this analysis as EPA's Proposal. While smaller than climate and health-related benefits and fuel savings, maintenance cost savings are a significant factor in the estimation of the net benefits of the Proposal. EPA estimates that PHEVs will have lower maintenance costs than ICEVs (and higher costs than BEVs), but not to the degree indicated by the utility factor. At the same time, EPA projected roughly the same maintenance cost savings for strong hybrids as PHEVs, and very few strong hybrids were projected to be sold in EPA's modeling of the No Action and proposed standards cases. Thus, our assumption may overestimate maintenance cost savings assuming ICEVs remain at 2022 emission levels, but both over- and underestimate maintenance cost savings assuming advanced technology ICEVs. However, any overestimation of maintenance savings in the former case would be much smaller than the value of reduced NMOG+NOx emissions resulting from a fleet consisting mostly of PHEVs.

Vehicle Costs

The average cost of MY2022 ICEVs and BEVs were taken directly from EPA's analysis supporting the Proposal. We then developed incremental costs of 1) a PHEV50 over a BEV300 and 2) of an ICEV with all of the available technology applied over the cost of a MY 2022 ICEV.

EPA does not include PHEV costs in its modeling for the Proposal. To determine reasonable PHEV50 cost estimates to use in conjunction with EPA's BEV cost estimates, we adjusted Roush's PHEV50 costs to match the ratio of PHEV50 to BEV300 costs projected by Roush. [16] Roush projected that PHEV50s would cost $4,800 to $8,100 more than BEV300s across 5 vehicle classes in MYs 2027 and 2032 with fleet average costs of $5,700 and $7,400, respectively, in MYs 2027 and 2032.[17] Adjusting Roush's incremental PHEV costs (relative to BEVs) to match EPA's methodology reduces the incremental PHEV costs by 30%, to $4,000 in 2027 and $5,200 in 2032. [18]

[16] Vishnu Nair, Himanshu Saxena, Sajit Pillai, Alternative Powertrain Pathways for Light-Duty and Class 3 Vehicles for MYs 2024, 2027, and 2035 to Meet Future CO2 Emission Targets, Roush for EDF (June 2023).

[17] This is using vehicle segment sales from EPA's OMEGA 2 modeling for the Proposal.

[18] We adjusted Roush's incremental costs for PHEV50s to harmonize with EPA's BEV cost estimates. EPA's and Roush's accounting for engine, transmission and aftertreatment removal with full electrification are similar, so no adjustment was necessary. However, EPA's battery capacities for BEV300s[18] are 23% larger than Roush's estimates.[18] We increased Roush's projected battery capacities for both PHEV50s and BEV300s by 23% to match EPA's methodology. And while EPA and Roush battery direct manufacturing costs for BEVs are comparable, EPA applies a 1.5 RPE factor to BEVs, while Roush applies a factor of 1.2 in 2027 and beyond to the entire electric powertrain. Similarly, we adjusted Roush's battery RPEs for both PHEV50s and BEVs to reflect EPA's RPE factor of 1.5. There was no need to do this for non-battery powertrain costs, as these are essentially the same for both BEVs and PHEVs. Both adjustments reduce the incremental cost of PHEV50s over BEVs. Combining these two

factors, the PHEV50 battery savings are 54% higher using EPA's battery capacities and battery RPEs than originally projected by Roush.

We obtained the incremental cost of a vehicle with advanced ICEV emission control technology from the CAFE model.[19] The incremental ICEV cost of a MY 2032 vehicle with all available ICEV technology applied was $1,267 above average MY 2022 costs.

[19] This used the same run used to estimate the emission benefits of the advanced application of ICEV technology described above. Specifically, we modelled a scenario beyond NHTSA's proposal without allowing any ZEV technologies to be used to ensure that all available ICEV technology was applied.

We then combined these costs for the four vehicle technologies into a single fleetwide cost for the No Action and Proposal scenarios for each of the alternative pathways being evaluated here.

The average incremental vehicle costs (on a fleetwide basis) of the four scenarios are shown in Table 6. These fleetwide estimates were developed from the incremental costs for each of the four vehicle types described above: 1) 2022 ICEVs, 2) advanced ICEV technology, 3) PHEV50s, and 4) BEV300s.

Table 6: Average Incremental Vehicle Costs

	Scenario	Incremental Vehicle Costs
1	EPA Proposal	$1,200
2	Zero BEV	$3,200
3	No Incremental BEVs	$2,900
4	Proportional BEVs	$2,600

As shown in Table 6, a greater reliance on PHEV sales increases the fleetwide cost of complying with the Proposal. The average fleetwide cost is highest under the Zero BEV scenario, as the increase in PHEV sales is 55 percentage points. It is lowest under the Proportional BEV scenario as the increase in PHEV sales is only 16 percentage points.

No Action Case Costs and Benefits

While EPA projected a significant degree of over-compliance in its modeling of the No Action scenario,[20] the Zero-BEV and Proportional BEV No Action cases are assumed to strictly comply with the MY2026 vehicle standards. To account for this, EDF developed a second set of costs and benefits for the case where manufacturers strictly complied with the current MY 2026 standards, the binding regulations under EPA's No Action scenario for the Proposed Standards.[21]

[20] This is due to the expected favorable economics of BEVs leading to more BEV sales than required for manufacturers to comply with the current regulations.

[21] We did this by reducing the number of BEVs sold in EPA's No Action scenario to the level where manufacturers just complied with the standards. Sales of ICEVs were increased accordingly. As EPA's OMEGA 2 model provides outputs for BEVs and ICEVs separately, all outputs were adjusted to reflect the increase or decrease in vehicle sales. This resulting set of OMEGA 2 outputs was then input to EPA's OMEGA 2 Effects Model to develop an alternative set of costs and benefits for the Proposal where manufacturers just complied with the current standards. The net benefits from this analysis could then serve as the basis for estimating the net benefits of the Zero BEV and Proportional BEV scenarios shown in Table 6. The net benefits of the Proposal relative to the "just complying" No Action scenario from calendar year (CY) 2027-2055 are about $150 billion higher than EPA's estimates, as the costs and benefits of some of the BEVs sold under EPA's No Action scenario now contribute to the incremental costs and benefits of the Proposal.

Net Benefit Results

Table 7 shows the estimated net benefits of EPA's proposed standards for MY 2027 and beyond under different compliance pathways. As described above, we assume that manufacturers that intend to comply with the proposed standards using PHEVs would already be deploying PHEVs to comply with the current standards.

Table 7: Net Benefits of EPA's Proposed Emission Standards from CY 2027-2055, Discounted at 3%/year to 2027, Per EPA Methodology ($ Billion)

	Scenario	Net Benefits
1	EPA Proposal	$1,400-$1,600
2	Zero BEV	$770-$900
3	No Incremental BEVs	$970-$1,100
4	Proportional BEVs	$1,300-$1,400

As shown in Table 7, all of the alternative scenarios evaluated here are projected to produce significant levels of net benefits relative to their No Action scenarios. The net benefits of the Proportional BEV scenario are the highest of the three alternative scenarios. They approach those of EPA's Proposal due to the fact that sales of both BEVs and PHEVs increase between the No Action and Proposal scenarios. The net benefits are the lowest for the No BEV scenario due to its reliance on PHEV sales, though they are still very substantial. The net benefits of the No Incremental BEV sales fall in between those of the other two alternative scenarios.

Conclusion

Our follow-up detailed analysis assessing additional pathways to compliance through fuller reliance on PHEVs, hybrids, and ICE efficiency improvements and less reliance on BEVs concludes that EPA's proposed standards can be met with varying levels of technology and no particular technology is required – in whole or in part – to meet the fleet-average standards.

Our analysis also finds that even a zero-BEV pathway would result in significant net benefits of more than $770 billion and as BEV sales increase so do the net benefits. This analysis reinforces the performance-based nature of EPA's Proposed Standards and the technology flexibility manufacturers have toward compliance. [EPA-HQ-OAR-2022-0829-5118]

Organization: Environmental Defense Fund (EDF)

Please add the attached document to the Greenhouse Gas Emissions Standards for Heavy-Duty Engines and Vehicles- Phase 3 (EPA-HQ-OAR-2022-0985) and Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (EPA-HQ-OAR-2022-0829) dockets. [EPA-HQ-OAR-2022-0829-5119]

[Attached study:]

U.S. Electric Vehicle Battery Manufacturing on Track to Meet Demand

The announced U.S. electric vehicle (EV) battery production capacity is more than on track to meet the projected demand for EV batteries that may occur under the Environmental Protection Agency's (EPA) proposed emission standards for light- medium- and heavy-duty vehicles with $92 billion of investment in batteries announced in the U.S.[i] Over 1,000 gigawatt hours (GWh) per year of U.S. battery production capacity has already been announced to come online by 2028 – enough to meet all of EPA's projected demand in 2030 and 85% of the projected demand in 2032.

[i] EPA's standards are technology neutral: vehicle manufacturers can use any combination of technologies they choose to reduce emissions from their vehicles. Likely the most cost-effective pathway is using ZEVs, as EPA modeled in its proposed rules.

Projected Demand for EV Batteries from EPA Proposed Standards

EDF used the EPA's projections for EV adoption and associated battery demand through 2030.[ii] Roughly 90% of the potential EV battery demand is from light-duty (passenger) vehicles. Potential demand for batteries in medium-duty vehicles (large pickup trucks and vans) and heavy-duty vehicles (delivery trucks, step vans, semi-trucks, buses, etc.) is much smaller.

[ii] Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29184 (May 5, 2023); Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, 88 Fed. Reg. 25926 (April 27, 2023).

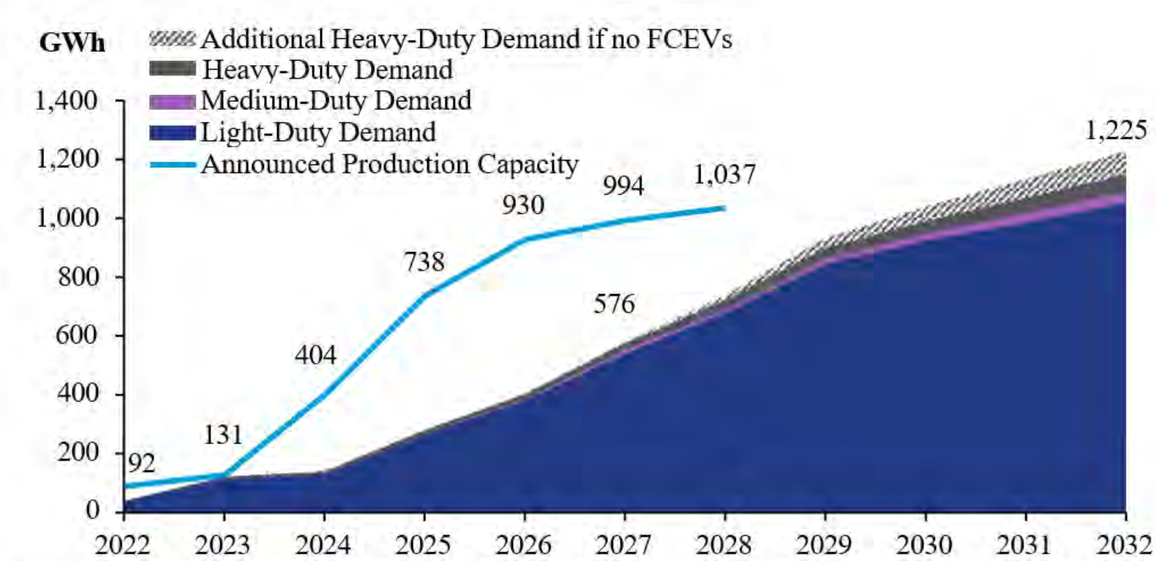

Figure 1: Projected U.S. EV Battery Demand and Announced Battery Production Capacity (2022-2032)

Figure 1 shows EPA projected battery demand by segment:

- Light-duty: 539 GWh per year in 2027 growing to 1,053 GWh per year by 2032.
- Medium-duty: 13 GWh per year in 2027 and only 38 GWh per year in 2032.
- Heavy-duty: 23 GWh per year in 2027 growing to between 59 GWh to 134 GWh per year in 2032, depending on whether heavy-duty EV adoption is met with a combination of fuel cell electric vehicles (FCEVs) and battery electric vehicles (BEVs) or solely BEVs (which would require more batteries). The additional batteries for an all-BEV compliance with EPA's heavy-duty proposal are labeled as "Additional Heavy-Duty Demand if no FCEVs".

Combined, U.S. EV battery demand is projected to be 576 GWh per year in 2027 and 1,151 GWh – 1,225 GWh per year in 2032. Even if heavy-duty EV battery demand increased twofold, overall battery demand would only increase to 1,359 GWh in 2032.

Announced Battery Manufacturing Capacity in the U.S.

As shown by the blue line in Figure 1, based solely on announced EV battery manufacturing plants, the U.S. will have an estimated capacity of 1,037 GWh per year by 2028, consistent with projections made by other sources.iii This includes 45 battery manufacturing facilities with an average production capacity of 23 GWh per year. Table 1 shows states with the most announced battery production capacity. To estimate the nation's battery manufacturing capacity, EDF used publicly announced battery manufacturing plant information, including total monetary investment, battery capacity, and production start date.

[iii] A DOE estimate from January 2023 found 1,000 GWh of announced battery capacity expected to come online by 2030. https://www.energy.gov/eere/vehicles/articles/fotw-1271-january-2-2023-electric-vehicle-battery-manufacturing-capacity Tech Crunch in August 2023 estimated 1,200 GWh per year of battery

capacity by 2030. https://techcrunch.com/2023/08/16/tracking-the-ev-battery-factory-construction-boom-across-north-america/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAACQ3fpohOwikg9 1T2WLv1r2F04jRtHJDtRVn8x0POx4Nz9XSKaYfKo6VDeVTY9Qgtb2X1MT1iiNwW2Zsoi8Owel0pZeKtL- M6tKgad7jbJsInS3C6TGxfX9gTHeWX7ZbKQtH5gHEk79lt0NqGsUzWt73wa0_Vb7Xw2ulgzY15X22 In July 2023, Digi Times Asia estimated the announced battery capacity for 2030 was 900 GWh per year. https://www.digitimes.com/news/a20230726VL202/us-battery-electric-vehicle-meet-the-analyst.html

Table 1: States with Highest Announced Battery Manufacturing

State	Number of Facilities	Battery Production (GWh)
Michigan	6	140
Georgia	5	136
Tennessee	3	128
Kentucky	4	119
Indiana	3	97
Ohio	2	75
South Carolina	5	67
Arizona	4	56
California	1	54
Illinois	1	40
Other	11	125
Total	45	1,037

The announced capacity for battery production outpaces EPA's projected demand through 2028, the last year for which any of the concrete current announcements project production will begin. Shifting consumer demand together with tax credits and incentives in the Inflation Reduction Act provide a strong case for battery manufacturers to build EV batteries in the U.S.

Even if construction delays shift production, there would still be enough battery supply. The average time between announcement and expected start of production for the battery facilities is 2.7 years, indicating that many of the facilities that would come online in 2027 and beyond have not yet been announced.

Plants Provide Capacity for Passenger EVs and Commercial EVs

As shown in Figure 1, EPA projects that roughly 90% of projected battery demand will power light-duty BEVs. While the relative demand for heavy-duty batteries is small, it will likely grow as demand for heavy- duty EVs grows. A recent announcement by Cummins, Daimler and PACCAR to build a joint battery plant in the U.S. indicates that heavy-duty manufacturers are already moving to supply this market.[iv]

[iv] *Accelera by Cummins, Daimler Truck, and PACCAR form a joint venture to advance battery cell production in the United States*, Cummins Newsroom, (September 6, 2023), https://www.cummins.com/news/releases/2023/09/06/accelera-cummins- daimler-truck-and-paccar-form-joint-venture-advance.

There can also be significant sharing of vehicle batteries and components across light- and heavy-duty EVs, including cell modules.[v] For example, Tesla uses the same batteries for its electric semi-truck and Model Y passenger car.[vi] And many of the same battery chemistries are being used and explored for both vehicle segments, including Nickel Manganese Cobalt Oxide (NMC) and Lithium-Iron Phosphate (LFP).[vii] [viii]

v Vishnu Nair et al., Medium and Heavy-Duty Electrification Costs for MY 2027- 2030, Roush for EDF, (February 2, 2022), https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2022/02/EDF-MDHD-Electrification-v1.6_20220209.pdf.

vi Mark Kane, New Photo Reveals Resla Semi's Massive Battery System, (January 25, 2023), https://insideevs.com/news/633133/photo-tesla-semi-battery-system/.

vii Nair et al., Medium and Heavy-Duty Electrification Costs for MY 2027- 2030.

viii A Million-Mile Battery From China Could Power Your Electric Car, Bloomberg News, (June 7, 2020), https://www.bloomberg.com/news/articles/2020-06-07/a-million-mile-battery-from-china-could-power-your-electric-car

Methodology

EPA's OMEGA2 model tracks fleetwide battery usage by model year. EDF used EPA's OMEGA2 model outputs for the light- and medium-duty runs for the proposed rule, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, to quantify the projected battery need. We summed the battery pack size for each vehicle by EPA's projected sales for a given year for all years between 2022 and 2032.

For the proposed heavy-duty rule, Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3, EPA used the HD TRUCS model to project EV adoption, including number of vehicles and size of battery packs. EPA modeled two years, 2027 and 2032. EPA also included two types of EVs – battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs). EDF multiplied the projected BEV adoption in 2027 and 2032 (in percentage terms) for each of the 101 vehicle categories in HD TRUCS by the annual sales and estimated battery pack size. HD TRUCS includes 2019 sales. To project HDV sales in later years, EDF assumed a 0.8% compound annual growth rate consistent with AEO2023.ix Heavy-duty battery demand in 2022 was assumed to be 10% of the demand in 2027. The battery demand was linearly interpolated for the years between 2022, 2027 and 2032.

[ix] U.S. Energy Information Administration's Annual Energy Outlook 2023, Table 49. Freight Transportation Energy Use, (March 2023), https://www.eia.gov/outlooks/aeo/supplement/excel/suptab_49.xlsx.

To account for a more conservative scenario in which the projected heavy-duty EV adoption might be met with all BEVs instead of a mix of BEVs and FCEVs as EPA projects, we calculated the battery demand if adoption projections are met entirely with BEVs. The largest group of vehicles projected to be FCEVs are sleeper cab tractors. EPA projects sleeper cab tractors would have very large battery packs, if BEVs were the chosen compliance path versus FCEVs, with the largest being more than 2 MWh per vehicle. EDF believes that EPA overestimates the battery pack size needed for many heavy- duty vehicles as explained in more detail in our comments,x but for purposes of this analysis, we used the EPA projected battery pack sizes. Assuming all heavy-duty EVs are BEVs results in the same 2027 battery demand because EPA does not project any FCEVs to be deployed then. Heavy-duty battery demand increases in 2030 to 90 GWh per year as a result of more BEVs, doubling EPA's projected demand for heavy-duty vehicles with BEVs and FCEVs of 45 GWh. This additional battery demand is labeled as "Additional Heavy-Duty Demand if no FCEVs" in Figure 1.

[x] Comments of the Environmental Defense Fund, EPA-HQ-OAR-2022-0985-1644, https://www.regulations.gov/comment/EPA- HQ-OAR-2022-0985-1644.

To determine the announced U.S. battery manufacturing capacity, EDF updated a previous analysis performed by WSP in August 2023 for EDF.xi EDF confirmed all plants produced batteries and not battery components to ensure no double counting. In cases where plans had changed for battery plants and the timelines for production were uncertain, the battery facilities were removed from the list. Some of the facilities like the North Carolina Toyota plant have announced investments ($13.9B) that would likely support much more battery production than they have announced (30GWh). Due to the conservative measures we took, this is likely an underestimate of the battery production capacity from already announced plants.

[xi] U.S. Electric Vehicle Manufacturing Investments and Jobs: Characterizing the Impacts of the Inflation Reduction Act after 1 Year, WSP for EDF, (August 2023), https://www.edf.org/sites/default/files/2023-08/EDF%20WSP%20EV%20report%208-16- 23%20FINAL%20FINAL.pdf.

[EPA-HQ-OAR-2022-0829-5119]

Organization: Hyundai Motor America

Hyundai Motor America ("Hyundai") would like to provide supplemental comments to those submitted on July 5, 2023, for the U.S. Environmental Protection Agency's ("EPA") notice of proposed rulemaking entitled, "Multi-Pollutant Emission Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." There are two specific areas that we wish to supplementally comment on: (1) Slowing EV Sales Rate and (2) Community Energy Savings Credit. These comments were not included in our previous letter because they are based on recent activity.

1. Slowing EV Sales Rate

A slowdown in EV Sales across the industry has been making headlines recently. Hyundai echoes these concerns. Our comment letter, submitted July 5, 2023, provides a balanced solution that allows EPA to regulate at levels it deems appropriate today while acknowledging that the unprecedented push to EVs hinges on the materialization of key enablers in just six short model years from now. The solution: A newly created Federal Advisory Committee (FAC) that would be charged with assessing, in the 2029-2030 calendar years, key enablers such as but not limited to the state of market demand, EV infrastructure development, and grid resiliency against the final rule's assumptions. The FAC is authorized to activate proportional EV multipliers as a regulatory cure for model years 2029-2032 if it finds there is a shortfall in the assumptions for key enablers supporting the rule's stringency and EV-equivalent penetration rates. Please see pages 8 and 9 of Attachment 1.

2. Community Energy Savings Credit

This is regarding our proposed incentive program for automakers who increase the volume of plug-in electric vehicles ("PEV") into disadvantaged communities. This concept was refined in response to the National Highway Traffic Safety Administration's ("NHTSA") notice of proposed rulemaking entitled, "Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027–2032."1 Specifically, we narrowed its scope and made it easier to implement while still yielding noteworthy fuel economy improvements and emissions reductions particularly among America's equity communities. Please see pages 6-7 and the last page of Attachment 2.

1 88 Fed. Reg. 56,371-56,374 (Aug. 17, 2023)

We appreciate EPA's thoughtful consideration of these supplemental comments and would be more than happy to discuss further. [EPA-HQ-OAR-2022-0829-5102; 2 attachments]

Organization: Toyota Motor North America, Inc. (submits 2 additional studies)

Toyota Motor North America, Inc. (Toyota) appreciates the opportunity to provide supplemental comments on the above-referenced Notice of Proposed Rulemaking (NPRM). We are submitting to the docket the recent correction to the Plötz et al (2021) paper, "From lab-to-road: real-world fuel consumption and CO_2 emissions of plug-in hybrid electric vehicles" (2021 Environ. Res. Lett. 16 054078).

As the only peer reviewed paper referenced in the NPRM in support of the proposed revisions to the SAE J2841 Utility Factor Curves, we believe it is incumbent upon EPA to incorporate the published corrections in their analysis of the Final Rule. See, e.g., Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983) ("[T]he agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made.") (internal quotation marks omitted).

The corrigendum notes that there were errors in the original conventional fuel consumption (FC) measures based on EPA's data, which now have been substituted with EPA label (window sticker) values. The resulting correction brings the Plötz work in line with the Toyota/Hamza et al (2022) paper, "On inferred real-world fuel consumption of past decade plug-in hybrid electric vehicles in the US." (2022 Environ. Res. Lett. 17 104053); suggesting strong correlation between real world data and the existing SAE J2841 Utility Factor Curves.

This important correction provides additional rationale in support of Toyota's July 5, 2023 comments that EPA should maintain SAE J2841 for determining utility factor curves for PHEVs. [EPA-HQ-OAR-2022-0829-5100]

EPA Summary and Response

AESI et al., a group of 29 organizations, commented in support of strong standards to control particulate matter (PM) emissions from light- and medium-duty vehicles. These commenters discussed the public health needs for further PM emissions control, the benefits of emissions standards, and the feasibility and availability of gasoline particulate filter technology in being effective in controlling tailpipe emissions. EPA appreciates these additional comments, and we are finalizing the proposed PM standards, with an extension of the phase-in to provide manufacturers with additional lead time. Section 4.1.3 addresses comments on the PM standard.

The Alliance for Automotive Innovation (Alliance) expressed concerns with the availability of adequate critical mineral supplies to support the market share of EVs under the proposed standards, given global demand for such materials. The Alliance submitted additional analysis from Benchmark Minerals Intelligence (BMI) on lithium supplies in the context of automaker production goals and global regulatory policies. EPA addresses comments related to critical minerals are addressed in Section 15.

The American Free Enterprise Chamber of Commerce (AmFree) provided comments regarding EPA's estimated per-vehicle costs in the proposed rule. EPA has responded to comment on our cost analysis, which has been updated since the proposal in consideration of comments and based on the best available information in the public record. Our final analysis includes several possible pathways toward compliance including pathways that rely on varying combinations of ICE, HEV, PHEV and BEVs (see Sections IV.F and G of the preamble to this final rule). We believe that manufacturers could choose to meet these multiple potential technology pathways at costs that are reasonable. Also see further responses to comments regarding our technology cost estimates in Section 12.2.7.

Center for Biological Diversity et al provided two additional studies for the record. One study, by EPRI, relates to aiding utilities efficiently plan investment to prepare the electric grid for expanded deployment of EV charging infrastructure. We discuss electric grid impacts further in Section 18. The second report is related to phasing in charging infrastructure and focuses on the heavy-duty vehicle sector. While heavy-duty infrastructure issues are out of scope for this rule, we have also included the CBD et al comment in the heavy-duty GHG rulemaking docket (EPA-HQ-OAR-2022-0985-2672).

EDF provided a follow-up detailed analysis, in which it assessed additional pathways to compliance through fuller reliance on PHEVs, hybrids, and ICE efficiency improvements with zero to moderate levels of battery electric vehicles (BEVs). EDF's analysis concluded that the proposed standards could be met with varying levels of technology and that no particular technology would be required (in whole or in part) to meet the fleet-average standards. EDF noted that this finding was true even in what it considered exceedingly unrealistic low- and no-BEV baseline scenarios. EDF further found that even a no-BEV pathway would result in significant net benefits, and as BEV sales increase so do the net benefits. EDF also shared additional information on state adoption of clean vehicle programs. EPA appreciates the additional information provided by EDF. We note that EDF's analysis of alternative pathways supports EPA's analysis that there is a wide range of feasible technology pathways for auto manufacturers to choose in complying with the standards, including pathways that rely to varying degrees of ICE, HEV, PHEV and BEVs, including pathways that include low levels or even no additional BEVs beyond those in the marketplace today, or beyond the No Action case.

Hyundai provided information on EV sales rates and community energy savings credits. Hyundai expressed concern with what they view as a slowing of EV sales in recent months, and put forward a suggestion to create a Federal Advisory Committee that would be charged with assessing, in the 2029-2030 calendar years, key enablers such as but not limited to the state of market demand, EV infrastructure development, and grid resiliency against the final rule's assumptions. As discussed further in Sections 3.4 and 28, EPA is not finalizing any form of a midterm evaluation or provisions for formally monitoring development of market demand, infrastructure or other factors. The Administrator has the authority to initiate a new rulemaking if he or she finds that there is an appropriate need without establishing these provisions. Hyundai also suggests an incentive program for automakers who increase the volume of PEVs into disadvantaged communities. EPA does not believe that further incentive credits are appropriate under the final standards, and because we neither proposed nor sought comment on such an approach we consider it out of scope.

Toyota submitted additional information regarding the PHEV utility factor. Specifically, Toyota submitted a correction to a published paper that EPA had referenced in the NPRM. EPA has considered the corrections to this paper in our final analysis of the PHEV UF, as further discussed in Section 3.1.6.

Appendix A: Other comments received, not reproduced verbatim in RTC text

This appendix contains a list of comments that are general in nature and do not require detailed EPA response beyond provided elsewhere in this document, and/or contain opinions or statements about issues that are raised without reasonable specificity. There are about 4,300 individual comments that fall into this category. The commenters are listed in Table A-3, below.

EPA Summary and Response:

Summary:

We characterize the nature of each of the comments not reproduced verbatim elsewhere in this document by classifying their statements along eight dimensions (one comment may contain statements on more than one dimension). The topics are as follows:

- General Support
- Want more stringent
- Oppose
- Environmental and/or health concerns
- Environmental Justice concerns
- Business and/or cost concerns
- Infrastructure and/or resource availability, supply chain concerns
- Incentives Available (IRA, BIL)

As shown in Table A-1, of the 4,300 unique non-detailed comments, 17.8% did not include a codable statement one of these 8 topics. Most of the comments included statements on 2 or 3 topics.

Table A-1: Number of Topics Raised in Other Comments Received, Not Reproduced Verbatim in RTC Text

No. Issues Raised	% of Commenters
0	17.8%
1	26.0%
2	33.5%
3	17.4%
4	4.1%
5	1.1%
6	0.1%
Total	100.0%

Table A-2 sets out the general themes raised in these comments. It should be noted that aside from the categories of "general support," "want more stringent," or "oppose," the coding does not distinguish between positive and negative comments on a particular theme. So, for example, comments on business and costs cover both those comments expecting decreased costs and those expecting increased costs. The purpose of the analysis is not to tally the comments per se, but rather to form an impression of the themes these commenters are most concerned about.

Table A-2: Themes Raised in Other Comments Received, Not Reproduced Verbatim in RTC Text

Theme	% of Comments Raising Theme
General support	0.7%
Want more stringent	7.5%
Oppose	25.0%
Environmental, Health	19.8%
Environmental Justice	1.9%
Business, Costs	27.1%
Infrastructure, Supply Chain	16.1%
Incentive Availability	2.0%
Total	100.0%

Response:

As noted above, these comments are general in nature and do not require detailed EPA response beyond provided elsewhere in this document, and/or contain opinions or statements that are raised without reasonable specificity. EPA's responses included throughout this RtC document address each of the general topics raised in these comments.

Table A-3: List of Comments Not Reproduced Verbatim in RtC

Index	Docket No.	Commenter Name
1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
2	EPA-HQ-OAR-2022-0829-1371	A Davis
3	EPA-HQ-OAR-2022-0829-4881	A. F. Montealegre
4	EPA-HQ-OAR-2022-0829-4374	Aaron Brown
5	EPA-HQ-OAR-2022-0829-2484	Aaron Dougherty
6	EPA-HQ-OAR-2022-0829-1728	Aaron White
7	EPA-HQ-OAR-2022-0829-1060	Abbas Alkaabi
8	EPA-HQ-OAR-2022-0829-3929	Abby Brown
9	EPA-HQ-OAR-2022-0829-4291	Abigail Smith
10	EPA-HQ-OAR-2022-0829-4886	Ada Blankenship
11	EPA-HQ-OAR-2022-0829-3682	Adam Callaghan
12	EPA-HQ-OAR-2022-0829-1406	Adam Dubicki
13	EPA-HQ-OAR-2022-0829-2153	Adam Moore
14	EPA-HQ-OAR-2022-0829-0855	Addie Green
15	EPA-HQ-OAR-2022-0829-4064	Adi Gundimeda
16	EPA-HQ-OAR-2022-0829-1678	Adin Benson
17	EPA-HQ-OAR-2022-0829-0606	Adrian Dominican Sisters, et al.
18	EPA-HQ-OAR-2022-0829-3472	Adrian Moeller
19	EPA-HQ-OAR-2022-0829-0856	Adrian Osorio
20	EPA-HQ-OAR-2022-0829-3292	Adrienne Sarkisian
21	EPA-HQ-OAR-2022-0829-0684	Advanced Engine Systems Institute (AESI)
22	EPA-HQ-OAR-2022-0829-0690	Advancing American Freedom
23	EPA-HQ-OAR-2022-0829-2060	Aggie Per
24	EPA-HQ-OAR-2022-0829-3259	Agnes Ann Bouwense
25	EPA-HQ-OAR-2022-0829-4855	Agnes Puzak
26	EPA-HQ-OAR-2022-0829-3107	Aileen Curfman
27	EPA-HQ-OAR-2022-0829-3856	Aimee Henry
28	EPA-HQ-OAR-2022-0829-3200	Al King

Index	Docket No.	Commenter Name
1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
29	EPA-HQ-OAR-2022-0829-4490	Al Moffitt
30	EPA-HQ-OAR-2022-0829-1563	Al Rakel
31	EPA-HQ-OAR-2022-0829-2485	Al Romano
32	EPA-HQ-OAR-2022-0829-3289	Alaina Peterson
33	EPA-HQ-OAR-2022-0829-3497	Alan Beck
34	EPA-HQ-OAR-2022-0829-2755	Alan Davis
35	EPA-HQ-OAR-2022-0829-4950	Alan Fraize
36	EPA-HQ-OAR-2022-0829-1163	Alan Hood
37	EPA-HQ-OAR-2022-0829-4200	Alan Horton
38	EPA-HQ-OAR-2022-0829-4279	Alan Numbers
39	EPA-HQ-OAR-2022-0829-2181	Alan Pravel
40	EPA-HQ-OAR-2022-0829-1310	Alan Reckner
41	EPA-HQ-OAR-2022-0829-4523	Alan Redman
42	EPA-HQ-OAR-2022-0829-4160	Alan Sayler
43	EPA-HQ-OAR-2022-0829-3426	Alan Smith
44	EPA-HQ-OAR-2022-0829-2894	Alan Solomon
45	EPA-HQ-OAR-2022-0829-2554	Alan Teague
46	EPA-HQ-OAR-2022-0829-3318	Alan Wadja
47	EPA-HQ-OAR-2022-0829-1642	Alathea LeBrun
48	EPA-HQ-OAR-2022-0829-5022	Albert Adcock
49	EPA-HQ-OAR-2022-0829-4082	Albert Caissie
50	EPA-HQ-OAR-2022-0829-3837	Albert Downer
51	EPA-HQ-OAR-2022-0829-0881	Albert Harraman
52	EPA-HQ-OAR-2022-0829-1938	Albert Harraman
53	EPA-HQ-OAR-2022-0829-3031	Albert Juergens
54	EPA-HQ-OAR-2022-0829-1679	Albert Kranz
55	EPA-HQ-OAR-2022-0829-1524	Albert Moody

Index	Docket No.	Commenter Name
1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
56	EPA-HQ-OAR-2022-0829-3521	Albin Slusarz
57	EPA-HQ-OAR-2022-0829-2377	Alden Hale
58	EPA-HQ-OAR-2022-0829-3783	Alex Kalfayan
59	EPA-HQ-OAR-2022-0829-1833	Alexa Cox
60	EPA-HQ-OAR-2022-0829-3311	Alexander Alperstein
61	EPA-HQ-OAR-2022-0829-2934	Alexander J Duschere
62	EPA-HQ-OAR-2022-0829-1085	Alexandra Matyja
63	EPA-HQ-OAR-2022-0829-1117	Alexandria McLaughlin
64	EPA-HQ-OAR-2022-0829-3201	alfred petersen
65	EPA-HQ-OAR-2022-0829-4955	alfred petersen
66	EPA-HQ-OAR-2022-0829-2968	Algin Bradford
67	EPA-HQ-OAR-2022-0829-4678	Ali Boraby
68	EPA-HQ-OAR-2022-0829-3319	Alice Freund
69	EPA-HQ-OAR-2022-0829-5025	Alice Gossy
70	EPA-HQ-OAR-2022-0829-2280	Alice Kyburg
71	EPA-HQ-OAR-2022-0829-3256	Alice Landolt
72	EPA-HQ-OAR-2022-0829-4488	Alice Lowrey
73	EPA-HQ-OAR-2022-0829-4284	Alice Markey
74	EPA-HQ-OAR-2022-0829-0897	Alicia Adams
75	EPA-HQ-OAR-2022-0829-2877	Alicia Schubert
76	EPA-HQ-OAR-2022-0829-4642	Alida Lumpkins
77	EPA-HQ-OAR-2022-0829-3298	Allan Overton
78	EPA-HQ-OAR-2022-0829-4671	Allan Prahl
79	EPA-HQ-OAR-2022-0829-0972	Allen Godin
80	EPA-HQ-OAR-2022-0829-4910	Allen Godin
81	EPA-HQ-OAR-2022-0829-2031	Allen LeBoeuf
82	EPA-HQ-OAR-2022-0829-0731	Alliance of Nurses for Healthy Environments et al.
83	EPA-HQ-OAR-2022-0829-4170	Allison Riley

Index	Docket No.	Commenter Name
1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
84	EPA-HQ-OAR-2022-0829-4417	Alvin Davis
85	EPA-HQ-OAR-2022-0829-4786	Alvin Davis
86	EPA-HQ-OAR-2022-0829-1989	Alvin Lappinga
87	EPA-HQ-OAR-2022-0829-4645	Alvin Ratliffe
88	EPA-HQ-OAR-2022-0829-3177	Alysha Edelman
89	EPA-HQ-OAR-2022-0829-4957	Alyson Rummler
90	EPA-HQ-OAR-2022-0829-1007	Alyson Shepherd
91	EPA-HQ-OAR-2022-0829-0443	Amadeus Guy
92	EPA-HQ-OAR-2022-0829-4922	Amanda Schmidt
93	EPA-HQ-OAR-2022-0829-3168	Amber Arbogast
94	EPA-HQ-OAR-2022-0829-0892	Amber LeCoq
95	EPA-HQ-OAR-2022-0829-4494	Amelia Norman
96	EPA-HQ-OAR-2022-0829-1682	Americas Podcast
97	EPA-HQ-OAR-2022-0829-3353	Amy Cummings-Leight
98	EPA-HQ-OAR-2022-0829-2410	Amy Dodds
99	EPA-HQ-OAR-2022-0829-3413	Amy Dodds
100	EPA-HQ-OAR-2022-0829-4882	Amy Dodds
101	EPA-HQ-OAR-2022-0829-4034	Amy Harlib
102	EPA-HQ-OAR-2022-0829-1853	Amy Parker
103	EPA-HQ-OAR-2022-0829-4410	Ana Juarbe
104	EPA-HQ-OAR-2022-0829-1479	Andre Swinson
105	EPA-HQ-OAR-2022-0829-1558	Andrea Barth
106	EPA-HQ-OAR-2022-0829-2832	Andrea Bugbee
107	EPA-HQ-OAR-2022-0829-3668	Andrea Houk
108	EPA-HQ-OAR-2022-0829-3850	Andrea Hutto
109	EPA-HQ-OAR-2022-0829-2725	Andrea LechVanDyke
110	EPA-HQ-OAR-2022-0829-1492	Andrea Robinson
111	EPA-HQ-OAR-2022-0829-1239	Andrea Tobias

Index	Docket No.	Commenter Name
1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
112	EPA-HQ-OAR-2022-0829-1120	Andreas Haggenmacher
113	EPA-HQ-OAR-2022-0829-2878	Andrew Ashburn
114	EPA-HQ-OAR-2022-0829-4851	Andrew Calcagno
115	EPA-HQ-OAR-2022-0829-2820	Andrew Carey
116	EPA-HQ-OAR-2022-0829-4258	Andrew Francis
117	EPA-HQ-OAR-2022-0829-1676	Andrew Jacobs
118	EPA-HQ-OAR-2022-0829-1523	Andrew McIver
119	EPA-HQ-OAR-2022-0829-2496	Andrew Meverden
120	EPA-HQ-OAR-2022-0829-1376	Andrew Prince
121	EPA-HQ-OAR-2022-0829-3791	Andrew Riehl
122	EPA-HQ-OAR-2022-0829-3765	Andrew Schultz
123	EPA-HQ-OAR-2022-0829-2760	Andrew Shannon
124	EPA-HQ-OAR-2022-0829-1139	Andy Eidson
125	EPA-HQ-OAR-2022-0829-2946	Andy Gresham
126	EPA-HQ-OAR-2022-0829-2939	Andy Jobman
127	EPA-HQ-OAR-2022-0829-4509	Andy Ruby
128	EPA-HQ-OAR-2022-0829-2583	Andy Willis
129	EPA-HQ-OAR-2022-0829-0837	Angela Callaghan
130	EPA-HQ-OAR-2022-0829-1910	Angela Giboney
131	EPA-HQ-OAR-2022-0829-2428	Angela Jarrett
132	EPA-HQ-OAR-2022-0829-2083	Angela McClendon
133	EPA-HQ-OAR-2022-0829-1503	Angela Meadors Smith
134	EPA-HQ-OAR-2022-0829-1375	Angela Navarrete
135	EPA-HQ-OAR-2022-0829-4021	Angela Navarrete
136	EPA-HQ-OAR-2022-0829-3370	Angela Toghia
137	EPA-HQ-OAR-2022-0829-3077	Angelo Zappulla
138	EPA-HQ-OAR-2022-0829-3957	Angelo Zappulla
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142	EPA-HQ-OAR-2022-0829-0817	Ann Clack
143	EPA-HQ-OAR-2022-0829-2668	Ann Cox
144	EPA-HQ-OAR-2022-0829-4100	Ann Englehart
145	EPA-HQ-OAR-2022-0829-1488	Ann Gabel
146	EPA-HQ-OAR-2022-0829-0433	Ann Garbett
147	EPA-HQ-OAR-2022-0829-4894	Ann Hassinger
148	EPA-HQ-OAR-2022-0829-4948	Ann Marks
149	EPA-HQ-OAR-2022-0829-4138	Ann Outka
150	EPA-HQ-OAR-2022-0829-2195	Ann Scott
151	EPA-HQ-OAR-2022-0829-3099	Ann Wakeman
152	EPA-HQ-OAR-2022-0829-1067	Anna Pierce
153	EPA-HQ-OAR-2022-0829-4660	Anne Anastasio
154	EPA-HQ-OAR-2022-0829-0456	Anne Bordonaro
155	EPA-HQ-OAR-2022-0829-4005	Anne Doherty
156	EPA-HQ-OAR-2022-0829-4131	Anne Laker
157	EPA-HQ-OAR-2022-0829-2761	Anne Laurance
158	EPA-HQ-OAR-2022-0829-1640	Anne Marcum
159	EPA-HQ-OAR-2022-0829-1773	Anne Marcum
160	EPA-HQ-OAR-2022-0829-3220	Anne Marcum
161	EPA-HQ-OAR-2022-0829-2134	Anne Moss
162	EPA-HQ-OAR-2022-0829-5068	Anne Randolph
163	EPA-HQ-OAR-2022-0829-4570	Anne Reiser
164	EPA-HQ-OAR-2022-0829-3359	Anne-Marie Oliver
165	EPA-HQ-OAR-2022-0829-1620	Annette Bennett
166	EPA-HQ-OAR-2022-0829-2910	Annie Capestany
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170	EPA-HQ-OAR-2022-0829-0430	Anonymous public comment
171	EPA-HQ-OAR-2022-0829-0434	Anonymous public comment
172	EPA-HQ-OAR-2022-0829-0796	Anonymous public comment
173	EPA-HQ-OAR-2022-0829-0799	Anonymous public comment
174	EPA-HQ-OAR-2022-0829-0800	Anonymous public comment
175	EPA-HQ-OAR-2022-0829-0802	Anonymous public comment
176	EPA-HQ-OAR-2022-0829-0809	Anonymous public comment
177	EPA-HQ-OAR-2022-0829-0851	Anonymous public comment
178	EPA-HQ-OAR-2022-0829-0875	Anonymous public comment
179	EPA-HQ-OAR-2022-0829-0876	Anonymous public comment
180	EPA-HQ-OAR-2022-0829-0877	Anonymous public comment
181	EPA-HQ-OAR-2022-0829-0883	Anonymous public comment
182	EPA-HQ-OAR-2022-0829-0894	Anonymous public comment
183	EPA-HQ-OAR-2022-0829-0895	Anonymous public comment
184	EPA-HQ-OAR-2022-0829-0896	Anonymous public comment
185	EPA-HQ-OAR-2022-0829-0906	Anonymous public comment
186	EPA-HQ-OAR-2022-0829-0907	Anonymous public comment
187	EPA-HQ-OAR-2022-0829-0914	Anonymous public comment
188	EPA-HQ-OAR-2022-0829-1053	Anonymous public comment
189	EPA-HQ-OAR-2022-0829-1141	Anonymous public comment
190	EPA-HQ-OAR-2022-0829-1161	Anonymous public comment
191	EPA-HQ-OAR-2022-0829-1164	Anonymous public comment
192	EPA-HQ-OAR-2022-0829-1169	Anonymous public comment
193	EPA-HQ-OAR-2022-0829-1170	Anonymous public comment
194	EPA-HQ-OAR-2022-0829-1171	Anonymous public comment
195	EPA-HQ-OAR-2022-0829-1172	Anonymous public comment

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198	EPA-HQ-OAR-2022-0829-1176	Anonymous public comment
199	EPA-HQ-OAR-2022-0829-1179	Anonymous public comment
200	EPA-HQ-OAR-2022-0829-1186	Anonymous public comment
201	EPA-HQ-OAR-2022-0829-1233	Anonymous public comment
202	EPA-HQ-OAR-2022-0829-1237	Anonymous public comment
203	EPA-HQ-OAR-2022-0829-1238	Anonymous public comment
204	EPA-HQ-OAR-2022-0829-1245	Anonymous public comment
205	EPA-HQ-OAR-2022-0829-1246	Anonymous public comment
206	EPA-HQ-OAR-2022-0829-1251	Anonymous public comment
207	EPA-HQ-OAR-2022-0829-1252	Anonymous public comment
208	EPA-HQ-OAR-2022-0829-1255	Anonymous public comment
209	EPA-HQ-OAR-2022-0829-1260	Anonymous public comment
210	EPA-HQ-OAR-2022-0829-1261	Anonymous public comment
211	EPA-HQ-OAR-2022-0829-1264	Anonymous public comment
212	EPA-HQ-OAR-2022-0829-1270	Anonymous public comment
213	EPA-HQ-OAR-2022-0829-1272	Anonymous public comment
214	EPA-HQ-OAR-2022-0829-1275	Anonymous public comment
215	EPA-HQ-OAR-2022-0829-1283	Anonymous public comment
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219	EPA-HQ-OAR-2022-0829-1409	Anonymous public comment
220	EPA-HQ-OAR-2022-0829-1412	Anonymous public comment
221	EPA-HQ-OAR-2022-0829-1517	Anonymous public comment
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223	EPA-HQ-OAR-2022-0829-1526	Anonymous public comment

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226	EPA-HQ-OAR-2022-0829-1543	Anonymous public comment
227	EPA-HQ-OAR-2022-0829-1545	Anonymous public comment
228	EPA-HQ-OAR-2022-0829-1546	Anonymous public comment
229	EPA-HQ-OAR-2022-0829-1552	Anonymous public comment
230	EPA-HQ-OAR-2022-0829-1553	Anonymous public comment
231	EPA-HQ-OAR-2022-0829-1672	Anonymous public comment
232	EPA-HQ-OAR-2022-0829-1741	Anonymous public comment
233	EPA-HQ-OAR-2022-0829-1786	Anonymous public comment
234	EPA-HQ-OAR-2022-0829-2045	Anonymous public comment
235	EPA-HQ-OAR-2022-0829-2150	Anonymous public comment
236	EPA-HQ-OAR-2022-0829-2151	Anonymous public comment
237	EPA-HQ-OAR-2022-0829-2204	Anonymous public comment
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247	EPA-HQ-OAR-2022-0829-2604	Anonymous public comment
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254	EPA-HQ-OAR-2022-0829-3161	Anonymous public comment
255	EPA-HQ-OAR-2022-0829-3215	Anonymous public comment
256	EPA-HQ-OAR-2022-0829-3281	Anonymous public comment
257	EPA-HQ-OAR-2022-0829-3476	Anonymous public comment
258	EPA-HQ-OAR-2022-0829-4056	Anonymous public comment
259	EPA-HQ-OAR-2022-0829-4107	Anonymous public comment
260	EPA-HQ-OAR-2022-0829-4243	Anonymous public comment
261	EPA-HQ-OAR-2022-0829-4387	Anonymous public comment
262	EPA-HQ-OAR-2022-0829-4545	Anonymous public comment
263	EPA-HQ-OAR-2022-0829-4650	Anonymous public comment
264	EPA-HQ-OAR-2022-0829-4679	Anonymous public comment
265	EPA-HQ-OAR-2022-0829-4690	Anonymous public comment
266	EPA-HQ-OAR-2022-0829-4930	Anonymous public comment
267	EPA-HQ-OAR-2022-0829-4934	Anonymous public comment
268	EPA-HQ-OAR-2022-0829-4960	Anonymous public comment
269	EPA-HQ-OAR-2022-0829-4965	Anonymous public comment
270	EPA-HQ-OAR-2022-0829-4969	Anonymous public comment
271	EPA-HQ-OAR-2022-0829-4971	Anonymous public comment
272	EPA-HQ-OAR-2022-0829-4972	Anonymous public comment
273	EPA-HQ-OAR-2022-0829-1132	Anthony Catalina
274	EPA-HQ-OAR-2022-0829-2571	Anthony Magnavito
275	EPA-HQ-OAR-2022-0829-3481	Anthony Pini
276	EPA-HQ-OAR-2022-0829-3920	April Crandall
277	EPA-HQ-OAR-2022-0829-1646	April Purvis
278	EPA-HQ-OAR-2022-0829-4749	Archibald Allison
279	EPA-HQ-OAR-2022-0829-2267	Ardie McCaslin

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282	EPA-HQ-OAR-2022-0829-2203	Arlene Pearson
283	EPA-HQ-OAR-2022-0829-3416	Arlene Wohlgemuth
284	EPA-HQ-OAR-2022-0829-3974	Armand Ciabattari
285	EPA-HQ-OAR-2022-0829-3121	Arne Johanson
286	EPA-HQ-OAR-2022-0829-1001	Arne Skaalure
287	EPA-HQ-OAR-2022-0829-4394	Arne Skaalure
288	EPA-HQ-OAR-2022-0829-4843	Art Bunting
289	EPA-HQ-OAR-2022-0829-2855	Art Hanson
290	EPA-HQ-OAR-2022-0829-4984	Art Hanson
291	EPA-HQ-OAR-2022-0829-1661	Arthur Arseneau
292	EPA-HQ-OAR-2022-0829-3056	Arthur Gales
293	EPA-HQ-OAR-2022-0829-4687	Arthur Gales
294	EPA-HQ-OAR-2022-0829-4207	Arthur Larson
295	EPA-HQ-OAR-2022-0829-1181	Arthur Ohare
296	EPA-HQ-OAR-2022-0829-1991	Arthur Parker Jr.
297	EPA-HQ-OAR-2022-0829-4038	Arza Patterson
298	EPA-HQ-OAR-2022-0829-1981	Ashlea Young
299	EPA-HQ-OAR-2022-0829-4846	Ashley Deal
300	EPA-HQ-OAR-2022-0829-3512	Audrey Sailer
301	EPA-HQ-OAR-2022-0829-0868	Austen Miller
302	EPA-HQ-OAR-2022-0829-3340	Austin Bell
303	EPA-HQ-OAR-2022-0829-3853	Austin Erdahl
304	EPA-HQ-OAR-2022-0829-4925	Austin Lawrenz
305	EPA-HQ-OAR-2022-0829-2230	Austin Pick
306	EPA-HQ-OAR-2022-0829-1183	Avarose Winner
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310	EPA-HQ-OAR-2022-0829-3861	Babs Wilkinson
311	EPA-HQ-OAR-2022-0829-1108	Barbara Bennigson
312	EPA-HQ-OAR-2022-0829-2351	Barbara Brainerd
313	EPA-HQ-OAR-2022-0829-3405	Barbara Brainerd
314	EPA-HQ-OAR-2022-0829-2436	Barbara Canter
315	EPA-HQ-OAR-2022-0829-1379	Barbara Cole
316	EPA-HQ-OAR-2022-0829-2649	Barbara Cole
317	EPA-HQ-OAR-2022-0829-1348	Barbara Croyle
318	EPA-HQ-OAR-2022-0829-1593	Barbara D. Martin
319	EPA-HQ-OAR-2022-0829-3268	Barbara D. Martin
320	EPA-HQ-OAR-2022-0829-2763	Barbara Gaffield
321	EPA-HQ-OAR-2022-0829-4988	Barbara Harney
322	EPA-HQ-OAR-2022-0829-1125	Barbara Heintz
323	EPA-HQ-OAR-2022-0829-4311	Barbara Heller
324	EPA-HQ-OAR-2022-0829-1744	Barbara Hellman
325	EPA-HQ-OAR-2022-0829-2980	Barbara Hickman
326	EPA-HQ-OAR-2022-0829-1988	Barbara Kludt
327	EPA-HQ-OAR-2022-0829-1152	Barbara La Mort
328	EPA-HQ-OAR-2022-0829-0968	Barbara Matz
329	EPA-HQ-OAR-2022-0829-4257	Barbara Matz
330	EPA-HQ-OAR-2022-0829-4327	Barbara Matz
331	EPA-HQ-OAR-2022-0829-4986	Barbara McNeely
332	EPA-HQ-OAR-2022-0829-3293	Barbara Peters
333	EPA-HQ-OAR-2022-0829-0997	Barbara Sharron
334	EPA-HQ-OAR-2022-0829-3374	Barbara Thompson
335	EPA-HQ-OAR-2022-0829-3887	Barbara Thompson

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338	EPA-HQ-OAR-2022-0829-4267	Barrett Koller
339	EPA-HQ-OAR-2022-0829-2254	Barry Carlson
340	EPA-HQ-OAR-2022-0829-2601	Barry Fass-Holmes
341	EPA-HQ-OAR-2022-0829-3926	Barry Franklin
342	EPA-HQ-OAR-2022-0829-2606	Barry Henderson
343	EPA-HQ-OAR-2022-0829-3495	Barry Ingalls
344	EPA-HQ-OAR-2022-0829-1573	Barry Meade
345	EPA-HQ-OAR-2022-0829-4295	Barry Miksch
346	EPA-HQ-OAR-2022-0829-1759	Barry Rava
347	EPA-HQ-OAR-2022-0829-1945	Barry Thistlethwaite
348	EPA-HQ-OAR-2022-0829-0529	Bart Bartleson
349	EPA-HQ-OAR-2022-0829-4250	Bea Smith
350	EPA-HQ-OAR-2022-0829-2025	Beatrice Elsamahy
351	EPA-HQ-OAR-2022-0829-4762	Becky Anderson
352	EPA-HQ-OAR-2022-0829-3636	Becky Pirente
353	EPA-HQ-OAR-2022-0829-4648	Bella Croton
354	EPA-HQ-OAR-2022-0829-4462	Ben Bosher
355	EPA-HQ-OAR-2022-0829-4974	Ben Bridge
356	EPA-HQ-OAR-2022-0829-4892	Ben Lieberman
357	EPA-HQ-OAR-2022-0829-1033	Ben Nottingham
358	EPA-HQ-OAR-2022-0829-3198	Benedetta Galzin
359	EPA-HQ-OAR-2022-0829-1059	Benjamin Edwards
360	EPA-HQ-OAR-2022-0829-3544	Benjamin Kinney
361	EPA-HQ-OAR-2022-0829-3227	Benjamin Park
362	EPA-HQ-OAR-2022-0829-3609	Benjamin Wright
363	EPA-HQ-OAR-2022-0829-4379	Benny Masdon

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366	EPA-HQ-OAR-2022-0829-2544	Bernadette Hsing
367	EPA-HQ-OAR-2022-0829-1154	Bernadine Keber
368	EPA-HQ-OAR-2022-0829-2566	Bernard Cane
369	EPA-HQ-OAR-2022-0829-1311	Bernard Sacks
370	EPA-HQ-OAR-2022-0829-1881	Bernie Thomas
371	EPA-HQ-OAR-2022-0829-3621	Bernie Thomas
372	EPA-HQ-OAR-2022-0829-4225	Beth Davidson
373	EPA-HQ-OAR-2022-0829-4031	Beth Evanko
374	EPA-HQ-OAR-2022-0829-4419	Beth Magura
375	EPA-HQ-OAR-2022-0829-4635	Beth Silvers
376	EPA-HQ-OAR-2022-0829-3032	Betsy Parker
377	EPA-HQ-OAR-2022-0829-4292	Betsy Parker
378	EPA-HQ-OAR-2022-0829-1122	Betsy Webster
379	EPA-HQ-OAR-2022-0829-4692	Bettina Thiel
380	EPA-HQ-OAR-2022-0829-3739	Betty Fulford
381	EPA-HQ-OAR-2022-0829-1584	Betty Jane Mister
382	EPA-HQ-OAR-2022-0829-4223	Betty Jane Mister
383	EPA-HQ-OAR-2022-0829-3630	Betty Lepard
384	EPA-HQ-OAR-2022-0829-2841	Bev Gavenda
385	EPA-HQ-OAR-2022-0829-3693	Beverly Balash
386	EPA-HQ-OAR-2022-0829-3356	Beverly Churchill
387	EPA-HQ-OAR-2022-0829-3384	Beverly Gould
388	EPA-HQ-OAR-2022-0829-1796	Beverly Munson
389	EPA-HQ-OAR-2022-0829-2605	Bill Abright
390	EPA-HQ-OAR-2022-0829-2927	Bill Abright
391	EPA-HQ-OAR-2022-0829-4541	Bill Bradlee

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394	EPA-HQ-OAR-2022-0829-4654	Bill Christie
395	EPA-HQ-OAR-2022-0829-4823	Bill Clement
396	EPA-HQ-OAR-2022-0829-1837	Bill Conley
397	EPA-HQ-OAR-2022-0829-4487	Bill Dotson
398	EPA-HQ-OAR-2022-0829-3663	Bill Grap
399	EPA-HQ-OAR-2022-0829-3624	Bill Johnson
400	EPA-HQ-OAR-2022-0829-2728	Bill Liddell
401	EPA-HQ-OAR-2022-0829-1317	Bill Thoreson
402	EPA-HQ-OAR-2022-0829-3249	Bill Wickham
403	EPA-HQ-OAR-2022-0829-2277	Bill Yancey
404	EPA-HQ-OAR-2022-0829-2474	Billy BrownII
405	EPA-HQ-OAR-2022-0829-3046	Billy Jergins
406	EPA-HQ-OAR-2022-0829-4844	Billy Jergins
407	EPA-HQ-OAR-2022-0829-3490	Biscuit Sponar
408	EPA-HQ-OAR-2022-0829-3158	Blair Bogens
409	EPA-HQ-OAR-2022-0829-2705	Blanche Jones
410	EPA-HQ-OAR-2022-0829-5057	Blythe Clark-McKitrick
411	EPA-HQ-OAR-2022-0829-2594	Bob Armstrong
412	EPA-HQ-OAR-2022-0829-2138	Bob Backus
413	EPA-HQ-OAR-2022-0829-3344	Bob Bartlett
414	EPA-HQ-OAR-2022-0829-1287	Bob Gates
415	EPA-HQ-OAR-2022-0829-3015	Bob Golenkow
416	EPA-HQ-OAR-2022-0829-1324	Bob Johnson
417	EPA-HQ-OAR-2022-0829-2774	Bob Rodriguez
418	EPA-HQ-OAR-2022-0829-3938	Bob Sizemore
419	EPA-HQ-OAR-2022-0829-1726	Bob Sparks

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422	EPA-HQ-OAR-2022-0829-3027	Bobby Oakley
423	EPA-HQ-OAR-2022-0829-4283	Bonita Bandaries
424	EPA-HQ-OAR-2022-0829-1633	Bonnie Chandler
425	EPA-HQ-OAR-2022-0829-4756	Bonnie Chandler
426	EPA-HQ-OAR-2022-0829-1410	Bonnie Gorman RN
427	EPA-HQ-OAR-2022-0829-2737	Bonnie Hackett
428	EPA-HQ-OAR-2022-0829-4253	Bonnie Hackett
429	EPA-HQ-OAR-2022-0829-3332	Bonnie Robinson
430	EPA-HQ-OAR-2022-0829-0867	Bonnie Wine
431	EPA-HQ-OAR-2022-0829-1229	Bonnie Winslow
432	EPA-HQ-OAR-2022-0829-3584	Bonnie Winslow
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434	EPA-HQ-OAR-2022-0829-3276	Boyce Kluting
435	EPA-HQ-OAR-2022-0829-0558	Brad Allen
436	EPA-HQ-OAR-2022-0829-1863	Brad Armentrout
437	EPA-HQ-OAR-2022-0829-4110	Brad Brown
438	EPA-HQ-OAR-2022-0829-4840	Brad Lowrey
439	EPA-HQ-OAR-2022-0829-1635	Brad Parsons
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441	EPA-HQ-OAR-2022-0829-4866	Brad Wilson
442	EPA-HQ-OAR-2022-0829-2488	Bradford Bisbee
443	EPA-HQ-OAR-2022-0829-1873	Bradley Coy
444	EPA-HQ-OAR-2022-0829-1997	Bradley Coy
445	EPA-HQ-OAR-2022-0829-3018	Bradley Coy
446	EPA-HQ-OAR-2022-0829-3279	Bradley Engleberry
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452	EPA-HQ-OAR-2022-0829-1219	Brenda Coleman
453	EPA-HQ-OAR-2022-0829-1850	Brenda Dangerfield
454	EPA-HQ-OAR-2022-0829-1489	Brenda Hansler
455	EPA-HQ-OAR-2022-0829-2241	Brenda Haueisen
456	EPA-HQ-OAR-2022-0829-3441	Brenda Lebsack
457	EPA-HQ-OAR-2022-0829-2646	Brenda Lindell
458	EPA-HQ-OAR-2022-0829-1094	Brenda Ping
459	EPA-HQ-OAR-2022-0829-3402	Brenda Prosser
460	EPA-HQ-OAR-2022-0829-3680	Brenda Prosser
461	EPA-HQ-OAR-2022-0829-2139	Brenda Windom
462	EPA-HQ-OAR-2022-0829-2075	Brenna J. Lawrence
463	EPA-HQ-OAR-2022-0829-2266	Brent Bailey
464	EPA-HQ-OAR-2022-0829-4382	Bret Pearcy
465	EPA-HQ-OAR-2022-0829-5011	Brett Beauregard
466	EPA-HQ-OAR-2022-0829-2941	Brett Clark
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481	EPA-HQ-OAR-2022-0829-1538	Brian Payne
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483	EPA-HQ-OAR-2022-0829-3959	Brian Slocum
484	EPA-HQ-OAR-2022-0829-2615	Brian Suter
485	EPA-HQ-OAR-2022-0829-3561	Brian Sutton
486	EPA-HQ-OAR-2022-0829-4503	Brian Thalmann
487	EPA-HQ-OAR-2022-0829-0950	Brian Welch
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490	EPA-HQ-OAR-2022-0829-2036	Brigetta Millen
491	EPA-HQ-OAR-2022-0829-2666	Brooke Biehl
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493	EPA-HQ-OAR-2022-0829-5006	Bruce Barrett
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509	EPA-HQ-OAR-2022-0829-2997	Bruce Niehm
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513	EPA-HQ-OAR-2022-0829-3452	Bruce Stevenson
514	EPA-HQ-OAR-2022-0829-2503	Bruce Watters
515	EPA-HQ-OAR-2022-0829-1197	Bruce Young
516	EPA-HQ-OAR-2022-0829-1923	Bryan Affolter
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522	EPA-HQ-OAR-2022-0829-1848	Bryce McIntyre
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524	EPA-HQ-OAR-2022-0829-4627	Bryon Thornberry
525	EPA-HQ-OAR-2022-0829-3360	Buck Schall
526	EPA-HQ-OAR-2022-0829-5051	Buck Schall
527	EPA-HQ-OAR-2022-0829-3849	Buddhadeb Ghosh
528	EPA-HQ-OAR-2022-0829-0808	Buddy Baird
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534	EPA-HQ-OAR-2022-0829-4953	C. F. (no surname provided)
535	EPA-HQ-OAR-2022-0829-2085	C. Ferreira
536	EPA-HQ-OAR-2022-0829-0910	Caleb Merendino
537	EPA-HQ-OAR-2022-0829-5059	Caleb Mitchell
538	EPA-HQ-OAR-2022-0829-0840	Calvin Ray
539	EPA-HQ-OAR-2022-0829-1832	Calvin Ray
540	EPA-HQ-OAR-2022-0829-1057	Candace Anderson
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546	EPA-HQ-OAR-2022-0829-0846	Carl Eickhoff
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549	EPA-HQ-OAR-2022-0829-4637	Carl Miller
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553	EPA-HQ-OAR-2022-0829-1279	Carla Messal
554	EPA-HQ-OAR-2022-0829-1288	Carla Pflasterer
555	EPA-HQ-OAR-2022-0829-2419	Carlo Fioranelli
556	EPA-HQ-OAR-2022-0829-1920	Carlos F. (no surname provided)
557	EPA-HQ-OAR-2022-0829-3439	Carmel McHale
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565	EPA-HQ-OAR-2022-0829-0928	Carol Engle
566	EPA-HQ-OAR-2022-0829-2044	Carol Griffin
567	EPA-HQ-OAR-2022-0829-1994	Carol Houghton
568	EPA-HQ-OAR-2022-0829-4466	Carol Hutton
569	EPA-HQ-OAR-2022-0829-3106	Carol Kuczora
570	EPA-HQ-OAR-2022-0829-0925	Carol Landis
571	EPA-HQ-OAR-2022-0829-2366	Carol Malone
572	EPA-HQ-OAR-2022-0829-3069	Carol McCoy
573	EPA-HQ-OAR-2022-0829-4744	Carol Mimms
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576	EPA-HQ-OAR-2022-0829-3671	Carol Parker
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594	EPA-HQ-OAR-2022-0829-1822	Carolyn Kragt
595	EPA-HQ-OAR-2022-0829-4582	Carolyn Marriott
596	EPA-HQ-OAR-2022-0829-4422	Carolyn McLaughlin
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611	EPA-HQ-OAR-2022-0829-3283	Cassandra Carmichael Hamernick
612	EPA-HQ-OAR-2022-0829-1398	Cassondra OReilly
613	EPA-HQ-OAR-2022-0829-3575	Catharine Munden
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627	EPA-HQ-OAR-2022-0829-4228	Cathryn Classen
628	EPA-HQ-OAR-2022-0829-0940	Cathryn Johnston
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704	EPA-HQ-OAR-2022-0829-1562	Christian Jepsen
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706	EPA-HQ-OAR-2022-0829-3223	Christina Larson
707	EPA-HQ-OAR-2022-0829-4689	Christina Morgan
708	EPA-HQ-OAR-2022-0829-1392	Christina Nieves
709	EPA-HQ-OAR-2022-0829-1206	Christina Prange
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711	EPA-HQ-OAR-2022-0829-1879	Christina Stokes
712	EPA-HQ-OAR-2022-0829-3100	Christine Dreyfus
713	EPA-HQ-OAR-2022-0829-1668	Christine Genge
714	EPA-HQ-OAR-2022-0829-3672	Christine Holley
715	EPA-HQ-OAR-2022-0829-4280	Christine Holley
716	EPA-HQ-OAR-2022-0829-2898	Christine Ihde
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1044	EPA-HQ-OAR-2022-0829-4968	Dennis Murphy
1045	EPA-HQ-OAR-2022-0829-3446	Dennis Ramsey
1046	EPA-HQ-OAR-2022-0829-0941	Dennis Schmit
1047	EPA-HQ-OAR-2022-0829-2625	Dennis Schmit
1048	EPA-HQ-OAR-2022-0829-3016	Dennis Sego
1049	EPA-HQ-OAR-2022-0829-2296	Dennis Tapley
1050	EPA-HQ-OAR-2022-0829-1532	Dennis Yoder
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1059	EPA-HQ-OAR-2022-0829-3414	Diana Gomez
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1067	EPA-HQ-OAR-2022-0829-3175	Diane Keefe
1068	EPA-HQ-OAR-2022-0829-1736	Diane Peterson
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1071	EPA-HQ-OAR-2022-0829-2833	Diane Wallace
1072	EPA-HQ-OAR-2022-0829-3724	Diane Wallace
1073	EPA-HQ-OAR-2022-0829-4789	Diane Wallace
1074	EPA-HQ-OAR-2022-0829-4265	Dianna Ross
1075	EPA-HQ-OAR-2022-0829-4101	Dianne Coane
1076	EPA-HQ-OAR-2022-0829-4277	Dianne Fox
1077	EPA-HQ-OAR-2022-0829-3255	Digby Macdonald
1078	EPA-HQ-OAR-2022-0829-4607	Dirk Rice
1079	EPA-HQ-OAR-2022-0829-4454	Dixie Bishop
1080	EPA-HQ-OAR-2022-0829-4187	DJ Margason
1081	EPA-HQ-OAR-2022-0829-2622	DL Popowitch
1082	EPA-HQ-OAR-2022-0829-3571	Dm Mink
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1100	EPA-HQ-OAR-2022-0829-4794	Don Woodward
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1102	EPA-HQ-OAR-2022-0829-1818	Donald Berrian
1103	EPA-HQ-OAR-2022-0829-4732	Donald Boggs
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1105	EPA-HQ-OAR-2022-0829-4348	Donald Bush
1106	EPA-HQ-OAR-2022-0829-3925	Donald Carnley
1107	EPA-HQ-OAR-2022-0829-3999	Donald Eastlund
1108	EPA-HQ-OAR-2022-0829-1387	Donald Garlit
1109	EPA-HQ-OAR-2022-0829-0441	Donald Graham
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1124	EPA-HQ-OAR-2022-0829-3625	Donna Baynai
1125	EPA-HQ-OAR-2022-0829-2937	Donna Dettrick
1126	EPA-HQ-OAR-2022-0829-3543	Donna Ellingsen
1127	EPA-HQ-OAR-2022-0829-1069	Donna Ellis
1128	EPA-HQ-OAR-2022-0829-4932	Donna Fine
1129	EPA-HQ-OAR-2022-0829-1077	Donna Furches
1130	EPA-HQ-OAR-2022-0829-4588	Donna Gellman
1131	EPA-HQ-OAR-2022-0829-4710	Donna Gross
1132	EPA-HQ-OAR-2022-0829-1167	Donna Handshy
1133	EPA-HQ-OAR-2022-0829-3050	Donna Lampkin
1134	EPA-HQ-OAR-2022-0829-4459	Donna Lampkin
1135	EPA-HQ-OAR-2022-0829-4621	Donna McCabe
1136	EPA-HQ-OAR-2022-0829-1916	Donna Rosa
1137	EPA-HQ-OAR-2022-0829-2400	Donna Rosa
1138	EPA-HQ-OAR-2022-0829-1841	Donna Stewart
1139	EPA-HQ-OAR-2022-0829-2279	Donna Vaughan
1140	EPA-HQ-OAR-2022-0829-1962	Donna Weimer
1141	EPA-HQ-OAR-2022-0829-2321	Dorcas Smith
1142	EPA-HQ-OAR-2022-0829-3144	Doreen Miller
1143	EPA-HQ-OAR-2022-0829-4247	Dori Lopez
1144	EPA-HQ-OAR-2022-0829-4079	Doris McCarter
1145	EPA-HQ-OAR-2022-0829-2316	Dorothy Cline
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1155	EPA-HQ-OAR-2022-0829-2074	Douglas Atkinson
1156	EPA-HQ-OAR-2022-0829-2609	Douglas Day
1157	EPA-HQ-OAR-2022-0829-0932	Douglas Hepner
1158	EPA-HQ-OAR-2022-0829-3270	Douglas Holmes
1159	EPA-HQ-OAR-2022-0829-4734	Douglas Huston
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1161	EPA-HQ-OAR-2022-0829-3397	Douglas Manuel
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1164	EPA-HQ-OAR-2022-0829-5052	Douglas Russell
1165	EPA-HQ-OAR-2022-0829-4652	Douglas Smith
1166	EPA-HQ-OAR-2022-0829-1619	Douglas Stierheim
1167	EPA-HQ-OAR-2022-0829-2009	Douglas Wagner
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1169	EPA-HQ-OAR-2022-0829-0995	Duane Kotwicki
1170	EPA-HQ-OAR-2022-0829-2582	Duane Kotwicki
1171	EPA-HQ-OAR-2022-0829-3235	Duane Kotwicki
1172	EPA-HQ-OAR-2022-0829-4889	Duane Robertson
1173	EPA-HQ-OAR-2022-0829-1038	Dustin Granger
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1178	EPA-HQ-OAR-2022-0829-4105	E. Higgins
1179	EPA-HQ-OAR-2022-0829-2639	E. Lang
1180	EPA-HQ-OAR-2022-0829-0446	E. Perry
1181	EPA-HQ-OAR-2022-0829-4800	Earl Alderfer
1182	EPA-HQ-OAR-2022-0829-1723	Earl Rizzo
1183	EPA-HQ-OAR-2022-0829-0993	Ebony Tillman
1184	EPA-HQ-OAR-2022-0829-3172	Ed Carter
1185	EPA-HQ-OAR-2022-0829-4612	Ed Crump
1186	EPA-HQ-OAR-2022-0829-2835	Ed Jones
1187	EPA-HQ-OAR-2022-0829-4024	Ed LaGrange
1188	EPA-HQ-OAR-2022-0829-3229	Ed Loosli
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1195	EPA-HQ-OAR-2022-0829-3072	Eddie Byrn
1196	EPA-HQ-OAR-2022-0829-0873	Edgar Baker
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1198	EPA-HQ-OAR-2022-0829-3240	Edith Laufer
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1211	EPA-HQ-OAR-2022-0829-1189	Edward Loredo
1212	EPA-HQ-OAR-2022-0829-5013	Edward Maibach
1213	EPA-HQ-OAR-2022-0829-5038	Edward Perkins
1214	EPA-HQ-OAR-2022-0829-0833	Edward Rak
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1222	EPA-HQ-OAR-2022-0829-4591	Eileen Fries
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1225	EPA-HQ-OAR-2022-0829-3652	Eileen Korenberg
1226	EPA-HQ-OAR-2022-0829-4774	Eileen McCorry
1227	EPA-HQ-OAR-2022-0829-4211	Eileen Ruppel
1228	EPA-HQ-OAR-2022-0829-2921	Eileen Vara
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1248	EPA-HQ-OAR-2022-0829-4444	Elizabeth Iszler
1249	EPA-HQ-OAR-2022-0829-3913	Elizabeth Jones
1250	EPA-HQ-OAR-2022-0829-1857	Elizabeth Lawhorne
1251	EPA-HQ-OAR-2022-0829-4733	Elizabeth Mascolo
1252	EPA-HQ-OAR-2022-0829-3169	Elizabeth Pottorff
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1254	EPA-HQ-OAR-2022-0829-2837	Elizabeth Sprague
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1275	EPA-HQ-OAR-2022-0829-2004	Ellyn Downs
1276	EPA-HQ-OAR-2022-0829-3096	Elsie V (No surname provided)
1277	EPA-HQ-OAR-2022-0829-1390	Elyce Santerre
1278	EPA-HQ-OAR-2022-0829-0438	Emia Oppenheim
1279	EPA-HQ-OAR-2022-0829-3342	Emily A. McCully
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1292	EPA-HQ-OAR-2022-0829-3464	Eric Muller
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1294	EPA-HQ-OAR-2022-0829-2235	Eric Ostlie
1295	EPA-HQ-OAR-2022-0829-4860	Eric Ostlie
1296	EPA-HQ-OAR-2022-0829-4868	Eric Ostlie
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1310	EPA-HQ-OAR-2022-0829-1021	Ernest Lottman
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1322	EPA-HQ-OAR-2022-0829-3951	Eugene Korzeniowski
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1328	EPA-HQ-OAR-2022-0829-3501	Evelyn Dreher
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1341	EPA-HQ-OAR-2022-0829-4805	Ferdinand Nowicki
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1355	EPA-HQ-OAR-2022-0829-1969	Frank Janecek
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1382	EPA-HQ-OAR-2022-0829-4801	Frederick Piazza
1383	EPA-HQ-OAR-2022-0829-3687	Freya Harris
1384	EPA-HQ-OAR-2022-0829-1299	Fritz Beiermeister
1385	EPA-HQ-OAR-2022-0829-4423	G Siegler (no first name provided)
1386	EPA-HQ-OAR-2022-0829-4412	Gabrielle Corson
1387	EPA-HQ-OAR-2022-0829-4296	Gail Beck
1388	EPA-HQ-OAR-2022-0829-0990	Gail Daley
1389	EPA-HQ-OAR-2022-0829-2788	Gail Eastwood
1390	EPA-HQ-OAR-2022-0829-1126	Gail Lee
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1600	EPA-HQ-OAR-2022-0829-3058	Ivars Loce
1601	EPA-HQ-OAR-2022-0829-4452	J Bell
1602	EPA-HQ-OAR-2022-0829-1547	J W
1603	EPA-HQ-OAR-2022-0829-2747	J. B.
1604	EPA-HQ-OAR-2022-0829-3120	J. J. Morran
1605	EPA-HQ-OAR-2022-0829-2702	J. S. (no surname provided)
1606	EPA-HQ-OAR-2022-0829-3545	Jacalyn Barnes
1607	EPA-HQ-OAR-2022-0829-4055	Jace Raney
1608	EPA-HQ-OAR-2022-0829-1732	Jack DeVience
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1636	EPA-HQ-OAR-2022-0829-2581	James Burton
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1640	EPA-HQ-OAR-2022-0829-3048	James Deuro
1641	EPA-HQ-OAR-2022-0829-2515	James Dewitz
1642	EPA-HQ-OAR-2022-0829-1029	James Dini
1643	EPA-HQ-OAR-2022-0829-0750	James E. Zook
1644	EPA-HQ-OAR-2022-0829-4721	James Eckroat
1645	EPA-HQ-OAR-2022-0829-4341	James England
1646	EPA-HQ-OAR-2022-0829-1432	James Engler
1647	EPA-HQ-OAR-2022-0829-2923	James Fargo
1648	EPA-HQ-OAR-2022-0829-3479	James Ferris
1649	EPA-HQ-OAR-2022-0829-4321	James Fisher
1650	EPA-HQ-OAR-2022-0829-1297	James Fitts
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1655	EPA-HQ-OAR-2022-0829-0872	James Funkhouser
1656	EPA-HQ-OAR-2022-0829-3507	James Godsey
1657	EPA-HQ-OAR-2022-0829-4861	James Goodson
1658	EPA-HQ-OAR-2022-0829-3047	James Green
1659	EPA-HQ-OAR-2022-0829-1575	James Halton
1660	EPA-HQ-OAR-2022-0829-2444	James Haynes
1661	EPA-HQ-OAR-2022-0829-4015	James Heine
1662	EPA-HQ-OAR-2022-0829-4848	James Heine
1663	EPA-HQ-OAR-2022-0829-3904	James hemund
1664	EPA-HQ-OAR-2022-0829-4999	James Hughes
1665	EPA-HQ-OAR-2022-0829-3720	James Jones
1666	EPA-HQ-OAR-2022-0829-4707	James kaiser
1667	EPA-HQ-OAR-2022-0829-1908	James Kennedy
1668	EPA-HQ-OAR-2022-0829-4245	James King
1669	EPA-HQ-OAR-2022-0829-2715	James LaCroix
1670	EPA-HQ-OAR-2022-0829-1793	James Lambert
1671	EPA-HQ-OAR-2022-0829-4987	James Lawrence
1672	EPA-HQ-OAR-2022-0829-3772	James Lebron
1673	EPA-HQ-OAR-2022-0829-1041	James Matlock
1674	EPA-HQ-OAR-2022-0829-1606	James McGill
1675	EPA-HQ-OAR-2022-0829-4239	James McGill
1676	EPA-HQ-OAR-2022-0829-1583	James McKeever
1677	EPA-HQ-OAR-2022-0829-1498	James McPartland
1678	EPA-HQ-OAR-2022-0829-1345	James Miller
1679	EPA-HQ-OAR-2022-0829-4739	James Miller

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1684	EPA-HQ-OAR-2022-0829-1911	James Purcell
1685	EPA-HQ-OAR-2022-0829-1000	James Quinn
1686	EPA-HQ-OAR-2022-0829-1505	James Quinn
1687	EPA-HQ-OAR-2022-0829-2346	James Rader
1688	EPA-HQ-OAR-2022-0829-4044	James Reed
1689	EPA-HQ-OAR-2022-0829-4600	James Reed
1690	EPA-HQ-OAR-2022-0829-1138	James Rife
1691	EPA-HQ-OAR-2022-0829-2922	James Robert
1692	EPA-HQ-OAR-2022-0829-3610	James Robert
1693	EPA-HQ-OAR-2022-0829-3612	James Rogers
1694	EPA-HQ-OAR-2022-0829-4249	James Rutland
1695	EPA-HQ-OAR-2022-0829-2381	James Sawyer
1696	EPA-HQ-OAR-2022-0829-3119	James Sharp
1697	EPA-HQ-OAR-2022-0829-3052	James Smith
1698	EPA-HQ-OAR-2022-0829-5090	James Sterman
1699	EPA-HQ-OAR-2022-0829-4500	James Talcott
1700	EPA-HQ-OAR-2022-0829-2614	James Thurau
1701	EPA-HQ-OAR-2022-0829-1725	James Trice
1702	EPA-HQ-OAR-2022-0829-1842	Jamie Bartlett
1703	EPA-HQ-OAR-2022-0829-3373	Jamie Brooks
1704	EPA-HQ-OAR-2022-0829-3346	Jamie Hill
1705	EPA-HQ-OAR-2022-0829-1541	Jamie Jepsrb
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1711	EPA-HQ-OAR-2022-0829-1095	Jana Bryant
1712	EPA-HQ-OAR-2022-0829-2984	Jana Doak
1713	EPA-HQ-OAR-2022-0829-1470	Jana Hargreaves
1714	EPA-HQ-OAR-2022-0829-5035	Jane B. Schildge
1715	EPA-HQ-OAR-2022-0829-4970	Jane Burgei
1716	EPA-HQ-OAR-2022-0829-4255	Jane Byrnes
1717	EPA-HQ-OAR-2022-0829-3578	Jane Groves
1718	EPA-HQ-OAR-2022-0829-1337	Jane Pooler
1719	EPA-HQ-OAR-2022-0829-1778	Jane Terwilliger
1720	EPA-HQ-OAR-2022-0829-2463	Jane van Dis
1721	EPA-HQ-OAR-2022-0829-4368	Janene Paramore
1722	EPA-HQ-OAR-2022-0829-3511	Janet Barwick
1723	EPA-HQ-OAR-2022-0829-2589	Janet Beaver
1724	EPA-HQ-OAR-2022-0829-4985	Janet Gerla
1725	EPA-HQ-OAR-2022-0829-5058	Janet Gilbert
1726	EPA-HQ-OAR-2022-0829-4273	Janet Graves
1727	EPA-HQ-OAR-2022-0829-3798	Janet Hanson
1728	EPA-HQ-OAR-2022-0829-3897	Janet Harden
1729	EPA-HQ-OAR-2022-0829-1104	Janet Monell
1730	EPA-HQ-OAR-2022-0829-4047	Janet Reynolds
1731	EPA-HQ-OAR-2022-0829-2731	Janet Skjonsby
1732	EPA-HQ-OAR-2022-0829-4485	Janet Skjonsby
1733	EPA-HQ-OAR-2022-0829-4461	Janice Bruns
1734	EPA-HQ-OAR-2022-0829-1296	Janice Dunbar
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1738	EPA-HQ-OAR-2022-0829-1493	Janice Taylor
1739	EPA-HQ-OAR-2022-0829-2006	Janice Whaley
1740	EPA-HQ-OAR-2022-0829-4184	Janiece Archer
1741	EPA-HQ-OAR-2022-0829-0816	Janine Ford
1742	EPA-HQ-OAR-2022-0829-3496	Janine Hanson
1743	EPA-HQ-OAR-2022-0829-2334	Janis Wagner
1744	EPA-HQ-OAR-2022-0829-1827	Jaquelyn Soto
1745	EPA-HQ-OAR-2022-0829-2838	Jared Laiti
1746	EPA-HQ-OAR-2022-0829-1168	Jarett Wonski
1747	EPA-HQ-OAR-2022-0829-4451	Jarod Kouma
1748	EPA-HQ-OAR-2022-0829-0431	Jason Barlow
1749	EPA-HQ-OAR-2022-0829-5037	Jason Clouse
1750	EPA-HQ-OAR-2022-0829-1662	Jason Eby
1751	EPA-HQ-OAR-2022-0829-3852	Jason Nigg
1752	EPA-HQ-OAR-2022-0829-1985	Jason Peoples
1753	EPA-HQ-OAR-2022-0829-2551	Jason Reeder
1754	EPA-HQ-OAR-2022-0829-4995	Jason Reeder
1755	EPA-HQ-OAR-2022-0829-1430	Jason Van Lishout
1756	EPA-HQ-OAR-2022-0829-4797	Jay McCaman
1757	EPA-HQ-OAR-2022-0829-4720	Jay Miller
1758	EPA-HQ-OAR-2022-0829-4825	Jay Parks
1759	EPA-HQ-OAR-2022-0829-3615	Jay Stermer
1760	EPA-HQ-OAR-2022-0829-2588	Jay Talsma
1761	EPA-HQ-OAR-2022-0829-3896	Jay Vierra
1762	EPA-HQ-OAR-2022-0829-2339	Jay Vines
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1767	EPA-HQ-OAR-2022-0829-2370	JBrad Lewis
1768	EPA-HQ-OAR-2022-0829-3128	JC Mayfield
1769	EPA-HQ-OAR-2022-0829-4549	Jean Dudley
1770	EPA-HQ-OAR-2022-0829-2142	Jean Finke
1771	EPA-HQ-OAR-2022-0829-2446	Jean Hagemann
1772	EPA-HQ-OAR-2022-0829-2129	Jean Peavler
1773	EPA-HQ-OAR-2022-0829-2520	Jean Weymier
1774	EPA-HQ-OAR-2022-0829-4946	Jean Wynn
1775	EPA-HQ-OAR-2022-0829-4572	Jeanette Mitchell
1776	EPA-HQ-OAR-2022-0829-4118	Jeanette Mott Oxford
1777	EPA-HQ-OAR-2022-0829-4580	Jeanette Nappier
1778	EPA-HQ-OAR-2022-0829-3506	Jeanette Schouweiler
1779	EPA-HQ-OAR-2022-0829-1025	Jeanna Benoy
1780	EPA-HQ-OAR-2022-0829-1561	Jeanne Carroll
1781	EPA-HQ-OAR-2022-0829-2412	Jeanne Everett
1782	EPA-HQ-OAR-2022-0829-4741	Jeanne Ruiz
1783	EPA-HQ-OAR-2022-0829-1301	Jeanne Schoettle
1784	EPA-HQ-OAR-2022-0829-3918	Jeannette Wiley
1785	EPA-HQ-OAR-2022-0829-3448	Jeannie Anderson
1786	EPA-HQ-OAR-2022-0829-2757	Jeannie Smith
1787	EPA-HQ-OAR-2022-0829-1742	Jed Hendrickson
1788	EPA-HQ-OAR-2022-0829-1413	Jeff Alson
1789	EPA-HQ-OAR-2022-0829-2252	Jeff Bailey
1790	EPA-HQ-OAR-2022-0829-4147	Jeff Chase
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1794	EPA-HQ-OAR-2022-0829-1190	Jeff Hancock
1795	EPA-HQ-OAR-2022-0829-2448	Jeff Knobloch
1796	EPA-HQ-OAR-2022-0829-4752	Jeff Miller
1797	EPA-HQ-OAR-2022-0829-2656	Jeff Phister
1798	EPA-HQ-OAR-2022-0829-1256	Jeff Rohal
1799	EPA-HQ-OAR-2022-0829-2069	Jeff Shrewsbury
1800	EPA-HQ-OAR-2022-0829-2546	Jeff Vines
1801	EPA-HQ-OAR-2022-0829-1977	Jeff Weber
1802	EPA-HQ-OAR-2022-0829-3712	Jeffery Mitchell
1803	EPA-HQ-OAR-2022-0829-3590	Jeffrey Beauman
1804	EPA-HQ-OAR-2022-0829-4702	Jeffrey Conz
1805	EPA-HQ-OAR-2022-0829-2797	Jeffrey Daniels
1806	EPA-HQ-OAR-2022-0829-2227	Jeffrey DeCristofaro
1807	EPA-HQ-OAR-2022-0829-4502	Jeffrey Greenstein
1808	EPA-HQ-OAR-2022-0829-5010	Jeffrey Kerr
1809	EPA-HQ-OAR-2022-0829-2173	Jeffrey Kochan
1810	EPA-HQ-OAR-2022-0829-4272	Jeffrey Kotyk
1811	EPA-HQ-OAR-2022-0829-3941	Jeffrey Kovatch
1812	EPA-HQ-OAR-2022-0829-3515	Jeffrey Loomis
1813	EPA-HQ-OAR-2022-0829-5003	Jeffrey Pierce
1814	EPA-HQ-OAR-2022-0829-4626	Jeffrey Scates
1815	EPA-HQ-OAR-2022-0829-4713	Jeffrey Torsrud
1816	EPA-HQ-OAR-2022-0829-2409	Jen Chandler
1817	EPA-HQ-OAR-2022-0829-2831	Jen Rund
1818	EPA-HQ-OAR-2022-0829-3123	Jenifer Garlitz
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1822	EPA-HQ-OAR-2022-0829-4759	Jennifer DeVault
1823	EPA-HQ-OAR-2022-0829-2933	Jennifer Drennan
1824	EPA-HQ-OAR-2022-0829-1377	Jennifer Elliott
1825	EPA-HQ-OAR-2022-0829-3844	Jennifer Giancola
1826	EPA-HQ-OAR-2022-0829-3125	Jennifer Hartman
1827	EPA-HQ-OAR-2022-0829-2586	Jennifer Jaspersen
1828	EPA-HQ-OAR-2022-0829-3831	Jennifer Johnson
1829	EPA-HQ-OAR-2022-0829-3914	Jennifer Jordan
1830	EPA-HQ-OAR-2022-0829-4767	Jennifer McMurtray
1831	EPA-HQ-OAR-2022-0829-4769	Jennifer Nitz
1832	EPA-HQ-OAR-2022-0829-3103	Jennifer Pick
1833	EPA-HQ-OAR-2022-0829-4931	Jennifer Rentfleish
1834	EPA-HQ-OAR-2022-0829-2447	Jennifer Runquist
1835	EPA-HQ-OAR-2022-0829-3469	Jennifer Young
1836	EPA-HQ-OAR-2022-0829-1475	Jenny Kuklok
1837	EPA-HQ-OAR-2022-0829-0819	Jerald Slatter
1838	EPA-HQ-OAR-2022-0829-4065	Jeremy hanson
1839	EPA-HQ-OAR-2022-0829-3147	Jeremy Lee
1840	EPA-HQ-OAR-2022-0829-1569	Jeri Brooke
1841	EPA-HQ-OAR-2022-0829-4480	Jerome Lederer
1842	EPA-HQ-OAR-2022-0829-1039	Jerry Aiken
1843	EPA-HQ-OAR-2022-0829-1385	Jerry Andree
1844	EPA-HQ-OAR-2022-0829-4656	Jerry Black
1845	EPA-HQ-OAR-2022-0829-3640	Jerry Bowers
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1851	EPA-HQ-OAR-2022-0829-3199	Jerry Morford
1852	EPA-HQ-OAR-2022-0829-4647	Jerry Musil
1853	EPA-HQ-OAR-2022-0829-2995	Jerry Stern
1854	EPA-HQ-OAR-2022-0829-4484	Jerry Stern
1855	EPA-HQ-OAR-2022-0829-0969	Jerry Thomas
1856	EPA-HQ-OAR-2022-0829-1654	Jerry Tipperreiter
1857	EPA-HQ-OAR-2022-0829-1490	Jesse Busby
1858	EPA-HQ-OAR-2022-0829-0437	Jesse Gamueda
1859	EPA-HQ-OAR-2022-0829-1802	Jesse White
1860	EPA-HQ-OAR-2022-0829-2401	Jessica Craven
1861	EPA-HQ-OAR-2022-0829-3407	Jessica Drauniivilevu
1862	EPA-HQ-OAR-2022-0829-3228	Jessie Panek
1863	EPA-HQ-OAR-2022-0829-1602	JG Haley
1864	EPA-HQ-OAR-2022-0829-2274	Jill Goodrich
1865	EPA-HQ-OAR-2022-0829-3690	Jill Heins
1866	EPA-HQ-OAR-2022-0829-0832	Jill Irish
1867	EPA-HQ-OAR-2022-0829-1860	Jill Johnson
1868	EPA-HQ-OAR-2022-0829-3331	Jill Seiden
1869	EPA-HQ-OAR-2022-0829-2164	Jill Wiseman
1870	EPA-HQ-OAR-2022-0829-2275	Jim Bartos
1871	EPA-HQ-OAR-2022-0829-1024	Jim Best
1872	EPA-HQ-OAR-2022-0829-2816	Jim Betty Burrell
1873	EPA-HQ-OAR-2022-0829-1628	Jim Carter
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1879	EPA-HQ-OAR-2022-0829-3775	Jim Hoover
1880	EPA-HQ-OAR-2022-0829-1484	Jim Jess
1881	EPA-HQ-OAR-2022-0829-1055	Jim Montgomery
1882	EPA-HQ-OAR-2022-0829-3449	Jim Muller
1883	EPA-HQ-OAR-2022-0829-1266	Jim Neff
1884	EPA-HQ-OAR-2022-0829-0905	Jim O.
1885	EPA-HQ-OAR-2022-0829-3987	Jim Plaquet
1886	EPA-HQ-OAR-2022-0829-2961	Jim Ry
1887	EPA-HQ-OAR-2022-0829-2180	Jim Schafer
1888	EPA-HQ-OAR-2022-0829-2807	Jim Steitz
1889	EPA-HQ-OAR-2022-0829-1870	Jim Thatcher
1890	EPA-HQ-OAR-2022-0829-3738	Jim Washington
1891	EPA-HQ-OAR-2022-0829-2471	Jim Zook
1892	EPA-HQ-OAR-2022-0829-1258	Jimmy Halford
1893	EPA-HQ-OAR-2022-0829-4426	Jion von Leden
1894	EPA-HQ-OAR-2022-0829-2952	JJ Smith
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1896	EPA-HQ-OAR-2022-0829-1622	Jo Dee Preston
1897	EPA-HQ-OAR-2022-0829-3152	Jo Dee Preston
1898	EPA-HQ-OAR-2022-0829-2799	Jo Reichler
1899	EPA-HQ-OAR-2022-0829-2745	Joan Donovan
1900	EPA-HQ-OAR-2022-0829-3335	Joan Flatt
1901	EPA-HQ-OAR-2022-0829-1383	Joan Formeister
1902	EPA-HQ-OAR-2022-0829-1791	Joan Hampton
1903	EPA-HQ-OAR-2022-0829-3336	Joan Hartman Moore

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1906	EPA-HQ-OAR-2022-0829-1903	Joan Mcknatt
1907	EPA-HQ-OAR-2022-0829-2822	Joan Milewski
1908	EPA-HQ-OAR-2022-0829-2022	Joan Russell
1909	EPA-HQ-OAR-2022-0829-1216	Joan Storlie
1910	EPA-HQ-OAR-2022-0829-2495	JoAnn Ford
1911	EPA-HQ-OAR-2022-0829-1020	JoAnn Thometz
1912	EPA-HQ-OAR-2022-0829-2077	Joanna Bishop
1913	EPA-HQ-OAR-2022-0829-4404	Joanna Suskawicz
1914	EPA-HQ-OAR-2022-0829-3784	Joanne Bernstein
1915	EPA-HQ-OAR-2022-0829-1782	Joanne Empie
1916	EPA-HQ-OAR-2022-0829-2460	Joanne Mullins
1917	EPA-HQ-OAR-2022-0829-2545	Joanne Mullins
1918	EPA-HQ-OAR-2022-0829-2049	Jody Benjamin
1919	EPA-HQ-OAR-2022-0829-1576	Jody Cefola
1920	EPA-HQ-OAR-2022-0829-1072	Joe Baker Jr
1921	EPA-HQ-OAR-2022-0829-1753	Joe Duffy
1922	EPA-HQ-OAR-2022-0829-2232	Joe Fowler
1923	EPA-HQ-OAR-2022-0829-1009	Joe Gentry
1924	EPA-HQ-OAR-2022-0829-1510	Joe Gentry
1925	EPA-HQ-OAR-2022-0829-2176	Joe Haraburda
1926	EPA-HQ-OAR-2022-0829-0901	Joe Huber
1927	EPA-HQ-OAR-2022-0829-1896	Joe Huber
1928	EPA-HQ-OAR-2022-0829-2336	Joe McCarthy
1929	EPA-HQ-OAR-2022-0829-2143	Joe Morrash
1930	EPA-HQ-OAR-2022-0829-4624	Joe Murphy
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1934	EPA-HQ-OAR-2022-0829-4343	Joe Terney
1935	EPA-HQ-OAR-2022-0829-4803	Joe Wolfe
1936	EPA-HQ-OAR-2022-0829-1749	Joel Ellis
1937	EPA-HQ-OAR-2022-0829-3141	Joel Tooley
1938	EPA-HQ-OAR-2022-0829-1357	Joelle Harmon
1939	EPA-HQ-OAR-2022-0829-2663	Joey Nilan
1940	EPA-HQ-OAR-2022-0829-4954	Joh Oboyle
1941	EPA-HQ-OAR-2022-0829-2836	Johanna Halbeisen
1942	EPA-HQ-OAR-2022-0829-2936	John Adams
1943	EPA-HQ-OAR-2022-0829-4871	John Adams
1944	EPA-HQ-OAR-2022-0829-4111	John Aiken
1945	EPA-HQ-OAR-2022-0829-1986	John And Laura Rahe
1946	EPA-HQ-OAR-2022-0829-2387	John Awezec
1947	EPA-HQ-OAR-2022-0829-3004	John Bagby
1948	EPA-HQ-OAR-2022-0829-4028	John Bakkila
1949	EPA-HQ-OAR-2022-0829-3381	John Belcastro
1950	EPA-HQ-OAR-2022-0829-1459	John Berg
1951	EPA-HQ-OAR-2022-0829-1922	John Bergin
1952	EPA-HQ-OAR-2022-0829-1585	John Betan
1953	EPA-HQ-OAR-2022-0829-2349	John Boden
1954	EPA-HQ-OAR-2022-0829-1772	John Broomell
1955	EPA-HQ-OAR-2022-0829-3499	John Broomell
1956	EPA-HQ-OAR-2022-0829-1259	John Burns
1957	EPA-HQ-OAR-2022-0829-3017	John Byrd
1958	EPA-HQ-OAR-2022-0829-2718	John Cannon
1959	EPA-HQ-OAR-2022-0829-2682	John Cheeseman

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1960	EPA-HQ-OAR-2022-0829-4873	John Cochrane
1961	EPA-HQ-OAR-2022-0829-4408	John Commerford
1962	EPA-HQ-OAR-2022-0829-4717	john connell
1963	EPA-HQ-OAR-2022-0829-4475	John Conte
1964	EPA-HQ-OAR-2022-0829-2804	John Conway
1965	EPA-HQ-OAR-2022-0829-3866	John Cook
1966	EPA-HQ-OAR-2022-0829-3803	John Cordell
1967	EPA-HQ-OAR-2022-0829-1321	John Creighton
1968	EPA-HQ-OAR-2022-0829-2497	John Cullings
1969	EPA-HQ-OAR-2022-0829-4926	John Daggett
1970	EPA-HQ-OAR-2022-0829-2292	John David Craig
1971	EPA-HQ-OAR-2022-0829-4605	John Dobie
1972	EPA-HQ-OAR-2022-0829-1026	JOhn Doe
1973	EPA-HQ-OAR-2022-0829-2962	John Droz
1974	EPA-HQ-OAR-2022-0829-4662	John Dulph
1975	EPA-HQ-OAR-2022-0829-2263	John Ekberg
1976	EPA-HQ-OAR-2022-0829-3763	John Elder
1977	EPA-HQ-OAR-2022-0829-4115	John Grabowski
1978	EPA-HQ-OAR-2022-0829-1845	John Grsy
1979	EPA-HQ-OAR-2022-0829-5067	John Halloran
1980	EPA-HQ-OAR-2022-0829-3867	John Harrington
1981	EPA-HQ-OAR-2022-0829-4049	John Harris
1982	EPA-HQ-OAR-2022-0829-4285	John Hovis
1983	EPA-HQ-OAR-2022-0829-3266	John Ims
1984	EPA-HQ-OAR-2022-0829-0847	John Jackson
1985	EPA-HQ-OAR-2022-0829-0794	John Jay Ulloth
1986	EPA-HQ-OAR-2022-0829-4290	John Kappus
1987	EPA-HQ-OAR-2022-0829-1165	John Klos

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1988	EPA-HQ-OAR-2022-0829-2597	John Kracht
1989	EPA-HQ-OAR-2022-0829-4304	John Kracht
1990	EPA-HQ-OAR-2022-0829-4299	John Lettow
1991	EPA-HQ-OAR-2022-0829-1525	John Lomax
1992	EPA-HQ-OAR-2022-0829-2453	John Lowery
1993	EPA-HQ-OAR-2022-0829-3074	John Markham
1994	EPA-HQ-OAR-2022-0829-3980	John Masse
1995	EPA-HQ-OAR-2022-0829-3983	John McCauley
1996	EPA-HQ-OAR-2022-0829-1192	John McClellan
1997	EPA-HQ-OAR-2022-0829-1497	John Meier
1998	EPA-HQ-OAR-2022-0829-1761	John Merola
1999	EPA-HQ-OAR-2022-0829-4761	John Meyer
2000	EPA-HQ-OAR-2022-0829-1464	John Miller
2001	EPA-HQ-OAR-2022-0829-3873	John Mitchell
2002	EPA-HQ-OAR-2022-0829-2826	John Morris
2003	EPA-HQ-OAR-2022-0829-4052	John Morrison
2004	EPA-HQ-OAR-2022-0829-2017	John Murdock
2005	EPA-HQ-OAR-2022-0829-4429	John Nelson
2006	EPA-HQ-OAR-2022-0829-1320	John Nicholson
2007	EPA-HQ-OAR-2022-0829-4157	John Nicholson
2008	EPA-HQ-OAR-2022-0829-1608	John Nowosacki
2009	EPA-HQ-OAR-2022-0829-2505	John Oberneder
2010	EPA-HQ-OAR-2022-0829-4785	John Omaha
2011	EPA-HQ-OAR-2022-0829-0931	John Owens
2012	EPA-HQ-OAR-2022-0829-4669	John Petty
2013	EPA-HQ-OAR-2022-0829-4153	John Pinto
2014	EPA-HQ-OAR-2022-0829-2727	john reaux
2015	EPA-HQ-OAR-2022-0829-2620	John Ruane

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2016	EPA-HQ-OAR-2022-0829-2524	John Russell
2017	EPA-HQ-OAR-2022-0829-2358	John Rymer
2018	EPA-HQ-OAR-2022-0829-3592	John Sadler
2019	EPA-HQ-OAR-2022-0829-4201	John Sakers
2020	EPA-HQ-OAR-2022-0829-1508	John Schiano
2021	EPA-HQ-OAR-2022-0829-1939	John Schiano
2022	EPA-HQ-OAR-2022-0829-1906	John Schmitt
2023	EPA-HQ-OAR-2022-0829-4032	John Schmitt
2024	EPA-HQ-OAR-2022-0829-1684	John Schultz
2025	EPA-HQ-OAR-2022-0829-1434	John Sekulich Jr
2026	EPA-HQ-OAR-2022-0829-4755	John Showalter
2027	EPA-HQ-OAR-2022-0829-1483	John Slusser
2028	EPA-HQ-OAR-2022-0829-1889	John Slusser
2029	EPA-HQ-OAR-2022-0829-3419	John Slusser
2030	EPA-HQ-OAR-2022-0829-4471	John Steich
2031	EPA-HQ-OAR-2022-0829-3722	John Stowe
2032	EPA-HQ-OAR-2022-0829-2514	John Stull
2033	EPA-HQ-OAR-2022-0829-2924	John Sweeney
2034	EPA-HQ-OAR-2022-0829-3769	John Taylor
2035	EPA-HQ-OAR-2022-0829-0803	John Tischler
2036	EPA-HQ-OAR-2022-0829-4355	John Totten
2037	EPA-HQ-OAR-2022-0829-4274	John Twigg
2038	EPA-HQ-OAR-2022-0829-2847	John Vanellis
2039	EPA-HQ-OAR-2022-0829-1644	John Viehweg
2040	EPA-HQ-OAR-2022-0829-4528	John Walcott
2041	EPA-HQ-OAR-2022-0829-2874	John Wallace
2042	EPA-HQ-OAR-2022-0829-4754	John Ward
2043	EPA-HQ-OAR-2022-0829-3978	John Wiltsie

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2045	EPA-HQ-OAR-2022-0829-4788	Johnnie McBride
2046	EPA-HQ-OAR-2022-0829-2001	Joianne Pettigrove
2047	EPA-HQ-OAR-2022-0829-1112	Jolynn Sitagata
2048	EPA-HQ-OAR-2022-0829-1463	Jon Antonson
2049	EPA-HQ-OAR-2022-0829-1496	Jon Coker
2050	EPA-HQ-OAR-2022-0829-1795	Jon Gildea
2051	EPA-HQ-OAR-2022-0829-3623	Jon Higley
2052	EPA-HQ-OAR-2022-0829-2963	Jon Kube
2053	EPA-HQ-OAR-2022-0829-4623	Jon Rosenstiel
2054	EPA-HQ-OAR-2022-0829-4577	Jon Sheehan
2055	EPA-HQ-OAR-2022-0829-4977	Jon Sheehan
2056	EPA-HQ-OAR-2022-0829-2220	Jon Vonleden
2057	EPA-HQ-OAR-2022-0829-3952	Jonalee Meyer-Watkins
2058	EPA-HQ-OAR-2022-0829-4264	Jonathan Powell
2059	EPA-HQ-OAR-2022-0829-1784	Jonathan Schaff
2060	EPA-HQ-OAR-2022-0829-1999	Jonathan Sisk
2061	EPA-HQ-OAR-2022-0829-0908	Jonathan Walker
2062	EPA-HQ-OAR-2022-0829-3339	Jonathan Wilcox
2063	EPA-HQ-OAR-2022-0829-3153	Jonathan Wiley
2064	EPA-HQ-OAR-2022-0829-4706	Jonn Tropp
2065	EPA-HQ-OAR-2022-0829-3208	Jordan Jones
2066	EPA-HQ-OAR-2022-0829-0869	Jordyn Jackson
2067	EPA-HQ-OAR-2022-0829-3181	Joseph B. Cassidy, III
2068	EPA-HQ-OAR-2022-0829-4670	Joseph Balbi
2069	EPA-HQ-OAR-2022-0829-1145	Joseph Barry
2070	EPA-HQ-OAR-2022-0829-1027	Joseph Bell
2071	EPA-HQ-OAR-2022-0829-4432	Joseph Bell

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2073	EPA-HQ-OAR-2022-0829-4330	Joseph Centeno
2074	EPA-HQ-OAR-2022-0829-3480	Joseph Dauster
2075	EPA-HQ-OAR-2022-0829-2161	Joseph Eichel
2076	EPA-HQ-OAR-2022-0829-4346	Joseph Felegie
2077	EPA-HQ-OAR-2022-0829-2108	Joseph Ferrell
2078	EPA-HQ-OAR-2022-0829-1686	Joseph Ferrell Sr.
2079	EPA-HQ-OAR-2022-0829-4357	Joseph Flemming
2080	EPA-HQ-OAR-2022-0829-2742	Joseph Garraffa
2081	EPA-HQ-OAR-2022-0829-3467	Joseph Garraffa
2082	EPA-HQ-OAR-2022-0829-4203	Joseph Keenen
2083	EPA-HQ-OAR-2022-0829-4514	Joseph Kessler
2084	EPA-HQ-OAR-2022-0829-3619	Joseph Knapp
2085	EPA-HQ-OAR-2022-0829-4559	Joseph Lakatos
2086	EPA-HQ-OAR-2022-0829-2382	Joseph Lindsey
2087	EPA-HQ-OAR-2022-0829-2681	Joseph Pero
2088	EPA-HQ-OAR-2022-0829-0874	Joseph Sanchez
2089	EPA-HQ-OAR-2022-0829-2744	Joseph Sardina
2090	EPA-HQ-OAR-2022-0829-4068	Josh Elliott
2091	EPA-HQ-OAR-2022-0829-0975	Josh Hunt
2092	EPA-HQ-OAR-2022-0829-5065	Joshua Ezekiel
2093	EPA-HQ-OAR-2022-0829-4006	Joshua Fox
2094	EPA-HQ-OAR-2022-0829-3162	Joshua Gibson
2095	EPA-HQ-OAR-2022-0829-2431	Joshua Latino
2096	EPA-HQ-OAR-2022-0829-4137	Joshua Pessar
2097	EPA-HQ-OAR-2022-0829-4982	Joy Randolph
2098	EPA-HQ-OAR-2022-0829-3358	Joyce Benenson
2099	EPA-HQ-OAR-2022-0829-4489	Joyce Davis

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2101	EPA-HQ-OAR-2022-0829-4878	Joyce Hohner
2102	EPA-HQ-OAR-2022-0829-2780	Joyce Hyne
2103	EPA-HQ-OAR-2022-0829-4450	Joyce Mast
2104	EPA-HQ-OAR-2022-0829-1940	Joyce Tilbury
2105	EPA-HQ-OAR-2022-0829-2549	Joyce Vinton
2106	EPA-HQ-OAR-2022-0829-3990	Joyce Vinton
2107	EPA-HQ-OAR-2022-0829-4275	Joyce Vinton
2108	EPA-HQ-OAR-2022-0829-2010	Joyce Walczynski
2109	EPA-HQ-OAR-2022-0829-3182	Joyce Weir
2110	EPA-HQ-OAR-2022-0829-2506	JR Stern
2111	EPA-HQ-OAR-2022-0829-2627	Juanita Coffelt
2112	EPA-HQ-OAR-2022-0829-1101	Judith Brunson
2113	EPA-HQ-OAR-2022-0829-0839	Judith Doyle
2114	EPA-HQ-OAR-2022-0829-5073	Judith Eda
2115	EPA-HQ-OAR-2022-0829-3038	Judith Kaplan
2116	EPA-HQ-OAR-2022-0829-2748	Judith Murphy
2117	EPA-HQ-OAR-2022-0829-0806	Judith Pfeiffer
2118	EPA-HQ-OAR-2022-0829-2844	Judith Preciado
2119	EPA-HQ-OAR-2022-0829-4278	JUDY BUDKE
2120	EPA-HQ-OAR-2022-0829-0920	Judy Danielson
2121	EPA-HQ-OAR-2022-0829-0918	Judy Grant
2122	EPA-HQ-OAR-2022-0829-1388	Judy Hahn
2123	EPA-HQ-OAR-2022-0829-3937	Judy Lomax
2124	EPA-HQ-OAR-2022-0829-3688	Judy Lukasiewicz
2125	EPA-HQ-OAR-2022-0829-2458	Judy Reynolds
2126	EPA-HQ-OAR-2022-0829-4938	Judy Schultz
2127	EPA-HQ-OAR-2022-0829-1099	Juli Kring

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2129	EPA-HQ-OAR-2022-0829-4787	Juli Kring
2130	EPA-HQ-OAR-2022-0829-1834	Julia Howell
2131	EPA-HQ-OAR-2022-0829-3264	Julia Howell
2132	EPA-HQ-OAR-2022-0829-4378	Julia Ingram
2133	EPA-HQ-OAR-2022-0829-4537	Julia Viands
2134	EPA-HQ-OAR-2022-0829-4161	Juliana Cheng
2135	EPA-HQ-OAR-2022-0829-2871	Julie Adelson
2136	EPA-HQ-OAR-2022-0829-4481	Julie Boles
2137	EPA-HQ-OAR-2022-0829-4547	Julie Breskin
2138	EPA-HQ-OAR-2022-0829-2076	Julie Carll
2139	EPA-HQ-OAR-2022-0829-3424	Julie Drake
2140	EPA-HQ-OAR-2022-0829-2846	Julie Dybdahl
2141	EPA-HQ-OAR-2022-0829-4363	Julie Klumpyan
2142	EPA-HQ-OAR-2022-0829-1883	Julie Martin
2143	EPA-HQ-OAR-2022-0829-5055	Julie Nye
2144	EPA-HQ-OAR-2022-0829-3658	Julie Porter
2145	EPA-HQ-OAR-2022-0829-4356	Julie Sims
2146	EPA-HQ-OAR-2022-0829-1174	Julien Zbinden
2147	EPA-HQ-OAR-2022-0829-4533	Juliet Bailey Bischoff
2148	EPA-HQ-OAR-2022-0829-1616	June Meek
2149	EPA-HQ-OAR-2022-0829-1882	June Meek
2150	EPA-HQ-OAR-2022-0829-3813	Justin Bornstad
2151	EPA-HQ-OAR-2022-0829-4918	Justin Lester
2152	EPA-HQ-OAR-2022-0829-3277	Justin Rucker
2153	EPA-HQ-OAR-2022-0829-1213	Justine Beeson
2154	EPA-HQ-OAR-2022-0829-2437	K Grigorian
2155	EPA-HQ-OAR-2022-0829-3789	Kaitlin Sundling

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2157	EPA-HQ-OAR-2022-0829-3839	Karen Albrecht
2158	EPA-HQ-OAR-2022-0829-4000	Karen Alderman
2159	EPA-HQ-OAR-2022-0829-3696	Karen Burke
2160	EPA-HQ-OAR-2022-0829-1130	Karen Burtness Prak
2161	EPA-HQ-OAR-2022-0829-4578	Karen Clair
2162	EPA-HQ-OAR-2022-0829-3245	Karen Coley
2163	EPA-HQ-OAR-2022-0829-2340	Karen Cox
2164	EPA-HQ-OAR-2022-0829-2470	Karen Cox
2165	EPA-HQ-OAR-2022-0829-2348	Karen Enns
2166	EPA-HQ-OAR-2022-0829-3930	Karen Frischkorn
2167	EPA-HQ-OAR-2022-0829-3420	Karen Gemar
2168	EPA-HQ-OAR-2022-0829-4854	Karen Gentry
2169	EPA-HQ-OAR-2022-0829-1341	Karen Gresham
2170	EPA-HQ-OAR-2022-0829-2943	Karen Gresham
2171	EPA-HQ-OAR-2022-0829-4085	Karen Gresham
2172	EPA-HQ-OAR-2022-0829-4667	Karen Hensley
2173	EPA-HQ-OAR-2022-0829-4942	Karen Hig
2174	EPA-HQ-OAR-2022-0829-3546	Karen Johnson
2175	EPA-HQ-OAR-2022-0829-3341	Karen Kahn
2176	EPA-HQ-OAR-2022-0829-5044	Karen Knetter
2177	EPA-HQ-OAR-2022-0829-2207	Karen Leaman
2178	EPA-HQ-OAR-2022-0829-1821	Karen Llewellyn
2179	EPA-HQ-OAR-2022-0829-3176	Karen M. Minahan
2180	EPA-HQ-OAR-2022-0829-1220	Karen Mahan
2181	EPA-HQ-OAR-2022-0829-4381	Karen Meyer
2182	EPA-HQ-OAR-2022-0829-2971	Karen Nonnewitz-Marston
2183	EPA-HQ-OAR-2022-0829-1595	Karen Nowicki

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2185	EPA-HQ-OAR-2022-0829-3037	Karen Pickett
2186	EPA-HQ-OAR-2022-0829-1480	Karen Raskasky
2187	EPA-HQ-OAR-2022-0829-2555	Karen Reese
2188	EPA-HQ-OAR-2022-0829-0842	Karen Samuelson
2189	EPA-HQ-OAR-2022-0829-1411	Karen Sauers
2190	EPA-HQ-OAR-2022-0829-4193	Karen Ulrich
2191	EPA-HQ-OAR-2022-0829-3326	Karen Van Atta
2192	EPA-HQ-OAR-2022-0829-4631	Karen Wolfrom
2193	EPA-HQ-OAR-2022-0829-2418	Karen Zea
2194	EPA-HQ-OAR-2022-0829-1499	Kari Fleck Gutstein
2195	EPA-HQ-OAR-2022-0829-1651	Kari Ostlie
2196	EPA-HQ-OAR-2022-0829-2406	Kari Wagers
2197	EPA-HQ-OAR-2022-0829-4527	Karin Hemmingsen
2198	EPA-HQ-OAR-2022-0829-4189	Karin Rader
2199	EPA-HQ-OAR-2022-0829-1350	Karl Engle
2200	EPA-HQ-OAR-2022-0829-3489	Karl Kanthak
2201	EPA-HQ-OAR-2022-0829-3821	Karla Haas
2202	EPA-HQ-OAR-2022-0829-1052	Karla Markus
2203	EPA-HQ-OAR-2022-0829-1102	Kate Considine
2204	EPA-HQ-OAR-2022-0829-3677	Kate Considine
2205	EPA-HQ-OAR-2022-0829-2796	Katharine OConnell
2206	EPA-HQ-OAR-2022-0829-2439	Katharine Penland
2207	EPA-HQ-OAR-2022-0829-3665	Katherine Anderson
2208	EPA-HQ-OAR-2022-0829-2286	Katherine Bennett
2209	EPA-HQ-OAR-2022-0829-1047	Katherine Del Conte
2210	EPA-HQ-OAR-2022-0829-2580	Katherine Hendricks
2211	EPA-HQ-OAR-2022-0829-5045	Katherine Ziegler

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2213	EPA-HQ-OAR-2022-0829-3422	Kathleen Burpee
2214	EPA-HQ-OAR-2022-0829-3857	Kathleen Dely
2215	EPA-HQ-OAR-2022-0829-3226	Kathleen Goryl
2216	EPA-HQ-OAR-2022-0829-3651	Kathleen Hitch
2217	EPA-HQ-OAR-2022-0829-4145	Kathleen Hulley
2218	EPA-HQ-OAR-2022-0829-1785	Kathleen Maloney
2219	EPA-HQ-OAR-2022-0829-4026	Kathleen O'Regan
2220	EPA-HQ-OAR-2022-0829-2536	Kathleen Redman
2221	EPA-HQ-OAR-2022-0829-2345	Kathleen Rollins
2222	EPA-HQ-OAR-2022-0829-3801	Kathleen Ryan
2223	EPA-HQ-OAR-2022-0829-4260	Kathleen Seline
2224	EPA-HQ-OAR-2022-0829-1478	Kathleen Windmueller
2225	EPA-HQ-OAR-2022-0829-2613	Kathryn Cobb
2226	EPA-HQ-OAR-2022-0829-2985	Kathryn Elalouf
2227	EPA-HQ-OAR-2022-0829-1961	Kathryn Hassenger
2228	EPA-HQ-OAR-2022-0829-3287	Kathryn Hill
2229	EPA-HQ-OAR-2022-0829-1983	Kathryn Vanderford
2230	EPA-HQ-OAR-2022-0829-3594	Kathryn Wood
2231	EPA-HQ-OAR-2022-0829-4388	Kathy Anderson
2232	EPA-HQ-OAR-2022-0829-3423	Kathy Baltsar
2233	EPA-HQ-OAR-2022-0829-1609	Kathy Cyganiewicz
2234	EPA-HQ-OAR-2022-0829-3969	Kathy Haney
2235	EPA-HQ-OAR-2022-0829-3587	Kathy Hansen
2236	EPA-HQ-OAR-2022-0829-1957	Kathy Hawes
2237	EPA-HQ-OAR-2022-0829-1565	Kathy Leblanc
2238	EPA-HQ-OAR-2022-0829-3916	Kathy Priest-Smith
2239	EPA-HQ-OAR-2022-0829-2394	Kathy Rayman

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2242	EPA-HQ-OAR-2022-0829-2473	Kathy Thomas
2243	EPA-HQ-OAR-2022-0829-3076	Kathy Tscheiner
2244	EPA-HQ-OAR-2022-0829-1657	Katie Gates
2245	EPA-HQ-OAR-2022-0829-1599	Katie Miller
2246	EPA-HQ-OAR-2022-0829-1097	Katie Spurlock
2247	EPA-HQ-OAR-2022-0829-1417	Katie West
2248	EPA-HQ-OAR-2022-0829-1653	Katy Libke
2249	EPA-HQ-OAR-2022-0829-3602	Kay Arnold
2250	EPA-HQ-OAR-2022-0829-2295	Kay Hudson
2251	EPA-HQ-OAR-2022-0829-4281	Kay Voge
2252	EPA-HQ-OAR-2022-0829-2834	Keegan Anderson
2253	EPA-HQ-OAR-2022-0829-2107	Keith Bowe
2254	EPA-HQ-OAR-2022-0829-1327	Keith Hezmalhalch
2255	EPA-HQ-OAR-2022-0829-1914	Keith Hughes
2256	EPA-HQ-OAR-2022-0829-3796	Keith Kizer
2257	EPA-HQ-OAR-2022-0829-1748	Keith Lewis
2258	EPA-HQ-OAR-2022-0829-0449	Keith Puntenney
2259	EPA-HQ-OAR-2022-0829-2124	Keith Rudolph
2260	EPA-HQ-OAR-2022-0829-1614	Keith Seymour
2261	EPA-HQ-OAR-2022-0829-3209	Keith Seymour
2262	EPA-HQ-OAR-2022-0829-2944	Keith Stevens
2263	EPA-HQ-OAR-2022-0829-2327	Keith Wahl
2264	EPA-HQ-OAR-2022-0829-4975	Keith Wahl
2265	EPA-HQ-OAR-2022-0829-2690	Keith Wilkins
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2269	EPA-HQ-OAR-2022-0829-3083	Kelly Marlatt
2270	EPA-HQ-OAR-2022-0829-2752	Kelly McKee
2271	EPA-HQ-OAR-2022-0829-4944	Kelly Peterson
2272	EPA-HQ-OAR-2022-0829-1861	Kelly Uchneat
2273	EPA-HQ-OAR-2022-0829-2320	Kelsey Keyes
2274	EPA-HQ-OAR-2022-0829-3159	Kelvin Cheng
2275	EPA-HQ-OAR-2022-0829-2740	Kelvin Kopp
2276	EPA-HQ-OAR-2022-0829-3880	Ken Brazier
2277	EPA-HQ-OAR-2022-0829-4589	Ken Bristow
2278	EPA-HQ-OAR-2022-0829-0899	Ken Burton
2279	EPA-HQ-OAR-2022-0829-3432	Ken Fadeley
2280	EPA-HQ-OAR-2022-0829-4850	Ken Gurvin
2281	EPA-HQ-OAR-2022-0829-4633	Ken Hammel
2282	EPA-HQ-OAR-2022-0829-0823	Ken Keefe
2283	EPA-HQ-OAR-2022-0829-1758	Ken Meeker
2284	EPA-HQ-OAR-2022-0829-3042	Ken Oliver
2285	EPA-HQ-OAR-2022-0829-2228	Ken Payauys
2286	EPA-HQ-OAR-2022-0829-4563	Kendall Sullivan
2287	EPA-HQ-OAR-2022-0829-1770	Kenn Olson
2288	EPA-HQ-OAR-2022-0829-0988	Kenneth Buskill
2289	EPA-HQ-OAR-2022-0829-1208	Kenneth Cook
2290	EPA-HQ-OAR-2022-0829-0830	Kenneth Cote
2291	EPA-HQ-OAR-2022-0829-2462	Kenneth Daniel
2292	EPA-HQ-OAR-2022-0829-2562	Kenneth Duncan
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2298	EPA-HQ-OAR-2022-0829-2913	Kenneth Harden
2299	EPA-HQ-OAR-2022-0829-0947	Kenneth Hasekamp
2300	EPA-HQ-OAR-2022-0829-1090	Kenneth Jackson
2301	EPA-HQ-OAR-2022-0829-2003	Kenneth Jackson
2302	EPA-HQ-OAR-2022-0829-4328	Kenneth Johnston
2303	EPA-HQ-OAR-2022-0829-3976	Kenneth Jordan
2304	EPA-HQ-OAR-2022-0829-4237	Kenneth Kimball
2305	EPA-HQ-OAR-2022-0829-4991	Kenneth Lyon
2306	EPA-HQ-OAR-2022-0829-3039	Kenneth Mendat
2307	EPA-HQ-OAR-2022-0829-2047	Kenneth Posey
2308	EPA-HQ-OAR-2022-0829-4849	Kenneth Starr
2309	EPA-HQ-OAR-2022-0829-3000	Kenneth Terhune
2310	EPA-HQ-OAR-2022-0829-3895	Kenny Gardner
2311	EPA-HQ-OAR-2022-0829-1890	Kent Hall
2312	EPA-HQ-OAR-2022-0829-5081	Kent Opal
2313	EPA-HQ-OAR-2022-0829-3364	Kenton Wells
2314	EPA-HQ-OAR-2022-0829-3328	Kenyon Karl
2315	EPA-HQ-OAR-2022-0829-2540	Kerry Baum
2316	EPA-HQ-OAR-2022-0829-2297	Kerry Brooks
2317	EPA-HQ-OAR-2022-0829-4248	Kerry Luedke
2318	EPA-HQ-OAR-2022-0829-4329	Kerry Nelson
2319	EPA-HQ-OAR-2022-0829-2640	Kerry Stone
2320	EPA-HQ-OAR-2022-0829-4668	Kerry Stone
2321	EPA-HQ-OAR-2022-0829-3670	Kerry Wilson
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2327	EPA-HQ-OAR-2022-0829-3297	Kevin Johnson
2328	EPA-HQ-OAR-2022-0829-2451	Kevin Keighin
2329	EPA-HQ-OAR-2022-0829-0949	Kevin Keller
2330	EPA-HQ-OAR-2022-0829-4879	Kevin Kennedy
2331	EPA-HQ-OAR-2022-0829-4592	Kevin Moody
2332	EPA-HQ-OAR-2022-0829-2284	Kevin Mulcahy
2333	EPA-HQ-OAR-2022-0829-4269	Kevin Rhatigan
2334	EPA-HQ-OAR-2022-0829-2994	Kevin Then
2335	EPA-HQ-OAR-2022-0829-4316	Kevin Then
2336	EPA-HQ-OAR-2022-0829-2945	Kevin Todd
2337	EPA-HQ-OAR-2022-0829-2948	Kevin Walsh
2338	EPA-HQ-OAR-2022-0829-2117	Kevin Wells
2339	EPA-HQ-OAR-2022-0829-2743	Kevin Wildemuth
2340	EPA-HQ-OAR-2022-0829-4104	Kim Allman
2341	EPA-HQ-OAR-2022-0829-3835	Kim Head
2342	EPA-HQ-OAR-2022-0829-0854	Kim Jones
2343	EPA-HQ-OAR-2022-0829-4675	Kim Martin
2344	EPA-HQ-OAR-2022-0829-0844	Kim Phillips
2345	EPA-HQ-OAR-2022-0829-3378	Kim Sebenoler
2346	EPA-HQ-OAR-2022-0829-1800	Kim Sherman
2347	EPA-HQ-OAR-2022-0829-2178	Kim Stover
2348	EPA-HQ-OAR-2022-0829-3273	Kimberlee Cather
2349	EPA-HQ-OAR-2022-0829-3989	Kimberly Durmis
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2356	EPA-HQ-OAR-2022-0829-1813	Kirt Schritz
2357	EPA-HQ-OAR-2022-0829-2781	Kit Lord
2358	EPA-HQ-OAR-2022-0829-1051	Kit Odom
2359	EPA-HQ-OAR-2022-0829-3851	Kory Chase
2360	EPA-HQ-OAR-2022-0829-4361	Kris Fox
2361	EPA-HQ-OAR-2022-0829-2827	Krista Lohr
2362	EPA-HQ-OAR-2022-0829-2102	Kristen Harris
2363	EPA-HQ-OAR-2022-0829-5002	Kristi Jones
2364	EPA-HQ-OAR-2022-0829-4694	Kristin Belisle
2365	EPA-HQ-OAR-2022-0829-5004	Kristin Graziano
2366	EPA-HQ-OAR-2022-0829-1866	Kristina Blanco
2367	EPA-HQ-OAR-2022-0829-2911	Kristina Lane
2368	EPA-HQ-OAR-2022-0829-1846	Kristina Robinson
2369	EPA-HQ-OAR-2022-0829-5101	Kristina Yates
2370	EPA-HQ-OAR-2022-0829-3706	Kristy Andrews
2371	EPA-HQ-OAR-2022-0829-2185	Kristy Asao
2372	EPA-HQ-OAR-2022-0829-3290	Krystal Jenkins
2373	EPA-HQ-OAR-2022-0829-3547	Krystal Jenkins
2374	EPA-HQ-OAR-2022-0829-1951	Kurt Kalenak
2375	EPA-HQ-OAR-2022-0829-2041	Kurt Schwarz
2376	EPA-HQ-OAR-2022-0829-1615	Kurt Teske
2377	EPA-HQ-OAR-2022-0829-1180	Kurt von Pessler
2378	EPA-HQ-OAR-2022-0829-1065	Kyla Martin
2379	EPA-HQ-OAR-2022-0829-1838	Kyle Anderson

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2382	EPA-HQ-OAR-2022-0829-2403	Kyle McAdam
2383	EPA-HQ-OAR-2022-0829-0889	Kylen Bowman
2384	EPA-HQ-OAR-2022-0829-2199	Kyler Westerfeldt
2385	EPA-HQ-OAR-2022-0829-1254	L. Love
2386	EPA-HQ-OAR-2022-0829-0862	Laci Custer
2387	EPA-HQ-OAR-2022-0829-1783	LaDawn Reid
2388	EPA-HQ-OAR-2022-0829-2652	Lalin Henderson
2389	EPA-HQ-OAR-2022-0829-4266	Lana Costello
2390	EPA-HQ-OAR-2022-0829-3606	Lance Hudson
2391	EPA-HQ-OAR-2022-0829-2064	Lance Keen
2392	EPA-HQ-OAR-2022-0829-3377	Landon Oliver
2393	EPA-HQ-OAR-2022-0829-2130	Lane Watkins
2394	EPA-HQ-OAR-2022-0829-3548	Larry Birdwell
2395	EPA-HQ-OAR-2022-0829-1151	Larry Burrows
2396	EPA-HQ-OAR-2022-0829-3563	Larry Cook
2397	EPA-HQ-OAR-2022-0829-1466	Larry Gremminger
2398	EPA-HQ-OAR-2022-0829-4023	Larry Langford
2399	EPA-HQ-OAR-2022-0829-4025	Larry Larson
2400	EPA-HQ-OAR-2022-0829-3534	Larry Lasiter
2401	EPA-HQ-OAR-2022-0829-3034	Larry Lasky
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2403	EPA-HQ-OAR-2022-0829-1808	Larry McGrenera
2404	EPA-HQ-OAR-2022-0829-2183	Larry Oberlander
2405	EPA-HQ-OAR-2022-0829-4046	Larry Oberlander
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2410	EPA-HQ-OAR-2022-0829-3726	Larry Reed
2411	EPA-HQ-OAR-2022-0829-3819	Larry Reese
2412	EPA-HQ-OAR-2022-0829-2329	Larry Smith
2413	EPA-HQ-OAR-2022-0829-2986	Larry Templeton
2414	EPA-HQ-OAR-2022-0829-4293	Larry Templeton
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2416	EPA-HQ-OAR-2022-0829-4406	Larry Tucker
2417	EPA-HQ-OAR-2022-0829-4389	Larry Verlinden
2418	EPA-HQ-OAR-2022-0829-3303	Larson James
2419	EPA-HQ-OAR-2022-0829-4964	Larson L. (no surname provided)
2420	EPA-HQ-OAR-2022-0829-2706	Lary Larson
2421	EPA-HQ-OAR-2022-0829-1567	Latonya McDevitt
2422	EPA-HQ-OAR-2022-0829-3248	Laura Adams
2423	EPA-HQ-OAR-2022-0829-2248	Laura Belchak
2424	EPA-HQ-OAR-2022-0829-3509	Laura Black
2425	EPA-HQ-OAR-2022-0829-2440	Laura Cox
2426	EPA-HQ-OAR-2022-0829-0946	Laura Drennan
2427	EPA-HQ-OAR-2022-0829-5012	Laura fries
2428	EPA-HQ-OAR-2022-0829-2951	Laura Gay
2429	EPA-HQ-OAR-2022-0829-2633	Laura Goodwin
2430	EPA-HQ-OAR-2022-0829-3325	Laura Haule
2431	EPA-HQ-OAR-2022-0829-3622	Laura Kelly
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2433	EPA-HQ-OAR-2022-0829-2830	Laura Magzis
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2439	EPA-HQ-OAR-2022-0829-3436	Laura Schofield
2440	EPA-HQ-OAR-2022-0829-3863	LAURA SUMRALL
2441	EPA-HQ-OAR-2022-0829-1081	Laura Telles
2442	EPA-HQ-OAR-2022-0829-3568	Laura Van Overschelde
2443	EPA-HQ-OAR-2022-0829-5069	Laura-Isabella Pais-fries
2444	EPA-HQ-OAR-2022-0829-4560	Laurel Hardin
2445	EPA-HQ-OAR-2022-0829-2245	Laurel Mancini
2446	EPA-HQ-OAR-2022-0829-5060	Lauren Bode
2447	EPA-HQ-OAR-2022-0829-3945	Laurie Brown
2448	EPA-HQ-OAR-2022-0829-4129	Laurie Dameron
2449	EPA-HQ-OAR-2022-0829-2054	Laurie Durgin
2450	EPA-HQ-OAR-2022-0829-2698	Laverne Larson
2451	EPA-HQ-OAR-2022-0829-2441	LaWren Booth
2452	EPA-HQ-OAR-2022-0829-3936	Lawrence Callaway
2453	EPA-HQ-OAR-2022-0829-2920	Lawrence Kalmbach
2454	EPA-HQ-OAR-2022-0829-1002	Lawrence Kramer
2455	EPA-HQ-OAR-2022-0829-2635	Lawrence Page
2456	EPA-HQ-OAR-2022-0829-2513	Lawrence Slagel
2457	EPA-HQ-OAR-2022-0829-3269	Lawrence Stice
2458	EPA-HQ-OAR-2022-0829-0978	Lawrence Turowski
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2460	EPA-HQ-OAR-2022-0829-4529	Leah Vandersluis
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2468	EPA-HQ-OAR-2022-0829-4906	Lee Wilson
2469	EPA-HQ-OAR-2022-0829-3567	Leisha Cowart
2470	EPA-HQ-OAR-2022-0829-2852	Lena Nilsson
2471	EPA-HQ-OAR-2022-0829-2162	Lenore Petruso
2472	EPA-HQ-OAR-2022-0829-1747	Leo Farnsworth
2473	EPA-HQ-OAR-2022-0829-4425	Leon Donahue
2474	EPA-HQ-OAR-2022-0829-1959	Leon Moores
2475	EPA-HQ-OAR-2022-0829-5026	Leonard Helt
2476	EPA-HQ-OAR-2022-0829-3586	Leroy Harbaugh
2477	EPA-HQ-OAR-2022-0829-4307	Leroy Harbaugh
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2479	EPA-HQ-OAR-2022-0829-2360	Leslie Gregg
2480	EPA-HQ-OAR-2022-0829-4078	Leslie Gregg
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2483	EPA-HQ-OAR-2022-0829-1880	Leslie Nunan
2484	EPA-HQ-OAR-2022-0829-3872	Leslie Provence
2485	EPA-HQ-OAR-2022-0829-2904	Leslie Spurling
2486	EPA-HQ-OAR-2022-0829-4594	Leslie Taylor
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2495	EPA-HQ-OAR-2022-0829-3812	Lidija Bell
2496	EPA-HQ-OAR-2022-0829-1293	Lillian Carpio
2497	EPA-HQ-OAR-2022-0829-4134	Lin Davis
2498	EPA-HQ-OAR-2022-0829-1203	Linda Calvelage
2499	EPA-HQ-OAR-2022-0829-4087	Linda Calvelage
2500	EPA-HQ-OAR-2022-0829-1819	Linda Carlson
2501	EPA-HQ-OAR-2022-0829-1665	Linda Chrystal
2502	EPA-HQ-OAR-2022-0829-2309	Linda Engle
2503	EPA-HQ-OAR-2022-0829-2929	Linda Feiring
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2505	EPA-HQ-OAR-2022-0829-3014	Linda Furlong
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2507	EPA-HQ-OAR-2022-0829-5054	Linda Hay
2508	EPA-HQ-OAR-2022-0829-4103	Linda Hayes
2509	EPA-HQ-OAR-2022-0829-2829	Linda Henson
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2515	EPA-HQ-OAR-2022-0829-2909	Linda Martin
2516	EPA-HQ-OAR-2022-0829-1207	Linda McCausland
2517	EPA-HQ-OAR-2022-0829-2697	Linda Mott-Smith
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2523	EPA-HQ-OAR-2022-0829-1495	Linda Racine
2524	EPA-HQ-OAR-2022-0829-4158	Linda Schelin
2525	EPA-HQ-OAR-2022-0829-2884	Linda Schneider
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2528	EPA-HQ-OAR-2022-0829-2542	Linda Sills
2529	EPA-HQ-OAR-2022-0829-4483	Linda Sills
2530	EPA-HQ-OAR-2022-0829-3263	Linda Smith
2531	EPA-HQ-OAR-2022-0829-3890	Linda Stamper
2532	EPA-HQ-OAR-2022-0829-0923	Linda Thompson
2533	EPA-HQ-OAR-2022-0829-4165	Linda Thompson
2534	EPA-HQ-OAR-2022-0829-2112	Linda Trocine
2535	EPA-HQ-OAR-2022-0829-2326	Linda Weimer
2536	EPA-HQ-OAR-2022-0829-2251	Linda Wilson
2537	EPA-HQ-OAR-2022-0829-2367	Linda Wiseman-Jones
2538	EPA-HQ-OAR-2022-0829-4837	Lindsay Mitchell
2539	EPA-HQ-OAR-2022-0829-2402	Lindsay Wert
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2542	EPA-HQ-OAR-2022-0829-4890	LInna Krumwied
2543	EPA-HQ-OAR-2022-0829-4876	Lionel Lugo
2544	EPA-HQ-OAR-2022-0829-4884	Lisa Coyne
2545	EPA-HQ-OAR-2022-0829-1520	Lisa Crabtree
2546	EPA-HQ-OAR-2022-0829-4393	Lisa Frey
2547	EPA-HQ-OAR-2022-0829-1211	Lisa Hendrickson
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2549	EPA-HQ-OAR-2022-0829-2823	Lisa Joy
2550	EPA-HQ-OAR-2022-0829-2792	Lisa Kunkel
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2555	EPA-HQ-OAR-2022-0829-2908	Lisa Wood
2556	EPA-HQ-OAR-2022-0829-4783	Liz Amsden
2557	EPA-HQ-OAR-2022-0829-0813	Liz Wagley
2558	EPA-HQ-OAR-2022-0829-1798	Liz Wagley
2559	EPA-HQ-OAR-2022-0829-2096	Liz Wagley
2560	EPA-HQ-OAR-2022-0829-3389	Llewellyn Lee
2561	EPA-HQ-OAR-2022-0829-4813	Lloyd Maraist
2562	EPA-HQ-OAR-2022-0829-1455	Lloyd Smith
2563	EPA-HQ-OAR-2022-0829-3135	Logan Danko
2564	EPA-HQ-OAR-2022-0829-4194	Logan Lozano
2565	EPA-HQ-OAR-2022-0829-3224	Lois Andersen
2566	EPA-HQ-OAR-2022-0829-2759	Lois Bahle
2567	EPA-HQ-OAR-2022-0829-2558	Lois Wilson
2568	EPA-HQ-OAR-2022-0829-3828	Lona Plisek
2569	EPA-HQ-OAR-2022-0829-4252	Loralee Batten
2570	EPA-HQ-OAR-2022-0829-0870	Lorelai Hammond
2571	EPA-HQ-OAR-2022-0829-5053	Lori Bryant
2572	EPA-HQ-OAR-2022-0829-3603	Lori Hanish
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2579	EPA-HQ-OAR-2022-0829-3371	Lorraine Stromberg
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2581	EPA-HQ-OAR-2022-0829-4641	Louis Bonin
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2588	EPA-HQ-OAR-2022-0829-2953	Louise Johnson
2589	EPA-HQ-OAR-2022-0829-2869	Louise Petering
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2591	EPA-HQ-OAR-2022-0829-2487	Lowell Neitzel
2592	EPA-HQ-OAR-2022-0829-1367	Lowell Steele
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2594	EPA-HQ-OAR-2022-0829-4088	Luanne Chihoski
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2596	EPA-HQ-OAR-2022-0829-3781	Luc Maker
2597	EPA-HQ-OAR-2022-0829-0963	Lucas Meharry
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2618	EPA-HQ-OAR-2022-0829-0836	Lynn Hawthorne
2619	EPA-HQ-OAR-2022-0829-2156	Lynn Hawthorne
2620	EPA-HQ-OAR-2022-0829-1123	Lynn Larroux
2621	EPA-HQ-OAR-2022-0829-4540	Lynn Larroux
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2627	EPA-HQ-OAR-2022-0829-2272	M & S Plumbing, Heating and Air Conditioning
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2634	EPA-HQ-OAR-2022-0829-4183	Madeline Amalphy
2635	EPA-HQ-OAR-2022-0829-1439	Maggie Hettinger
2636	EPA-HQ-OAR-2022-0829-3284	Mahmoud Elgassier
2637	EPA-HQ-OAR-2022-0829-1448	Maida Pirich
2638	EPA-HQ-OAR-2022-0829-3488	Maida Pirich
2639	EPA-HQ-OAR-2022-0829-1056	Malcolm Harbison
2640	EPA-HQ-OAR-2022-0829-1531	Malinda Perkins
2641	EPA-HQ-OAR-2022-0829-1631	Mandi Baladez
2642	EPA-HQ-OAR-2022-0829-1196	Mandy Kirkland
2643	EPA-HQ-OAR-2022-0829-4198	Manuel Suarez
2644	EPA-HQ-OAR-2022-0829-4763	Marc Duffy
2645	EPA-HQ-OAR-2022-0829-1518	Marc HIscox
2646	EPA-HQ-OAR-2022-0829-1735	Marc Hiscox
2647	EPA-HQ-OAR-2022-0829-2893	Marc LeMaire
2648	EPA-HQ-OAR-2022-0829-1247	Marc Lipkowitz
2649	EPA-HQ-OAR-2022-0829-1250	Marc Morrison
2650	EPA-HQ-OAR-2022-0829-2491	Marc Rauch
2651	EPA-HQ-OAR-2022-0829-5019	Marcia Gustafson
2652	EPA-HQ-OAR-2022-0829-4301	Marcia Hoy
2653	EPA-HQ-OAR-2022-0829-1811	Marcus Jensen
2654	EPA-HQ-OAR-2022-0829-1234	Marcus Kelly
2655	EPA-HQ-OAR-2022-0829-3180	Marcus Maloney
2656	EPA-HQ-OAR-2022-0829-4958	Marcy (no surname provided)
2657	EPA-HQ-OAR-2022-0829-0826	Marcy Sanders
2658	EPA-HQ-OAR-2022-0829-3417	Margaret Boyd
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2663	EPA-HQ-OAR-2022-0829-3196	Margaret Kling
2664	EPA-HQ-OAR-2022-0829-1806	Margaret Montana
2665	EPA-HQ-OAR-2022-0829-4933	Margaret Phanes
2666	EPA-HQ-OAR-2022-0829-4772	Margaret Roth
2667	EPA-HQ-OAR-2022-0829-2751	Margaret Schubert
2668	EPA-HQ-OAR-2022-0829-1003	Margaret Smetana
2669	EPA-HQ-OAR-2022-0829-2424	Margaret Smetana
2670	EPA-HQ-OAR-2022-0829-1353	Margaret Stolpen
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2672	EPA-HQ-OAR-2022-0829-1862	Margaret Wilson
2673	EPA-HQ-OAR-2022-0829-2072	Margaret Wilson
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2676	EPA-HQ-OAR-2022-0829-3242	Margaret Wilson
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2681	EPA-HQ-OAR-2022-0829-2479	Maria Thereza Santos Stone
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2683	EPA-HQ-OAR-2022-0829-4705	Marian Malone
2684	EPA-HQ-OAR-2022-0829-0980	Mariann Benway
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2691	EPA-HQ-OAR-2022-0829-4915	Marie Gronley
2692	EPA-HQ-OAR-2022-0829-4317	Marie murray
2693	EPA-HQ-OAR-2022-0829-4558	Marie Taylor
2694	EPA-HQ-OAR-2022-0829-4802	Marie Wolpers
2695	EPA-HQ-OAR-2022-0829-2786	Marilyn Oser
2696	EPA-HQ-OAR-2022-0829-4507	Marina Verdun
2697	EPA-HQ-OAR-2022-0829-1756	Marjorie Hooper
2698	EPA-HQ-OAR-2022-0829-2063	Marjorie Kirchmeyer
2699	EPA-HQ-OAR-2022-0829-3473	Marjorie Stewart
2700	EPA-HQ-OAR-2022-0829-1964	Mark Armstrong
2701	EPA-HQ-OAR-2022-0829-1241	Mark Baumiller
2702	EPA-HQ-OAR-2022-0829-4893	Mark Besmen
2703	EPA-HQ-OAR-2022-0829-1809	Mark Bondurant
2704	EPA-HQ-OAR-2022-0829-4603	Mark Bunselmeyer
2705	EPA-HQ-OAR-2022-0829-1447	Mark Coffey
2706	EPA-HQ-OAR-2022-0829-1885	Mark Coffey
2707	EPA-HQ-OAR-2022-0829-5071	Mark Coffey
2708	EPA-HQ-OAR-2022-0829-4457	Mark Coldren
2709	EPA-HQ-OAR-2022-0829-0849	Mark Davis
2710	EPA-HQ-OAR-2022-0829-3807	Mark Dunford
2711	EPA-HQ-OAR-2022-0829-1828	Mark Fisher
2712	EPA-HQ-OAR-2022-0829-2480	Mark Fisher
2713	EPA-HQ-OAR-2022-0829-1418	Mark Floyd
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2719	EPA-HQ-OAR-2022-0829-3827	Mark Hillenburg
2720	EPA-HQ-OAR-2022-0829-4063	Mark Horan
2721	EPA-HQ-OAR-2022-0829-3994	Mark Hutto
2722	EPA-HQ-OAR-2022-0829-1230	Mark Ingram
2723	EPA-HQ-OAR-2022-0829-2343	Mark Jacobson
2724	EPA-HQ-OAR-2022-0829-4661	Mark Knox
2725	EPA-HQ-OAR-2022-0829-0848	Mark Ledger
2726	EPA-HQ-OAR-2022-0829-1984	Mark Marshall
2727	EPA-HQ-OAR-2022-0829-1913	Mark Martell
2728	EPA-HQ-OAR-2022-0829-4302	Mark Nahmias
2729	EPA-HQ-OAR-2022-0829-1187	Mark Nicklay
2730	EPA-HQ-OAR-2022-0829-0887	Mark Nixon
2731	EPA-HQ-OAR-2022-0829-4144	Mark Pezzati
2732	EPA-HQ-OAR-2022-0829-0501	Mark Richardson
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2734	EPA-HQ-OAR-2022-0829-4218	Mark Slingerland
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2736	EPA-HQ-OAR-2022-0829-3254	Mark Vancil
2737	EPA-HQ-OAR-2022-0829-1278	Mark Varley
2738	EPA-HQ-OAR-2022-0829-4973	Mark Willis
2739	EPA-HQ-OAR-2022-0829-4996	Mark Willis
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2747	EPA-HQ-OAR-2022-0829-3550	Marshall Richards
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2749	EPA-HQ-OAR-2022-0829-4949	Martha Johnson
2750	EPA-HQ-OAR-2022-0829-5005	Martha Karlstad
2751	EPA-HQ-OAR-2022-0829-2411	Martha Redmond
2752	EPA-HQ-OAR-2022-0829-4867	Martha Rhoades
2753	EPA-HQ-OAR-2022-0829-2821	Martha Whitman
2754	EPA-HQ-OAR-2022-0829-5047	Martha Wilson
2755	EPA-HQ-OAR-2022-0829-4833	Martin Barbre
2756	EPA-HQ-OAR-2022-0829-3361	Martin D. Stephens
2757	EPA-HQ-OAR-2022-0829-2391	Martin Kralik
2758	EPA-HQ-OAR-2022-0829-3694	Martin Kralik
2759	EPA-HQ-OAR-2022-0829-4614	Martin Marr
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2769	EPA-HQ-OAR-2022-0829-3295	Mary Ann Rennels
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2775	EPA-HQ-OAR-2022-0829-1638	Mary Canter
2776	EPA-HQ-OAR-2022-0829-4437	Mary Canter
2777	EPA-HQ-OAR-2022-0829-3443	Mary Carlton
2778	EPA-HQ-OAR-2022-0829-2860	Mary D. Moderacki
2779	EPA-HQ-OAR-2022-0829-4453	Mary Dadian
2780	EPA-HQ-OAR-2022-0829-3475	Mary DeMartino
2781	EPA-HQ-OAR-2022-0829-2741	Mary Diehl
2782	EPA-HQ-OAR-2022-0829-1338	Mary Erickson
2783	EPA-HQ-OAR-2022-0829-2221	Mary Erickson
2784	EPA-HQ-OAR-2022-0829-1457	Mary Fritschle
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2787	EPA-HQ-OAR-2022-0829-3811	Mary Grill
2788	EPA-HQ-OAR-2022-0829-1040	Mary Gurganus
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2808	EPA-HQ-OAR-2022-0829-2312	Mary Waggener
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2810	EPA-HQ-OAR-2022-0829-2372	Mary Wilbanks
2811	EPA-HQ-OAR-2022-0829-4538	Mary Wildt
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2831	EPA-HQ-OAR-2022-0829-4493	Matthew Tucker
2832	EPA-HQ-OAR-2022-0829-1884	Matthew Williams
2833	EPA-HQ-OAR-2022-0829-2981	Matthew` Burke
2834	EPA-HQ-OAR-2022-0829-2885	Maureen Kilroy
2835	EPA-HQ-OAR-2022-0829-5066	Maureen Kilroy
2836	EPA-HQ-OAR-2022-0829-4748	Maureen Mitchell
2837	EPA-HQ-OAR-2022-0829-1767	Maureen O'Ferrall
2838	EPA-HQ-OAR-2022-0829-3415	Maureen O'Ferrall
2839	EPA-HQ-OAR-2022-0829-2099	Mauri Norman
2840	EPA-HQ-OAR-2022-0829-3025	Maury Miller
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2842	EPA-HQ-OAR-2022-0829-1015	Meg Wilson
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3167	EPA-HQ-OAR-2022-0829-3522	Patricia Woods
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3171	EPA-HQ-OAR-2022-0829-2168	Patrick Eves
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4038	EPA-HQ-OAR-2022-0829-3818	Thomas Meyer
4039	EPA-HQ-OAR-2022-0829-2244	Thomas Morrison
4040	EPA-HQ-OAR-2022-0829-4562	Thomas Panetta
4041	EPA-HQ-OAR-2022-0829-4952	Thomas Pekol
4042	EPA-HQ-OAR-2022-0829-4254	Thomas Pichla
4043	EPA-HQ-OAR-2022-0829-3491	Thomas Puglia
4044	EPA-HQ-OAR-2022-0829-4610	Thomas Ramus
4045	EPA-HQ-OAR-2022-0829-0921	Thomas Rausch
4046	EPA-HQ-OAR-2022-0829-1280	Thomas Reed
4047	EPA-HQ-OAR-2022-0829-2250	Thomas Remmey
4048	EPA-HQ-OAR-2022-0829-2169	Thomas Sassaman
4049	EPA-HQ-OAR-2022-0829-2969	Thomas Tucker
4050	EPA-HQ-OAR-2022-0829-4022	Thomas Tucker
4051	EPA-HQ-OAR-2022-0829-3530	Thomas voloshen
4052	EPA-HQ-OAR-2022-0829-1335	Thomas Wappes
4053	EPA-HQ-OAR-2022-0829-2158	Thomas Williamson
4054	EPA-HQ-OAR-2022-0829-2578	Thomas Wynn
4055	EPA-HQ-OAR-2022-0829-1184	Tierney Clark
4056	EPA-HQ-OAR-2022-0829-5043	Tim Bardell

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1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
4057	EPA-HQ-OAR-2022-0829-1242	Tim Bieker
4058	EPA-HQ-OAR-2022-0829-0834	Tim Breuninger
4059	EPA-HQ-OAR-2022-0829-4966	Tim Browne
4060	EPA-HQ-OAR-2022-0829-1062	Tim Creveling
4061	EPA-HQ-OAR-2022-0829-1500	Tim Guffey
4062	EPA-HQ-OAR-2022-0829-3613	Tim Guffey
4063	EPA-HQ-OAR-2022-0829-0958	Tim Helms
4064	EPA-HQ-OAR-2022-0829-0922	Tim Kautza
4065	EPA-HQ-OAR-2022-0829-4826	Tim Killian
4066	EPA-HQ-OAR-2022-0829-4828	Tim Lenz
4067	EPA-HQ-OAR-2022-0829-3073	Tim Maiers
4068	EPA-HQ-OAR-2022-0829-2568	Tim O'Connell
4069	EPA-HQ-OAR-2022-0829-4008	Tim Seidel
4070	EPA-HQ-OAR-2022-0829-2851	Tim Sunlake
4071	EPA-HQ-OAR-2022-0829-4827	Tim Thompson
4072	EPA-HQ-OAR-2022-0829-1244	Tim Young
4073	EPA-HQ-OAR-2022-0829-4743	Timothy Anders
4074	EPA-HQ-OAR-2022-0829-4414	Timothy Bybee
4075	EPA-HQ-OAR-2022-0829-3355	Timothy Dudley
4076	EPA-HQ-OAR-2022-0829-4476	Timothy Frink
4077	EPA-HQ-OAR-2022-0829-1519	Timothy Karp
4078	EPA-HQ-OAR-2022-0829-1303	Timothy Kell
4079	EPA-HQ-OAR-2022-0829-2012	Timothy Kell
4080	EPA-HQ-OAR-2022-0829-3762	Timothy Kent
4081	EPA-HQ-OAR-2022-0829-3081	Timothy Mehallick
4082	EPA-HQ-OAR-2022-0829-2735	Timothy Mishic
4083	EPA-HQ-OAR-2022-0829-1058	Timothy Northcott
4084	EPA-HQ-OAR-2022-0829-1522	Timothy Schnaitman

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1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
4085	EPA-HQ-OAR-2022-0829-2469	Timothy Spong
4086	EPA-HQ-OAR-2022-0829-2717	Timothy Spong
4087	EPA-HQ-OAR-2022-0829-4937	Tina Grosowsky
4088	EPA-HQ-OAR-2022-0829-4168	Tina Jinkens
4089	EPA-HQ-OAR-2022-0829-2711	Tina Sackman
4090	EPA-HQ-OAR-2022-0829-3905	Tisa cheney
4091	EPA-HQ-OAR-2022-0829-1416	Titan Fuel Tanks
4092	EPA-HQ-OAR-2022-0829-4349	Tod Bartholomew
4093	EPA-HQ-OAR-2022-0829-4597	Tod Bartholomew
4094	EPA-HQ-OAR-2022-0829-2258	Todd Coleman
4095	EPA-HQ-OAR-2022-0829-1533	Todd Hendricks
4096	EPA-HQ-OAR-2022-0829-4701	Todd Jarvis
4097	EPA-HQ-OAR-2022-0829-4073	Todd Kettering
4098	EPA-HQ-OAR-2022-0829-0935	Todd Marvin
4099	EPA-HQ-OAR-2022-0829-3194	Todd Middleton
4100	EPA-HQ-OAR-2022-0829-4708	Todd Perry
4101	EPA-HQ-OAR-2022-0829-3804	Todd Place
4102	EPA-HQ-OAR-2022-0829-2192	Todd Snyder
4103	EPA-HQ-OAR-2022-0829-2193	Todd Snyder
4104	EPA-HQ-OAR-2022-0829-2736	Todd Snyder
4105	EPA-HQ-OAR-2022-0829-2935	Todd Sparks
4106	EPA-HQ-OAR-2022-0829-2810	Tom Byrnes
4107	EPA-HQ-OAR-2022-0829-3713	Tom DeMartini
4108	EPA-HQ-OAR-2022-0829-2123	Tom Fortner
4109	EPA-HQ-OAR-2022-0829-4564	Tom Goodwin
4110	EPA-HQ-OAR-2022-0829-3071	Tom Graham
4111	EPA-HQ-OAR-2022-0829-4599	Tom Graham
4112	EPA-HQ-OAR-2022-0829-2957	Tom Grant

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4114	EPA-HQ-OAR-2022-0829-2205	Tom Meyer
4115	EPA-HQ-OAR-2022-0829-2233	Tom Morgan
4116	EPA-HQ-OAR-2022-0829-3714	Tom Nobis
4117	EPA-HQ-OAR-2022-0829-1427	Tom Schafer
4118	EPA-HQ-OAR-2022-0829-2845	Tom Steinmetz
4119	EPA-HQ-OAR-2022-0829-0812	Tom Wagley
4120	EPA-HQ-OAR-2022-0829-3525	Tommie Martin
4121	EPA-HQ-OAR-2022-0829-2974	TOMMY ROBERTS
4122	EPA-HQ-OAR-2022-0829-4685	Tony Paskali
4123	EPA-HQ-OAR-2022-0829-1315	Tony Troutman
4124	EPA-HQ-OAR-2022-0829-1954	Tonya Dunn
4125	EPA-HQ-OAR-2022-0829-3150	Tonya Kelley
4126	EPA-HQ-OAR-2022-0829-2039	Tracey Bonner
4127	EPA-HQ-OAR-2022-0829-4009	Tracey Powers
4128	EPA-HQ-OAR-2022-0829-2386	Tracy Angeles
4129	EPA-HQ-OAR-2022-0829-1399	Tracy Curran
4130	EPA-HQ-OAR-2022-0829-1121	Tracy Hawkins
4131	EPA-HQ-OAR-2022-0829-2887	Tracy Heart
4132	EPA-HQ-OAR-2022-0829-3661	Tracy Price
4133	EPA-HQ-OAR-2022-0829-1307	Tracy Sparks
4134	EPA-HQ-OAR-2022-0829-0841	Travis McCullough
4135	EPA-HQ-OAR-2022-0829-1322	Trent Perkins
4136	EPA-HQ-OAR-2022-0829-4114	Trevor Bollmann
4137	EPA-HQ-OAR-2022-0829-1907	Trevor Laurie
4138	EPA-HQ-OAR-2022-0829-3145	Trey Thompson
4139	EPA-HQ-OAR-2022-0829-1042	Triangle Republican women
4140	EPA-HQ-OAR-2022-0829-3243	Trisha Lucero

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4141	EPA-HQ-OAR-2022-0829-1347	Troy Black
4142	EPA-HQ-OAR-2022-0829-1733	Troy Lindquist
4143	EPA-HQ-OAR-2022-0829-1482	Trudee Nims
4144	EPA-HQ-OAR-2022-0829-1739	U.S. Representative Harriet M. Hageman
4145	EPA-HQ-OAR-2022-0829-0520	United States Climate Alliance
4146	EPA-HQ-OAR-2022-0829-1019	Urbiegato Morbidendus
4147	EPA-HQ-OAR-2022-0829-2058	Ursula Cohrs
4148	EPA-HQ-OAR-2022-0829-2805	Ursula Cohrs
4149	EPA-HQ-OAR-2022-0829-3700	Valerie Allar
4150	EPA-HQ-OAR-2022-0829-1536	Valerie Dunbar
4151	EPA-HQ-OAR-2022-0829-4725	Valerie Huerta
4152	EPA-HQ-OAR-2022-0829-4076	Valri Kriner
4153	EPA-HQ-OAR-2022-0829-3618	Van Elander
4154	EPA-HQ-OAR-2022-0829-4887	Van Heath
4155	EPA-HQ-OAR-2022-0829-2355	Vance Revennaugh
4156	EPA-HQ-OAR-2022-0829-4947	Vasu Murti
4157	EPA-HQ-OAR-2022-0829-1177	Veeral Lad
4158	EPA-HQ-OAR-2022-0829-4431	Vernon Huber
4159	EPA-HQ-OAR-2022-0829-4385	Vernon Ryan
4160	EPA-HQ-OAR-2022-0829-1262	Vic Minish
4161	EPA-HQ-OAR-2022-0829-3869	Vic Nicholls
4162	EPA-HQ-OAR-2022-0829-2793	Vicki Bynum
4163	EPA-HQ-OAR-2022-0829-2347	Vicki Paxton
4164	EPA-HQ-OAR-2022-0829-4222	Vicki Paxton
4165	EPA-HQ-OAR-2022-0829-3627	Vicki Stewart
4166	EPA-HQ-OAR-2022-0829-4798	Vickie Brown
4167	EPA-HQ-OAR-2022-0829-2709	Vickie Hatton
4168	EPA-HQ-OAR-2022-0829-4709	Vickie Riggins

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4169	EPA-HQ-OAR-2022-0829-2011	Vicky Rafn
4170	EPA-HQ-OAR-2022-0829-2527	Vicky Zelenka
4171	EPA-HQ-OAR-2022-0829-1404	Victor Brown
4172	EPA-HQ-OAR-2022-0829-2110	Victor Johnson
4173	EPA-HQ-OAR-2022-0829-4041	Victor Johnson
4174	EPA-HQ-OAR-2022-0829-4199	Victoria Farrell
4175	EPA-HQ-OAR-2022-0829-1153	Victoria Pless
4176	EPA-HQ-OAR-2022-0829-2712	Victoria Skalland
4177	EPA-HQ-OAR-2022-0829-4496	Vincent Salvatore
4178	EPA-HQ-OAR-2022-0829-1601	Virginia Choate
4179	EPA-HQ-OAR-2022-0829-4150	Virginia Choate
4180	EPA-HQ-OAR-2022-0829-2307	Virginia Harris
4181	EPA-HQ-OAR-2022-0829-3510	Virginia Lee
4182	EPA-HQ-OAR-2022-0829-1738	Virginia Metcalf
4183	EPA-HQ-OAR-2022-0829-3967	Virginia Thomas
4184	EPA-HQ-OAR-2022-0829-4179	Vivian Broadhead
4185	EPA-HQ-OAR-2022-0829-3368	Vonn Koshinski
4186	EPA-HQ-OAR-2022-0829-3703	W. Smith
4187	EPA-HQ-OAR-2022-0829-3792	Walker Shapiro
4188	EPA-HQ-OAR-2022-0829-2722	Wallace Alvey
4189	EPA-HQ-OAR-2022-0829-2557	Wallace Bosma
4190	EPA-HQ-OAR-2022-0829-4303	Wallace Bosma
4191	EPA-HQ-OAR-2022-0829-1987	Wallace Judd
4192	EPA-HQ-OAR-2022-0829-4096	Wallace Mitchell
4193	EPA-HQ-OAR-2022-0829-4916	Walt Trojanowski
4194	EPA-HQ-OAR-2022-0829-4519	Walter Adams
4195	EPA-HQ-OAR-2022-0829-1248	Walter Bright
4196	EPA-HQ-OAR-2022-0829-2607	Walter Evens

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1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
4197	EPA-HQ-OAR-2022-0829-3649	Walter FitzPatrick
4198	EPA-HQ-OAR-2022-0829-1944	Walter mirczak
4199	EPA-HQ-OAR-2022-0829-4116	Walter Phillips
4200	EPA-HQ-OAR-2022-0829-3084	Walter Shonk
4201	EPA-HQ-OAR-2022-0829-1836	Walter Truitt
4202	EPA-HQ-OAR-2022-0829-1257	Ward Wenholz
4203	EPA-HQ-OAR-2022-0829-1232	Warren Hostetter
4204	EPA-HQ-OAR-2022-0829-4628	Warren Kitchen
4205	EPA-HQ-OAR-2022-0829-1380	Warren Musselman
4206	EPA-HQ-OAR-2022-0829-2198	Warren Musselman
4207	EPA-HQ-OAR-2022-0829-1286	Wayne Aarum
4208	EPA-HQ-OAR-2022-0829-1396	Wayne Bliss
4209	EPA-HQ-OAR-2022-0829-2628	Wayne Forkum
4210	EPA-HQ-OAR-2022-0829-2584	Wayne Ginnow
4211	EPA-HQ-OAR-2022-0829-4126	Wayne Graff
4212	EPA-HQ-OAR-2022-0829-3964	Wayne Peterkin
4213	EPA-HQ-OAR-2022-0829-4629	Wayne Smyly
4214	EPA-HQ-OAR-2022-0829-2959	Wells Lynne
4215	EPA-HQ-OAR-2022-0829-1328	Wendell Hurst
4216	EPA-HQ-OAR-2022-0829-4832	Wendell Shauman
4217	EPA-HQ-OAR-2022-0829-3461	Wendi R. Wilkinson
4218	EPA-HQ-OAR-2022-0829-2324	Wendy Alberg
4219	EPA-HQ-OAR-2022-0829-4639	Werner Alber
4220	EPA-HQ-OAR-2022-0829-4470	Wgh Adyk
4221	EPA-HQ-OAR-2022-0829-2019	Wilbur Sauerbry
4222	EPA-HQ-OAR-2022-0829-1149	Wiliam Hunt
4223	EPA-HQ-OAR-2022-0829-2466	Will Parker
4224	EPA-HQ-OAR-2022-0829-2806	Will Perry

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1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
4225	EPA-HQ-OAR-2022-0829-4680	William Ackerman
4226	EPA-HQ-OAR-2022-0829-4847	William Bistak
4227	EPA-HQ-OAR-2022-0829-1974	William Brethauer
4228	EPA-HQ-OAR-2022-0829-3382	William Cathey
4229	EPA-HQ-OAR-2022-0829-4365	William Chalgren
4230	EPA-HQ-OAR-2022-0829-1803	William Clark
4231	EPA-HQ-OAR-2022-0829-3305	William Clark
4232	EPA-HQ-OAR-2022-0829-4682	William Clark
4233	EPA-HQ-OAR-2022-0829-0989	William Coates
4234	EPA-HQ-OAR-2022-0829-2194	William Coates
4235	EPA-HQ-OAR-2022-0829-1652	William Cooper
4236	EPA-HQ-OAR-2022-0829-1937	William Cunningham
4237	EPA-HQ-OAR-2022-0829-4226	William Dargan
4238	EPA-HQ-OAR-2022-0829-1111	William Dixon
4239	EPA-HQ-OAR-2022-0829-2556	William Foster
4240	EPA-HQ-OAR-2022-0829-4326	William Foster
4241	EPA-HQ-OAR-2022-0829-1982	William Frost
4242	EPA-HQ-OAR-2022-0829-4980	William Geresy
4243	EPA-HQ-OAR-2022-0829-2638	William Gibson
4244	EPA-HQ-OAR-2022-0829-2618	William Gradoville
4245	EPA-HQ-OAR-2022-0829-2645	William Gradoville
4246	EPA-HQ-OAR-2022-0829-4583	William Gradoville
4247	EPA-HQ-OAR-2022-0829-4339	william grant
4248	EPA-HQ-OAR-2022-0829-4232	William Hammons
4249	EPA-HQ-OAR-2022-0829-3972	William Hewitt
4250	EPA-HQ-OAR-2022-0829-4202	William Holman
4251	EPA-HQ-OAR-2022-0829-2888	William Huggins
4252	EPA-HQ-OAR-2022-0829-4718	William Jackson

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1	EPA-HQ-OAR-2022-0829-1750	4D Transportation, Inc.
4253	EPA-HQ-OAR-2022-0829-3884	William Johnson
4254	EPA-HQ-OAR-2022-0829-2563	William Kaminske
4255	EPA-HQ-OAR-2022-0829-3375	William Kamp
4256	EPA-HQ-OAR-2022-0829-4234	William Kamp
4257	EPA-HQ-OAR-2022-0829-4276	William King
4258	EPA-HQ-OAR-2022-0829-3721	William Kinkead
4259	EPA-HQ-OAR-2022-0829-4127	William M Musser IV
4260	EPA-HQ-OAR-2022-0829-2246	William McDowell Mastin
4261	EPA-HQ-OAR-2022-0829-3689	William McPherson
4262	EPA-HQ-OAR-2022-0829-1792	William Michie
4263	EPA-HQ-OAR-2022-0829-2732	William Michie
4264	EPA-HQ-OAR-2022-0829-3133	William Michie
4265	EPA-HQ-OAR-2022-0829-1831	William Nelson
4266	EPA-HQ-OAR-2022-0829-4815	William Phillips
4267	EPA-HQ-OAR-2022-0829-1205	William Pirnat
4268	EPA-HQ-OAR-2022-0829-1690	William Pirnat
4269	EPA-HQ-OAR-2022-0829-3679	William Porter
4270	EPA-HQ-OAR-2022-0829-3427	William Robinson
4271	EPA-HQ-OAR-2022-0829-3447	William S Fairhurst
4272	EPA-HQ-OAR-2022-0829-4512	William Santo
4273	EPA-HQ-OAR-2022-0829-3981	William Slicher
4274	EPA-HQ-OAR-2022-0829-4673	William Tafolla
4275	EPA-HQ-OAR-2022-0829-2729	William Veitch
4276	EPA-HQ-OAR-2022-0829-4905	William Vroman
4277	EPA-HQ-OAR-2022-0829-4522	William Werner
4278	EPA-HQ-OAR-2022-0829-2685	William Wild
4279	EPA-HQ-OAR-2022-0829-3130	William Willson
4280	EPA-HQ-OAR-2022-0829-0524	William Wilson

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4281	EPA-HQ-OAR-2022-0829-4914	William Wortman
4282	EPA-HQ-OAR-2022-0829-4852	William Young
4283	EPA-HQ-OAR-2022-0829-1590	Willizm Orso
4284	EPA-HQ-OAR-2022-0829-4142	Wisconsin Environmental Health Network
4285	EPA-HQ-OAR-2022-0829-3570	WJ graves
4286	EPA-HQ-OAR-2022-0829-4091	Wwayn Smith
4287	EPA-HQ-OAR-2022-0829-0860	Wyatt Halterman
4288	EPA-HQ-OAR-2022-0829-0688	Wyatt Tomlinson
4289	EPA-HQ-OAR-2022-0829-1537	Wyatt Wilkinson
4290	EPA-HQ-OAR-2022-0829-0858	Yasmine Juarez
4291	EPA-HQ-OAR-2022-0829-1312	Yolanda Sylvester
4292	EPA-HQ-OAR-2022-0829-1450	Yolanda Sylvester
4293	EPA-HQ-OAR-2022-0829-1597	Yolanda Sylvester
4294	EPA-HQ-OAR-2022-0829-4149	Yolanda Sylvester
4295	EPA-HQ-OAR-2022-0829-3809	Yunhui Pu
4296	EPA-HQ-OAR-2022-0829-1645	Yvonne Collins
4297	EPA-HQ-OAR-2022-0829-2493	Yvonne Smith
4298	EPA-HQ-OAR-2022-0829-0805	Zach Dunham
4299	EPA-HQ-OAR-2022-0829-2040	Zachary Katznelson
4300	EPA-HQ-OAR-2022-0829-3477	Zachary Rogers
4301	EPA-HQ-OAR-2022-0829-3136	Zachary Winslett
4302	EPA-HQ-OAR-2022-0829-5039	Zane Bennett
4303	EPA-HQ-OAR-2022-0829-3001	Zee Alexi
4304	EPA-HQ-OAR-2022-0829-4943	Zoe Poteet

Appendix B: Mass comment campaigns

EPA received 46 mass mail campaigns commenting on the proposal, representing 247,767 signatures. These mass comment campaigns are in the form of either a cover letter with many signatures; individual letters that are identical or nearly identical; or a cover note with a spreadsheet containing many individual comments. The mass mail campaigns are listed in Table B-1, organized by the sponsoring organization (if known), along with the number of signatures. Also reproduced verbatim below is the docketed example of each mass mail campaign or one excerpt from the associated spreadsheet or attachments.

Sixteen of the mass mail campaigns contain detailed comments and are included verbatim in the RtC document. These are also noted in Table B-1. The remaining 30 comments are reproduced below.

Table B-1: List of Mass Comment Campaigns

	Docket Number	Sponsoring Organization	Number of Signatures	Included Verbatim in RtC Section
1	EPA-HQ-OAR-2022-0829-0505	E2 Environmental Entrepreneur Business Leaders. (web)	124	
2	EPA-HQ-OAR-2022-0829-0512	Moms Clean Air Force - Arizona. (web)	40	
3	EPA-HQ-OAR-2022-0829-0535	Moms Clean Air Force - Arizona Chapter	14	
4	EPA-HQ-OAR-2022-0829-0543	Alliance of Nurses for Healthy Environments (web)	54	
5	EPA-HQ-OAR-2022-0829-0691	The Climate Reality Project. (web)	7,367	
6	EPA-HQ-OAR-2022-0829-0692	Arizona Interfaith Power & Light. (web)	216	9
7	EPA-HQ-OAR-2022-0829-0693	Evangelical Environmental Network (EEN). (web)	25,303	
8	EPA-HQ-OAR-2022-0829-0717	Natural Resources Defense Council (NRDC). (web)	24,038	
9	EPA-HQ-OAR-2022-0829-0718	Missouri Corn Growers Association (MCGA). (web)	168	19.1
10	EPA-HQ-OAR-2022-0829-0719	Interfaith Power & Light (IPL). (web)	190	
11	EPA-HQ-OAR-2022-0829-0720	Union of Concerned Scientists. (web)	1,030	
12	EPA-HQ-OAR-2022-0829-0721	Evergreen Collaborative. (web)	8,119	
13	EPA-HQ-OAR-2022-0829-0722	Center for Biological Diversity. (web)	12,460	3.1

	Docket Number	Sponsoring Organization	Number of Signatures	Included Verbatim in RtC Section
14	EPA-HQ-OAR-2022-0829-0723	American Lung Association (ALA). (web)	1,371	
15	EPA-HQ-OAR-2022-0829-0724	Specialty Equipment Market Association (SEMA). (web)	1,488	15
16	EPA-HQ-OAR-2022-0829-0725	National Religious Partnership for the Environment. (web)	10,890	
17	EPA-HQ-OAR-2022-0829-0726	Sponsoring organization unknown. (web)	22	
18	EPA-HQ-OAR-2022-0829-0727	Climate Hawks Vote Civic Action. (web)	5,035	
19	EPA-HQ-OAR-2022-0829-0728	Consumer Reports (web) – Petition included as Attachment 1 to the main comment	18,817	1.1
20	EPA-HQ-OAR-2022-0829-0730	Sierra Club. (web)	16,273	
21	EPA-HQ-OAR-2022-0829-0757	Michigan Corn Growers Association (MCGA). (email)	30	19
22	EPA-HQ-OAR-2022-0829-1697	Sponsoring organization unknown. (web)	5,581	
23	EPA-HQ-OAR-2022-0829-1698	Sponsoring organization unknown. (web)	132	
24	EPA-HQ-OAR-2022-0829-1699	Sponsoring organization unknown. (web)	2,937	
25	EPA-HQ-OAR-2022-0829-1700	Sponsoring organization unknown. (web)	679	15
26	EPA-HQ-OAR-2022-0829-1701	Sponsoring organization unknown. (web)	118	15, 17, 27
27	EPA-HQ-OAR-2022-0829-1702	Sponsoring organization unknown. (web)	5,465	14
28	EPA-HQ-OAR-2022-0829-1703	Sponsoring organization unknown. (web)	60	
29	EPA-HQ-OAR-2022-0829-1704	Sponsoring organization unknown. (web)	44,335	9
30	EPA-HQ-OAR-2022-0829-1705	Sponsoring organization unknown. (web)	223	
31	EPA-HQ-OAR-2022-0829-1706	Sponsoring organization unknown. (web)	1,982	
32	EPA-HQ-OAR-2022-0829-1707	Sponsoring organization unknown. (web)	2,088	12.3

	Docket Number	Sponsoring Organization	Number of Signatures	Included Verbatim in RtC Section
33	EPA-HQ-OAR-2022-0829-1708	Sponsoring organization unknown. (web)	3,105	
34	EPA-HQ-OAR-2022-0829-1709	Sponsoring organization unknown. (web)	76	19
35	EPA-HQ-OAR-2022-0829-1710	Sponsoring organization unknown. (web)	1,851	19
36	EPA-HQ-OAR-2022-0829-1711	Sponsoring organization unknown. (web)	44	
37	EPA-HQ-OAR-2022-0829-1712	Sponsoring organization unknown. (web)	3,164	
38	EPA-HQ-OAR-2022-0829-1713	Sponsoring organization unknown. (web)	340	
39	EPA-HQ-OAR-2022-0829-1714	Sponsoring organization unknown. (web)	20	3.2
40	EPA-HQ-OAR-2022-0829-1715	Sponsoring organization unknown. (web)	14,249	
41	EPA-HQ-OAR-2022-0829-1716	Sponsoring organization unknown. (web)	2,309	19
42	EPA-HQ-OAR-2022-0829-1717	Sponsoring organization unknown. (web)	513	3.3
43	EPA-HQ-OAR-2022-0829-1718	Sponsoring organization unknown. (web)	57	
44	EPA-HQ-OAR-2022-0829-1719	Sponsoring organization unknown. (web)	261	
45	EPA-HQ-OAR-2022-0829-1720	Sponsoring organization unknown. (web)	19,816	
46	EPA-HQ-OAR-2022-0829-1721	Sponsoring organization unknown. (web)	5,313	3.1
		Total	247,767	

Comments by Organizations

EPA-HQ-OAR-2022-0829-0505 - Mass Comment Campaign sponsored by E2 Environmental Entrepreneur Business Leaders. (web) (124 signatures)

As business leaders and supporters of E2, we are writing to urge you to ensure that both the medium/light duty and heavy-duty vehicle emission standards are as strong as possible.

Specifically, we believe that it is vital the Environmental Protection Agency (EPA):

1. Quickly finalize a standard for Light and Medium-duty vehicles that achieves at least a 75% reduction in greenhouse gas emissions by model year 2030.

2. Finalize Heavy Duty Vehicle/clean truck standards by the end of 2023 that puts the nation on a path to all new heavy-duty vehicle sales being zero emissions by 2035.

E2 is a national, nonpartisan group of more than 11,000 business leaders, investors, and professionals from every sector of the economy. Our members have founded or funded more than 2,500 companies, created more than 600,000 jobs and manage more than $100 billion in venture and private equity capital.

We recognize and appreciate that this administration has driven incredible and unprecedented federal clean energy investments across a broad range of sectors including vehicles. E2 has been proud to actively support key components of your agenda including the passage of the Inflation Reduction Act, the Infrastructure Investment and Jobs Act and the Chips and Science Act.

As businesspeople from a broad cross-section of the economy, we value these investments and are seeing, firsthand, the positive benefits. However, we also recognize that without strong light/medium and heavy-duty vehicle emission standards, the U.S. risks ceding global economic leadership to other nations and regions such as Asia, Europe or India. These global competitors have plans in place advancing their transition to zero-emission vehicles in the coming decades.

As of September 2022, automakers and battery manufacturers worldwide will spend more than $626 billion through 2030 to develop new electric cars, passenger trucks, freight trucks and buses. That is a $110 billion increase from projections in April of 2022.

To be globally competitive, the US must accelerate the rate that our auto sector is transitioning to clean vehicles. Strong EPA standards will provide the clear market certainty needed to support commitments that are already being made by many in the industry and will provide regulatory support to ensure those commitments are met.

Furthermore, many of our businesses are trying to lower emissions in our supply chains and lower costs for our consumers. Most businesses are dependent on third party delivery truck operators. Stronger vehicle emissions standards will drive the availability of lower emission, lower cost, options in a way that businesses with small market-share cannot.

Strengthening tailpipe emissions and advancing a transition to zero-emission vehicles is a win for America and all those looking to protect public health, spur job creation, economic growth, as well as family and business cost savings.

Please redouble your efforts to ensure that the very strongest light-, medium-, and heavy-duty vehicle emission standards are finalized this year. Doing so will allow us to tackle the climate crisis and address air pollution. It will also allow us to fully leverage the recent federal clean energy investments and historic investments from Congress, accelerate the vehicle sector's shift to a zero-emission future, increase U.S. global competitiveness, save consumers money, and create good American jobs.

EPA-HQ-OAR-2022-0829-0512 - Mass Comment Campaign sponsored by Moms Clean Air Force - Arizona. (web) (40 signatures)

The transportation sector is the largest source of climate pollution in the US, and cleaning up this pollution is one of the most important things we can do to fight climate change and protect our children's future. Tailpipe pollution can also harm the health of our families and communities. Clean Car Standards are a critical tool to fight climate change and reduce dangerous air pollution. They help protect public health nationwide.

EPA has proposed Clean Car Standards that are a significant step forward In the transition to zero-emission vehicles. This rule would put us on a path to boosting the electric passenger vehicle market share to 67% by 2032.

We the undersigned urge the EPA to move quickly to finalize the strongest possible standards for tailpipe pollution from passenger cars and trucks.

EPA-HQ-OAR-2022-0829-0535 - Mass Comment Campaign sponsored by Moms Clean Air Force - Arizona Chapter (14 signatures)

The transportation sector is the largest source of climate pollution in the US, and cleaning up this pollution is one of the most important things we can do to fight climate change and protect our children's future. Tailpipe pollution can also harm the health of our families and communities. Clean Car Standards are a critical tool to fight climate change and reduce dangerous air pollution. They help protect public health nationwide.

EPA has proposed Clean Car Standards that are a significant step forward In the transition to zero-emission vehicles. This rule would put us on a path to boosting the electric passenger vehicle market share to 67% by 2032.

We the undersigned urge the EPA to move quickly to finalize the strongest possible standards for tailpipe pollution from passenger cars and trucks.

EPA-HQ-OAR-2022-0829-0543 - Mass mail campaign submitted Alliance of Nurses for Healthy Environments (web) (54 signatures)

The transportation sector is the largest source of greenhouse gasses in the United States, making up nearly 30% of our country's emissions. Emissions from passenger vehicles and trucks pollute the air we breathe causing adverse health impacts and contributing to the increasingly urgent issue of climate change. Nurses applaud EPA for finalizing robust clean car standards through model year 2026 and for taking the important next steps to finalize stricter clean car and truck standards through model year 2027.

It is critical that EPA finalize the strongest possible clean car and truck standards to drive a rapid transition to zero emissions vehicles. Numerous studies show that poor health outcomes and higher incidences of chronic conditions, like asthma, lung disease, and cancer, are linked to tailpipe pollution from passenger vehicles. In 2020, the national passenger vehicle fleet represented approximately 94 percent of the nation's on-road vehicles and generated over one million tons of ozone- and particle-forming NOx emissions, and over 33,400 tons of fine particles annually. Further, freight truck pollution harms especially those who live near highways, ports, freight hubs and other high traffic areas. We know that clean car standards are the most effective policy to reduce dangerous air pollution and protect public health nationwide.

Climate change poses serious threats to the health and lives of all Americans, especially children, older adults, low-wealth communities, communities of color and people living with chronic diseases. When poor air quality due to vehicle emissions coincides with climate-related risks, such as extreme heat or ground-level ozone, adverse health effects are further amplified.

By finalizing the strongest possible clean car standards for cars and trucks, EPA will help the communities, who often are more exposed to air pollution and the hardest hit by effects of climate change and will align with the Biden Administration's environmental justice goals.

The Biden Administration has an opportunity to protect public health and fight the climate crisis with strong long-term clean cars standards. As we transition nationwide to zero-emission vehicles, we urge EPA to move swiftly to enact the strongest possible long-term standards for light-, medium-, and heavy-duty trucks to clean our air, keep Americans healthy, and combat the climate crisis.

EPA-HQ-OAR-2022-0829-0691 - Mass Comment Campaign sponsored by The Climate Reality Project. (web) (7,367 signatures)

On behalf of more than 7,300 Americans who want to improve their communities' health and protect the planet we share, The Climate Reality Project strongly urges you to enact historic climate regulation by implementing the strongest possible proposed vehicle pollution standards.

We have attached the comment letter we have asked our followers, friends, and volunteers in the region to sign as well as each signatory's name. As you tabulate the number of comments, we hope you count each and every one of these signatories as an individual comment.

Thank you for your work and commitment to climate action.

Transportation makes up the largest share United States greenhouse gas (GHG) emissions—28%—due to the fossil fuels we burn for cars, trucks, and other modes of transport.i This must change if we are to achieve our climate and justice goals. In combination with recent historic provisions in the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA), the proposed standards for light-, medium-, and heavy-duty vehicles could accelerate emission reductions, while significantly growing the electric vehicle (EV) sector.ii We are encouraged by the EPA's proposal and urge you to enact the strongest possible limits on vehicle pollution.

Communities of color are more likely to reside near highways, and subsequently experience the brunt of associated negative health impacts, including impaired lung function, cardiovascular diseases, and premature death.iii The new standards could address these issues by potentially reducing emissions for harmful pollutants, such as particulate matter, by over 95%.iv Not only would this lessen burden of pollution on vulnerable communities, but the standards could yield up to $1.6 trillion in net benefits from cleaner air to lower vehicle operating costs and fuel savings.v

EVs made up an estimated 5.6% of cars and trucks sold in 2022.vi To achieve President Biden's goal of cutting climate pollution in half by the end of the decade, the number of EVs on the road must significantly increase; the strongest proposed limits could lead to an estimated

69% of new light-duty passenger vehicles sold being electric by 2032.vii Once out of reach for the average American, EVs popularity is expected to grow as a result of recent incentives making these vehicles more accessible.viii According to the International Council on Clean Transportation, EVs could reach cost parity with traditional cars in the next two years.ix Between the climate and economic benefits, we cannot afford to delay this transition with less stringent standards.

IPCC recently warned that rapid and deep GHG emission reductions must be executed to keep warming below the critical 1.5 degrees Celsius threshold.x In 2021, President Biden signed an Executive Order setting a target for half of all vehicles sold to be zero emission vehicles by 2030.xi We applaud EPA's efforts to exceed this directive and implement ambitious regulation that will help us to meet our climate targets.

Under the BIL and IRA, Congress showcased its commitment to transitioning toward a clean energy economy. If we are serious about unlocking the full potential of these laws, we must end our dependence on dirty fossil fuels. We urge you to enact historic climate regulation by implementing the strongest possible proposed vehicle pollution standards. Our just energy transition and the health of our communities depends on it.

i https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

ii https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards- cars-and

iii https://www.epa.gov/mobile-source-pollution/environmental-justice-and-transportation; https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever- pollution-standards-cars-and

iv https://www.epa.gov/system/files/documents/2023-04/lmdv-multi-pollutant-emissions-my-2027-nprm-2023- 04.pdf pg. 43

v https://www.epa.gov/mobile-source-pollution/light-and-medium-duty-proposed-standards-model-years-2027- and-later

vi https://insideevs.com/news/657660/us-electric-car-sales-january2023/#:~:text=Reference%3A%202022%20EV%20Sales&text=In%202022%2C%20more%20than%20750%2 C000,Experian%20(via%20Automotive%20News).;

vii https://www.epa.gov/system/files/documents/2023-04/lmdv-multi-pollutant-emissions-my-2027-nprm-2023- 04.pdf pg. 425

viii https://www.nytimes.com/2023/02/10/business/electric-vehicles-price-cost.html

ix https://energyinnovation.org/wp-content/uploads/2023/01/Analyzing-the-Impact-of-the-Inflation-Reduction-Act-on-EV-Uptake-in-the-U.S..pdf pg. 8

x https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf pg. 21

xi https://www.whitehouse.gov/briefing-room/presidential-actions/2021/08/05/executive-order-on-strengthening- american-leadership-in-clean-cars-and-trucks/

EPA-HQ-OAR-2022-0829-0693 - Mass Comment Campaign sponsored by Evangelical Environmental Network (EEN). (web) (2,5303 signatures)

As pro-life Christians, we have a special concern for the unborn and believe all human life is sacred and worth defending. Children deserve the hope and expectation of a healthy, vibrant, and full life, unhindered by the ravages of pollution. Tailpipe emissions from passenger vehicles fills the air we breathe where we live, work, and play with toxic pollution, like soot (PM2.5) and ozone. Traffic is preventable and puts God's creation and our families - especially pregnant mothers and the unborn - in harm's way. Medical research links traffic pollution to serious harms to human health, including asthma, lung cancer, dementia, and pre-term birth.

As pro-life Christians, we have duty to defend life. We urge the EPA to set the strongest standards possible for tailpipe pollution from passenger vehicles. To create the healthy future our children deserve, we need the strongest possible long-term standards—beyond model year 2026—that will reduce car and light truck pollution by 75% by 2030 and put us on a path to a 100% zero-emission new vehicle sales target by 2035. Our kids deserve clean air and the right to an abundant life.

EPA-HQ-OAR-2022-0829-0717 - Mass Comment Campaign sponsored by Natural Resources Defense Council (NRDC). (web) (24,038 signatures)

Please accept these public 24,038 comments from members and online activists of the Natural Resources Defense Council (NRDC) asking you to finalize the strongest possible standards to reduce pollution and help ensure the transition toward zero-emission vehicles.

Transportation accounts for the largest share of climate pollution in the U.S. and is also a major source of other harmful pollutants that significantly impact public health, causing deadly diseases such as asthma, heart problems, and cancer.

Cleaner vehicles are a winner all around. They help clean up the air, deliver savings on fuel, support domestic job creation, and protect the climate.

Please finalize a strong vehicle standard that would do the following:

• A strong EPA standard for cars, SUVs, pickup trucks, and cargo vans should be finalized by the end of the year and must lead to significant reductions in carbon emissions by being at least as strong as the most stringent alternative in the agency's proposal.

EPA-HQ-OAR-2022-0829-0719 - Mass Comment Campaign sponsored by Interfaith Power & Light (IPL). (web) (190 signatures)

As faith leaders from diverse religious and spiritual traditions, we speak with one voice in support of bold and just climate solutions. Climate change is a moral issue that is most harmful to those least responsible for creating the problem. People of faith and conscience recognize the need for bold, new transportation solutions, and clean cars and light trucks are an integral step towards addressing the climate crisis. Today we write to ask you to move swiftly to enact robust light-duty vehicle multi-pollutant emissions standards. As a nation, we have a moral imperative to enact the most stringent light-duty vehicle standards in order to address our historically unsafe pollutant emissions and to protect our public health and Shared Home.

Transportation is currently the single largest source of climate pollution in the United States. In 2020, the national passenger vehicle fleet represented approximately 94% of the nation's onroad vehicles and generated over one million tons of ozone- and particle-forming NOx emissions, which create dangerous smog. In order for the U.S to meet our Paris Climate

Agreement goals we need the strongest possible long-term standards—beyond model year 2026 — that will put the country on a path to a 100% zero-emission new vehicle sales target by 2035.

It is critical to remember that the climate crisis is a challenge of racial, economic, and generational justice, and these rules target air pollution that disproportionately harms marginalized communities of color and low-wealth communities that reside in counties closest to major freeways. Implementing the strongest light-duty vehicle standards is a matter of environmental justice, and these standards would deliver massive emission reductions and lifesaving relief to frontline communities.

In addition, electrifying cars and light trucks will be key to improving air quality and saving lives across the nation. More than 119 million American residents currently live in areas with unhealthy levels of air pollution. According to research from Harvard University, more than 8 million people died from the effects of fossil fuel combustion in 2018, meaning that fossil fuels like oil and coal are linked to 1 in 5 deaths worldwide. Pollutants caused by burning fossil fuels have been linked to early death, heart attacks, respiratory disorders, stroke, and asthma.

It is of the utmost importance that standards require tighter limits on internal combustion engine vehicles in order to continually make these vehicles cleaner as manufacturers transition to zero-emission cars.

Now is the time to maximize the impact of our national clean car standards—the most effective policy that the federal government has to reduce dangerous air pollution, lower greenhouse gas emissions, and save consumers money at the pump. As policymakers, you have a critical and sacred role in helping to achieve these goals. As faith leaders, we urge you to establish strong light-duty vehicle multi-pollutant emissions standards that put our nation on a trajectory to a zero-emissions transportation future, and we ask you to redouble efforts to announce the draft rule before the end of 2023. For more than a decade, people of faith and conscience have advocated for strong safeguards on greenhouse gas pollution from transportation. Since then, the climate crisis has only accelerated, taking an enormous toll on human life, our communities, and our world. We have a moral responsibility to act right now as a nation to do all we can to address climate change for our communities, future generations, and our Sacred Earth.

EPA-HQ-OAR-2022-0829-0720 - Mass Comment Campaign sponsored by Union of Concerned Scientists. (web) (1,030 signatures)

We, the over 1000 undersigned scientists, researchers, health professionals, economists, engineers, and planners respectfully submit this comment in support of standards for heavy-duty vehicles and passenger vehicles that put us on a trajectory to eliminate tailpipe pollution.

The Environmental Protection Agency (EPA) has made explicit commitments to climate, clean air, and environmental justice under this administration. The transportation sector is the largest contributor to global warming emissions in the United States. And while heavy-duty trucks make up only 10 percent of vehicles on the road, they produce 28 percent of global warming emissions from on-road transportation, as well as 45 percent of nitrogen oxide emissions and 57 percent of particulate matter emissions, which disproportionately harm environmental justice communities living near ports and freight corridors. Thus, we believe that the light- and medium-duty vehicle multipollutant rule and the global warming emissions proposal for heavy-duty trucks should live up to these important stated commitments and to set us on an accelerated path to a zero-emission transportation future.

The light- and medium-duty vehicle rule is on the right track to reduce climate-harming, smog-forming, and particulate pollution, but the heavy-duty rule trails passenger vehicles, leaving environmental justice communities in harm's way.1 The science and technology, as well as the urgent need to protect public health and address the climate crisis, are clear on this front: zero-emission vehicles are available today and must be the number one priority.2

1 https://www.movingforwardnetwork.com/zero-emissions

2 https://www.ucsusa.org/resources/electrify-trucks

New state standards adopted by several states across the country will ensure more than 50 percent of new heavy-duty vehicle sales are electric vehicles by 2030. Also, new tax incentives for commercial trucks are predicted to push electrification even further.3 As the EPA acts to accelerate the deployment of zero-emission passenger vehicles, it must also eliminate toxic tailpipe emissions from heavy-duty trucks and ensure that 100 percent of all new vehicles sales are electric by 2035 to maximize clean air to breathe. This has also long been an ask of environmental justice communities across the country.

3 https://theicct.org/wp-content/uploads/2023/04/hdv-phase3-ghg-standards-benefits-apr23.pdf

The urgency of these issues demands a strong response. For far too long, vehicle pollution has been devastating for the health of communities across the country and the climate.4 The solutions are here – and we urge the EPA to stand up to this moment, pass the strongest possible version of the light- and medium-duty standards, and eliminate tailpipe pollution from heavy-duty trucks and cars.

4 https://www.ucsusa.org/resources/diesel-engines-public-health

EPA-HQ-OAR-2022-0829-0721 - Mass Comment Campaign sponsored by Evergreen Collaborative. (web) (8,119 signatures)

Thank you for the proposed light-duty multi-pollutant emissions rule for 2027-2032 (Clean Car Standards). I want to applaud EPA for using the full force of Clean Air Act authorities to address climate pollution and public health impacts by proposing the most ambitious standards yet. It's wonderful to see EPA affirming its commitments to prioritize environmental justice by proposing standards that will reduce soot and smog in our communities.

Specifically, I am supportive of EPA's proposed "Alternative 1," which sets the most stringent emissions reduction standards. While these proposed standards are technology neutral, electric vehicles present the best option for compliance as they emit zero tailpipe pollution, resulting in improved public health and climate outcomes. Based on the current and growing uptake of electric vehicles, paired with the investments in charging and manufacturing from the Inflation Reduction Act and the Infrastructure Investment and Jobs Act, these standards should be achievable under the model years covered.

And, I would be supportive of EPA further strengthening Alternative 1 to increase the stringency of the rule after 2030, as the market will likely be prepared for stronger standards at that time.

I am also supportive of EPA adopting clean car standards that last through 2035, as requested by auto manufacturers to create market stability. Locking in clean car standards now, and for the next decade, will give manufacturers, investors, and consumers greater confidence in the direction of the vehicle market.

We urgently need tailpipe emissions standards that clean up the air we breathe and protect the climate, and by locking in the strongest possible proposal, EPA can best protect communities that have long been harmed by transportation pollution.

Please move quickly to finalize the strongest possible Clean Car Standards that align with the level of ambition needed to protect public health and the planet.

EPA-HQ-OAR-2022-0829-0723 - Mass Comment Campaign sponsored by American Lung Association (ALA). (web) (1,371 signatures)

We urge the U.S. Environmental Protection Agency to finalize strong emissions standards for heavy-duty, light-duty and medium-duty vehicles this year. These emissions standards are critical for addressing climate change, improving public health and promoting environmental justice.

We appreciate your proposal to strengthen greenhouse gas emissions limits for new heavy-duty vehicles. We urge you to ensure that they are finalized this year, as new diesel trucks have long lifespans on our roads. We also urge you to make the final rule even stronger than the proposal. The final standards should be at least as stringent as the state-level Advanced Clean Trucks program currently in place in many states.

We also appreciate your proposal to strengthen limits on greenhouse gases and other air pollutants for new light-duty and medium-duty vehicles in Model Years 2027-2032. We call on you to ensure these standards for all pollutants are finalized this year as well. We appreciate that in the proposal, you included alternative levels, and urge you to build off Alternative 1 – the most stringent option – in the final rule. This alternative will yield the most health benefits from pollution reductions.

Emissions from vehicles powered by gasoline and diesel pose immediate harm to health. In the heavy-duty vehicle sector, pollution from diesel-powered trucks and buses drive health harms including asthma attacks, heart attacks and strokes, and premature death. Seventy-two million people are estimated to live near truck freight routes, and they are more likely to be people of color and with lower incomes.

Pollution from light- and medium-duty vehicles powered by gasoline and diesel, like passenger cars, SUVs, pickup trucks and package delivery vans, also harms public health and is driving climate change. Particulate matter can cause immediate health harm, including respiratory and cardiovascular disease and even premature death.

Transportation is the single biggest source of greenhouse gas emissions in the U.S. and transitioning to zero-emission cars is a critical part of addressing climate change. Climate change is a health emergency, leading to more frequent and intense extreme weather events like flooding, excessive heat, drought, and wildfires; longer and more intense allergy seasons; increased risks from water-borne and vector-borne diseases like Lyme Disease; and worsening air quality.

Stronger limits on emissions from cars, vans, buses and trucks will help drive a nationwide transition to zero-emission vehicles, which is crucial for not only addressing climate change, but also for improving public health and equity.

EPA-HQ-OAR-2022-0829-0725 - Mass Comment Campaign sponsored by National Religious Partnership for the Environment. (web) (10,890 signatures)

As Black church leaders, we urge the Environmental Protection Agency (EPA), the agency responsible for protecting the health and environment of communities across the United States, to finalize robust clean car standards that protects human health and the sanctity of God's creation. Since transportation is the largest source of carbon pollution in our country, strong pollution standards will protect families from dangerous vehicle pollution and fight climate change.

Addressing pollution and climate change is a moral and justice matter. Our communities have traditionally borne an undue burden from pollution and climate change; a burden levied on us from redlining and other discriminatory practices. Our communities are often located closest to highways and other sources of vehicle pollution. It is no surprise that black communities are disproportionately impacted by asthma and other respiratory illnesses. Stronger vehicle emission standards will help address these unequal health impacts.

For the health and wellbeing of our communities, it is imperative that the EPA deliver emission standards for cars that set us on the path to zero-emission vehicles by 2035. These tailpipe emission standards, which will help drive us towards a clean energy future, must be done in partnership with an investment in infrastructure that will allow all communities access to zero-emission vehicles.

As Christians, we are called to protect God's creation and care for God's people. The EPA has an opportunity to help address the injustice of pollution and climate change by enacting the strongest possible federal clean car standards.

EPA-HQ-OAR-2022-0829-0726 - Mass Comment Campaign sponsoring organization unknown. (web) (22 signatures)

I'm writing to urge the EPA to quickly finalize the strongest possible air pollution safeguards on emissions from passenger cars and light trucks. The EPA's current proposal is a good start, but it must be stronger to limit climate change and improve public health significantly. I appreciate that the EPA has said it will consider more stringent alternatives and ask the agency to implement air pollution safeguards on cars and light trucks that are at least as strong as the standards outlined in Alternative 1 of the EPA's proposal.

For the U.S. to meet its Paris Climate Agreement goals, the EPA must set the strongest possible long-term standards that will reduce car and light truck greenhouse gas emissions 75% by 2030, putting the country on a path to a 100% zero-emission new vehicle sales target by 2035. According to the EPA's own analysis, the transportation sector accounts for 27% of greenhouse gas emissions and is the fastest growing emitter of greenhouse gases.

Greenhouse gas emissions accelerate climate change, which poses a serious threat to Americans' health and well-being, affecting everything from the air we breathe to the places we live. Extreme weather events worsened by climate change create more air and water pollution, destabilize food sources, and put our homes and lives at risk. According to the American Lung Association, a nationwide transition to zero-emission cars, light trucks, and heavy-duty vehicles –coupled with a transition to zero-emission electricity – would result in 110,000 premature deaths prevented (nationwide, 2020-2050); $1.2 trillion in health benefits (nationwide, 2020-2050); and $1.7 trillion in additional climate benefits (global, 2020- 2050).

The strongest possible air pollution safeguards on cars and light trucks would also deliver massive emission reductions and life-saving relief to frontline communities that are often closest to highways and bear the greatest burden from vehicle pollution. Low-wealth and BIPOC (Black, Indigenous, People of Color) communities experience disproportionate harm from dirty vehicle pollution, leading to increased rates of asthma and other respiratory illnesses.

I ask that the EPA move quickly to finalize air pollution safeguards on cars and light trucks that are at least as strong as the standards set forth in Alternative 1 of the agency's proposal. There is no time to lose. The EPA has the opportunity–and responsibility–to deploy the strongest possible safeguards to clean up deadly car pollution, limit catastrophic climate change, and improve public health. Thank you for the opportunity to provide input.

EPA-HQ-OAR-2022-0829-0727 - Mass Comment Campaign sponsored by Climate Hawks Vote Civic Action. (web) (5,035 signatures)

Enclosed and attached, please find the comments of 5,035 Climate Hawks Vote Civic Action members and supporters encouraging you to finalize the strongest possible clean vehicle standards. On behalf of all of us, we thank you for your work to promote electric vehicle adoption, and your recent car emissions standards, which will help America get to 67% clean cars by 2032. But we, and you, know that America can do more to clean up our cars and protect Americans' health, as well as the health of our climate. We're writing to ask you to finalize the strongest possible clean vehicle standards, now.

Transportation is the biggest source of US climate pollution, accounting for roughly a third of all US Greenhouse Gas emissions. Tailpipe pollution is also a major source of other pollution that harms public health, such as ozone, smog, and more. These pollutants are known by the EPA to cause climate chaos, as well as deadly diseases such as asthma, heart disease, and cancer.

Now is the time to protect our climate, and public health, by finalizing the strongest possible standards for cars and light duty trucks. Here's how your current proposed rule can be improved:

First, new EPA standard for cars, SUVs, pickup trucks, and cargo vans must be finalized by the end of 2023, and must lead to significant reductions in carbon emissions.

Second, new EPA standards must put us on a trajectory to cut all pollution, including global warming pollution, 75% by 2030, and to zero emissions by 2035. These targets are significantly stronger than the most stringent alternative in the EPA's current proposal.

Finally, you must study and publish estimates in the federal record that show that tougher emissions standards and the transition to electric cars will not only reduce pollution, but save consumers money. Only by showing that clean, green, climate action to clean up our cars is also an investment in cheaper, more affordable transportation for all Americans will we build the support needed to finalize this rule.

On behalf of climate hawks everywhere, thank you.

EPA-HQ-OAR-2022-0829-0728 - Comment submitted by Consumer Reports (CR) - Mass Mail Campaign Included. (web) (18,817 signatures; mass mailer was submitted as Attachment 1 to their main comments)

Petition to the Environmental Protection Agency: 18,817 Consumers Want More Clean Vehicles for a Better Climate Future

We're urging the EPA to adopt the strongest possible rules to reduce climate- and health-damaging vehicle emissions and greatly reduce fuel consumption, while helping consumers save an estimated $12,000 over the lifetime of a new vehicle. The rules will rapidly accelerate the number of cleaner vehicles like EVs and hybrids in production over the next decade; save lives due to a dramatic decrease in tailpipe pollution; and put us on the route towards a zero emissions future. These rules are a win-win for the climate, consumers' wallets, and our health!

EPA-HQ-OAR-2022-0829-0730 - Mass Comment Campaign sponsored by Sierra Club. (web) (16,273 signatures)

Sierra Club has collected 16,273 public comments. We have highlighted a selection of comments below. The names of the individuals submitting comments are listed under the selected comments. Each of the individuals signed onto the following text:

Please deliver a strong clean cars standard!

We appreciate Administrator Regan and the Environmental Protection Agency for proposing an updated standard to address light and medium duty vehicle pollution, which contributes to poor air quality and drives the climate crisis.

This proposal moves our vehicles in the right direction. However, the EPA must finalize the strongest possible standards this year to accelerate the adoption of zero-emission cars, pickup trucks, and delivery vans.

The standards must reduce greenhouse gas emissions by 75 percent by 2030 and put the country on a path so that all new vehicle sales are zero emission by 2035.

Thank you for finalizing these standards as swiftly as possible and delivering public health and climate benefits.

Thank you for considering this public input

EPA-HQ-OAR-2022-0829-1697- Mass Comment Campaign sponsoring organization unknown (5,581 signatures)

I am aggravated by the Environmental Protection Agency's (EPA) proposed rule change on emissions that would require up to two-thirds of new vehicles sold in the U.S. to be electric by 2032, the strictest standards ever proposed. The EPA is once again exceeding their authority by attempting to dictate national policy without congressional authorization. I believe that the proposal ignores America's market dynamics, fails to consider current supply chain limitations, and and violates the market dynamics which have made the US the greatest nation the world has ever known. You appear to be poised to destroy that greatness.

Forced compliance with stricter emissions regulations will increase costs for business equipment and operations, particularly for small businesses in the transportation industry. The EPA has acknowledged that compliance costs for manufacturers would be $6 billion and could include businesses spending thousands of additional dollars per business on zero-emissions vehicles. These burdensome regulations could lead many small businesses to cut jobs or even face bankruptcy, creating spillover effects that harm the rest of the economy. Increased transportation costs, for instance, could further drive up the cost of food for families across America at a time when they are already being crushed by record inflation.

Furthermore, China controls many critical materials for electric vehicle (EV) batteries, including inputs such as cobalt, graphite, manganese, and lithium. One question is whether you expect to participate financially in this rule, since it has been rumored, unverifiable, that the Bidens own 10% of a lithium mine, necessary to make electric vehicles possible. While rules issued under the so-called “Inflation Reduction Act” exclude sourcing from “foreign entities of concern,” it is unclear how the stimulated increased demand for EVs will be met without relying on China’s production of critical minerals or EV batteries. While the Biden Administration might be attempting to incentivize domestic supply chain production, the mining and processing of critical minerals such as lithium remain time-consuming and constrained by strict domestic environmental laws – one of many significant regulatory barriers that will remain in place even after this rule goes into effect. I fear that implementing this rule will ultimately harm our domestic industry while enriching one of our chief geopolitical rivals.

Ultimately, Americans and their families are hurt by this rule because it seeks to increase the cost of gas-powered vehicles enough to make the less-affordable EVs more appealing.

In an already inflationary environment, it is unconscionable to force American families to choose between owning a car or putting food on the table. I ask that you withdraw this poorly considered proposal.

EPA-HQ-OAR-2022-0829-1698 - Mass Comment Campaign sponsoring organization unknown (132 signatures)

American families are counting on you and the EPA to set strong vehicle emissions standards for cars and light- and medium-duty trucks as soon as possible. Strong tailpipe regulations that move the U.S. toward a zero-emissions vehicle future will protect public health and fight the climate crisis. We need the strongest possible long-term standards—beyond model year 2026—that will reduce car and light truck emissions by 75% by 2030, putting the country on a path to a 100% zero-emission new vehicle sales target by 2035.

EPA-HQ-OAR-2022-0829-1699 - Mass Comment Campaign sponsoring organization unknown (2,937 signatures)

As an environmental educator and field biologist as well as a parent and grandparent who cares deeply about the health of our planet and all its inhabitants, I am writing to urge you to move quickly to finalize the strongest possible standards for tailpipe pollution from passenger cars and light trucks.

The transportation sector is the largest source of climate pollution in the US, and cleaning up this pollution is one of the most important things we can do to fight climate change and protect our childrens future.

Not only does tailpipe pollution contribute to the climate crisis, but it can also harm the health of our families and communities. Exposure to pollution from cars and trucks can cause asthma, lung infections, heart attacks, stroke, premature death, low birth weight, and cancer. Clean car standards are a critical tool to fight climate change, and they help reduce dangerous air pollution. They help protect public health nationwide.

Our families want to see a rapid transition to zero-emitting cars and trucks, and we urgently need cleaner air for our children and our communities. Please move quickly to finalize the strongest possible Clean Car Standards. [EPA-HQ-OAR-2022-0829-1699]

EPA-HQ-OAR-2022-0829-1703 - Mass Comment Campaign sponsoring organization unknown (60 signatures)

Im writing to urge you to prioritize the implementation of robust vehicle emissions standards for cars and light trucks and medium-duty vehicles. American families are relying on your leadership to protect public health and combat the climate crisis through stringent safeguards.

The transportation sector alone accounts for a staggering 27% of greenhouse gas emissions, as highlighted in the EPA's own 2020 study. This makes cleaner vehicles absolutely crucial in safeguarding our communities from harmful tailpipe pollution.

While the proposed standards for model year model years 2027 through 2032 represent a crucial first step, we cannot afford to stop there. I implore you to finalize standards at least as strong as Alternative 1 and set standards that go beyond 2032. By reducing car and light truck emissions by 75% by 2030, we can set our nation on a trajectory toward achieving a 100% zero-emission new vehicle sales target by 2035.

To accomplish this, it is essential to increase the pace of progress after 2030 toward cleaner new vehicles in 2032 and beyond. We also need to ensure that gas cars become even cleaner and more efficient. By going with stronger final standards, we can create a more sustainable future while protecting public health and the environment.

Thank you for your attention to this urgent matter. I strongly urge you to take decisive action by finalizing the strongest possible vehicle emissions standards this year.

I appreciate your consideration in doing whats necessary to move towards cleaner air, healthier communities, and a more sustainable future.

EPA-HQ-OAR-2022-0829-1705 - Mass Comment Campaign sponsoring organization unknown (223 signatures)

As a supporter of healthy outdoor opportunities for all, I strongly urge the EPA to finalize the clean car proposal and final rule for cleaner vehicles as soon as possible. This rule is an essential piece of reducing greenhouse gas and ozone-forming emissions under the Clean Air Act and will protect waterways, clean, healthy air, and ecosystems across the nation.

Clean air is vitally important for our health. Vehicles are responsible for 30-40% of greenhouse gas emissions. It could be a much more beautiful world!

Strengthening national emission standards for vehicles on our roadways will also advance environmental justice. A significant body of research has established that people of color in this country breathe more particle-polluted air, on average than White people because communities of color tend to be located near sources of this deadly pollutant, including major roadways. For example, a recent study found that Black, Latino, and Asian Americans across the country were consistently exposed to more soot pollution than White Americans, in both rural and urban settings, and at all income levels.

I urge EPA to finish this rulemaking process expeditiously and retain the strong emission standard targets proposed. The EPAs work to implement and enforce the Clean Air Act has yielded enormous public health benefits and saved countless lives over the years. It is essential that the agency continue that work by setting the strongest science-based air quality emission standards to protect our air and the public welfare and advance environmental justice, and safeguard our health.

EPA-HQ-OAR-2022-0829-1706 - Mass Comment Campaign sponsoring organization unknown (1,982 signatures)

My family is directly impacted by the air pollution in Salt Lake City. Personally, I would like to move to an area with cleaner air, but now with wildfire smoke spreading across North America, there is no safe area. Already our family suffers from COPD, bronchitis, and frequent respiratory illnesses. Animals don’t soil their dens. Why are we humans soiling the air we breathe?!

As a person of faith and conscience, I recognize that we have a moral obligation to cut carbon emissions that harm our Shared Home. People of faith and conscience are ready for bold, new transportation solutions, and cleaner cars and light trucks are an integral step towards addressing climate change for our communities, future generations, and our Sacred Earth.

I am asking EPA to move quickly and finalize the strongest possible light-duty vehicle (LDV) standards. This proposal is a first step and the EPA needs to finish the job by finalizing the strongest possible standards this year.

In order for the U.S. to meet our Paris Climate Agreement goals we need the strongest possible long-term standards—beyond model year 2026— that will put the country on a path to a 100% zero-emission new vehicle sales target by 2035. Not implementing the strongest possible light-duty vehicle standards would create major negative implications for our country’s climate goals.

We must also keep in mind that these rules target air pollution that disproportionately harms marginalized communities of color and low-wealth communities. For example, “Black and Hispanic Americans are exposed to 56 and 63 percent more particulate matter pollution, respectively, than they produce.” This is especially concerning for people of faith, as all religions call on us to treat our neighbors with respect, dignity, and compassion. Implementing the strongest LDV standards is a matter of environmental justice, and these standards would deliver massive emission reductions and life-saving relief to frontline communities.

In addition, electrifying passenger vehicles will be key to improving air quality and saving lives across the nation. More than 119 million American residents currently live in areas with unhealthy levels of air pollution. In 2020, the national passenger vehicle fleet represented approximately 94% of the nation's on-road vehicles and generated over 33,400 tons of fine particles annually, which are so small that they easily enter our bloodstream and harm our health. It is also critical that standards require tighter limits on internal combustion engine vehicles in order to continually make these cars cleaner as manufacturers transition to zero-emission vehicles.

So again, on behalf of millions of people of faith and conscience around the country, I urge the EPA to move quickly and finalize the strongest possible light-duty vehicle standards in order to reap the benefits of light-duty vehicle electrification and accelerate the transition to zero-emission vehicles.

Thank you for this opportunity to comment.

EPA-HQ-OAR-2022-0829-1708 - Mass Comment Campaign sponsoring organization unknown (3,105 signatures)

Over the centuries, most jobs become obsolete; why should it be any different for people who work in fossil fuels?

As someone who loves and cares about our national parks, I know that the clock is ticking for us to curb climate pollution. We need bold climate action now.

We certainly do need bold action and must end all use of fossil fuels!

With the transportation sector now the largest source of climate-altering greenhouse gas pollution in the U.S., the U.S. Environmental Protection Agency (EPA) must put us on a clear path to make all on-road vehicles zero emissions as soon as possible.

Vehicle pollution harms the health and well-being of individuals, affects ecosystems and visibility in our treasured national parks, and exacerbates the global climate crisis. EPAs proposals to reduce greenhouse gas emissions from light, medium, and heavy-duty vehicles will provide our communities with cleaner air and can prevent the worst effects of climate change.

For this reason, I urge EPA to move forward quickly with ambitious new rules for on-road vehicles. Specific to EPAs clean cars proposal, I ask that you implement the stronger Alternative 1. For EPAs clean trucks proposal, more must be done sooner, and EPA should follow the lead of states that have already committed to 100 percent zero-emission truck sales by no later than 2045.

Following significant investments in the Inflation Reduction Act to support transportation electrification, now is the time for aggressive action to tackle vehicle emissions and deliver cleaner air and a livable climate for our communities and national parks.

EPA-HQ-OAR-2022-0829-1711 - Mass Comment Campaign sponsoring organization unknown (44 signatures)

My children and grandchildren are looking to our government (not big business) to make our country and planet habitable for all kinds of fauna & flora for centuries to come.

And we implore the EPA to take the strongest actions right now before all hope is gone...

So we urge EPA to create the strongest possible limits on medium and light-duty vehicle pollution. The proposal for Alternative 1 constitutes a strong start to regulating dangerous air pollution for the first three years, but EPA should increase the pace starting in 2030 to require only zero-emission vehicle sales after 2035. Additionally, gas cars should be made cleaner and more efficient along the way.

Tailpipe pollution causes tens of thousands of premature deaths nationwide each year, especially in communities of color. Exposure to air pollution can lead to health problems including increased risk of asthma attacks, strokes, heart attacks, cancer, and premature deaths. The EPA can further its commitment to environmental justice this year by issuing stronger and longer term clean car standards.

Strong tailpipe regulations that move the U.S. toward a zero-emissions vehicle future will protect public health and fight the climate crisis. We need the strongest possible long-term standards that will reduce car and light truck emissions by 75% by 2030, putting the country on a path to a 100% zero-emission new vehicle sales target by 2035.

Increasingly strong clean car standards are the signal the industry needs to provide more, and more affordable, zero-emission vehicles, along with the infrastructure to support them. EPA should also require that manufacturers make any combustion engine vehicles that are on the road increasingly cleaner and more efficient.

Alternative 1 is good for the first 3 years, but we need to increase the pace starting in 2030 to stay on the route to zero emissions.

EPA-HQ-OAR-2022-0829-1712 - Mass Comment Campaign sponsoring organization unknown (3,164 signatures)

I dont know why you have this job if you cant do the obvious things the Environmental Protection Agency SHOULD AND MUST DO. Your corporate corrupt backround is clowding your understanding of this JOB!

EPA must create the strongest possible limits on medium and light-duty vehicle pollution. The proposal for Alternative 1 constitutes a strong start to regulating dangerous air pollution for the first three years, but EPA should increase the pace starting in 2030 to require only zero-emission vehicle sales after 2035. Additionally, gas cars should be made cleaner and more efficient along the way.

Tailpipe pollution causes tens of thousands of premature deaths nationwide each year, especially in communities of color. Exposure to air pollution can lead to health problems including increased risk of asthma attacks, strokes, heart attacks, cancer, and premature deaths.

The EPA can further its commitment to environmental justice this year by issuing stronger and longer term clean car standards.

Strong tailpipe regulations that move the U.S. toward a zero-emissions vehicle future will protect public health and fight the climate crisis. We need the strongest possible long-term standards that will reduce car and light truck emissions by 75% by 2030, putting the country on a path to a 100% zero-emission new vehicle sales target by 2035.

Increasingly strong clean car standards are the signal the industry needs to provide more, and more affordable, zero-emission vehicles, along with the infrastructure to support them. EPA should also require that manufacturers make any combustion engine vehicles that are on the road increasingly cleaner and more efficient.

Alternative 1 is good for the first 3 years, but we need to increase the pace starting in 2030 to stay on the route to zero emissions.

EPA-HQ-OAR-2022-0829-1713 - Mass Comment Campaign sponsoring organization unknown (340 signatures)

Use this space to type out a comment for the EPA explaining what more expensive vehicles would mean for your family's budget.

UNA FORDABLE

EPA-HQ-OAR-2022-0829-1715 - Mass Comment Campaign sponsoring organization unknown (14,249 signatures)

I am opposed to this regulation.

The American spirit built the auto industry and defined the 20th century; the open road became a symbol of freedom. Now, this regulation threatens to take away our freedoms by taking away our cars.

These new vehicle regulations proposed by the Environmental Protection Agency (EPA) are clearly intended to limit the production and sale of gas cars. And it’s very clear that President Biden and the far Left would like to ban gas cars altogether. But this is NOT what the American people want. We like gas cars and we like being able to buy gas cars. We do not need the Socialist state to regulate our choice of car.

Regulating gas cars out of existence is extremely unpopular—it’s why this policy would never make it through Congress. It is why the President is instead pushing this policy via the federal bureaucracy.

This regulation will limit my options when I go to buy my next car. I will be stuck with a car or truck that is more expensive, of lower quality, dependent on rare Chinese materials, dependent on the vulnerable electric grid, and otherwise unable to meet my needs. We will be forced to replace our gas cars with electric cars—which are more expensive, have shorter ranges, take more time to refuel, and line the pockets of the Chinese Communist Government because of the lithium mining needed.

This regulation is the big-government Socialist state at its worst; it hurts Americans and helps our adversaries. It raises the key question: what does this Administration have against American citizens?

Let's keep America free—let us buy the car or truck that we want.

EPA-HQ-OAR-2022-0829-1718 - Mass Comment Campaign sponsoring organization unknown (email) (57 signatures)

Thank you for your recently announced proposals to address pollution from light and medium-duty vehicles. I am worried about the impacts of the climate crisis and dangerous air pollution on the health of our communities, which is why I hope that you'll finalize this rule by the end of the year.

With your support we can ensure that all new vehicles are zero-emission in 2035.

The transportation sector is the leading source of climate pollution in the US and is responsible for significant NOx and particulate matter emissions. The climate crisis and air pollution are harming our families and our communities today, and vehicle emissions are a major contributor to this pollution. This is especially true for passenger cars and trucks, which are responsible for 57% of the total climate pollution from the transportation sector.

EPA's proposed standards will be crucial in addressing this pollution. EPA estimates that the proposed standards would avoid approximately 7.3 billion metric tons of greenhouse gas emissions from 2027 through 2055, and would significantly reduce NOx, PM, and VOC emissions during that time.

It is vital for EPA to finalize the most protective multipollutant standards possible that are consistent with and build from the proposals, helping to ensure that at least two-thirds of new light-duty vehicles and at least 40% of new medium-duty vehicles sold in 2032 are zero-emitting. These standards must put us on a path for all new vehicles to have zero emissions no later than 2035. Standards at this level are eminently achievable, accounting for the progress already underway thanks to manufacturer and fleet investments and commitments, federal spending, and state policies like the Advanced Clean Cars II rule. According to a report by EDF and WSP, U.S. manufacturing will be capable of producing an estimated 4.3 million new passenger EVs every year by 2026 (a third of all new vehicles sold in 2022). U.S. manufacturing facilities will also be able to produce enough batteries to supply up to 11.2 million new passenger EVs every year by 2026.

Please take action to ensure that EPA finalizes the most protective standards possible that are consistent with, and build from the proposals, to put us on the path to zero emissions from new vehicles in 2035.

EPA-HQ-OAR-2022-0829-1719 - Mass Comment Campaign sponsoring organization unknown (email) (261 signatures)

I support the EPA's proposed standards for light-, medium-, and heavy-duty vehicles. These standards should significantly reduce emissions and grow the electric vehicle sector, helping us reach important climate goals.

The EPA's proposals reflect the desires of a majority of Americans. Seven in ten Americans want tougher fuel efficiency standards.

Congress committed to transitioning toward a clean energy economy under the Bipartisan Infrastructure Law and Inflation Reduction Act. To unlock the full potential of these laws, we must end our dependence on fossil fuels.

I urge you to implement the strongest possible proposed vehicle pollution standards. Our energy transition and the health of our communities depend on it.

EPA-HQ-OAR-2022-0829-1720 - Mass Comment Campaign sponsoring organization unknown (email) (19,816 signatures)

I have lived with Los Angeles smog my whole life. As an EV driver, I am trying to do my part to reduce emissions and am glad that you have proposed strong emissions standards for light- and medium-duty vehicle pollution that move us forward in addressing harmful air pollutants and global warming emissions.

These standards will be a good step in the right direction to limit dangerous smog forming and particulate emissions that can increase the risk of asthma attacks, strokes, and heart attacks, and lowering global warming emissions. Transportation is the number one contributor to global warming emissions in the United States, and curbing these emissions will be critical to addressing the climate crisis.

However, we can go farther. We need to see the strongest possible standards finalized this year. The EPA's Alternative 1 is a good start, but we need the agency to set more stringent standards after Model Year 2030 to accelerate our transition to zero-emissions and continue to make gas cars cleaner.

Please finalize a regulation at least as strong as Alternative 1 and continue working to make cars cleaner.

In order to limit dangerous NOx emissions and other air pollutants, and reduce global warming emissions to address the climate crisis, the EPA needs to pass the strongest possible cleaner cars standards. Thank you for your consideration.

EPA Summary and Response:

Summary:

Many of these mass mail campaigns are supportive of EPA's proposed program or request EPA to issue more stringent standards to address climate change and other environmental issues, as well as Environmental Justice concerns. Some, however, raise concerns about potential adverse impacts of the rule.

Response:

The mass mail campaign comments reproduced verbatim above are general in nature and do not require detailed EPA response beyond provided elsewhere in this document, and/or contain opinions or statements that are raised without reasonable specificity. EPA's responses included throughout this RtC document address each of the general topics raised in these comments. The mass mail campaign comments that are not reproduced above and that contain detailed comments on specific issues are addressed under the relevant topics of this RtC document.

Appendix C: List of testifiers at public hearings

This appendix contains a list of individuals who testified at a virtual public hearing on the proposal, which was held on May 9-11, 2023. The hearing transcript can be found in the docket for this rule (EPA-HQ-OAR-2022-0829-5115). Over the three days of the hearings, 217 testifiers provided statements voicing their support for or concerns about the proposal: 88 testifiers on May 9, 89 testifiers on May 10, and 49 testifiers on May 11. The testifiers are listed in Table C-3, below.

<u>EPA Summary and Response:</u>

Summary:

We characterize the nature of each of these comments by classifying their statements along eight dimensions (one comment may contain statements on more than one dimension). The topics are as follows:

- General support
- Want more stringent
- Oppose
- Environmental and/or health concerns
- Environmental Justice concerns
- Business and/or cost concerns
- Infrastructure and/or resource availability
- Incentive availability (IRA, BIL, etc.)

As shown in Table C-1, each of the testifiers testified on at least one of these 8 topics. Most of the testifiers made statements on 2 or 3 topics (36% and 30%, respectively).

Table C-1: Number of Topics Raised in Hearing Testimony

No. Issues Raised	% of Testifiers
0	0%
1	26%
2	36%
3	30%
4	6%
5	1%
Total	100%

As shown in Table C-2, the most commonly raised topics were statements raising concerns about the climate change and the environment (29%), general support (24%), and Environmental Justice (13%).

Table C-2: Themes Raised in Hearing Testimony

Themes of Non-Detailed Comments	% Testifiers Raising Theme
General support	24%
Want more stringent	11%
Oppose	3%
Environmental, Health	29%
Environmental Justice	13%
Business, Costs	11%
Infrastructure, resource availability	5%
Incentive availability	4%
Total	100%

<u>Response:</u>

Hearing statements that are specific in nature and are not included in written comments submitted by the testifier or the testifier's organization are included verbatim in sections of this document above and responded to by EPA.

Some of the testimony statements are general in nature and do not require detailed EPA response beyond those provided in the sections above in this document, and/or they contain opinions or statements about issues without reasonable specificity. EPA's responses included throughout this RtC document address each of the general topics raised in these general comments.

Table C-3: List of Testifiers at Public Hearing, May 9-11, 2023

Day	Name of Testifier	Organization
1	Alex Stavis	
1	Alexander Gecu	
1	Alexandra Grose	Consumer Reports
1	Ali Simpson	Moms Clean Air Force
1	Almeta Cooper	Moms Clean Air Force
1	Amanda Pantoja	Green Latinos
1	Ana Rios	Moms Clean Air Force, EcoMadres
1	Anh Bui	International Council on Clean Transportation
1	Bill Janiga	AZIPL
1	Bob Yuhnke	Elders Climate Action
1	Brent Sieling	
1	Brian Jennings	American Coalition for Ethanol
1	Brian Werner	Minnesota Biofuels Association
1	Britt Carmon	National Resources Defense Council
1	Bruce Krawisz	
1	Bryan Burton	American Lung Association

Day	Name of Testifier	Organization
1	Cara Cook	Alliance of Nurses For Healthy Environments
1	Carissa Stip	
1	Chris Edgington	National Corn Growers Association
1	Dave Cooke	Union of Concerned Scientists
1	David Carter	Lucid Motors
1	East Peterson-Trujillo	Public Citizen
1	Elaine Weir	Sierra Club
1	Elizabeth Bechard	Moms Clean Air Force
1	Elizabeth Brandt	Moms Clean Air Force
1	Erik White	Plaster County Air Pollution Control District
1	Eugenie Lewis	Sierra Club, Climate Reality Project, Citizens Climate Lobby
1	Gary Ewart	American Thoracic Society
1	Geoff Cooper	Renewable Fuels Association
1	Howard Sherman	
1	Ida Sami	Moms Clean Air Force
1	Ileagh Macivers	Interfaith Power and Light
1	Illana Naylor	Moms Clean Air Force
1	Jason Dragseth	Sierra Club New York
1	Jeff Alson	
1	Jeff Weber	National Automobile Dealers Association
1	Jenna Rlemenschneider	Asthma and Allergy Foundation of America
1	Jessica Moerman	Science and Policy at the Evangelical Environmental Network
1	Jim Rocco	Energy Marketers of America
1	John Bodine	
1	Julie Kimmel	Moms Clean Air Force
1	Karin Stein	Moms Clean Air Force, EcoMadres
1	Kate Shenk	Regulatory Affairs for Clean Fuels Alliance America
1	Katherine Pruitt	American Lung Association
1	Katherine Stainken	Electrification Coalition
1	Kathy Daniel	
1	Kathy Kupfer	Environmental Defense Fund
1	Keith Cavallini	Green Diesel Engineering
1	Kevin Martin Brown	MECA
1	Kevin Martin Fisher	Environmental Defense Action
1	Kindra Weid	Moms Clean Air Force, Alliance of Nurses for Healthy Environments
1	Laura Kate Bender	Healthy Air with the American Lung Association
1	Laura Kate Magzis	New Hampshire Sierra Club
1	Laurie Anderson	Moms Clean Air Force
1	Leslie Vasquez	South Bronx Unite

Day	Name of Testifier	Organization
1	Levi Kamolnick	Ceres
1	Lisa Allee	
1	Lisa Patel	Medical Society Consortium on Climate and Health
1	Liz Hurtado	Moms Clean Air Force
1	Lori Byron	Academy of Pediatrics national network of pediatric climate advocates
1	Lucia Valentine	Moms Clean Air Force
1	Marianne Comfort	Sisters of Mercy
1	Melody Reis	Moms Clean Air Force
1	Mercedes McKinley	Moms Clean Air Force, EcoMadres
1	Michael Geller	MECA
1	Michael Hartrick	Alliance for Automotive Innovation
1	Michael Petelle	
1	Michelle Uberuaga	Moms Clean Air Force
1	Mike McAndrews	
1	Mollly Collins	
1	Ozilynn Frost	
1	Patrice Tomcik	Moms Clean Air Force
1	Patrick Kelly	American Fuel and Petrochemical Manufacturers
1	Paul Billings	Public Policy for the American Lung Association
1	Paul Zwiebel	
1	Phoebe Morad	Lutherans Restoring Creation
1	Quinta Warren	Consumer Reports
1	Rasto Brezny	MECA
1	Richard Sigler	
1	Riley Talbot	Catholic Climate Covenant
1	Roselie Bright	
1	Sarah McBride	Moms Clean Air Force
1	Shaina Oliver	Moms Clean Air Force
1	Steven Paul Henderson	Ford Motor Company
1	Susan Hendershot	Interfaith Power and Light, Christian Church Disciples of Christ
1	Thereza Cevidanes	National Trade Association For Truck Stops and Travel Centers, National Trade Association For Fuel Marketers Retailers.
1	Tracy Sabetta	Moms Clean Air Force
1	William Berrett	American Lung Association
2	Alexa Aispuro	
2	Alondra Morales Sanchez	Poder Lantinx
2	Anastasia Gordon	We Act for Environmental Justice

Day	Name of Testifier	Organization
2	Andrew Hauptman	Moms Clean Air Force
2	Andy Burt	
2	Ann Mesinkoff	Environmental Law and Policy Center
2	Ann Mudd	
2	Anne Mellinger-Birdsong	
2	Berit Foss	POET
2	Billy Brooks	COBB Tuning
2	Brian Russo	Sierra Club
2	Brittany Keyes	
2	Brittany Meyer	
2	Brooke Petry	Moms Clean Air Force
2	Bryan Just	American Petroleum Institute
2	Cassandra Carmichael	National Religious Partnership for the Environment
2	Celerah Hewes	Moms Clean Air Force
2	Chelsea Lyons	Moms Clean Air Force
2	Chris Biley	Growth Energy
2	Chris Harto	Consumer Reports
2	Chris Nevers	Rivian Automotive
2	Connor Mighell	Center for the American Future of Texas Public Policy Foundation
2	Constantin Donea	
2	Dan Millen	Livernois Motorsports
2	Daniel McCarthy	Sierra Club
2	Darren Bakst	Center of Energy Environment at the Competitive Enterprise Institute
2	David Gorman	
2	David Hill	
2	Donna Jackson	National Centers Project 21 Black Leadership Network
2	Doug O'Malley	Environment New Jersey
2	Elizabeth Hauptman	Moms Clean Air Force
2	Emily Pickett	Moms Clean Air Force
2	Gabrielle Lawrence	
2	Ginnie Judd	
2	Hazel Chandler	Moms Clean Air Force
2	Ian Kolesinkas	
2	Jacqueline Georgi	
2	James Colen	
2	Jennifer Cantley	Moms Clean Air Force
2	Joan Schiller	Oncologists United for Climate Health, Lung Cancer Research Foundation

Day	Name of Testifier	Organization
2	Joel Charles	
2	Jonathan Walker	Consumer Reports
2	Katherine Garcia	Sierra Club
2	Kelly Senecal	Conversion Science and Vehicles
2	Kent Schaeffer	Consumer Reports
2	Kineema Moore	
2	Laura Turner	
2	Leah Qusba	Action for Climate Change Emergency
2	Liane Randolph	California Air Resources Board
2	Liz Scott	American Lung Association Healthy Air Campaign
2	Luz Druda	Moms Clean Air Force
2	Marco Castellanos	
2	Maribeth Diggle	Moms Clean Air Force
2	Mariela Ruacho	American Lung Association in California
2	Mark Hardin	
2	Matthew Le Fleur	Sierra Club
2	Mike Copeland	Arrington Performance
2	Mike Spagnola	Specialty Equipment Market Association
2	Naman Rawal	
2	Natalie Ekberg	Moms Clean Air Force
2	Neil Feldmeier	
2	Oscar Hauptman	
2	Patricia Samples	Elders Climate Action
2	Patrick Quinn	AESI
2	Peter Huether	American Council for an Energy-Efficient Economy
2	Rabbi Daniel Swartz	Coalition on the Environment and Jewish Life
2	Rachel Meyer	Moms Clean Air Force
2	Rich Reis	Sierra Club
2	Robert Larew	National Farmers Union
2	Shelley Francis	EVHybridNoire
2	Stacie Slay	
2	Thomas Barnstable	
2	Thomas Boylan	Zero-Emission Transportation Association
2	Thomas Easley	Colorado Communities for Climate Action
2	Tina Catron	Environmental Defense Action Fund
2	Tonyisha Harris	
2	Tyler Kerce	
2	Urvashi Nagrani	
2	Vanessa Lynch	Moms Clean Air Force
2	Veena Dharmaraj	Massachusetts Sierra Club

Day	Name of Testifier	Organization
3	Alex Boesenberg	MEMA
3	Andrea Strzelec	N/A
3	Andy Su	Environmental Defense Fund
3	Ash Lauth	Action For the Climate Emergency
3	Beatrice Zovich	Pennsylvania chapter of the Sierra Club
3	Brian Kalina	N/A
3	Cere Begulki	N/A
3	Cindy Le	Action for the Climate Emergency
3	Dan Byers	U.S. Chamber of Commerce
3	Darien Davis	League of Conservation Voters
3	David DJ Portugal	Chispa Arizona
3	David Myers	Moms Clean Air Force
3	David Patterson	PHEV Coalition
3	Dean Taylor	Strong Plug in Hybrid Coalition
3	Elbert Hill	N/A
3	Erandi Trevino	Moms Clean Air Force
3	Jack Shu	National Parks and Conservation Association
3	Jeffery McMahon	N/A
3	Jessica Enzmann	Sierra Club
3	Jessica Mengistab	Alliance of Nurses for Healthy Environments
3	Jim McCarthy	Electric Vehicle Association of Southern California
3	Josh Skipworth	Campaigns for Active Climate Emergency
3	Keith Puntennery	N/A
3	Kim Anderson	Evangelical Environmental Network
3	Kim Pendergast	Magnuson Superchargers
3	Kyle Meyaard-Schaap	Evangelical Environmental Network
3	Laurel Moorhead	Transfer Flow
3	Linda Ellsworth	N/A
3	Linda Singerman	N/A
3	Lindey Mendelson	Maryland chapter of the Sierra Club
3	Marcus Cole	Evangelical Environmental Network
3	Mark Rose	National Parks Conservation Association
3	Micheal McClain	National Religious Partnership For the Environment
3	Mona Sarfaty	George Mason University Center For Climate Change Communication
3	Paul Miller	Northeast States for Coordinated Air Use Management
3	Rachel Patterson	Evergreen Action
3	Reem Rayef	Blue Green Alliance
3	Richard Killmer	N/A
3	Rob Simmons	of Automotive Consulting Services

Day	Name of Testifier	Organization
3	Saleh Mousa	N/A
3	Sam Beard	Sierra Club Illinois
3	Samantha Scmitz	Moms Clean Air Force
3	Sarah Bucic	Alliance of Nurses for Healthy Environments
3	Shannon Baker-Branstetter	Center for American Progress
3	Shelly Sallee	Texas Sierra Club
3	Tricia Yacavone-Biagi	N/A
3	Trisha Dellolacono	CALSTART
3	Walter Englert	N/A
3	Yeh-Tang Huang	Natural Resources Defense Council.

Appendix D: EPA's request for comment on potential fuels controls for future rulemaking such as gasoline PM standards

This appendix contains the responses received to EPA's request for comment on including potential fuels controls in a future rulemaking.

<u>Comments by Organizations</u>

Organization: Alliance for Automotive Innovation

A. EPA Should Act Now to Improve Fuels

EPA should act now to:

- Implement a nationwide clean fuel standard to lower GHG emissions; [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Regulate the particulate forming tendency of market gasoline by eliminating the heavy aromatic fraction of gasoline, thereby reducing PM emissions from all ICE vehicles, equipment, and engines to improve air quality for all; [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Lower the sulfur cap of gasoline from 80 ppm to 10 ppm at the refinery gate to further reduce non-GHG emissions from ICE-equipped vehicles and engines to improve air quality; [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Adjust Tier 3 certification fuel specifications to align with current market fuel composition and to enable fuel suppliers to target a particulate matter index of 1.5 to 1.6; [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Cap summer vapor pressure of gasoline at 9.0 psi or less, regardless of ethanol content, to further reduce evaporative emissions as E10 fuel is ubiquitous in the market; [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Immediately eliminate sub-87 anti-knock index ("AKI") octane fuels from the market to increase fuel efficiency and reduce GHG emissions; [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Transition to a higher minimum-octane gasoline (i.e., minimum 95–98 research octane number) to facilitate higher engine efficiency; and [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

- Limit air toxics, e.g., olefins and aromatics, and their precursors from the fuel to improve air quality for all. [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

In addition to a comprehensive fuels rulemaking, Auto Innovators recommends that EPA also proceed with finalizing its eRINs proposal from the Renewable Fuel Standard Set Rule for Renewable Volume Obligations for 2023-2025 NPRM.404 This proposal provides a complementary approach to EPA's proposed multipollutant rule, including supporting and encouraging both EVs and renewable sources of energy, as well as to the overall goal of decarbonizing the transportation sector. [EPA-HQ-OAR-2022-0829-0701, pp. 260-261]

404 Renewable Fuel Standard Set Rule for Renewable Volume Obligations for 2023-2025, https://www.govinfo.gov/content/pkg/FR-2022-12-30/pdf/2022-26499.pdf

E. EPA Should Regulate the Particulate Forming Tendency of Market Gasoline

1. Regulatory Authority

All major global regulatory agencies (EPA, CARB, the European Union, China) have taken steps to reduce vehicle particulate emissions as demonstrated by their regulations limiting tailpipe emissions of particulate mater (“PM”).409,410 While establishing and tightening particulate emissions standards for future vehicles may lower future PM emissions from those new vehicles, reducing heavy aromatic content in gasoline will reduce PM emissions today from the on-road fleet as well as from new vehicles. EPA recognizes that it has the authority to address gasoline composition as a mechanism to address the in-use fleet, citing the sulfur standards for gasoline and diesel.411 [EPA-HQ-OAR-2022-0829-0701, pp. 263-266]

409 Engeljehringer, K., Emission Regulation Trends: Overcoming BS6 & RDE Challenges with 2020 getting Closer, in AVL India Seminar May 2018, available at https://www.avl.com/documents/10138/8665616/02+AVL+India+Seminar+May+2018_Regulation+Trends_Engelje hringer.pdf (accessed Sep. 24, 2021).

410 Ball, D., Meng, X., and Weiwei, G., Vehicle Emission Solutions for China 6b and Euro 7, SAE Technical Paper 2020- 01-0654, 2020, available at https://doi.org/10.4271/2020-01-0654 (accessed Sep. 24, 2021).

411 NPRM at 29402

2. High Leverage for PM Emissions Reduction

We agree with EPA’s position that removal of heavy aromatic compounds from gasoline has a very high leverage to reduce PM emissions from vehicles fueled by gasoline.412 These compounds have a disproportionate contribution to PM formation in vehicle exhaust, particularly aromatic hydrocarbons with 10 or more carbons. As discussed by EPA, removing these heavy aromatic hydrocarbons from gasoline greatly reduces PM emissions from vehicles.413,414 A regulatory change in fuel requirements to reduce or limit the amount of heavy aromatic hydrocarbons in gasoline would also reduce PM emissions from off-road equipment fueled by gasoline (e.g., lawn care equipment, generators, snowmobiles, outboard motors, etc.). [EPA-HQ-OAR-2022-0829-0701, pp. 263-266]

412 NPRM at 29398

413 Aikawa, K., Sakurai, T., and Jeter, J., Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions, SAE Int. J. Fuels Lubr. 3(2):610-622, 2010, available at https://doi.org/10.4271/2010-01-2115 (accessed Sep. 24, 2021).

414 Coordinating Research Council, “Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In- Use Vehicles,” Report No. E-94-2, March 2016.

Many studies have shown the contribution of heavy aromatics to tailpipe PM. Early papers of particular importance were published by Honda and include the development of a PM index (PMI) for gasoline. PMI values correlate well with tailpipe PM emissions.415,416 The PMI calculation is based on data from a laboratory technique known as detailed hydrocarbon analysis

(DHA). Other methods of measuring heavy hydrocarbon content and PM-forming tendency beyond the DHA method may be more readily implemented.417,418,419,420 Improvements to one such method, known as Simulated Distillation or SimDis, were recently reported by EPA.421 Auto Innovators 2018 and 2019 market fuel DHA study reveals the high PMI fuels are from high molecular weight aromatic hydrocarbons, those with 10 or more carbon atoms (e.g., C10+ aromatics).422 Therefore, an upper limit for C10+ aromatics is needed. [EPA-HQ-OAR-2022-0829-0701, pp. 263-266]

415 Aikawa, K., Sakurai, T., and Jeter, J., Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions, SAE Int. J. Fuels Lubr. 3(2):610-622, 2010, available at htps://doi.org/10.4271/2010-01-2115 (accessed Sep. 24, 2021).

416 Aikawa, K. and J.J. Jeter, Impact of gasoline composition on particulate matter emissions from a direct-injection gasoline engine: Applicability of the particulate matter index. International Journal of Engine Research, 2014. 15(3): p. 298-306. available at htps://doi.org/10.1177/1468087413481216 (accessed Sep. 24, 2021).

417 Chapman, E., Winston-Galant, M., Geng, P., and Konzack, A., Global Market Gasoline Range Fuel Review using Fuel Particulate Emission Correlation Indices, SAE Technical Paper 2016-01-2251, 2016, htps://doi.org/10.4271/2016-01-2251 (accessed Sep. 24, 2021).

418 Coordinating Research Council, “An Improved Index for Particulate Mater Emissions (PME),” Report No. RW- 107-2, March 2021.

419 Chapman, E., Winston-Galant, M., Geng, P., and Pryor, S., Development of an Alternative Predictive Model for Gasoline Vehicle Particulate Matter and Particulate Number, SAE Technical Paper 2019-01-1184, 2019, htps://doi.org/10.4271/2019-01-1184 (accessed Sep. 24, 2021).

420 Chapman, E., et al., Comparison of the Particulate Matter Index and Particulate Evaluation Index Numbers Calculated by Detailed Hydrocarbon Analysis by Gas Chromatography (Enhanced ASTM D6730) and Vacuum Ultraviolet Paraffin, Isoparaffin, Olefin, Naphthene, and Aromatic Analysis (ASTM D8071). SAE Technical Paper 2021-01-5070, 2021, htps://doi.org/10.4271/2021-01-5070 (accessed Sep. 24, 2021).

421 USEPA, "Assessment and Optimization of ASTM D7096 Simulated Distillation for Quantifying Heavy Hydrocarbons in Gasoline," April 2023. Document EPA-420-R-23-009.

422 USEPA, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources," April 2023. Document EPA-420-R-23-008.

Several Coordinating Research Council (CRC) research projects have been conducted to investigate the impacts of PMI, ethanol, and octane ratings on vehicle emissions.423,424,425 The data show a direct and strong correlation between increased fuel PMI and increased tailpipe PM. Detailed hydrocarbon analysis of the fuels showed that the high molecular weight aromatic hydrocarbons in the fuel, C10+ hydrocarbons, are particularly significant contributors to increased tailpipe PM. The greater the C10+ aromatic hydrocarbon content, the greater the increase in PM emissions. [EPA-HQ-OAR-2022-0829-0701, pp. 263-266]

423 Coordinating Research Council Report No. E-94-1. Evaluation and Investigation of Gaseous and Particulate Emissions on SIDI In-Use Vehicles with Higher Ethanol Blend Fuels (2014), htp://crcsite.wpengine.com/wp- content/uploads/2019/05/03-17589_CRC-E94-1_Final-Report_6-2-2014_Lobato_Morgan.pdf (accessed Sep. 24, 2021).

424 Coordinating Research Council Report No. E-94-2. Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles (2017), htp://crcsite.wpengine.com/wp-

content/uploads/2019/05/CRC_2017-3-21_03-20955_E94-2FinalReport-Rev1b.pdf (accessed Sep. 24, 2021).

425 Coordinating Research Council, “An Improved Index for Particulate Matter Emissions (PME),” Report No. RW-107-2, March 2021.

Figure 87 shows that fuels with high PMI values have higher proportions of heavy aromatics (C10+ aromatics).

[See original for box plot titled “Figure 87: 2018 and 2019 Summer U.S. Market Gasoline C10+ and PMI”] [EPA-HQ-OAR-2022-0829-0701, pp. 263-266]

Figure 88 below shows that limiting the content of total aromatic hydrocarbons doesn’t necessarily control against high PMI market fuels, however, limiting the amount of C10+ aromatics would do so.

[See original for graph titled “Figure 88: 2018 and 2019 Summer U.S. Market Gasoline PMI and Total Aromatics”] [EPA-HQ-OAR-2022-0829-0701, pp. 263-266]

More recently, as described in Section IX of the NPRM, a study of this fuel impact on vehicle PM emissions was conducted by EPA, Environment Canada and several automotive OEMs.426 The program included 10 test vehicles of model years 2015 to 2022. Three test fuels, two E10 and one E15 (fuels B, C, and D respectively), were constructed that contained a reduced heavy aromatic content relative to a baseline E10 test fuel (fuel A). The baseline fuel represented a U.S. market fuel with high C10+ aromatic content whereas the base fuel and the three test fuels represented fuels with C10+ aromatic content typical of average U.S. gasoline. The fuels therefore had similar composition except that test fuels B, C, and D had replaced 3 %vol (all C10+ aromatics) with other lighter hydrocarbons or ethanol (each intended to replace the octane value of the removed C10+ aromatics). As summarized in Figure 89 below, the three fuels incorporating this 3 %vol change in composition led to major (25-40%) reductions in average PM emissions across the test vehicle fleet (40% on the FTP drive cycle and by 25% on US06). [EPA-HQ-OAR-2022-0829-0701, pp. 266-268]

426 USEPA, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources," April 2023. Document EPA-420-R-23-008.

[See original for graph titled “Figure 89: FTP Composite and US06 PM Emissions Results”]

Above figures adapted from EPA-420-R-23-008 (Figures ES.1 and ES.2) [EPA-HQ-OAR-2022-0829-0701, pp. 266-268]

As these multiple studies and others have conclusively shown, the removal of heavy aromatic hydrocarbons from gasoline, particularly those in the C10+ range, has very high leverage in reducing tailpipe PM emissions from gasoline vehicles. In particular, the 2023 study by EPA and others427 showed that a 3% change in gasoline formulation (replacing these heavy hydrocarbons) yielded tailpipe PM emissions reductions averaging 40% and 25% on the FTP and US06 regulatory drive cycles, respectively. [EPA-HQ-OAR-2022-0829-0701, pp. 266-268]

427 USEPA, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources," April 2023. Document EPA-420-R-23-008.

The Worldwide Fuel Charter, Sixth Edition,428 published as a cooperative effort between global vehicle and engine manufacturers, discusses fuel quality needs commensurate with meeting emissions control requirements in different global markets. This document gives a suggested PMI maximum in the range of 1.5-1.8 for markets with highly advanced emission control requirements, such as the United States (Tier 3 Bin 30) and California regulations. However, as shown in Figure 42 of the NPRM, approximately 20% of U.S. gasoline still has a PMI of 1.8 or greater.429 The Charter also notes that "Various fuel-sampling efforts have shown that many areas of the developed world have achieved a PMI value of 1.5 in their commercially available gasoline without actively trying to minimize PMI. Setting a maximum PMI value of 1.5 for all grades of commercially available gasoline will reduce and help control the particulate emissions from legacy, current, and future vehicles." We note that the same outcome can be achieved through an alternative control metric that achieves the same result (e.g., distillation or simulated distillation cut point), as discussed in the NPRM.430 [EPA-HQ-OAR-2022-0829-0701, pp. 266-268]

428 htps://www.acea.auto/files/WWFC_19_gasoline_diesel.pdf

429 NPRM at 29401.

430 NPRM at 29402

Therefore, EPA should proceed with controlling the particulate-forming tendency of market gasoline by requiring the removal of the heavy aromatic components to lower PM emissions throughout the fleet and improve air quality. Based on the body of information presented above, we recommend an approach that would limit market fuels to a maximum PMI value of 1.5. [EPA-HQ-OAR-2022-0829-0701, pp. 266-268]

3. Reduction of Heaviest Gasoline Aromatics will have little to no impact on the Octane Rating

Evaluation of API research report 45,431 where the octane ratings of individual hydrocarbons have been measured, shows that octane ratings start to tail-off as boiling points increase. A plot of these data shows the following trends. [EPA-HQ-OAR-2022-0829-0701, pp. 266-268]

431 Knocking Characteristics of Pure Hydrocarbons. American Society for Testing Methods, Developed Under American Petroleum Institute Research Project 45.

[See original for graph titled "Figure 90: API Project 45 Octane and Boiling Points"] [EPA-HQ-OAR-2022-0829-0701, pp. 266-268]

4. Addresses Entire On-Road Fleet and Off-Road Equipment

We agree with EPA that a new fuel-based PM regulation for gasoline is the only mechanism to reduce PM emissions from all gasoline engines, both old and new, in on-road vehicles and off-road equipment. The average lifespan of light duty vehicles has increased over time. S&P Global Mobility reports that the average lifespan for U.S. light duty vehicles has risen to 12.5 years (13.6 years for cars, and 11.8 years for SUVs, crossovers, and light duty trucks).432 The on-road LDV fleet consists of 290 million vehicles of varying age,433 whereas new vehicles are produced at a rate of only 14-17 million per year over the last decade.434 A fuel-based solution to address PM emissions from the on-road fleet will have a broad impact. [EPA-HQ-OAR-2022-0829-0701, pp. 269-270]

432 htps://www.cnbc.com/2023/05/15/americans-are-keeping-their-cars-longer-amid-rising-interest-rates.html

433 U.S. Vehicle Registration Statistics, Hedges & Company, htps://hedgescompany.com/automotive-market- research-statistics/auto-mailing-lists-and-marketing/ (accessed May 23, 2023).

434 htps://www.epa.gov/system/files/documents/2022-12/420r22029.pdf

A fuel-based PM regulation is the ONLY option to reduce PM emissions from the on-road fleet and has a particularly high impact on those vehicles with the highest tailpipe PM emissions (older vehicles that were subject to higher emissions limits). A fuel-based regulation would also yield tailpipe PM reductions for new vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 269-270]

5. Improves Resistance to Abnormal Combustion

Additionally, it is well known that Stochastic Preignition (SPI), also commonly known as Low- Speed Preignition (LSPI), is an abnormal combustion issue that can adversely impact downsized, boosted spark-ignition engines that now dominate the light-duty vehicle market. SPI is more than just engine “knock,” for which fuel solutions and engine controls strategies exist. SPI involves early combustion of the air-fuel mixture which can lead to catastrophic engine damage. Improving fuel economy of future vehicles to meet more stringent requirements will require that automakers further increase the efficiency and power density of future engines. However, these engine improvements are constrained by the increased occurrence of SPI under those conditions. The presence of high boiling point aromatic compounds and high fuel PMI value have been shown to be positively correlated to the SPI occurrence frequency from engines. Heavy compounds in gasoline that do not easily vaporize will impinge on the wall, which can produce SPI events in the current or next combustion cycle. Various papers have been published about the relationship, 435,436,437,438,439 and on-going studies are in process to confirm it.440 The described fuel-based regulation controlling high boiling point compounds would beneficially reduce the occurrence of SPI in U.S. gasoline vehicles. [EPA-HQ-OAR-2022-0829-0701, pp. 269-270]

435 Swarts, A., Chapman, E., and Costanzo, V., "Detailed Analyses and Correlation of Fuel Effects on Stochastic Preignition," SAE Int. J. Adv. & Curr. Prac. in Mobility 2(6):3248-3267, 2020, https://doi.org/10.4271/2020-01- 0612

436 Chapman, E., Davis, R., Studzinski, W., and Geng, P., "Fuel Octane and Volatility Effects on the Stochastic Pre- Ignition Behavior of a 2.0L Gasoline Turbocharged DI Engine," SAE Int. J. Fuels Lubr. 7(2):379-389, 2014, doi:10.4271/2014-01-1226.

437 Mansfield, A., et al. “Effect of Market Variations in Gasoline Composition on Aspects of Stochastic Pre-Ignition” Fuel 184 (2016): 390-400.

438 Chapman, E. and Costanzo, V., "A Literature Review of Abnormal Ignition by Fuel and Lubricant Derivatives," SAE Int. J. Engines 9(1):2016, doi:10.4271/2015-01-1869.

439 Kar, A., Huisjen, A., Aradi, A., Reitz, J. et al., "Assessing the Impact of Lubricant and Fuel Composition on LSPI and Emissions in a Turbocharged Gasoline Direct Injection Engine," SAE Int. J. Adv. & Curr. Prac. in Mobility 2(5):2568- 2580, 2020, htps://doi.org/10.4271/2020-01-0610.

440 CRC Project AVFL-33 Phase 1 and Phase 2 - htps://crcao.org/wp-content/uploads/2023/03/Final-2022-CRC- Annual-Reportv2.pdf

Unlike SPI mitigation strategies employed by automakers today, which are reactive in nature, reducing heavy aromatic hydrocarbons in gasoline would also help address one of the root causes of SPI. [EPA-HQ-OAR-2022-0829-0701, pp. 269-270]

6. Addresses Proposed Changes to National Ambient Air Quality Standards (NAAQS)

A new fuel-based PM regulation, which will reduce tailpipe PM emissions from the on-road fleet, particularly in areas with high tailpipe PM emissions from gasoline vehicles, would also help states to meet the proposed lower annual PM2.5 standard that EPA proposed for the NAAQS earlier this year.441 A fuel-based PM regulation is the only option for reducing PM across the light-duty vehicle fleet and from gasoline-powered equipment. [EPA-HQ-OAR-2022-0829-0701, p. 270]

441 htps://www.federalregister.gov/documents/2023/01/27/2023-00269/reconsideration-of-the-national-ambient- air-quality-standards-for-particulate-mater

7. Environmental Justice Considerations

We agree with EPA that a reduction in heavy aromatics in gasoline will produce beneficial reductions in PM emissions that will further national environmental justice goals. EPA notes in the NPRM that people living and working near roadways will benefit from fuel improvements that reduce PM formation, that those individuals are more likely to be people of color and/or have a low socioeconomic status (SES), and that lower-SES neighborhoods are likely to have more vehicles with higher emissions than higher-SES neighborhoods.442 A fuel-based regulation to reduce PM emissions would do so for all vehicles in the on-road fleet. Importantly, the greatest absolute emissions reductions will occur in and benefit lower-SES communities, as those communities are more likely to have the highest-emitting vehicles, i.e., a higher proportion of older vehicles with the highest emissions levels (due to their vehicle's age). [EPA-HQ-OAR-2022-0829-0701, pp. 270-271]

442 NPRM at 29393

EPA also uses this same rationale (proximity of low-SES communities to roadways) in support of a proposed lower tailpipe PM emissions limit, but the distribution of ages of vehicles on roadways is not discussed. The emissions reductions from the proposed tailpipe emissions rule will only reduce emissions for the newest vehicles, which in the near-term benefits higher-SES communities more than lower-SES communities. Moreover, these new vehicles will tend to replace vehicles of more recent vintage that already adhere to the newest, most stringent PM emissions limits. A fuel-based regulation targets all vehicles and is the only approach that immediately reduces emissions from older, higher-emitting vehicles more often found in low-SES communities. [EPA-HQ-OAR-2022-0829-0701, pp. 270-271]

5. Limit Air Toxics from Market Fuels

The emissions from an average light duty vehicle have been reduced by over 99% since the introduction of emissions control technology. The reduction has been such that, according to CARB, in the California south coast air basin, lawn and garden equipment is a greater contributor to poor air quality than light-duty vehicles.453 The best approach to limiting toxic emissions is to remove toxics from the fuel prior to distribution. EPA recognized and applied this approach to limiting benzene emissions. Going forward, EPA must broaden its approach and limit air toxics, e.g., olefins and aromatics, and their precursors from the fuel prior to distribution. [EPA-HQ-OAR-2022-0829-0701, pp. 277-278]

453 SORE Fact Sheet, California Air Resources Board, https://www.arb.ca.gov/msprog/offroad/sore/sm_en_fs.pdf?_ga=2.125314186.1460474514.1631206544-48095875.1631206544 (accessed Sep. 24, 2021).

Organization: American Chemistry Council, Fuel Additives Task Group (FATG)

In the Program Announcement 2, EPA states that,

2 EPA-420-F-23-009. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017626.pdf

…advanced gasoline technologies are expected to play an important role in the future… [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

EPA is also seeking comment on potential future gasoline fuel property standards, aimed at further reducing PM emissions, for consideration in a possible subsequent rulemaking. These could provide an important complement to the vehicle standards being proposed in the current action. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

The proposed standards are performance-based, allowing each manufacturer to choose what set of emissions control technologies is best suited for their vehicle fleet to meet the standards. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

The FATG supports EPA's recognition that multiple technologies can lead to a reduction in emissions and supports the use of performance-based standards. The longevity of the internal combustion engines (ICE) of the current car parc means that they, and carbon-based liquid fuels, will continue to play an important role in the transportation needs of the United States. Fuel additives have and will continue to play a vital role in the optimization of the fuel and engine system with the aim of reducing particulate matter (PM) emissions. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

Fuel Additive Benefits

Fuel additives provide benefits to the environment and the consumer3. Additive technologies help enhance desired performance attributes beyond the base capabilities of the fuel and help ensure fitness for use, leading to improved function and performance. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

3 Additive Technical Committee, "Fuel Additives: Use and Benefits," Document 113, September 2013. [Embedded link: https://www.atc-europe.org/public/Doc113%202013-11-20.pdf]

Gasoline deposit control additives play a significant role in engine cleanliness and performance. They help to control the formation of deposits in port fuel injectors and on intake valves. In doing so, they help maintain optimum fuel delivery to minimize exhaust emissions and limit fuel economy degradation. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

Fuel additives help to optimize the functional efficiency of the internal combustion engine leading to the reduction of fuel consumption. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

Recognizing the benefits of treating gasoline with detergents, the Clean Air Act Amendments of 1994 require all gasoline sold in the United States to contain additives to limit the formation of intake valve and port fuel injector deposits and avoid a negative impact on emissions. The lowest additive treat rate that passes the required certification testing can be registered with the EPA as the Lowest Additive Concentration (LAC) for the detergent additive. The performance standards in the voluntary TOP TIERTM Detergent Gasoline program result in deposit control additive treat rates that are at least as high - and typically higher - than those required to meet EPA standards. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

As a stakeholder regarding EPA's potential subsequent rulemaking on future gasoline property standards, the FATG would welcome a meeting with EPA to detail the role additives can play in further reducing PM emissions. The additive industry will respond to regulatory and technology trends to continue to enable the level of performance required of current and future fuels. [EPA-HQ-OAR-2022-0829-0663, pp. 1-2]

Organization: American Coalition for Ethanol (ACE)

We welcome EPA specifically identifying fuel and the opportunity to address particulate matter (PM) emission reductions from sources of liquid fuels in a separate future rulemaking. Given the inescapable link between vehicle emissions and the fuel used to power the engines in those vehicles, we strongly recommend the Agency not wait for a future rulemaking but rather address fuel quality and PM reductions as part of the final rule for 2027 and later model year vehicles. EPA's proposal explains the complications facing refiners with respect to reducing the content of high-boiling point compounds in gasoline given the need to meet market octane requirements (since removing aromatics from gasoline requires a method to replace the octane those aromatics contained). This presents another opportunity for the Agency to rely on greater concentrations of ethanol in gasoline because ethanol delivers the highest-octane rating for fuel at the lowest cost, allowing automakers to benefit by continuing to develop high-compression and fuel-efficient engine technologies to reduce vehicle GHG emissions. We believe high octane, low carbon blends comprised of 25 to 30 percent ethanol would enable more fuel-efficient vehicles, reduce GHG emissions, and reduce other pollutants. [EPA-HQ-OAR-2022-0829-0613, pp. 4-5]

There are approximately 25 million FFVs in the U.S. today. The ideal way to transition from today's legacy fleet of internal combustion engines to new vehicles with advanced engine technologies designed to run optimally on a high-octane fuel is to utilize FFVs as bridge vehicles that can provide immediate demand for midlevel ethanol blends. [EPA-HQ-OAR-2022-0829-0613, pp. 4-5]

As a matter of fact, the Department of Energy Oak Ridge National Lab has investigated the use of high- octane ethanol blends such as E25 and E30 in FFVs that are designed and compatible with ethanol blend levels from 0 to 85 percent and can therefore seamlessly and with OEM approval utilize midlevel ethanol blends.9 Key findings from Oak Ridge include: "Experiments were performed with four FFVs using an E10 (92 RON) and E30 (100 RON) fuel. The two direct-injection FFVs demonstrated performance improvements for E30 compared to E10 of 2.5 to 3 percent, based on the 15-80 wide- open throttle acceleration time. Three of the four FFVs showed performance improvement with high- octane E30 compared to regular E10. (…) Marketing E25 or E30 to FFV owners as a performance fuel may enable greater utilization of ethanol in the near term and could help establish the refueling infrastructure to enable manufacturers to build dedicated vehicles designed for a high-octane midlevel ethanol blend." [EPA-HQ-OAR-2022-0829-0613, pp. 4-5]

> 9 Effects of High-Octane Ethanol Blends on Four Legacy FFVs and a Turbocharged GDI Vehicle." Thomas, J, West, and Huff, S, U.S. DoE ORNL. March 2015.

The full lifecycle GHG emissions analysis in the final rule must be based upon the latest version of the Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model developed by U.S. Department of Energy's Argonne National Laboratory.

GREET is considered the gold-standard for calculating energy use, GHGs, and other regulated emissions that occur during the full lifecycle production and combustion of all transportation fuels and sources. GREET is used by the California Low Carbon Fuel Standard program and the Oregon Clean Fuels program and has more than 40,000 registered users worldwide. Congress directed the Treasury Department to use GREET for the new 45Z clean fuel production tax credit in the Inflation Reduction Act (IRA). [EPA-HQ-OAR-2022-0829-0613, pp. 5-6]

While it may be an inconvenient truth for some to accept, corn ethanol is a proven and cost-effective low carbon fuel playing an important role in reducing GHG emissions and air pollution from the transportation sector. In fact, the RFS has cut GHG emissions by nearly 600 million metric tons since 2007, exceeding EPA's original expectation of 444 million metric tons.10 [EPA-HQ-OAR-2022-0829-0613, pp. 5-6]

10 Unnasch. S. (2019) GHG Reductions from the RFS2 – A 2018 Update. Life Cycle Associates Report LCA. LCA.6145.199.2019 Prepared for Renewable Fuels Association.

Organization: American Free Enterprise Chamber of Commerce (AmFree) et al.

EPA's projected increase in electric-vehicle adoption also rests on unrealis- tic expectations of increased future sales. In addition to assuming that "con- sumer uptake" will increase as more models become available and charging infrastructure develops—issues addressed elsewhere in this comment—the agency asserts that growing interest and satisfaction with electric-vehicle tech- nology, as well as decreasing costs, will play a substantial role in turning the tides toward electrification. See 88 Fed. Reg. at 29,189, 29,312; Draft RIA at 4- [EPA-HQ-OAR-2022-0829-0683, pp. 21-22]

17. Available data, however, demonstrate that these assumptions suffer from critical flaws.

Consumer Interest and Satisfaction. Although nearly 95 percent Americans in the market for a new car chose not to purchase an electric vehicle last year, EPA claims that American consumers are increasingly interested in, and satisfied with, electric-vehicle technology. That assertion rests on a collection of un- justified inferences. [EPA-HQ-OAR-2022-0829-0683, pp. 21-22]

First, EPA cites one recent survey reporting that more than one-third of Americans said that they would either "seriously consider or definitely buy or lease" a battery-electric model today if they were in the market for a new vehicle. 88 Fed. Reg. at 29,189. But other data undermine EPA's reliance on abstract consumer "affinity" (id.) for electric vehicles. Other polls show that, even when there is an expressed interest in purchasing an electric vehicle, consumers often do not follow through. For example, "[a] 2022 CarGurus survey found that 35 percent of new car buyers expressed an interest in purchasing a hybrid, but only 13 percent eventually did." Robert N. Charette, Convincing Consumers to Buy EVs: How Range, Affordability, Reliability, and Behavioral Changes Figure into Purchase Decisions, IEEE Spectrum (Jan. 23, 2023) ("Convincing Consumers"), https://tinyurl.com/3p26536j. "Similarly, 22 percent expressed interest in a battery electric vehicle . . . , but only 5 percent bought one." Id. Just as manu- facturer announcements are not a reliable indicator of actual future production, abstract consumer surveys are not a reliable indicator of actual future purchase. [EPA-HQ-OAR-2022-0829-0683, pp. 21-22]

Organization: American Fuel & Petrochemical Manufacturers

VI. EPA's Consideration of Fuel Controls

EPA requested comment on potential changes to fuel controls to address PM emissions in the existing fleet. EPA specifically stated that it "has not undertaken sufficient analysis to propose changes to fuel requirements under CAA section 211(c) in this rulemaking and considers such changes beyond the scope of this rulemaking."284 Since EPA has declared it is not actually proposing to change fuel controls in this Proposal, AFPM respectfully asserts that it cannot provide detailed comments on this issue at this time; however, we are more than willing to work with the Agency on this issue. [EPA-HQ-OAR-2022-0829-0733, pp. 63-64]

284 Proposed Rule at 29,397.

As noted above, AFPM sought a brief extension to the comment period, which EPA denied.285 AFPM does not have adequate time to thoroughly review and comprehend EPA's supporting materials, conduct additional research into the unrealistic assumptions and conclusions embedded in the Proposed Rule, and provide informed comment on each aspect of a rule that has significant implications for our industry and the nation while also reviewing, researching, and providing comments on potential changes to fuel controls. [EPA-HQ-OAR-2022-0829-0733, pp. 63-64]

285 See Section V.

That said, at an extremely high level, we would have significant concerns about the adverse impacts this would have on the supply of gasoline and the minuscule PM benefits that might be achieved. For example, EPA's assessment must include the significant impacts to refineries and the gasoline pool such potential measures would entail. The potential fuel controls measures would cut a significant amount of the gasoline pool that is not contributing to PM generation. This would translate into both economical and logistical impacts (e.g., alternate disposition, or blending into diesel pool) that impacts costs to consumers. EPA should consider the significant contribution to PM from tire wear and entrained road dust, which account for a majority of the total PM2.5 emissions associated with traffic.286 EPA also must revise its flawed methodologies. For instance, the ASTM D7096 simulated distillation by gas chromatography (SimDis) proposed to either calculate PMI or to set high boiling point limits is not adequately precise to use as a control method and would generate significant errors. We also question the Agency's legal authority to move forward with these fuel controls, which have no environmental benefit for new motor vehicles. [EPA-HQ-OAR-2022-0829-0733, pp. 63-64]

286 See https://www.epa.gov/air-emissions-inventories.

Please contact the undersigned to explore these issues in greater detail. AFPM is happy to bring its members' technical expertise to this complex issue to help inform EPA's decision-making in this area. [EPA-HQ-OAR-2022-0829-0733, pp. 63-64]

Organization: American Honda Motor Co., Inc.

EPA is deferring consideration of fuel specifications that would better enable 0.5 mg/mi emissions compliance] [EPA-HQ-OAR-2022-0829-0652, p. 17]

Finally, important fuel specifications changes could assist automakers' abilities to comply with tighter PM standards, but the agency has chosen to defer action. [EPA-HQ-OAR-2022-0829-0652, p. 17]

C. Fuels Issues

In addition to vehicle emissions reductions, the agency also notes the opportunity for additional PM reductions through fuel specification changes:

The emissions standards for new vehicles (MY 2027 and later) proposed in this rule would achieve significant air quality benefits. However, there is an opportunity to further address PM emissions from the existing vehicle fleet, the millions of vehicles produced during the phase-in period, as well as nonroad engines, through changes in market fuel composition… EPA requests comments on aspects of a possible future rulemaking aimed at further PM emission reductions from these sources via gasoline fuel property standards. Such future fuel standards could be an important complement to EPA's proposed vehicle PM standards.31 [EPA-HQ-OAR-2022-0829-0652, p. 18]

31 88 Fed. Reg. 29397 (May 5, 2023)

Honda supports these efforts and believes strongly that the removal of heavy hydrocarbons from market gasoline would have a sizable impact in reducing PM emissions — not only from new vehicles moving forward, but also from the majority of cars and trucks operating on U.S. roads today.32 It will be important for EPA to consider changes to fuel property standards for both market fuel and certification test fuel, as applying changes to both fuels would far better align compliance requirements with real- world emissions performance. [EPA-HQ-OAR-2022-0829-0652, p. 18]

32 It would also have an emissions benefit of reducing PM emissions from all internal combustion engines, including motorcycles, marine engines, and small engine products such as lawn mowers, generators and ICE-based power tools.

The importance of including these changes in certification fuel is clear: removal of heavy hydrocarbons would have a significant impact on the viability of reaching 0.5 mg/mi levels. Because it appears the agency will only consider gasoline fuel property standards as part of "a possible future rulemaking," we strongly urge the agency to maintain alignment with California LEV IV standards at this time, and revisit mg/mi PM stringency when fuel specifications can better accommodate such performance standards. [EPA-HQ-OAR-2022-0829-0652, p. 18]

Tailpipe emissions are inherently an input-output function. With the entire car parc already subject to existing fuel regulations at the pump for RVP, octane, lead and other requirements, reducing the PM potential of market fuel would have a significant impact on our nation's PM inventory. If market fuel regulation can drive reductions in tailpipe PM, it seems only logical to also update certification fuel and MOVES modeling to reflect the real-world inventory impacts. This would also have an ancillary benefit in helping OEMs comply with, as proposed, a significantly more stringent (than CARB LEV IV) PM requirement. [EPA-HQ-OAR-2022-0829-0652, p. 18]

The Honda PM Index (PMI), calculated via a detailed hydrocarbon analysis (DHA) of a gasoline, has become an established parameter associated with tailpipe particulate matter.33 34 Low-volatility aromatics have huge leverage on the PMI value and also on measured tailpipe PM emissions; a percent or two of these heavy aromatics are responsible for a large portion of PM emissions. Although PMI should remain the "gold standard," Honda realizes that its use as the only compliance method will meet resistance due to the method's time and technical requirements. Therefore, alternative compliance methods should be allowed, with the caveats that (1) any such alternatives would require approval from EPA and (2) all approved methods should have compliance standards of equivalent stringency. [EPA-HQ-OAR-2022-0829-0652, p. 19]

33 Aikawa, K., Sakurai, T., and Jetter, J., "Development of a

Predictive Model for Gasoline Vehicle Particulate Matter Emissions," SAE Int. J. Fuels Lubr. 3, no. 2 (2010): 610-622 [EPA-HQ-OAR-2022-0829-0652, p. 19]

34 Aikawa, K. and Jetter, J.J., "Impact of Gasoline Composition on Particulate Matter Emissions from a Direct- Injection Gasoline Engine: Applicability of the Particulate Matter Index," International Journal of Engine Research 15, no. 3 (2014): 298-306

One promising alternative, as noted in the agency's proposed rule and associated documents,35 36 is simulated distillation (SimDis) by ASTM D7096. This method is short, usually requires no post-analysis review, and is sufficiently precise to quantify the heavy tail of a fuel sample. Although it is based on the volatility of the gasoline and not the fuel's chemistry, data show that the heavy tail consists primarily of aromatics. This makes it a potential surrogate for PMI. Also noted in the proposed rule is the vacuum- ultraviolet (VUV) method. Honda agrees with EPA's assessment that more VUV data on market fuels will be needed to complete a correlation with DHA-derived PMI values. An example of such work is currently in progress within the Coordinating Research Council (CRC). [EPA-HQ-OAR-2022-0829-0652, p. 19]

35 US EPA, "Assessment and Optimization of ASTM D7096 Simulated Distillation - EPA-420-R-23-009," April 2023

36 Butler, A, et al., US EPA, "Supplemental Information Related to Potential Fuel Control for Gasoline PM - EPA-HQ- OAR-2022-0829," April 2023

Recommendation: Reduce PM emissions by reducing the PM potential of fuel. Update fuel property standards to remove heavy hydrocarbons from both market fuel and certification fuel. [EPA-HQ-OAR-2022-0829-0652, p. 19]

Organization: American Petroleum Institute (API)

viii. EPA lacks authority to set limits on aromatics and other high-boiling material.

The proposed rule asks for comments on whether EPA should engage in a rulemaking to address potential limits on aromatics and high-boiling material as fuel standards under CAA § 211(c). Although EPA has not proposed to engage in a rulemaking at this time, API urges the agency to avoid a costly and burdensome rulemaking effort that would exceed its authority. [EPA-HQ-OAR-2022-0829-0641, pp. 33-34]

The proposed rule acknowledges that fuel standards would not assist the new vehicle fleet to comply with the new standards, but suggests the agency is thinking about them to reduce particulate matter from the existing fleet. However, EPA lacks authority to set fuel standards to address vehicle emissions from the existing vehicles, which are already able to comply with their applicable particulate matter standards. [EPA-HQ-OAR-2022-0829-0641, pp. 33-34]

EPA's authority to regulate vehicle emissions applies only prospectively. EPA may only set standards for classes of "new motor vehicles." CAA § 202(a)(1). In turn, EPA may only consider controlling or regulating fuel after it has determined there are no other "economically feasible means of achieving emissions standards under section [202]." Regulating fuel cannot be needed to achieve the Section 202 standards for existing vehicles because those vehicles already meet their applicable particulate matter standards without any additional fuel regulation. Any attempt to rely on the inability of existing vehicles to comply with the particulate matter standards for new vehicles because of lack of alternative controls would be contrary to the Act's focus on prospective standards. [EPA-HQ-OAR-2022-0829-0641, pp. 33-34]

In any event, EPA may not issue standards under CAA § 211(c) at this time because, as the proposed rule readily admits, EPA has not "considered all relevant medical and scientific evidence available to [it], including consideration of other technologically or economically feasible means of achieving" the standards under section 202. See § 202(c)(2)(A). Unless and until EPA completes that analysis and allows stakeholders an opportunity to comment on it, EPA may not set new standards under CAA § 211(c). [EPA-HQ-OAR-2022-0829-0641, pp. 33-34]

i. Additional Concerns.

EPA must address several aspects of their analysis of vulnerabilities associated with critical minerals as outlined in Appendix A and related to cost, modeling, and assumptions as outlined in Appendix B. [EPA-HQ-OAR-2022-0829-0641, p. 34]

j. Response to EPA Request for Information on Particulate Matter Fuel Controls.

In Appendix C we respond to EPA's request to review the Agency's rationale for considering fuels controls in a future rulemaking to reduce PM emissions. API finds the Agency has not appropriately considered all data and issues raised by a potential rulemaking. Furthermore, EPA needs to reconsider their analytical conclusions, limitations of SimDis, refinery modeling specifications, and that tire wear and entrained road dust related PM emissions are significant. Please note that due to the compressed comment period for such a complex request for information, coupled with the lack of an extension, API may supplement the docket. [EPA-HQ-OAR-2022-0829-0641, p. 34]

8. Cost and Impacts on Refining

EPA's qualitative description of refining impacts from restriction of gasoline heavy-boiling components is over-simplified and incomplete. EPA asserts an easy shift of gasoline heavy-ends to distillates; in the experience of API members, it is often challenging to make such shifts while keeping distillate fuel properties on specification, especially flashpoint. In addition, EPA's analysis focuses on octane loss as the only detriment to segregating heavy-ends from the gasoline pool, neglecting the value of these components' low volatility as a volatility "sink" which allows blending of butanes and other light components. Eliminating heavy-ends would result in a significant loss of light components to the gasoline pool as well to meet maximum RVP requirements. Finally, EPA considers only one refinery configuration where fluid catalytic cracking (FCC) dominates gasoline production, augmented by alkylation to upgrade FCC light olefins. Among API member refineries are plants which have neither FCC or alkylation units; impacts on these refineries are neglected in EPA's analysis. [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

EPA correctly identifies LP optimization as a useful tool for estimating refinery cost impacts of process changes, and provides results from a Haverly optimization program. Unfortunately, the Agency does not describe how it modeled the single refinery configuration considered. Although challenging to review without knowing key assumptions, correlations, and constraints used in the Haverly model, the results presented raise several concerns to API members. Among these concerns are the apparent lack of proper constraints, allowing the LP to make up lost gasoline heavy-ends with increased isomerization and alkylation; in practice, these units are likely fully utilized without headroom for increased production. Also, the results fail to discuss the light-ends utilization impact from eliminating the heavy-ends as RVP soak. [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

Finally, the results are again limited to a single, simple refinery configuration. API members routinely use LP models for refinery planning and preliminary optimization, but the models required to accurately represent a real refinery are highly complex and unique to a specific plant; a one-size-fits-all Haverly model is highly insufficient to quantify refining impacts of EPA's proposed restriction of gasoline heavy-ends blending. EPA should provide access to the model files with the assumed correlations to allow the public to fully analyze the results. [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

While the preliminary results suggest some directional relationship, API has concerns with: [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

(1) The accuracy of the correlation between PMI and the 99% SimDis by D7096; and

(2) Whether the minimum distillate flash and minimum gasoline T50 limits were modeled sufficiently. [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

Adding a restrictive max 99% point specification to gasoline, which already has a limiting minimum T50 specification, puts gasoline blending in a tight box which has the potential to increase costs to society. Similarly, our ability to shift transitional molecules from gasoline to distillate is limited by the flash specification. [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

EPA states, "The estimated costs for the 5°F, 10°F, and 15°F reductions in T90 were 0.5, 2.2, and 3.0 cents per gallon, respectively." These relative costs are questionable, as the cost per degree should be monotonically increasing as the reduction becomes more severe. An economic model should be graduated, beginning with the lower-cost steps first. The EPA model seems to contradict this economic fundamental when its 5°F to 10°F reduction costs 1.7 cpg (=2.2-0.5), while the 10°F to 15°F reduction costs only 0.8 cpg (=3.0-2.2). [EPA-HQ-OAR-2022-0829-0641, pp. 36-37]

Appendix C:

Consideration of Potential Fuels Controls for a Future Rulemaking

EPA notes in the NPRM that the Agency "…has not undertaken sufficient analysis to propose changes to fuel requirements…"130 and has not provided enough support to set limits at this time. In reviewing EPA's rationale for considering fuels controls in a future rulemaking to reduce PM emissions, API finds the Agency has not appropriately considered all data and issues raised by a potential rulemaking. In the ten sections below, API provides detailed comments on EPA's analysis, finding generally that such a rulemaking on potential fuels controls is unnecessary. If EPA plans to continue to review this issue, API and its members would like the opportunity to meet with the agency to work on this topic. [EPA-HQ-OAR-2022-0829-0641, p. 52]

130 88 Fed. Reg. 29397 (May 5, 2023).

1. Impacts of High-Boiling Components on Emissions

EPA acknowledges that fuel standards would not assist the new vehicle fleet comply with the new standards, but suggests the agency is thinking about reducing particulate matter from the existing fleet, which are already able to comply with their current particulate matter standards. While vehicle technologies have proven to be the primary means to control vehicle emissions, fuels quality can enable and support vehicle emissions systems performance. Fuels quality contributions, however, are smaller than those achieved by vehicle technologies. For instance, Tier III engine technologies such as higher fuel injection pressures, for gasoline direct injection (GDI), and future technologies with gasoline particulate filter (GPF), that can be used for both GDI and port-fuel injection (PFI), are capable to meet the very stringent 2025 LEV III 1 mg/mi mass particulate emissions standards or beyond131. Current vehicle technologies, without a GPF, are capable of reducing significantly PM emissions, and further constraints on the fuel will have limited impact on further reducing these emissions. The 2023 EPA certification vehicle test data shows that there were approximately 83 carline models (out of approximately 376 carlines tested on US06) that achieved a certification level of emissions of 0 gm/mile (and a rounded emission test results level below 0.5 mg/mile) of PM on the US06 drive cycle. These carlines were able to meet a 0.5 mg/mile PM emissions level using current certification gasolines, without the need for specialty lower PMI fuels. Additionally, newer vehicle technologies without GPFs have been demonstrated to have minimal sensitivity to fuel changes.132 In regard to future vehicles, EPA's DRIA states that GPF technologies are more effective at reducing PM emissions than fuel controls (e.g., PMI limit or T99 limits). Specifically, Figure 3-19 of the DRIA describes that PM emissions can be reduced by 99%, 96% and 96% for the testing cycles -7°C FTP, 25°C FTP, and US06, respectively. In contrast when considering a fuel control approach, the NPRM points to studies where it was found that there was a 1-2 percent PM emissions increase for each percent PMI increase. When assessed together, fewer PM emission reductions are gained through fuel controls compared to vehicle hardware approaches. [EPA-HQ-OAR-2022-0829-0641, p. 52]

131 https://doi.org/10.1016/j.scitotenv.2022.161225.

132 Citation: Singh, R., Voice, A., Fatouraie, M., and Levy, R., "Fuel Effects on Engine-out Emissions Part 1 - Comparing Certification and Market Gasoline Fuels," SAE Int. J. Adv. & Curr. Prac. in Mobility 3(6):3121-3137, 2021, https://doi.org/10.4271/2021-01-0541.

Furthermore, even if fuel controls were required to significantly reduce PM emissions from existent and future vehicles, which they are not, EPA's proposed methodology is flawed. PMI equations were developed on early, light duty vehicles with Tier 2 technology. New Tier 3 vehicles used advancements in fuel pressure, injector nozzle design and combustion strategy. PMI calculations are not necessarily correlated with modern vehicle technology. PMI equations were developed on Tier 2 gasolines, current EPA gasoline would not be expected to have the same emissions profile. [EPA-HQ-OAR-2022-0829-0641, p. 52]

PM indices also have proven biased for alcohol molecules and are not accurate for current vehicle and fuels technologies. "PMI was found to perform well if the fuels being evaluated had the same ethanol content, but it proved to be a biased indicator when applied to groups of fuels with varying ethanol content – i.e., E0 (neat), E10 (10% ethanol by volume), and higher ethanol-content fuels. LA92 Phase I PM emissions from fuels with ethanol were found to be consistently greater than emissions from nonoxygenated fuels of the same PMI" [CRC Project No. RW-107-2]. [EPA-HQ-OAR-2022-0829-0641, p. 52]

A study133 presented at the 33rd CRC Real World Emissions Workshop134, demonstrated and concluded that PMI was not predictive of engine out (or tailpipe) PM emissions. Further, it was concluded that FBP performed somewhat better predictor than PMI, but was still a weak indicator. [EPA-HQ-OAR-2022-0829-0641, p. 52]

133 "Can modern vehicle emissions be predicted from fuel properties?," Voice, Alexander, Chanel Sito, Aramco Americas – Transport Technology, March 2023.

134 The 33rd Real World Emissions Workshop, March 26-29, 2023, Long Beach, CA. (https://crcao.org/33rd-crc-real- world-emissions-workshop/)

2. Survey of High-Boiling Materials in Market Gasoline

EPA discusses their assessment of the trends of T90 from ASTM D86 (high-boiling material) over the past two decades, followed by a summary of available PMI data. [EPA-HQ-OAR-2022-0829-0641, p. 52]

The PMI Profile of Market Gasoline discussion in this section also points out that median PMI is 1.6 for US fuels with 10% remaining above 2.0, suggesting an opportunity to reduce PMI. However, Figure 42135 in the NPRM shows two-time frames (2008-12) and (2021-2022) but no source for the data. When conducting industry projects (i.e., CRC) where higher PMI fuels are being solicited, it has become almost impossible to find these in real-world fuels.136 [EPA-HQ-OAR-2022-0829-0641, p. 52]

135 88 Fed. Reg. 29397 (May 5, 2023).

136 One API member recently surveyed its gasoline BOB production (i.e., gasoline prior to blending ethanol) and found 95% of BOBs with PMI below 2.0.

3. Sources of High-Boiling Compounds in Gasoline Production and How Reductions might Occur – Refinery Impacts

EPA's analysis of high-boiling components in gasoline production is over-simplified and neglects significant effect of proposed reduction technologies. It should be pointed out that high boiling point does not necessarily mean high aromatic content. Reducing the gasoline high boiling point as a surrogate for heavy aromatic content would cut a significant amount of the gasoline pool that is not contributing to PM generation. This would translate into both economical and logistical impacts (e.g., alternate disposition, or blending into diesel pool). that would ultimately impact costs to consumers. Segregation of gasoline heavy-ends to distillates may impact octane, and replacement of octane is more complex than claimed. A potential impact resulting in a reduction of octane would reduce vehicle fuel economy limiting the advantages of higher octane. Work from the Department of Energy's Co-optima concluded, for downsize boosted engine technology, RON and octane sensitivity (enabled through high aromatic fuels) have the most potential to improve efficiency among all fuel properties.137 For naturally aspirated, port fuel- injected legacy vehicles, CRC138 showed that decreases in energy consumption of up to 2% for a small SUV was possible through the use of a 97 RON fuel compared to 91 RON fuel on a US06 drive cycle. [EPA-HQ-OAR-2022-0829-0641, p. 52]

137 https://doi.org/10.1016/j.pecs.2020.100876.

138 https://crcao.org/wp-content/uploads/2020/12/CRC-Project-AVFL-20a_SAE-Paper-2020-01-5117.pdf.

Shifting boiling points of naphtha produced on the fluid catalytic cracker (FCC), reformer, and coker to produce lighter distillate or kerosene may cause potential market issues, including:

- Overall gasoline production may fall if fuel producers are required to shift gasoline molecules to distillates, which may lead to higher gasoline prices for consumers. [EPA-HQ-OAR-2022-0829-0641, p. 52]

- There may be equipment constraints that prevent shifting of the cut point without restricting overall refining capacity, which could lead to higher consumer prices if overall production falls. [EPA-HQ-OAR-2022-0829-0641, p. 52]

- The value of alkylate and ethanol (non-aromatic high octane blend components) may increase. The alkylate production would probably fall if FCC units were constraint because of tightened specifications. [EPA-HQ-OAR-2022-0829-0641, p. 52]

- There may also be constraints in aromatics content and cetane number for putting these aromatic molecules into jet fuel or distillate, which may further reduce capacity or cause increased shipping of diesel blend components to maintain distillate specifications. [EPA-HQ-OAR-2022-0829-0641, p. 52]

- There are some capital projects that refiners may pursue to help mitigate the impacts, but these too could result in increased cost of supply to gasoline consumers. [EPA-HQ-OAR-2022-0829-0641, p. 52]

4. Methods of Compliance Determination

ASTM D7096 Simulated Distillation by GC Analysis: EPA proposes to use ASTM D7096 simulated distillation by gas chromatography (SimDis) to control / reduce gasoline particulate matter index (PMI) because the actual analytical method needed to calculate PMI --- detailed hydrocarbon analysis (DHA) --- is too costly and time-consuming to use as a production control. While API members agree that DHA is inappropriate for the reasons cited by the Agency, our experience indicates SimDis is not a reasonable alternative because (1) SimDis cannot distinguish between heavy gasoline constituents that contribute to PMI from those that do not, (2) SimDis results are not well correlated to PMI by DHA, and (3) SimDis is not adequately precise to use as a control method. [EPA-HQ-OAR-2022-0829-0641, pp. 52-53]

ASTM D7096 SimDis identifies the carbon number of hydrocarbons and estimates boiling point ranges, but it does not differentiate molecules that contribute highly to PM emissions (and PMI) from molecules in the same boiling point range that have minimal contribution to PM emissions. If EPA were to place limits on gasoline blending by using a SimDis constraint, a significant part of the available gasoline pool would be eliminated without sound technical reasoning. [EPA-HQ-OAR-2022-0829-0641, pp. 52-53]

Measurements by API members shows poor correlation between PMI and/or C10+ aromatics and Simulated Distillation Endpoint, T98, T95, or T90. While the heavy aromatics which contribute to PM emissions are in the high end of the distillation, many other non-PM formers are also present. Consequently, SimDis is too crude in its selectivity to use as a control method for reducing PMI. [EPA-HQ-OAR-2022-0829-0641, pp. 52-53]

ASTM D7069-19 states reproducibility of the method to be 8.3°F for T95 and 18.5°F for FBP. At EPA's proposed control point of T99 by SimDis, the reproducibility would be more closely represented by that of FBP stated in the method. Subsequently, a fuel specification with a SimDis T99 cut-off of 450 °F or 425 °F would result in an indefinite and inconsistent portion of heavy gasolines removed from the gasoline pool. From a compliance standpoint, fuel qualities that can be measured with greater precision are optimal because they can be tightly correlated with unit operations. [EPA-HQ-OAR-2022-0829-0641, pp. 52-53]

VUV Methods: EPA's analysis of VUV as a compliance tool contains errors regarding the appropriate methods, and inappropriately dismisses VUV as being insufficiently available for use as a control method. [EPA-HQ-OAR-2022-0829-0641, pp. 52-53]

EPA cities ASTM D8071 as the applicable method to substitute for DHA and use in PMI calculation, but this is incorrect. The D8071 method only gives compound classifications, not detailed component analysis needed for PMI calculation. The most suited VUV method for this application is D8369. [EPA-HQ-OAR-2022-0829-0641, pp. 52-53]

API disagrees with EPA's finding that VUV is insufficiently mature and available for consideration as a method to quantity gasoline PMI. When using the appropriate method D8369, API members find the VUV results are equivalent to PMI calculated from DHA but at a fraction of the analysis cost and time. In addition, most API members companies and many commercial laboratories have already implemented VUV analysis. [EPA-HQ-OAR-2022-0829-0641, pp. 52-53]

The proposed 99% SimDis specification would significantly reduce the molecules that can swing between gasoline and diesel, which is the primary model the industry uses to adapt to changing demands and inventory imbalances. With reduced blending flexibility, refiners will have much less ability to increase gasoline yields. Restricting gasoline end points could lead to gasoline price spikes in periods of market volatility. [EPA-HQ-OAR-2022-0829-0641, p. 53]

5. Statutory Authority

The proposed rule asks for comments on whether EPA should engage in a rulemaking to address potential limits on aromatics and high-boiling material as fuel standards under CAA § 211(c). Although EPA has not proposed to engage in a rulemaking at this time, API urges the agency to avoid a costly and burdensome rulemaking effort that would exceed its authority. [EPA-HQ-OAR-2022-0829-0641, p. 53]

The proposed rule acknowledges that fuel standards would not assist the new vehicle fleet to comply with the new standards, but suggests the agency is thinking about them to reduce particulate matter from the existing fleet. However, EPA lacks authority to set fuel standards to address vehicle emissions from the existing vehicles, which are already able to comply with their applicable particulate matter standards. [EPA-HQ-OAR-2022-0829-0641, p. 53]

EPA's authority to regulate vehicle emissions applies only prospectively. EPA may only set standards for classes of "new motor vehicles." CAA § 202(a)(1). In turn, EPA may only consider controlling or regulating fuel after it has determined there are no other "economically feasible means of achieving emissions standards under section [202]." Regulating fuel cannot be needed to achieve the Section 202 standards for existing vehicles because those vehicles already meet their applicable particulate matter standards without any additional fuel regulation. Any attempt to rely on the inability of existing vehicles to comply with the particulate matter standards for new vehicles because of lack of alternative controls would be contrary to the Act's focus on prospective standards. [EPA-HQ-OAR-2022-0829-0641, p. 53]

In any event, EPA may not issue standards under CAA § 211(c) at this time because, as the proposed rule readily admits, EPA has not "considered all relevant medical and scientific evidence available to [it], including consideration of other technologically or economically feasible means of achieving" the standards under section 202. See § 202(c)(2)(A). Unless and until EPA completes that analysis and allows stakeholders an opportunity to comment on it, EPA may not set new standards under CAA § 211(c). [EPA-HQ-OAR-2022-0829-0641, p. 53]

Please note that due to the compressed comment period for such a complex request for information, coupled with the lack of an extension, API may supplement the docket. [EPA-HQ-OAR-2022-0829-0641, p. 53]

6. Structure and Level of the Standard

As mentioned at the beginning of Appendix C, vehicle technologies have proven to be the primary means for controlling vehicle emissions. Fuels quality can improve vehicle emissions systems and help achieve air quality objectives, but fuels contributions are smaller than those achieved by vehicle technologies. [EPA-HQ-OAR-2022-0829-0641, p. 53]

To the extent a structure and level of standard may be considered, an averaging, banking, and trading solution has worked well for mogas sulfur and benzene. Much like a Low Carbon Fuels Standard program, it allows the industry to meet the goals of the program at the lowest possible cost while providing flexibility to blend fuel under abnormal operations. This would be preferrable to a price per gallon cap which could be difficult to both measure and design controls to ensure operations are below required thresholds. [EPA-HQ-OAR-2022-0829-0641, p. 53]

7. Impact of PMI on Engine Design and Efficiency

EPA mentions that another potential reason to consider a PMI limit is related to low- speed preignition (LSPI) and requests comments on the impact of PMI on engine design and effciency. References below point to other factors that impact LSPI that need to be considered. Fuel specification changes may not be sufficient to reduce LSPI occurrences. [EPA-HQ-OAR-2022-0829-0641, p. 53]

CRC Project CM-137-17-1 139 [Link: https://crcao.org/wp-content/uploads/2019/07/CM-137-17-1_FinalReport-June-2019.pdf] (Review of Low-Speed Pre-Ignition Literature) makes clear that one single LSPI initiation mechanism cannot be derived from the published literature. However, the report did allow for the general statement that "improved oil formulation and oil ignitability as well as a design that leads to reduced oil intrusion from, for example, the crankcase ventilation system or past the piston rings is of benefit. Further the report went on to indicate that low calcium and High ZNDTP or MODTC oil formulations are linked to low LSPI counts. [EPA-HQ-OAR-2022-0829-0641, p. 53]

139 “REVIEW OF LOW-SPEED PRE-IGNITION LITERATURE,” CRC Report No. CM-137-17-1, June 2019, (https://crcao.org/wp-content/uploads/2019/07/CM-137-17-1_FinalReport-June-2019.pdf).

ILSAC GF-6A and GF-6B 140 [Link: https://www.api.org/products-and-services/engine-oil/eolcs-categories-and-classifications/oil-categories#tab-ilsac] specifications represent the latest performance requirements for gasoline engine oils set by the International Lubricant Specification Advisory Committee (ILSAC). GF-6A and GF-6B were introduced in May 2020 and are designed to provide protection against low-speed pre-ignition (LSPI) in engines operating on ethanol-containing fuels up to E85. [EPA-HQ-OAR-2022-0829-0641, p. 53]

140 ILSAC Standard For Passenger Car Engine Oils. (https://www.api.org/products-and-services/engine-oil/eolcs- categories-and-classifications/oil-categories#tab-ilsac).

For automotive gasoline engines, the latest engine oil service category includes the performance properties of each earlier category. Therefore, the latest engine oil specifications will provide full protection for automotive engines where an earlier oil category is recommended by the engine manufacturer. [EPA-HQ-OAR-2022-0829-0641, p. 53]

SAE paper 2017-24-0061 141 [Link: https://www.sae.org/publications/technical-papers/content/2017-24-0061/] shows that high aromatic and high sensitivity fuels help to mitigate knock under high load for boosted SI engines. Similarly, in SAE paper 2011-01-0342142 low-aromatics fuel blends showed an increase tendency to auto-ignition and knock (traditional engine knock, not LSPI) characterized by the presence of a low-temperature heat release regime prior to the main combustion phase. It should be noted that LSPI, autoignition, and knock are different phenomenon and not related. [EPA-HQ-OAR-2022-0829-0641, p. 53]

141 Szybist, J., Wagnon, S., Spliter, D., Pitz, W. et al., "The Reduced Effectiveness of EGR to Mitigate Knock at High Loads in Boosted SI Engines," SAE Int. J. Engines 10(5):2305-2318, 2017, https://doi.org/10.4271/2017-24-0061.

142 Amann, M., Mehta, D., and Alger, T., "Engine Operating Condition and Gasoline Fuel Composition Effects on Low- Speed Pre-Ignition in High-Performance Spark Ignited Gasoline Engines," SAE Int. J. Engines 4(1):274-285, 2011, https://doi.org/10.4271/2011-01-0342.

The LSPI phenomenon is complex with some mechanisms strictly related to lubricants formulation. Fuel specification changes may not reduce LSPI occurrences. Proposed PMI limits could reduce the aromatic content of the gasoline pool and potentially result in an unintentional increase of knock or autoignition events for the current on-road carpark. [EPA-HQ-OAR-2022-0829-0641, p. 53]

8. Cost and Impacts on Refining

EPA's qualitative description of refining impacts from restriction of gasoline heavy- boiling components is over-simplified and incomplete. EPA asserts an easy shift of gasoline heavy-ends to distillates; in the experience of API members, it is often challenging to make such shifts while keeping distillate fuel properties on specification, especially flashpoint. In addition, EPA’s analysis focuses on octane loss as the only detriment to segregating heavy-ends from the gasoline pool, neglecting the value of these components’ low volatility as a volatility “sink” which allows blending of butanes and other light components. Eliminating heavy-ends would result in a significant loss of light components to the gasoline pool as well to meet maximum RVP requirements. Finally, EPA considers only one refinery configuration where fluid catalytic cracking (FCC) dominates gasoline production, augmented by alkylation to upgrade FCC light olefins. Among API member refineries are plants which have neither FCC or alkylation units; impacts on these refineries are neglected in EPA's analysis. [EPA-HQ-OAR-2022-0829-0641, p. 53]

EPA correctly identifies LP optimization as a useful tool for estimating refinery cost impacts of process changes, and provides results from a Haverly optimization program. Unfortunately, the Agency does not describe how it modeled the single refinery configuration considered. Although challenging to review without knowing key assumptions, correlations, and constraints used in the Haverly model, the results presented raise several concerns to API members. Among these concerns are the apparent lack of proper constraints, allowing the LP to make up lost gasoline heavy-ends with increased isomerization and alkylation; in practice, these units are likely fully utilized without headroom for increased production. Also, the results fail to discuss the light-ends utilization impact from eliminating the heavy-ends as RVP soak. [EPA-HQ-OAR-2022-0829-0641, p. 53]

Finally, the results are again limited to a single, simple refinery configuration. API members routinely use LP models for refinery planning and preliminary optimization, but the models required to accurately represent a real refinery are highly complex and unique to a specific plant; a one-size-fits-all Haverly model is highly insufficient to quantify refining impacts of EPA's proposed restriction of gasoline heavy-ends blending. EPA should provide access to the model files with the assumed correlations to allow the public to fully analyze the results. [EPA-HQ-OAR-2022-0829-0641, p. 53]

While the preliminary results suggest some directional relationship, API has concerns with: [EPA-HQ-OAR-2022-0829-0641, p. 53]

(1) The accuracy of the correlation between PMI and the 99% SimDis by D7096; and

(2) Whether the minimum distillate flash and minimum gasoline T50 limits were modeled sufficiently. [EPA-HQ-OAR-2022-0829-0641, p. 53]

Adding a restrictive max 99% point specification to gasoline, which already has a limiting minimum T50 specification, puts gasoline blending in a tight box which has the potential to increase costs to society. Similarly, our ability to shift transitional molecules from gasoline to distillate is limited by the flash specification. [EPA-HQ-OAR-2022-0829-0641, p. 53]

EPA states, "The estimated costs for the 5°F, 10°F, and 15°F reductions in T90 were 0.5, 2.2, and 3.0 cents per gallon, respectively." These relative costs are questionable, as the cost per degree should be monotonically increasing as the reduction becomes more severe. An economic model should be graduated, beginning with the lower-cost steps first. The EPA model seems to contradict this economic fundamental when its 5°F to 10°F reduction costs 1.7 cpg (=2.2-0.5), while the 10°F to 15°F reduction costs only 0.8 cpg (=3.0-2.2). [EPA-HQ-OAR-2022-0829-0641, p. 53]

The proposed 99% SimDis specification would significantly reduce the molecules that can swing between gasoline and diesel, which is the primary model the industry uses to adapt to changing demands and inventory imbalances. With reduced blending flexibility, refiners will have much less ability to increase gasoline yields. Restricting gasoline end points could lead to gasoline price spikes in periods of market volatility. [EPA-HQ-OAR-2022-0829-0641, p. 53]

9. Estimated Emissions and Air Quality Impacts

EPA has failed to assess particulate matter impacts from tire wear or entrained road dust. Tire wear and entrained road dust emissions account for a majority of the total PM2.5 emissions associated with traffic.143 There is a high correlation between both tire wear, and entrained road dust emissions, and vehicle weight. Studies have also found electric vehicles to be heavier than the equivalent class/size of ICEVs due to the inclusion of the battery. Therefore, converting ICEVs to ZEVs, as a result of the proposed regulation on “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light- Duty and Medium-Duty Vehicles” would significantly increase the average vehicle weight on roadways, which in turn would increase tire, brake, and entrained road dust emissions. Including these emissions144, 145, 146,147 in the analysis could potentially change EPA’s conclusions and significance findings in the DRIA. Hence, EPA must evaluate these emissions and their impacts. [EPA-HQ-OAR-2022-0829-0641, p. 53]

143 https://www.epa.gov/air-emissions-inventories.

144 https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf.

145 https://doi.org/10.1016/j.scitotenv.2022.156961.

146 htp://dx.doi.org/10.1016/j.atmosenv.2016.03.017.

147 https://doi.org/10.1016/j.scitotenv.2022.161225.

There are several sources in the literature that raise questions as to the absolute and relative magnitude of the potential reductions to PM concentrations, and subsequent health benefits, that reducing PMI could have that are not included in the proposed rule: that EPA needs to evaluate: [EPA-HQ-OAR-2022-0829-0641, p. 53]

- The 2019 OECD report lays out the relative contribution of primary PM emissions from road transport, showing approximately 1/3 PM2.5 from non-exhaust (tires, brakes, road wear) in 2014 148 (Figure 2.1). [EPA-HQ-OAR-2022-0829-0641, p. 53]

148 OECD (2020), Non-exhaust Particulate Emissions from Road Transport: An Ignored Environmental Policy. Challenge, OECD Publishing, Paris, https://doi.org/10.1787/4a4dc6ca-en.

- The 2019 OECD report also includes data from EPA (2019 NEI) that shows that less than half of primary PM2.5 from road transportation is from vehicles, and this represents 3% of total primary PM2.5. See Table 2.3 [EPA-HQ-OAR-2022-0829-0641, p. 53]

- Total PM 2.5 is a combination of primary PM 2.5 emissions plus secondary species (inorganic and organic). Secondary aerosols often dominate. Primary PM can range from 10% to 70%, and is often less than 50%.149,150 [EPA-HQ-OAR-2022-0829-0641, p. 53]

149 https://www.science.org/doi/10.1126/science.1180353.

150 https://www3.epa.gov/tnchie1/conference/ei13/mobile/hodan.pdf.

- Mobile sources of secondary organic aerosols are a small fraction of the total in both absolute and population weighted terms.151 On-road sources already a generally small fraction without limiting to just light duty/passenger (Figure 7).152 [EPA-HQ-OAR-2022-0829-0641, p. 53]

151 https://acp.copernicus.org/articles/21/17115/2021/acp-21-17115-2021.pdf.

152 https://www.science.org/doi/10.1126/science.1180353.

10. Analysis of the references to CRC studies

Comments on references used in Section IX153: Consideration of Potential Fuels Controls for a Future Rulemaking. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

153 **The focus of section IX is PM emissions reduction, and therefore will serve as the focus of comments.

Proposed Rule Statement:

Statement: "Numerous emissions studies have associated high-boiling compounds in gasoline with increased tailpipe PM emissions."154 [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

154 88 Fed. Reg. 29398 (May 5, 2023).

Statement references 155: [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

155 Statement reference numbers refer to footnote numbering in the proposed rule.

868 Coordinating Research Council, "Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles," Report No. E–94–2, March 2016. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

869 USEPA "Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards: Analysis of Data from EPAct Phase 3 (EPAct/V2/E–89)," April 2013. Document EPA–420–R–13–002. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

Background: references 868 (CRC report E-94-2) and 869 (EPA EPAct study) refer to large fuel effects-emissions studies seeking to determine what gasoline properties drive vehicle emissions (mainly PM). E-94-2 looked at emissions across a mix of Tier 2, GDI vehicles (12) running match-blended gasoline fuels that approximated market gasoline fuels (PMI, AKI, and ethanol levels were varied). In the EPAct work, ethanol, T50, T90, aromatics, and RVP were varied. For the study, 27 fuels were developed (i.e., match-blended) and tested in 15 light-duty vehicles (Tier 2, MY2008, all PFI). [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

API Comment: Although PMI was strongly correlated with increasing PM emissions in E-94-2, PM increased with increasing C10+ aromatics in EPAct, both studies contain faults. E-94-2, for example, used match-blended fuels, which received criticism when the final report was released for not being representative of market fuels. In addition, EPAct results are no longer relevant due to the MY2008 test fleet. In short, the references are dated, and more-recent attempts by CRC to study emissions impacts of newer, Tier 3 vehicles with injection pressures approaching 350 bar are inconclusive, warranting further study. Generally, higher injection pressures lower PM emissions; and the positive correlation between PMI and PM is less clear (CRC E-135). [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

Statement: "…analysis of a large number of market fuel samples has shown that the high-boiling tail of gasoline contains a high proportion of aromatics, and that the heaviest few percent of this material has very high leverage on PM emissions."156 [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

156 88 Fed. Reg. 29393 (May 5, 2023)

Statement references: [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

870 Chapman E., Winston-Galant M., Geng P., Latigo R., Boehman A., “Alternative Fuel Property Correlations to the Honda Particulate Mater Index (PMI),” SAE Technical Paper 2016–01–2550, 2016. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

871 Ben Amara A., Tahtouh T., Ubrich E., Starck L., Moriya H., Iida J., Koji N., “Critical Analysis of PM Index and Other Fuel Indices: Impact of Gasoline Fuel Volatility and Chemical Composition,” SAE Technical Paper 2018–01–1741, 2018. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

872 Sobotowski R.A., Butler A.D., Guerra Z., “A Pilot Study of Fuel Impacts on PM Emissions from Light-duty Gasoline Vehicles,” SAE Int. J. Fuels Lubr. 8(1):2015. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

873 Aikawa, K., Sakurai K., Jeter J.J., “Development of a Predictive Model for Gasoline Vehicle Particulate Mater Emissions,” SAE Technical Paper 2010–01–2115, 2010. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

Background: Honda published the SAE paper introducing the PMI concept in 2010 (873), and while it took a few years to gain notoriety, its dependency on DHA has motivated others to find alternative, easier pathways towards a predictive PM emissions metric (GM in 870; Toyota in 871). Regardless of metric, heavier fuel components tend to lead to higher PM emissions. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

API Comment: So much of the supporting work is based on assessments using Tier 2 technology. We know Tier 3 vehicles are transitioning to higher injection pressures (which lowers PM, generally), but many fuel effects studies are ongoing or in development. Lastly, it would be unfortunate if some type of fuel distillation cut limited potential use of low-carbon feedstocks for future fuels. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

Statement: PMI has been used in several emission studies and modeling analyses correlating fuel parameters to PM, and our assessment of potential impacts of fuel formulation changes on PM emission inventories, presented in Section IX.7, rely heavily on PMI.”157 [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

157 88 Fed. Reg. 29398 (May 5, 2023).

Statement references: [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

879 Butler A.D., Sobotowski R.A., Hoffman G.J., and Machiele, P., “Influence of Fuel PM Index and Ethanol Content on Particulate Emissions from Light-Duty Gasoline Vehicles,” SAE Technical Paper 2015–01–1072, 2015. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

880 Coordinating Research Council, “Alternative Oxygenate Effects on Emissions,” Report No. E–129–2, October 2022. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

Background: Reference 879 refers to an SAE paper authored by EPA staff members involved in the EPAct study (2015-01-1072). The authors work to integrate PMI into the EPAct data, while also observing ethanol-PM interactions. 10 of 15 vehicles used in the EPAct study showed a correlation between PM and PMI; in addition, the authors postulated that ethanol addition appears to exacerbate the inability of heavier components to volatilize, resulting in increased PM (it should be noted that the remaining 5 vehicles did not exhibit any PM sensitivity to PMI or ethanol). Reference 880 is a CRC report covering results from E-129-2, a program run out of NREL on a single cylinder research engine running a couple of base gasolines (low- and high-PMI) blended with various alcohols. The primary objective of this program was to develop data to better understand competing effects between heat of vaporization (as mentioned above in reference to the EPAct study) and dilution (i.e., diluted gasoline results in lower emissions). While PM emissions generally increased with increasing PMI, correlation strength was highly variable across multiple test conditions. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

API Comment: While PMI has become the most 'robust' parameter for indicating a fuel's propensity for PM formation, it has limitations. For example, in E-129-2, ethanol blended into the 'low' PMI (1.21) fuel appeared to show HOV effects dominated. In the 'high' PMI blend (2.75), HOV effects dominated at the high-speed condition, but dilution seemed to dominate at the low-speed condition (i.e., PM decreased with increasing ethanol content). The choice to include this reference is interesting as the results are far from absolute, and beg more questions for future study. For the SAE EPA paper (reference 879), I have concerns with the age of the vehicle fleet used in the study (MY2008), technology (PFI), as well as 1/3 of the fleet exhibiting no sensitivity to PMI and/or ethanol with respect to PM emissions. [EPA-HQ-OAR-2022-0829-0641, pp. 53-63]

Organization: Chevron

5. Potential future fuel controls.

In Section IX. (Consideration of Potential Fuels Controls for a Future Rulemaking) of the proposed rule, EPA discusses an opportunity to address particulate matter emissions from the existing and future fleet through changes in fuel compositions. Chevron has extensive technical expertise in fuel formulation, emissions testing, and analytical methodology. Based on our experience, we believe EPA's suggested approach to controlling particulate matter may not be cost effective or necessary. We offer the following comments on Section IX. [EPA-HQ-OAR-2022-0829-0553, p. 7]

Specifically, Chevron recommends against EPA's consideration of Particulate Matter Index (PMI) methodology as an option to control particulate matter (PM) emissions from gasoline. The PMI methodology was developed over 10 years ago and is based on testing with Tier 2 vehicles and fuels. The transition to Tier 3 vehicles and fuels has greatly reduced PM emissions from the vehicle fleet. Vehicle hardware technology advancements, such as gasoline direct injection and higher fuel injection pressures are better suited to manage the remaining PM emissions rather than changing the gasoline composition. When the PMI methodology is used to evaluate current gasoline samples, Tier 3 gasoline has shown a steady reduction in calculated PMI compared to Tier 2 gasoline, even where the Tier 3 samples have higher final distillation boiling temperatures. The combination of advanced vehicle technology and improved Tier 3 gasoline quality suggests that the PMI methodology may no longer be effective at identifying future PM control measures. [EPA-HQ-OAR-2022-0829-0553, p. 7]

As an alternative to PMI, EPA suggests that ASTM D7096 SIMDIS may be the best technology to evaluate candidate gasoline fuels and to determine a new standard to address PM emissions. Chevron does not believe the use of SIMDIS is appropriate because it does not distinguish between molecules that contribute to PM formation and molecules that do not form particulates. Use of the SIMDIS methodology will result in a fairly imprecise reduction in the final boiling point of gasoline. Changing the gasoline distillation specification in this way will eliminate many non-PM forming molecules, like heavy alkylate species, which are valuable components for gasoline octane, vapor pressure, and economics. [EPA-HQ-OAR-2022-0829-0553, p. 7]

In lieu of using the SIMDIS analytical method, Chevron prefers the vacuum-UV (VUV) technology. Chevron has developed gasoline characterization methods using VUV and believes that it is well suited to identifying particulate-forming molecules. Chevron is available to work with EPA in identifying analytical techniques that could be used in evaluating PM formation from gasoline. [EPA-HQ-OAR-2022-0829-0553, p. 7]

The API comments on the proposed rule contain an extensive discussion of the technical issues related to particulate matter formation. Chevron made significant contributions to the API comments. We endorse the API comments on Section IX. in their entirety. We recommend that EPA should work closely with industry prior to any decision to proceed with a formal rulemaking to address gasoline particulates. [EPA-HQ-OAR-2022-0829-0553, p. 7]

Organization: Clean Fuels Development Coalition (CDFC)

SOA from Gasoline Aromatics. On p. 591, EPA noted that “Mobile sources are an important contributor to secondary aerosols formed from nitrate, sulfate and organic precursors. Studies have shown that secondary organic aerosol (SOA) formation from gasoline vehicle exhaust can exceed directly emitted (tailpipe) PM emissions, and that changes to gasoline formulation can have impacts on SOA that are larger than the associated shifts in direct PM emissions.” [EPA-HQ-OAR-2022-0829-0630, p. 8]

This statement seems at odds with the Agency’s claim that the proposed rule would reduce PM emissions by “more than 95 percent”. In fact, EPA historically has vastly understated the substantial contributions mobile sources—especially gasoline BTEX— make to SOA + PAH formation. [EPA-HQ-OAR-2022-0829-0630, p. 8]

Former OTAQ Director Grundler offered this explanation to SDFU President Sombke: “With respect to your concern that the EPA’s models incorrectly predict the contribution of light-duty gasoline vehicles to PM (e.g., as compared to leaf blowers) it is important to note that the EPA estimates cited in the Wall Street Journal refer only to directly emitted PM. We agree that ambient levels of PM are a result of secondarily formed particles in addition to direct PM emissions, and that light-duty gasoline vehicles are important sources of precursors to PM formation.”4 [Emphasis supplied] [EPA-HQ-OAR-2022-0829-0630, p. 8]

4 Supra, Grundler letter to Sombke, March 15, 2018.

It took several exchanges to elicit this admission five years ago. It is clear from EPA’s claim that the proposed rule would reduce PM emissions by “more than 95 percent” that the Agency continues to downplay the disproportionate role SOA plays in fine and ultrafine particulate emissions. [EPA-HQ-OAR-2022-0829-0630, p. 8]

Leading experts are convinced that aromatics ("organics") are the primary culprit. "An important recent study, co-authored by the Nobel Prize winner Mario Molina, concluded that reducing the smallest (ultrafine) particles "without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem". [Detchon/Modlin 2021 comments, p. 2.] This has implications not only for GDI engine emissions effects, but also for the NPRM's gasoline particulate filter (GPF) strategies. [EPA-HQ-OAR-2022-0829-0630, p. 8]

Detchon and Modlin went on to note that "Emissions from aromatic compounds in gasoline were thought to be short-lived, thus posing little threat to human health. But that was wrong. A recent General Motors study found that nearly 96% of the fine particle emissions from gasoline are caused by the aromatics in the fuel". [Ibid., p. 1] [EPA-HQ-OAR-2022-0829-0630, p. 8]

In a letter to Acting OAR Administrator Joseph Goffman, former Senate Majority Leader Tom Daschle cited these experts and then cautioned EPA that failure to control BTEX would severely compromise, perhaps doom, EPA's PM control strategies DaschleGoffmanHOLCAexecutedjune2021.pdf: [Link: file:///C:/Users/dehbi/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/OFSN24IW/DaschleGoffmanHOLCAexecutedjune2021.pdf] [EPA-HQ-OAR-2022-0829-0630, p. 8]

"Given the role of aromatic hydrocarbons in PM formation and given the propensity of GDI engines to increase emissions of UFPs, EPA's strategies for regulating fine particle pollution in urban areas are doomed to failure unless they significantly reduce gasoline aromatics." A prescient statement that is proving itself to be even more true as GDI engines dominate the U.S. fleet. [EPA-HQ-OAR-2022-0829-0630, p. 8]

EPA Experts Have Warned About "Atmospheric Transformation Products" from Aromatics for Many Years. Outside of OTAQ, EPA experts have been clear about EPA's duty under the Clean Air Act to control carcinogenic and mutagenic atmospheric reaction products, the predominant precursors of which are gasoline aromatics. [EPA-HQ-OAR-2022-0829-0630, p. 9]

"Although oxidized VOCs can be components of primary emissions from a variety of sources, most result from secondary reactions of hydrocarbons emitted into the atmosphere, making them late-generation atmospheric reaction products. Assessments of health effects based solely on direct emissions are incomplete if potentially important contributions from such products are neglected, as has been noted by the Clean Air Act, which mandates consideration of atmospheric transformation products. [EPA-HQ-OAR-2022-0829-0630, p. 9]

5. Conclusions and implications for control strategies

Other than 1,2,4- and 1,3,5-trimethylbenzene, all of the precursor aromatic VOCs investigated here are classified as hazardous air pollutants by the U.S. EPA, and therefore emissions of these species from industrial activities are controlled under the Clean Air Act (U.S. EPA, 2015a). Nonetheless, of the 8 VOCs that produced mutagenic atmospheres, all did so only under irradiation. Thus, only late-generation reaction products were responsible for the mutagenicity, not the precursor VOCs, raising an interesting point regarding potential control strategies when the photochemistry of certain chemical species is similar to those described here. Non-mutagenic primary compounds may be less likely to be controlled; however, the resulting late-generation products may be more likely to be mutagenic. Therefore, consideration should be given to precursor compounds based not only on their intrinsic health concerns but also on those of their potential late-generation atmospheric photochemical products. It seems that these products, which are typically not monitored or controlled, account for much of the gas-phase direct-acting mutagenicity. Based on these limited studies, reducing the concentrations of primary VOCs would likely result in a corresponding reduction in the concentrations of the products, with a parallel reduction in atmospheric mutagenicity."5 [EPA-HQ-OAR-2022-0829-0630, p. 9]

5 "Mutagenic atmospheres resulting from the photooxidation of aromatic hydrocarbon and NOx mixtures", Theran P. Riedela,∗ , David M. DeMarinib , Jose Zavalac , Sarah H. Warrenb , Eric W. Corsed , John H. Offenberga , Tadeusz E. Kleindiensta , Michael Lewandowski]

[Dr. Riedel is a senior scientist at EPA's National Exposure Research Lab in Research Triangle Park, NC. He and his colleagues published this study in 2018 ResearchGate https://www.researchgate.net/publication/315864231_Mutagenicity_and_Carcinogen icity] [EPA-HQ-OAR-2022-0829-0630, p. 9]

Conclusion. Thus, the NPRM presents us with "insurmountable opportunities", as Pogo would say. Recognizing that EPA's primary thrust with this rulemaking is to drive the U.S. to an electrified transport system, we must also recognize that trillions of miles will be driven by ICEs powered by gasoline. Unless EPA moves urgently to improve the quality of that gasoline by substantially reducing gasoline BTEX content— as required by Congress—tens of millions of Americans will have their health unnecessarily damaged and die premature deaths. The Detchon/Modlin comments said it best: [EPA-HQ-OAR-2022-0829-0630, pp. 8-10]

"It doesn't have to be this way. Technologies and products have come together to define a new solution for what the Clean Air Act requires: "the greatest degree of emission reduction achievable through the application of technology which will be available." Along with a rapid transition to electric vehicles, a complementary program should include adoption of higher ethanol blends, which have been shown by U.S. National Laboratories to enable higher fuel economy and vehicle performance. Such blends would enable a 40% reduction in the use of toxic aromatics in gasoline. An important recent study, co-authored by the Nobel Prize winner Mario Molina, concluded that reducing the smallest (ultrafine) particles "without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem." (p. 2) [EPA-HQ-OAR-2022-0829-0630, pp. 8-10]

OTAQ's exclusive reliance on vehicle technology improvements was not only a violation of clear Congressional directives, it has proven to be a colossal scientific miscalculation. The rapid adoption of gasoline direct injection (GDI) engines—absent a parallel reduction in gasoline BTEX levels—will increase emissions of the most harmful UFP + PAH carcinogens by more than a "septillion" particles over the next decade. [EPA-HQ-OAR-2022-0829-0630, pp. 8-10]

Detchon/Modlin conclude: "Test programs in the rural Midwest have shown that today's vehicles operate well on higher levels of ethanol blended with conventional gasoline. Automakers have affirmed that such benefits would be realized by both new and existing internal combustion engines and therefore should be encouraged as additional solutions as soon as possible." [EPA-HQ-OAR-2022-0829-0630, pp. 8-10]

The nation has waited 35 years for EPA/OTAQ to act. The nation's public health and environment cannot afford to wait any longer. Higher ethanol blends cost less than gasoline BTEX, they are here today, they would save the nation hundreds of billions of dollars every year in reduced oil imports and health costs, and automakers require the additional octane. More importantly, EPA has a nondiscretionary duty to act—one it has ignored for far too long. [EPA-HQ-OAR-2022-0829-0630, pp. 8-10]

[See original submission for Supporting Documentation and End Notes] [EPA-HQ-OAR-2022-0829-0630, pp. 8-10]

Organization: Colorado Energy Office, Colorado Department of Transportation, and Colorado Department of Public Health and Environment

In response to EPA's request for comments on specific aspects of the rule, we offer the following suggestions to ensure the rule is as successful as possible: [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

- EPA requested comment on what levels of carbon dioxide (CO2) emissions stringency to pursue between 2026 and 2032, and suggested one recommended stringency schedule and three alternative schedules. We believe that the federal government needs to streamline widespread adoption of EVs to avoid the inefficiency that comes with significantly varied markets across the country. At times, it has been hard to get the products consumers want in Colorado, because the initial stock of popular models gets sent to larger states like California even though our state is an ideal market with strong EV incentives. For example, the State of Colorado put in an order for over 100 Ford F-150 Lightnings, but only four have been delivered thus far. Similarly, it has been challenging for consumers to access popular models with great potential for mountain driving, such as the Toyota RAV-4 Prime. Thankfully, delivery times are starting to improve, but as the supply chain normalizes, it is critical that states like Colorado have equal access to the full range of vehicle choices, and that will be enhanced by the federal government taking the lead on regulations that normalize production and delivery across the country. Alternative 1 would provide the most consistency with what Colorado is already pursuing. We urge the federal government to place even greater focus on consistency and streamlining of regulations in order to help us accelerate EV adoption with the urgency that we need. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

- Regarding criteria pollutants, we urge EPA to consider ways to align these proposed standards with California, and in doing so to avoid any backsliding in remaining conventional vehicles sold, while avoiding a scenario in which OEMs are forced to divert investment away from transportation electrification and towards technology advancement on conventional vehicles. We are concerned that the criteria standards in the EPA draft rule could have this unintended effect. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

- We urge EPA to consider investments in charging infrastructure as an option for manufacturers to achieve compliance credit. For years, EPA has included a broad range of crediting options to add flexibility to the program in ways that support its underlying goals. At the state and local level, one of the greatest challenges we face is completing robust and varied networks of public and private charging infrastructure so that travelers can travel where they want to go without range anxiety. We appreciate new funding in IIJA, but achieving this goal will require all the tools in the toolbox. We strongly urge EPA to utilize its credit program to incentivize companies investing in the charging networks which benefits consumers and will facilitate more public private partnership around this critical need. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

- We encourage EPA to coordinate its EV battery durability and warranty requirements with the maintenance and durability requirements of the ACC II program to the greatest extent possible. These provisions are critical for ensuring consumer confidence in the performance and durability of EVs in the new and used market, and alignment to the greatest extent possible can help avoid confusion for consumers, dealers, and other key stakeholders. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

- EPA requested comment on whether to consider a future rulemaking for gasoline fuel property standards to further reduce PM emissions. Colorado supports EPA exercising its authority under CAA 211(c) to develop gasoline property standards in a future rulemaking. Cleaner fuel standards will complement the vehicle emissions standards proposed in the current rulemaking by addressing emissions from the existing ICE vehicle fleet, as well as the vehicles that will be produced during the phase-in and operative periods of the proposed vehicle emissions standards. [EPA-HQ-OAR-2022-0829-0694, pp. 2-3]

Organization: Hyundai America Technical Center, Inc. (HATCI)

HMG supports AFAl's public comments regarding criteria pollutant standards related to low carbon fuels [EPA-HQ-OAR-2022-0829-0554, p. 7]

Under the Proposed Rule, EPA seeks comment on fuel property standards proposed to further reduce PM emissions, and specifically proposed improvements regarding when heavy hydrocarbon series are reduced. [EPA-HQ-OAR-2022-0829-0554, p. 7]

AFAI cites in its public comments multiple industry and agency studies demonstrating the effect of fuel composition on PM. Indeed, fuel properties contributing to the reduction of PMI are thoroughly analyzed and well understood. As a result, HMG supports the demand for strengthening the specifications for both commercial and certification fuels in future rulemaking to further reduce PMI. HMG also supports additional industry positions on fuels as reflected in AFAl's public comments. [EPA-HQ-OAR-2022-0829-0554, p. 7]

Organization: Illinois Corn Growers Association

Section IX. of the proposed Multi-Pollutant Emissions Standards entitled “Consideration of Potential Fuels Controls for a Future Rulemaking” states: [EPA-HQ-OAR-2022-0829-0756, pp. 7-8]

“The emissions standards for new vehicles (MY 2027 and later) proposed in this rule would achieve significant air quality benefits. However, there is an opportunity to further address PM emissions from the existing vehicle fleet, the millions of vehicles produced during the phase-in period, as well as nonroad engines, through changes in market fuel composition. Given the current population of vehicles and nonroad equipment, we expect that tens of millions of gasoline-powered sources will remain in use well into the 2030s. Although EPA has not undertaken sufficient analysis to propose changes to fuel requirements under CAA section 211(c) in this rulemaking, and considers such changes beyond the scope of this rulemaking, EPA has begun to consider the possibility of such changes and in this section, EPA requests comments on aspects of a possible future rulemaking aimed at further PM emission reductions from these sources via gasoline fuel property standards. Such future fuel standards could be an important complement to EPA's proposed vehicle PM standards." (emphasis added) [EPA-HQ-OAR-2022-0829-0756, pp. 7-8]

As previously discussed, the potential technological pathways for automakers for reducing CO2 tailpipe emissions have dwindled from 34 in the 2012 rulemaking to just 9 in the current rulemaking. Moreover, most of the 9 pathways discussed in the Regulatory Impact Analysis have already been employed across many automakers' product line. While the proposed standards have the appearance of being "technology neutral," the only potential option that an automaker could employ to achieve the called-for massive emission reductions is electrification of at least half their 2032 model year light and medium duty product line. [EPA-HQ-OAR-2022-0829-0756, pp. 7-8]

Given that the vehicle technology pathways have dwindled to just one, it seems reasonable that the next most viable pathway would be with improving the liquid fuels that could be used by the half of the 2032 new vehicle fleet that is not expected to be electrified. Yet EPA is only proposing future fuel changes that might help automakers meet one small part of the Multi-Pollutant Emissions Standards – the standards for PM emissions. [EPA-HQ-OAR-2022-0829-0756, pp. 7-8]

EPA should strongly consider opening the scope of any future rulemaking regarding fuel standards to include a detailed analysis of the benefits and costs of implementing a HOLC fuel program and compare those costs and benefits to the limited rulemaking discussed in Section IX of the current Multi-Pollutant Emissions Standard rulemaking. [EPA-HQ-OAR-2022-0829-0756, pp. 7-8]

EPA has responded to past requests to use its authority to set octane standards and revise their testing requirements to encourage the use of HOLC fuel with the position that automotive manufacturers have many other options to comply with the greenhouse gas standards and do not need a HOLC fuel. With only one viable pathway available to meet the proposed standards, EPA should expand the scope of the proposed future rulemaking on potential fuel controls to include the explicit consideration of HOLC fuel and, like was done in the 1970's with unleaded gasoline, make the regulatory changes to make widespread use of HOLC fuel a reality. [EPA-HQ-OAR-2022-0829-0756, pp. 7-8]

Costs and Benefits of Potential Future Fuel Controls

The focus of Section IX of the current proposed rulemaking (Consideration of Potential Fuels Controls for a Future Rulemaking) is a future rulemaking to set a cap on aromatic compounds in gasoline to help automakers comply with the proposed particulate standards. [EPA-HQ-OAR-2022-0829-0756, p. 9]

EPA identifies the biggest challenge to doing this in gasoline at the refinery level: aromatic compounds are used to increase the octane rating of gasoline and removing them would cause the octane rating to fall. [EPA-HQ-OAR-2022-0829-0756, p. 9]

As EPA explains it:

"If heavy aromatics were to be removed from gasoline, then not only their volume, but their octane would have to be replaced. One source for additional octane is via increased reformer severity or throughput to generate additional light aromatics. This action may require other adjustments to maintain compliance with gasoline benzene standards or rebalance naphtha streams. A refinery may also be able to increase high-octane isoparaffin production through additional alkylation and/or isomerization operations. Finally, a refinery may opt to further increase reliance on ethanol as a source of octane."6 [EPA-HQ-OAR-2022-0829-0756, p. 9]

6 Pg 584, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles

Cost of Alternatives to Aromatics Compared to Ethanol. Refineries currently consider aromatics as the low-cost means of increasing the octane rating of gasoline blend stock. By limiting their consideration of reducing aromatics at the refinery level, EPA will inevitably see an increase to the price of gasoline if aromatic levels are reduced. If, on the other hand, EPA would expand the scope of their future rulemaking beyond the refinery to include gasoline blends that use more ethanol than is the case today, the price of gasoline would likely be reduced and the capital costs to refineries would be essentially zero. This fact alone should justify a more expansive view of fuel controls than reflected in Section IX. One way to illustrate this is to compare the difference in cost between a gallon of blend stock and a gallon of various octane boosting alternatives to aromatics. The Oil Price Information Service's weekly reports includes spot prices for regular and premium grade reformulated and conventional gasoline blend stocks, ethanol (which only the sales-weighted average is used in this analysis), alkylates and MTBE on a per gallon basis.7 Assuming the same amount of each aromatic alternative is required to provide the same octane boost as aromatics,8 then a positive [EPA-HQ-OAR-2022-0829-0756, pp. 9-10]

7 MTBE is not used in the U.S. as an octane booster, although it is used elsewhere.

8 Since ethanol has the highest blending octane the alternatives, this assumption underestimates the value of ethanol.

[See original attachment for "Figure 2. Relative Costs of Alternatives to Aromatics"] difference indicates that the alternative will raise the cost of gasoline blend stock and a negative value indicates the alternative will lower the cost. As shown in Figure 2, page 9, only ethanol provides a cost savings. [EPA-HQ-OAR-2022-0829-0756, pp. 9-10]

Furthermore, the price advantage of ethanol over gasoline blend stock may well be greater in the future. The Nebraska Energy Board has been publishing the monthly rack9 price of fuel ethanol and regular grade gasoline in their state since 1982. These monthly prices are expressed in nominal dollars (i.e., not adjusted for inflation). After the Defour Group adjusted the annual average data to reflect 2022 dollars, calculated the implied blend stock price and computed the difference between the price of a gallon of ethanol and gasoline blend stock, the relationship between ethanol and gasoline blend stock prices over a 40-year period can be established. This is shown in Figure 3. [EPA-HQ-OAR-2022-0829-0756, p. 10]

9 The rack price is the price paid by fuel blenders for the blend stock and ethanol they receive from oil and bio refineries.

There is a statistically significant linear correlation between fuel ethanol and gasoline blend stock, with the price of ethanol becoming more favorable over time. If this correlation remains consistent, ethanol's price advantage over gasoline blend stock could increase to $1.66 a gallon by 2032. [EPA-HQ-OAR-2022-0829-0756, p. 10]

[See original attachment for "Figure 3 Ethanol and Figure 4. Gasoline Ethanol Blendss: 1982-2021"] [EPA-HQ-OAR-2022-0829-0756, p. 10]

The Greenhouse Gas Benefits of Using HOLC Fuel. What is referred to as "gasoline" is a blend of a fossil fuel (gasoline blend stock) and a renewable fuel (ethanol). Nearly all such blended fuel consists of 90% gasoline blend stock and 10% ethanol known as E10. As shown in Figure 4, the total volume of gasoline blend fuels peaked just prior to the Covid pandemic. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

Thus, due to the blending of ethanol into gasoline, the fossil fuel component of liquid fuel peaked in 2006 while total gasoline blend usage peaked in 2018. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

The first substantital reduction in the use of fossil fuels in the transportation sector occurred over a relatively short period of time. While the overall use of motor fuel began to stabilize starting in 2005, the replacement of gasoline blend stock by ethanol reduced fossil fuel use enough to turn the trend downward. This was due primarily to the enactment of the Renewable Fuel Standards (RFS) which dictated the annual volume of biofuel that must be blended into gasoline and diesel fuels. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

[See original attachment for "Figure 5. Impact of Proposed GHG Emission Reductions on U.S. Fuel Consumption" and "Figure 6. Benefits from a Possible HOLC Fuel"] [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

Figure 5 illustrates what these trends would look like if the current rulemaking would achieve the results shown in Table 1. Note that while overall liquid fuel use goes down, the amount of ethanol used also declines because the concentration of ethanol in gasoline has remained unchanged at 10%. Thus, the full potential of the proposed shift to electric vehicles is blunted by the decreased use of ethanol. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

If, on the other hand. EPA were to adopt changes to the regulations to bring about widespread use of HOLC fuel with triple the ethanol that is in today's fuel, an additional 8% to 16%10 of the fossil fuel portion of the fuel (the gasoline blend stock) would be displaced by 2055. Figure 6 illustrates what the trends would look like if the current rulemaking would achieve the results shown in Table 1. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

10 This assumes a 2% reduction in mpg due to ethanol after energy density, heat of vaporization and optimization impacts are considered.

To illustrate the difference, consider that the amount of petroleum used for light and medium duty vehicles in 2055 if the proposed standards are successful would drop to 1962 levels. If, however, HOLC fuel with 20% to 30% ethanol were to replace E10 by 2055, the amount of petroleum used would drop to levels not seen since 1952. [EPA-HQ-OAR-2022-0829-0756, pp. 10-11]

Aromatic Reductions from the Use of HOLC Fuel. Reducing heavy aromatics in gasoline at the refinery level is complicated by the corresponding loss in octane. Finding a solution within the refinery using compounds made from petroleum will be expensive and do nothing to reduce overall fossil fuel use. On the other hand, as shown in Figure 1, adding ethanol to an existing blend stock both increases the octane rating of the resulting fuel but also decreases the concentration of all the other petroleum compounds, including aromatics and benzene. In addition, by replacing a portion of the blend stock portion of the fuel with a low carbon alternative, overall CO2 emissions will also be reduced. Finally, if the HOLC fuel is made using existing blend stocks, then expensive capital investment in refineries will be unnecessary. [EPA-HQ-OAR-2022-0829-0756, pp. 11-12]

In 2020, the Defour Group evaluated the aromatic standards being considered for use in the Next Generation Fuels Act (NGFA). These standards (shown in Table 4), in conjunction with octane and carbon intensity standards, would require the production and sale of mid-level ethanol blend {MLEB} high octane low carbon fuels beginning in the year 2028. [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

[See original attachment for "Table 4. Standards Included in Next Generation Fuel Act"] [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

This study was based on data regarding fuel propertites found in the 2016 EPA Fuels Trend Report.11 This report contained values for the average and 95% (2 standard deviation for a normal distribution) for both summer and winter reformulated and conventional gasolines. [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

11 Fuel Trends Report: Gasoline 2006 - 2016 Office of Transportation and Air Quality U.S. Environmental Protection Agency EPA-420-R-17-005 October 2017

The Aromatic Average. As proposed in the NGFA, the aromatic standard in retail gasoline for 2027 and beyond will be 17.5%. In its Fuel Trends Report, EPA reported that the average concentration of aromatics in all grades of fuels during the five-year period from 2012 - 2016 ranged from 18.8% to 19.6% and average ethanol concentration in gasoline was only 9.57%. MathPro estimated the average aromatic concentrations for all grades of fuel was 19.0%.12 For modeling purposes, Defour Group assumed an average aromatic concentration of 18.5% and an average ethanol concentration of 9.8%. The aromatic concentration was then apportioned to regular grade gasoline (17.52%) and premium grade gasoline (24.57%).[EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

12 David S. Hirshfeld et al, "Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content," Journal of Environmental Science and Technology, August 21, 2014

Under the NGFA: [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

-A new NGFA fuel will be introduced into the market prior to January 1, 2027. If this fuel is an E20 fuel (20% ethanol) combined with regular grade E10 gasoline blend stock, its average Research Octane Number (RON) is estimated to be 96.2 RON and the aromatic average is estimated to be 15.6%. [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

-New vehicles model year 2028 and later are required to use the new HOLC fuel. About 30% of these vehicles (approximately 5 million vehicles) are expected to be sold in the 2027 calendar year. [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

-Some of these new vehicles operating on NGFA fuel in 2027 will be replacing legacy vehicles that operate on E10 premium. [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

-All flex-fuel vehicles (approximately 5 million vehicles) can use the new HOCL fuel or E85 (with an estimated aromatic concentration of 4.7%). [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

-All vehicles 2001 and newer can use E15, with an estimated aromatic concentration of 16.5% (regular) and 23.2% (premium). [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

With all these sources of low aromatic gasoline in the marketplace in 2027, multiple scenarios can be developed that would assure compliance with the 17.5% average aromatic concentration standard. Furthermore, compliance with the average standard in subsequent years will become easier as more new vehicles using NGFA fuel enter the market. The aromatic average will continue to decline over time, and by 2055, the average aromatic concentration is estimated to be about 14%. [EPA-HQ-OAR-2022-0829-0756, pp. 12-13]

Aromatic Cap. As proposed in the NGFA, the aromatic standard in retail gasoline for 2028 and beyond will be 30% for years 2027 – 2031 and 25% for 2032 and thereafter. Since there is no uniform standard across the country for octane, premium gasolines range from 90 AKI to 93 AKI.13 The highest-octane premium grade gasoline is 93 AKI with an average aromatic concentration of 29.8%. An E15 version of 93 AKI premium, however, would have an aromatic concentration of 28.1%. [EPA-HQ-OAR-2022-0829-0756, p. 13]

13 There are even high-octane specialty premium fuels on the market primarily used for racing. Since these are already uniquely blended boutique fuels, it is assumed that these fuels could be made with no more than 30% aromatics.

Two options could be employed to meet the aromatic cap in 2027. The first option would be to replace E10 with E15 in areas that have 93 AKI premium. 14 The second option would be to replace 93 AKI premium with 91 AKI premium. This second option has the additional advantage of making the octane standard for legacy premium more consistent across the country. Either option (or a combination of the two) would enable compliance with the 30% cap for 2027 2031. [EPA-HQ-OAR-2022-0829-0756, p. 13]

14 Anti-Knock Index, which is the average of a fuel’s Research Octane Number (RON) and Motor Octane Number (MON).

In 2032, the cap drops to 25% under the NGFA. At this point, fuel retailers would need to limit their premium grade option to E15 with an octane rating no higher than 91 AKI to be in compliance. By this time, however, nearly half of the fleet will be vehicles designed to run on high octane NGFA fuel. [EPA-HQ-OAR-2022-0829-0756, p. 13]

In the past. EPA stated their opinion that, while they had the authority to make significant changes to vehicle fuel, it would only be possible after all other alternatives have been exhausted. As established, there is only one realistic technological alternative that can effectively reduce gasoline consumption by 50%, but that alternative has many issues yet to be resolved and requires sweeping changes that are not likely to occur in less than nine years. [EPA-HQ-OAR-2022-0829-0756, pp. 14-15]

A second alternatitve has been under development for a decade that could assist automakers in complying with the standards: a new high octane low carbon fuel made with ethanol. It seems reasonable that any future rulemaking establishing fuel standards would include regulatory changes to assist in implementing this new fuel. Such changes include, but are not limited to, the following: [EPA-HQ-OAR-2022-0829-0756, pp. 14-15]

-Specifications for E20 and E25 -E30 certification fuels.

-Octane standards for legacy fuels that would, at a minimum, limit the octane of premium

gasoline nationwide to 91 AKI.

-Octane standards for E20 fuel of 95 RON and for E25 and E30 fuels of 98 RON.

-Permanently extend the RVP waiver for E10 to any gasoline-ethanol blend fuel.

-Aromatic standards for all gasoline that would address both average and maximum levels of aromatic compounds in gasoline.

-Any other standards or regulations that the Agency believes would facilitate the transition into a high-octane low carbon fuel as outlined in the 2019 Co-Optima report entitled "Top Ten Blendstocks For Turbocharged Gasoline Engines: Bioblendstocks With Potential to Deliver the for Highest Engine Efficiency." [EPA-HQ-OAR-2022-0829-0756, pp. 14-15]

Organization: Marathon Petroleum Corporation (MPC)

EPA is seeking comment on promulgating future gasoline fuel property standards aimed at further reducing Particulate Matter ("PM") emissions specifically within the existing light duty transportation fleet. MPC data and testing show that the use of analytical methods as support for restrictions on the back end, or tail, distillation point of gasoline is misplaced. [EPA-HQ-OAR-2022-0829-0593, pp. 4-5]

1. Simulated Distillation does not provide data that reliably predicts PMI.

EPA states that the basis of its discussion and request for comments relies on the theory that high boiling point compounds in gasoline increase PM emissions and, further, that the high boiling point tail of gasoline contains a high proportion of multi-ring aromatics. Particulate Matter Index ("PMI") is a method to analytically predict the tailpipe PM-forming potential of one fuel compared to another. However, other factors including vehicle hardware design, calibration, and ethanol content also impact vehicle tailpipe PM emissions. As the agency correctly points out, the method to calculate PMI using a Detailed Hydrocarbon Analysis ("DHA") via ASTM 6370 is time- consuming and expensive. As a proxy for DHA, EPA proposes using a final boiling point ("FBP") via Simulated Distillation ("SimDis") as an indicator of PMI since, theoretically, the majority of the multi-ring aromatics occur in the T90 portion of the distillation curve. The Agency believes that use of SimDis could be an accurate and cost-effective means of measuring PMI. MPC has already tested this approach to determine if using SimDis is an accurate way of predicting PMI. [EPA-HQ-OAR-2022-0829-0593, pp. 4-5]

MPC completed an analysis on sixty (60) gasoline samples before ethanol blending from all of its refineries. All samples were tested using the SimDis method ASTM D2887, with twenty (20) of these samples also tested by SimDis ASTM D7096. Results showed that C10+ aromatic content varied greatly among the fuel types and grades at a given distillation point. Consequently, MPC's correlation of the SimDis data showed there was no relationship between the D2887 final boiling points and C10+ aromatic content, see Figure 1. [See original comment for Figure 1 – C10+ Aromatics vs. Simulated Distillation Final Boiling Point] For the D7096 simulated distillation data – the method recommended by the EPA— correlations of T98, T95, and T90 points to PMI showed slightly stronger correlation with R2 values ranging from 0.21 to 0.36. [EPA-HQ-OAR-2022-0829-0593, pp. 4-5]

Based on MPC's analysis, there is a significant amount of uncertainty that the SimDis method can accurately predict a lower PM-forming potential fuel. Most importantly, MPC found little correlation between the PMI of a fuel and its final boiling point minus T98 or T95 values. In fact, in the analysis, fuels with the highest distillation values had the lowest C10+ aromatics and yielded the lowest PMI values (see Figure 2). [See original comment for Figure 2 – PMI Comparison to SimDis Final Boiling Point and Tail (FBP – T95)] [EPA-HQ-OAR-2022-0829-0593, pp. 4-5]

Consumers and refiners will be impacted by changes to gasoline distillation parameters.

Limiting certain portions of gasoline based on distillation properties will impact refiners and consumers due to restrictions of the gasoline pool. Each refinery is an individual operation, fine-tuned to run on particular feedstocks based on the type of equipment used at that refinery. The Haverly model used by the EPA is not reflective of actual refinery operations, and use of simulations and models, including the Haverly model, rely on generalizations and averaging, which result in flawed model outputs. [EPA-HQ-OAR-2022-0829-0593, pp. 6-7]

EPA states that to make up for lost gasoline and octane in its Haverly model, it simply "increased the reformer severity, purchased and isomerized natural gas liquids, and produced more alkylate," ignoring the reality that each one of these changes represents significant adjustments to refinery planning, operations, and expense. EPA's simplistic modeling input changes do not reflect how individual refineries would need to react to new distillation restrictions. The actual impacts for each refinery would likely be widely varying depending on each refinery's current operations and expenses. EPA modeling needs to consider hydrotreating and hydrocracking capacity, hydrogen availability, alkylation capacity to make up octane loss, and butane blending losses. Changes of these parameters and associated losses due to refining constraints would represent significant monetary impacts that are not accounted for in the current proposal. [EPA-HQ-OAR-2022-0829-0593, pp. 6-7]

Restricting back-end distillation would result in the loss of a significant amount of gasoline volume. And critically, as has been discussed, the volume that would be removed from the gasoline pool does not contribute to PM emissions. By way of example, MPC modeled a refinery's light product outputs using site-specific information to determine the impact of shifting FCC naphtha from the gasoline pool to the distillate pool. The model showed that the total gasoline production was reduced by one and one-half (1.5) barrels for each barrel of FCC naphtha that was shifted to the distillate pool. This resulted in a reduction of the refinery's daily production of gasoline by approximately 4%. Other refineries likely would be required to reduce gasoline volumes to restrict back-end distillation. These decreases in daily production could leave some markets short, translating to consumer impacts at the pump in both price and supply. [EPA-HQ-OAR-2022-0829-0593, pp. 6-7]

Additionally, if EPA implements changes that limit distillation properties of gasoline, existing blending practices that occur downstream of the refinery may be prohibited. EPA regulations currently allow the blending of transmix into fuel because the quality and performance of the final fuel is unaffected. Transmix represents a conglomeration of off-specification refined products and product interfaces that are collected and reintroduced into a final fuel, most often after the final fuel has left a refinery. The potential fuels specification being discussed could impact the amount of transmix being used within the gasoline pool, which in turn could also impact the total available gasoline volume. The alternative to blending transmix would be to reprocess the off-specification refined products at a refinery creating unnecessary criteria and GHG emissions from transporting the material to a refinery and reprocessing it. Also, the transportation of fuels occurs within fungible systems – pipelines, ships, trucks— where products share transportation assets as these products move to retail locations, often with the same types of products being commingled. As such, residual fuels present within these shared transportation assets could alter the distillation properties of any given fuel. Any effort by EPA to change or disallow these practices would serve to further restrict supplies of gasoline on top of that which would be caused by changes to distillation parameters. [EPA-HQ-OAR-2022-0829-0593, pp. 6-7]

Organization: Minnesota Corn Growers Association (MCGA)

FUEL QUALITY RULEMAKING NEEDED

The EPA proposed rulemaking requested "comment on potential future gasoline fuel property standards aimed at further reducing PM emissions, for consideration in a possible subsequent rulemaking". A major advantage of fuel property standards is that they affect emissions from all vehicles on the road today – not just new vehicles. [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

In response to EPA's request for input on fuel standards, NCGA supports EPA establishing a pathway to a higher minimum clean octane standard for fuel of at least 98 RON that enables mid-level ethanol blends to immediately and cost-effectively reduce both GHG and tailpipe emissions, supporting greater fuel efficiency and bringing lower carbon and lower cost fuels to the market. [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

Even with advancements in engine technology, automotive manufacturers are nearing a point where further improvements are difficult without a higher-octane fuel. This is because advanced downsized, down sped engines, and their associated technologies, make an engine more susceptible to knock. Due to its knock-limiting properties, a higher-octane fuel, such as a midlevel ethanol blend, enables engine designs featuring higher compression ratios, turbocharging, and down speeding and increases overall engine performance and efficiency.12 According to Department of Energy (DOE) researchers at Oak Ridge National Laboratory, "the opportunity for further downsizing and down speeding of engines to improve fuel economy is limited by the available octane rating of fuels…[which] allow higher efficiency designs of naturally aspirated and turbocharged engines dedicated to use the high octane fuel."13 Since 2016, DOE has completed extensive research through its Co-Optimization of Fuels and Engines initiative (Co-Optima) on innovating fuels and engines together and understanding the types of fuels that can improve engine performance and efficiency to reduce emissions.14[EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

12 Leone, T., Olin, E., Anderson, J., Jung, H. et al. 2014. "Effects of Fuel Octane Rating and Ethanol Content on Knock, Fuel Economy, and CO2 for a Turbocharged DI Engine," SAE Int. J. Fuels Lubr. 7(1):9-28, 2014, doi:10.4271/2014-01-1228.

13 Theiss, T., T. Alleman, A. Brooker, A. Elgowainy, G. Fioroni, J. Han, S. Huff, C. Johnson, M. Kass, P. Leiby, R. U. Martinez, R. McCormick, K. Moriarty, E. Newes, G. Oladosu, J. Szybist, J. Thomas, M. Wang, B. West. 2016. Summary of High-Octane Mid-Level Ethanol Blends Study. Oak Ridge National Laboratory, National Renewable Energy Laboratory, and Argonne National Laboratory. Available at: http://info.ornl.gov/sites/publications/files/pub61169.pdf.

14 . Department of Energy, Office of Energy Efficiency and Renewable Energy, “Co-Optimization of Fuels & Engines,” https://www.energy.gov/eere/bioenergy/co-optimization-fuels-engines.

The recently concluded Co-Optima research15 validates the solution of pairing clean octane and optimized engines to deliver greater environmental and economic benefits on the pathway to a net-zero transportation future, and DOE confirms ethanol’s declining carbon intensity.16 [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

15 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “On the Road to a Net-Zero-Carbon Transportation Future,” https://www.energy.gov/eere/bioenergy/articles/road-net-zero-carbon-transportation-future.

16 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “Ethanol vs. Petroleum-Based Fuel Carbon Emissions,” https://www.energy.gov/eere/bioenergy/articles/ethanol-vs-petroleum-based-fuel-carbon-emissions.

- New fuel options can improve fuel economy by 10 percent with today’s turbocharged engines, with an additional 15 percent improvement with advanced engines.

- Domestically sourced bio-based fuels produce 60 percent fewer GHG emissions than petroleum-based fuels.

- Optimized fuel and engine combinations also cut criteria pollutant emissions. [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

As DOE explained in its GHG analysis of high-octane fuel, determining GHG impacts of high-octane fuel relative to current gasoline requires accounting for vehicle efficiency gains, refinery operation changes and GHG emissions changes from ethanol blending. DOE’s results show the largest impacts on wells-to-wheels (WTW) emissions from high-octane fuel come from efficiency gains and the level of ethanol blending. [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

DOE’s modeling compared 100 RON E25 and E40 fuels to baseline E10. When used in HOF vehicles, the E25 reduced WTW GHG emissions by a total of 8 to 9 percent (or 36-40 g CO2e/mile driven) compared to baseline E10. The vehicle efficiency gains from HOF reduced GHG emissions by 4 percentage points of that total, and the additional 4 percentage points of GHG reductions with the E25 fuel were realized from ethanol offsetting petroleum. For the E40 HOF, the ethanol content provided a 9 percent reduction in WTW GHG emissions.17 [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

17 Theiss et al., 2016.

Current fuels with higher octane, marketed as premium grades, where ethanol blends are limited to 10%, are not cost-effective for consumers, and fall short of enabling the efficiency and emissions technology changes automakers need to advance transportation decarbonization. Because ethanol results in nearly half the emissions of gasoline and is on a pathway to future net-zero emissions, producing higher-octane fuel with a midlevel ethanol blend would do more to reduce GHG emissions and support the stringency goals of the proposed rule. Optimized vehicles powered by low carbon, high-octane fuel made from a midlevel ethanol blend would have much lower GHG emissions than vehicles running on either current E10 blends or premium E10 blends. [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

Higher ethanol content, reached by removing regulatory barriers to higher blends, would boost GHG reductions and replace harmful aromatics, providing a cost-effective low carbon fuel solution for consumers, including low- income consumers, and the environment. [EPA-HQ-OAR-2022-0829-0612, pp. 6-7]

EPA should adopt rules to limit PMI of both finished fuels and the hydrocarbon blend stocks used for E10, E15, and E85. Limiting PMI of hydrocarbon blend stocks will ensure that the particulate emissions benefits of ethanol are not offset by negative changes at refineries. [EPA-HQ-OAR-2022-0829-0612, pp. 10-11]

Improved fuel property standards should be a high priority because they can achieve significantly lower particulate emissions and dramatically lower GHG emissions. California's Low Carbon Fuel Standard already recognizes the importance of fuel standards, and it has led to dramatic increases in sales of E85 and other low- carbon biofuels. High-octane low-carbon fuels are a key enabler for continued GHG emissions improvements in the millions of liquid-fueled vehicles which will be produced over the next 10+ years, as documented by the U.S. Department of Energy Co-Optimization of Fuels & Engines initiative and in numerous other studies, such as those by MIT and by automakers. A detailed proposed blueprint for future high-octane low-carbon fuels exists in the Next Generation Fuels Act, and EPA has the statutory authority to make these changes without waiting for Congress to act. [EPA-HQ-OAR-2022-0829-0612, pp. 10-11]

In summary, EPA should pursue stringent new fuel standards – not only for reduced particulate emissions but also for dramatically lower GHG emissions. Fuel standards can achieve benefits much more quickly than standards which only impact new vehicles. [EPA-HQ-OAR-2022-0829-0612, pp. 10-11]

Organization: National Association of Clean Air Agencies (NACAA)

Potential Future Gasoline Fuel Property Standards

EPA seeks comment on potential future gasoline fuel property standards aimed at further reducing PM emissions. The agency writes in the proposal that comments on this topic would inform a possible subsequent EPA rulemaking that could provide an important complement to the vehicle standards being proposed in this current action. "The emissions standards for new vehicles (MY 2027 and later) proposed in this rule would achieve significant air quality benefits. However, there is an opportunity to further reduce PM emissions from the existing vehicle fleet, the millions of vehicles that will be produced during the phase- in period [of the proposed vehicle standards], as well as millions of nonroad gasoline engines, through changes in market fuel composition. Given the current population of vehicles and nonroad equipment, we expect that tens of millions of gasoline-powered sources will remain in use well into the 2030s. Although EPA has not undertaken sufficient analysis to propose changes to fuel requirements under CAA section [EPA-HQ-OAR-2022-0829-0559, pp. 8-9]

211(c) in this rulemaking, and considers such changes beyond the scope of this rulemaking, EPA has begun to consider the possibility of such changes."29 NACAA agrees with EPA that fuel property standards to further reduce PM emissions would yield significant and necessary reductions from the existing fleet and also provide an important complement to the currently proposed emission standards. We support EPA pursuing such a program. [EPA-HQ-OAR-2022-0829-0559, pp. 8-9]

29 Id at 29,397

Organization: National Corn Growers Association (NCGA)

The EPA proposed rulemaking requested "comment on potential future gasoline fuel property standards aimed at further reducing PM emissions, for consideration in a possible subsequent rulemaking". A major advantage of fuel property standards is that they affect emissions from all vehicles on the road today – not just new vehicles. [EPA-HQ-OAR-2022-0829-0643, p. 5]

In response to EPA's request for input on fuel standards, NCGA supports EPA establishing a pathway to a higher minimum clean octane standard for fuel of at least 98 RON that enables mid-level ethanol blends to immediately and cost-effectively reduce both GHG and tailpipe emissions, supporting greater fuel efficiency and bringing lower carbon and lower cost fuels to the market. [EPA-HQ-OAR-2022-0829-0643, p. 5]

Even with advancements in engine technology, automotive manufacturers are nearing a point where further improvements are difficult without a higher-octane fuel. This is because advanced downsized, down sped engines, and their associated technologies, make an engine more susceptible to knock. Due to its knock-limiting properties, a higher-octane fuel, such as a midlevel ethanol blend, enables engine designs featuring higher compression ratios, turbocharging, and down speeding and increases overall engine performance and efficiency. 12 According to Department of Energy (DOE) researchers at Oak Ridge National Laboratory, "the opportunity for further downsizing and down speeding of engines to improve fuel economy is limited by the available octane rating of fuels…[which] allow higher efficiency designs of naturally aspirated and turbocharged engines dedicated to use the high octane fuel." 13 Since 2016, DOE has completed extensive research through its Co-Optimization of Fuels and Engines initiative (Co-Optima) on innovating fuels and engines together and understanding the types of fuels that can improve engine performance and efficiency to reduce emissions. 14 [EPA-HQ-OAR-2022-0829-0643, p. 5]

12 Leone, T., Olin, E., Anderson, J., Jung, H. et al. 2014. "Effects of Fuel Octane Rating and Ethanol Content on Knock, Fuel Economy, and CO2 for a Turbocharged DI Engine," SAE Int. J. Fuels Lubr. 7(1):9-28, 2014, doi:10.4271/2014-01-1228.

13 Theiss, T., T. Alleman, A. Brooker, A. Elgowainy, G. Fioroni, J. Han, S. Huff, C. Johnson, M. Kass, P. Leiby, R. U. Martinez, R. McCormick, K. Moriarty, E. Newes, G. Oladosu, J. Szybist, J. Thomas, M. Wang, B. West. 2016. Summary of High-Octane Mid-Level Ethanol Blends Study. Oak Ridge National Laboratory, National Renewable Energy Laboratory, and Argonne National Laboratory. Available at: http://info.ornl.gov/sites/publications/files/pub61169.pdf

14 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Co-Optimization of Fuels & Engines," https://www.energy.gov/eere/bioenergy/co-optimization-fuels-engines.

The recently concluded Co-Optima research 15 validates the solution of pairing clean octane and optimized engines to deliver greater environmental and economic benefits on the pathway to a net-zero transportation future, and DOE confirms ethanol's declining carbon intensity. 16 [EPA-HQ-OAR-2022-0829-0643, p. 5]

15 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "On the Road to a Net-Zero-Carbon Transportation Future," https://www.energy.gov/eere/bioenergy/articles/road-net-zero-carbon-transportation-future

16 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Ethanol vs. Petroleum-Based Fuel Carbon Emissions," https://www.energy.gov/eere/bioenergy/articles/ethanol-vs-petroleum-based-fuel-carbon-emissions

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DOE's modeling compared 100 RON E25 and E40 fuels to baseline E10. When used in HOF vehicles, the E25 reduced WTW GHG emissions by a total of 8 to 9 percent (or 36-40 g CO2e/mile driven) compared to baseline E10. The vehicle efficiency gains from HOF reduced GHG emissions by 4 percentage points of that total, and the additional 4 percentage points of GHG reductions with the E25 fuel were realized from ethanol offsetting petroleum. For the E40 HOF, the ethanol content provided a 9 percent reduction in WTW GHG emissions. 17 [EPA-HQ-OAR-2022-0829-0643, pp. 5-6]

17 Theiss et al., 2016.

Current fuels with higher octane, marketed as premium grades, where ethanol blends are limited to 10%, are not cost-effective for consumers, and fall short of enabling the efficiency and emissions technology changes automakers need to advance transportation decarbonization. Because ethanol results in nearly half the emissions of gasoline and is on a pathway to future net-zero emissions, producing higher-octane fuel with a midlevel ethanol blend would do more to reduce GHG emissions and support the stringency goals of the proposed rule. Optimized vehicles powered by low carbon, high-octane fuel made from a midlevel ethanol blend would have much lower GHG emissions than vehicles running on either current E10 blends or premium E10 blends. [EPA-HQ-OAR-2022-0829-0643, pp. 5-6]

Higher ethanol content, reached by removing regulatory barriers to higher blends, would boost GHG reductions and replace harmful aromatics, providing a cost-effective low carbon fuel solution for consumers, including low-income consumers, and the environment. [EPA-HQ-OAR-2022-0829-0643, pp. 5-6]

Bringing high octane fuel to market in the form of midlevel ethanol blends will be significantly less capital-intensive than attempting to increase blend stock octane with hydrocarbon components at refineries. It will also be incredibly cleaner. The avoided production cost and offset emissions lower end-costs to consumers, reducing both economic costs and social costs related to health and environment, key considerations in advancing environmental justice and avoiding adverse impacts from oil refineries on communities that have historically borne them. [EPA-HQ-OAR-2022-0829-0643, p. 7]As explained in EPA's Fuel Trends Report: Gasoline 2006-2016, "Ethanol's high-octane value has also allowed refiners to significantly reduce the aromatic content of the gasoline, a trend borne out in the data." EPA's data shows that aromatics' share of gasoline volume dropped from nearly 25 percent to 19.3 percent, and benzene volume dropped from 0.99 percent to 0.58 percent between 2000 and 2016, the same time as ethanol blending increased from 1 percent to at least 10 percent. [EPA-HQ-OAR-2022-0829-0643, p. 8]

EPA's data demonstrates the air quality and human health benefits of increased ethanol blending in gasoline by replacing harmful aromatics with clean octane from ethanol. Limiting the aromatics content of gasoline and using higher ethanol blends in high octane fuel would further reduce risks from SOA formation and exposure to PM 2.5, which causes serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. The same GDI engine advancements that help lower GHG emissions have the unfortunate side effect of increasing particulate emissions, which could be reduced by use of midlevel ethanol blends. [EPA-HQ-OAR-2022-0829-0643, p. 8]

Petroleum-based aerosol particles represent a significant source of pollution, especially in population-dense urban areas. Health issues related to PM and other emission-based pollutants can be reduced by lowering the volume of petroleum in the domestic gasoline pool, which can be accomplished by increasing octane with higher ethanol blends and replacing more hydrocarbon aromatics with ethanol. [EPA-HQ-OAR-2022-0829-0643, p. 8]

It is well known that particulate emissions are a strong function of aromatic fuel components with a high double bond equivalent and low vapor pressure, and the particulate forming potential is well represented by the "PMI" metric developed by Honda. 27 The value of the PMI metric has been validated in many other studies including the joint auto-oil Coordinating Research Council 28 and the EPA. 29 PMI and particulate emissions can be reduced by altering refinery processes to reduce heavy aromatic content of the fuel, and, as noted, ethanol can replace those aromatics. [EPA-HQ-OAR-2022-0829-0643, p. 8]

27 Aikawa, Sakurai, and Jetter, "Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions", SAE paper 2010-01-2115, 2010; https://doi.org/10.4271/2010-01-2115

28 Coordinating Research Council, "Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles," Report No. E-94-2, March 2016; http://crcsite.wpengine.com/wp-content/uploads/2019/05/CRC_2017-3-21_03-20955_E94-2FinalReport-Rev1b.pdf

29 US Environmental Protection Agency, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources", report EPA-420-R-23-008, April 2023

Organization: National Farmers Union (NFU)

VI. Fuel Effects on Particulate Emissions

EPA's proposal requests "comment on potential future gasoline fuel property standards aimed at further reducing PM emissions, for consideration in a possible subsequent rulemaking." [EPA-HQ-OAR-2022-0829-0581, p. 14]

88 Fed. Reg. at 29,197. A major advantage of supporting biofuels is that their use reduces emissions from all vehicles on the road today – not just new vehicles. Therefore, emissions benefits are achieved quickly on a larger scale. [EPA-HQ-OAR-2022-0829-0581, p. 14]

Particulate emissions are a strong function of aromatic fuel components with a high double bond equivalent and low vapor pressure. The particulate forming potential is well represented by the "PMI" metric developed by Honda.33 The value of the PMI metric has been used and validated by others including the Coordinating Research Council34 and EPA.35 [EPA-HQ-OAR-2022-0829-0581, p. 14]

33 See Koichiro Aikawa, et al., Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions, SAE paper 2010-01-2115 (2010), available at https://doi.org/10.4271/2010-01-2115.

34 See Coordinating Research Council, Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles, Report No. E-94-2, March 2017, available at http://crcsite.wpengine.com/wp- content/uploads/2019/05/CRC_2017-3-21_03-20955_E94-2FinalReport-Rev1b.pdf.

35 See EPA, Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources, EPA-420-R-23-008 (April 2023), available at https://www.epa.gov/system/files/documents/2023- 05/420r23008.pdf.

PMI and particulate emissions can be reduced by altering refinery processes to reduce heavy aromatic content of the fuel. This may require other refinery changes in order to achieve fuel octane requirements, and the changes generally increase cost. A more cost-effective option for octane is higher blends of ethanol, and higher blends of ethanol have been shown to reduce particulate matter emissions.36 But the petroleum gasoline with which ethanol may be blended can impact the benefits of ethanol. As such, EPA should adopt rules to limit PMI of both finished fuels and the hydrocarbon blendstocks used for ethanol blends, including ensuring the ability to use mid-level ethanol blends. Limiting PMI of hydrocarbon blendstocks will ensure that the particulate emissions benefits of ethanol are not offset by negative changes at refineries. Such rules can also incentivize improved pipeline practices, to minimize contamination of gasoline with diesel and jet fuel. [EPA-HQ-OAR-2022-0829-0581, p. 14]

36 See, e.g., Tianbo Tang, et al., Expanding the ethanol blend wall in California: Emissions comparison between E10 and E15, Fuel Vol. 350 (2023), available at https://doi.org/10.1016/j.fuel.2023.128836.

Organization: North Dakota Farmers Union (NDFU)

Fuel Effects on Particulate Emissions

EPA's proposal requests "comment on potential future gasoline fuel property standards aimed at further reducing PM emissions, for consideration in a possible subsequent rulemaking." A major advantage of supporting biofuels is that their use reduces emissions from all vehicles on the road today – not just new vehicles. Therefore, emissions benefits are achieved quickly on a larger scale. [EPA-HQ-OAR-2022-0829-0586, p. 6]

Particulate emissions are a strong function of aromatic fuel components with a high double bond equivalent and low vapor pressure. PMI and particulate emissions can be reduced by altering refinery processes to reduce heavy aromatic content of the fuel. This may require other refinery changes in order to achieve fuel octane requirements, and the changes generally increase cost. Ethanol provides a more cost-effective option for boosting octane and reducing particulate matter emissions.12 But the petroleum gasoline with which ethanol may be blended can impact the benefits of ethanol. As such, EPA should adopt rules to limit PMI of both finished fuels and the hydrocarbon blendstocks used for ethanol blends, including ensuring the ability to use mid-level ethanol blends. Limiting PMI of hydrocarbon blendstocks will ensure that the particulate emissions benefits of ethanol are not offset by negative changes at refineries. [EPA-HQ-OAR-2022-0829-0586, p. 6]

12 Tang, T., et. al. (2023, October 15). Expanding the ethanol blend wall in California: Emissions comparison between E10 and E15. Fuel, Volume 350. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0016236123014497?via%3Dihub.

Organization: Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC)

C. Potential Future Gasoline Fuel Property Standards

EPA also seeks comment on a potential future rulemaking to establish gasoline fuel property standards aimed at further reducing PM emissions. NESCAUM and the OTC believe that, while the proposed emissions standards for MYs 2027 and later would achieve significant air quality benefits, cleaner fuel standards would provide an important complement to the standards for new vehicles proposed in the NPRM. It is critical to address emissions from the existing vehicle fleet, as well as the millions of vehicles that will be produced during the phase-in and operative periods of the proposed standards. Accordingly, NESCAUM and the OTC support EPA exercising its authority under CAA 211(c) to develop gasoline property standards in a future rulemaking. [EPA-HQ-OAR-2022-0829-0584, p. 11]

Organization: Oryxe International Inc.

3. EPA Should Ensure that the Approach Applied to Any Future Gasoline Fuel Property Standards Harnesses the Full Benefit that Low Emission Fuel Additives Can Provide.

In the event EPA moves forward with promulgating new gasoline fuel property standards aimed at achieving additional particulate matter emission reductions, Oryxe urges EPA to establish waivers under which states desiring to mandate gasoline with lower emission properties are able to do so. Oryxe also urges EPA to provide credit to original equipment manufacturers achieving lower emission gasoline through the use of fuel additives. [EPA-HQ-OAR-2022-0829-0752, p. 4]

Additionally, Oryxe encourages EPA to move forward with a program that would base the carbon intensity of fuels on emissions performance. By setting greenhouse gas intensity standards for lifecycle emissions per unit of transport fuel energy supplied in a specific market, EPA would encourage innovation and make additional progress toward the Administration's goal of reducing emissions in the transportation sector. Emissions intensity standards are important tools for decarbonizing transport fuels that should be pursued. [EPA-HQ-OAR-2022-0829-0752, p. 4]

Organization: Pearson Fuels

During the period of harmonized CAFE and GHG crediting, the U.S. FFV fleet grew rapidly. Now, at a critical time for climate change mitigation, the U.S. FFV fleet is in dramatic decline.

On April 22, 2021, President Biden announced a “nationally determined contribution” pledge under the 2015 Paris climate agreement to cut U.S. GHG emissions in half by 2030 at a virtual climate summit attended by dozens of world leaders. In his remarks about the pledge from the White House, the President stated, “These steps will set America on a path of net zero emissions economy by no later than 2050.” Thus the President has re-established aggressive GHG reduction as a priority policy of the federal government and set a goal of carbon neutrality by 2050. While there has been a significant expansion of BEVs, internal combustion engines continue to dominate the market and roads of America and are anticipated to maintain this dominant role for the next decade and potentially longer. The following illustrative graphics were developed by the Alliance for Automotive Innovation. [EPA-HQ-OAR-2022-0829-0577, pp. 5-6]

During the period of harmonized GHG crediting, when both the GHG and CAFE programs utilized the 0.15 divisor, there was a substantial expansion of the FFV fleet peaking with the manufacture of 2.8 million total light-duty vehicles in MY 2014. The total registered fleet of FFVs in the U.S. continued to grow incrementally until 2020, but from 2015-2020 automakers sharply reduced the number of vehicle offerings. The attached Exhibit 1 developed by the Renewable Fuels Association details vehicle offerings by model and engine type and shows the massive reduction of models that occurred due to the near total elimination of light-duty GHG program crediting. During the peak period of manufacturing, Chrysler, Ford and General Motors manufactured 76 different models of FFVs. This scale of manufacturing has since been decimated with only 8 FFV models offered in 2023 with 5 of these being limited to fleet models. [EPA-HQ-OAR-2022-0829-0577, pp. 5-6]

II. EPA SHOULD TAKE THE OPPORTUNITY IN THIS RULEMAKING TO RECOGNIZE THE TRUE GHG POLICY VALUE OF FFVS BY RESTORING MEANINGFUL GHG CREDITING FOR FFVs

We encourage the Agency to re-affirm the policy value of FFVs and American ethanol production and use by restoring meaningful GHG crediting for the manufacture of FFVs by modifying the methodology for determining GHG crediting for FFVs beginning MY 2027. EPA has authority to better harmonize crediting between the GHG and CAFE standards and thereby expand FFV manufacturing through two alternative means both of which are supported by Pearson Fuels. [EPA-HQ-OAR-2022-0829-0577, p. 16]

a. EPA should re-integrate the methodology that continues to exist in the CAFE program by re-establishing its use of the 0.15 multiplier in the EPA’s GHG Standards, or,

b. EPA should establish a new GHG Emissions Factor for the GHG Standards that recognizes the lifecycle emissions reductions of E85 as compared with conventional gasoline. [EPA-HQ-OAR-2022-0829-0577, p. 16]

Crediting based on lifecycle GHG emissions reductions can be accomplished simply by establishing a GHG Emissions Factor that is based on the average GHG emissions reduction provided by ethanol as compared to petroleum gasoline on a lifecycle basis. This GHG Emissions Factor would be subject to adjustment based on a determination by Argonne National Laboratory regarding the average lifecycle emissions of U.S. used as a transportation fuel as compared to the average lifecycle emissions of the U.S. gasoline used as a transportation fuel. [EPA-HQ-OAR-2022-0829-0577, p. 16]

Organization: POET, LLC

Finally, POET strongly supports EPA's proposal to set gasoline fuel property standards to reduce particulate matter ("PM") emissions from gasoline-fueled LDVs and medium-duty vehicles.11 Bioethanol must play a major role in any future regulatory proposal. Bioethanol has been shown to significantly reduce PM and other toxic air emissions relative to alternative aromatics and other blending compounds. It will also boost octane levels in gasoline to make up for any loss in octane from standards requiring removal of certain high-boiling, heavy aromatics. Bioethanol also has the added benefit of significantly reducing lifecycle GHG emissions unlike other, carbon-intensive alternatives. EPA should propose standards that tackle two problems at once, by promoting increased bioethanol blends, such as E15, that both reduce PM emissions and help combat climate change. [EPA-HQ-OAR-2022-0829-0609, pp. 6-7]

11 See Proposed Rule at Section IX, 88 Fed. Reg. at 29397-29404.

VIII. POET Strongly Supports EPA's Suggestion in Section IX of the Proposed Rule to Institute a Future Regulatory Action to Further Limit PM Emissions from Vehicles and Nonroad Equipment.

POET strongly supports EPA's consideration of a possible future rulemaking aimed at further PM emissions reductions for vehicles and nonroad equipment.134 POET agrees with the EPA's assessment that reducing certain high-boiling compounds in gasoline could further reduce vehicle PM emissions.135 However, removing those heavy aromatic compounds will lower gasoline octane levels. To most effectively reduce tailpipe PM emissions while retaining high-octane gasoline, POET urges EPA to support a future rule that would limit the use of high-boiling compounds while encouraging those compounds to be replaced with higher bioethanol blends, such as E15. Bioethanol boosts octane while decreasing PM emissions. Bioethanol also significantly reduces lifecycle GHG emissions compared to more carbon-intensive alternative octane-boosting compounds, such as heavy aromatics.136 Bioethanol should be EPA's preferred solution because it both reduces toxic air pollutants and helps combat climate change. [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

134 88 Fed. Reg. at 29397.

135 Id. at 29398.

136 See generally Attachment 3.

In support of POET's position, POET retained Environmental Health & Engineering, Inc. ("EH&E"), who prepared a report on the potential changes to EPA gasoline fuel property and GHG standards for light- and medium-duty vehicles in the Proposed Rule, attached hereto as Attachment 3. EH&E's report confirms that heavy aromatics have significant negative impacts on PM emissions.137 The report assesses EPA's position that high boiling compounds are associated with increased tailpipe emissions, reviews the impact of removing high boiling compounds on gasoline and refineries, analyzes the suitability of EPA's Haverly model, studies the importance of octane for gasoline, and evaluates increased ethanol blending as an alternative for octane contributions in gasoline. [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

137 88 Fed. Reg. at 29398.

EH&E's report uses the particulate matter index, or "PMI," to predict the propensity of PM in various gasoline compounds. PMI values are correlated with emissions of PM: the higher a compound's PMI value, the higher the tailpipe PM emissions for gasoline containing that compound.138 Studies have found that high-boiling compounds—and particularly heavy aromatics—have significantly higher PMI values than other, lower-boiling compounds in gasoline blends.139 And while heavy aromatics are only a small portion of the compounds making up gasoline, about 2.4% of gasoline by volume, they contribute disproportionately to the PMI of gasoline, making up about 38 percent of gasoline's PMI value.140 In comparison, ethanol has proven to be the most favorable component in gasoline in terms of PMI contribution: it represents 10% of gasoline volume but contributes less than 1% to PMI.141 Because the PMI value of ethanol is so low, the PM emissions associated with gasoline blended with higher levels of ethanol are significantly lower than gasoline containing heavy aromatics.142 [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

138 Attachment 3 at 3.

139 Id. at 1, 3.

140 Id. at 6.

141 Id.

142 Id. at 3-8.

Despite the negative air quality impacts of heavy aromatics, they do serve to increase octane in gasoline. Sufficiently high octane levels are necessary for the efficient operation of vehicles with internal combustion engines.143 Specifically, octane supports high compression ratios, turbocharging, and advanced spark and valve timing and downsizing.144 If EPA moves forward with a rulemaking to limit heavy aromatics in gasoline, EPA should also identify an alternative to maintain octane levels and develop its standards with that alternative in mind. [EPA-HQ-OAR-2022-0829-0609, pp. 29-31]

143 Id. at 10-11.

144 Id. at 11.

EPA requested comment on several potential alternatives to maintain octane levels, including increasing alkylation operations, increasing isomerization production, or increasing reliance on ethanol blending.145 But increased alkylation and/or isomerization are not workable solutions. Refiners already produce alkylate and isomerized natural gas liquids at near capacity, so additional infrastructure would be required to meaningfully increase production.146 And it is unlikely that refiners will make any significant investments into alkylation/isomerization infrastructure, as the gasoline market is facing long-term decline as alternative fuel vehicles become more popular.147 [EPA-HQ-OAR-2022-0829-0609, pp. 31-32]

145 88 Fed. Reg. at 29401-02.

146 Attachment 3 at 2-3, 9.

147 Id. at 9.

POET strongly supports EPA's third proposed alternative: increasing ethanol blending, specifically bioethanol. Increasing bioethanol blending is feasible. The bioethanol industry continues to grow significantly, and trends indicate that this growth will continue. Unlike the infrastructure that supports alkylation and isomerization capacity, bioethanol production infrastructure continues to expand, providing sufficient capacity for a possible increased reliance on bioethanol to lower vehicle PM emissions. Bioethanol is also cost-effective. Edgeworth Economics assessed economic data provided by POET to compare the costs of using gasoline additives other than ethanol and determined that those alternatives would cost between $0.10 to $0.24 cents more per gallon based on prices from January 2021 through January 2022.148 Adding alkylate, for instance, costs $0.19 more per gallon than ethanol.149 [EPA-HQ-OAR-2022-0829-0609, pp. 31-32]

148 EPA Docket No. EPA-HQ-OAR-2021-0427, comment submitted by POET LLC at 22.

149 Id.

As we have discussed above, bioethanol has a significantly lower PMI value than heavy aromatics. Bioethanol also contributes significantly to octane in gasoline. Increasing ethanol blending from E10 to E15 would more than make up for the octane loss related to reducing heavy aromatics in gasoline.150 Using bioethanol blending as a replacement would significantly reduce the PMI beyond the reductions that would be realized simply by imposing the potential PM emissions standards.151[EPA-HQ-OAR-2022-0829-0609, pp. 31-32]

150 Attachment 3 at 10.

151 Id. at 10, 12-18.

Organization: Reginald Modlin and B. Reid Detchon

2. Aromatics

a. Aromatics are hydrocarbons built around one or more benzene rings. Often referred to by the acronym BTEX, they include not just benzene itself, a known carcinogen, but also toluene, ethylbenzene, xylenes, and other compounds similar to benzene in their behavior in the environment. People are exposed to BTEX primarily through emissions from motor vehicles and cigarette smoke. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

8 Emma P. Popek, "Environmental Chemical Pollutants" in Sampling and Analysis of Environmental Chemical Pollutants (second edition), Elsevier (2018), p. 36: https://www.sciencedirect.com/science/article/pii/B9780128032022000021 (accessed Feb. 24, 2021).

9 Queensland (Australia) Department of Environment and Science, "BTEX chemicals": https://environment.des.qld.gov.au/management/activities/non-mining/fraccing/btex-chemicals (accessed Feb. 24, 2021).

b. Aromatics are derived from petroleum during the refining process and blended into gasoline to increase octane. Their use increased dramatically during the 1980s when the previously used additive, tetraethyl lead, was phased out due to health concerns. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

10 Francesca Lyman, “The Gassing of America,” in The Washington Post, April 13, 1990: https://www.washingtonpost.com/archive/lifestyle/1990/04/13/the-gassing-of-america/bce94f4d-c8a1-47e5-8c9c-d0a6befd8b80/ (accessed Feb. 24, 2021).

11 U.S. Environmental Protection Agency, “Examples of Successful Lead Phaseouts: United States,” in Implementer’s Guide to Phasing Out Lead in Gasoline (1999), pp. 10-11: https://archive.epa.gov/international/air/web/pdf/epa_phase_out.pdf (accessed Feb. 24, 2021).

i. Octane is needed in gasoline to prevent premature combustion of the fuel mixture (“knock”), which can damage engines. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

12 “Engine knocking,” in Wikipedia: https://en.wikipedia.org/wiki/Engine_knocking (accessed Feb. 24, 2021).

ii. The level of aromatics in gasoline is capped at 25% in regions required to use reformulated gasoline (areas that have high levels of ozone pollution, roughly 30% of the U.S. market). On average, aromatics comprise 20% of the gasoline sold in the U.S. Levels elsewhere (e.g., in Europe and China) have been as high as 40%, worsening air pollution and public health in those regions. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

13 42 U.S. Code, sec.?7545, “Regulation of fuels,” at (k)(3)(A)(ii): P.L. 101-549, sec. 219, enacted Nov. 15, 1990: https://www.law.cornell.edu/uscode/text/42/7545 (accessed June 17, 2021).

14 U.S. Environmental Protection Agency, “Fuel Trends Report: Gasoline 2006 - 2016” (2017), Table 6: Summary of Annual Average Gasoline Properties Between 1997 and 2016: EPA-420-R-17-005: p. 27: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100T5J6.pdf (accessed Feb. 24, 2021).

15 Guiqian Tang et al., “Organic composition of gasoline and its potential effects on air pollution in North China,” Science China: Chemistry (2015): 58(9): pp. 1416-25: http://engine.scichina.com/publisher/scp/journal/SCC/58/9/10.1007/s11426-015-5464-0?slug=abstract (accessed Feb. 24, 2021).

iii. In the decade from 1997 to 2006, aromatics made up roughly 25% of the U.S. gasoline pool. That level fell to 20% over the next 10 years as ethanol’s share of the market rose from 3% to nearly 10%. This 20% level equates to 25.3 billion gallons of aromatics used in cars and light trucks per year. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

16 U.S. EPA, “Fuel Trends Report,” op. cit., supra note 14.

17 U.S. Energy Information Administration, “Gasoline explained – use of gasoline”, online fact sheet: “Light-duty vehicles (cars, sport utility vehicles, and small trucks) account for about 92% of all gasoline consumption in the United States”: https://www.eia.gov/energyexplained/gasoline/use-of-gasoline.php (accessed Feb. 24, 2021). EIA projects gasoline use in 2021 to total 137.5 billion gallons, or 126.5 billion gallons for light-duty vehicles: U.S. Energy Information Administration, “Annual Energy Outlook 2021,” Table 11. Petroleum and Other Liquids Supply and Disposition (Reference case): https://www.eia.gov/outlooks/aeo/data/browser/#/?id=11-AEO2021®ion=0-0&cases=ref2021&start=2019&end=2050&f=A&linechart=ref2021-d113020a.3-11-AEO2021&chartindexed=0&sourcekey=0 (accessed Feb. 24, 2021).

iv. Aromatics have a much higher ratio of carbon to hydrogen than other typical hydrocarbons do, driving up the carbon content of gasoline and producing higher greenhouse gas emissions. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

18 U.S. Energy Information Administration, “Emissions of Greenhouse Gases in the United States 1987-1994” (1995), DOE/EIA-0573(87-94), p. 77: https://www.osti.gov/servlets/purl/122288 (accessed Feb. 24, 2021).

v. Aromatics contribute about 10% of global anthropogenic emissions of non-methane organic gases (NMOG), the major source being car exhaust from gasoline-powered vehicles. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

19 I. Barnes and K.H. Becker, “Aromatic Hydrocarbons,” in Tropospheric Chemistry and Composition, Encyclopedia of Atmospheric Sciences (2003): p. 2376: https://www.sciencedirect.com/science/article/pii/B0122270908004243 (accessed Feb. 24, 2021).

vi. Aromatics are also responsible for an estimated 30-40% of the ozone and other photooxidants in urban atmospheres, making them the most important class of hydrocarbons with regard to photochemical ozone formation. [EPA-HQ-OAR-2022-0829-0570, pp. 7-8]

20 Ibid

c. The BTEX chemicals are characterized as hazardous air pollutants “known or suspected to cause cancer or other serious health or environmental effects.” They are identified as mobile source air toxics and formed in four ways, of which the first two are most pertinent. According to EPA: [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

21 U.S. Environmental Protection Agency, “What are Hazardous Air Pollutants?”, online fact sheet: https://www.epa.gov/haps/what-are-hazardous-air-pollutants (accessed Aug. 29, 2021).

22 U.S. Environmental Protection Agency, “Control of Emissions of Hazardous Air Pollutants from Mobile Sources; Final Rule,” Federal Register (2001): 66(61): pp. 17235-39: https://www.govinfo.gov/content/pkg/FR-2001-03-29/pdf/01-37.pdf (accessed Feb. 24, 2021).

i. “First, some air toxics are present in fuel and are emitted to the air when it evaporates or passes through the engine as unburned fuel. Benzene, for example, is a component of gasoline. Cars emit small quantities of benzene in unburned fuel, or as vapor when gasoline evaporates. [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

ii. “Second, mobile source air toxics are formed through engine combustion processes. A significant amount of automotive benzene comes from the incomplete combustion of compounds in gasoline such as toluene and xylene that are chemically very similar to benzene.” (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

d. According to a review of the literature by a Health Effects Institute panel, “It is estimated that about 50% of the benzene produced in the exhaust is the result of decomposition of aromatic hydrocarbons in the fuel. … [Two] studies showed that lowering aromatic levels in gasoline significantly reduces toxic benzene emissions from vehicle exhausts.” [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

23 Health Effects Institute, Panel on the Health Effects of Traffic-Related Air Pollution, “Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects” (Special Report 17): Chapter 2, “Emissions from Motor Vehicles,” Appendix B: “Fuel Composition Changes Related To Emission Controls” (2010): pp. 3-4: https://www.healtheffects.org/system/files/SR17TrafficReviewChapter2AppendixB.pdf (accessed Aug. 24, 2021).

e. Gasoline-powered vehicles accounted for 69% of all U.S. emissions of single-ring aromatic hydrocarbons, based on source-specific speciation in the 2005 National Emissions Inventory. [EPA-HQ-OAR-2022-0829-0570, pp. 8-9]

24 Katherine von Stackelberg et al., "Public health impacts of secondary particulate formation from aromatic hydrocarbons in gasoline," Table 3, National emissions inventory of single-ring aromatic hydrocarbons, Environmental Health (2013): 12(19): https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-12-19/tables/3 in https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-12-19 (accessed Feb. 24, 2021).

6. EPA's modeling – Part 1

a. EPA has long acknowledged its modeling shortcomings in this area. Noting that "SOA continues to be a significant topic of research and investigation," it said in 2005: "Despite significant progress that has been made in understanding the origins and properties of SOA, it remains the least understood component of PM2.5." [EPA-HQ-OAR-2022-0829-0570, pp. 21-22]

106 U.S. Environmental Protection Agency, "Proposed Rule To Implement the Fine Particle National Ambient Air Quality Standards," Federal Register (2005): 70(210): p. 65997: https://www.govinfo.gov/content/pkg/FR-2005-11-01/pdf/05-20455.pdf (accessed Feb. 24, 2021).

i. Atmospheric models have been found to underestimate SOA emissions by an order of magnitude or more when applied in and downwind of urban areas/polluted regions. (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 21-22]

107 Q. Zhang et al., "Ubiquity and dominance of oxygenated species in organic aerosols in anthropogenically?influenced Northern Hemisphere midlatitudes," Geophysical Research Letters (2007): 34(13), L13801: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2007GL029979 (accessed Feb. 24, 2021).

108 Allen H. Goldstein and Ian E. Galbally, "Known and Unexplored Organic Constituents in the Earth's Atmosphere," Environmental Science & Technology (2007): 41(5): pp. 1515-21: https://pubs.acs.org/doi/10.1021/es072476p (accessed Feb. 24, 2021).

b. EPA's summary of a 2015 workshop on UFPs contained this admission, based on the PNNL research described above, unpacking the implications of its knowledge gap: [EPA-HQ-OAR-2022-0829-0570, pp. 21-22]

i. "[SOA] particles play an important role in air quality but for many years available atmospheric models were not able to predict SOA formation. The main issue was the fact that: all models relied on the assumptions that SOA particles were well-mixed low viscosity solutions and maintained equilibrium with the gas-phase by rapid mixing in the condensed phase with evaporation and condensation. Recent studies using the multidimensional characterization approach demonstrated that these assumptions were wrong and that SOA particles must be viscous semi-solid. These studies showed also that there is a synergetic effect between PAHs and SOA since PAHs trapped inside the SOA particles slow down SOA evaporation and increase SOA yield and lifetime. This can explain the long-range transport of toxic compounds like PAHs and other persistent pollutants. In conclusion, a new SOA paradigm has been developed." (emphasis added) [EPA-HQ-OAR-2022-0829-0570, pp. 21-22]

109 Richard W. Baldauf et al., "Ultrafine Particle Metrics and Research Considerations: Review of the 2015 UFP Workshop," International Journal of Environmental Research and Public Health (2016): 13(11):

p. 13: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5129264/pdf/ijerph-13-01054.pdf (accessed Feb. 24, 2021).

- Note: The modeling that EPA has used to assess and regulate SOA emissions was thus based on erroneous assumptions and completely missed the scale of the problem. The significance of this failure is heightened by the finding in the 2011 National Air Toxics Assessment that secondary formation is the largest contributor of all sources to cancer risks nationwide, accounting for 47% of the risk. [EPA-HQ-OAR-2022-0829-0570, pp. 21-22]

110 U.S. EPA, “Overview of EPA’s 2011 National Air Toxics Assessment,” op. cit., supra note 66.

Organization: Renewable Fuels Association (RFA)

XI. Potential Fuel Property Controls to Address Particulate Matter Emissions

EPA’s proposed rule requests comment on “potential future gasoline fuel property standards aimed at further reducing PM emissions, for consideration in a possible subsequent rulemaking.” A major advantage of fuel property standards is that they can reduce emissions from all vehicles on the road today – not just new vehicles. Therefore, emissions benefits can be achieved much more quickly than with standards that only apply to new vehicles. [EPA-HQ-OAR-2022-0829-0602, pp. 21-22]

It is well established that particulate (PM) emissions are a strong function of aromatic fuel components with a high double bond equivalent value and low vapor pressure, and the particulate forming potential is accurately represented by the “PMI” metric developed by Honda.44 The PMI metric has been validated in many other studies, including from the joint auto-oil Coordinating Research Council45 and the EPA.46 [EPA-HQ-OAR-2022-0829-0602, pp. 21-22]

44 Aikawa, Sakurai, and Jetter, "Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions", SAE paper 2010-01-2115, 2010; https://doi.org/10.4271/2010-01-2115.

45 Coordinating Research Council, "Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles," Report No. E-94-2, March 2016; http://crcsite.wpengine.com/wp- content/uploads/2019/05/CRC_2017-3-21_03-20955_E94-2FinalReport-Rev1b.pdf

46 US Environmental Protection Agency, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources", report EPA-420-R-23-008, April 2023.

PMI and particulate emissions can be decreased by altering refinery processes to reduce the heavy aromatic content of the fuel. As EPA recognizes, reducing heavy aromatics typically requires other refinery changes in order to achieve fuel octane requirements, and those changes generally increase cost and the energy intensity of refining. As an alternative, larger volumes of ethanol can be added to the fuel, which simultaneously reduces PMI and increases octane. [EPA-HQ-OAR-2022-0829-0602, pp. 21-22]

Emissions studies that use “splash blends” (i.e., a constant hydrocarbon base fuel blended with varying levels of ethanol), invariably show lower PM emissions with higher ethanol content. Studies which use “match blends” sometimes show higher PM emissions with higher ethanol content, because the hydrocarbon portion of the fuel was modified in an attempt to hold other properties (such as distillation curve) constant.47 Perhaps the most credible and comprehensive study on this topic was recently published by the University of California Center for Environmental Research and Technology,48 showing statistically significant 16-54% reductions in PM emissions for E15 (15% ethanol) compared to E10 (10% ethanol). [EPA-HQ-OAR-2022-0829-0602, pp. 21-22]

47 Anderson, Wallington, Stein, and Studzinski, "Issues with T50 and T90 as Match Criteria for Ethanol-Gasoline Blends", SAE paper 2014-01-9080, 2014, https://doi.org/10.4271/2014-01-9080

48 Tang et al., "Expanding the ethanol blend wall in California: Emissions comparison between E10 and E15", Fuel, June 2023; https://doi.org/10.1016/j.fuel.2023.128836

Via a future rulemaking, EPA should adopt standards to limit PMI of both finished fuels and the hydrocarbon blendstocks used for E10, E15, and other ethanol blends. Limiting PMI of hydrocarbon blendstocks will ensure that the particulate emissions benefits of ethanol are not offset by negative changes at refineries. The standards should also be designed to incentivize improved pipeline practices to minimize contamination of gasoline with diesel and jet fuel. Alternatively, EPA could consider instituting a volumetric cap (per gallon of gasoline) on the allowable content of the heavy aromatics most closely linked to PM formation. [EPA-HQ-OAR-2022-0829-0602, pp. 21-22]

Improved fuel property standards should be a high priority because they can achieve significantly lower particulate emissions and dramatically lower GHG emissions. As EPA considers undertaking future rulemaking to address fuel properties, RFA strongly encourages the Agency to include a higher minimum octane standard (e.g., 95-98 RON) as part of the discussion. [EPA-HQ-OAR-2022-0829-0602, pp. 21-22]

High-octane low-carbon fuels are a key enabler for continued GHG emissions improvements in the tens of millions of liquid-fueled vehicles that will be produced in the decades ahead, as documented by the U.S. Department of Energy Co-Optimization of Fuels & Engines initiative49 and in numerous other studies, e.g. by MIT50 and by automakers.51 A detailed blueprint for a future high-octane low-carbon fuel program exists in the Next Generation Fuels Act, and EPA has the statutory authority to make these changes without waiting for Congress to act. [EPA-HQ-OAR-2022-0829-0602, pp. 21-22]

49 Farrell, Wagner, Gaspar and Moen, "Co-Optimization of Fuels & Engines: 2018 Year in Review", https://www.energy.gov/sites/prod/files/2019/06/f64/Co-Optima_YIR2018_FINAL_LOWRES%20190619_0.pdf.

50 Speth et al., "Economic and Environmental Benefits of Higher-Octane Gasoline", Environ. Sci. Technol., 2014, https://doi.org/10.1021/es405557p.

51 Leone et al., "The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark-Ignition Engine Efficiency", Environ. Sci. Technol., 2015, https://doi.org/10.1021/acs.est.5b01420.

Organization: Satya Consultores

As EPA notes in the rule preamble, the International Agency for Research on Cancer has recently concluded that diesel exhaust is “carcinogenic to humans.” 88 Fed. Reg. at 29216. [EPA-HQ-OAR-2022-0829-0687, pp. 1-2]

Accordingly, EPA also should evaluate the feasibility of further PM2.5 and NOX reductions from new diesel fuel standards in a future fuel-controls rulemaking. [EPA-HQ-OAR-2022-0829-0687, pp. 1-2]

Below we share information about Satya's Dispersive Energy Process ("DEP"), which can achieve further significant emissions reductions of PM2.5 and NOX when used to modify ultra-low sulfur diesel fuel, bypassing the trade-off that usually exists when controlling for these two pollutants. The emissions reductions can be accomplished at a reasonable cost, without compromising the calorific value of the improved, less-polluting diesel fuel. [EPA-HQ-OAR-2022-0829-0687, pp. 1-2]

Satya began its DEP work with the goal of solving the tradeoff between reducing diesel soot and NOX emissions. At higher temperatures, diesel engines achieve more complete combustion, and emit less soot and other fine particulate matter as a result. However, under these conditions NOX emissions increase. In turn, lower engine temperatures result in lower NOX emissions but cause soot emissions to increase. This tradeoff is well known among fuel scientists.1 Both pollutants have significant adverse environmental impacts and health effects. [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

Satya's DEP resolves this conundrum. We call the resulting fuel "Next Diesel." [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

1 See, e.g., Narayan et al., Combustion Monitoring in Engines Using Accelerometer Signals, J. VIBROENGINEERING, Sep. 2019, at 4; Tie Li & Hideyuki Ogawa, Analysis of the Trade-Off between Soot and Nitrogen Oxides in Diesel- Like Combustion by Chemical Kinetic Calculation.

In DEP, two proprietary additives are mixed into the diesel fuel. The first additive ("A1") is an ethoxylated fatty acid ester, made with a mixture of stearic and palmitic acid esters of sorbitol and its mono- and dianhydrides. The second additive ("A2") is a complex water-based blend of aromatic solvents with methyl radicals mixed with ethoxylated phenol-derived surfactants. [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

Diesel fuel flows from a tank at the end of the refining process in a continuous stream through piping to a Shock Wave Power Reactor. En route, A1 is metered into the diesel fuel stream via a Progressive Cavity Injection Pump, and the combination is blended using a static mixer. Once the fuel/A1 mixture is homogenous, A2 is metered in, and that combination is blended in a second static mixer. The resulting diesel fuel/A1/A2 mixture then flows into the Shock Wave Power Reactor where it is subjected to controlled cavitation, a process which creates vapor bubbles in the fuel mixture. As a liquid passes through the SPR it is subjected to "controlled cavitation." The heart of the reactor is a specially designed rotor. The spinning action generates hydrodynamic cavitation in the rotor cavities away from the rotor to prevent damage to metal surfaces. As microscopic cavitation bubbles are produced and collapse, shockwaves are given off into the liquid which can heat and/or mix.2 [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

2 Hydro Dynamics, Inc. (n.d.). Retrieved from Harnessing the Power of Cavitation: https://www.hydrodynamics.com/cavitation-technology/.

The resulting diesel fuel exhibits improved properties, including significantly improved ignition characteristics. Its electrical conductivity is more than 1,000 times greater than regular diesel fuel, and the lubricity value is more than 100 times greater. These and other upgraded properties of Next Diesel enable more complete fuel combustion, which in turn results in less soot production and also reduces NOX emissions. The corresponding loss of fuel power, if any, is negligible. [EPA-HQ-OAR-2022-0829-0687, pp. 2-3]

As EPA notes in Section IX of the preamble, fuel controls would address a large category of air pollutants that the current proposal would not touch: emissions from the existing vehicle fleet. 88 Fed. Reg. at 29397. The preamble discussion considers potential standards that would limit the amounts of heavy aromatics in gasoline by reducing T90 [4] temperatures and limiting the production of gasoline with a PM Index ("PMI")5 greater than 2. Diesel fuel controls would be just as important and impactful to achieve further reductions in soot emissions. Importantly, Next Diesel can significantly reduce soot emissions and lower the PMI of diesel fuel without modifying the distillation curve or lowering T90 values. EPA proposed a lower primary annual PM2.5 ambient air quality standard in January 2023. See 88 Fed. Reg. 5558 (January 27, 2023). [EPA-HQ-OAR-2022-0829-0687, p. 6]

4 88 Fed. Reg. at 29398 ("The T90 parameter refers to the temperature at which 90 volume percent of the gasoline sample has been distilled.").

5 Id. ("The PM Index (PMI) parameter, first described in a 2010 publication, combines detailed fuel composition data (from ASTM D6730) with volatility and structural characteristics for all compounds identified in the fuel to predict its relative propensity to form PM.").

Further, the air quality benefits of diesel fuel controls would extend beyond highway vehicles to the many existing non-road diesel engines, including locomotives. See 88 Fed. Reg. at 29210 (nonroad diesel engines are generally older technology and more polluting). The PM in diesel exhaust consists principally of particles less than 2.5 micrograms, mostly soot, which are most damaging to human health. 88 Fed. Reg. at 29210. As EPA notes in the preamble, "[t]hese particles have a large surface area which makes them an excellent medium for adsorbing organics and their small size makes them highly respirable." Id. In other words, the particles themselves are dangerous, and they transport mutagenic and carcinogenic organics from diesel into the body as well. [EPA-HQ-OAR-2022-0829-0687, pp. 6-7]

Diesel engine emissions, especially emissions from existing vehicles, medium- and heavy-duty vehicles, and nonroad engines, can be effectively addressed with DEP and Next Diesel. Satya continues to develop the technology and to look for opportunities to demonstrate its effectiveness in reducing diesel soot and NOX emissions on a large scale [EPA-HQ-OAR-2022-0829-0687, pp. 6-7]

Organization: Southern Environmental Law Center (SELC)

EPA is also proposing that BEVs and fuel cell electric vehicles (FCEVs)—i.e., vehicles with no internal combustion—retain a zero gram per mile (g/mi) compliance value and not be required to account for upstream emissions under the GHG standards.69 This aligns with the standards' treatment of other, fossil fuel-powered vehicles. Even though this regulatory regime deals specifically with tailpipe emissions, EPA should not lose sight of the upstream GHG or other emissions associated with light- and medium-duty vehicles—ZEVs or otherwise. We therefore support EPA's consideration of future gasoline fuel property standards that could provide additional meaningful reductions in PM emissions.70 However, even more could be done. Some states, for example, are leading the way by implementing low carbon fuel standards that consider lifecycle GHG emissions from energy used for fuel.71 [EPA-HQ-OAR-2022-0829-0591, p. 9]

69 Id.

70 See id. at 29197.

71 See, e.g., KELSI BRACMORT, CONG. RSCH. SERV., R46835, A LOW CARBON FUEL STANDARD: IN BRIEF 2 (2021), https://sgp.fas.org/crs/misc/R46835.pdf.

Organization: Valero Energy Corporation

VI. EPA should not limit heavy aromatics in gasoline.

EPA has requested comments on a possible future rulemaking aimed at further particulate matter (PM) emission reductions from the current population of vehicles and nonroad equipment via the introduction of gasoline fuel property standards aimed at reducing heavy aromatics. [EPA-HQ-OAR-2022-0829-0707, pp. 92-94]

As EPA stated, "[i]f heavy aromatics were to be removed from gasoline, then not only their volume, but their octane would have to be replaced."371 The high- octane properties of heavy aromatics make them an excellent gasoline blending component as they improve engine performance and fuel economy. Using heavy aromatics in gasoline blending is superior to their likely alternate disposition in the diesel pool. The low cetane properties of heavy aromatics make them detrimental to diesel engine efficiency and therefore a poor diesel fuel component. [EPA-HQ-OAR-2022-0829-0707, pp. 92-94]

371 88 Fed. Reg. 29404, 29401 (May 5, 2023).

Thus, introducing a rule that limits heavy aromatics in gasoline may have the unintended consequence of increasing diesel engine PM emissions due to less efficient combustion of lower cetane fuel. Replacing the volume and octane loss from the removal of heavy aromatics from gasoline would require capital projects and operational changes that would increase emissions from refinery stationary sources and would increase emissions from the transportation of components between refineries. Because this potential rulemaking would not reduce emissions when viewed holistically, EPA should refrain from proposing limits on heavy aromatics in gasoline. [EPA-HQ-OAR-2022-0829-0707, pp. 92-94]

Furthermore, EPA's discussion of a potential future rulemaking is entirely premised on "the ability to use high boiling point as a surrogate for heavy aromatic content."372 Although we agree there is some degree of correlation, with some high boiling point components containing heavy aromatics, that is not always the case. Using high boiling point as a surrogate would require removal of high boiling point components indiscriminately, including removal of clean-burning components that do not contribute to tailpipe PM emissions. We therefore disagree with the use of high boiling point as a surrogate for heavy aromatics. If a limit is proposed, it should be proposed on heavy aromatics specifically (i.e., C10+ polycyclic aromatics). [EPA-HQ-OAR-2022-0829-0707, pp. 92-94]

372 Id. at 29398.

Before EPA proposes any new gasoline standard aimed at reducing heavy aromatics, however, CAA § 211(c) requires EPA to consider technologically and economically feasible alternatives. Further, significant additional analysis is needed to understand the impacts of such a rule on refineries, gasoline and diesel fuel properties, gasoline and diesel engine exhaust emissions, fuel supply market dynamics, consumer impacts, and other emissions impacts, including potential increases in stationary source emissions and emissions from transportation of components between refineries. EPA presented oversimplified options for volume and octane replacement that are unrealistic. In reality, such a limit may require significant capital investments at some refineries, significantly impact refinery operations, lead to closure of disadvantaged refineries, exacerbate supply disruptions, increase costs to consumers, and may even increase emissions in the aggregate. [EPA-HQ-OAR-2022-0829-0707, pp. 92-94]

A. At a Minimum, CAA Section 211(c) Requires that EPA Consider Other Technologically or Economically Feasible Means of Achieving Emissions Standards.

We agree that “EPA has not undertaken sufficient analysis to propose changes to fuel requirements under CAA section 211(c) in this rulemaking.”373 We also agree that CAA section 211(c) requires EPA “to consider other technologically or economically feasible means of achieving emissions standards under section 202” before introducing a new fuel standard.374 However, we do not agree that limiting the heavy aromatic content of gasoline is the only “practical means of significantly reducing PM emissions from the existing fleet.”375 EPA must consider other options as required by CAA Section 211(c). [EPA-HQ-OAR-2022-0829-0707, pp. 92-94]

373 Id. at 29397.

374 Id. at 29402.

375 Id.

Just a few examples of additional options for PM reductions that warrant review before proposing a limit on heavy aromatics in gasoline include vehicle hardware options (potential retrofits to existing gasoline vehicles and non-road engines such as modern fuel injection and combustion management); reducing PM emissions from brake, tire, and road wear (improvements here would be especially impactful for electric vehicle emission control376); fuel additives to improve combustion; and other ways to improve fuel economy which would result in lower PM emissions, such as a 95 RON octane standard. The results of a cost-benefit analysis of technologically or economically feasible options should inform any future rulemaking. [EPA-HQ-OAR-2022-0829-0707, pp. 92-94]

376 EVs tend to be heavier than internal combustion engine vehicles (ICEVs) due to battery weight. Heavier EVs yield higher PM emissions from increased brake, tire, and road wear. Roadway dust emissions which include particles from tire wear are correlated with vehicle weight, so increases in vehicle weight would be expected to increase roadway dust PM2.5 emissions. EPA, Emissions Factor Documentation for AP-42 (Dec. 31, 2003) available at https://www3.epa.gov/ttn/chief/old/ap42/ch13/s021/final/c13s0201.pdf.

B. If a Limit Aimed at Reducing Heavy Aromatics in Gasoline is Proposed, it Should be on Heavy Aromatics Directly (not on High Boiling Point as a Surrogate and not on Total Aromatics).

1. Limiting High Boiling Point Would Cut Out Clean-Burning Gasoline Components for No Environmental Benefit.

High boiling point is not always correlated with heavy aromatic content; limiting it without consideration to actual aromatic content would lead to gasoline volume and octane loss and higher prices to consumers with limited corresponding environmental benefit. There would be no environmental benefit from the removal of gasoline blend components such as iso-octene, iso-octane, and alkylate made from heavier olefins, as these components have high boiling points but contain no aromatics. Alkylation units typically have a debutanizer make a low Reid Vapor Pressure (RVP) gasoline blending component, but they seldom have subsequent fractionation that could split out the heavy portion of the alkylate. To do so would require significant capital investment, for no environmental benefit – to the contrary, stationary source emissions would increase due to additional processing and fractionation. Establishing limits solely on end point and not considering heavy aromatic levels would prevent refineries from using heavy, clean-burning, high octane alkylate as a gasoline blend component. The extent of the impact depends on what specific limit EPA may propose on high boiling point. [EPA-HQ-OAR-2022-0829-0707, pp. 94-95]

If EPA proposes a limit based on high boiling point, at a minimum, there should be an alternative compliance option based on heavy aromatics to allow refineries to continue to blend clean-burning high boiling point components into gasoline. Such an approach would be similar to flexibilities provided for jet fuel PM and aromatics defined in ASTM D1655 – Standard Specification for Aviation Turbine Fuels and to flexibilities provided for diesel fuel cetane index and aromatics in ASTM D975 – Standard Specification for Diesel Fuel. [EPA-HQ-OAR-2022-0829-0707, pp. 94-95]

2. Limiting Total Aromatics Would Limit Production of Premium Gasoline for Minimal Environmental Benefit.

If a rule aimed at reducing heavy aromatics is proposed, it should only limit heavy aromatics, not total aromatics. A total aromatic limit may limit production of premium gasoline with minimal benefits in terms of emissions reduction and air quality improvement. Premium gasolines often require higher aromatic content to meet high octane requirements. This is especially true during summer months when high octane/high RVP blendstock components like butane and isobutane must be used in lower concentrations due to stringent RVP limitations. Aromatics provide high octane/low RVP material for blending. [EPA-HQ-OAR-2022-0829-0707, pp. 94-95]

If a limit is proposed, EPA may want to consider specifically limiting C10+ heavy aromatics such as naphthalenes, which are more likely to result in tailpipe PM emissions. Lighter, monocyclic aromatics such as toluene and xylene provide significant octane (100+) while remaining below 2 psi RVP. These compounds contribute less to tailpipe PM emissions in comparison with heavier polycyclic compounds such as naphthalenes and its derivatives. Limiting only heavy aromatics (e.g., naphthalenes) would still allow blending of lighter monocyclic aromatics (xylene/toluene) which would assist in curtailing major production decreases and price increases for premium gasolines. [EPA-HQ-OAR-2022-0829-0707, pp. 94-95]

C. The Gasoline Pool is the Ideal Location for High Boiling Point Aromatics when Compared to the Environmental Impacts of Shifting them to the Diesel Pool.

A new limit on heavy aromatics in gasoline would likely result in shifting heavy aromatics out of the gasoline pool and into the diesel pool. Diesel engine performance improves with increases in diesel fuel cetane. However, heavy aromatics are low in cetane. Such a shift would therefore result in increased PM emissions from less efficient combustion of low cetane heavy aromatics in diesel engines. These aromatics would not be shifted into jet fuel due to smoke test requirements. Overall, heavy aromatics are a misfit for their alternate dispositions in diesel and jet engines. [EPA-HQ-OAR-2022-0829-0707, pp. 94-95]

1. A Limit Aimed at Reducing Heavy Aromatics in Gasoline would Shift Heavy Aromatics into Diesel Fuel.

EPA's analysis must consider the alternate disposition of the molecules being discussed. There are three main sources for aromatics in gasoline: fluid catalytic cracking (FCC) gasolines, reformate, and hydrocracker naphtha. As discussed below, adjustments to each of these streams that would likely be made in response to a rulemaking aimed at limiting heavy aromatics in gasoline would shift heavy aromatics out of gasoline into diesel fuel. [EPA-HQ-OAR-2022-0829-0707, pp. 95-96]

The aromatics in the swing heavy FCC gasoline are an inherent result of cracking gas oil. The swing cut is either hydrotreated for sulfur and blended into gasoline or it is routed into a distillate hydrotreater. Typical distillate hydrotreaters do very little aromatics saturation. Thus, swinging the endpoint of FCC gasoline to keep heavy aromatics out of gasoline simply shifts aromatics into diesel, to the extent permitted while continuing to comply with diesel fuel aromatics specifications (total and/or on polycyclic aromatics, depending on market). [EPA-HQ-OAR-2022-0829-0707, pp. 95-96]

To reduce the high boiling point aromatics in reformate, refiners would reduce the endpoint of heavy naphtha feeding the reformer in the upstream crude unit, coker, and/or hydrocracker fractionators. These heavy naphtha swing cuts are a mix of paraffins, naphthenes, and aromatics. Straight run naphtha from light crude may be 40% naphthene and aromatic (N+A). Coker and hydrocracker naphtha streams are typically even higher in N+A content. The net result is shifting naphthenes and aromatics from gasoline into diesel. [EPA-HQ-OAR-2022-0829-0707, pp. 95-96]

Some refiners further reform hydrocracker naphtha. Many refiners currently blend hydrocracker naphtha with high aromatics directly into gasoline. Such refiners would reduce the cutpoint of the hydrocracker naphtha stream to address a high boiling point aromatics limit, shifting those aromatics into the diesel pool. [EPA-HQ-OAR-2022-0829-0707, pp. 95-96]

Jet fuel is not a suitable alternate disposition for heavy aromatics due to the requirement to pass a smoke test. [EPA-HQ-OAR-2022-0829-0707, pp. 95-96]

2. Shifting Heavy Aromatics into Diesel Fuel Would Increase PM Emissions from Diesel Engines.

Given the likely result of shifting heavy aromatics out of the gasoline pool into the distillate pool described above, EPA should consider what impacts this possible future rulemaking would have on diesel engine tailpipe PM. Limiting the heavy aromatic content of gasoline may actually increase PM emissions overall when considering the impact to the distillate pool. Spark ignition gasoline engines provide more efficient combustion of aromatics than a diesel combustion cycle. Heavy aromatics are low cetane; swinging them into diesel will directionally diminish the effectiveness of the PM controls on diesel engines. [EPA-HQ-OAR-2022-0829-0707, pp. 95-96]

The potential future rulemaking under discussion may result in an increase in diesel engine tailpipe PM emissions, greater than the reduction achievable by limiting heavy aromatics in gasoline fuel, which would be contrary to the purpose of the rule. As such, EPA should refrain from proposing limits aimed at reducing heavy aromatics in gasoline. [EPA-HQ-OAR-2022-0829-0707, pp. 95-96]

D. EPA's Analysis of Impacts to the U.S. Gasoline Market and Refiners' Ability to Replace Volume and Octane is Oversimplified and Unrealistic.

The refining industry has notably less capacity to simply replace octane barrels and shift more production to the export market than EPA's broad statements suggest. Some of the mechanisms identified by EPA that may help with octane replacement are not feasible, or may only be feasible at certain refineries, or may only be feasible with significant capital investments, higher energy consumption, and increased emissions from sources other than the vehicle tailpipes targeted by this potential rulemaking. Refiners' ability to replace octane and export more products that are no longer appropriate for the U.S. market vary by refinery, with inland refineries generally at a disadvantage as they are typically configured to be in balance with little or no intermediate purchases or sales. The cost to make up gasoline volume and octane while continuing to comply with gasoline RVP limits could result in significant increases in prices consumers pay at the pump and could potentially result in refinery shutdowns and exacerbate supply disruptions. [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

1. EPA's Predictions of How Refinery Production Will Shift with Shifting

U.S. Market Demand Miss the Mark.

EPA has predicted that a new limit aimed at reducing heavy aromatics in gasoline will cause the gasoline-to-distillate ratio (GDR) to continue to shift downwards over the coming decades.377 Because a decreasing GDR is associated with a decrease in the T90 level of gasoline, EPA has predicted that "[t]o the extent that U.S. refinery production shifts along with U.S. market demand, then the T90 level of gasoline would be expected to continue to decline in the future as well."378 EPA has also noted a relationship of these changes with the export market, and assumed refiners will "maintain or expand export markets as much as possible."379 [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

377 88 Fed. Reg. 29404, 29400 (May 5, 2023).

378 Id.

379 Id.

These predictions rely on the false assumption that these barrels can simply be shifted from the gasoline pool to the distillate pool with little consequence, and that any excess distillate barrels can simply be exported. In reality, for some refineries, market size is fixed (e.g., for land-locked refineries), as the capacity to move barrels into and out of a region is limited. Any notable shift in products for a refinery with limited to no ability to export products could mean notable investment to find a new home for additional distillate and could create a short supply for gasoline. Furthermore, in some cases, the distillate pool cannot absorb these barrels and continue to meet fuel specifications such as flash, cetane, aromatics, and jet smoke. In other cases, refineries are running against physical and permitting limits that prevent them from further shifting to the distillate pool today; significant capital investments would be needed to shift these molecules through diesel hydrotreating units. [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

Refinery shutdowns and exacerbated supply disruptions are a more likely outcome of a new gasoline standard aimed at removing heavy aromatics from gasoline than EPA's prediction that the industry will simply seeing a decreasing GDR and a decline in the T90 of gasoline over time. [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

2. Low RVP Replacement Costs Must be Considered.

We agree that "[i]f heavy aromatics were to be removed from gasoline, then not only their volume, but their octane would have to be replaced."380 Additionally, their low RVP must be replaced. The RVP of high boiling point aromatics in reformate and FCC gasoline are in the 1-2 psi range; their removal therefore displaces low cost butane from gasoline, resulting in lower gasoline supply volumes and higher gasoline production costs. [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

380 Id. at 29401.

3. Many Refiners Do Not Have Spare Reformer Throughput Capacity or the Ability to Increase Reformer Severity for Octane Replacement.

As EPA noted, "[o]ne source for additional octane is via increased reformer severity or throughput to generate additional light aromatics."381 However, many refineries do not have spare reformer throughput capacity or the ability to increase reformer severity. [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

381 Id.

Throughput and severity may be physically limited and/or limited by refinery permits. Increasing either throughput or severity would result increased stationary source emissions; both are typically limited by refinery permits. Physical limitations on existing furnace capacity also limit a refiners' ability to increase the severity of reacting conditions (temperature). [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

Reformer severity may actually have to be reduced at refineries with limited ability to shift aromatics to the distillate pool. Reducing reformer severity will lower their gasoline pool octane, requiring them such refineries to import components that are high octane and low heavy aromatics. It will also cause a reduction in hydrogen production which could have a negative impact on gasoline sulfur. Hydrogen is used in hydroprocessing units dedicated to meeting low sulfur requirements. Reformer hydrogen is often the only source of hydrogen for many refiners [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

Refinery configurations are tailored to match the range of crude oils they process and the demand for products in the markets they serve. For example, light sweet crude refineries typically have little to no spare reforming throughput capacity or the ability to increase reformer severity. [EPA-HQ-OAR-2022-0829-0707, pp. 96-98]

4. Refiners Do Not Have Spare Alkylation Capacity for Octane Replacement and Isomerization Provides Very Little Octane Benefit.

EPA's suggestion that "[a] refinery may also be able to increase high-octane isoparaffin production through additional alkylation and/or isomerization operations" is not a feasible method of octane replacement without significant capital investment. Refinery alkylation units are already highly utilized, with little or no spare capacity available to make additional octane barrels. If an alkylation unit is not operating at its capacity, it is likely maximized to the capacity of upstream fractionation on the FCC unit producing olefin feedstocks. With significant capital investment, the industry could expand FCC capacity to allow increased utilization of alkylation units. However, expanding FCC capacity to increase alkylation rates would also cause an increase in FCC naphtha production. In many instances, FCC naphtha has a higher production yield compared to C3-C5 olefin production, so any increases in low aromatic alkylation feedstocks would be accompanied and overshadowed by increased volumes of high aromatic FCC naphtha blendstocks, which may ultimately raise the overall aromatic content of the gasoline blending pool. Additionally, these projects would likewise result in their own stationary source emission increases. [EPA-HQ-OAR-2022-0829-0707, pp. 98-99]

Light straight run (LSR) isomerization provides very little octane benefit relative to reforming of heavy naphtha. Isomerization also increases the RVP of the stream, backing low cost, high octane butane out of the gasoline pool. [EPA-HQ-OAR-2022-0829-0707, pp. 98-99]

5. Cost and Impacts on Refining Will Vary Greatly for Individual Refineries and Are Not Accurately Reflected by EPA's Simplified Application of the Haverly LP Refining Model.

EPA requested comment on their use of the Haverly linear programming (LP) refinery model to estimate cost and impacts on refining. While LP models such as Haverly or PIMS could provide directional guidance on likely impacts in a typical refinery, these models are highly complex and should be run and interpreted by experienced refining engineers using data from actual operations and laboratory testing to ensure the modeled gasoline streams have sufficiently extensive definition to correctly balance and optimize to meet finished product specifications. Furthermore, likely impacts to a "typical" refinery may not sufficiently predict impacts to the actual U.S. refining industry. [EPA-HQ-OAR-2022-0829-0707, pp. 98-99]

For example, to simulate the effects of removing high boiling point components from the gasoline pool, EPA "used the Haverly LP refinery model to reduce the average T90 of U.S. gasoline by 15°F in 5°F steps."382 However, it cannot be assumed that the entire industry would make a similar shift. Distillation properties of gasoline vary by refinery. For example, refineries making California grade gasoline are likely making lower end point reformate and may not have to change anything (other than possibly building a splitter to cut the tail off of their zero aromatics alkylate). Refineries with large jet fuel markets are likely operating with lower heavy naphtha (and therefore reformate); jet fuel has a lower flash specification than diesel and allows them to operate as such. Refineries with some combination of no jet market, running light sweet crude, filling a large FCC with purchased vacuum gas oil (VGO) and/or selling low boiling point components like LSR will have a gasoline pool with higher endpoint and T90. A refinery with a configuration producing higher baseline endpoint gasoline would be making a larger cutpoint change. The cost is likely not linear with the number of degrees that the cutpoint is changed. [EPA-HQ-OAR-2022-0829-0707, pp. 98-99]

382 Id. at 29403.

EPA's cost estimates need to consider different refinery configurations and costs related to production and logistics, including the potential need for capital expenditures. The cost impact will be different for every refinery depending on its required cutpoint change, its product markets, and its location (relative to the alternate disposition for displaced butane and additional diesel to be marketed and to the supply of gasoline to replace lost volume). Any notable swing in the formulation of gasoline will likely require significant capital investments to produce the new fuel specification and for logistics to move excess barrels to their new disposition and to replace the supply of displaced gasoline barrels. [EPA-HQ-OAR-2022-0829-0707, pp. 98-99]

E. Comments on the Structure of the Standard will Depend on the Stringency of any Standard that May be Proposed in the Future; Advance Notice and Engagement with the Refining Industry is Essential Ahead of Rulemaking.

We appreciate that EPA "understand[s] that it may be difficult to comment on the various structures for a standard without having some idea of what the stringency of the standard might be."383 Given this limitation, and our view that high boiling point is not an appropriate surrogate for heavy aromatics in gasoline to begin with, we have provided limited general comments in this area at this time. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

383 Id.

Before proposing a rule, EPA should provide the refining industry with a specific limit or narrow range of potential limits and enough time to fully evaluate the feasibility of such a standard given unique refinery configurations, supply constraints, and demand balances across the nation. Refiners will need enough time to determine if the proposed limits are feasible, and if so, time to identify what capital investments and/or operational changes would be needed. The implementation timeline included in any proposed rule should reflect the time industry would need to implement such changes, including time for any required federal and regional permitting, project construction, etc. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

EPA has presented many options for consideration, including a "per-gallon cap, a national annual average standard implemented along with an averaging, banking, and trading program (ABT), a facility maximum annual average standard, or some combination of these."384 [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

384 Id. at 29402.

1. If EPA Proceeds With a Rulemaking, a Company-Wide Annual Average Standard Would Likely be the Best Approach, Depending on the Stringency of the Standard.

Although we agree with EPA's statements about the regulatory burdens associated with managing a company-wide annual average standard385, we would prefer to manage these regulatory burdens over the burdens associated with producing a fuel that must meet a per-gallon standard or a facility maximum annual average standard. A company-wide average standard would allow some degree of flexibility for refiners to respond to issues with gasoline production, reduce supply disruptions, and minimize costs to consumers. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

385 Id.

Depending on what limit may be proposed, an ABT system may be necessary for certain sites or companies to maintain compliance. While not preferred, providing banking flexibility is better than causing supply disruptions and increasing costs to consumers. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

A thorough review of potential implications of a company-wide annual average standard is needed before proposing such a standard, and will depend on the stringency of the standard proposed. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

2. Per-Gallon Caps and Facility Maximum Annual Average Standards are Untenably Inflexible and May Lead to Increased Emissions from Transportation of Components Between Refineries Among Other Issues.

We strongly agree with the downsides of a per-gallon cap identified by EPA.386 A per-gallon standard is simply not feasible if refiners are to have flexibility to respond to gasoline production issues and to reduce supply disruptions and prices at the pump. A per-gallon standard would have additional downsides beyond those already identified by EPA, and we have similar concerns with a facility maximum annual average standard. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

386 Id.

Such a standard may lead to an increase in emissions associated with the transportation of components between refineries that are needed for an individual refinery to comply. For example, refineries without an FCC generally do not produce alkylate and rely heavily on reformer aromatics for octane replacement. Such refineries may have to ship light naphtha and reformate to a third party and backhaul low aromatics alkylate. Shipping barrels around to meet per-gallon standards, or even to meet annual facility-specific average targets, is inefficient and may result in increased emissions associated with the transportation of said intermediates. In addition, compliance may not be possible during necessary refinery turnarounds/planned maintenance events or during unplanned unit shutdowns. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

If EPA has health risk concerns for particular areas of the country, they should only target those areas, and not penalize areas with low PM emissions. Regional variables such as altitude, humidity, and air temperature have considerable impacts on engine performance and tailpipe emissions. EPA should consider regional limits for geographies with PM NAAQS non-attainment issues rather than requiring all refineries across the nation to comply with a facility maximum annual average or per-gallon limits. For example, this may be similar to local/regional reformulated gasoline (RFG) requirements. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

A thorough review of potential implications of a per-gallon standard or a facility maximum annual average standard is needed before proposing such a standard, and will depend on the stringency of the standard proposed. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

3. Seasonal Limits May or May Not Be Appropriate Depending on the Stringency of Any Standard if Proposed.

Gasoline produced and introduced into the market between May 1 and September 15 must meet summer RVP standards defined in Title 40 of the Code of Federal Regulations (40 C.F.R.)

Part 1090 – Regulation of Fuels, Fuel Additives, and Regulated Blendstocks. These standards require RVP suppression during summer months due to elevated ambient temperatures. Refiners typically achieve these more stringent summer standards by reducing the volume of lighter blendstocks in the blend pool such as butanes and pentanes, while also increasing the use of heavier endpoint blendstocks. Many refineries may not have the ability to purchase isomerate (as noted in EPA's Haverly study) due to logistical constraints and may not have the ability to increase reformer severity or produce more alkylate. Individual refineries may be further constrained by the lack of disposition of high RVP blendstocks which need to be removed from summer blends. The geography and interconnectivity of a given refinery to other customers or sources of blendstocks or LPG caverns will determine their flexibility to meet these standards. Additionally, introducing season average limits could reduce flexibility during maintenance outages, which will result in lower production and/or higher market prices. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

A thorough review of potential implications of a seasonal standard is needed before proposing such a standard, and will depend on the stringency of the standard proposed. [EPA-HQ-OAR-2022-0829-0707, pp. 99-102]

F. Test Methods.

Although we do not believe high boiling point is an appropriate surrogate for heavy aromatics in gasoline, we offer the following comments on test methods EPA presented as possible candidates for demonstrating compliance with a high boiling point limit. If EPA moves forward with a limit on distillation as a surrogate for heavy aromatics, EPA should propose ASTM D86 – Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure, the current industry standard, as the default test method. However, we also provide comments regarding test methods for direct measurement of heavy aromatics, which we think would be a more appropriate than distillation, as described previously. ASTM D8071 - Standard Test Method for Determination of Hydrocarbon Group Types and Select Hydrocarbon and Oxygenate Compounds in Automotive Spark- Ignition Engine Fuel Using Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy Detection (GC-VUV) would be an appropriate test method to propose for refiners to demonstrate compliance with such standards if proposed in the future. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

1. ASTM D86 is the Industry Standard for Distillation Evaluation and is the Best Test Method if EPA Proposes a Limit on High Boiling Point as a Surrogate for Heavy Aromatics in Gasoline.

ASTM D86 is the industry standard for distillation evaluation for distillate and lighter streams. It is the only distillation test method referenced in 40 C.F.R. Part 1090 – Regulation of Fuels, Fuel Additives, and Regulated Blendstocks. It is also one of only two methods approved by ASTM D4814 – Standard Specification for Automotive Spark-Ignition Engine Fuel. The only other distillation test method approved for use by ASTM D4814 is ASTM D7345 – Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure (Micro Distillation Method). ASTM D86 is the referee of the two methods approved under ASTM D4814. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

ASTM D86 is efficient (refineries already have the equipment), more accurate than simulated distillation estimates, and provides more precise results (lower published reproducibility) compared to other methods. ASTM D86 T90 is preferred over T95 or final boiling point (FBP) because there is more established data for T90, which was previously reported to EPA under 40 C.F.R. Part 80 – Regulation of Fuels and Fuel Additives, and because distillation curves have lower published reproducibility and repeatability at T90 than at T95 or FBP. As EPA noted, the ASTM D86 distillation parameter with the best correlation to the PM Index (PMI) parameter is T90387; as such, if a distillation limit is proposed, it should be based on T90 by ASTM D86. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

387 Id.

2. The Downsides of ASTM D7096 Outweigh the Potential Benefits.

EPA identified ASTM D7096, a simulated distillation (SimDis) method, as "[t]he most promising alternative" test method.388 However, the downsides of employing ASTM D7096 for measuring simulated distillation outweigh the potential benefits identified by EPA. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

388 Id.

ASTM D7096 is not currently referenced or approved by 40 C.F.R. Part 1090 – Regulation of Fuels, Fuel Additives, and Regulated Blendstocks. It is also not approved by ASTM D4814 – Standard Specification for Automotive Spark- Ignition Engine Fuel for gasoline certification. There are no established correlation equations between ASTM D86 and ASTM D7096. If EPA were to require ASTM D7096 testing, all gasoline certified in the U.S. would need to be tested redundantly by both ASTM D86 and ASTM D7096 for distillation. Gasoline meeting the ASTM D4814 Final Boiling Point maximum standard of 437°F using ASTM D86 could produce a value above 437°F if tested using D7096. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

Labs certifying gasoline intended for U.S. consumption may not have trained personnel or equipment to perform D7096. D7096 is a gas chromatography (GC) method which requires significant capital and expensive standards to operate. Third party laboratories generally charge approximately three times more for ASTM D7096 testing than for ASTM D86 testing. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

Flaws with ASTM D7096 distillation prediction cause the method to be less accurate towards the end of the boiling range because it tends to estimate a longer distillation tail which can manifest more significantly for heavier gasolines. This is because D7096 estimates distillation based on molecular composition. Estimates are not always accurate due to abnormalities and non-linearities when mixing compounds. A similar phenomenon can be seen with RVP. When pure ethanol (RVP = 2 psi) is mixed with summer gasoline (RVP = 9 psi) in a 10:90 ratio (i.e., E10 gasoline), the expected result would be to have a mixture under 9 psi RVP based on the blending components. However, the RVP of the mixture is actually higher than the individual sources, resulting in a mixture of approximately 10 psi RVP. Similarly, ASTM D7096 expects a mixture to have a higher FBP based on the presence of high end point molecules, but in practice, the mixture physically boils away at a temperature lower than the predicted ASTM D7096 value. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

Flaws with ASTM D7096 distillation prediction cause the method to have lower precision when compared to ASTM D86. For comparison, ASTM D7096-19 has a published FBP reproducibility of 18.5°F, while ASTM D86-23 has a published FBP reproducibility of 7.1°F.

ASTM D86 results will have 2.5 times higher precision than ASTM D7096 results when tested and compared to a quality control sample with an established Accepted Reference Value (ARV). [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

3. ASTM D8071 is the Best Test Method if EPA Proposes a Limit Directly on Heavy Aromatics (i.e., C10+ Aromatics) in Gasoline.

ASTM D8071 - Standard Test Method for Determination of Hydrocarbon Group Types and Select Hydrocarbon and Oxygenate Compounds in Automotive Spark-Ignition Engine Fuel Using Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy Detection (GC-VUV) would be an appropriate test method to propose for refiners to demonstrate compliance with heavy aromatic standards. Any aromatic standards should be limited to heavy aromatics (i.e., polycyclic C10+ aromatics such as naphthalenes). [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

Vacuum Ultra-Violet (VUV) methods such as ASTM D8071 are preferred over traditional gas chromatography (GC) methods, such as D5769 – Standard Test Method for Determination of Benzene, Toluene, and Total Aromatics in Finished Gasolines by Gas Chromatography/Mass Spectrometry. VUV solves a known drawback of traditional GC technology with the coelution of molecules at the same retention time resulting in chromatograph peaks which cannot be properly separated or integrated. VUV has the ability to provide deconvolution to coeluting peaks by identifying unique spectral fingerprints through first-order molecular absorption. Traditional GCs would require increased runtime to resolve peak coelution, and even with additional runtime, many peaks still could not be separated based on molecular similarities. VUV resolved coelution through algorithms and run times are much quicker than traditional GCs. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

As such, VUV is superior to GC and to Detailed Hydrocarbon Analysis (DHA) methods such as ASTM D6729 – Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Metre Capillary High Resolution Gas Chromatography and ASTM D6730 – Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100- Metre Capillary (with Precolumn) High-Resolution Gas Chromatography. [EPA-HQ-OAR-2022-0829-0707, pp. 102-104]

G. Additional Considerations

1. EPA Should Consider Impacts to Gasoline Benzene and Sulfur.

Displacing aromatics from gasoline shrinks the gasoline pool, thereby concentrating benzene and possibly sulfur. This could result trigger a need for additional benzene and sulfur removal, which would further raise costs for the consumer, and may result in other emissions impacts. [EPA-HQ-OAR-2022-0829-0707, pp. 104-105]

Also, aromatics production is desirable as its production in reformer units results in production of an essential source of hydrogen that is then used in hydroprocessing units to help refiners meet low sulfur limits. To meet a new aromatics limit, some refineries may have to decrease reformer severity, resulting in decreased hydrogen production and related impacts to gasoline sulfur. [EPA-HQ-OAR-2022-0829-0707, pp. 104-105]

2. Historical Decreases in Gasoline-to-Distillate Ratio were Not Related to the Tier 2 Sulfur Program.

We agree that "[a] common thread across the market shifts in T90 has been a decreasing gasoline-to-distillate ratio (GDR) in the product slates produced by refineries" and that this shift was largely attributable to "the influx of ethanol into gasoline."389 However, we disagree that lower T90 values can also be attributed to the Tier 2 program.390 As a whole, the refining industry built Gasoline Desulfurization Units (GDUs) to respond to Tier 2 sulfur limits; the T90 shifts seen in this time period were more related to market pricing impacts. [EPA-HQ-OAR-2022-0829-0707, pp. 104-105]

389 Id. at 29400.

390 Id.

3. Scope and Applicability of a Potential Future Rulemaking.

If EPA proposes a rule that aims to decrease heavy aromatics in the gasoline pool, EPA should clarify the scope of the rule and how it interacts with various state programs and for imports. For example, EPA should clarify if CARB gasoline will be granted the same exemption criteria it is offered today under § 1090.625. Regarding imports, there may be special considerations for import by truck similar to those in § 1090.1610. [EPA-HQ-OAR-2022-0829-0707, pp. 104-105]

Organization: Wisconsin Department of Natural Resources

7. Updating fuel property standards. EPA is requesting comment on if it should, in a separate rule, update fuel property standards to reduce PM tailpipe emissions from legacy light and medium-duty vehicles. Since updated fuel standards would ensure additional PM emissions reductions occur in the near term, which would both protect public health and help states attain and maintain any upcoming revisions to the PM NAAQS, the WDNR recommends that EPA pursue such a rulemaking. [EPA-HQ-OAR-2022-0829-0507, p. 3]

EPA Summary and Response

Summary:

Commenters representing petroleum suppliers and refiners generally opposed new standards aimed at limiting heavy aromatics or other high-boiling components of gasoline. They suggested that EPA overestimates the amount of heavy aromatics currently in gasoline, noting that it has declined over time. They also suggest that EPA overstates the benefits of reducing gasoline heavy aromatics, and underestimates the cost and other negative impacts on refining. They raise concerns about the suitability of ASTM D7096 SimDis test method as a compliance parameter, and question whether EPA has the statutory authority to put in place market fuel standards aimed at a pollutant (PM) that will be greatly reduced under the proposed vehicle emission standards.

Commenters representing ethanol producers and related companies support a limit on heavy aromatics, and suggest that the limit should apply to the petroleum blendstocks prior to ethanol blending so that higher-ethanol blends will result in further reductions via dilution. They also advocated for a high-octane/low-carbon fuel standard to reduce both PM and GHGs.

Commenters from the auto industry support a limit on heavy aromatics and/or other high boiling gasoline components, suggesting this will reduce emissions from existing vehicles regardless of future vehicle standards. An industry trade group cited an emission study recently published by EPA and several partners showing the impacts of heavy aromatics reductions on emissions from a range of recent model-year vehicles. They also advocated for other fuel improvements including a lower sulfur cap (currently 80ppm) and reduction of fuel components that act as precursors for air toxics. Another commenter voiced support for surrogate compliance methods (such as ASTM D7096 SimDis) if they can provide equivalent performance to a heavy aromatics or PM Index standard.

Response:

We are not finalizing fuel standards at this time. We thank the commenters for their statements and will continue to assess options for limiting the heavy aromatic content of gasoline.